Essays About Corporate Governance, Strategy, and Performance:

Critical Perspectives on Employee Oversight and Organizational Decisions

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1 Introduction

1.1 Motivation

In recent years, the perception of corporate purpose has changed: The traditional view that "the social responsibility of business is to increase its profits" (Friedman, 1970, p. 17) is increasingly questioned and characterized as "fundamentally wrong" (Mayer, 2018, p. 37). Contrary to what, for example, agency theory suggests, many firms pursue environmental, social, and governmental (ESG) goals that exceed regulatory requirements and are not primarily intended to increase shareholder value (Boffo, Marshall, and Patalano, 2020; Boffo and Patalano, 2020; Eulerich, Bonrath, and Lopez Kasper, 2022). This trend is reinforced by institutional investors who pressure firms to give greater consideration to ESG topics (BlackRock, 2018; State Street, 2022; Vanguard, 2021). As a consequence, the CEOs of firms such as Walmart, Amazon, and Apple commit to managing their companies for the benefit of all stakeholders (Business Roundtable, 2019).

The debate on corporate purpose is closely related to the question of how to define good corporate governance. Huse (2007) notes that the definitions of corporate governance reflect the background of those using them and differentiates between four perspectives:

- The **managerial definition** reflects the perspective of managers. Firms are governed to create value for management, while other actors—especially board members—are considered instruments for management rather than control mechanisms. Accordingly, managerial hegemony is often characterized by excessive management compensation, empire building, hostile takeovers, and anti-takeover measures (Huse, 2007; Lund and Pollman, 2021; Mace, 1971).
- Due to the conflicting interests of managers and shareholders, the **shareholder supremacy definition** and principal agent theory became dominant (Fama, 1980; Fama and Jensen, 1983; Jensen, 1983; Jensen and Meckling, 1976). Contrary to the managerial definition, it reflects the perspective of shareholders and emphasizes the firm's role in creating and protecting shareholder value (Huse, 2007; Lund and Pollman, 2021).

- The **stakeholder definition** is an extension of the shareholder supremacy definition, because it suggests that the interests of other stakeholders should also be considered (Freeman, 1984). This perspective does not specify for whom the firm should create value, but it requires the firm to balance the interests of the various stakeholders (e.g., through stakeholder representatives on boards). However, the identification of relevant stakeholders and the extent of consideration have been intensively discussed in prior literature (Huse, 2007; Lund and Pollman, 2021).
- Unlike the other perspectives, the **firm definition** is less about value distribution to specific actors but rather about what is best for the firm. From this perspective, firms consider all actors impartially, balance their interests, and attempt to facilitate cooperation among each other (Huse, 2007).

Huse (2007) argues that corporate governance reflects interactions between various actors inside and outside the firm, all having different perspectives on corporate governance resulting in different expectations regarding value distribution. These actors include board members, shareholders, and stakeholders.[1] As the influence of each actor varies among firms, perceptions of good corporate governance and hence expectations regarding value distribution vary as well. This influence-based variation has been explored extensively in the literature on ownership structures. Specifically, different owner types (e.g., family members, institutional investors, or managers) have been found to prioritize different values, while high percentages of holdings facilitate enforcement of these values (Cheng, Wang, and Wang, 2022; Gedajlovic et al., 2012; McNulty and Nordberg, 2016). For example, an increasing number of investors favor sustainable investments, resulting in a growth in the number and size of ESG funds (Curtis, Fisch, and Robertson, 2021; Lund and Pollman, 2021). Consistent with their perception of good corporate governance, ESG funds use their influence through holdings to lobby for sustainability, which in turn likely contributes to the described abandonment of Friedman's (1970) doctrine (Curtis, Fisch, and Robertson, 2021).

[1] Huse (2007) distinguishes between three groups of actors: internal actors (i.e., those who make and take decisions), external actors (i.e., those who seek to influence and control decisions), and board members. However, he notes that it is not always possible to differentiate between these groups. More important than a clear differentiation is realizing that there are different groups of actors with different perceptions of good corporate governance. For the purpose of this dissertation, I distinguish between board members, shareholders, and stakeholders.

1.2 Objective

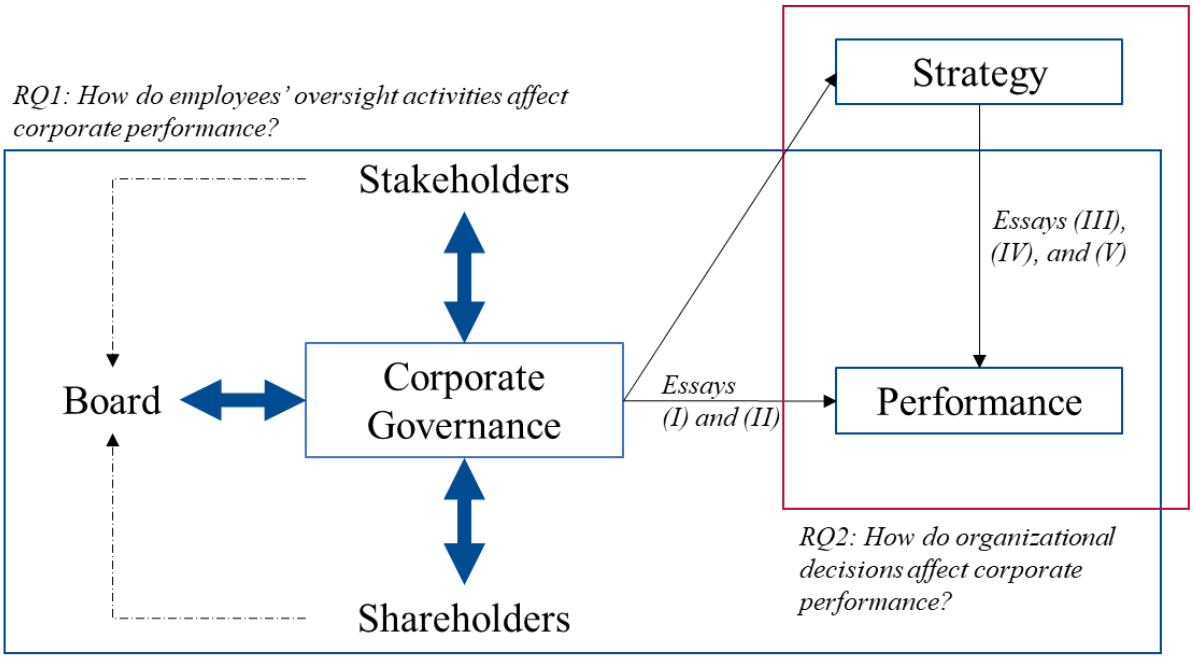
The focus of this dissertation is to analyze the association between corporate governance, strategy, and performance.[2] Specifically, two research questions are investigated in the context of five essays:

RQ_1: How do employees' oversight activities affect corporate performance?

RQ_2: How do organizational decisions affect corporate performance?

RQ_1 explores the effect of employees' influence on performance. Based on Huse's (2007) definition of corporate governance, the influence of employees as a specific group of stakeholders is expected to affect the perceptions of good corporate governance and expectations regarding value distribution within the firm, which should ultimately affect several dimensions of performance. RQ_2 explores a selection of organizational decisions and their effect on performance. The connection between both research questions and the essays is shown in Figure 1.1.

Figure 1.1: Connection between the Research Questions and Essays



This figure illustrates the connection between the research questions and essays.

[2] Note that this dissertation is based on a broad understanding of the terms strategy and performance. Strategy refers to a variety of measures that firms may take (e.g., investing in internal auditing, competitive strategies, or diversification), while performance refers to both financial outcomes (e.g., market valuation or profitability) and nonfinancial outcomes (e.g., tax avoidance or financial reporting quality) of these measures.

Shareholders typically have a high influence within the firm, because they elect the board members. However, several countries, such as Germany, empower employees to elect a certain number or proportion of board members. This institutional setting of board-level employee representation (often referred to as codetermination) increases the influence of employees and enables analyses of how the influence of a specific group of stakeholders affects performance. With respect to RQ_1, essays (I) and (II) analyze the effect of codetermination on market valuation, profitability, earnings management, and tax avoidance. Both essays contribute to the literature by demonstrating how the influence of a specific group of actors affects different dimensions of performance. Additionally, the essays inform policy-makers in the U.S. about the potential consequences of recent proposals giving employees the right to elect a specific proportion of board members.[3]

As firms take measures to meet expectations regarding performance and value distribution, this dissertation also analyzes the effects of organizational decisions such as investment in internal auditing, competitive strategies, and industrial diversification. The benefits of these decisions are ambiguous for different reasons. Although several regulators require firms to establish an internal audit function (e.g., NYSE Section 303A.07(c)), there is little evidence on how much to invest in internal auditing. As data on investment in internal auditing is not publicly available and neither regulators nor professional associations require a specific amount of investment, practitioners often rely on benchmarking studies (Carcello, Hermanson, and Raghuandan, 2005). Essay (III) analyzes whether this benchmark is beneficial and examines to what extent organizations obtain benefits from deviating from the benchmark.

In contrast, the effects of competitive strategies on performance and the market valuation of diversified firms have been subject to extensive research (e.g., Spanos, Zaralis, and Lioukas, 2004; Glaser and Müller, 2010). However, most strategic frameworks were published more than 40 years ago, raising the question of whether they are still applicable. Given the mixed findings on the strategy-performance relationship in the more recent literature (e.g., Abernethy, Kuang, and Quin, 2019), essay (IV) provides insights into the existence, development, and performance effects of competitive strategies. Finally, essay (V) analyzes the market valuation of conglomerates. Specifically, it examines how research design choices affect estimates on the valuation difference between diversified and focused firms.

[3] In the U.S., Elizabeth Warren and Bernie Sanders proposed giving employees the right to elect 40% to 45% of the board members (Sanders, 2020; Warren, 2018). Both senators refer to the existing approach of codetermination in Germany and raise controversy about the extent to which employees should participate in a firm's decision-making process (e.g., Fox, 2018; Stein, 2019; Vogel, 2019).

This dissertation proceeds as follows. Chapters 2, 3, 4, 5, and 6 each contain one of the studies summarized below. Chapters 2 and 3 examine the influence of employees' oversight activities on corporate performance (RQ_1). Chapters 4, 5, and 6 analyze how organizational decisions affect corporate performance (RQ_2). Finally, Chapter 7 concludes this dissertation.

1.3 Summary of Essays

Chapter 2 "Does Codetermination Reduce Shareholder Value? Board-level employee representation, firms' market value, performance, and rent seeking behavior"[4]

This study analyzes the effect of board-level codetermination on shareholder value using a unique dataset of listed German firms that considers heterogeneous aspects of codetermination to overcome otherwise common identification issues. The results suggest that codetermination reduces firms' market value but does not have a corresponding negative effect on operating performance. Employees of codetermined firms are able to positively affect wages and employee count while negatively affecting dividends paid to shareholders, thus providing some justification for the observed decrease in market value. The findings highlight how the heterogeneity of firms' governance structures can result in tradeoffs in economic outcomes and should be of interest to policy-makers concerned about the economic consequences of codetermination.

Chapter 3 "Codetermination and Aggressive Reporting: Audit Committee Employee Representation, Tax Aggressiveness, and Earnings Management"[5]

This study uses a unique dataset from listed German firms that helps identify a granular measure of board-level codetermination to examine whether board-level codetermination reduces aggressive financial and tax reporting. The results suggest that codetermination reduces tax aggressiveness and earnings management, while highlighting the mechanisms through which employees can monitor and influence firms' decisions and outcomes. Specifically, employee representation on audit committees is the most consistent mechanism associated with reduced tax aggressiveness and earnings management. This study contributes to prior and current

[4] This study is a joint work with Professor Marc Eulerich and Professor Andrew Imdieke.
[5] This study is a joint work with Professor James A. Chyz, Professor Marc Eulerich, and Professor Miles A. Romney. It was published in 2023 in the Journal of International Accounting, Auditing and Taxation (volume 51, 100543): https://doi.org/10.1016/j.intaccaudtax.2023.100543.

discussions of stronger employee rights and influences on management decisions from a board-level perspective.

Chapter 4 "Dissecting Investment in Internal Audit: Assurance Service Substitution and the Value in Value Add"[6]

This study investigates organizational benefits obtained from investing in internal audit activities beyond benchmark expectations. Practitioners frequently rely on benchmarking studies to determine whether their internal audit resources are sufficient, but there is no prior evidence on how deviations from the benchmark (specifically, overinvesting relative to expectations) affect organizational value. The results suggest that overinvestment in internal auditing is associated with greater assurance service substitution, greater audit risk coverage, and a higher degree of external audit reliance on internal audit work products. Exploratory analyses also quantify internal audit value-added beyond assurance service substitution.

Chapter 5 "Analyzing the strategy-performance relationship in Germany–Can we still use the common strategic frameworks?"[7]

This study examines the strategy-performance relationship within publicly traded German firms. The strategic management literature provides several strategic frameworks that offer guidance on promising strategies. However, given major changes, such as globalization, managers wonder whether strategic frameworks are still applicable. The results provide evidence for the existence of efficiency-based strategies, differentiation-based strategies, and mixed strategies, but only differentiation-based strategies are positively related to performance.

Chapter 6 "To diversify or not to diversify? – Questioning the Diversification Discount in Germany"[8]

The decision to realign a firm through industrial diversification is highly relevant not only for the board but also for shareholders and stakeholders and is typically assessed with regard to its

[6] This study is a joint work with Professor Christopher Calvin and Professor Marc Eulerich.
[7] This study is a joint work with Professor Marc Eulerich and Dr. Anna Eulerich. It was published in 2023 in the Journal of Strategy and Management (volume 16, issue 3, pages 516-532): https://doi.org/10.1108/JSMA-09-2022-0157.
[8] This study is a joint work with Professor Marc Eulerich. It is forthcoming in the Journal of Business Economics: https://doi.org/10.1007/s11573-023-01188-y.

effects on market valuation. Although the fact that conglomerates trade at a discount seems to be common knowledge, the results in prior literature are ambiguous and outdated, especially for the German market. Against this background, this study analyzes how design choices explain the sensitivity of prior results. The results suggest that conglomerates trade at a discount, with the size of the discount affected by, among others, the measures of excess value, the sample selection process, and the use of control variables. However, using a 2SLS approach indicates that the conglomerate discount is not evidence that diversification destroys value but merely reflects the negative relation between the factors that cause firms to diversify and market valuation.

2 Does Codetermination Reduce Shareholder Value?

Board-level employee representation, firms' market value, performance, and rent seeking behavior

Marc Eulerich Benjamin Fligge Andrew Imdieke

Abstract. We analyze the relationship between board-level codetermination and shareholder value. We use a unique dataset of listed German companies that enables us to identify heterogeneous aspects of codetermination and overcome otherwise common identification issues. We find that codetermination reduces firms' market value but does not have a corresponding negative effect on firm performance. However, we find that employees of codetermined firms are able to positively affect employee wages and employee count while negatively affecting dividends paid to shareholders, thus providing some justification for the observed decrease in perceived market value. Our findings highlight how heterogeneity of firms' governance structures can result in tradeoffs in economic outcomes that are a function of the structure's economic characteristics. This study should be of interest for policy makers' understanding of the economic consequences of codetermination.

1. Introduction

In recent years, domestic and foreign economies have increasingly shifted focus from the shareholder model to the stakeholder model of corporate governance. In particular, there has been increased focus on the role of firm employees in corporate governance. In the U.S., Senators Elizabeth Warren and Bernie Sanders proposed giving employees the right to elect 40 to 45 percent of a company's board members. These senators cited the "successful approach in Germany", where typically one-half of a supervisory board consists of employee representatives (Sanders 2020; Warren 2018). Dammann and Eidenmüller (2020) state that Warren and Sanders capture the spirit of the times and refer to a statement signed by 181 CEOs who committed to leading their companies "for the benefit of all stakeholders" (Business Roundtable, 2019). Thus, there has been an increase in recent discussion in the U.S. on the extent to which employees should participate in firms' decision-making processes (Emba, 2018; Fox, 2018; Holmberg, 2019; Stein, 2019; Vogel, 2019).

In this study, we examine the association between codetermination and shareholder value. Despite its potential for significant impact on the corporate governance and performance of affected firms, codetermination (i.e., employee representation on corporate boards) has rarely been analyzed in prior research due to data constraints and empirical identification issues, leading Chyz et al. (2023) to describe codetermination as a "black box". The governance literature (including literature on codetermination) has been discussed as promoting that some organizational structures are unconditionally "good" or "bad" (Armstrong et al., 2010; Brickley and Zimmerman, 2010). For example, opponents of codetermination often argue that the consideration of employees' interests reduces shareholder value due to employees' payroll incentives, risk aversion, and side-contracting with the board (Alchian and Demsetz, 1972; Atanassov and Kim, 2009; Bertrand and Mullainathan, 2003; Cronqvist et al., 2009; Dammann and Eidenmüller, 2020; Fauver and Fuerst, 2006; Gleason et al., 2021; Pagano and Volpin, 2005). Alternatively, advocates of codetermination highlight employees' ability to reduce agency problems and increase transparency (Balsmeier et al., 2013; Fauver and Fuerst, 2006; Petry, 2018). Accordingly, the few studies that examine whether, and how codetermination impacts shareholder value have provided mixed results (Balsmeier et al., 2013; Fauver and Fuerst, 2006; Gorton and Schmid, 2004; Gregorič and Rapp, 2019; Kim et al., 2018; Petry, 2018). Moreover, methodological issues exist that call into question the inferences of these studies. In particular, prior research employs the proportion of employee representatives on the board, which is determined by law and dependent on the overall number of company

employees, as a proxy for codetermination. Thus, it is difficult to separate this measure from the influence of firm size.

One contribution of our study is the use of the codetermination index (CDI) to analyze the effects of heterogenous aspects of codetermination on shareholder value. The CDI was developed with input from experts and practitioners and validated by members of the Hans Böckler Foundation, which is part of the Confederation of German Trade Unions (Scholz and Vitols, 2019).[9] Prior literature assumes that codetermined firms are homogeneous and typically relies on binary variables to measure codetermination which leads to binary conclusions about whether codetermination is good or bad. However, there are several important voluntary aspects of codetermination that vary between codetermined firms. Specifically, we apply the index values from the CDI to firm-years within our study. Aside from identifying whether heterogeneous aspects of codetermination affect shareholder value, the CDI allows us to analyze differences between codetermined firms (aside from the proportion of employee representatives) that have not been studied in prior research.

We analyze a sample of 1,606 firm-years between 2006 and 2017. Our results suggest that a higher CDI (i.e., higher level of codetermination) is associated with lower market value. Specifically, we find that a one standard deviation increase in the CDI reduces market to equity (market to book) by 7.78 percent (6.94 percent). We also analyze the effect of codetermination on operating performance because a firm's valuation should reflect its current performance and investors' expectations of future performance. Based on our findings of a negative effect of codetermination on market value, we expect codetermination to reduce a firm's profitability and growth. However, we do not find evidence that codetermination reduces operating performance.

A negative effect of codetermination on market value without a corresponding negative effect on operating performance might suggest that investors' reaction to codetermination are not justified. However, employees' payroll maximization incentives could result into a shift in the distribution of earnings via salary to employees at the expense of dividends to shareholders. Consistent with our expectations, we find a one standard deviation in the CDI is associated with an increase in salaries to employees of 14.71 percent and number of employees to sales of 20.00 percent. On the contrary, a one standard deviation increase in *CDI* decreases the likelihood of a dividend distribution by 8.73 percent and dividends paid to sales by 48.94 percent. Thus, the

[9] The CDI has also been used in prior international (Chyz et al., 2023; Scholz and Vitols, 2019) and national (Campagna et al., 2020; Eulerich et al., 2022; Scholz, 2017) studies on codetermination.

negative market response to codetermination without a corresponding decrease in operating performance can be at least partially explained by a shift in the distribution of earnings to employees at the expense of shareholders.

Further, we separate the CDI into its individual components to analyze which components most affect performance. We find the strongest results for the number and type of employee representatives, employees serving as vice chair, and the extent of employee representation on board committees. Finally, we analyze whether endogeneity affects our inferences by using an instrumental variable approach and performing a Durbin-Wu Hausman test. We find that our results continue to be robust.

Our results provide a deeper understanding of the association between codetermination and performance. We are among the first to consider heterogeneous differences between codetermined firms and their influence on a firm's market value while also analyzing the mechanisms by which employees' rent seeking behaviors impact shareholder value. In this context, our results confirm expectations in Gleason et al. (2021) that employees constrain reductions in discretionary expenditures and foster inventory production to increase wages and job security. Specifically, we find that higher levels of codetermination are positively related to wages and employee count which can result into more real earnings management but also reduces shareholder value. Furthermore, we provide evidence in response to calls from scholars such as Balsmeier et al. (2013), for more research on the associations among codetermination, firm performance and risk taking. Finally, our results answer the call of Lin et al. (2018) and Overland and Samani (2021) for a better understanding of the effects of a direct employee voice.[10]

The results of this study should be of interest for policy makers concerned about the societal consequences of codetermination. In particular, our results suggest that proposals in the U.S. giving employees the right to elect a high proportion of the board members could reduce market value. At the same time, our results suggest that the presence of a direct employee voice can provide benefits to firm employees in the form of increased salaries and wages.

[10] Specifically, we find results consistent with Lin et al. (2018) of a positive association between *CDI* and firm leverage (untabulated). While Lin et al. (2018) use a binary measure within a regression discontinuity design to show this effect, the precision of the *CDI* allows us to show a heterogeneous and continuous association between codetermination and leverage even within one-third codetermined firms.

2. Institutional background and hypothesis development

2.1 Codetermination

Codetermination has existed in Germany for decades and has evolved via a series of legislative acts between the 1950's and 1970's (e.g. Coal and Steel Codetermination Act of 1951; Works Councils Act of 1952, 1972; Codetermination Act of 1976). Codetermination enables employees to participate in firms' decision-making processes via three channels. First, employees can establish work councils, which provides them access to information and veto rights at the establishment level.[11] Second, German law requires specific proportions of employee representatives on the board, which allow employees to directly influence firm-wide decisions and directly monitor the work of the C-suite. Third, employees from different firms can establish industry-wide operating unions, giving them significant power in collective bargaining and political influence. In line with recent discussions in the U.S. on the extent to which employees should participate in a firm's decision-making processes, we focus on firm-level codetermination, also known as board-level employee representation.

In Germany, boards are separated into the supervisory board and the board of management. The supervisory board appoints and monitors the board of management, which is responsible for managing the firm. Employees of firms with between 500 and 2,000 domestic employees can elect one-third of the supervisory board members (one-third codetermination). For firms with more than 2,000 domestic employees, one-half of the supervisory board is determined by employee elections (parity codetermination).[12] In recent years, the focus of supervisory boards has increasingly shifted from monitoring the board of management to an advisory and counseling role (Tüngler 2000). The German Corporate Governance Code (2019) requires the supervisory board to be "involved in fundamental decisions" (GCGC, Principle 6). Thus, codetermination allows employees to have a direct influence on firm-wide decisions, such as firm leverage, M&A activities and new strategies, etc. (Lin et al., 2018).

[11] "Establishment level" has been used by the Federal Ministry of Labour and Social Affairs to describe forms of codetermination that are actually limited to certain establishments/plants/locations (https://www.bmas.de/SharedDocs/Downloads/EN/PDF-Publikationen/a741e-co-determination.pdf?__blob=publicationFile&v=1). While supervisory board representation refers to firm-level codetermination as it allows employees to influence decisions that affect the whole firm, works councilors on establishment-level could only influence decisions that affect the establishment where they are voted.

[12] There are also exceptions from the size thresholds based on the firm's legal form, the date of incorporation, or industry membership. However, a review of our sample firms suggests that none of them are affected by these exceptions.

Supervisory board members can be divided into shareholder representatives, who are elected at the general shareholders meeting, and employee representatives, who are elected by employees. Nevertheless, employee representatives are not homogenous. For instance, firms subject to parity codetermination are required to elect a certain number of union representatives (external employee representatives), who are not employees of the firm and represent the interests of employees in the whole industry. These union representatives can be members of large labor unions, who, due to their unique access to industry-specific resources, are more likely to influence management than union representatives from small labor unions (Chyz et al., 2023). Moreover, internal employee representatives can be ordinary workers, work councilors or managerial employees. Scholz and Vitols (2019) state that work councilors on the board are associated with strong codetermination since they are closely linked to employee representatives at the establishment level and thus increase the strategic capacity of employee representatives on the board.

2.2 Prior research on codetermination

A number of studies have identified an effect of codetermination on firm-wide decisions. This research suggests that codetermination increases leverage (Lin et al., 2018), corporate social responsibility efforts (Scholz and Vitols, 2019), and the number of patents (Kraft et al., 2011) while reducing M&A activities (Gorton and Schmid, 2004) and financial reporting aggressiveness (Chyz et al., 2023; Overland and Samani, 2021), and influencing boards' compensation targets (Gorton and Schmid, 2004). However, studies on codetermination have been frequently criticized for several reasons.

Perhaps the largest criticism of prior research on codetermination is based on the crudeness of proxies for codetermination. Specifically, prior research often measures codetermination based on the proportion of employee representatives resulting mainly in measures that are binary indicators.[13] Because the proportion of employee representatives is determined by law and is dependent on the number of employees, these studies are faced with the problem of separating the influence of codetermination from the influence of firm size.[14] Further, this measure assumes that codetermined firms with the same proportion of employee representatives are

[13] Research on the effect of employee representation typically focuses on labor union presence and labor unionization rates (e.g., Hilary, 2006; McNabb and Whitfield, 1997). However, it is not clear whether the effects stem from union member monitoring or preferences (i.e., a direct effect) or whether they are a result of managers' responses to the threat of union rent seeking (i.e., an indirect effect). The German setting allows us to assess the direct effect of employee representation through supervisory board membership (Chyz et al., 2023).

[14] This methodological issue also applies to research on board-level union representation in Germany as only firms subject to one-half codetermination are required to elect a certain proportion of unionists.

homogeneous. To circumvent these issues, researchers recently started analyzing other, heterogeneous aspects of codetermination. For example, Scholz and Vitols (2019) demonstrate the mechanisms through which employee representatives on the board can influence firm-wide decisions, thus developing the codetermination index (CDI). Their results suggest that codetermination is positively related to substantive corporate social responsibility policies such as the adoption of targets for reducing pollution.

In contrast to requirements for the proportion of employee representatives on the board, the distribution of employees across board committees is not regulated. Thus, board committee membership captures the extent of codetermination by analyzing the engagement of employee representatives. Focusing on the voluntary aspects of codetermination such as employee engagement or the types of employee representatives enables researchers to both overcome methodological issues and measure codetermination more precisely. In this study, we leverage the CDI to more precisely measure variation in the effect of codetermination on market value and firm performance.

2.3 Hypothesis development

Prior studies examining the effect of codetermination on market value and performance provide mixed evidence. We provide an overview of this literature in Figure 2.1. Kim et al. (2018) and Fauver and Fuerst (2006) find that codetermined firms perform no worse or better than other firms. However, Gorton and Schmid (2004) and Petry (2018) show that codetermination has a negative effect on market valuation. Balsmeier et al. (2013) use power indices to measure the influence of employee representatives on the board relative to the influence of block holders. Their results suggest that codetermination and market value have an inverted U-shaped relationship. Moreover, Gregorič and Rapp (2019) find that codetermined firms have either higher or similar stock returns during crisis periods, while Kim et al. (2018) state that codetermination increases the negative impact of shocks on valuation.

Figure 2.1: Prior Literature on Codetermination and Performance

Article	Identification of Codetermination	Sample	Findings
Gurdon and Rai (1990)	Comparisons of firms affected by the Codetermination Act of 1976 and unaffected firms	63 German firms in 1970, 1975, 1980, and 1985	While firms affected by the Codetermination Act of 1976 show a decrease in productivity, profitability increases during the sample period.
FitzRoy and Kraft (1993)	Binary measure indicating whether a firm is subject to one-half codetermination before and after the introduction of the Codetermination Act of 1976	112 German firms in 1975 and 1983	Changes from one-third to one-half codetermination are negatively related to profitability. Compared to unaffected firms, affected firms show a higher value add and similar return on equity prior to the introduction of the Codetermination Act of 1976, while they had a similar value add and lower return on equity after they were forced to have one-half codetermination.
Gorton and Schmid (2004)	Binary measure indicating whether the firm is subject to one-half codetermination	186 German firms between 1989 and 1993	One-half codetermined firms have a 31% lower market-to-book ratio by and 26% lower Tobin's Q compared to firms subject to one-third codetermination.
Fauver and Fuerst (2006)	Binary measure indicating whether the firm is subject to one-third or one-half codetermination	786 German firms in 2003	Codetermination has no general effect on Tobin's Q, but a significantly positive effect in high-coordination industries. Additional analyses on the inclusion of unionists on the board and the percentage of employee representatives also reveal no significant effect of codetermination on Tobin's Q. However, there is some evidence for an inverted U-shaped relationship between codetermination and market value in high-coordination industries.
Renaud (2007)	Changes from one-third to parity codetermination around the introduction of the Codetermination Act of 1976	249 to 252 German firms between 1970 and 2000.	Changes from one-third to one-half codetermination have increased both productivity and profitability. While the productivity affect does not change over time, the profitability effect even seems to increase.

Article	Identification of Codetermination	Sample	Findings
Balsmeier, Bermig, and Dilger (2013)	Power index of the relative influence of employee representatives and unionists	222 German firms between 1998 and 2007	While codetermination has a linear and positive effect on ROA, there is an inverted U-shaped relationship between codetermination and market value (i.e., Tobins' Q and market-to-book ratio). Additional analyses indicate that the downward-pointing right side of the inverted U-shaped relationship might be driven by the influence of unionists.
Lin, Schmid, and Xuan (2018)	Binary measure indicating whether the firm is subject to one-half codetermination	57 German firms between 2005 and 2013	Firms with one-half codetermination have more stable cash flows and returns on assets compared to firms with one-third codetermination
Petry (2018)	Changes from one-third to parity codetermination around the introduction of the Codetermination Act of 1976	476 German firms between 1975 and 1978	News about the Codetermination Act of 1976 cause a decline in market value of firms that are certain affected by the law of up to 1.5% relative to unaffected firms. There was no effect on firms close to the regulatory threshold.
Kim, Maug, and Schneider (2018)	Binary measure indicating whether the firm is subject to one-half codetermination	184 German firms between 2004 and 2006	Firms with one-half codetermination do not have a significant different market value or profitability compared to firms with one-third codetermination. However, codetermination more than doubles the negative impact of shocks on both measures. Firms with one-half codetermination have a 3.6% lower ROA and a 9.2% lower Tobin's Q compared to firms with one-third codetermination that are affected by a shock.

These mixed results reflect the countervailing arguments of opponents of and advocates for codetermination. Opponents of codetermination state that codetermination reduces shareholder value. Otherwise, firms would have voluntarily introduced codetermination without having to be forced by law to do so (Jensen and Meckling, 1979).[15] Additionally, employee representatives are likely focused on maximizing a different utility function than shareholders, resulting in voting behavior that may not serve the shareholders' best interests (Gleason et al., 2021; Gorton and Schmid, 2004). Employees are unlikely to vote for risky decisions as they are primarily concerned with whether the company generates enough cash flow to cover their wages and prioritize firm stability over firm value (Chyz et al., 2013, 2023; Faleye et al., 2006). Moreover, Huse et al. (2009) find that employee representatives perceive their board tasks differently than shareholder representatives. However, for specific board decisions that might require two-thirds of the votes, employees' votes will become necessary to ratify the decision. Thus, when there is a conflict of interest between shareholders and employees, firm performance could suffer (Petry, 2018). Finally, critics of codetermination frequently cite the lack of expertise among employee representatives (Chyz et al., 2013). For instance, Huse et al. (2009) shows that employee elected board members have less tenure on the board and less board experiences from other companies.[16]

Advocates of codetermination highlight employees' ability to increase transparency and reduce agency problems and hence optimize firm value (Petry, 2018; Fauver and Fuerst, 2006). Codetermination improves communication quality between the lower and higher hierarchy levels of a firm, as it provides managers access to detailed information and operational knowledge (Balsmeier et al., 2013). Additionally, codetermination protects small shareholders, as board membership enables employees to have a voice in decisions that would benefit large owners and management to the detriment of firm viability and thus employees' and small shareholders' interests (Fauver and Fuerst, 2006). Further, employee representatives provide a unique and diverse perspective which increases the quality of discussions and hence also performance (Karuna, 2020; Magnanelli et al., 2020; Huse et al., 2009). Also, codetermination increases the acceptance of board decisions amongst employees of the organization.

[15] Fauver and Fuerst (2006) argue that voluntary codetermination would reduce the compensation differential between management and workers and increase worker job security, leading to adverse selection, as voluntary codetermined firms are likely to lose their best management talent and attract the least productive workers. However, legislation allows firms to overcome these coordination issues and realize the benefits of codetermination.

[16] Overland and Samani (2021) analyze the effect of employee representatives' characteristics on earnings quality and find that tenure does not enhance monitoring. Their results indicate that employee representatives with low or moderate tenure are those who contribute to earning quality.

Codetermination makes it easier to reach compromises in crises and decreases the probability of costly strikes (Balsmeier et al., 2013; Fauver and Fuerst, 2006). Finally, codetermination promotes human capital investment (i.e., employee development of firm-specific human capital), as it ensures future rewards for employee commitment (Furubotn and Wiggins, 1984; Smith 1991).

Considering the different arguments and mixed findings in previous research, we present H_{1a} in null form below. Assuming that changes in market value are representative of changes in operating performance, we also present H_{1b} in null form below:

H_{1a}: Codetermination does not influence firms' market value.

H_{1b}: Codetermination does not influence firms' operating performance.

3. Research design and empirical model

3.1 Measuring codetermination

We employ the codetermination index (*CDI*) established by Scholz and Vitols (2019) to measure heterogeneous differences in board-level codetermination that have been neglected in prior literature. The indicators to construct the index are selected in reconciliation with the Hans Böckler Foundation, which is part of the Confederation of German Trade Unions. Thus, the *CDI* covers heterogeneous aspects of codetermination relevant from both an academic and practitioner perspective. All indicators are hand-collected and aggregated into the following six components:

1. Number and type of worker representatives on the supervisory board. The highest score is obtained if one-half of the supervisory board is employee representatives, the internal representatives are work councilors, and the union representatives are full-time union representatives.
2. Employee as vice chairperson of the supervisory board. The highest score is obtained if the vice chairman is an employee representative (either a full-time union representative or works councilor).
3. Employee representation on board committees: The highest score is obtained if one-half of the committee members (such as members of the audit committee or human resources (HR) committee) are employee representatives.

4. Internationalization of employment: The highest score is obtained if all employees are employed in Germany or if there is an international works council.
5. Importance of the supervisory board in the companies' legal form: The highest score is obtained if the firm's legal form provides extensive decision-making rights to the supervisory board.
6. Responsibility for personnel policies lies with the management board: The highest score is obtained if primary responsibility for HR is not assigned to the CEO or CFO.

Each of the components exhibits values between zero (no compliance) and 100 (full compliance with all related indicators) and have differing weights by component. Components 1 to 4 have a weight of 0.2, while components 5 and 6 have a weight of 0.1. The *CDI* is a continuous measure that is calculated by adding the weighted component values and is hence standardized between the values of zero (no codetermination) and 100 (full codetermination). For example, a firm that shows the characteristics described above would have a value of 100 for each component, which translates to weighted values of 20, 20, 20, 20, 10, and 10. The *CDI* for that company would be 100 (20+20+20+20+10+10). For our empirical analyses, we divide the *CDI* by 100 to allow for easier interpretation of the coefficients. Figure 2.2 provides a detailed description of the components.

The ability of the *CDI* to assess the level of codetermination has been validated by members of the Hans Böckler Foundation. Specifically, these experts were asked to compare their perceptions of the level of codetermination in specific companies with the *CDI* values of the respective companies.[17] The perceived importance of the *CDI* is also evident by several international (Chyz et al. 2023; Scholz and Vitols 2019) and national (Campagna et al., 2020; Eulerich et al., 2022; Scholz, 2017) studies on codetermination.

[17] See Scholz and Vitols (2019) and Chyz et al. (2023) for further information on the construction of the *CDI*.

Figure 2.2: Codetermination Index

Component		Variables	Scoring	Weighting Component
1	Number and type of employee representative	Percentage of full-time unionists	2 points per percentage point	0.2
		Percentage of part-time unionists	1 point per percentage point	
		Percentage of works councilors	2 points per percentage point	
		Percentage of internal employee representatives (excluding works councilors)	1 point per percentage point	
		Percentage of executive employee representatives	2 points per percentage point	
		Percentage of international supervisory board members	1 point per percentage point	
		Percentage of international works councilors or unionists	2 points per percentage point	
2	Employee as vice chairperson	Supervisory board has two vice chairpersons; second is employee representative	16.67 points	0.2
		Supervisory board has two vice chairpersons; first is an employee representative	33.33 points	
		The vice chairperson is an employee representative	50 points	
		The employee representative is not a full-time unionist or works councilor	25 point	
		The vice chairperson is a full-time unionist or works councilor	50 points	
3	Extent of employee representation on board committees	Employee representatives are included in board committees	33.33 points	0.2
		One half of any board committees consists of employee representatives	66.67 points	
		One half of each board committee consists of employee representatives	100 points	
4	Degree of fragmentation of employee representation through internationalization	There are no employee representatives on the supervisory board	0 points	0.2
		Percentage of domestic employees	1 point per percentage point	
		There firm has an international works council	100 points	
5	Firm's legal form	There are no employee representatives on the supervisory board	0 points	0.1
		The firm is a limited partnership by shares or holding (e.g. KGaA)	33.33 points	
		The firm is a limited liability company (e.g. GmbH)	66.67 points	
		The firm is a joint stock company (e.g. AG or SE)	100 points	
6	Responsibility for personnel policies	The responsibility for HR is assigned to a Chief Human Resources Manager	100 points	0.1

3.2 Sample selection

Our sample covers the Composite DAX Index (CDAX)[18] between 2006 and 2017; this index consists of German companies listed in the German Prime and General Standard of the Frankfurt Stock Exchange.[19] The CDAX represents a diverse set of publicly traded German firms as it consists of firms from different segments and of various sizes. We consider all companies that were members of the CDAX in at least one year during our sample period. Hence, we exclude duplicate observations of firms with more than one type of stock (e.g., common stock and preferred stock). We obtained data on the financial variables from the Datastream database, while data on our codetermination variables were obtained from Scholz and Vitols (2019).[20]

We exclude firms without codetermination as we are interested in differences between codetermined firms.[21] After eliminating firm-years with missing data, our sample is comprised of 1,606 firm years from 182 different firms. Details of our sample selection and sample composition are included in Table 2.1.

3.3 Measuring market value and operating performance

Consistent with much of the codetermination literature (e.g. Balsmeier et al., 2013; Fauver and Fuerst, 2006; Gorton and Schmid, 2004) we employ *Tobins-Q*, market to book value of assets (*MTB*) and market to book value of equity (*MTE*) to measure market value. We calculate *Tobins-Q* as the market value of equity plus the book value of assets minus the book value of equity divided by the book value of assets (Balsmeier et al., 2013; Fauver and Fuerst, 2006). Market to book (*MTB*) and market to equity (*MTE*) are measured as market value of equity in year *t* divided by the book value of assets or equity in year *t*, respectively (e.g. Balsmeier et al., 2013; Gorton and Schmid, 2004).

[18] The CDAX reflects German shares across Prime and General Standard. Admission to Prime or General Standard requires the fulfillment of specific transparency criteria. As it represents a broad range of firms, it is often considered as a suitable indicator for the economic development of the whole German stock market.
[19] Our sample period starts in 2006 as we have no access to codetermination data prior to 2006.
[20] We would like to thank Robert Scholz and Sigurt Vitols for sharing their enlarged codetermination dataset with us because it allows us to consider more firm-years than considered in Scholz and Vitols (2019).
[21] The exclusion of firms with no codetermination allows us to overcome two important limitations of the CDI. First, the difference between the minimum *CDI* (*CDI*=0.165) and the *CDI* for no codetermination (*CDI*=0) is relatively large. As a result, we would be unable to differentiate whether our regression results reflect differences between codetermined firms our differences between firms with no codetermination and firms with low codetermination. Second, the inclusion of firms with no codetermination increases correlations between firm size and the *CDI* which potentially case multicollinearity issues.

Table 2.1: Sample Selection and Sample Composition

Panel A: Sample Selection

	Number of firm-years	Number of firms
All firms listed in the German CDAX between 2006 and 2017	6,425	720
Less		
firms without codetermination	2,644	203
missing financial data	841	125
missing codetermination data	1,334	210
Final sample	1,606	182

Panel B: Sample Composition

Year	Frequency	Percent	Industry	Frequency	Percent
2006	127	7.91	Non-Durables	111	6.91
2007	136	8.47	Durables	131	8.16
2008	137	8.53	Manufacturing	369	22.98
2009	137	8.53	Energy	10	0.62
2010	140	8.72	Chemicals	90	5.60
2011	137	8.53	Business Equipment	200	12.45
2012	129	8.03	Telecommunication	29	1.81
2013	132	8.22	Utilities	64	3.99
2014	129	8.03	Shops	136	8.47
2015	131	8.16	Healthcare	144	8.97
2016	136	8.47	Finance	158	9.84
2017	135	8.41	Other	164	10.21

This table presents the sample selection process for the study resulting in 1,606 firm-years among 182 firms and the sample composition. Of these, 1,154 firm-years are subject to one-half (parity) codetermination and 452 firm-years are subject to one-third codetermination.

We use four proxies to capture operating performance including *ROA* measured as net income scaled by the book value of assets in year *t, ROE* measured as net income scaled by the book value of equity in year *t, EBIT*, measured as earnings before interest and taxes scaled by sales revenue in year *t,* and *Growth* is measured as the change in book value of assets between year *t* and *t+1* scaled by the book value of assets in year *t*.

3.4 Empirical model

To investigate the relationship between codetermination and market value, we estimate the following model based on Fauver and Fuerst (2006):

$$\begin{aligned} Performance = {} & \beta_0 + \beta_1 CDI + \beta_2 Diversified + \beta_3 International + \beta_4 Assets + \\ & \beta_5 Operating\ Income + \beta_6 Capex + \beta_7 Leverage + \beta_8 Dividends + \\ & \beta_9 OWN10 + \beta_{10} OWN10\text{-}30 + \beta_{11} OWN30 + \end{aligned} \quad (1)$$

We employ proxies for market value and operating performance as defined above as measures of *Performance* in equation (1). *CDI* is the codetermination index as defined earlier in the paper and described in Figure 2.2. In addition, following Fauver and Fuerst (2006) we include various control variables, including *Diversified*, *International*, *Assets*, *Operating Income*, *Capex*, *Leverage*, *Dividends*, *OWN10*, *OWN10-30*, and *OWN30+*. Appendix 2.A provides the definitions and Datastream identifier of all variables.[22]

Because the CDAX includes heterogeneous firms, which differ in size and thus cause heteroscedasticity, we calculate robust standard errors. We also use year fixed effects to account for time invariant effects on market value and industry fixed effects to control for industry-specific differences.

4. Empirical results

4.1 Descriptive results

Table 2.2 provides the descriptive statistics for our sample. The mean *CDI* is 0.712, with a standard deviation of 0.229, and the *CDI* ranges from 0.487 at the 25th percentile to 0.900 at the 75th percentile. Due to the exclusion of firms without codetermination the minimum *CDI* is 0.165. To gain further insights into the data, we divide the sample into two additional groups: (1) *one-third codetermination*, if one-third of the supervisory board consists of employee representatives, and (2) *one-half codetermination*, if one-half of the supervisory board consists of employee representatives.

[22] In addition to the firm's ownership structure, we also include control variables concerning the firm's board size and whether the external auditor is a Big4 firm and find similar results.

Table 2.2: Descriptive Statistics

Variables	Mean	Std. Dev.	25 pct	75 pct	(1) one-third codetermination (n=452)	(2) one-half codetermination (n=1,154)	(2)-(1) difference
Tobins-q	1.458	0.747	1.038	1.569	1.495	1.444	-0.051
MTB	0.823	0.821	0.347	0.994	0.938	0.777	-0.161***
MTE	2.016	1.655	1.126	2.583	2.158	1.960	-0.198**
ROA	0.038	0.064	0.013	0.063	0.040	0.037	-0.003
ROE	0.096	0.245	0.058	0.158	0.091	0.098	0.007
EBIT	0.198	4.188	0.041	0.117	0.117	0.230	0.113
Growth	0.058	0.207	-0.017	0.096	0.072	0.053	-0.019
CDI	0.712	0.229	0.487	0.900	0.388	0.839	0.451***
Component 1	0.827	0.222	0.667	1.000	0.513	0.950	0.437***
Component 2	0.673	0.426	0.000	1.000	0.053	0.916	0.863***
Component 3	0.612	0.386	0.333	1.000	0.176	0.782	0.606***
Component 4	0.797	0.252	0.610	1.000	0.680	0.842	0.162***
Component 5	0.932	0.202	1.000	1.000	0.984	0.911	-0.073***
Component 6	0.374	0.484	0.000	1.000	0.046	0.503	0.456***
Diversified	0.537	0.499	0.000	1.000	0.456	0.569	0.113***
International	0.870	0.336	1.000	1.000	0.841	0.882	0.041**
Assets	14.996	2.226	13.413	16.582	13.399	15.621	2.222***
Operating Income	0.064	0.269	0.027	0.105	0.080	0.058	-0.022
Capex	0.056	0.129	0.019	0.059	0.071	0.051	-0.020***
Leverage	0.213	0.168	0.084	0.309	0.194	0.221	0.027***
Dividends	0.851	0.356	1.000	1.000	0.874	0.842	-0.032
OWN10	7.965	3.772	9.000	10.000	8.533	7.742	-0.791***
OWN10-30	17.534	13.296	0.000	30.000	21.854	15.842	-6.012***
OWN30+	12.496	17.006	0.000	24.000	12.361	12.549	0.188
Wages_Empl	0.569	0.286	0.405	0.671	0.553	0.576	0.023
Wages_Sales	0.238	0.142	0.142	0.309	0.257	0.231	-0.026***
Employees	0.005	0.004	0.003	0.006	0.005	0.005	0.000
Dividends_ Sales	0.288	2.603	0.023	0.145	0.200	0.323	0.123
Dividends_MV	0.028	0.060	0.010	0.036	0.029	0.028	-0.001

*This table presents full sample descriptive statistics for the variables used in our regressions. We also divide the sample into two groups: (1) firms subject to one-third codetermination, and (2) firms subject to one-half codetermination. Detailed variable definitions are available in Appendix 2.A. *, **, and *** denote significance level of 0.1, 0.005, 0.001, respectively, for the results of t-test of means.*

The univariate results shown in Table 2.2 suggest that the proportion of employee representatives is negatively associated with market value. Compared to one-third codetermination, firms with one-half codetermination suffer from significantly lower market to book (difference = -0.161, $p<0.01$), and market to equity ratios (difference = -0.198, $p=0.031$) than firms with one-third codetermination. This is in line with Gorton and Schmid (2004) and Petry (2018), who identify a negative effect of the proportion of employee representatives on market value. However, we find no significant differences between both groups with respect to operating performance. These findings reflect the mixed results in prior research on the association between codetermination and operating performance (FitzRoy and Kraft, 1993; Lin et al., 2018; Renaud, 2007).

In terms of firm characteristics, we find that firms with higher proportions of employee representatives have a higher propensity to diversify and operate internationally, hold more assets, have lower capital expenditures, higher leverage, a less concentrated ownership structure, and pay lower wages relative to sales.

Table 2.3 Panel A presents the Spearman correlations between the variables. Consistent with our previous results, we find significant and negative correlations between the *CDI* and market value (i.e. *Tobins-q, MTB, and MTE).* Correlations between the *CDI* and profitability (i.e., *ROA, EBIT,* and *GROWTH*) are also significant and negative suggesting that codetermination reduces operating performance. We also find significant correlations between explanatory variables. However, variance inflation factors are consistently below 5, and the mean variance inflation factors are around 2. Thus, multicollinearity does not appear to be a problem in our models. Table 2.3 Panel B presents Spearman correlations by codetermination regime. Firms subject to one-third (one-half) codetermination are shown above (below) the diagonal. Correlations are similar to those in Panel A. We continue to find significant and negative correlations between the CDI and most measures of market value and operating performance.

Table 2.3: Correlations

Panel A: Full-Sample

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)
(1) *Tobins-q*	**1.00**																						
(2) *MTB*	**0.89**	**1.00**																					
(3) *MTE*	**0.88**	**0.73**	**1.00**																				
(4) *ROA*	**0.58**	**0.69**	**0.49**	**1.00**																			
(5) *ROE*	**0.48**	**0.38**	**0.52**	**0.76**	**1.00**																		
(6) *EBIT*	**0.36**	**0.29**	**0.34**	**0.53**	**0.56**	**1.00**																	
(7) *Growth*	**0.31**	**0.30**	**0.32**	**0.29**	**0.25**	**0.19**	**1.00**																
(8) *CDI*	**-0.11**	**-0.22**	**-0.09**	**-0.13**	-0.03	**-0.08**	**-0.07**	**1.00**															
(9) *Diversified*	-0.04	**-0.09**	-0.03	0.00	0.03	0.04	0.03	**0.05**	**1.00**														
(10) *International*	**0.06**	**0.08**	**0.12**	**0.09**	**0.07**	0.00	**0.09**	-0.01	0.04	**1.00**													
(11) *Assets*	**-0.15**	**-0.34**	-0.01	**-0.23**	0.03	**0.22**	-0.03	**0.60**	**0.07**	**0.06**	**1.00**												
(12) *Operating Income*	**0.40**	**0.34**	**0.39**	**0.47**	**0.49**	**0.84**	**0.20**	**-0.11**	0.03	0.05	**0.18**	**1.00**											
(13) *Capex*	**0.08**	**0.12**	0.05	**0.07**	-0.02	**0.19**	**0.06**	**0.19**	0.03	0.04	**0.14**	**0.15**	**1.00**										
(14) *Leverage*	**-0.16**	**-0.28**	**-0.18**	**-0.28**	**-0.17**	-0.01	**-0.09**	**0.18**	**0.08**	**-0.09**	**0.11**	-0.02	**0.28**	**1.00**									
(15) *Dividends*	0.05	**0.08**	**0.09**	**0.12**	**0.11**	**0.10**	0.04	**-0.05**	0.02	**0.07**	0.01	**0.12**	0.04	-0.04	**1.00**								
(16) *OWN10*	**0.07**	**0.09**	0.03	0.02	-0.04	**-0.05**	-0.01	-0.02	-0.04	0.02	**-0.14**	**-0.09**	0.00	**-0.06**	-0.02	**1.00**							
(17) *OWN10-30*	**0.06**	**0.08**	0.00	-0.03	**-0.11**	**-0.08**	0.02	**-0.13**	**-0.08**	0.05	**-0.22**	**-0.12**	0.01	-0.03	-0.01	**0.57**	**1.00**						
(18) *OWN30+*	0.02	0.03	-0.04	-0.04	**-0.09**	**-0.08**	0.01	**-0.05**	**-0.09**	0.00	**-0.19**	**-0.11**	0.01	-0.05	-0.03	**0.40**	**0.75**	**1.00**					
(19) Wages_Empl	0.00	**-0.09**	**0.06**	**-0.06**	**0.07**	**0.22**	0.01	**0.19**	**-0.10**	0.01	**0.41**	**0.19**	0.00	**-0.14**	**-0.07**	**-0.07**	**-0.14**	**-0.09**	**1.00**				
(20) Wages_Sales	**0.18**	**0.22**	**0.13**	**0.08**	-0.03	-0.01	0.00	**-0.11**	**-0.03**	0.01	**-0.40**	0.04	**0.07**	-0.05	-0.01	0.02	0.00	-0.03	-0.01	**1.00**			
(21) Employees	**0.13**	**0.22**	**0.06**	**0.10**	**-0.05**	**-0.14**	-0.02	**-0.22**	0.02	0.01	**-0.57**	**-0.10**	**0.09**	0.04	0.03	0.05	**0.08**	0.04	**-0.55**	**0.79**	**1.00**		
(22) Dividends_ Sales	**0.12**	**0.11**	**0.19**	**0.19**	**0.26**	**0.42**	0.01	-0.02	-0.01	0.02	**0.26**	**0.43**	**0.09**	**-0.13**	**0.36**	**-0.06**	**-0.09**	**-0.08**	**0.13**	**-0.36**	**-0.35**	**1.00**	
(23) Dividends_MV	**-0.24**	**-0.21**	**-0.16**	-0.01	0.04	0.03	**-0.14**	0.01	0.04	0.00	**0.10**	**0.06**	0.05	**-0.09**	**0.37**	-0.05	**-0.09**	**-0.06**	-0.02	**-0.15**	**-0.09**	**0.70**	**1.00**

Panel B: Correlations by codetermination regime

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)
(1) *Tobins-q*	**1.00**	**0.89**	**0.90**	**0.61**	**0.50**	**0.25**	**0.35**	-0.09	-0.02	**0.10**	-0.03	**0.31**	-0.07	**-0.19**	0.08	**0.16**	0.08	0.02	-0.02	**0.20**	**0.17**	-0.03	**-0.28**
(2) *MTB*	**0.90**	**1.00**	**0.68**	**0.71**	**0.35**	0.09	**0.32**	**-0.10**	0.03	**0.23**	**-0.24**	**0.15**	-0.02	**-0.32**	0.07	**0.13**	**0.10**	0.06	**-0.15**	**0.27**	**0.29**	-0.09	**-0.26**
(3) *MTE*	**0.87**	**0.76**	**1.00**	**0.45**	**0.58**	**0.32**	**0.33**	**-0.10**	-0.05	0.05	0.09	**0.37**	**-0.11**	**-0.19**	**0.11**	**0.11**	0.02	-0.01	**0.10**	**0.18**	0.08	0.05	**-0.23**
(4) *ROA*	**0.57**	**0.68**	**0.50**	**1.00**	**0.72**	**0.36**	**0.36**	**-0.15**	**0.11**	**0.18**	**-0.27**	**0.38**	0.01	**-0.29**	**0.17**	0.04	-0.03	-0.07	**-0.10**	**0.16**	**0.16**	0.09	-0.03
(5) *ROE*	**0.48**	**0.41**	**0.49**	**0.78**	**1.00**	**0.61**	**0.33**	**-0.12**	0.00	0.01	0.06	**0.61**	-0.08	**-0.20**	**0.22**	0.01	**-0.12**	**-0.12**	**0.16**	0.03	-0.06	**0.29**	0.08
(6) *EBIT*	**0.40**	**0.37**	**0.35**	**0.58**	**0.55**	**1.00**	**0.21**	0.08	0.03	**-0.17**	**0.48**	**0.90**	**0.13**	0.00	**0.19**	-0.08	**-0.19**	**-0.20**	**0.25**	**-0.12**	**-0.27**	**0.46**	0.05
(7) *Growth*	**0.30**	**0.29**	**0.31**	**0.26**	**0.23**	**0.17**	**1.00**	-0.03	-0.02	0.03	0.07	**0.22**	0.07	**-0.15**	-0.03	0.08	**0.12**	**0.11**	0.02	0.02	-0.02	-0.04	**-0.16**
(8) *CDI*	**-0.14**	**-0.20**	**-0.08**	**-0.13**	**-0.06**	-0.01	**-0.07**	**1.00**	**-0.11**	**-0.19**	**0.23**	**0.10**	**0.20**	**0.21**	0.01	**0.15**	**0.10**	**0.10**	**0.19**	**0.13**	-0.04	-0.06	0.00
(9) *Diversified*	-0.05	**-0.13**	-0.02	-0.04	0.03	**0.08**	0.05	0.00	**1.00**	0.05	-0.09	0.02	0.09	-0.02	0.05	**-0.16**	-0.09	0.02	**-0.25**	**-0.16**	-0.03	**0.13**	0.05
(10) *International*	0.05	0.01	**0.22**	0.04	**0.10**	0.05	**0.10**	0.01	**0.16**	**1.00**	**-0.10**	-0.10	0.01	-0.09	0.05	-0.03	0.09	**0.10**	**-0.10**	**0.12**	**0.17**	**-0.17**	**-0.11**
(11) *Assets*	**-0.16**	**-0.29**	-0.02	**-0.19**	0.00	**0.25**	-0.03	**0.47**	**0.14**	**0.20**	**1.00**	**0.49**	**0.11**	**0.14**	**0.11**	0.08	0.08	0.08	**0.30**	**-0.43**	**-0.58**	**0.34**	-0.01
(12) *Operating Income*	**0.43**	**0.40**	**0.39**	**0.50**	**0.46**	**0.81**	**0.18**	-0.03	**0.08**	**0.12**	**0.19**	**1.00**	0.06	-0.03	**0.25**	-0.05	**-0.13**	**-0.13**	**0.23**	-0.10	**-0.26**	**0.48**	0.09
(13) *Capex*	**0.15**	**0.20**	**0.12**	**0.10**	-0.01	**0.23**	**0.06**	**0.20**	0.04	0.06	**0.13**	**0.20**	**1.00**	**0.24**	0.04	0.09	**0.13**	**0.11**	**-0.13**	-0.04	0.03	0.05	0.07
(14) *Leverage*	**-0.14**	**-0.25**	**-0.16**	**-0.27**	**-0.15**	0.01	-0.05	**0.15**	**0.14**	**-0.12**	**0.10**	0.01	**0.30**	**1.00**	0.01	-0.05	-0.09	**-0.16**	**-0.13**	-0.09	0.00	**-0.14**	**-0.12**
(15) *Dividends*	0.00	**0.06**	**0.10**	**0.18**	**0.15**	**0.18**	**0.07**	0.02	**0.09**	**0.15**	**0.19**	**0.19**	**0.09**	**-0.09**	**1.00**	-0.09	-0.05	-0.02	0.04	0.09	0.04	**0.59**	**0.59**
(16) *OWN10*	**0.08**	**0.08**	0.04	-0.04	**-0.08**	**-0.08**	-0.05	**0.07**	**-0.08**	**-0.11**	**-0.13**	**-0.15**	0.02	0.01	**-0.10**	**1.00**	**0.73**	**0.49**	**0.11**	0.06	0.01	**-0.12**	-0.06
(17) *OWN10-30*	0.05	0.05	-0.01	-0.05	**-0.10**	**-0.09**	-0.03	-0.02	**-0.11**	**-0.15**	**-0.22**	**-0.17**	0.00	0.02	**-0.11**	**0.80**	**1.00**	**0.84**	0.03	0.03	0.04	**-0.13**	-0.06
(18) *OWN30+*	0.01	-0.01	**-0.07**	**-0.06**	**-0.08**	-0.06	-0.02	-0.01	**-0.15**	**-0.20**	**-0.20**	**-0.11**	0.00	0.02	**-0.14**	**0.51**	**0.86**	**1.00**	-0.03	-0.02	-0.01	**-0.11**	-0.06
(19) Wages_Empl	0.01	-0.04	0.05	-0.03	0.03	**0.22**	0.01	**0.23**	-0.04	**0.11**	**0.42**	**0.19**	0.06	**-0.15**	-0.02	**-0.09**	**-0.17**	**-0.12**	**1.00**	**0.22**	**-0.37**	**0.12**	0.06
(20) Wages_Sales	**0.16**	**0.18**	**0.10**	0.04	-0.04	0.02	-0.01	**-0.14**	0.02	0.02	**-0.40**	**0.08**	**0.13**	-0.03	**-0.15**	-0.04	-0.03	-0.05	**-0.08**	**1.00**	**0.77**	**-0.30**	-0.01
(21) Employees	**0.11**	**0.17**	0.05	0.06	-0.04	**-0.10**	-0.02	**-0.25**	0.06	-0.03	**-0.56**	-0.05	**0.12**	**0.07**	**-0.10**	0.01	**0.08**	0.05	**-0.59**	**0.80**	**1.00**	**-0.33**	-0.02
(22) Dividends_ Sales	**0.18**	**0.18**	**0.24**	**0.23**	**0.24**	**0.39**	0.03	**0.08**	-0.04	**0.06**	**0.33**	**0.41**	**0.12**	**-0.11**	**0.64**	**-0.07**	**-0.10**	**-0.09**	**0.13**	**-0.40**	**-0.38**	**1.00**	**0.72**
(23) Dividends_MV	**-0.22**	**-0.20**	**-0.14**	-0.01	0.02	0.01	**-0.13**	**0.08**	0.06	0.05	**0.18**	0.04	0.05	**-0.07**	**0.64**	**-0.13**	**-0.12**	**-0.08**	-0.05	**-0.20**	**-0.13**	**0.70**	**1.00**

This table presents Spearman correlations between the variables used in our regressions. Panel A presents correlations for the full sample, Panel B presents correlations by codetermination regime: Firms subject to one-third (one-half) codetermination are shown above (below) the diagonal. Detailed variable definitions are available in Appendix 2.A. ***Bold*** *if p-value < 0.05 (2-tailed).*

4.2 Market value and operating performance

Panel A of Table 2.4 summarizes our empirical results for the estimating the effect of *CDI* on market value. We do not find a significant association between *CDI* and *Tobins-Q*. However, we do find that *CDI* is negatively associated with both *MTB* and *MTE* (p=0.047 and 0.041, respectively). The marginal effect of *CDI* on *MTB (MTE)* when holding all other variables at their means is 0.279 (0.613). Economically, an increase in *CDI* by one standard deviation is associated with a 7.78 percent (6.94 percent) decrease in *MTB* (*MTE*).[23] Thus, we find evidence consistent with some prior research that codetermination negatively affects shareholder value (Gorton and Schmid 2004; Petry 2018). However, our study is the first to find the negative association using a more precise measure of heterogeneous differences in the codetermination index.[24] This also allows us to better understand marginal effects.[25]

Panel B of Table 2.4 summarizes our empirical results for the effect of *CDI* on operating performance where we re-estimate equation (1), but modify the equation by removing a control for operating performance (*Operating Income)* from the equation. If market value is negatively affected by *CDI*, we expect that operating performance should follow a similar pattern to reflect changes in underlying firm fundamentals. However, we do not find a significant association between *CDI* and *ROA*, *ROE*, *EBIT*, or *Growth*. Collectively, these findings might suggest that investors inappropriately discount market value of codetermined firms. In the next section, we perform further analysis to determine if this is the case.

[23] We calculate marginal effects of an increase in *CDI* by one standard deviation by estimating the percentage change in the dependent variable, when *CDI* increases from its mean (i.e., *CDI*=0.712) by one standard deviation (i. e., *CDI*=0.941). This allows for a better understanding of the effect of codetermination on our outcome variables of interest.

[24] To reconcile our findings with prior literature, we replicate the main models in Fauver and Fuerst (2006) in Appendix 2.B. Using a binary measure of codetermination, we find codetermined firms to have a significantly higher Tobin's Q. Fauver and Fuerst (2006) do not find a significant association between the binary measure of CDI and Tobin's Q. However, their sample is only in one year and only includes 786 observations whereas our sample is across twelve years and includes 5,240 observations. In the online appendix, we also provide yearly regressions and find a significant coefficient in only four of the twelve years. Thus, it is possible that the lack of a significant result from Fauver and Fuerst (2006) is due to lack of power. Our results extend these findings by showing that there are differences among codetermined firms that reduce performance.

[25] Prior literature found some evidence for a curvilinear relationship between codetermination and performance (Balsmeier et al., 2013; Fauver and Fuerst, 2006). Thus, we also analyze whether the effect of the *CDI* differs between firms subject to one-third codetermination and one-half codetermination. In untabulated results, we find significant and negative coefficients on *CDI* for each measure of market value at the 5 percent level. When we analyze one-third codetermined firms the coefficients on *CDI*, we only find a significant and negative effect on *MTE*. This could be due to the fact that employee representatives in one-third codetermined firms do not achieve a power level that allows them to enforce value decreasing decisions (Balsmeier et al., 2013).

Table 2.4: Effects of Codetermination on Performance

Panel A: Market Value				
	(1)	***(2)***	***(3)***	
Variables	***Tobins-q***	***MTB***	***MTE***	
CDI	-0.116	-0.279**	-0.613**	
	(-0.859)	(-1.986)	(-2.040)	
Diversified	0.011	-0.007	-0.036	
	(0.305)	(-0.202)	(-0.451)	
International	-0.149*	-0.198**	0.288*	
	(-1.772)	(-2.407)	(1.724)	
Assets	-0.013	-0.023	0.047	
	(-0.753)	(-1.357)	(1.236)	
Operating Income	0.375	0.387	0.623	
	(1.599)	(1.441)	(1.531)	
Capex	0.088	0.145	0.067	
	(1.038)	(1.127)	(0.448)	
Leverage	-0.642***	-1.232***	-2.693***	
	(-3.468)	(-7.179)	(-7.542)	
Dividends	-0.005	0.064	0.311***	
	(-0.095)	(1.118)	(2.590)	
OWN10	0.014**	0.015**	0.027*	
	(2.201)	(2.221)	(1.927)	
OWN10-30	-0.004	-0.004	-0.002	
	(-1.497)	(-1.472)	(-0.384)	
OWN30+	0.001	0.001	-0.007**	
	(1.078)	(0.886)	(-2.101)	
Constant	2.307***	2.120***	2.514***	
	(10.190)	(9.114)	(5.148)	
Year Fixed Effects	Yes	Yes	Yes	
Industry Fixed Effects	Yes	Yes	Yes	
Observations	1,606	1,606	1,606	
Adj. R-squared	0.191	0.289	0.205	
Panel B: Operating Performance				
	(1)	**(2)**	**(3)**	**(4)**
Variables	***ROA***	***ROE***	***EBIT***	***Growth***
CDI	0.006	0.025	0.458	-0.025
	(0.563)	(0.472)	(0.832)	(-0.698)
Diversified	0.010***	0.006	-0.263	0.014
	(3.105)	(0.431)	(-1.047)	(1.304)
International	-0.018***	-0.014	-1.070	0.004
	(-2.595)	(-0.665)	(-1.079)	(0.232)
Assets	-0.002*	-0.003	-0.022	-0.001
	(-1.664)	(-0.367)	(-0.613)	(-0.206)
Capex	0.002	-0.031	-0.035	0.080**
	(0.172)	(-1.067)	(-0.110)	(2.381)
Leverage	-0.095***	-0.176***	-1.164	-0.068*
	(-8.123)	(-3.141)	(-0.971)	(-1.947)
Dividends	0.035***	0.094***	0.078	0.014
	(5.458)	(3.776)	(1.148)	(0.697)
OWN10	0.000	-0.000	-0.070	-0.001
	(0.714)	(-0.251)	(-1.025)	(-0.343)
OWN10-30	-0.000	-0.001	0.001	-0.000
	(-1.435)	(-1.073)	(0.361)	(-0.436)
OWN30+	0.000	0.000	-0.006	0.000
	(0.745)	(0.846)	(-1.029)	(0.854)
Constant	0.094***	0.168**	1.966	0.175***
	(4.881)	(1.987)	(1.027)	(3.070)
Year Fixed Effects	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes
Observations	1,606	1,606	1,606	1,606
Adj. R-squared	0.163	0.049	0.007	0.042

*This table presents regression results of codetermination on performance. Detailed variable definitions are available in the Appendix 2.A. Robust t-statistics are reported under each coefficient in parentheses. *, **. *** denote significance level of 0.10, 0.05, and 0.01, respectively.*

4.3 Employee rent seeking

Our results from model (1) find evidence that while market value is decreasing on average, we do not find evidence of a corresponding decrease in operating performance. On the surface, one might interpret this result to mean that shareholders improperly discount the market value of codetermined firms. However, it is possible that even if net operating performance is not decreasing, individual operating decisions may reduce perceived and actual shareholder value. For example, employee representatives have different incentives than shareholders, and the inclusion of this second agent type in the board room reduces efficiency due to employee payroll incentives (Alchian and Demsetz, 1972; Fauver and Fuerst, 2006). Thus, employee representatives of codetermined firms might also prefer higher wages over shareholder dividend distributions.

Employee representatives indicate that they "have strong views about employment" and perceive "preserving jobs (…) as the main criterion in reaching a compromise decision" (Gold, 2011, p. 50). Consistent with these statements, prior literature suggests that codetermination is associated with overstaffing and protects employees against layoffs during crises (Gorton and Schmid, 2004; Gregorič and Rapp, 2019; Kim et al., 2018). Additionally, Jäger et al. (2021) argue that codetermination can affect wages though various channels in addition to increased bargaining power. For example, employee representatives could push for the selection of labor-friendly managers, change pay equity norms, and affect firm's decision to accede to or opt out of collective bargaining agreements. Although Jäger et al. (2021) find no significant relation between codetermination on wages, codetermination has been shown to increase salaries, for example, by Gorton and Schmid (2004). In this context, survey evidence in Harju et al. (2021) suggest that employee representatives perceive good working conditions, avoidance of redundancies and/or layoffs, good salaries, and employee stability as the most important goals.

Moreover, conflicts between employee representatives and shareholder representatives could lead to side-contracting with the board of management, resulting in management and employees benefitting at the expense of shareholders (Atanassov and Kim, 2009; Bertrand and Mullainathan, 2003; Cronqvist et al., 2009; Pagano and Volpin, 2005). Examples for employee representatives voting against the interests of shareholders has been documented by Gold (2011). For example, employee representatives report situations where they vote against generous dividend payments and against the extension of the loan capacity for the benefit of the foreign parent company (Gold, 2011). Thus, we posit the following hypotheses in alternative form:

H_{2a}: Codetermination is positively associated with employee pay.

H_{2b}: Codetermination is negatively associated with dividend distributions.

Hypothesis 2 predicts that codetermination increases employee wages at the expense of dividend distributions. Thus, we re-estimate equation (1) while replacing the *Performance* dependent variable with individual components of a firm's performance. First, we measure employee pay with two proxies including *Wages_Empl* and *Wages_Sales* which are measured as salaries and benefits expense scaled by the number of employees and sales, respectively. We also use a third proxy (*Employees)* which is measured as the number of employees scaled by sales because employee representatives of codetermined firms likely also want more favorable labor conditions including lower workload per employee. We use three proxies to measure dividend distributions and yields to shareholders including *Dividends* which is an indicator variable equal to one if the company pays dividends in year *t*, and zero otherwise, *Dividends_Sales* which is measured as dividends paid scaled by sales in year *t*, and *Dividends_MV* which is measured as dividends paid scaled by market value of equity in year *t*. Because we now test the effect of CDI on dividends, we remove *Dividends* as a control variable from equation (1).

Table 2.5 summarizes our empirical results for the effect of *CDI* on employee pay and dividends paid. In columns (2) and (3) of Panel A we find a positive and significant association between *CDI* and employee pay scaled by sales and employee count at the 1 percent level (*p<0.01*, respectively*)*, consistent with H_{2a}. The results also appear to be economically significant as an increase in the *CDI* by one standard deviation increases *Wages_Sales* by 14.71 percent and *Employees* by 20.00 percent. Our results contradict the findings of two recent studies. While Kim et al. (2018) find that parity codetermined firms pay lower wages as an insurance mechanism for the higher protection against layoffs, Jäger et al. (2021) find no effect of codetermination on wages. However, our results suggest that employees could increase both wages and the number of employees. One explanation is that Kim et al. (2018) and Jäger et al. (2021) use binary variables to measure whether firms are subject to codetermination and hence neglect important differences between codetermined firms. Moreover, both studies analyze wages in German establishments, while our measures also capture wages in foreign subsidiaries. To the extent that codetermination reduces the likelihood of shifting labor into low-cost countries, codetermination may not affect domestic wages, but increase overall wages.

Table 2.5: Codetermination and Rent Seeking Behavior

Panel A: Employee Pay			
	(1)	***(2)***	***(3)***
Variables	***Wages_Empl***	***Wages_Sales***	***Employees***
CDI	0.014	0.152***	0.005***
	(0.328)	(7.156)	(6.896)
Diversified	-0.055***	-0.005	0.000*
	(-4.674)	(-0.849)	(1.960)
International	-0.109**	0.005	-0.001***
	(-2.552)	(0.439)	(-3.455)
Assets	0.036***	-0.028***	-0.001***
	(6.147)	(-11.242)	(-11.354)
Operating Income	0.932***	-0.153***	0.001***
	(2.995)	(-11.927)	(2.735)
Capex	0.053	0.024	0.000
	(0.365)	(1.623)	(0.013)
Leverage	-0.204***	-0.059***	-0.000
	(-4.045)	(-3.233)	(-0.408)
OWN10	-0.006**	0.000	-0.000
	(-2.192)	(0.229)	(-0.773)
OWN10-30	0.000	-0.000	-0.000
	(0.590)	(-0.798)	(-1.474)
OWN30+	-0.001	-0.000**	0.000
	(-1.330)	(-1.975)	(0.563)
Constant	-0.019	0.516***	0.019***
	(-0.368)	(17.598)	(17.381)
Year Fixed Effects	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes
Observations	1,460	1,472	1,593
Adj. R-squared	0.428	0.494	0.411
Panel B: Dividends			
	(1)	**(2)**	**(3)**
Variables	***Dividends***	***Dividends_Sales***	***Dividends_MV***
CDI	-2.382***	-0.612**	0.016
	(-4.392)	(-2.285)	(0.838)
Diversified	0.369**	-0.319**	-0.001
	(2.331)	(-2.420)	(-0.217)
International	0.230	-1.524**	0.010
	(0.874)	(-2.331)	(1.441)
Assets	0.317***	0.204***	-0.003*
	(4.750)	(2.894)	(-1.802)
Operating Income	0.356	-5.664***	-0.002
	(1.504)	(-4.167)	(-1.135)
Capex	3.976***	-0.386	0.012**
	(2.714)	(-0.499)	(2.081)
Leverage	-2.050***	-1.356**	-0.025**
	(-4.825)	(-2.177)	(-2.258)
OWN10	-0.101***	-0.074**	-0.000
	(-3.254)	(-2.355)	(-0.578)
OWN10-30	0.011	0.008	0.000
	(1.031)	(1.287)	(0.748)
OWN30+	-0.019***	-0.007*	-0.000*
	(-2.793)	(-1.778)	(-1.835)
Constant	0.375	0.437*	0.053***
	(0.442)	(1.700)	(5.335)
Year Fixed Effects	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes
Observations	1,542	1,472	1,606
Adj. R-squared	0.140	0.429	0.032

*This table presents regression results of codetermination on rent seeking behavior. Panel A summarizes our empirical results for the effect of CDI on employee pay. Panel B summarizes our empirical results for the effect of CDI on dividends. Detailed variable definitions are available in Appendix 2.A.. Robust t-statistics are reported under each coefficient in parentheses. *, **. *** denote significance level of 0.10, 0.05, and 0.01, respectively.*

Consistent with H_{2b}, columns (1) and (2) of Table 5 Panel B show a negative association between *CDI* and the likelihood of dividend distribution at the one percent level ($p<0.01$). Economically, a one standard deviation increase in *CDI* decreases the likelihood of a dividend distribution by 8.73 percent. Further, we find a negative and significant effect of codetermination on *Dividends_Sales* ($p=0.022$). A one standard deviation increase in *CDI* decreases the ratio between dividends paid and sales by 48.94 percent. Thus, our findings indicate that investors' negative reaction to codetermination without a corresponding decrease in operating performance are aligned with an increase in employee wages at the expense of distributions to shareholders.

5. Additional analyses

5.1 Individual components of the codetermination index

In untabulated results, we answer Overland and Samani's (2021) call for research on how employee representation affects board work directly. We separate the *CDI* into its individual components to analyze which components most affect performance. Due to high correlation between the individual components, we test the effect of each component in separate regressions.

We find the strongest results for Components 1 through Components 3. First, we find that the number and type of employee representative (Component 1) is associated with lower market value (in terms of *Tobins-q*, *MTB*, and *MTE*), but has no effect on most measures of operating performance. We only find a negative effect of Component 1 on *Growth.* This component captures codetermination structure such as the percentage of unionists and works councilors that are on the board. Also, consistent with the notion of employee rent seeking in codetermined firms, this component is positively associated with *Wages_Sales* and *Employees* while being negatively associated with *Dividends* and *Dividends_Sales*. Scholz and Vitols (2019) state that in particular, work councilors on the board are associated with strong codetermination since they are closely linked to employee representatives at the establishment level. Further, Balsmeier et al. (2013) argue that unionists on the board follow their own agenda. They find that the inclusion of this third type of agent is associated with lower market value. Our results also confirm those of Chyz et al. (2023) who find the number and type of employee representatives to affect firm's use of earnings management and real earnings management.

We do not find an association between the extent of employee representation on board committees (Component 3) and employees serving as vice chair (Component 2) on market value and operating performance. However, we again find that these components are positively associated with salaries and number of employees while being negatively associated with dividends. It has been argued that codetermination reduces a board's efficiency as employee representatives have a different agenda than shareholder representatives (Alchian and Demsetz, 1972; Fauver and Fuerst, 2006). While we do not find a decrease in board efficiency, we do find that employees are able to increase wages at the expense of dividend distributions when they are in positions of higher power such as vice chairperson or when they have representation on board committees.[26]

Regarding the other components, interesting findings include a negative effect of the fragmentation of employee representation (Component 4) and the responsibility for personnel policies (Component 6) on market value. Thus, lower fragmentation of employee representation and higher human resources representation on the board results in decreased market value. Contrarily, the firm's legal form (Component 5) does not affect market value and operating performance.

Collectively, these findings suggest that investors react differently to the type of employee representatives in codetermined firms based on individual aspects of codetermination specific to that firm. These differential reactions by investors based on individual components of the CDI both highlight the mechanisms by which codetermination affects market value as well as the importance of using a heterogeneous measure of codetermination as opposed to a binary measure in future research.

5.2 Endogeneity

While a strength of our study is improved identification through the use of the novel *CDI* due to its ability to allow us to consider heterogeneous differences between codetermined firms, a limitation of this measure is that certain components of the *CDI* may still be subject to

[26] Anecdotal discussion with supervisory board members from the shareholder and employee side suggests that many of the board decisions are made at the committee level, thus providing support for our results that employees are able to more easily influence employee wages and dividend distribution decisions when they have representation on board committees, since they can directly influence the decision-making process. Accordingly, Chyz et al. (2023) find employee representation on the audit committee to be the most important codetermination mechanism associated with reductions in tax aggressiveness and earnings management.

endogeneity concerns. Specifically, the supervisory board affects both firm value and partially the *CDI*.

Although we cannot completely rule out that omitted factors are correlated with both the *CDI* and performance, most components of the *CDI* are exogenous. As we previously discussed, component 3 is largely determined by employee representatives' willingness to engage in board's committee work. Further, Components 1 and 4 are substantially affected by the employees' voting behavior and their decision to establish (international) works councils. Finally, we note that Component 5 is subject to little variation (89.73 percent of the firms are joint stock companies) and therefore not likely to drive our results.

However, we address this potential limitation by applying an instrumental variable approach. Consistent with prior literature (Balsmeier et al., 2013; Chyz et al., 2023; Overland and Samani, 2021), we employ the average extent of codetermination of industry peers as an instrument for codetermination. In particular, we calculate the average *CDI* per year within the same industry and company size quantile. While a firm is individually unable to affect the average extent of codetermination significantly, it likely orients its behavior according to industry peers.

We conduct a Durbin-Wu-Hausman test (Durbin 1954; Wu 1974; Hausman 1978) and regress *CDI* on the instrument and all explanatory variables. The coefficient on our instrument is significant ($p<0.01$) indicating that a weak instrument bias is unlikely. Further, we find significant and positive coefficients on *log_Assets, OWN10,* and *OWN30+*, as well as significant and negative coefficients on *international, capexsales, dividend_indicator,* and *OWN10-30.* The residuals from this regression are included in a re-estimate of equation (1) as additional regressors and are presented in Table 2.6. Consistent with Balsmeier et al. (2013) and Chyz et al. (2023), we find insignificant coefficients on the residuals in 9 of 13 of our dependent variables, suggesting that endogeneity is not driving our results.[27] Thus, our inferences remain robust even after controlling for potentially endogeneity in our models. Still we acknowledge that we cannot completely rule out endogeneity and thus, this remains a limitation of our study.

[27] When using *MTE, Sales_Empl, Employees, or Dividends_Sales* as a dependent variable, we find a significant coefficient on the residuals ($p<0.01$, $p<0.05$, $p<0.0$, and $p<0.01$, respectively).

Table 2.6: Durbin-Wu-Hausman test

Variables	**coefficient**	**t-stat**
Tobins'q	-0.435	-1.646
MTB	-0.406	-1.499
MTE	-1.953***	-3.259
ROA	-0.044	-1.596
ROE	-0.058	-0.445
EBIT	0.232	0.460
Growth	-0.120	-1.400
Wages_Empl	0.250**	2.286
Wages_Sales	0.073	1.638
Employees	0.003**	2.228
Dividends	1.262	1.140
Dividends_Sales	-1.236***	-2.983
Dividends_MV	0.002	0.161

*This table presents second-stage results of the Durbin-Wu-Hausman test. We re-estimate each regression in our manuscript and add the respective residuals from the first-stage as additional regressors. This table reports the coefficients and t-stats for these residuals. *, **. *** denote significance level of 0.10, 0.05, and 0.01, respectively.*

6. Conclusion

This study analyzes the relationship between board-level codetermination and both shareholder value and operating performance. In recent years, domestic and foreign economies have shifted or have considered shifting their focus from shareholders to the stakeholder model of corporate governance, often times through increasing inclusion of employee representatives on the board. However, the potential effects of this shift in governance on market and firm performance are widely unknown. We use a unique dataset of listed German companies and a novel measure of codetermination that enables us to precisely identify heterogeneous variation in codetermination and overcome otherwise common identification issues. Our results suggest that codetermination reduces firms' market value on average, but do not have a corresponding negative effect on operating performance. However, further analyses reveal that employees of codetermined firms are able affect shareholder value via increases in wages and the number of employees while negatively affecting dividends paid to shareholders.

Interestingly, investors react differently to the type of employee representatives in codetermined firms. Our findings regarding employee rent seeking behavior are in line where we might most likely expect it; via the number and type of employee representative, whether an employee is a vice chairperson, and the extent to which the employees have representation on board committees.

Our results should be of interest for policy makers concerned about the economic consequences of codetermination. Specifically, we provide new evidence on the effects of board-level employee representation on shareholder value and profitability. Though our sample consists of German firms, our results should also be of interest to policy makers in the U.S. that discuss the introduction of German codetermination laws. Our results should also be of global interest to any stakeholders and/or countries considering the trade-offs of a governance structure that increasingly incorporates board-level employee representation.

Nevertheless, we caution readers that firms in our sample could have some governance structure, cultural norms, or a legal environment features that are unique to Germany. Dammann and Eidenmüller (2020) argue that U.S. firms might not benefit as much from codetermination as German firms due to legal, social and institutional differences. Based on our research, future studies should focus on the specific effects of codetermination on the decision-making process or consider other countries with a comparable institutional setting.

Our study is also subject to some other limitations. We acknowledge that the inferences from our study rely on the validity of the CDI measure developed by Scholz and Vitols (2016). Since our sample has insufficient observations for all codetermination groups, especially firms with fewer than 500 employees and between 500 and 2000 employees, a regression discontinuity design is not feasible. Moreover, endogeneity could skew our results. We have tried to address this concern through the Durbin-Wu-Hausman test, but cannot rule out that endogeneity affects our results.

Still, our study provides a deeper understanding of the association between codetermination and performance by capturing heterogeneous differences between codetermined firms. In particular, we contribute to the latest stream of the literature on codetermination that goes beyond considering the existence and number of employee representatives on corporate boards (Chyz et al., 2023; Overland and Samani, 2021; Scholz and Vitols, 2019). Furthermore, we echo scholars such as Balsmeier et al. (2013) and Lin et al. (2018) who call for more research on the associations among codetermination, firm performance and risk taking. Finally, our

study provides evidence that heterogeneous variation in the extent of employee representation on the board results in tradeoffs of economic benefits to investors and employees.

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Appendix 2.A: Variable Definitions

Variables	Definition
Tobins-q	$=\frac{\text{(market value of equity (WC08001) + total assets (WC02999) - book value of equity (WC035(}}{\text{total assets (WC02999)}}$, winsorized at 1st and 99th percentiles.
MTB	$=\frac{\text{market value of equity (WC08001)}}{\text{total assets (WC02999)}}$, winsorized at 1st and 99th percentiles.
MTE	$=\frac{\text{market value of equity (WC08001)}}{\text{book value of equity (WC03501)}}$, winsorized at 1st and 99th percentiles.
ROA	$=\frac{\text{net income (WC01706)}}{\text{assets (WC02999)}}$, winsorized at 1st and 99th percentiles.
ROE	$=\frac{\text{net income (WC01706)}}{\text{book value of equity (WC03501)}}$, winsorized at 1st and 99th percentiles.
EBIT	$=\frac{\text{ebit (WC18191)}}{\text{sales (WC01001)}}$, winsorized at 1st and 99th percentiles.
one-third codetermination	is a binary variable that takes a value of 1 when the firm is subject to one third codetermination, i.e. one-third of the supervisory board members are employee representatives.
one-half codetermination	is a binary variable that takes a value of 1 when the firm is subject to parity codetermination, i.e. one-half of the supervisory board members are employee representatives.
CDI	is an index that shows to what extent codetermination is institutionalized at the board-level.

Diversified	is a binary variable that takes a value of 1 when the firm is diversified and zero when the firm is focused. We follow Glaser and Müller (2010) and classify all firms as having (1) only one operating segment, (2) more than one operating segment, all of which operate in the same two-digit SIC industry or (3) no business segment information at all as focused firms.
International	is a binary variable that takes a value of 1 when the firm reports international sales (WC07101) or international assets (WC07151).
Assets	= log (assets (WC02999))
Operating Income	$=\frac{\text{operating income (WC01250)}}{\text{sales (WC01001)}}$, winsorized at 1st and 99th percentiles
Capex	$=\frac{\text{capex (WC04601)}}{\text{sales (WC01001)}}$, winsorized at 1st and 99th percentiles
Leverage	$=\frac{\text{long term debt (WC03251)}}{\text{assets (WC02999)}}$, winsorized at 1st and 99th percentiles
Dividends	is a binary variable that takes a value of 1 when the firm paid a dividend (WC04551).
OWN10, OWN10-30, OWN30+	reflect a firm's ownership concentration through three bins of the percentage of shares held by blockholders (i.e., owners of 5% or more) following Fauver and Fuerst (2006).
Wages_Empl	$=\frac{\text{salaries(WC01084)}}{\text{employees(WC07011)}}$, winsorized at 1st and 99th percentiles.
Wages_Sales	$=\frac{\text{salaries(WC01084)}}{\text{sales(WC01001)}}$, winsorized at 1st and 99th percentiles.
Employment	$=\frac{\text{employees(WC07011)}}{\text{sales(WC01001)}}$, winsorized at 1st and 99th percentiles.
Dividends_ Sales	$=\frac{\text{dividends(WC04551)}}{\text{sales(WC01001)}}$, winsorized at 1st and 99th percentiles.
Dividends_MV	$=\frac{\text{dividends(WC04551)}}{\text{market value of equity (WC08001)}}$, winsorized at 1st and 99th percentiles.

Appendix 2.B: Replication of Fauver and Fuerst (2006)

To reconcile our findings with prior literature, we replicate the main models in Fauver and Fuerst (2006) in this online appendix. Note that we were unable to control for the existence of a bank representative as this information is not available in our database. Additionally, we include industry fixed effects based on Fama-French's 12 industry classification instead of indicators for trade, transportation, and manufacturing industries to consider differences among industries more comprehensively. We also include year fixed effects as our sample period

ranges from 2006 to 2017, while Fauver and Fuerst (2006) only analyze data in 2003. Descriptions of all variables can be found in Appendix 2.A. Compared to our empirical model in equation (1), this replication relies on a binary measure of codetermination indicating whether the supervisory board has one or more employee representatives.

Our results in Figure 2.3 indicate that having employee representatives on the supervisory board increases Tobin's Q ($p<0.01$). While this may seem inconsistent with Fauver and Fuerst (2006), we also note that our sample is different from their sample in that we include a panel of 12 years and 5,240 observations whereas they examine one year and 786 observations. To attempt to provide further reconciliation with their findings, we regress Tobin's Q on the employee representation indicator on a year by year basis. We find a significant coefficient on only 4 of the 12 individual years in our sample. It is possible that the lack of a significant result from the Fauver and Fuerst (2006) paper is due to a lack of power. Our somewhat differential results from Fauver and Fuerst (2006) support the need for further analysis of the impact of codetermination on firm performance as well as the incremental contribution of evaluating a continuous measure of CDI.

Figure 2.3: Replication of Fauver and Fuerst (2006)

Variables	***Tobins-q***
Employee representation indicator	0.184***
	(4.110)
Diversified	-0.071**
	(-2.230)
International	0.082**
	(2.000)
Assets	-0.133***
	(-10.610)
Operating Income	-0.151***
	(-5.788)
Capex	-0.092*
	(-1.651)
Leverage	0.267*
	(1.921)
Dividends	0.201***
	(6.146)
OWN10	-0.011*
	(-1.934)
OWN10-30	-0.001
	(-0.594)
OWN30+	0.002*
	(1.650)
Constant	2.982***
	(19.555)
Year Fixed Effects	Yes
Industry Fixed Effects	Yes
Observations	5,240
Adj. R-squared	0.164

*This table presents replication results of the main model in Fauver and Fuerst (2006). Detailed variable definitions are available in Appendix 2.A. Robust t-statistics are reported under each coefficient in parentheses. *, **. *** denote significance level of 0.10, 0.05, and 0.01, respectively.*

3 Codetermination and Aggressive Reporting

Audit Committee Employee Representation, Tax Aggressiveness, and Earnings Management

James A. Chyz Marc Eulerich Benjamin Fligge Miles A. Romney

Abstract. This study uses a unique dataset from listed German companies that helps identify a granular measure of board-level codetermination to examine whether board-level codetermination (inclusion of employee representatives on the board) reduces aggressive financial and tax reporting, i.e., tax aggressiveness and earnings management. To the extent codetermination allows for effective employee monitoring of management, then it should be negatively associated with tax and financial reporting aggressiveness because prior research hypothesizes that employees prefer lower tax aggressiveness and less earnings management. Our analysis also highlights the mechanisms through which employees can monitor and influence firms' decisions and outcomes. We find employee representation on audit committees is the most consistently influential codetermination mechanism associated with reduced tax aggressiveness and earnings management. We contribute to prior and current discussions of stronger employee rights and influences on management decisions from a board-level perspective.

1. Introduction

In this study, we examine the impact of board-level codetermination on tax aggressiveness and earnings management within publicly traded German firms. The German system of codetermination includes employee representatives on the (supervisory) board, from where employees can monitor and influence firm-wide decisions (Scholz and Vitols, 2019).[28] Prior literature suggests that, relative to employees, managers have stronger incentives for tax aggressiveness (Faleye et al., 2006; Desai and Dharmapala, 2006, 2009b; Chen et al., 2011; Rego and Wilson, 2012; Chyz et al., 2013; Kubick and Masli, 2016) and upward earnings management (Jensen, 2005; Chi and Gupta, 2009; Desai and Dharmapala, 2009a). Consistent with the expectations from this prior literature, Gleason et al. (2021) document a negative association between codetermination and both tax aggressiveness and earnings management. However, prior research examining the associations between employee incentives, monitoring, and firm outcomes (e.g. Gorton and Schmid, 2000; Fauver and Fuerst, 2006; Balsmeier et al., 2013; Petry, 2018; Gleason et al., 2021) relies on binary variables to measure codetermination, such as whether there are any employees on the board or not, and typically assumes codetermined firms are homogeneous.

While German law mandates minimum proportions of employee representation on corporate boards, it does not mandate membership on committees, which introduces variation between firms with otherwise similar codetermined boards. Our study uses hand-collected codetermination data that allow us to look beyond employee board representation and examine employees' committee membership, such as membership on the audit committee, to more precisely identify the likely mechanisms through which employee representatives can monitor and influence firms' decisions and outcomes. The manner and extent to which various factors of codetermination are negatively associated with tax and financial reporting aggressiveness are empirical questions because employee representatives on corporate boards are less likely to possess financial expertise, which past literature demonstrates is an important determinant of board members' ability to monitor the firm (Xie et al., 2003; Davidson et al., 2005; Güner et al., 2008; Robinson et al., 2012; Badolato et al., 2014; Minton et al., 2014; Bilal et al., 2018).

For our empirical tests, we analyze a German sample of approximately 2,000 firm-years between 2006 and 2017. The German system of codetermination is often used as an example in discussions about the introduction of mandatory board-level employee representation

[28] See Figure 3.1 for a graphic depiction of board-level codetermination.

(Warren, 2018; Holmberg, 2019; O'Dowd and Hagan, 2019; Sanders, 2020; Dammann and Eidenmuller, 2021), suggesting that our setting could be informative to policy making in other countries.[29] For these firms we hand-collect data to derive the Codetermination Index (CDI) and its components consistent with Scholz and Vitols (2019). Consistent with prior research, we measure tax aggressiveness with book-tax differences and effective tax rates and earnings management with discretionary accruals (Frank et al., 2009). Similar to prior research, our initial results show higher levels of codetermination are associated with lower tax aggressiveness and lower levels of earnings management. We then split the CDI variable into its individual components to identify mechanisms through which codetermination reduces aggressive reporting. Specifically, we separate the effects of the involvement and engagement of employee representatives on the (supervisory) board and audit committee as well as other specific codetermination mechanisms through which they influence firm leadership.

We find the most consistent driver of reduced aggressive reporting is a codetermined audit committee, that is an employee representative on the audit committee. Audit committee membership is salient in our setting because audit committees are a pillar of corporate governance tasked with monitoring and advising management on tax policy and financial reporting (Robinson et al., 2012; Richardson et al., 2013; Armstrong et al., 2015). While only a few studies have analyzed the effects of board and audit committee characteristics on tax aggressiveness (e.g. Robinson et al., 2012, Richardson et al., 2013, Armstrong et al., 2015), the overall results are somewhat mixed (Armstrong et al., 2015) and do not consider the role of employee representation on the audit committee. This is potentially important because many studies highlight the importance of audit committee financial expertise to reduce earnings management (Bilal et al., 2018). Our results suggest employee board representation is associated with improved audit committee monitoring despite such representatives' lower levels of financial expertise.

In additional analysis, we apply a Durbin-Wu-Hausman test and find no evidence of endogeneity issues in our models. We also explore the impact of codetermination on real earnings management using measures consistent with Roychowdhury (2006). The link between employees and real earnings management and their ability to monitor it is potentially stronger

[29] We acknowledge that German Accounting Law Modernization Act (BilMoG) from 2009 required specific companies to establish an audit committee (see § 324 (1) of the German Commercial Code). However, this reform essentially applies to limited liability companies without a supervisory board and, hence, does not affect the codetermined firms we examine. Thus, the German Accounting Law Modernization Act neither affects the CDI nor the probability of having employee representatives on the audit committee before or after 2009.

than their link with accruals earnings management. This is because it involves operational decisions of which employees should have a better understanding and better access to operational information through their connections to rank-and-file employees. Research finds auditors are aware of real earnings management and how it negatively impacts their assessment of managers' subjective estimates, management's tone, and leads to higher audit fees and auditor resignation (Commerford et al., 2016; Greiner et al., 2016; Commerford et al., 2018, 2019). These findings suggest real earnings management could be negatively related to codetermination and particularly important to the audit committee. At the same time, Gleason et al. (2021) note some real earnings management techniques, including abnormal production, can benefit employees through higher payroll, suggesting in some cases employees could have incentives for more real earnings management. Consistent with employees providing a knowledge of operations that constrains real earnings management, we find the presence of an employee representative on the audit committee is negatively associated with both abnormal production and abnormal expenditures.

In developed economies, use of aggressive tax and financial reporting practices increased over the last few decades (Frank et al., 2009). Our study extends the shareholder focus of United States (US) board-related research to analyze aggressive reporting related to an under examined stakeholder group—employees. While Gleason et al. (2021) show employee representation on the board reduces extreme levels of tax aggressiveness and earnings management, our results demonstrate employee representation on the audit committee is the most effective mechanism to reduce tax aggressiveness and earnings management. Thus, our results can inform policymakers, including high-profile US Senators Elizabeth Warren (Democrat from Massachusetts) and Bernie Sanders (Democrat from Vermont) who both cite the German model of codetermination in their proposed legislation and policy statements, on how to design or adjust codetermination laws to achieve their objectives.[30]

Our study also contributes to prior research examining how employee representation impacts monitoring and corporate outcomes in US settings that has typically focused on labor union presence and labor unionization rates (see, for example, Faleye et al., 2006, Chen et al., 2011, Chyz et al., 2013). It is not always clear from this research whether unions' associations with corporate outcomes arise because of union member monitoring and preferences (i.e., a primary effect) or as a result of managers' responses to the threat of union rent seeking (i.e., a secondary

[30] See Mulder (2017) for a discussion of a recent decision of the Court of Justice of the European Union (EU) regarding codetermination across EU borders.

effect). German firm codetermination data allow us to better capture employees' primary influence on firm-wide decisions through representation on company boards and specific committees charged with manager oversight. In addition, union-based research tends to rely on industry-level unionization rates whereas we use firm-level codetermination data. Furthermore, our study answers the call of Desai and Dharmapala (2006) for more research into the examination of tax aggressiveness within an agency context.

2. Institutional background, literature review, and hypotheses development

2.1 Codetermination

Codetermination allows workers to participate in management of the companies for which they work. It has existed with legal protection in Germany for several decades (Coal and Steel Codetermination Act of 1951, Works Councils Act of 1952 and 1972, Codetermination Act of 1976). Unlike the US governance system, German boards are separated into an executive board and a supervisory board. The supervisory board consists of shareholder representatives elected at the general meeting and employee representatives elected by the employees. Codetermination laws allow workers to elect representatives (local workers/employees as well as national union representatives, or "unionists") for half of the board of directors. This 50% board representation applies and is mandated by law when there are more than 2,000 domestic employees. For companies with between 500 and 2,000 domestic employees, one third of the supervisory board comes from employee elections. Although German law allows for different levels of codetermination at 500 and 2,000 employee thresholds, our data suggest many firms below these employee thresholds exhibit codetermination characteristics of firms above the thresholds and vice versa. This variation suggests using the thresholds to identify variation in codetermination, such as in Gleason et al. (2021), can lead to noisy measures.[31]

Supervisory board members (employee and shareholder representatives) are typically elected for five-year terms, are allowed to be re-elected, and there is no transition period. Historically, German firms have rarely faced any sanctions (except from reputation loss) if they ignored codetermination laws. Labor unions have been critical of the lack of enforcement (Deutscher Gewerkschaftsbund, 2015; Hans Böckler Stiftung, 2015, 2016; Sick, 2015) and have filed a

[31] Several firms do not exhibit actual codetermination consistent with their legally required codetermined board structure. 8.29% of firms with less than 500 domestic employees have codetermination, while 28.69% of firms with between 500 and 2,000 domestic employees do not. Additionally, we find 4.91% (13.57%) of the firms with between 500 and 2,000 domestic employees have (do not have) unionists on the board.

lawsuit to force compliance with codetermination laws that require employee representatives on the board.

Besides the proportion of employee representatives, there are also requirements regarding the type of employee representatives. In firms with between six or eight employee representatives, there must be at least two unionists. In firms with ten employee representatives, there must be at least three unionists. The remaining employee seats can be filled by works councils, other workers, and managerial employees. The supervisory board appoints and controls the executive board, thus, setting up the audit committee that controls the accounting practices of the firm.

Employees from any non-executive level within a company would be eligible to run for a supervisory board or works council position. Like other elections, candidates indicate their interest and can "campaign" to amass support. As a result, "rank-and-file" employees could have greater chances of appointment because they are more likely to have larger pools of colleagues from which they could draw voter support.[32] Appointments to the supervisory board are seen as a full-time job, and employees effectively leave their old positions for the duration of the supervisory board appointment. Works council representatives typically keep their old positions but receive leave to fulfill their works council responsibilities. Employees appointed to the supervisory board are compensated comparably to non-employee supervisory board members. While this pay structure can result in substantial increases in pay for some, German law requires employees on the supervisory board donate 80% of their supervisory board pay to the Hans-Böckler Foundation. Net of these donations, most employees experience a modest increase in pay while serving on the supervisory board. Stock options are not commonly distributed to employees or employee representatives. Works council representatives typically receive a modest pay increase to compensate for their additional service.

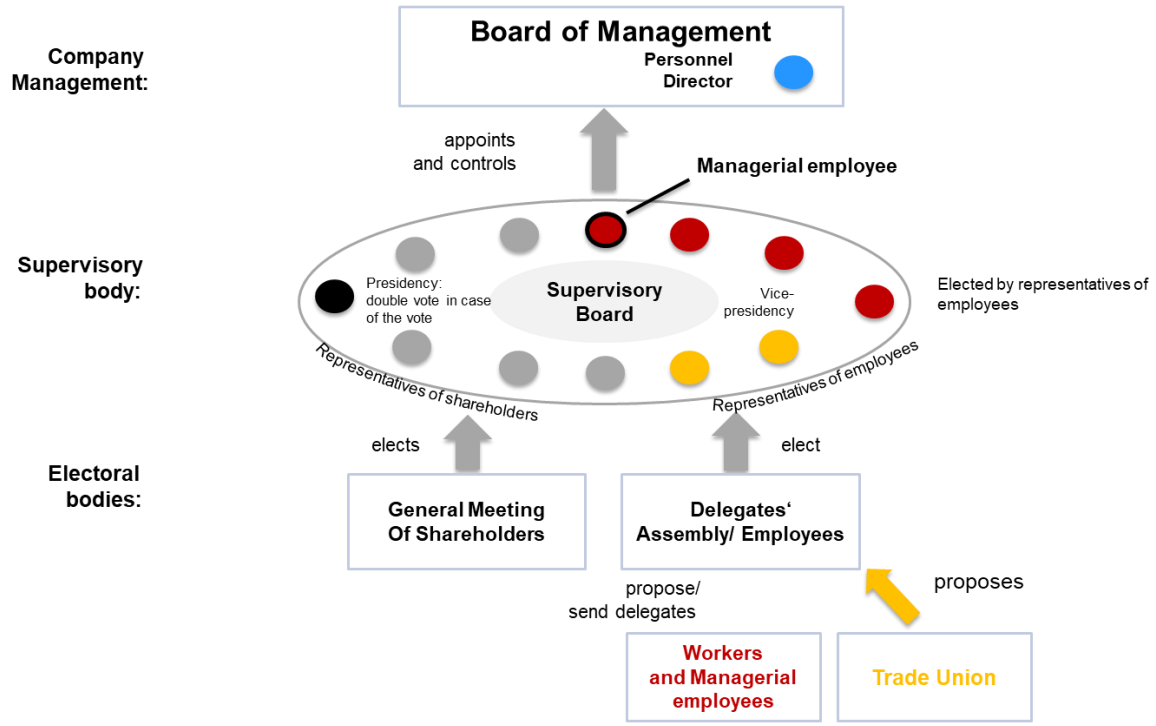
Employees can influence corporate decisions with the German codetermination framework via different channels: First, employees establish firm-level works councils with rights to access information and to veto corporate decisions.[33] Second, depending on the sector, legal form, and number of employees, there is a legally defined proportion of employee representatives on the (supervisory) board, where companies with more than 2,000 employees must have 50% of the

[32] Data limitations do not allow us to capture variation in employee representatives' personal traits or job descriptions prior to their appointment to the supervisory board.

[33] Page (2018) provides a detailed description of the rights of works councils according to the Work Constitution Act. Unlike employee representation on corporate boards, works councils allow employees to exert influence on establishment-level decisions. Absent board representation, works councils' rights are limited to establishment-level employee issues, such as manpower planning and dismissals or social matters. We believe it is unlikely they have influence over firm-level policy choices, such as tax aggressiveness and the use of earnings management.

supervisory board coming from employee representation. Third, national industry-specific labor unions fill seats on the supervisory board, giving them significant power in collective bargaining. These "unionists" typically come from outside the firm but represent industry-wide employees' interests. Fourth, codetermined boards often have codetermined committees to include employee representatives in the whole board decision process. Thus, employees can serve as committee members, including the audit committee and compensation committee.

Figure 3.1: Board-level codetermination



This figure is a graphic depiction of board-level codetermination inspired by Page (2018).

Jensen and Meckling's (1976) theory of the firm would suggest that codetermination is a less efficient governance model that is detrimental to welfare including economic growth, business costs, the rate of innovation, and capital formation. Jensen and Meckling (1976) further suggest codetermination represents labor using the political systems cause a wealth transfer from other stakeholders to themselves, and shareholders must be disadvantaged by codetermination because otherwise they would introduce it voluntarily. Nevertheless, codetermination could also serve as a mechanism to enable a more efficient and effective exchange of information between employees and management, leading to better performance, especially in companies with a high need for employee coordination (Fauver and Fuerst, 2006). The evidence to date is mixed as research identifies both positive and negative economic effects of codetermination on a firm's performance (e.g., Gorton and Schmid, 2000, Fauver and Fuerst, 2006, Chen et al., 2011, Balsmeier et al., 2013, Kim et al., 2018). Determining whether the tax and financial

reporting outcomes associated with codetermination are efficient in a broader sense is beyond the scope of our study. We focus instead on employees' preferences, whether firm outcomes tend to reflect these preferences when codetermination is stronger, and what components of codetermination appear to explain the association.

2.2. Hypotheses development

We begin our hypothesis development by discussing employee preferences for earnings management and tax aggressiveness. We then consider how higher codetermination could facilitate the reflection of these preferences in firm outcomes to formulate our first set of hypotheses.

2.2.1. Tax aggressiveness

Consistent with Chyz et al. (2013), we expect employees to prefer lower levels of tax aggressiveness because of the greater sensitivity to its costs and their relatively lower realization of its benefits. For example, when cash flows due to tax aggressiveness arise after collective bargaining concludes, employees are not able to extract rents. Additionally, employees typically have longer time horizons than managers and shareholders who can leave the company more quickly or sell their shares. Tax aggressiveness simultaneously impacts firms' tax risk (Crocker and Slemrod, 2005; Hanlon and Slemrod, 2009) and hampers employees' ability to assess the extent of firms' tax risk due to agency costs (Desai and Dharmapala, 2006, 2009b). This impact is particularly important because employee representatives tend to be more risk-averse than shareholders and managers (Faleye et al., 2006; Chen et al., 2011).

Prior literature also suggests corporate tax aggressiveness is indicative of companies not paying their "fair share" of taxes (Elbra and Mikler, 2017; Kirchler, 1997; Pegg, 2017). As employees prefer to work for socially responsible firms (Turban and Greening, 1997; Aguilera et al., 2007; Kim et al., 2010), Lee et al. (2020) hypothesize and find news of tax aggressiveness negatively affects employee perceptions of managers and firms. Codetermination empowers employees to monitor and reduce tax aggressiveness. Moreover, managers are aware that employees perceive tax aggressiveness negatively (PwC, 2012; EY, 2015). As a result, managers may be less tax aggressive in the presence of employee representation on the supervisory board to improve perceptions of their work.

2.2.2. Earnings management

Managers have incentives to manage earnings upward. Jensen (2005) suggests earnings management causes overvaluation in capital markets. Firm managers use upward earnings management to avoid capital market punishments. In so doing, the fulfillment of analysts' forecasts by earnings management in subsequent years requires higher levels of earnings management ("the ratchet effect").[34] Despite not improving real firm performance, upward earnings management can increase managers' compensation, reputation, and job security (Jensen, 2005; Bergstresser and Philippon, 2006; Chi and Gupta, 2009).

We expect employees to prefer less earnings management for several reasons. First, they are more risk-averse vis-à-vis other stakeholders and benefit less from advantages of earnings management while bearing more risk. Second, upward earnings management in prior periods might lead to unrealistic future earnings forecasts, placing additional pressure on the workforce to meet projected earnings (Jensen, 2005). Third, Overland and Samani (2022) show employee representatives advocate smaller income distributions and limited executive compensation for ideological reasons, while Blandhol et al. (2020) conclude workers would not benefit (i.e., receive higher wages) from legislation mandating worker representation on corporate boards.[35] These factors reduce incentives for managers to engage in earnings management.

2.2.3. Codetermination and employee preferences

Given the presence of various stakeholders with diverse interests, employees can typically exert only limited influence on management decisions and must rely on the trustworthiness of management (Chyz et al., 2013). For that reason, employee opportunities to influence corporate investment through board representation are crucial. In our German corporate setting, we expect employees to have greater influence on the company's tax and financial policy through participation in supervisory boards, works councils, and unions. As such, we present our first two testable hypotheses in the alternative form:

[34] Reasons behind this rationale include the need to use more earnings management to offset earnings carried forward to the next year and that analysts' expectations rise each time managers exceed forecasts. Chi and Gupta (2009) show that overvaluations are significantly associated with income-increasing earnings management and (especially overvalued) firms using earnings management have lower future performance.

[35] We note significant differences between our setting and those of Overland and Samani (2022) and Blandhol et al. (2020). Those studies do not examine tax avoidance or earnings management and use Swedish and Norwegian firms, respectively. Our sample of German firms is more economically significant (approximately $2.3 billion in average market capitalization as compared to their $1.1 billion).

H_1: Firms with higher levels of codetermination exhibit less tax aggressiveness.

H_2: Firms with higher levels of codetermination exhibit less earnings management.

There are several reasons why we might not find support for our first two hypotheses. Most importantly, critics of codetermination cite the lack of financial expertise among employee representatives. As financial expertise is critical in reducing information asymmetry (Xie et al., 2003; Be´dard et al., 2004; Badolato et al., 2014), a lower proportion of board members with financial expertise could allow management to build up information asymmetries vis-à-vis the board. In addition, prior research (Armstrong et al., 2015) suggests corporate governance is positively associated with tax aggressiveness when firms have low levels of tax aggressiveness relative to peers. Because employee representatives on firm boards should have better access to proprietary financial data, there could be a positive association between codetermination and tax aggressiveness to the extent that a substantial amount of our sample firms are under-investing in tax aggressiveness. This alternative explanation could work against our hypothesis and lead to a null result or even a positive association between codetermination and tax aggressiveness.[36]

The next four hypotheses (H_3 – H_6) seek to identify specific governance mechanisms and channels driving our primary results. Through these mechanisms and channels, employee representatives could influence tax aggressiveness and earnings management directly by determining demand for internal and external auditing. However, in most cases, employee representatives more likely affect financial reporting aggressiveness indirectly through operational knowledge and/or networks within the firm.

2.2.4. Governance mechanisms: Audit Committee

Prior literature suggests the audit committee is one of the most important corporate governance mechanisms with respect to firms' tax aggressiveness and earnings management (Xie et al., 2003; Davidson et al., 2005; Badolato et al., 2014; Deslandes et al., 2020). According to German Corporate Governance Code Article D3, audit committee members are responsible for the monitoring of the accounting process, the effectiveness of the internal control system, the risk management system, the internal audit system, the audit of the financial statements, and

[36] Gleason et al. (2021) hypothesize that workers on corporate boards reduce extreme under- and over-aggressive tax planning as low levels of tax aggressiveness reflect inefficient high tax expenditures and high levels of tax aggressiveness reflect high tax risks. Employees could suffer from extreme under-aggressive tax planning if better firm performance would lead to increased wages and more employment opportunities. However, we would still expect employees to prefer lower levels of tax aggressiveness than shareholders

compliance. Inclusion of employees in the audit committee could enable employees to reduce tax aggressiveness and earnings management through various channels. First, audit committee membership enables employee representatives to access detailed information on the firm's financial reporting. Apart from audit committee members, individuals from various functions (e.g. external auditor, internal auditor, risk management, executive board, tax department, and financial department) attend the meetings (Köhler, 2005). Second, audit committee membership requires employees to monitor firm's financial reporting decisions. Other supervisory board members are not necessarily part of this decision-making process. Third, audit committee members can increase a firm's demand for auditing as they determine the budget of the internal audit function (Abbott et al., 2010), may propose a more qualified auditor, or could ask for additional audit procedures (Köhler, 2005). Fourth, employee representatives provide detailed information and operational knowledge to the audit committee (Fauver and Fuerst, 2006; Balsmeier et al., 2013). To the extent earnings management and tax aggressiveness result from agency problems, inclusion of employees on audit committees could be associated with earnings management and tax aggressiveness. These factors lead to our third testable hypothesis follows:

H_3: The inclusion of employee representatives in the audit committee is negatively associated with tax aggressiveness and earnings management.

Expertise and independence of audit committee members are considered the most important characteristics of committee members. Because employee representatives are elected by employees independently of their professional expertise, they are more likely than non-employee committee members to have low financial expertise. In addition, employees are not independent of the firm. Collectively, this fact suggests their presence on the audit committee might not be negatively associated with tax aggressiveness or earnings management. However, Overland and Samani (2022) argue employee representatives can be considered independent, because they derive their mandate from employees and are, thus, independent from management.

2.2.5. Governance mechanisms: Unionists

Research on labor unions in US settings suggests unionization is associated with less tax aggressiveness and earnings management. One limitation of those prior studies is that it is not always clear whether unions' associations with corporate outcomes arise because of union member monitoring and preferences (i.e., a primary effect) or if they are a result of managers'

responses to threats of union rent seeking (i.e., a secondary effect). For example, managers facing strong unions have incentives to shelter firm resources and understate performance to gain a bargaining advantage (Liberty and Zimmerman, 1986; Klasa, et al., 2009; Matsa, 2010; Chyz et al., 2013; Bova, 2013). In contrast, unionists in Germany can have a primary influence on firm-wide decisions through their participation on boards.

Resource dependency theory suggests unionists provide important resources improving boards' abilities to monitor the firm (Pfeffer and Salancik, 2003). For example, unionists possess industry-specific knowledge as labor unions in Germany typically represent employees within a given industry. Unionists also benefit from their social networks as they likely know unionists serving as board members of other firms within the same industry. For example, union representatives in all major German firms in the automotive industry, Audi, BMW, Daimler, and Volkswagen, come from the IG Metall labor union. Finally, unionists could access labor union's resources to fulfill their duties, such as trainings and seminars to educate employee representatives. These factors lead to our fourth testable hypothesis:

H_{4a}: The proportion of unionists on the board is negatively associated with tax aggressiveness and earnings management.

Scholz and Vitols (2019) distinguish between full-time unionists (i.e., unionists from large labor unions) and other unionists. They argue articulation between employee representatives on the board and large trade unions increases the strategic capacity of the board. Thus, full-time unionists are often more effective as they benefit from larger social networks and have access to more resources. This distinction leads to our next testable hypothesis:

H_{4b}: The proportion of full-time unionists on the board is negatively associated with tax aggressiveness and earnings management.

There are arguments suggesting the presence of unionists, instead of internal employee representatives, could be associated with relatively higher levels of tax aggressiveness and earnings management. Unlike internal employee representatives, unionists are not employed by the firm. While unionists are concerned with whether the firm can generate enough cash flow to cover employees' wages, internal employee representatives are also concerned with whether the firm can cover their own wages. Thus, internal employee representatives have stronger incentives to reduce tax aggressiveness and earnings management. Moreover, ethical decision-making theory suggests proximity to employees influences the moral intensity of employee representatives (Jones, 1991a; Lehnert et al., 2015). On one hand, proximity can cause internal

employee representatives to allow less tax aggressiveness and earnings management than unionists as both are viewed as unethical and not in line with the interests of employees (Lee et al., 2020). On the other hand, proximity can also cause employee representatives to allow more tax aggressiveness and earnings management than unionists when the firm is financially distressed and employees' jobs are at risk. Additionally, unionists also represent the interests of employees within the whole industry. The consideration of employees outside the firm can lead unionists to allow less tax aggressiveness and earnings management if it forces other firms to be more tax aggressive (Chyz and Gaertner, 2018; Balakrishnan et., 2019) and engage in more earnings management.

2.2.6. Governance mechanisms: Works Councilors

Employee representatives are expected to provide information and operational knowledge to the board, which could help to reduce agency problems (Fauver and Fuerst, 2006; Balsmeier et al., 2013). This role is especially true for works councilors on the board who represent employees' interests at the establishment level. Because employers must supply comprehensive information to the works councils (see Page (2018) for a detailed description of the rights of works councils), they tend to possess detailed information on establishments. Scholz and Vitols (2019) suggest articulation with other levels of codetermination will increase the strategic capacity of the supervisory board. Thus, to the extent earnings management and tax aggressiveness result from agency problems, a higher proportion of works councilors could reduce earnings management and tax aggressiveness.

Overland and Samani (2022) suggest employee representatives use their networks within the firm when they participate in financial report preparation. Works councilors possess a large network at the establishment level but are also likely to use their network of other works councilors within the firm. Overland and Samani (2022) further suggest this proximity between employees and employee representatives allows employees to maintain a closer dialogue with firms' departments. Due to these network-related attributes, works councilors could have a stronger influence on tax aggressiveness and earnings management than other internal employee representatives and unionists. These factors lead to our fifth hypothesis:

H_5: The proportion of works councilors on the board is negatively associated with tax aggressiveness and earnings management.

2.2.7. Governance mechanisms: Employee representatives as Vice Chairman

While the chairman of the board is elected by the shareholder representatives, the vice chairman of the board is often an employee representative. Scholz and Vitols (2019) describe the filling of the vice chairman position as an aspect of strong codetermination. Together with the chairman of the supervisory board, the vice chairman prepares meetings, discusses relevant issues, and makes emergency decisions between meetings. According to German Corporate Governance Code Principle 7, the chair also coordinates activities of the supervisory board. Thus, employee representatives of firms in which the vice chairman of the supervisory board is an employee representative have a better understanding of board's activities and are able to include employee-related topics more easily in the meeting agenda.

While prior research examines a chairman's influence on board-level decisions, including tax aggressiveness and earnings management (e.g., Xie et al., 2003; Liu and Lu, 2007; Minnick and Noga, 2010; Chan et al., 2013; Knockaert et al., 2015; Palvia et al., 2015; Halioui et al., 2016; Banerjee et al., 2020), little research examines the role of the vice chairman. Because the vice chair is part of the decision-making process, we expect they could influence decisions and affect earnings management and tax aggressiveness in ways that reflect employees' incentives and preferences. This influence leads to our final hypothesis:

H_6: Firms in which the vice chairman of the board is an employee representative are negatively associated with tax aggressiveness and earnings management.

3. Research design and empirical model

3.1 Sample selection

Our sample covers the Composite DAX Index (CDAX) between 2006 and 2017, which includes all companies listed in the German Prime and General Standard of the Frankfurt Stock Exchange. Due to its composition across different segments and sizes, the CDAX represents a diverse set of firms traded publicly in German stock markets.

Table 3.1 presents the sample selection processes. We consider all companies listed in the CDAX during our sample period, yielding an initial sample of 6,202 firm years of 688 unique firms. Most financial variables come from the Thomson Reuters database, while our codetermination variables of interest come from Scholz and Vitols (2019), who use prior literature and the assessment of practitioners to construct their weighted codetermination index

(*CDI*).[37] We verify their database by comparing a random sample of the legally mandated proportion of employee representatives (both members from the works councils and unionists) with their data on board composition. We exclude financial firms (SIC 6000-6999), leading to a sample of 5,122 firm-year observations among 570 unique firms. In addition, we exclude 1,365 firm-years (69 unique firms) due to missing codetermination data.

Table 3.1: Sample Selection Process.

	firm-years	firms	firm-years	firms
Initial Sample	**6,202**	**688**	**6,202**	**688**
- financial sector	1,080	118	1,080	118
- missing codetermination data	1,365	69	1,365	69
- missing discretionary accruals	851	80		
- missing earnings management controls	330	14		
Panel A: earnings management	**2,576**	**407**		
- negative income before taxes			842	55
- missing or negative tax expenditures			243	17
- missing tax controls			559	64
- missing book-tax differences			195	29
Panel B: book-tax differences			**1,918**	**336**
- missing tax rates			113	4
Panel C: effective tax rates			**1,805**	**332**

This table presents the sample selection process.

Because proxies of tax aggressiveness and earnings management require other financial data, sample sizes differ when we use earnings management proxies, book-tax differences, and tax rates. Missing financial data necessary to calculate discretionary accruals or related control variables restrict our earnings management analysis to 2,576 firm-years among 407 firms (Panel A). For tax aggressiveness tests, we exclude firm-years with negative income before taxes (842 firm-years) and missing or negative tax expenditures (243 firm-years). Missing financial data restrict our analysis of book-tax differences to 1,918 firm-years among 336 firms (Panel B) and our analysis of tax rates to 1,805 firm-years among 332 firms (Panel C).[38]

[37] Appendix 3.B details the construction of the codetermination index. We thank Robert Scholz and Sigurt Vitols for sharing their enlarged codetermination dataset with us, allowing us to increase our sample size. While the *CDI* is subject to limitations, there are several reasons to rely on its weighting scheme. First, the *CDI* is the only index that measures differences between codetermined firms and is employed in several recent German studies (see e.g., Scholz, 2017; Campagna et al., 2020; Eulerich et al., 2020). Thus, using this weighted score could open a new research perspective on codetermination and allow for better comparisons between other studies. Second, we find similar results when we only use the first three equally weighted components of the *CDI*. Third, using another weighting scheme would undo the biggest advantage of the *CDI*—a practitioner-validated measure identifying variation in between codetermined firms.

[38] While we cannot rule out the possibility these excluded observations bias our results, untabulated univariate results suggest firms with or without *CDI* do not differ in their use of earnings management and tax aggressiveness.

3.2 Measuring tax aggressiveness

Following prior literature, we measure tax aggressiveness with total (*BTD*) and residual (*RBTD*) book-tax differences (Rego and Wilson, 2012; Khurana and Moser, 2013; Huang et al., 2016). Higher book-tax differences reflect higher tax aggressiveness. In addition, we use one-year effective tax rates (*ETR*) and cash effective tax rates (*CETR*). Lower effective tax rate values reflect higher tax aggressiveness (Chyz et al., 2013; Khan et al., 2016).[39] In additional analyses, we use longer-run tax aggressiveness measures and document similar results. Consistent with prior research, we measure our proxies for tax aggressiveness relative to similarly sized firms in the same industry (Chyz and Gaertner, 2017; Balakrishnan et al., 2019). Thus, positive (negative) values imply higher (lower) effective tax rates relative to peer firms.

3.3 Measuring earnings management

For our earnings management tests, we rely on two proxies from the earnings literature inspired by Jones (1991b).[40] We use both the Modified-Jones model (*DACC_M*), and the Performance-Adjusted-Jones model (*DACC_P*) because there are trade-offs in either measure. Because abnormal accruals are residuals from cross-sectional regressions by industry and year, we do not employ an additional industry-year adjustment (e.g., Balakrishnan et al., 2019).

3.4 Measuring codetermination

Scholz and Vitols (2019) demonstrate the broad variety of institutional approaches among the codetermination mechanisms used in German boards. Although several codetermination measures exist in the literature, including the number of employees, existence of works councils, and union coverage, the impact of these individual proxies on firm-wide decision-making processes in the board room is an open empirical question. Thus, we operationalize codetermination with the codetermination index (*CDI*) (Scholz and Vitols, 2019) and focus on board-level codetermination.[41] The ability of the *CDI* to assess the level of codetermination has been validated by members of the Hans Böckler Foundation, a part of the Confederation of German Trade Unions. The *CDI* is standardized between the values of zero (no

[39] Since tax expense and income before tax are both accounting measures, they insufficiently reflect the real tax burden and related taxable income due to differences identified in prior research (e.g., see Dyreng et al., 2008, Hanlon and Heitzman, 2010, Blouin, 2014). Furthermore, prior research highlights limitations of cash ETRs.
[40] For examples of discretionary accruals in accounting research, see Dechow et al. (1995), McNichols (2000), Kothari et al. (2005), Bergstresser and Philippon (2006), Caramanis and Lennox (2008), Dechow et al. (2010), Badolato et al. (2014), Abbott et al. (2016), and Gaver and Utke (2018).
[41] See Scholz and Vitols (2019) for more detailed descriptions on the CDI, also referred to as MB-ix in their study.

codetermination) and 100 (full compliance with all indicators) and consists of the following six components (also 0 to 100):

1. *Number and type of worker representatives on the supervisory board*: Full score if half of the supervisory board are employee representatives, internal representatives are works councilors, and unionists are full-time unionists.
2. *Employee as vice chairperson of the supervisory board*: Full score if vice chairman is an employee representative.
3. *Extent of worker representation on board committees*: Full score if half of the members on key committees (such as the audit or Human Resources (HR) committees) are employee representatives.
4. *Degree of fragmentation of worker representation through the internationalization of employment*: Full score if there is an international or European work council or if all employees are employed in Germany.
5. *Importance of the supervisory board in the corporate governance of the firm measured by the companies' legal form*: Full score if firm's legal form provides extensive decision-making rights for the supervisory board.
6. *Responsibility for personnel policies is located in the management board*: Full score if primary responsibility for HR is assigned to a Chief Human Resources Manager and not to the Chief Executive Officer or Chief Financial Officer.

To better understand what specific aspects of codetermination potentially drive the association between the *CDI* and our outcomes of interest, we also present a set of separate regressions where we include only one factor of the *CDI* and drop the other factors. For three reasons, we perform this analysis only for variables (factors) of *Union_Power*, *Union_Size*, *Works_Councils*, *Vice_Chairman*, and *Audit_Committee* (described below and in Appendix 3.A), which operationalize components (1) through (3) of *CDI*. First, variables associated with internationalization (component (4)) reflect establishment-level codetermination and, thus, have no influence on reporting decisions. Second, there is no variation in variables, such as legal form (component (5)), in our sample. Third, we measure responsibility for personnel policies through existence of a Chief Human Resource Officer (component (6)) who likely has little to no influence on firm's reporting.[42]

[42] To address the concerns that some *CDI* components are irrelevant for our study, in untabulated robustness tests we omit the last three components when calculating the index. Our inferences remain unchanged.

Each factor we separately examine is measured as follows: *Union_Power* is the share of unionists as a proportion of the total number of board members, capturing the influence of labor unions on the board. *Union_Size* is the share of full-time unionists as a proportion of the total number of unionists on the board. *Works_Councils* measures the percentage share of works councilors in the total number of employee representatives (excluding unionists). *Vice_Chairman* equals 1 if the vice chairman of the supervisory board is an employee representative. *Audit_Committee* equals 1 if employee representatives sit on the audit committee. Consistent with our focus on factors most likely to affect financial reporting decisions, we do not consider other committee membership where influence on financial reporting is likely very low, such as the HR committee.

3.5 Empirical model

To investigate the relationship between tax aggressiveness and codetermination, we estimate the following model:

$$\begin{aligned} TAX\_AGGRESSIVENESS_{it} = {} & \beta_0 + \beta_1 CODETERMINATION_{it} + \beta_2 Assets_{it} + \beta_3 Institutional_{it} \\ & + \beta_4 ROA_{it} + \beta_5 For\_Ops_{it} + \beta_6 Liab\_Cash_{it} + \beta_7 Cap\_Ex_{it} + \beta_8 PPE_{it} \\ & + \beta_9 RD_{it} + \beta_{10} NOL_{it} + \sum \beta_{11\text{-}22} * INDUSTRY \\ & + \sum \beta_{23\text{-}29} * YEAR + \varepsilon_{it} \end{aligned}$$

To investigate the relationship between earning management and codetermination we estimate the following model:

$$\begin{aligned} EARNINGS\_MANAGEMENT_{it} = {} & \beta_0 + \beta_1 CODETERMINATION_{it} + \beta_2 Assets_{it} + \beta_3 Institutional_{it} \\ & + \beta_4 ROA_{it} + \beta_5 For\_Ops_{it} + \beta_6 Liab\_Cash_{it} + \beta_7 Cap\_Ex_{it} + \beta_8 PPE_{it} \\ & + \beta_9 RD_{it} \sum \beta_{10\text{-}21} * INDUSTRY + \sum \beta_{22\text{-}28} * YEAR + \varepsilon_{it} \end{aligned}$$

Depending on the regression, CODETERMINATION refers to the Codetermination Index, *Union_Size*, *Union_Power*, *Works_Councils*, *Audit_Committee*, or *Vice_Chairman*. Significantly negative (*BTDs*) or positive (*ETRs*) β_1 coefficients would provide support for H_1 when testing tax aggressiveness and lead us to reject hypotheses H_3-H_6. Significantly negative β_1 coefficient would provide support for H_2 when testing earnings management and lead us to reject hypotheses H_3-H_6.

Our model includes various control variables based on prior literature. We use two measures associated with company size—*Assets* and *PPE*—because large companies can more easily implement tax avoidance or earnings management strategies through economies of scale and complexity. Another measure of complexity is international operations (*For_Ops*). Internationally operating firms have better opportunities to manage earnings or tax avoidance, by relocating activities to countries with low tax rates or exploiting accounting leeway in the context of cross-border activities. We also include *Institutional* to control for the influence of institutional investors. In addition, we control for the effect of current profitability by using *ROA* when *ETR*, *CETR*, and *DAAC_M* are our dependent variables. When *DACC_P* is the dependent variable, we follow Ferentinou and Anagnostopoulou (2016) and control for lagged profitability (*Lag_ROA*) and not current profitability because current profitability is a regressor in the performance adjusted Jones model (Kothari et al., 2005).[43] Including *Liab_Cash* in our regressions enables us to control for the financial circumstances of the company. High liabilities are associated with greater control by lenders, reducing the ability to manage earnings. Otherwise, high liabilities increase income volatility and, thus, incentives for management to control it by earnings management. Further, earnings management can be used to meet liabilities to lenders. We also control for research and development expenditures *(RD*) and capital expenditures (*Cap_Ex*) as possible determinants of reporting aggressiveness. For our tax aggressiveness regressions, we control for positive loss carryforward at the beginning of year t. As German firms do not report tax loss carryforward data, we assume firms have a loss carry forward at the beginning of year t when pre-tax income in year t-1 is negative.

In all regressions, we use industry and year fixed effects to isolate the impact of industries with greater opportunities for aggressive reporting and to remove other externalities, such as tax reforms, between years. Because the CDAX includes heterogeneous companies, which differ greatly in size, we calculate robust standard errors in our models to avoid heteroscedasticity. Appendix 3.A contains definitions of all variables.

[43] Controlling for current profitability (i.e., *ROA* instead of *Lag_ROA*) in our DACC_P regressions does not alter our inferences.

4. Empirical results

4.1 Descriptive results

Table 3.2 provides descriptive statistics for our sample. The CDAX contains a diverse selection of German companies, as evidenced by the large dispersion between the variables. For example, *Assets* have a range of 11.69 (14.61) at the 25th (75th) percentile and a standard deviation of 2.23. Such heterogeneity of values exists for most other variables. The mean *CDI* is 0.37, with a range of 0 (0.78) at the 25th (75th) percentile and a standard deviation of 0.39. On average, 5.52% of the employee representatives are unionists, 33.35% of the unionists are full-time unionists and 26.08% of the employee representatives (excluding unionists) are works councilors. Furthermore, 36.45% of the supervisory board vice chairmen are employee representatives and 39.36% of the audit committees are codetermined.

Table 3.2: Descriptive statistics for variables used in regressions.

Variables	Observations	Mean	Std. Dev.	25 percentile	75 percentile
TAX AGGRESSIVENESS					
BTD	1,918	.0018	.3058	-.1134	.1355
RBTD	1,918	.0020	.3055	-.1133	.1337
ETR	1,805	-.0061	.1582	-.0780	.0340
CETR	1,805	-.0054	.2041	-.1313	.0616
EARNINGS MANAGEMENT					
DACC_M	2,576	-.0175	.2850	-.1221	.0855
DACC_P	2,576	.0029	.2707	-.1092	.1071
CODETERMINATION					
CDI	2,576	.3669	.3870	0	.7833
Union_Size	2,576	.3335	.4637	0	1
Union_Power	2,576	.0552	.0752	0	.1500
Works_Councils	2,576	.2608	.3490	0	.7142
Vice_Chairman	2,576	.3645	.4814	0	1
Audit_Committee	2,576	.3936	.4887	0	1
FIRM CHARACTERISTICS					
Assets	2,576	13.2497	2.2274	11.6877	14.6080
Institutional	2.576	.0273	.0732	0	0
ROA	2,576	1.7180	14.3287	.8971	6.7289
For_Ops	2,576	.9173	.2755	1	1
Liab_Cash	2.576	.4479	.3397	.2666	.6311
Cap_Ex	2,576	.0482	.0536	.0181	.0620
PPE	2,576	.2341	.1878	.0883	.3262
RD	2,576	.0421	.0824	.0003	.0495
NOL	2,576	.1891	.3916	0	0

This table provides descriptive statistics for variables used in regressions. Detailed variable definitions are available in Appendix 3.A.

Table 3.3 presents Spearman correlations between the variables. We find negative but mostly insignificant correlations between codetermination (*CDI*, *Union_Size*, *Union_Power*, *Works_Councils*, *Vice_Chairman*, *Audit_Committee*) and earnings management (*DACC_M*, *DACC_P*). The correlations between codetermination and tax aggressiveness are less consistent. However, *Audit_Committee* is significantly positively correlated to tax rates and negatively correlated to book-tax differences. Correlations between *CDI* and tax rates are also positive, but only significant for *CETR*.[44] We do not find any statistically significant correlations between our tax aggressiveness and earnings management proxies.

Table 3.3: Correlations

Variables	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) *BTD*	**.999**	**-.371**	**-.212**	-.013	-.016	.016	.031	.021	.030	.040
(2) *RBTD*		**-.370**	**-.212**	-.000	-.005	.016	.031	.020	.030	.039
(3) *ETR*			**.415**	.004	.004	.022	.014	.013	-.010	.008
(4) *CETR*				-.024	-.014	**.052**	.013	.030	.006	.016
(5) *DACC_M*					**.869**	-.041	-.041	-.042	-.047	-.028
(6) *DACC_P*						-.040	-.037	**-.050**	-.048	-.027
(7) *CDI*							**.854**	**.820**	**.832**	**.881**
(8) *Union_Size*								**.924**	**.780**	**.917**
(9) *Union_Power*									**.741**	**.910**
(10) *Works_Councils*										**.809**

Variables	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
(1) *BTD*	-.022	.030	.036	**.151**	**-.068**	.015	.003	.035	-.040	.000
(2) *RBTD*	-.025	.027	.035	**.157**	**-.067**	.016	.005	.036	-.041	.001
(3) *ETR*	**.060**	.023	-.045	**-.359**	**.076**	**.099**	.021	-.024	.025	.012
(4) *CETR*	**.0681**	.0430	-.004	**-.255**	**.092**	.014	-.022	-.020	-.010	**-.082**
(5) *DACC_M*	-.021	.021	.001	.036	-.000	**.114**	.023	-.028	.003	**-.107**
(6) *DACC_P*	-.022	.019	-.004	.002	-.013	**.119**	-.039	**-.105**	-.027	**-.082**
(7) *CDI*	**.834**	**.739**	**.056**	**-.129**	.046	**.376**	**.221**	**.348**	.015	-.036
(8) *Union_Size*	**.751**	**.691**	**.069**	**-.086**	.009	**.346**	**.208**	**.282**	.029	-.024
(9) *Union_Power*	**.764**	**.642**	**.074**	**-.063**	-.001	**.305**	**.166**	**.245**	.0315	-.027
(10) *Works_Councils*	**.709**	**.664**	.0319	**-.155**	**.068**	**.3719**	**.193**	**.305**	**.096**	-.039
(11) *Vice_Chairman*	**.781**	**.727**	.047	**-.100**	.038	**.364**	**.188**	**.291**	.007	-.034
(12) *Audit_Committee*		**.679**	.072	-.159	.021	.343	.127	.219	.089	-.030
(13) *Assets*			**.051**	**-.172**	**.125**	**.445**	**.141**	**.265**	-.026	**-.052**
(14) *Institutional*				.032	-.026	.007	.001	**-.062**	**.066**	.018
(15) *ROA*					-.017	**-.358**	**.061**	**-.120**	**.162**	**-.205**
(16) *For_Ops*						**.049**	-.017	-.021	**.164**	.004
(17) *Liab_Cash*							**.147**	**.268**	**-.130**	**.063**
(18) *Cap_Ex*								**.658**	**.067**	**-.098**
(19) *PPE*									**-.107**	.030
(20) *RD*										.007

*This table presents Spearman correlation coefficients for variables used in our regression models. Correlations that are significant at the 5 percent level are in **bold**. Variable definitions are included in Appendix 3.A.*

[44] We find significant correlations between *CDI* components. As such, we test them separately and find variance inflation factors (VIFs) consistently below 5 and mean VIFs around 2, suggesting multicollinearity is not a problem. Nevertheless, our results are similar when we exclude assets, suggesting size does not drive our results.

In univariate analysis we find evidence for the noise in codetermination measures solely based on company size.[45] Though no codetermination requirement exists in firms with less than 501 employees, we find some exceptions, leading to an average *CDI* of 0.0267. In addition, codetermination laws require unionists on boards in firms with more than 2,000 employees. However, 0.01% of the board members in firms with less than 501 employees and 0.71% of board members in firms with more than 500 but less than 2,001 employees are unionists.

4.2 Empirical results: Tax aggressiveness

Tables 3.5 and 3.6 summarize the ordinary least squares (OLS) regression results for our tests examining the relation between codetermination, its factors, and tax aggressiveness. For each model, we vary the measurement of codetermination by using either the *CDI* or our variables on the supervisory board structure (*Union_Size*, *Union_Power*, *Works_Councils*, *Vice_Chairman*, and *Audit_Committee*). Because earnings management can influence book-tax differences, we examine the impact of codetermination on book-tax differences that have been "purged" of the effects of earnings management with *RBTD* in model (2).[46]

Our results provide support for H_1 that codetermination leads to less tax aggressiveness. The associations between *CDI* and both *BTD* and *RBTD* in models (1) and (2) are negative and significant. This association is also significantly positive with *ETR* measures in models (3) and (4). The x-standardized coefficients shed light on the economic significance of codetermination relative to other significant factors. When *CDI* increases by one standard deviation, *BTD* (*RBTD*) decreases by .0245 (.0246). The magnitude of the *CDI* effect seems economically significant as it is among the highest in models (1) and (2).[47] *ETR* (*CETR*) increases by .0111 (.0198) when *CDI* increases by one standard deviation. Although the magnitude of this effect appears smaller in models (3) and (4), the economic effects are not trivial.

[45] We do not include controls for (1/3 or 1/2) board structures in our models, leading to concerns our inferences are confounded. Moon et al. (2022) suggest confounding variables are correlated with both the independent variable of interest (in our case, the *CDI* and its components) and dependent variable (firm outcome measures). Descriptive evidence in Table 3.4 suggests board structure is associated with *CDI* and its components but not with any of our dependent variables. Thus, we do not believe board structure is a useful control in our research design.
[46] For robustness, we rerun these same tests including discretionary accruals as a control and find substantially similar results that help address concerns earnings management is a correlated omitted variable. We also account for the contemporaneous existence of the separate *CDI* factors in untabulated analyses by including each of the five mechanisms simultaneously in one regression and find similar results.
[47] We find x-standardized coefficients on *Liab_Cash*, *Cap_Ex*, and *PPE* to be lower than that of the *CDI*. The only significant variable with a higher x-standardized-coefficient is *ROA*.

Table 3.4: Univariate tests

Variables	(1) *No_ Codetermination* (n = 1,049)	(2) *1/3_ Codetermination* (n = 488)	(3) *Parity_ Codetermination* (n = 1,039)	(4) Difference (2)-(1)	(5) Difference (3)-(1)	(6) Difference (3)-(2)
BTD	.0213	-.0251	-.0002	-.0464**	-0.0216	.0248
RBTD	.0225	-.0253	-.0003	-.0478**	-.0228	.0250
ETR	-.0077	.0039	-.0010	.0116	.0066	-.0049
CETR	-.0208	.0120	-.0003	.0329**	.0205*	-.0124
DACC_M	-.0219	-.0127	-.0152	.0092	.0066	-.0026
DACC_P	.0019	.0079	.0015	.0060	-.0004	-.0064
CDI	.0267	.3087	.7378	.2819***	.7111***	.4291***
Union_Size	.0010	.0297	.8120	.0288***	.8110***	.7823***
Union_Power	.0001	.0071	.1334	.0070***	.1333***	.1263***
Works_Councils	.0187	.1434	.5603	.1246***	.5415***	.4169***
Vice_Chairman	.0048	.1127	.8460	.1079***	.8412***	.7330***
Audit_Committee	.0124	.3217	.8123	.3094***	.7999***	.4906***
Assets	11.4026	13.0380	15.2140	1.6354***	3.8114***	2.1760***
Institutional	.0348	.0173	.0243	-.0175***	-.0106***	.0069***
ROA	-2.0520	4.8440	4.0561	6.8960***	6.1081***	-.7879*
For_Ops	.8761	.9385	.9490	.0625***	.0729***	.0105
Liab_Cash	.3496	.4271	.5569	.0775***	.2073***	.1298***
Cap_Ex	.0427	.0494	.0532	.0066**	.0104***	.0038*
PPE	.1782	.2587	.2788	.0805***	.1006***	.0201**
RD	.0616	.0338	.0262	-.0278***	-.0353***	-.0076***
NOL	.2965	.1230	.1116	-.1735***	-.1848***	-.0113

*This table presents descriptive statistics for the variables used in our regressions. We divide the sample into three groups: (1) No_Codetermination, if the firm has less than 501 employees, (2) 1/3_Codetermination, if the firm has more than 500 but less than 2,001 employees, and (3) Parity_Codetermination, if the firm has more than 2,000 employees. Detailed variable definitions are available in Appendix 3.A. *, **, and *** denote significance level of 0.1, 0.05, 0.01, respectively, for results of t-test of means in columns (4) through (6).*

Table 3.5: OLS regression results of codetermination and book-tax differences

	(1)						(2)					
	BTD	*BTD*	*BTD*	*BTD*	*BTD*	*BTD*	*RBTD*	*RBTD*	*RBTD*	*RBTD*	*RBTD*	*RBTD*
CDI	-0.063**						-0.064**					
	(-2.39)						(-2.40)					
Union_Size		-0.009						-0.009				
		(-0.50)						(-0.50)				
Union_Power			-0.078						-0.081			
			(-0.69)						(-0.71)			
Works_Councils				0.001						0.001		
				(0.05)						(0.05)		
Vice_Chairman					-0.017						-0.017	
					(-0.89)						(-0.90)	
Audit_Committee						-0.047**						-0.047**
						(-2.50)						(-2.51)
Assets	0.003	-0.004	-0.004	-0.006	-0.003	0.002	0.002	-0.004	-0.004	-0.006	-0.003	0.001
	(0.45)	(-0.81)	(-0.70)	(-1.07)	(-0.54)	(0.29)	(0.42)	(-0.86)	(-0.73)	(-1.12)	(-0.57)	(0.25)
Institutional	0.209	0.210	0.211	0.209	0.210	0.214	0.215	0.216	0.217	0.215	0.216	0.219
	(1.47)	(1.46)	(1.47)	(1.45)	(1.46)	(1.50)	(1.52)	(1.51)	(1.51)	(1.49)	(1.51)	(1.54)
ROA	0.009***	0.008***	0.009***	0.008***	0.008***	0.008***	0.009***	0.008***	0.008***	0.008***	0.008***	0.008***
	(5.69)	(5.64)	(5.65)	(5.61)	(5.64)	(5.47)	(5.69)	(5.64)	(5.65)	(5.60)	(5.63)	(5.46)
For_Ops	-0.035	-0.030	-0.031	-0.029	-0.031	-0.038	-0.037	-0.033	-0.034	-0.031	-0.034	-0.041
	(-1.11)	(-0.97)	(-0.99)	(-0.92)	(-1.00)	(-1.22)	(-1.19)	(-1.04)	(-1.07)	(-0.99)	(-1.07)	(-1.29)
Liab_Cash	0.083**	0.083**	0.083**	0.082**	0.083**	0.086***	0.085**	0.084**	0.084**	0.083**	0.085**	0.087***
	(2.52)	(2.49)	(2.48)	(2.47)	(2.51)	(2.59)	(2.55)	(2.52)	(2.52)	(2.50)	(2.54)	(2.62)
Cap_Ex	-0.488**	-0.465**	-0.468**	-0.464**	-0.471**	-0.481**	-0.488**	-0.465**	-0.469**	-0.465**	-0.472**	-0.481**
	(-2.42)	(-2.30)	(-2.32)	(-2.30)	(-2.33)	(-2.38)	(-2.42)	(-2.30)	(-2.31)	(-2.29)	(-2.33)	(-2.38)
PPE	0.097*	0.080	0.081	0.079	0.084	0.083	0.100*	0.083	0.083	0.082	0.086	0.085
	(1.79)	(1.49)	(1.51)	(1.47)	(1.55)	(1.55)	(1.84)	(1.53)	(1.55)	(1.51)	(1.59)	(1.59)
RD	-0.167	-0.171	-0.171	-0.173	-0.170	-0.157	-0.143	-0.148	-0.147	-0.150	-0.147	-0.134
	(-1.31)	(-1.33)	(-1.32)	(-1.33)	(-1.32)	(-1.23)	(-1.13)	(-1.15)	(-1.14)	(-1.15)	(-1.14)	(-1.05)
NOL	0.020	0.020	0.020	0.019	0.020	0.020	0.018	0.017	0.017	0.017	0.017	0.017
	(0.53)	(0.51)	(0.51)	(0.50)	(0.51)	(0.52)	(0.46)	(0.44)	(0.45)	(0.43)	(0.44)	(0.45)
Year & Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,918	1,918	1,918	1,918	1,918	1,918	1,918	1,918	1,918	1,918	1,918	1,918
Adj. R-squared	0.0345	0.0319	0.0319	0.0317	0.0321	0.0348	0.0345	0.0319	0.0320	0.0318	0.0321	0.0348

*This table presents regression results of codetermination and book-tax differences. Detailed variable definitions are available in Appendix 3.A. t-statistics are reported under each coefficient in parentheses. *, **, and *** denote significance level of 0.1, 0.05, 0.01, respectively.*

Table 3.6: OLS regression results of codetermination and tax rates

	(3)						(4)					
	ETR	*ETR*	*ETR*	*ETR*	*ETR*	*ETR*	*CETR*	*CETR*	*CETR*	*CETR*	*CETR*	*CETR*
CDI	0.029**						0.051***					
	(2.08)						(2.80)					
Union_Size		0.013						0.011				
		(1.27)						(0.80)				
Union_Power			0.101						0.173**			
			(1.61)						(2.06)			
Works_Councils				-0.012						-0.003		
				(-0.90)						(-0.17)		
Vice_Chairman					0.007						0.005	
					(0.74)						(0.38)	
Audit_Committee						0.024***						0.037***
						(2.61)						(3.01)
Assets	-0.005**	-0.003	-0.004	-0.000	-0.003	-0.005**	-0.008**	-0.004	-0.006*	-0.002	-0.003	-0.008**
	(-1.96)	(-1.33)	(-1.54)	(-0.13)	(-1.03)	(-2.19)	(-2.50)	(-1.10)	(-1.90)	(-0.54)	(-0.83)	(-2.44)
Institutional	0.003	0.002	0.001	0.003	0.003	0.000	-0.042	-0.044	-0.047	-0.043	-0.043	-0.047
	(0.05)	(0.03)	(0.01)	(0.04)	(0.04)	(0.00)	(-0.63)	(-0.65)	(-0.69)	(-0.64)	(-0.64)	(-0.70)
ROA	-0.011***	-0.011***	-0.011***	-0.011***	-0.011***	-0.011***	-0.011***	-0.011***	-0.011***	-0.011***	-0.011***	-0.011***
	(-12.02)	(-11.99)	(-12.04)	(-11.99)	(-11.96)	(-11.90)	(-10.48)	(-10.44)	(-10.49)	(-10.42)	(-10.39)	(-10.37)
For_Ops	0.006	0.005	0.006	0.002	0.004	0.008	0.043**	0.039*	0.043**	0.037*	0.038*	0.046**
	(0.29)	(0.25)	(0.28)	(0.09)	(0.19)	(0.39)	(2.02)	(1.83)	(2.00)	(1.71)	(1.77)	(2.13)
Liab_Cash	-0.029**	-0.030**	-0.030**	-0.028*	-0.029**	-0.030**	-0.048**	-0.048**	-0.048**	-0.047**	-0.047**	-0.049**
	(-2.07)	(-2.08)	(-2.07)	(-1.96)	(-2.05)	(-2.12)	(-2.49)	(-2.46)	(-2.49)	(-2.40)	(-2.43)	(-2.54)
Cap_Ex	0.203***	0.191***	0.195***	0.184**	0.192***	0.202***	0.068	0.044	0.054	0.040	0.044	0.062
	(2.86)	(2.69)	(2.75)	(2.55)	(2.69)	(2.83)	(0.72)	(0.46)	(0.56)	(0.42)	(0.46)	(0.65)
PPE	-0.099***	-0.092***	-0.093***	-0.088***	-0.092***	-0.093***	-0.080**	-0.065*	-0.069**	-0.063*	-0.065*	-0.067*
	(-3.96)	(-3.71)	(-3.75)	(-3.53)	(-3.69)	(-3.71)	(-2.30)	(-1.88)	(-1.98)	(-1.81)	(-1.85)	(-1.95)
RD	0.038	0.042	0.040	0.056	0.044	0.032	0.039	0.053	0.044	0.060	0.055	0.033
	(0.69)	(0.77)	(0.73)	(1.01)	(0.81)	(0.58)	(0.51)	(0.69)	(0.57)	(0.77)	(0.72)	(0.43)
NOL	-0.002	-0.002	-0.002	-0.002	-0.002	-0.003	-0.038	-0.037	-0.038	-0.037	-0.037	-0.038*
	(-0.13)	(-0.13)	(-0.13)	(-0.11)	(-0.11)	(-0.14)	(-1.64)	(-1.62)	(-1.64)	(-1.60)	(-1.60)	(-1.65)
Year & Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,805	1,805	1,805	1,805	1,805	1,805	1,805	1,805	1,805	1,805	1,805	1,805
Adj. R-squared	0.1287	0.1273	0.1278	0.1269	0.1268	0.1297	0.0852	0.0813	0.0832	0.0810	0.0811	0.0854

*This table presents regression results of codetermination and tax rates. Detailed variable definitions are available in Appendix 3.A. t-statistics are reported under each coefficient in parentheses. *, **, and *** denote significance level of 0.1, 0.05, 0.01, respectively.*

As we separate the *CDI* into its components, the most consistent evidence we document supports H_3 that examines the role played by employees included in the audit committee. Specifically, the inclusion of employees in the audit committee has a negative and statistically significant association with tax aggressiveness across all four models. Many studies analyze the effects of board and audit committee independence and financial expertise on tax aggressiveness (e.g. Robinson et al., 2012, Richardson et al., 2013, Armstrong et al., 2015). However, results of the relationships among audit committee characteristics and tax avoidance are inconclusive (Armstrong et al., 2015).

By contrast, we do not find strong empirical support for H_4-H_6 examining the roles of unions, works councilors, and vice chairman as they relate to tax aggressiveness. We find insignificant coefficients on *Union_Size*, *Union_Power*, *Works_Councils*, and *Vice_Chairman* in most specifications using one-year ETRs.[48] Only model (4) where *CETR* is the dependent variable shows that higher proportions of unionists on the board are negatively associated with tax aggressiveness. This is consistent with Chyz et al. (2013), who find a negative relation between union presence and tax aggressiveness in the US.

The proportion of works councilors and appointment of an employee representative as vice chairman do not affect tax aggressiveness. These results suggest the connection between works councilors on board and works councils at the establishment level does not provide useful additional information regarding taxes to supervisory boards. No significant influence of the vice chairman of the supervisory board confirms the importance of codetermined audit committees as employee influence on board activities and meeting agenda does not affect tax aggressiveness.

4.3 Empirical results: Earnings management

Table 3.7 summarizes the results for our tests examining the relation between codetermination, its components, and earnings management. We analyze the association between codetermination and earnings management using *DACC_M* in model (5) and *DACC_P* in model (6). As in our tax aggressiveness tests, we vary codetermination measurement by using

[48] We also test H_1 using long-run (i.e., three-year) tax aggressiveness measures to address volatility in annual measures of tax aggressiveness that could add noise to our results (Dyreng et al, 2008). Results with these alternative measures for tax aggressiveness are consistent with those in Tables 3.5 and 3.6. We also find evidence that union power and size are negatively associated with tax aggressiveness, although union power appears to play a stronger role. These findings could be the result of less effective monitoring by non-union employees who are less likely than full-time unionists to have industry-specific and financial expertise, and less likely able to influence firm outcomes through work stoppages (Agrawal, 2012; Prevost et al., 2012; Chyz et al., 2013).

the codetermination index or the individual codetermination mechanisms (*Union_Size*, *Union_Power*, *Works_Councils*, *Vice_Chairman*, and *Audit_Committee*). Our results provide support for H_2 that codetermination leads to less earnings management. Specifically, the association between *CDI* and both *DACC_M* and *DACC_P* in models (5) and (6) is negative and significant ($p < 1\%$).

In our OLS regressions separating the *CDI* into its components, the results provide support for H_3-H_6 when earnings management proxies are our dependent variables. We find the inclusion of employees in the audit committee continues to be an important mechanism for employees to influence financial reporting outcomes. The coefficient on *Audit_Committee* is negative and statistically significant in both models. However, other components of codetermination are also significantly and negatively associated with earnings management, suggesting that employee representatives on the board are concerned about earnings management and could potentially influence it. The union-related effects are consistent with prior research in US settings (Bova, 2013; Hamm et al., 2018).[49] The significant effect of the proportion of work councilors and whether the vice chairman is an employee representative are consistent with Scholz and Vitols (2019) who describe both as aspects of strong codetermination.

To provide additional insights into the relation between codetermination and earnings management, we differentiate between firms using income-increasing earnings management (*DACC_M*>0 or *DACC_P*>0) versus income-decreasing earnings management (*DACC_P*<0, *DACC_M*<0). The untabulated results suggest codetermination is negatively associated with income-increasing earnings management but not with income-decreasing earnings management. We find negative and significant coefficients on each codetermination component when we restrict the sample to firms using income-decreasing earnings management. This result is consistent with employees not benefiting from an increase in firm's income due to earnings management and being adversely impacted by the costs and risks associated with earnings management. Furthermore, none of the codetermination components significantly impacts earnings management when we restrict the sample to firms using income-decreasing earnings management.

[49] For robustness, we rerun these same tests including *ETR* as a control and find substantially similar results to address concerns that tax aggressiveness is a correlated omitted variable.

Table 3.7: OLS regression results of codetermination and accruals earnings management

	(5)						(6)					
	DACC_M	*DACC_M*	*DACC_M*	*DACC_M*	*DACC_M*	*DACC_M*	*DACC_P*	*DACC_P*	*DACC_P*	*DACC_P*	*DACC_P*	*DACC_P*
CDI	-0.132***						-0.111***					
	(-5.75)						(-5.15)					
Union_Size		-0.082***						-0.070***				
		(-5.45)						(-4.79)				
Union_Power			-0.504***						-0.467***			
			(-5.45)						(-5.23)			
Works_Councils				-0.092***						-0.078***		
				(-4.63)						(-4.21)		
Vice_Chairman					-0.087***						-0.073***	
					(-5.46)						(-4.78)	
Audit_Committee						-0.072***						-0.060***
						(-4.69)						(-4.24)
Assets	0.020***	0.016***	0.016***	0.013***	0.017***	0.015***	0.016***	0.012***	0.013***	0.010***	0.013***	0.011***
	(4.67)	(3.95)	(3.93)	(3.49)	(4.14)	(3.62)	(4.23)	(3.50)	(3.74)	(3.09)	(3.68)	(3.29)
Institutional	0.093	0.111	0.113	0.106	0.105	0.108	-0.007	0.008	0.010	0.004	0.003	0.006
	(0.99)	(1.18)	(1.20)	(1.12)	(1.11)	(1.15)	(-0.09)	(0.09)	(0.12)	(0.04)	(0.03)	(0.07)
ROA	0.001**	0.001**	0.001**	0.001**	0.001**	0.001**						
	(2.18)	(2.11)	(2.19)	(2.08)	(2.08)	(2.13)						
For_Ops	-0.050*	-0.052**	-0.051**	-0.046*	-0.051*	-0.050*	-0.052**	-0.053**	-0.054**	-0.049*	-0.053**	-0.052**
	(-1.93)	(-1.97)	(-1.96)	(-1.77)	(-1.96)	(-1.90)	(-2.06)	(-2.10)	(-2.12)	(-1.93)	(-2.08)	(-2.03)
Liab_Cash	0.181***	0.180***	0.180***	0.180***	0.183***	0.181***	0.168***	0.167***	0.167***	0.166***	0.168***	0.167***
	(5.84)	(5.78)	(5.76)	(5.74)	(5.84)	(5.76)	(5.28)	(5.23)	(5.24)	(5.19)	(5.28)	(5.21)
Cap_Ex	0.419**	0.453**	0.444**	0.438**	0.438**	0.436**	0.251	0.279*	0.271*	0.266*	0.267*	0.265*
	(2.25)	(2.45)	(2.39)	(2.35)	(2.36)	(2.35)	(1.61)	(1.81)	(1.75)	(1.72)	(1.72)	(1.71)
PPE	-0.044	-0.067	-0.066	-0.058	-0.058	-0.066	-0.120***	-0.140***	-0.139***	-0.132***	-0.132***	-0.139***
	(-0.98)	(-1.52)	(-1.50)	(-1.30)	(-1.31)	(-1.49)	(-2.89)	(-3.39)	(-3.38)	(-3.18)	(-3.20)	(-3.37)
RD	0.181*	0.181*	0.181*	0.188*	0.183*	0.173*	0.146	0.145	0.148	0.151	0.146	0.138
	(1.85)	(1.86)	(1.86)	(1.91)	(1.87)	(1.77)	(1.39)	(1.38)	(1.41)	(1.43)	(1.39)	(1.31)
Lag_ROA							0.002***	0.002***	0.002***	0.002***	0.002***	0.002***
							(3.08)	(3.03)	(3.07)	(3.01)	(3.01)	(3.04)
Year & Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,576	2,576	2,576	2,576	2,576	2,576	2,576	2,576	2,576	2,576	2,576	2,576
Adj. R-squared	0.0565	0.0519	0.0520	0.0501	0.0533	0.0511	0.0476	0.0441	0.0454	0.0426	0.0449	0.0430

*This table presents regression results of codetermination and accruals earnings management. Detailed variable definitions are available in Appendix 3.A. t-statistics are reported under each coefficient in parentheses. *, **, and *** denote significance level of 0.1, 0.05, 0.01, respectively.*

The x-standardized coefficients on CDI suggest codetermination has an economically significant effect on earnings management. When *CDI* increases by one standard deviation, *DACC_M* (*DACC_P*) decreases by .051 (.043). The magnitude of the *CDI* is among the highest in model (5) and (6).[50]

We find positive and significant coefficients on *Liab_Cash*. Prior research (e.g. Badolato et al., 2014, Abbott et al., 2016) argues high leverage is associated with greater control by lenders, reducing the ability to manage earnings. Otherwise, earnings management can help to meet liabilities to lenders and high leverage increases the volatility of income and, thus, the incentives for management to control it by earnings management. Contrary to our expectations and prior research (Badolato et al., 2014), we find a negative effect of *internationalization* on earnings management, suggesting international firms use less income-increasing earnings management. All other controls are consistent with prior literature.[51]

One potential explanation for the consistent impact of audit committee representation in explaining the relations between codetermination and both tax aggressiveness and earnings management could come from the recommendation in German Corporate Governance Code Article 5.2. This article states the chairman of the supervisory board may cast a tie-breaking vote in general board decisions. Because the chairman of the supervisory board cannot serve as chairman of the audit committee, this situation is not possible in the audit committee. Thus, employee representatives on the audit committee have stronger influence on financial reporting decisions than through other board positions.

5 Additional analyses

5.1 Endogeneity

A strength of our study is the use of the CDI to improve identification, as it covers several non-mandatory aspects of codetermination. However, we acknowledge audit committee membership and a firm's level of reporting aggressiveness could be endogenously determined. We address this potential limitation of our study in an untabulated analysis by applying a Durbin-Wu-Hausman test (Durbin, 1954; Wu, 1974; Hausman, 1978). This test requires us to

[50] We find x-standardized coefficients on *Assets*, *ROA*, *Lag_ROA*, *For_Ops*, *Cap_Ex*, and *RD* to be lower than that of the *CDI*. The only significant variable with a higher x-standardized-coefficient is *Liab_Cash*.

[51] We are unable to control for corporate governance mechanisms affecting financial reporting outcomes, such as the number of independent directors or the financial expertise of board members. We use the Refinitiv database to identify external auditors for approximately 74% of our sample. In untabulated robustness tests, we find our inferences remain unchanged upon inclusion of a Big 4 auditor indicator variable.

find an instrument for the *CDI*. Consistent with Balsmeier et al. (2013), we argue employee representatives orient their behavior according to their industry peers, while employee representatives are individually unable to affect the whole industry significantly. Thus, we take the average CDI for each industry (based on Fama-French 12 industry classification) and firm size quantile (using total Assets) as an instrument for the CDI. As our tax aggressiveness and earnings management measures capture reporting aggressiveness relative to peer firms within the same industry, they are, by construction, independent from characteristics affecting reporting aggressiveness of all firms in a given industry. Following Fauver and Fuerst (2006), we also include the number of domestic employees as a second instrument as German codetermination laws induce a strong exogenous relationship between the number of domestic employees and the number of employee representatives.

In the first stage, we estimate two models in which we regress *CDI* on the instruments plus all the relevant explanatory variables. As indicated by F-tests on the joint significance of the instruments (*p-value* < 0.01), both instruments explain a significant part of the variation in the *CDI*. According to Staiger and Stock's (1997) rule of thumb, the F-test values indicate the instruments are not weak, as they exceed the minimum value of 10. Therefore, weak instrument bias is unlikely to affect our first-stage results. In the second stage, we include the residuals of the first-stage specifications in our models as additional regressors. Consistent with Balsmeier et al. (2013), we find no significant coefficients on the residuals, providing evidence endogeneity is not driving our results.

5.2 Real earnings management

In our earlier accrual earnings management tests, we document a negative and significant association between discretionary accruals and codetermination. Because employees should have a better understanding of the impacts of operational decisions, it is possible they could more effectively monitor and curtail real earnings management. At the same time, in some cases employees could have incentives to increase real earnings management when it could lead to increased wages (Gleason et al., 2021). To test these competing assertions, we replace accruals earnings management dependent variables with three measures of real earnings management from Roychowdhury (2006). These include abnormal cash flows (*AbnCFO*), abnormal expenditures (*AbnEXP*), and abnormal production (*AbnPROD*).

Abnormal cash flows can be a symptom of excessive price discounting and lenient credit terms customers could reasonably expect to persist. Abnormal expenditures lead to myopic reductions

in discretionary expenses, such as research and development, that could decrease firms' competitiveness and long-term value. Finally, abnormal production causes excess inventory, helping decrease the reported cost of goods sold but increasing inventory holding costs. The negative impacts of real earnings management can exceed the negative impacts of accruals earnings management (Roychowdhury, 2006; Cohen and Zarowin, 2010; Achleitner et al., 2014), and managers' private costs of real earnings management are less than managers' private costs of accruals earnings management (Roychowdhury, 2006). To the extent employees are effective monitors, codetermination should be negatively associated with real earnings management. However, the variation in incentives among employees could impact the source of the association between codetermination and real earnings management.

Prior research indicates that auditors are aware of real earnings management and related increased audit costs (Greiner et al., 2016; Commerford et al., 2018; Commerford et al., 2016, 2019), suggesting strong incentives for audit committees to reduce real earnings management. To the extent employees are better placed to detect real earnings management through their understanding of and contacts with operations, we would expect employee representation on audit committees to be negatively related to real earnings management. A better understanding of operations and contacts with operations employees could also lead to a negative association between non-audit committee employee representation and real earnings management unless more self-serving incentives are present. Gleason et al. (2021) argue employees have incentives to increase abnormal production as it increases wages while the impact of abnormal cash flows and abnormal expenditures on wages is not as direct, making predictions less clear.

We summarize our real earnings management regression results in Tables 3.8 and 3.9. We find the codetermination index is significantly and negatively associated with abnormal expenditures (*AbnEXP*) and abnormal production (*AbnPROD*) but not significantly associated with abnormal cash flows (*AbnCFO*). When we decompose the index into its components, we find the presence of an employee on the audit committee is negatively associated with abnormal expenditures and abnormal production. Coefficients on *Works_Councils* and *Vice_Chairman* are significantly negative in terms of abnormal expenditures and abnormal production but not significant in terms of abnormal cash flow.

We also find a negative effect of *Union_Size* and *Union_Power* on abnormal expenditures. Unlike the US setting where research and development is less likely to be undertaken by unionized employees, reducing unions' incentives to support it (Bradley et al., 2017), this result

is consistent with a broader industry sector membership base of German unions representing all types of employees within the firm, not only blue-collar workers.

Finally, we find a positive association between abnormal cash flows and the presence of an employee on the audit committee. This result provides evidence employees can use their influence on the supervisory board to affect strategic decisions, such as excessive price discounting and lenient credit terms customers. Alternatively, it could be that discounting is perceived by audit committee members as a more transparent and acceptable form of real earnings management. As we are aware of no study that analyzes the relation between codetermination and corporate strategy, we encourage further research to provide more evidence on the effect of codetermination on a firm's competitive strategy.

6 Conclusion

This study examines whether codetermination is associated with less aggressive financial and tax reporting. We measure aggressive reporting as tax aggressiveness and upward earnings management. Without effective monitoring by employees, their relative lack of financial expertise could incentivize management to maintain information asymmetries between themselves and other stakeholders, thereby leading to more earnings management. In a principal-agent setting in which employees prefer less aggressive reporting due to their risk aversion and smaller benefits aggressive reporting, we predict and find codetermination is associated with reductions in tax aggressiveness and earnings management. We also find employee representation on the audit committee is the most important codetermination mechanism associated with reductions in tax and financial reporting aggressiveness, including real earnings management. Our results are mostly consistent (some results of tests using individual codetermination index components were not statistically significant with one-year measures) with Chyz et al. (2013), who document a negative association between union power and influence and tax aggressiveness, and with Call et al. (2017), who find rank-and-file employees can help improve financial reporting quality.

Table 3.8: OLS regression results of codetermination and real earnings management (abnormal cash flows and expenditures)

	(7)						(8)					
	AbnCFO	AbnCFO	AbnCFO	AbnCFO	AbnCFO	AbnCFO	AbnEXP	AbnEXP	AbnEXP	AbnEXP	AbnEXP	AbnEXP
CDI	0.010						-0.089***					
	(1.38)						(-4.25)					
Union_Size		0.004						-0.037**				
		(0.81)						(-2.40)				
Union_Power			0.034						-0.314***			
			(0.97)						(-3.18)			
Works_Councils				0.001						-0.062***		
				(0.11)						(-3.40)		
Vice_Chairman					0.003						-0.060***	
					(0.51)						(-3.81)	
Audit_Committee						0.010**						-0.073***
						(2.22)						(-5.27)
Assets	-0.000	0.000	0.000	0.001	0.001	-0.000	0.025***	0.019***	0.021***	0.020***	0.023***	0.025***
	(-0.07)	(0.25)	(0.16)	(0.57)	(0.34)	(-0.25)	(6.03)	(5.19)	(5.74)	(5.64)	(6.03)	(7.04)
Institutional	-0.056*	-0.057**	-0.057**	-0.057**	-0.057**	-0.056**	-0.021	-0.010	-0.009	-0.014	-0.014	-0.014
	(-1.96)	(-2.00)	(-2.01)	(-2.01)	(-2.00)	(-1.99)	(-0.39)	(-0.18)	(-0.16)	(-0.26)	(-0.26)	(-0.26)
ROA	-0.004***	-0.004***	-0.004***	-0.004***	-0.004***	-0.004***	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(-11.94)	(-11.95)	(-11.94)	(-11.95)	(-11.95)	(-11.92)	(-0.59)	(-0.59)	(-0.56)	(-0.62)	(-0.66)	(-0.61)
For_Ops	-0.028***	-0.028***	-0.028***	-0.028***	-0.028***	-0.027***	0.012	0.014	0.012	0.015	0.012	0.010
	(-2.83)	(-2.84)	(-2.83)	(-2.88)	(-2.86)	(-2.78)	(0.47)	(0.53)	(0.48)	(0.59)	(0.46)	(0.38)
Liab_Cash	0.061***	0.061***	0.061***	0.061***	0.061***	0.060***	0.021	0.017	0.018	0.018	0.021	0.022
	(4.68)	(4.71)	(4.70)	(4.71)	(4.71)	(4.61)	(0.93)	(0.77)	(0.82)	(0.82)	(0.94)	(1.00)
Cap_Ex	-0.185*	-0.187*	-0.187*	-0.187*	-0.187*	-0.185*	0.219	0.240	0.235	0.232	0.231	0.226
	(-1.80)	(-1.82)	(-1.82)	(-1.82)	(-1.82)	(-1.81)	(1.07)	(1.15)	(1.13)	(1.13)	(1.12)	(1.10)
PPE	-0.008	-0.006	-0.006	-0.006	-0.006	-0.006	-0.108***	-0.123***	-0.122***	-0.116***	-0.117***	-0.123***
	(-0.51)	(-0.40)	(-0.41)	(-0.41)	(-0.42)	(-0.40)	(-3.73)	(-4.11)	(-4.13)	(-3.94)	(-3.98)	(-4.15)
RD	-0.008	-0.008	-0.008	-0.006	-0.007	-0.009	-1.494***	-1.500***	-1.495***	-1.489***	-1.493***	-1.492***
	(-0.13)	(-0.12)	(-0.13)	(-0.10)	(-0.11)	(-0.14)	(-9.51)	(-9.39)	(-9.40)	(-9.30)	(-9.43)	(-9.47)
Year & Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,571	2,571	2,571	2,571	2,571	2,571	2,495	2,495	2,495	2,495	2,495	2,495
Adj. R-squared	0.3054	0.3051	0.3052	0.3049	0.3050	0.3060	0.2239	0.2189	0.2208	0.2205	0.2224	0.2262

*This table presents regression results of codetermination and real earnings management (i.e., abnormal cash flows and expenditures). Detailed variable definitions are available in Appendix 3.A. t-statistics are reported under each coefficient in parentheses. *, **, and *** denote significance level of 0.1, 0.05, 0.01, respectively.*

Table 3.9: OLS regression results of codetermination and real earnings management (abnormal production)

	(9)					
	AbnPROD	AbnPROD	AbnPROD	AbnPROD	AbnPROD	AbnPROD
CDI	-0.046**					
	(-2.19)					
Union_Size		-0.020				
		(-1.28)				
Union_Power			-0.203**			
			(-2.11)			
Works_Councils				-0.057***		
				(-3.12)		
Vice_Chairman					-0.042***	
					(-2.74)	
Audit_Committee						-0.047***
						(-3.36)
Assets	0.019***	0.016***	0.018***	0.019***	0.020***	0.021***
	(5.24)	(4.90)	(5.59)	(6.08)	(6.01)	(6.47)
Institutional	-0.135**	-0.129*	-0.128*	-0.133**	-0.132**	-0.131**
	(-2.04)	(-1.95)	(-1.93)	(-2.02)	(-1.99)	(-1.97)
ROA	-0.003***	-0.003***	-0.003***	-0.003***	-0.003***	-0.003***
	(-7.75)	(-7.73)	(-7.75)	(-7.84)	(-7.83)	(-7.83)
For_Ops	-0.023	-0.022	-0.024	-0.022	-0.024	-0.025
	(-0.98)	(-0.94)	(-1.01)	(-0.96)	(-1.04)	(-1.09)
Liab_Cash	0.081***	0.080***	0.081***	0.083***	0.083***	0.084***
	(4.04)	(3.95)	(4.02)	(4.13)	(4.11)	(4.16)
Cap_Ex	0.007	0.017	0.016	0.009	0.013	0.010
	(0.04)	(0.11)	(0.10)	(0.06)	(0.08)	(0.06)
PPE	-0.118***	-0.127***	-0.127***	-0.122***	-0.122***	-0.127***
	(-3.91)	(-4.16)	(-4.18)	(-4.01)	(-4.05)	(-4.19)
RD	-0.708***	-0.711***	-0.706***	-0.695***	-0.703***	-0.703***
	(-6.76)	(-6.72)	(-6.71)	(-6.66)	(-6.72)	(-6.75)
Year & Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,398	2,398	2,398	2,398	2,398	2,398
Adj. R-squared	0.0975	0.0972	0.0960	0.0988	0.0984	0.0997

*This table presents regression results of codetermination and real earnings management (i.e., abnormal production). Detailed variable definitions are available in Appendix 3.A. t-statistics are reported under each coefficient in parentheses. *, **, and *** denote significance level of 0.1, 0.05, 0.01, respectively.*

While our results can inform policy makers' decisions, we caution readers that our sample firms could have features of governance structure, cultural norms, and legal environment unique to Germany. Dammann and Eidenmuller (2021) argue that US firms might not benefit as much from codetermination as German firms due to legal, social, and institutional differences. Future studies might focus on specific effects of employee representatives on decision-making processes or in countries where comparable institutional settings apply. Furthermore, we encourage future research to examine how codetermination in audit committees impacts financial reporting outcomes in less-developed economies.

Our study is also subject to other limitations. First, the indicators used to construct the *CDI* measure are ordinal, rendering impossible a calculation of continuous variables from this index. Second, the components of the *CDI* is a weighted average of the six components, with the first four components accounting for 20% each and the last two components for 10% respectively. We acknowledge subjectivity exists in these weightings. Because the Hans Böckler Foundation is closely related to labor organizations, it could introduce bias in constructing the *CDI* favoring the interests of labor groups. Third, data limitations preclude us from controlling for other audit committee characteristics, such as the independence of the audit committee or the financial expertise of the audit committee, which could be correlated with employee representation on the audit committee. We leave it open for future research to determine whether this limitation materially impacts our inferences. Fourth, the components of the *CDI* are partly size-dependent, since an independent personnel department or the formation of committees may not be a necessary governance feature in smaller firms. Furthermore, since our sample has insufficient observations for all codetermination groups, especially under 500 employees and between 500 and 2000 employees, a regression discontinuity design (RDD) is not possible. Nevertheless, this study opens the black box of board-level codetermination impacts on financial reporting decisions.

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Appendix 3.A: Variable Definitions

TAX AGGRESSIVENESS

BTD Book-Tax Differences: Firm's book-tax difference less average book tax difference of firms from the same industry and from the same quintile of total Assets, using Atwood et al.'s (2012) measure of book-tax differences:

$$= \frac{\text{(pretax income-special items)*statutory tax rate-current taxes paid}}{\text{pretax income-special items}}$$, winsorized at [0, 1]

RBTD Residual Book-Tax Differences: Firm's residual book-tax difference less average residual book-tax difference of firms from the same industry and from the same quintile of total Assets. Desai and Dharmapala's (2006) residual book-tax difference is the error term from the following cross-sectional regression: $BTD=\beta_0+\beta_1 TACC+\varepsilon_{it}$.

ETR Effective Tax Rate: Firm's effective tax rate less average effective tax rate of firms from the same industry and from same quintile of total Assets, where effective tax rate

$$= \frac{\text{total tax expense}}{\text{pretax income - special items}}$$, winsorized at [0, 1].

CETR Cash Effective Tax Rate: Firm's cash effective tax rate less average cash effective tax rate of firms from the same industry and from same quintile of total Assets, where cash effective tax rate $= \frac{\text{cash taxes paid}}{\text{pretax income - special items}}$, winsorized at [0, 1].

EARNINGS MANAGEMENT

DACC_M Discretionary Accruals—Modified Jones Model: error term from the following cross-sectional regressions by industry (Fama-French 12 industry classification) and year (with at least 10 observations):

$$\frac{TACC_t}{A_{t-1}} = \alpha_1\left(\frac{1}{A_{t-1}}\right) + \alpha_2\left(\frac{\Delta REV_t - \Delta REC_t}{A_{t-1}}\right) + \alpha_3\left(\frac{PPE_t}{A_{t-1}}\right) + \varepsilon_t$$

where: $\Delta REV_t = Sales_t - Sales_{t-1}$, $\Delta REC_t = Receivables_t - Receivables_{t-1}$, A_{t-1} =lagged total assets

DACC_P Discretionary Accruals—Performance-Adjusted Jones Model: error term from the following cross-sectional regressions by industry (Fama-French 12 industry classification) and year (with at least 10 observations):

$$\frac{TACC_t}{A_{t-1}} = \alpha_0 + \alpha_1\left(\frac{1}{A_{t-1}}\right) + \alpha_2\left(\frac{\Delta REV_t - \Delta REC_t}{A_{t-1}}\right) + \alpha_3\left(\frac{PPE_t}{A_{t-1}}\right) + \alpha_4 ROA_t + \varepsilon_t$$

where: $\Delta REV_t = Sales_t - Sales_{t-1}$, $\Delta REC_t = Receivables_t - Receivables_{t-1}$, A_{t-1} =lagged total assets

AbnCFO Abnormal Cash Flows: deviations from firm's cash flow from operations and the predicted values from corresponding industry-year regression (with at least 10 observations) multiplied by negative one:

$$\frac{CFO_t}{A_{t-1}}=\alpha_0+\alpha_1\left(\frac{1}{A_{t-1}}\right)+\alpha_2\left(\frac{SALES_t}{A_{t-1}}\right)+\alpha_3\left(\frac{\Delta SALES_t}{A_{t-1}}\right)+\varepsilon_t$$

AbnEXP Abnormal Expenditures: deviations from firm's discretionary expenses and the predicted values from corresponding industry-year regression (with at least 10 observations) multiplied by negative one:

$$\frac{EXP_t}{A_{t-1}}=\alpha_0+\alpha_1\left(\frac{1}{A_{t-1}}\right)+\alpha_2\left(\frac{SALES_{t-1}}{A_{t-1}}\right)+\varepsilon_t$$

where: EXP_t=R&D Expenditures$_t$-SG&A Expenditures$_t$

AbnPROD Abnormal Production: deviations from firm's production and the predicted values from corresponding industry-year regression (with at least 10 observations):

$$\frac{PROD_t}{A_{t-1}}=\alpha_0+\alpha_1\left(\frac{1}{A_{t-1}}\right)+\alpha_2\left(\frac{SALES_t}{A_{t-1}}\right)+\alpha_3\left(\frac{\Delta SALES_t}{A_{t-1}}\right)+\alpha_4\left(\frac{\Delta SALES_{t-1}}{A_{t-1}}\right)+\varepsilon_t$$

where: $PROD_t=COGS_t-\Delta Inventories_t$

CODETERMINATION

CDI Codetermination Index: index showing to what extent codetermination is institutionalized. It consists of six components with values between zero (no codetermination) and 100 (full compliance with all indicators). For a detailed description, see Scholz and Vitols (2019).

Union_Size Ratio of full-time unionists over the total number of unionists on the supervisory board.

Union_Power Ratio of the number of unionists over the total number of employee representatives.

Works_Councils Ratio of the number of works councilors over the total number of employee representatives (excluding unionists) on the supervisory board.

Vice_Chairman Dummy variable that is 1 if the vice chairman of the supervisory board is an employee representative, and otherwise 0.

Audit_Committee Dummy variable that is 1 if there are any employee representatives in the audit committee, and otherwise 0.

No_Codetermination Dummy variable that is 1 for firms with less than 501 employees that are therefore not subject to any codetermination law, and otherwise 0.

1/3_Codetermination Dummy variable that is 1 for firms with less than 2,001 but more than 500 employees that are therefore subject to third codetermination, and otherwise 0.

Parity_Codetermination	Dummy variable that is 1 for firms with more than 2,000 employees that are therefore subject to parity codetermination, and otherwise 0.
CONTROLS	
Assets	Log of Total Assets.
Institutional	Institutional Ownership: percentage of shares held by institutional blockholders or rather shares holdings of 5% or more by investment banks, institutions or pension fund.
ROA	Return on Assets: $\frac{\text{income}}{\text{assets}} * 100$, winsorized at 1st and 99th percentiles.
Lag_ROA	*ROA* in t-1
For_Ops	Foreign Operations: Dummy variable that is 1 if the firm reports foreign income or foreign assets, and otherwise 0.
Liab_Cash	Financial Health: $\frac{\text{liabilities-cash}}{\text{lagged total assets}}$, winsorized at 1st and 99th percentiles.
Cap_Ex	Capital Expenditures: $\frac{\text{capital expenditures}}{\text{lagged total assets}}$, winsorized at [0, 1].
PPE	Property Plant & Equipment: $\frac{\text{PPE}}{\text{lagged total assets}}$, winsorized at [0, 1].
RD	Research & Development: $\frac{\text{rd}}{\text{lagged total assets}}$, winsorized at [0, 1]; set to zero if missing.
NOL	Net Operating Loss: Dummy variable that is 1 if pre-tax income in t-1 is negative, and otherwise 0.

Appendix 3.B: Calculation of the Codetermination Index

Component		Variables	Scoring	Weighting Component
1	Number and type of employee representative	Percentage of full-time unionists	2 points per percentage point	0.2
		Percentage of part-time unionists	1 point per percentage point	
		Percentage of works councilors	2 points per percentage point	
		Percentage of internal employee representatives (excluding works councilors)	1 point per percentage point	
		Percentage of executive employee representatives	2 points per percentage point	
		Percentage of international supervisory board members	1 point per percentage point	
		Percentage of international works councilors or unionists	2 points per percentage point	
2	Employee as vice chairperson	Supervisory board has two vice chairpersons; second is employee representative	16.67 points	0.2
		Supervisory board has two vice chairpersons; first is an employee representative	33.33 points	
		The vice chairperson is an employee representative	50 points	
		The employee representative is not a full-time unionist or works councilor	25 point	
		The vice chairperson is a full-time unionist or works councilor	50 points	
3	Extent of employee representation on board committees	Employee representatives are included in board committees	33.33 points	0.2
		One half of any board committees consists of employee representatives	66.67 points	
		One half of each board committee consists of employee representatives	100 points	
4	Degree of fragmentation of employee representation through internationalization	There are no employee representatives on the supervisory board	0 points	0.2
		Percentage of domestic employees	1 point per percentage point	
		There firm has an international works council	100 points	
5	Firm's legal form	There are no employee representatives on the supervisory board	0 points	0.1
		The firm is a limited partnership by shares or holding (e.g. KGaA)	33.33 points	
		The firm is a limited liability company (e.g. GmbH)	66.67 points	
		The firm is a joint stock company (e.g. AG or SE)	100 points	
6	Responsibility for personnel policies	The responsibility for HR is assigned to a Chief Human Resources Manager	100 points	0.1

4 Dissecting Investment in Internal Audit

Assurance Service Substitution and the Value in Value Add

Christopher Calvin Marc Eulerich Benjamin Fligge

Abstract. This study investigates organizational benefits obtained from investing in internal audit activities beyond benchmark expectations. Practitioners frequently rely on benchmarking studies to determine whether their internal audit resources are sufficient, but there is no prior evidence on how deviations from the benchmark (specifically, overinvesting relative to expectations) affect organizational value. We utilize a unique survey dataset and develop a new measure of abnormal investment in internal audit to explore this issue. Our results suggest that overinvestment in internal audit is associated with greater assurance service substitution, greater audit risk coverage, and a higher degree of external audit reliance on internal audit work product. Exploratory analyses also quantify internal audit's value-add beyond assurance service substitution. Our results are of interest to organizations which must choose their level of internal audit investment, regulatory bodies like the Institute of Internal Auditors, which establish subjective investment requirements, and capital market participants that rely on the work of internal auditors in their decision-making.

1. Introduction

The internal audit function (IAF) is a fundamental element of an organization's corporate governance. Prior research suggests that IAFs can improve operating performance (Jiang et al., 2020), reduce an organization's risk level (Carcello et al., 2020), increase financial reporting quality (Abbott et al., 2016, 2012a; Prawitt et al., 2011), and detect fraud (Beasley et al., 2000). Companies and investors appear to recognize these benefits. Some companies are required to implement an IAF due to capital market regulation (e.g., New York Stock Exchange (NYSE) listed companies), while others are expected to implement an IAF due to operating in highly regulated industries (e.g., financial services).[52] However, even in non-mandatory environments, organizations tend to install IAFs to get assurance over their internal control systems, risk management activities, and governance structures.

Consequently, organizations must decide how many resources to allocate to internal auditing, both upon establishment and on an ongoing basis (Anderson et al., 2010; Hubbard, 2007; IIA, 2018; IIA Australia, 2020; Jacka, 2018). Shelton (2018, p. 31) notes that "at some point in almost every chief audit executive's (CAE's) career, he or she is asked to assess and justify the organization's level of internal audit resources." IIA standard 2030 states that IAF resources must be sufficient, leading previous research to focus primarily on the determinants of IAF size (Anderson et al., 1993; Anderson et al. 2010, 2012; Baru et al., 2010; Carcello et al., 2005; Eulerich and Lohmann, 2022). Although these studies benchmark organizations against similar organizations and determine whether investment in the IAF is sufficient, none of these studies analyze whether the benchmark is beneficial or optimal (that is, whether value can be derived from deviating from the benchmark).

General economic theory suggests that an investment in the IAF should be made if the benefits outweigh the costs. However, the IAF provides value to multiple stakeholders, including the board, the audit committee, external auditors, and the organization as a whole, making it difficult to determine and communicate the benefits of investment (Eulerich and Lenz, 2020; Miller and Rittenberg, 2021; Tan, 2020). This could lead organizations to overestimate or underestimate their optimal levels of IAF investment, which in turn affect the aggregate benchmark level of investment to which companies compare themselves. In this study, we

[52] In the United States, firms listed on the NYSE must establish an IAF according to NYSE Section 303A.07(c). In Germany, organizations in the financial industry as well as some other organizations (especially listed companies) are required to establish an IAF per relevant regulation (e.g., German Banking Act; Insurance Supervision Act; Law on Control and Transparency in Business; German Accounting Law Modernization Act).

investigate whether IAF investment above the benchmark level yields quantifiable benefits, which would imply the benchmark level of IAF investment is, on average, suboptimal.

We pair unique CAE survey data obtained from a national IIA chapter with hand-collected financial data to calculate a novel measure of IAF abnormal investment, defined as the difference between real IAF size and expected IAF size scaled by expected IAF size. We then label organizations with positive abnormal investment as "overinvestment" organizations and explore the relationship between overinvestment and potential assurance benefits of the IAF, such as substitution of external audit fees, audit procedure efficiency and audit risk coverage, and external auditor reliance on the IAF's work product. We also use utility maximization theory to quantify the average "value-add" of IAF non-assurance work attributed to overinvestment.

Our results suggest that overinvestment in internal audit yields greater substitution of external audit activities, evidenced by reduced external audit fees, greater audit risk coverage, evidenced by more audits per employee and more risk object coverage per employee, and a higher degree of external audit reliance on internal audit work product. Our results also show that the cost of IAF overinvestment exceeds the assurance benefits derived by an average minimum of 637,076 euros, implying that companies are extracting at least this value in additional value-add non-assurance services from their IAFs.

Our results extend the academic literature on IAF investment by providing evidence that investment benchmarks may represent suboptimal levels of IAF investment and by being the first study, to the best of our knowledge, to quantify the monetary value-add contribution of internal auditing. Thus, we offer an empirical and theoretical contribution to the current discussion. Our results are also of interest to practice. They inform organizations which must choose their level of internal audit investment about the potential benefits of investing above the benchmark. They highlight a potential downside to the benchmarking approach to investing, which informs regulatory bodies like the Institute of Internal Auditors, whose current guidance about investment level is intentionally subjective. Finally, our results inform capital market participants about the potential for value extraction from an IAF's assurance procedure substitution role and value-add non-assurance role.

2. Background

2.1 The IAF as an Assurance and Consulting Service Provider

The IAF provides assurance and consulting services designed to add value and improve an organization's operations (IIA, 2017). The IAF's assurance services begin with the establishment of a risk-based audit plan per IIA standard 2010. Under a risk-based approach, the IAF prioritizes assurance for audit objects with the highest risk over value-add activities such as consulting on audit objects of lower risk. Assurance can take many forms, including, for example, internal control testing, external audit assistance, and compliance audits. To the extent that an audit plan has capacity beyond assurance activities, the IAF can engage in a variety of value-add activities.

One common value-add activity is the use of the IAF as a management training ground (MTG). The utilization of the IAF as an MTG has been shown to increase executive management's usage of IAF's recommendations (Carcello et al., 2018). However, MTG auditors have also been found to be less objective (Rose et al., 2013; Suh et al., 2021), which reduces external auditors' reliance on the IAF and increases audit fees (Messier et al., 2011). Thus, while use of the IAF as an MTG has internal added value, it can carry with additional external cost, though general economic theory suggests those costs must not outweigh the value-add benefit derived.

A modern value-add activity of IAFs is the implementation of audit technology tools (e.g., continuous auditing, process mining, or robotic process automation) (Eulerich et al., 2022). These audit technology tools can, among others, increase audit quality (Jans et al., 2013), reduce employees' non-compliance behavior (Eulerich et al., 2021), and increase the usage intensity of the IAF's work by its stakeholders (Eulerich et al., 2020). As with MTG IAFs, there is an external cost, the price of technology acquisition and related training (Cangemi, 2015), but again, that cost is not expected to outweigh the value-add benefit under rational decision-making.

Finally, a more traditional "catch-all" of value-add IAF activity is the performance of consulting services to enhance operations and internal processes. These services are traditionally requested by management or the board when inefficiencies or other problems are suspected in existing business processes. That makes consulting services inherently value-add, assuming the IAF makes implementable recommendations for improvement, without the burden of potentially offsetting external costs. Čular et al. (2020) show that consulting services can be additionally

beneficial in that they can increase external audit reliance on the IAF, and thus decrease external audit fees, though only in the presence of a strong audit committee.

2.2 IAF Investment

A company's decision of how much to invest in its IAF is largely derived from a collection of unknowable outcomes. The number of assurance and consulting services an IAF can perform depends on the resources allocated to it. Higher investment enables the IAF to increase its audit capacity and/or audit scope, theoretically adding more value to the company's stakeholders. However, this only holds true to the extent that the additional audits or additional scope truly add value to the organization. Because IAF audit plans are risk-based, expanding the plan yields diminishing returns. While organizations can easily determine the costs of an investment in the IAF (i.e., IAF budget), it is difficult to determine the diminishing benefit derived from that marginal investment. For example, Eulerich and Eulerich (2020) note that IAF value is a multi-dimensional construct, as there are multiple perspectives on the value added and multiple measures for each perspective, making value-add quantification a complex task. Erasmus and Coetzee (2018) document differences between audit committee's and executive management's perceptions of IAF value, suggesting that even if quantification is achievable, it may vary by organizational stakeholder. In sum, the diminishing benefit of marginal IAF investment is difficult to know, and not equally perceived by all decision makers, at the time of the investment decision.

Because of this, organizations often struggle to know whether their investments in internal auditing are optimal or even sufficient (Anderson et al., 2010; Hubbard, 2007; IIA, 2018; IIA Australia, 2020; Jacka, 2018). In practice, three approaches are often used to determine IAF budgets (Anderson et al., 2010):

1. **Static approach.** The starting point is the current amount of investment in the IAF. Whenever the demand for internal auditing changes (e.g., due to changes in the organization's risk level or stakeholder needs), IAF resources are increased or decreased.
2. **Risk analysis approach.** The IAF presents various plans to the board concerning the extent of coverage that the IAF can achieve with a given budget. The board decides how much should be invested in the IAF based on its risk appetite.
3. **Benchmarking approach.** Investment in the IAF is determined based on comparisons to other organizations of similar size and industry affiliation.

Previous literature has focused primarily on the benchmarking approach, which the IIA supports through a global database that enables members to compare their resources with each other.[53] The studies of Anderson et al. (2010, 2012), Baru et al. (2010), Carcello et al. (2005), and Eulerich and Lohmann (2022) suggest that several organizational characteristics (e.g., complexity, listing status, and industry membership) and IAF characteristics (e.g., outsourcing, competence, and technology) tend to determine the IAF's budget. However, Anderson et al. (2010, 2012) criticize that benchmarking studies might give misleading indications as to the appropriate amount of investment in the IAF due to the omission of other relevant variables. Furthermore, benchmarking analyses only provide information on the average investment in the IAF as a function of specific variables. They do not indicate whether abnormal investments in the IAF (i.e., deviations from the benchmark) are more or less favorable.

As mentioned before, economic theory suggests that organizations invest if the expected benefits are greater than the costs. To the extent that a company makes a negative abnormal investment in internal auditing, it suggests the company does not receive as much benefit from its IAF as benchmark companies. To the extent that a company makes a positive abnormal investment in internal auditing, it suggests the company receives benefit from its IAF in excess of average expectations. There are two potential sources of this benefit. The first source is assurance services, which benchmark companies already receive in some capacity due to the prioritization of higher risk audits in the IAF's audit plan. This suggests that any marginal benefit from assurance services likely comes from a substitution effect for assurance services benchmark companies receive from another assurance provider. The second source is consulting services, which can be a value-add differentiator between IAFs with different audit plan capacities.

2.3 The Substitution of Internal and External Audit

From a theoretical perspective, there are numerous overlaps in companies' fundamental use of internal and external auditing. In the context of principal-agent theory, the assurance activities of both types of auditors are intended to reduce information asymmetry and minimize the risk of opportunistic behavior in the organization (Eulerich and Lohmann, 2022). Thus, the assurance objective of both types is, generally speaking, the same, but with slightly different parties involved. The external auditor minimizes information asymmetry between top-level management, the audit committee, and shareholders, while the internal auditor minimizes

[53] The annual IIA's Global Audit Information Network (GAIN) database is available for purchase by IIA members.

information asymmetry between employees and top-level management, as well as between management and the audit committee.

From the perspective of the company, the choice of one or the other depends on the respective net benefits derived from each. Both internal audit and external audit yield utility (*U*) for the company. However, for the benefit of either to be realized, the company or owners must incur certain costs to engage their respective partners. For internal auditing, these costs consist of assurance (*cIA*) and value-add costs (*cIVA*). For external auditing, these costs consist of assurance costs only (*cEA*). Both partners also generate respective benefits. For internal auditing, these benefits come from both assurance (*uIA*) and value-add services (*uIVA*). For external auditing, these benefits come only from assurance services (*uEA*).[54] Thus, from the company's point-of-view, investment in internal and external auditing activities should be allocated such that the net utility of the company is maximized. The following equation represents the described utility function:

$$max.\ U = [(uIA - cIA) + (uEA - cEA)] + (uIVA - cIVA)$$

Absent regulatory restrictions, the assurance relationship between internal and external auditing could be either perfectly or imperfectly substitutive. If both functions were perfect substitutes (i.e., an equivalent substitute that can generate the identical benefits at the same cost as the substituted institution), the company would be indifferent as to the choice. A full audit by the external auditor would be just as good as a full audit by the internal auditor and vice versa. Regulatory requirements for an independent audit of financial statements prevent this type of perfect substitution by prohibiting the transfer of all external audit assurance duties to an IAF. Thus, the incursion of some minimum amount of external audit benefit and cost is necessary in practice. However, regulation allows for a portion of external audit assurance service to be offloaded to the IAF, and in a perfect substitution environment, the company would be indifferent between which auditor performed this portion of services. In the case of imperfect substitutes, which is likely given the potential for value-add utility from only the internal auditor, choosing one over the other would result in a change in net utility for the company.

Overinvestment in internal auditing, relative to a comparative benchmark, signals that a company perceives high net utility from its IAF. To the extent that the marginal utility of overinvestment is derived from external assurance substitution, we predict the following:

[54] It's worth noting that companies may optionally hire their external auditors to perform a restricted set of "non-audit" services which could be perceived as value-add services. However, as these services are not a component of the standard, mandated external auditor relationship, we do not include them in our utility equation.

H_1: Companies that overinvest in internal auditing will pay lower external audit fees than benchmark-invested and underinvested IAFs.

If overinvestment in internal auditing is at least partly due to a marginal benefit derived from external assurance substitution, this further suggests that internal and external auditing are imperfect substitutes with respect to the portion of assurance services than can be substituted under regulatory restrictions. Temporarily ignoring the potential for value-add related to assurance services, one possible explanation for imperfect substitution is that internal auditors can cover more audit risk than external auditors. They could do this either in an absolute sense or as a result of greater efficiency due to their knowledge of company operations, familiarity with company documentation, and established connections with company process owners and decision makers. This leads to our second prediction:

H_2: Overinvested IAFs will conduct more audits and cover more risk factors than benchmark-invested and underinvested IAFs.

Regardless of which auditor performs the company's assurance services, the external auditor still has a professional and regulatory duty to gain comfort over the company's financial reports. To do so, it will likely need to rely on the assurance work shifted to an overinvested IAF. Thus, we predict the following:

H_3: The assurance work product of overinvested IAFs will be relied upon more heavily by external audit than the assurance work product of benchmark invested and underinvested IAFs.

In addition to marginal benefits from assurance service substitution, companies that overinvest in internal audit may do so because they also receive a non-assurance service value-add benefit. Companies are not required to externally report on the services provided by their IAFs, so measuring this exact value is not possible with public data. However, to the extent that a marginal investment in a company's IAF outweighs the marginal external assurance cost savings the company receives, general economic theory suggests the difference must represent the minimum value of non-assurance benefit obtained. As such, we pose the following research question for exploration:

RQ_1: What is the average marginal value-add of an overinvested IAF's non-assurance services?

3. Research Design and Empirical Model

3.1 Measuring Overinvestment in the IAF

Companies are not required to publicly disclose their internal audit investment. To proxy for this unobservable value, prior research has substituted the IAF's budget (Baru et al., 2010; Carcello et al., 2005) or the number of IAF staff (Anderson et al., 2010, 2012) as a measure of investment in the IAF. While these measures reflect IAF size, they have an important disadvantage when analyzing the value of investing in internal auditing. Both are determined by organizational characteristics such as organization size, making it difficult to separate the effects of an investment in the IAF from the effects of these organizational characteristics (Anderson et al., 2010, 2012; Baru et al., 2010; Carcello et al. 2005; Eulerich and Lohmann, 2022). To overcome this problem, studies often scale IAF size by organization size (Prawitt et al., 2011). However, this approach neglects the other determinants of IAF size that have been documented in previous literature (Anderson et al., 2010, 2012; Baru et al., 2010; Carcello et al., 2005).

Given these limitations, we use a regression-based approach to measure abnormal investment in the IAF. By doing so, we can account for multiple determinants of IAF investment, including company size, simultaneously. We first estimate the following prediction model, derived from IAF investment determinant models from prior literature (Anderson et al., 2010, 2012; Baru et al., 2010; Carcello et al., 2005):

$$\begin{aligned} IAF\_Staff = \; & \alpha + \beta_1 Listing + \beta_2 Financial + \beta_3 Ln\_Size + \beta_4 Receivables + \\ & \beta_5 ForeignOps + \beta_6 ROA + \beta_7 Leverage + \beta_8 Outsourcing + \\ & \beta_9 MTG + \beta_{10} Salesgrowth + \beta_{11} Acquisition + \epsilon \end{aligned} \quad (1)$$

We employ the number of IAF staff per 1000 company employees (*IAFStaff*) as our proxy for IAF investment.[55] We regress this proxy on: 1) measures of company complexity (*Listing*, *Financial*, *Ln_Size*, *ForeignOps*, *Acquisition*, and *Receivables*), as complexity results in agency problems that increase the organization's risk level and demand for monitoring, and hence the demand for internal auditing (Adams, 1994; Hay et al., 2006); 2) measures of the company's financial condition (*Leverage*, *Salesgrowth*, and *ROA*), as companies' performance and financial pressure may impact the budget they allocate to their IAFs (Baru et al. 2010; Carcello

[55] The number of IIA staff per 1,000 company employees is an indicator commonly used by internal audit practitioners and researchers (Anderson et al., 2010; Eulerich and Lenz, 2020).

et al., 2005); and 3) measures of the IAF's composition (*Outsourcing* and *MTG*), as IAF outsourcing reduces the need for investment (Anderson et al., 2010; Baru et al., 2010; Carcello et al., 2005) and the use of the IAF as a management training ground (MTG) may increase or decrease the need for IAF investment depending on the skills and tenure of the rotating MTG auditors. We define all regression variables in Appendix 4.A.

After estimating Eq. (1) using ordinary least squares with robust standard errors, we use the fitted values from the estimation to calculate each company's expected IAF size.[56] We then calculate each company's percentage of abnormal IAF investment using the following calculation:

$$Abnormal\_Investment = \frac{IAFStaff - expected\ IAFStaff}{expected\ IAFStaff} \quad (2)$$

Finally, we identify all companies whose actual IAF investment is greater than their expected IAF investment (i.e., $Abnormal\_Investment > 0$) and label these companies as *Overinvestment* companies.

3.2 Internal Audit as an External Audit Substitute

We test H_1 using the following equation that models external audit fees as a function of IAF overinvestment and a control set of external audit fee determinants derived from prior literature (Prawitt et al., 2009; Hay et al., 2006; Calvin and Holt, 2022):

$$FeesProxy = \alpha + \beta_1 Overinvestment + \sum controls + \epsilon \quad (3)$$

In the above model, *FeesProxy* takes on one of two proxies for fees paid to the company's external auditor: 1) *Auditfees*, the natural log of fees the company pays its external auditor for services related to the independent audit; and 2) *Unexpected_Fees*, the residual from an audit fee determinant model.[57] The variable of interest, *Overinvestment*, is an indicator equal to one when *Abnormal_Investment* (see Eq. (2)) is greater than zero, and equal to zero when *Abnormal_Investment* is less than or equal to zero. Control variables include *Ln_Size*, *Listing*, *ForeignOps*, *Financial*, *Receivables*, *Salesgrowth*, *ROA*, *Leverage*, *Acquisition*, *Big4*, *Change*, *Tenure*, *Meetings*, *DecEnd*, *Outsourcing*, and *MTG*, all defined in Appendix 4.A. We estimate the model using ordinary least squares with robust standard errors. If companies that overinvest

[56] Though not a formal test, we present the results of our estimation of Eq. (1) in Appendix 4.B for reference.
[57] We use Eq. (3) with *AuditFees* as the dependent variable and excluding *Overinvestment* as an independent variable to estimate our audit fee determinant model.

in internal audit are more likely to substitute a portion of external audit assurance services with IAF assurance services (H_1), then we expect a negative, significant coefficient on β_1 using both external audit fee proxies.

3.3 Internal Audit Efficiency and Risk Coverage

We test H_2 using the following equation that models audit activities as a function of IAF overinvestment and a control set of company and IAF characteristics:

$$ActivityProxy = \alpha + \beta_1 Overinvestment + \sum controls + \epsilon \quad (4)$$

In model (4), *ActivityProxy* takes on one of four proxies for audit activity: 1) *Audits_IAF*, which is the number of audits conducted per internal auditor; 2) *Objects_IAF*, which is the number of audit objects within the audit universe per internal auditor; 3) *Audits*, which is the number of audits conducted per company employee; and 4) *Objects*, which is the number of audit objects within the audit universe per company employee. The first two of these proxies measure the IAF's efficiency in conducting audits and covering organizational risk. The second two measure overall audit and risk coverage, scaled to the size of the organization, regardless of efficiency. The variable of interest, *Overinvestment*, is as previously defined. Control variables include *Ln_Size*, *Listing*, *ForeignOps*, *Financial*, *Receivables*, *Salesgrowth*, *ROA*, *Leverage*, *Acquisition*, *Outsourcing*, and *MTG*, all defined in Appendix 4.A. We estimate the model using ordinary least squares with robust standard errors. If overinvested IAFs conduct more audits and cover more risk factors than benchmark-invested and underinvested IAFs (H_2), then we expect a positive, significant coefficient on β_1 using all four activity proxies.

3.4 External Audit's Reliance on Internal Audit

We test H_3 using the following equation that models external audit reliance as a function of IAF overinvestment and a control set of company and IAF characteristics:

$$Intensity\_EA = \alpha + \beta_1 Overinvestment + \sum controls + \epsilon \quad (5)$$

In the above model, *Intensity_EA* represents the usage of an IAF's work by external auditors on a five-point scale, where one is rarely used and five is intensive usage.[58] The variable of

[58] *Intensity_EA* captures CAEs' perceptions of the extent to which external auditors use the IAFs' work and could therefore be subject to self-perception bias. This is an inherent limitation common in internal audit research due to the lack of publicly available information about internal audit and the difficulty in obtaining survey responses from stakeholders who interact with internal audit.

interest, *Overinvestment*, is as previously defined. Control variables mirror those used in Eq. (3). We estimate the model using ordinal logistic regression with robust standard errors. If the assurance work product of overinvested IAFs will be relied upon more heavily by external audit than the assurance work product of benchmark-invested and underinvested IAFs (H_3), then we expect a positive, significant coefficient on β_1.

3.5 Sample Selection

Our dataset stems from three sources. We begin with survey data provided by a national chapter of the IIA for 317 organizations.[59] We hand-collected published financial statements for as many of the identified companies as possible to obtain organization financial information. We then searched for the identified companies in the Refinitiv database to obtain industry membership information.

We verified that all 317 survey responses were from participants who are CAEs. CAEs have a better overview of the IAF and are therefore better able to answer questions about the IAF than staff auditors. Limiting our sample to only CAEs also significantly reduces the possibility of having duplicate observations from the same IAF in our sample. We exclude 45 organizations in which internal audit services are performed by risk management, compliance, or another function within the organization, as they are fundamentally different from organizations with separate IAFs and do not have an appropriate level of independence (IAFSB, 2013; PCAOB, 2007; AICPA, 1991). Our analyses require data on IAF size, which results in a loss of 50 observations. Further, we lose 14 responses that could not be matched to financial data. Finally, missing regression variables results in the loss of another 41 observations, leaving us with a primary sample of 167 IAFs. We use this sample to calculate our measure of abnormal investment in the IAF (Eq. (1) and Eq. (2)). For our remaining analyses, we require audit fee data, audits conducted data, audit risk objects data, external audit usage data, and additional control variables, resulting in the further loss of up to 67 observations and subsamples ranging from 100 to 165 IAFs. Table 4.1 details our sample selection process.

[59] The survey was conducted in cooperation with the Austrian and Swiss chapters of the IIA and distributed to 4,009 organizations in Germany, Austria, and Switzerland of which 600 IAFs responded. However, only the German chapter of the IIA provided us with the names of the respondents. Thus, we were unable to collect the financial statements of the Austrian and Swiss respondents.

Table 4.1: Sample Selection Process

IAF survey responses received by the German chapter of the IIA		**317**
-	IAF is not a separate function	45
-	IAF size is missing	50
-	financial statements are not available	14
-	missing determinants of IAF investment	41
Panel A: Abnormal Investment Sample		**167**
-	Missing dependent variables and/or additional control variables	2-67
Panel B: Additional Regression Subsamples		100-165

This table presents our sample selection process.

3.6 Descriptive Statistics

Table 4.2 presents descriptive statistics for all variables used in regression analyses. Regarding IAF investment, the average number of internal auditors in a respondent's IAF per 1,000 company employees is 5.87 (*IAF_Staff*). Furthermore, approximately 44 percent of companies in the sample invest in their IAFs above the benchmark expectation (*Overinvestment*).[60] Regarding our dependent variables of interest, the average non-transformed audit fees paid by an organization in our sample is 2,133,395 euros, with a range from 6,000 euros to 57,048,000 euros.[61] The average number of audits conducted per company employee (internal auditor) is 0.037 (5.629). The average number of audit risk objects per company employee (internal auditor) is 0.118 (1.178). Finally, the average external audit reliance on the IAF in our sample is 3.196 on a five-point scale, with a minimum of one and maximum of four.

[60] We group the remaining 56 percent of companies in the sample and accordingly discuss this comparison group as benchmark-invested and underinvested IAFs. It is worth noting, however, that only three observations have a level of underinvestment more than one standard deviation from the benchmark. Thus, the vast majority of our comparison group are statistically clustered around the expected benchmark level of investment.

[61] Non-transformed audit fees reflect the fees paid for audit services. For our empirical analyses, we use the natural logarithm of non-transformed audit fees (*AuditFees*). Note that by construction, the mean of logarithmized audit fees is not equal to the logarithm of the mean of non-transformed audit fees.

Table 4.2: Descriptive Statistics

Variables	Mean	Std. Dev.	25 pct	50 pct	75 pct
Non-transformed Auditfees	2,133,395	6,041	212,000	422,000	1,300,000
Auditfees	6.289	1.553	5.357	6.045	7.170
Unexpected_Fees	0.000	0.606	-0.323	0.060	0.363
Audits_IAF	5.629	4.598	3.000	4.200	6.077
Audits	0.037	0.092	0.002	0.005	0.036
Objects_IAF	1.178	1.124	0.449	0.777	1.596
Objects	0.118	0.231	0.011	0.045	0.126
Intensity_EA	3.196	1.076	3.000	3.000	4.000
Overinvestment	0.441	0.498	0.000	0.000	1.000
Abnormal_Investment	1.332	6.160	-0.607	-0.133	0.993
IAF_Staff	5.866	7.578	0.528	1.900	10.841
Ln_Size	14.886	2.016	13.698	15.045	16.202
Listing	0.228	0.421	0.000	0.000	0.000
ForeignOps	0.283	0.452	0.000	0.000	1.000
Financial	0.362	0.483	0.000	0.000	1.000
Receivables	0.339	0.313	0.099	0.181	0.642
Salesgrowth	0.024	0.098	-0.015	0.034	0.069
ROA	0.022	0.042	0.001	0.009	0.040
Leverage	0.524	0.290	0.316	0.551	0.785
Acquisition	0.26	0.440	0.000	0.000	1.000
Outsourcing	1.001	2.295	0.000	0.200	1.000
MTG	2.220	1.188	1.000	2.000	3.000
Big4	0.740	0.440	0.000	1.000	1.000
Change	0.063	0.244	0.000	0.000	0.000
Tenure	6.701	3.753	3.000	8.000	10.000
Meetings	4.669	2.179	4.000	4.000	5.000
DecEnd	0.937	0.244	1.000	1.000	1.000

This table presents descriptive statistics for regression variables. Detailed variable definitions are available in Appendix 4.A.

We present Pearson and Spearman correlations between our regression variables in Table 4.3. For brevity, we defer discussion of associations between these variables to our multivariate tests in the next section.

Table 4.3: Correlation Matrix

	Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1)	Overinvestment	1.000	0.089	0.188*	-0.160	-0.235**	0.021	-0.254**	0.070	0.134
(2)	Abnormal_Investment	0.261**	1.000	-0.381***	-0.131	0.010	0.926***	-0.066	0.809***	0.324***
(3)	Auditfees	0.197*	-0.226**	1.000	0.373***	-0.359***	-0.487***	-0.650***	-0.461***	-0.258**
(4)	Unexpected_Fees	-0.231**	-0.047	0.393***	1.000	-0.062	-0.137	0.021	-0.118	-0.123
(5)	Audits_IAF	-0.106	0.021	-0.263**	-0.018	1.000	0.330***	0.522***	0.277***	0.060
(6)	Audits	0.193*	0.691***	-0.262**	-0.056	0.446***	1.000	0.112	0.857***	0.314***
(7)	Object_IAF	-0.272***	-0.144	-0.485***	0.041	0.425***	-0.031	1.000	0.227**	0.034
(8)	Objects	0.187*	0.489***	-0.288***	-0.084	0.250**	0.604***	0.131	1.000	0.287***
(9)	Intensity_EA	0.203*	0.224**	-0.150	-0.100	0.105	0.360***	-0.182*	0.296***	1.000
(10)	Ln_Size	0.296***	0.072	0.802***	0.016	-0.225**	-0.021	-0.635***	-0.184*	0.058
(11)	Listing	0.249**	-0.354***	0.562***	-0.036	-0.088	-0.294***	-0.135	-0.260**	-0.269**
(12)	ForeignOps	0.059	-0.340***	0.547***	0.023	-0.161	-0.314***	-0.271**	-0.279***	-0.176*
(13)	Financial	-0.021	0.725***	-0.077	0.051	0.042	0.613***	-0.224**	0.414***	0.290***
(14)	Receivables	-0.073	0.717***	-0.172	0.050	0.058	0.611***	-0.165	0.354***	0.254**
(15)	Salesgrowth	-0.005	-0.067	0.048	0.056	0.034	-0.090	0.064	-0.080	-0.036
(16)	ROA	0.074	-0.186*	0.215**	0.000	-0.046	-0.171	0.050	-0.002	-0.278***
(17)	Leverage	-0.063	0.502***	-0.013	0.036	-0.008	0.414***	-0.205*	0.168	0.061
(18)	Acquisition	0.273***	-0.350***	0.475***	-0.031	-0.170	-0.305***	-0.181*	-0.277***	-0.091
(19)	Outsourcing	0.106	-0.117	0.383***	0.017	-0.115	-0.102	-0.141	0.191*	-0.018
(20)	MTG	0.014	-0.189*	0.217**	0.010	-0.143	-0.099	-0.220**	-0.086	-0.008
(21)	Big4	0.129	-0.155	0.354***	-0.005	-0.030	-0.233**	-0.033	-0.038	-0.307***
(22)	Change	-0.069	-0.089	-0.105	-0.024	0.272**	-0.052	0.220**	0.197*	-0.055
(23)	Tenure	0.011	0.084	0.151	0.021	-0.184*	0.025	-0.089	-0.079	-0.081
(24)	Meetings	0.062	-0.025	0.231**	0.011	0.061	-0.045	-0.033	0.035	0.164
(25)	DecEnd	-0.065	-0.098	0.092	-0.014	0.075	0.052	-0.024	0.082	0.099

Table 4.3: Correlation Matrix (continued)

	Variables	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
(1)	Overinvestment	0.338***	0.146	-0.033	-0.009	-0.126	0.001	0.027	-0.023	0.249**
(2)	Abnormal_Investment	0.037	-0.259**	-0.337***	0.656***	0.369***	-0.178*	-0.307***	0.363***	-0.382***
(3)	Auditfees	0.706***	0.417***	0.498***	-0.117	-0.110	0.125	0.304***	-0.030	0.333***
(4)	Unexpected_Fees	-0.061	-0.117	0.073	0.126	0.148	0.095	-0.016	0.050	-0.093
(5)	Audits_IAF	-0.302***	-0.065	-0.227**	0.043	-0.020	0.071	-0.100	0.023	-0.032
(6)	Audits	-0.059	-0.274***	-0.419***	0.603***	0.304***	-0.140	-0.318***	0.318***	-0.385***
(7)	Object_IAF	-0.758***	-0.268**	-0.417***	-0.090	-0.115	0.040	-0.168	-0.234**	-0.176*
(8)	Objects	-0.120	-0.183*	-0.409***	0.536***	0.280***	-0.169	-0.247**	0.208**	-0.289***
(9)	Intensity_EA	0.039	-0.276***	-0.169	0.206*	0.141	-0.082	-0.229**	0.069	-0.078
(10)	Ln_Size	1.000	0.238**	0.344***	0.178*	-0.047	0.078	0.083	0.116	0.152
(11)	Listing	0.333***	1.000	0.293***	-0.146	-0.114	-0.041	0.255**	-0.001	0.246**
(12)	ForeignOps	0.338***	0.548***	1.000	-0.222**	-0.121	0.089	0.036	-0.095	0.152
(13)	Financial	0.268**	-0.316***	-0.342***	1.000	0.376***	-0.054	-0.266**	0.407***	-0.354***
(14)	Receivables	0.059	-0.287***	-0.236**	0.650***	1.000	-0.067	-0.270**	0.641***	-0.072
(15)	Salesgrowth	0.091	0.021	0.053	-0.005	-0.041	1.000	0.067	0.048	0.043
(16)	ROA	0.013	0.135	0.082	-0.297***	-0.263**	0.043	1.000	-0.380***	0.162
(17)	Leverage	0.117	-0.045	-0.135	0.431***	0.721***	0.070	-0.319***	1.000	-0.103
(18)	Acquisition	0.270**	0.597***	0.320***	-0.329***	-0.258**	0.132	0.185*	-0.053	1.000
(19)	Outsourcing	0.293***	0.223**	0.279***	-0.022	-0.145	-0.026	0.202*	-0.193*	0.018
(20)	MTG	0.139	0.103	0.194*	-0.173	0.006	-0.133	-0.022	-0.029	0.238**
(21)	Big4	0.229**	0.323***	0.261**	-0.155	-0.254**	0.048	0.108	-0.103	0.271**
(22)	Change	-0.093	-0.074	-0.015	-0.080	-0.023	0.052	0.110	-0.097	0.018
(23)	Tenure	0.044	0.066	0.041	0.024	0.105	0.055	0.059	0.109	0.037
(24)	Meetings	0.154	0.296***	0.129	0.047	0.097	0.000	0.004	0.122	0.141
(25)	DecEnd	0.126	0.004	-0.129	0.102	0.052	0.098	0.064	0.111	-0.080

Table 4.3: Correlation Matrix (continued)

	Variables	(19)	(20)	(21)	(22)	(23)	(24)	(25)
(1)	Overinvestment	0.295***	-0.002	0.201*	-0.037	-0.031	0.153	-0.030
(2)	Abnormal_Investment	-0.047	-0.109	-0.149	-0.057	0.012	-0.062	0.116
(3)	Auditfees	0.459***	0.166	0.281***	0.001	0.140	0.343***	0.131
(4)	Unexpected_Fees	-0.009	-0.079	0.041	-0.219**	0.135	0.060	0.189*
(5)	Audits_IAF	-0.162	-0.101	0.005	0.113	-0.137	-0.014	-0.069
(6)	Audits	-0.117	-0.161	-0.106	-0.003	-0.075	-0.078	0.067
(7)	Object_IAF	-0.397***	-0.255**	0.024	0.026	-0.134	-0.193*	-0.057
(8)	Objects	-0.138	-0.177*	-0.072	0.028	0.059	-0.129	0.118
(9)	Intensity_EA	-0.026	0.012	-0.274***	0.040	-0.074	0.090	0.190*
(10)	Ln_Size	0.425***	0.194*	0.140	0.169	0.018	0.249**	0.100
(11)	Listing	0.197*	-0.020	0.162	0.083	0.150	0.368***	0.094
(12)	ForeignOps	0.261**	0.172	0.101	0.042	-0.097	0.042	-0.048
(13)	Financial	-0.054	-0.077	-0.091	-0.046	0.108	0.039	0.050
(14)	Receivables	-0.183*	0.080	-0.298***	-0.015	0.213**	0.033	0.136
(15)	Salesgrowth	0.053	-0.170	0.135	0.124	-0.095	0.013	0.089
(16)	ROA	0.217**	0.071	0.164	0.015	0.023	0.086	-0.127
(17)	Leverage	-0.056	-0.002	-0.154	-0.092	0.138	0.119	0.145
(18)	Acquisition	0.084	0.141	-0.043	0.181*	0.040	0.203*	0.119
(19)	Outsourcing	1.000	0.088	0.291***	0.149	-0.062	0.189*	0.094
(20)	MTG	0.100	1.000	-0.005	0.040	-0.105	-0.127	0.025
(21)	Big4	0.208*	0.053	1.000	-0.014	-0.145	-0.060	0.023
(22)	Change	0.300***	0.072	0.024	1.000	-0.124	-0.048	0.047
(23)	Tenure	-0.219**	-0.066	-0.215**	-0.449***	1.000	0.058	0.138
(24)	Meetings	0.094	-0.197*	0.011	-0.025	0.160	1.000	0.002
(25)	DecEnd	0.114	-0.020	-0.043	0.079	0.042	-0.088	1.000

*This table presents Pearson (bottom half) and Spearman (top half) correlations between the variables used in our regression analyses. Detailed variable definitions are available in Appendix 4.A. The symbols *, **, and *** denote significance level of 0.10, 0.05, and 0.01, respectively.*

4. Empirical Results

4.1 IAF Overinvestment and Audit Fees

Some external audit services must be conducted by the external auditor due to independence requirements, but national and international auditing standards (e.g., ISA 610, PCAOB AS 5, or SAS No. 65) permit the external auditor to rely on the work of the IAF for a portion of its procedures. This gives companies the flexibility to substitute external audit costs with internal audit costs, but they will only do so if they perceive the substitution as marginally beneficial. H_1 predicts that companies which overinvest in their IAFs are those that are more likely to view their IAFs as marginally beneficial, and are therefore those more likely to substitute internal audit procedures for external audit procedures. We test this hypothesis using Eq. (3), whose estimation results are presented in Table 4.4.

Column (1) presents the results of estimating Eq. (3) using *AuditFees* as the dependent variable. The coefficient on *Overinvestment* is -0.31, which is statistically significant with a t-stat of -2.21. This result implies an average audit fee reduction for overinvested IAFs of 26.66 percent, or approximately 573,456 euros.[62] Column (2) presents the results of estimating Eq. (3) using *Unexpected_Fees* as the dependent variable. The coefficient on *Overinvestment* is -0.25, which is statistically significant with a t-stat of -2.11. Since *Unexpected_Fees* is mean zero by design, we do not attempt an economic interpretation of this reduction. Combined, the results of both columns provide support for H_1, that companies which overinvest in their IAFs are likely to derive marginal benefit from their IAFs through external audit procedure substitution, which in turn lowers absolute and unexpected audit fees.[63]

[62] Our calculation of the audit fee reduction is as follows: The mean audit fees in the sample was 2,133,395 euros. The marginal effect of overinvestment was -.313 using a natural log transformed dependent variable. We convert this coefficient to percent change in the non-transformed dependent variable as follows: [(e^-.313)-1] *100 = - 26.88 percent. This represents a 573,456 euro reduction in audit fees for overinvested IAFs.

[63] We also analyze whether overinvestment in IAF reduces non-audit fees paid to the external auditor. Our untabulated results do not suggest that companies view external audit consulting services and IAF consulting services as substitutes. One potential explanation for this finding is that non-audit services often include tax consulting services which are typically not performed by an IAF.

Table 4.4: Overinvestment in Internal Audit and External Audit Fees

	(1) Auditfees	(2) Abnormal_Fees
Overinvestment	-0.313**	-0.254**
	(-2.212)	(-2.106)
Ln_Size	0.557***	
	(9.836)	
Listing	0.289	
	(1.222)	
ForeignOps	0.336	
	(1.413)	
Financial	-0.301	
	(-1.082)	
Receivables	-0.532	
	(-1.067)	
Salesgrowth	-1.151*	
	(-1.668)	
ROA	3.887**	
	(2.121)	
Leverage	0.433	
	(0.947)	
Acquisition	0.463**	
	(2.182)	
Big4	0.319**	
	(2.171)	
Change	-0.185	
	(-0.578)	
Tenure	0.050**	
	(2.151)	
Meetings	0.035	
	(1.470)	
DecEnd	0.194	
	(0.926)	
Outsourcing	0.109***	
	(3.023)	
MTG	0.053	
	(0.914)	
Constant	-3.429***	0.117
	(-4.518)	(1.545)
Observations	100	100
Adjusted R-squared	0.817	0.034

*This table presents the results of our estimates of Eq. (3) using ordinary least squares regression. Detailed variable definitions are available in Appendix 4.A. The symbols *, **, and *** denote significance levels of 0.10, 0.05, 0.01, respectively.*

4.2 IAF Overinvestment, Audit Efficiency, and Risk Coverage

Internal auditors perform the same type of work as external auditors, but have more client-specific experience, such as familiarity with the client's operations, vendors, customers, processes, and data (Abbott et al., 2012b). This can enable internal auditors to conduct a greater scope of audit procedures or the same number of audit procedures, but with greater efficiency, than external auditors. However, the IAF can only do so if it has sufficient investment from the company to be effective. H_1 predicts companies that overinvest in their IAFs will substitute

more external audit procedures with internal audit procedures because there is a marginal benefit to IAFs doing these procedures. The likely sources of that benefit are greater audit efficiency and/or scope. Therefore, H_2 predicts that IAFs receiving overinvestment will complete more audits and cover more risk objects (per IAF employee/per company employee) than IAFs receiving only the benchmark level of investment or below. We test this hypothesis using Eq. (4), whose estimation results are presented in Table 4.5.

Table 4.5: Audit Service Substitution Mechanisms

	(1) Audits_IAF	(2) Objects_IAF	(3) Audits	(4) Objects
Overinvestment	-0.902	-0.475***	0.051***	0.121***
	(-1.224)	(-2.948)	(2.735)	(2.707)
Ln_Size	-0.713**	-0.220***	-0.018**	-0.026*
	(-2.221)	(-3.643)	(-2.049)	(-1.771)
Listing	1.929**	0.239	0.017	-0.015
	(2.121)	(0.802)	(1.370)	(-0.463)
ForeignOps	-0.958	-0.409*	0.005	-0.011
	(-1.443)	(-1.826)	(0.435)	(-0.435)
Financial	0.807	-0.259	0.090***	0.165***
	(0.616)	(-1.111)	(3.003)	(3.145)
Receivables	4.380**	0.011	0.068**	-0.014
	(2.047)	(0.025)	(2.563)	(-0.195)
Salesgrowth	-1.155	0.696**	-0.037	0.048
	(-0.642)	(2.186)	(-1.370)	(0.323)
ROA	7.782	1.401	0.239**	0.562
	(1.111)	(0.647)	(2.491)	(0.941)
Leverage	-1.480	-0.337	0.015	0.087
	(-0.787)	(-0.759)	(0.557)	(1.375)
Acquisition	-0.794	-0.107	-0.010	-0.061**
	(-1.164)	(-0.526)	(-1.412)	(-2.330)
Outsourcing	15.530***	4.925***	-0.004***	-0.002
	(3.598)	(6.390)	(-2.743)	(-0.396)
MTG	-0.902	-0.475***	0.006*	0.014
	(-1.224)	(-2.948)	(1.773)	(0.813)
Constant	-0.713**	-0.220***	0.208**	0.326**
	(-2.221)	(-3.643)	(2.045)	(2.030)
Observations	165	151	165	153
Adjusted R-squared	0.131	0.318	0.361	0.145

*This table presents the results of our estimates of Eq. (4) using ordinary least squares regression. Detailed variable definitions are available in Appendix 4.A. The symbols *, **, and *** denote significance levels of 0.10, 0.05, 0.01, respectively.*

Columns (1) and (2) present the results of estimating Eq. (4) using *Audits_IAF* or *Objects_IAF* as the dependent variable. Contrary to our expectations, *Overinvestment* has no effect on *Audits_IAF* and significantly reduces *Objects_IAF* (t-stat = -2.95), suggesting that overinvested IAFs are not more efficient. Columns (3) and (4) present the results of estimating Eq. (4) using *Audits* or *Objects* as the dependent variable. The coefficient on *Overinvestment* is 0.05 in column (3), which is statistically significant with a t-stat of 2.74. This result implies overinvested IAFs perform one additional audit per twenty company employees than

benchmark-invested and underinvested IAFs. The coefficient on *Overinvestment* is 0.12 in column (4), which is statistically significant with a t-stat of 2.71. This result implies overinvested IAFs include in their scope one additional risk object per nine company employees than benchmark-invested and underinvested IAFs. Combined, the results indicate that companies that overinvest in their IAFs derive audit benefits through greater risk coverage, though not through greater audit efficiency.

4.3 IAF Overinvestment and External Audit Reliance

Prior literature argues that external auditors are pressured to reduce the cost of audits, and one mechanism for doing so is by relying on IAF work product (Krishnamoorthy, 2001). However, since responsibility for the financial statement audit opinion lies solely with the external auditor, professional standards require them to assess the reliability of the IAF's work, partly by evaluating the IAF's competence, before using it (IAFSB, 2013; PCAOB, 2007; AICPA, 1991). Adequate resourcing (i.e., investment) of the IAF is one factor that contributes to the competence evaluation (e.g., ISA 610). Furthermore, substitution of external audit procedures for internal audit procedures, which we expect for overinvested IAFs (H_1), can increase audit quality, and therefore reliability, by allowing those procedures to be performed by practitioners with greater knowledge about the company. Investment in the IAF reduces an organization's control risk (Carcello et al., 2020), permitting the external auditor to rely on controls to a greater extent and reduce substantive procedures. Finally, greater efficiency and/or scope in the performance of audits (H_2) enables IAFs to perform more audits that contribute to financial reporting quality (Abbott et al., 2012a; Cohen et al., 2004; Prawitt et al., 2009). Given these expectations, H_3 predicts the work of overinvested IAFs will be relied upon by external auditors to a greater extent than IAFs receiving only the benchmark level of investment or below. We test this hypothesis using Eq. (5), whose estimation results are presented in Table 4.6.

The coefficient on *Overinvestment* is 1.17, which is statistically significant with a t-stat of 2.35. The dependent variable, *Intensity_EA*, is measured on a five-point scale and we estimate Eq. (5) using ordinal logistic regression. Transformed, this result implies overinvested IAFs have 3.21 times higher odds (e^1.166) of being relied upon to a greater degree by the external auditor than benchmark-invested and underinvested IAFs, supporting H_3.

Table 4.6: External Audit Reliance on Internal Audit

	(1) Intensity_EA
Overinvestment	1.166**
	(2.354)
Ln_Size	0.014
	(0.099)
Listing	-1.643**
	(-2.368)
ForeignOps	0.563
	(0.951)
Financial	0.270
	(0.359)
Receivables	2.326
	(1.603)
Salesgrowth	0.487
	(0.211)
ROA	-7.477
	(-1.522)
Leverage	-1.372
	(-1.286)
Acquisition	0.305
	(0.535)
Big4	-0.961*
	(-1.681)
Change	-1.738*
	(-1.897)
Tenure	-0.166**
	(-2.372)
Meetings	0.274***
	(3.490)
DecEnd	1.274**
	(2.284)
Outsourcing	0.054
	(0.767)
MTG	0.157
	(1.038)
Observations	125
Pseudo R-squared	0.015

*This table presents the results of our estimates of Eq. (5) using ordinal logistic regression. Detailed variable definitions are available in Appendix 4.A. The symbols *, **, and *** denote significance levels of 0.10, 0.05, 0.01, respectively.*

4.4 IAF Overinvestment and Adding Value

We proposed as RQ_1 an exploration of the average marginal value-add of an IAF's non-assurance services. Per our utility maximization theory, companies will only substitute external audit services with internal audit services if doing so increases overall utility, which can be gained from assurance and non-assurance services. Our audit fee test results implied an average audit cost savings of 573,456 euro for overinvested IAFs (see section 4.1). If the cost of overinvestment is less than these savings, the difference represents marginal utility obtained from assurance service substitution. However, if the cost of overinvestment exceeds audit fee

savings, general economic theory suggests the difference must represent the minimum additional value-add generated by the IAF's non-assurance services.

CAE survey respondents were asked to indicate the average wages of four groups within their IAFs: the CAE and the three hierarchical levels below the CAE (representing managers, senior staff auditors, and lower-level staff auditors, or their company-specific equivalents). CAEs were permitted to choose their responses from a seven-point scale: 1) <50,000 euros; 2) 50,000 – 70,000 euros; 3) 70,000 – 90,000 euros; 4) 90,000 – 110,000 euros; 5) 110,000 – 130,000 euros; 6) 130,000 – 150,000 euros; and 7) >150,000 euros. We assigned to each response the midpoint of the chosen range (e.g., 25,000 euros for the 0 – 50,000 euro range, 60,000 euros for the 50,000 – 70,000 range, etc.), except for the >150,000 euro response option, to which we conservatively assigned 150,000 euros since it has no upper bound. We then calculated the average of the four chosen response values for each CAE survey respondent (using the aforementioned assigned values) to approximate the average cost of one IAF employee per sample observation.[64]

We re-estimated Eq. (1) using the raw number of IAF staff as the dependent variable to obtain a non-transformed abnormal investment residual. For each observation classified as an overinvested IAF, we then multiplied the average cost of an additional IAF employee by the non-transformed residual to calculate the observation-specific cost of overinvestment. Finally, we average these observation-specific costs together to obtain an average cost of overinvestment of 1,210,532 euros. This cost exceeds the average audit fee savings in our sample by 637,076 euros, implying companies that overinvest in their IAFs receive a minimum of 637,076 euros worth of non-assurance, value-add benefit in addition to their assurance substitution benefits.

4.5 Robustness Checks

One potential caveat of our study is that we analyze the average effect of overinvestment regardless of the level of abnormal investment. We take this approach because a particular level of overinvestment will likely not carry the same meaning for one IAF as it does for another. For example, a twenty-five percent overinvestment for an IAF with five employees will likely have different audit fee, efficiency, coverage, and reliance impacts than a similar overinvestment for an IAF that already has fifty employees. However, we recognize that our

[64] Some CAEs chose more than one wage range for a specific hierarchy level. For these observations, we calculated the average of all responses provided, even though more than four responses were provided.

primary methodology treats all overinvestments equally, which is also unlikely to hold true in practice. For robustness, we therefore re-estimate our models using levels of IAF investment and present the results in Table 4.7.

Consistent with our primary results, we find the level of overinvestment (*Abnormal_Investment*) to reduce *Auditfees* and *Unexpected Fees* (t-stats = -1.78 and -1.84, respectively). Economically, an increase in *Abnormal_Investment* by one standard deviation is associated with a 3.78% decrease in *Auditfees*.[65] Also consistent with our primary results, we find positive and significant coefficients on *Abnormal_Investment* when *Audits, Objects,* and *Intensity_EA* (t-stats = 2.19, 2.26, and 3.51, respectively) are used as the dependent variable.

One potential criticism to our study's motivation is that greater IAF investment will inherently yield greater IAF benefit. Though we have provided arguments explaining why the marginal benefit from each dollar of IAF investment should decline (see prior discussion of risk-based audit planning), we took advantage of our investment level regression to empirically test whether this holds true. We included in our Table 4.7 model a squared transformation of our investment level measure (*Abnormal_Investment_sq*) to show that greater investment does not guarantee greater benefit. We find significant and negative coefficients on the squared term when using *Auditfees* or *Unexpected Fees* (t-stats = 2.60 and 2.78, respectively) as the dependent variable, and significant and positive coefficients when using *Audits*, *Objects*, and *Intensity_EA* as the dependent variable (t-stats = -2.02, -2.19, and -2.79, respectively). These results collectively suggest there is a limit to the benefit that be derived from IAF overinvestment, such that it could yield a loss of previously derived benefits if overinvestment is too great.

[65] We calculate the marginal effects of an increase in *Abnormal_Investment* by one standard deviation by estimating the percentage change in the dependent variable when *Abnormal_Investment* increases from its mean (i.e., *Abnormal_Investment* = 1.189) by one standard deviation (i. e., *Abnormal_Investment* = 7.192). This allows for a better understanding of the effect of abnormal investment in IAF.

Table 4.7: Abnormal Investment in IAF

	(1) Auditfees	(2) Unexpected Fees	(3) Audits	(4) Objects	(5) Intensity_EA
Abnormal_Investment	-0.064*	-0.052*	0.009**	0.021**	0.259***
	(-1.784)	(-1.842)	(2.185)	(2.262)	(3.509)
Abnormal_Investment_sq	0.002**	0.002***	-0.000**	-0.000**	-0.004***
	(2.604)	(2.781)	(-2.022)	(-2.189)	(-2.792)
Ln_Size	0.562***		-0.018*	-0.027*	0.012
	(9.606)		(-1.961)	(-1.721)	(0.090)
Listing	0.151		0.033**	0.020	-0.953
	(0.603)		(2.010)	(0.649)	(-1.513)
ForeignOps	0.300		0.005	-0.008	0.392
	(1.185)		(0.482)	(-0.304)	(0.661)
Financial	-0.359		0.096***	0.177***	0.623
	(-1.251)		(2.910)	(3.117)	(0.850)
Receivables	-0.608		0.066**	-0.017	2.628*
	(-1.280)		(2.453)	(-0.226)	(1.946)
Salesgrowth	-1.045		-0.037*	0.056	0.833
	(-1.425)		(-1.699)	(0.391)	(0.344)
ROA	4.508**		0.246**	0.639	-3.866
	(2.622)		(2.333)	(1.009)	(-0.663)
Leverage	0.483		0.021	0.107	-1.637
	(1.071)		(0.753)	(1.624)	(-1.603)
Acquisition	0.408*		-0.015*	-0.074**	-0.117
	(1.814)		(-1.888)	(-2.442)	(-0.186)
Big4	0.320**				-1.097*
	(2.201)				(-1.763)
Change	-0.232				-1.207
	(-0.729)				(-1.139)
Tenure	0.043*				-0.139*
	(1.813)				(-1.866)
Meetings	0.042*				0.270***
	(1.759)				(3.129)
DecEnd	0.174				1.018*
	(0.818)				(1.880)
Outsourcing	0.108**		-0.004**	-0.002	0.002
	(2.497)		(-2.459)	(-0.307)	(0.022)
MTG	0.059		0.008*	0.017	0.301*
	(0.978)		(1.796)	(0.954)	(1.789)
Observations	100	100	165	153	125
Adjusted R-squared	0.821	0.054	0.321	0.100	0.160

*This table presents previous results using a continuous measure of abnormal investment in the IAF. Detailed variable definitions are available in Appendix 4.A. The symbols *, **, and *** denote significance levels of 0.10, 0.05, 0.01, respectively.*

5. Limitations and Conclusion

This study investigates organizational benefits obtained from investing in IAFs beyond benchmark expectations. Organizations frequently rely on benchmarking studies to determine whether their internal audit resources are sufficient, but some organizations voluntarily invest beyond the level of IAF investment suggested by benchmarks based on their organizational characteristics and risk. General economic theory suggests that (over)investment in the IAF should only be made if the benefits of that investment outweigh the costs. Against this

background, we combine a unique dataset of IAF practitioner survey data with archival organization data and develop a new measure of abnormal investment in the IAF. We identify those companies with positive abnormal investment and study the benefits associated with making such investment.

Our results suggest that one benefit of overinvestment in internal audit is greater external audit procedure substitution, evidenced by reduced external audit fees. We further find overinvestment to be associated with greater audit risk coverage, as evidenced by more audits per employee and more risk object coverage per employee, compared to benchmark-invested and underinvested IAFs. Our results also find that IAF overinvestment is associated with a higher degree of external audit reliance on internal audit work product, which can contribute to faster and higher quality audits, given the increased familiarity and experience IAFs have with their organizations relative to external auditors.

We also explore whether overinvested IAFs yield benefits to the organization beyond assurance service substitution. We find that companies which overinvest in their IAFs do so by an average of 1,210,532 euros, while the cost savings from external audit fee savings derived from overinvestment only averages 573,456 euros. Since companies will not invest in their IAFs when the cost of investment outweighs the benefit of investment, this finding suggests that overinvested IAFs yield at least 637,076 euros worth of non-assurance "value-add" benefit to their organizations, on average. To the best of our knowledge, ours is the first study to quantify the value-add contribution of internal audit.

Our results are of interest to organizations which must choose their level of internal audit investment, as benchmarking is a common tool for making that choice, and our results suggest there is additional value to be derived from investing above the benchmark. Our results are also of interest to regulatory bodies like the Institute of Internal Auditors, which establish subjective investment requirements. Currently, authoritative internal auditing guidance simply states that IAFs should be sufficiently funded, without quantifying what it means to be sufficient or the best way to derive sufficiency on a case-by-case basis. Our results suggest benchmarking could be used as a starting point for sufficient investment, but that consideration should be given to investing beyond the benchmark to maximize the IAF's value-add capability. Finally, our results are of interest to capital market participants who rely on financial reporting in their decision-making and seek to extract value from the companies in which they invest. Our results suggest IAFs can play a risk mitigating and value-enhancing role in financial reporting assurance procedures as well as in value-add, non-assurance procedures.

Our study is subject to several limitations. First, we are not able to measure how much an organization actually invests in internal auditing, and instead rely on estimates and ranges to calculate the value of average overinvestment for overinvesting companies in our sample. Second, we have no insight into investment in other assurance sources (e.g., internal control or risk management systems) that potentially substitute for investment in the IAF. We encourage additional research to examine the relationship between the benefits and costs of an investment in the IAF and other assurance providers. Third, our sample consists only of members of the German chapter of the IIA, so generalizability could be impaired if the German market setting varies from others. In this context, we rely on, but cannot guarantee, the accuracy of survey responses. Finally, our survey responses have the potential to suffer from self-perception bias. There is no way around this concern, as non-survey internal audit data is not readily obtainable. However, prior research has found CAEs' perceptions to be comparable to those of company stakeholders (Gramling et al., 2013; Carcello et al., 2020). We do not feel these limitations are detrimental to our inferences and encourage additional exploration of these areas by future research.

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Appendix 4.A: Variable Definitions

Variable	Definition
Abnormal_Investment	A company's percentage of abnormal IAF investment, calculated as the difference between the company's number of IAF employees per 1,000 company employees and its expected value (derived from the fitted values of an IAF investment determinant model (see Eq. (1))), divided by the expected number of IAF employees per 1,000 company employees.
Abnormal_Investment_sq	The square of *Abnormal_Investment*.
Acquisition	An indicator variable equal to one if the company reports merger and acquisition activities, and equal to zero otherwise.
Auditfees	The natural log of fees the company pays its external auditor for services related to the independent audit.
Audits	The number of audits conducted by the IAF, scaled by number of company employees.
Audits_IAF	The number of audits conducted by the IAF, scaled by number of company employees.
Big4	An indicator variable equal to one if the company's external auditor is Ernst and Young, PricewaterhouseCoopers LLP, Deloitte and Touch LLP, or KPMG LLP, and equal to zero otherwise.

Change	An indicator variable equal to one if the company changed external auditors in the current year, and equal to zero otherwise.
DecEnd	An indicator variable equal to one if the has a December fiscal year end, and equal to zero otherwise.
Financial	An indicator variable equal to one if the company operates in the financial services industry, and equal to zero otherwise.
ForeignOps	An indicator variable equal to one if the organization reports at least one foreign segment, and equal to zero otherwise.
IAF_Staff	The number of IAF staff employed by the company, scaled by number of company employees and multiplied by 1,000.
Intensity_EA	The extent to which an IAF's work is used by external auditors on a five-point scale, where one is rarely and five is intensive.
Leverage	The company's total liabilities divided by total assets.
Listing	An indicator variable equal to one if the organization is publicly listed, and equal to zero otherwise.
Ln_Size	The natural log of the company's total assets.
Meetings	The number of meetings held by the company's supervisory board in the observation year.
MTG	A variable from one (does not apply) to five (fully applies) measuring the extent to which the IAF's objectives include the preparation of internal auditors for future management positions.
Objects	The number of audit objects within the audit universe, scaled by number of organization employees.
Objects_IAF	The number of audit objects within the audit universe, scaled by number of organization employees.
Outsourcing	The number of full-time equivalent internal audit staff co-sourced or outsourced per year.
Overinvestment	An indicator equal to one when *Abnormal_Investment* is greater than zero, and equal to zero when *Abnormal_Investment* is less than or equal to zero.
Receivables	The company's receivables, scaled by total assets.
ROA	The company's net income divided by lagged total assets.
Salesgrowth	The company's year-over-year percentage growth in sales.
Tenure	The number of years the external auditor has audited the company's financial statements.
Unexpected_Fees	The residual from an audit fee determinant model. See Eq. (3). We use *Auditfees* as the dependent variable and exclude *Overinvestment* as an independent variable.

Appendix 4.B: Abnormal Investment in IAF

	(1) IAF_Staff
Ln_Size	-0.510
	(-1.445)
Listing	-0.506
	(-0.479)
ForeignOps	-0.015
	(-0.017)
Financial	8.577***
	(6.049)
Receivables	6.337***
	(2.645)
Salesgrowth	-4.513*
	(-1.740)
ROA	9.375
	(0.832)
Leverage	2.813*
	(1.672)
Acquisition	-1.121*
	(-1.805)
Outsourcing	-0.003
	(-0.031)
MTG	-0.108
	(-0.323)
Constant	7.454*
	(1.718)
Observations	167
Adjusted R-squared	0.541

*This table presents the results of our estimates of Eq. (1) using ordinary least squares regression. Detailed variable definitions are available in Appendix 4.A. The symbols *, **, and *** denote significance levels of 0.10, 0.05, 0.01, respectively.*

5 Analyzing the strategy-performance relationship in Germany

Can we still use the common strategic frameworks?

Marc Eulerich Anna Eulerich Benjamin Fligge

Abstract. This study examines the strategy-performance relationship within publicly-traded German firms. Strategic management literature provides several strategic frameworks that offer guidance on promising strategies. However, given major changes, such as globalization, managers wonder whether strategic frameworks are still applicable. We employ principal component analysis to measure competitive strategy and analyze a sample of 6,037 firm-years among 651 firms between 2000 and 2019. While we find evidence for the existence of efficiency-based strategies, differentiation-based strategies, and mixed strategies, only differentiation-based strategies are positively related to performance. Our results contribute to the discourse on the strategy-performance relationship, as they provide insights into promising strategies that are of interest to researchers and practitioners. Further, we introduce a new measure of competitive strategy based on principal component analysis.

1. Introduction

One of the main questions in the field of strategic management is why some firms perform better than others. Managers are concerned to choose the right strategy and "are forever asking the same questions: Where do we go from here, and which strategy will get us there?" (Bingham et al., 2011, p. 71). To guide this decision, prior literature provides several frameworks on promising strategies. Especially the approaches of Miles and Snow (1978) and Porter (1980) have received much attention in practice and are among the most influential works in the literature (Ramos-Rodríguez and Ruíz-Navarro, 2004). Their strategic frameworks contain a set of competitive strategies that help firms to create a competitive advantage and outperform their competitors. In general, competitive strategies are based on efficiency, differentiation, or combining both dimensions (Campbell-Hunt, 2000).

Despite the popularity of strategic frameworks, it has been argued that they are no longer applicable in today's business environment. Fundamental changes over the past 40 years, such as globalization, technological innovations, and increasing uncertainty, are expected and found to affect the strategy-performance relationship (Flammer, 2015; Hitt et al., 1997; Kim et al., 2004; Lillis and Van Veen-Dirks, 2008; Pertusa-Ortega et al., 2009; Parnell, 2006a; Porter, 2001). While it is therefore unclear whether competitive strategies from traditional strategic frameworks are still beneficial, much of the literature has shifted toward non-performance-related outcomes of competitive strategies (e.g., Bentley-Goode et al., 2017, 2019; Hsieh et al., 2018; Jiang et al., 2020; Martinez and Ferreira, 2019). In addition, competitive strategies have been studied extensively in U.S. samples, but rarely in other countries such as Germany. However, there are important differences between German and U.S. firms (e.g., inclusion of employees on corporate boards, more concentrated ownership structures, and high proportion of family firms) that might affect the existence of certain strategies and their relation to performance. In this context, Allen et al. (2007) provide some evidence for country-specific strategies that do not correspond to common strategic frameworks. Given the lack of exploratory studies outside the U.S., the applicability of strategic frameworks in Germany is an open question.

In this study, we use an exploratory approach to identify strategy types and analyze how they are related to performance. Our two research questions are as follows:

RQ_1: Which strategy types exist in Germany?

RQ_2: Which strategy type leads to higher performance?

We analyze a sample of 6,037 firm-years among 651 German firms between 2000 and 2019 using archival data (i.e. data from financial reports). Archival data reflect the actually implemented strategy, whereas survey data reflect perceptions of the strategic position (Mintzberg, 1978). Thus, they appear more reliable as they are free from perceptual bias, validated by an external auditor, and enable us to analyze competitive strategies over a longer sample period. The novelty of this study is the usage of principal component analysis (PCA). In the archival-based literature, measures of competitive strategy often appear subjective, especially because the authors choose a specific strategic framework as a starting point, the number of strategies, the variables associated with each strategy, and their weighting. PCA analyzes data patterns and identifies strategies based on correlations between strategy-related variables. Therefore, PCA allows us to analyze which typology reflects the behavior of our sample firms and we do not have to adopt assumptions related to any strategic framework (e.g. whether strategies are mutually exclusive).

Two significant principal components emerge from PCA reflecting differentiation and efficiency. We interpret principal component scores as the extent of focus on a strategic dimension, where higher scores for a given component indicate a higher focus on that strategy. Using these measures, we observe an increasing focus on differentiation, while the focus on efficiency decreases. In addition, about 26% of the firms in our sample pursue a mixed strategy.

We further analyze the effect of these strategies on operating performance, market value, and firm growth. This allows us to assess the strategy-performance relationship from different perspectives. Our results suggest that differentiation-based strategies lead to higher operating performance, market value, and firm growth. Contrary to our expectations, the firm's focus on efficiency does not affect operating performance and market value suggesting that efficiency-based strategies are not successful in Germany. Further, we find negative interactions between efficiency and differentiation indicating that mixed strategies lead to lower operating performance and firm growth.

Our results provide a deeper understanding of competitive strategies as we show that strategic frameworks are no longer completely applicable in today's business environment. These results are of relevance to practitioners concerned about promising strategies and researchers that increasingly focus on non-performance-related outcomes of competitive strategies. Our results imply that German firms have to focus on differentiation to outperform competitors. Contrary to strategic frameworks, efficiency-based strategies are not beneficial in our setting and are increasingly losing importance. Finally, we offer an exploratory approach to identify the firm's

strategic focus that can be used in further research to examine the relevance and benefits of competitive strategies in other countries.

2. Literature Review and Hypothesis Development

Over the last decades, globalization, digitalization, uncertainty, and complexity have dominated the media and significantly affect how firms compete. Nevertheless, traditional strategic frameworks are still popular in research and practice. Porter's (1980) concept of differentiation and cost leadership is the best-known and dominant framework of competitive strategies (Campbell-Hunt, 2000). Cost leaders have a low-cost advantage due to cost minimization, while firms pursuing a differentiation strategy are perceived as unique due to their technology, image, or other dimensions of differentiation. The bibliometric study of Ramos-Rodríguez and Ruíz-Navarro (2004) suggests that Porter's (1980) framework had the greatest impact on strategic management literature during 1980-2000 and later publications also show its relevance in current research (Parnell and Brady, 2019).

Miles and Snow (1978) introduced another framework that is also among the most popular typologies. They develop three different types of strategies: prospectors, defenders, and analyzers. Defenders focus on improving efficiency, while prospectors continually search for opportunities and innovations. Analyzers combine both strategies as they have areas that follow a defender strategy and areas that follow a prospector strategy.

Moreover, March (1991) distinguishes organizational learning processes between exploitation and exploration. While exploitation captures efficiency, exploration includes discovery and innovation. Additionally, Treacy and Wiersema (1995) developed a strategic framework of product leadership, customer intimacy, and operational excellence. Product leadership and customer intimacy refer to differentiation through innovative products or services. Operational excellence captures reliable products at low prices.

In general, generic strategies are based on either efficiency or differentiation or combine both dimensions (Campbell-Hunt, 2000). Efficiency-based strategies can be linked to strategies such as cost leadership, defender, exploitation, and operational excellence. Differentiation-based strategies can be linked to differentiation strategy, prospector, exploration, and customer intimacy (Bentley et al., 2013; Higgins et al., 2015; Martinez and Ferreira, 2019; Thornhill and White, 2007).

2.1 Efficiency-based Strategies

Firms with a strong focus on efficiency attempt to gain advantages over competitors through a low-cost position based on efficient processes and cost minimization. They tend to offer a limited number of standardized products and services. This enables them to increase efficiency through economies of scale, process enhancements, and experience curve benefits (Delmas and Pekovic, 2015). Archival-based studies characterize firms with a strong focus on efficiency through productive employees, efficient use and distribution of assets, rigorous cost-cutting programs in non-necessary areas (e.g., R&D or marketing), and low employee fluctuations (Abernethy et al., 2019; Anwar and Hasnu, 2016; Balsam et al., 2011; Bentley et al., 2013; Bentley-Goode et al., 2017, 2019; Higgins et al., 2015; Lim et al., 2018; Martinez and Ferreira, 2019).

Porter (1980) states that efficiency protects the firm against various sources of competition, such as rivalry within the industry and the bargaining power of buyers and suppliers. Firms with a low-cost position maintain profitability even when buyers or competitors push prices down or suppliers increase firms' input costs. Furthermore, a low-cost position is a significant entrance barrier and helps firms to deal with substitutes. Miles and Snow (1978) argue that efficient firms seal off a portion of the market to become as efficient as possible through concentration on one single-core technology, continuous improvements in that technology, strict cost control, and vertical integration. As a result, firms with a strong focus on efficiency tend to ignore developments and trends outside their domains.

However, fundamental changes in the business environment may cause efficiency-based strategies to become obsolete. First, firms focusing on efficiency are less flexible and therefore more vulnerable to changes in the market (Pertusa-Ortega et al., 2009). Moreover, the widespread use of the Internet for price comparisons has reduced the switching costs for customers. Globalization has reinforced this effect by lowering nearly all entry barriers (Kim et al., 2004), leading Hitt et al. (1997) to conclude that competition has shifted from low costs to product development.

In this context, it is difficult for German firms to achieve a low-cost advantage over foreign competitors due to high production costs and strong employee rights. Employees in Germany can exert influence on firm-wide decisions through mandatory board-level codetermination. Campagna et al. (2020) argue and find that employees use this influence to reduce the firm's

focus on efficiency. For example, codetermined firms are more likely to be overstaffed and pay higher wages (Eulerich et al., 2020).

While it appears to be more difficult for German firms to pursue efficiency-based strategies, Duanmu et al. (2018) argue that firms in emerging economies are more likely to benefit from efficiency-based strategies than firms in developed countries because consumers in emerging economies are more sensitive to prices, given their low income. Consistent with this argument, Abernethy et al. (2019) find a negative relation between efficiency and operating performance and Parnell and Brady (2019) find no significant association between cost leadership and financial performance. However, the majority of studies provide evidence for the advantageousness of efficiency-based strategies (Conant et al., 1990; Lechner and Gudmundsson, 2014). Therefore, we hypothesize:

H_1: A firm's focus on efficiency is positively associated with performance.

2.2 Differentiation-based Strategies

Differentiation-based strategies aim at creating products or services that are perceived as unique. This can be done through various dimensions such as quality, image, distribution channels, speed of delivery, or customer service, and is usually backed by heavy investments in R&D, administration, sales, or marketing (Allen et al., 2007; Kim et al., 2004; Spanos et al., 2004). A differentiation strategy enables a firm to charge higher prices to compensate for the higher costs. However, firms need to justify higher prices through advantages, quality, and exclusivity of their product (Delmas and Pekovic, 2015; Kim et al., 2004).

If products and services are perceived as unique, the firm is protected against substitutes, competitors, potential entrants, and the bargaining power of buyers (Porter, 1980). Moreover, the ability to generate higher prices protects the firm from increasing input costs and price wars (Kim et al., 2004). However, "companies have to show that they can create a steady stream of standout products that will keep customers awake with anticipation" (Treacy and Wiersema, 1995, p. 88). This requires firms following a differentiation strategy to identify and exploit opportunities, be both organizationally and technologically flexible, and coordinate numerous and diverse operations (Miles and Snow, 1978).

Archival-based studies characterize differentiation-based strategies by several indicators, including high expenditures on R&D, marketing and new equipment, high margins, and large growth opportunities (Abernethy et al., 2019; Anwar and Hasnu, 2016; Balsam et al., 2011; Bentley et al., 2013; Bentley-Goode et al., 2017, 2019; Higgins et al., 2015; Lim et al., 2018;

Martinez and Ferreira, 2019). Further, prior research often categorizes efficiency and differentiation as two ends of a continuum, where high expenditures in certain areas are associated with differentiation and low expenditures with efficiency (Pertusa-Ortega et al., 2009; Spanos et al., 2004). Thus, differentiation strategies can also be characterized by attributes such as less productive employees or a less efficient use and distribution of assets.

It has been argued that differentiation-based strategies have become even more beneficial as the internet allows customers to identify and switch to firms that offer additional value through differentiated features with just a few mouse clicks (Kim et al., 2004; Porter, 2001). Moreover, differentiation strategies are most appropriate in a dynamic and uncertain environment, making them even more suitable for the current economic situation than they were 40 years ago (Hambrick, 1983; Miller, 1988). Thus, important changes such as the ongoing process of globalization, digitalization, and new technologies may have increased the advantages of differentiation-based strategies.

We expect differentiation-based strategies to be particularly popular in the German market for several reasons. First, Flammer (2015) suggests that it is becoming increasingly difficult for firms in developed countries to compete on a low-cost basis, which increases incentives to focus on differentiation. Second, mandatory employee representation on corporate boards in Germany has been found to increase a firm's focus on differentiation (Campagna et al., 2020). Finally, the German market is characterized by a high proportion of family firms that are found to make higher investments in R&D (De Massis et al., 2013).

Interestingly, prior literature provides mixed results regarding the relation between differentiation-based strategies and performance. While some studies identify a positive effect (Conant et al., 1990; Lechner and Gudmundsson, 2014; Parnell and Brady, 2019), there are also studies that find a negative or no effect (Anwar and Hasnu, 2016; Abernethy et al., 2019; Spanos et al., 2004). March (1991, p. 73) states that "returns from exploration are systematically less certain, more remote in time, and organizational more distant from the locus of action and adaption." Accordingly, firms might, for example, not be considered technology leaders, despite high R&D expenditures if improvements cannot be realized or take years to realize. However, we expect investments to pay off on average and assume:

H_2: A firm's focus on differentiation is positively associated with performance.

2.3 Mixed Strategies

Despite the similarities between the mentioned strategic frameworks, there are also differences, including whether strategies are mutually exclusive. Porter (1980) states that differentiation and efficiency are not compatible because they combine a different set of resources, strengths, organizational structures, and management styles. He argues that the simultaneous adaptation of a differentiation strategy and cost leadership reflects a firm's unwillingness to make choices about competitive strategies. Moreover, firms with a pure strategy benefit from greater clarity of their position and actions by avoiding complexity, confusion, mutually exclusive trade-offs, and competitor attacks from two flanks. Some authors provide evidence for Porter's (1980) arguments and find that firms with a mixed strategy are outperformed by firms with a pure strategy (Shinkle et al., 2013; Thornhill and White, 2007).

Contrarily, in the era of global competition and rapidly changing competitive environments, pursuing multiple strategies is expected to yield higher performance (Kim et al., 2004; Lillis and Van Veen-Dirks, 2008). Miles and Snow's (1978) framework includes mixed strategies (analyzers), that combine efficiency-based areas with differentiation-based areas. Treacy and Wiersema (1995, p. 202) and March (1991, p. 71) also emphasize the need to "balance" both dimensions. Campbell-Hunt (2000) finds that, depending on the context, all-rounder designs may be superior to pure strategies. In this context, Parnell (2010) finds evidence that even supports a U-shaped relationship between strategic clarity and performance. Murray (1988) argues that external conditions for differentiation primarily stem from customer taste, while external conditions for cost leadership primarily stem from industry structure. As these factors are independent, firms can pursue both an efficiency and a differentiation strategy. According to the different arguments and findings, we assume:

H_{3a}: Firms focusing on both efficiency and differentiation have a lower performance.

H_{3b}: Firms focusing on both efficiency and differentiation have a higher performance.

3. Methods

3.1 Sample Selection

We obtain financial variables on German firms between 2000 and 2019 from Datastream. We consider all firms that were listed and headquartered in Germany. Our initial sample contains 13,764 firm-years among 1,175 unique firms. Following previous research, we exclude firms

from the financial sector (SIC 6000-6999) as our analyses require several variables that are often not reported by financial firms because these variables are not meaningful to them. Moreover, we exclude observations with missing strategy variables, leading to a sample of 6,037 firm-years among 651 firms (Panel A). We further exclude observations with missing performance and control variables. Our final sample (Panel B) consists of 4,133 firm-years among 515 firms. Table 5.1 presents the sample selection process.[66]

Table 5.1: Sample Selection Process

	firm-years	firms
Publicly traded German firms between 2000 and 2019	**13,764**	**1,175**
- financial industry or missing industry-classification	2,796	253
- missing strategy variables	4,931	271
Panel A	**6,037**	**651**
- missing performance variables	720	46
- missing control variables	1,184	90
Panel B	**4,133**	**515**

This table presents the sample formation for this study.

3.2 Measuring Strategy

Although strategic frameworks are widely accepted and analyzed in various settings, there are still concerns about the measurement. Prior research often analyzes specific strategic frameworks and adopts the corresponding assumptions, rather than examining which framework fits the sample. For example, several studies based on Porter's (1980) framework neglect mixed strategies, which are promising in other strategic frameworks (Allen and Helms, 2006; Koo et al., 2004). Additionally, analyzing a specific strategic framework also neglects country-specific strategies (Allen et al., 2007).

Further, the selection and weighting of variables is also a challenge. There are many variables, that have been employed to measure competitive strategy and it appears to be difficult to choose the right set of variables. Several studies use a unidimensional conceptualization (Hambrick, 1983), but it is questionable whether this can capture the complexity of competitive strategies (Conant et al., 1990). However, in multidimensional conceptualizations (Bentley et al., 2013) the variables need to be weighted. Frequently, variables have been equally weighted (Higgins et al., 2015), but it may also be reasonable to use other weights.

Given these limitations, we use Principal Component Analysis (PCA) to measure competitive strategies. PCA is a statistical technique that analyzes data patterns and identifies principal components based on correlations between variables. The principal components are a linear

[66] Note that all analyses are conducted in Stata.

transformation of the variables and explain most of their variance (Allee et al., 2022). Thus, PCA allows us to identify competitive strategies based on strategically relevant variables and calculates their weights so that competitive strategies reflect the underlying variables as accurately as possible. Due to the mentioned advantages, PCA has been employed in several survey-based studies (Allen and Helms, 2006; Allen et al., 2007; Koo et al., 2004;). However, PCA is also suitable for archival data (Allee et al., 2022).

Based on prior research (e.g., Balsam et al., 2011; Bentley et al., 2013; Bentley-Goode et al., 2017, 2019; Higgins et al., 2015), we use six variables for our empirical analysis: *wagesales, cogssales, sgasales, rdsales, capacityutilization,* and *capexsales*. The ratio of salaries and benefits to sales (*wagesales)* reflects employee productivity and the firm's effort to reduce costs. High values often imply that employees conduct non-repetitive activities that are difficult to automate. The ratio of costs of goods sold to sales *(cogssales)* reveals the spread between sales and production costs. The lower this ratio, the higher the firm's ability to charge higher prices through advantages, quality, and exclusivity of their product. The propensity to search for new projects and marketing efforts is captured by the ratio of SG&A expenditures to sales *(sgasales),* while the ratio of R&D expenditures to sales *(rdsales)* reflects the focus on exploiting new products and services. On average, higher expenditures in these areas are expected to allow for better differentiation from competitors' products and services. The ratio of property, plant, and equipment to sales *(capacityutilization)* reveals the focus on production assets. Finally, the ratio of capital expenditures to sales *(capexsales)* reflects the effort to increase production capacity. The focus on production assets and efforts to increase production capacity are both associated with efficiency-based strategies.

The principal component solution obtained after varimax rotation is shown in Table 5.2. Two significant factors (eigenvalue ≥ 1) emerge from PCA, accounting for 64.21 percent of the total variance. Each variable exhibited factor loadings greater than $\pm.38$ on at least one factor. Kim and Mueller (1978) suggest factor loadings of $\pm.30$ as a cutoff for significance.[67] Principal component 1 (*PC1*) represents variables related to differentiation-based strategies, as *wagesales*, *cogssales*, *sgasales,* and *rdsales* load significantly on *PC1*. This leads us to interpret *PC1* as the firm's focus on differentiation. For instance, higher expenditures on R&D relative to sales increase the value of *PC1* and hence the firm's focus on differentiation. Principal

[67] There are also studies in this area that treat loadings of $\pm.40$ or $\pm.50$ as a cutoff for significance. However, using these more conservative criteria does not affect our strategy measures as insignificant factors are typically retained in PCA. Furthermore, we believe that stricter thresholds do not affect the interpretation of our principal components.

component 2 (*PC2*) contains *capacityutilization,* and *capexsales*, which are associated with efficiency-based strategies. Moreover, *wagesales*, *sgasales*, and *rdsales* load negatively on *PC2* reflecting cost minimization behavior. Therefore, we interpret *PC2* as the firm's focus on efficiency.[68]

Table 5.2: PCA after Varimax Rotation

	PC1 (differentiation)	**PC2 (efficiency)**
Sgasales	**.593**	-.024
Wagesales	**.442**	-.089
Rdsales	**.382**	.026
Cogssales	**-.554**	-.074
Capacityutilization	-.028	**.699**
Capexsales	.032	**.705**
Eigenvalue	2.372	1.481
proportion of variance explained	39.5%	24.7%

This table presents the results of the PCA after varimax rotation. Loadings >.300 are printed in bold.

We transform principal component scores to an interval from 0 to 100 for each industry, so that the highest (lowest) principal component score within an industry is given the value 100 (0). This allows us to compare principal component scores across different industries. We treat the transformed principal component scores as indicators of the firm's strategic focus. *differentiation* is the transformed principal component score on *PC1* and *efficiency* is the transformed principal component score on *PC2*.[69]

3.3 Empirical Model

We analyze the strategy-performance relationship using the following model:

$$Performance_{t+1} = \beta_0 + \beta_1 efficiency_t + \beta_2 differentiation_t + \beta_3 efficiency \times differentiation + \beta_4 log\_assets_t + \beta_5 forsales_t + \beta_6 diversified_t + \beta_7 leverage_t + \beta_7 marketgrowth_t + \beta_8 concentration_t + \beta_9 lag\_performance_t + \varepsilon_t.$$

[68] In untabulated results, we include the ratio of inventories to sales and growth of sales as additional strategy variables and find similar results. Specifically, the composition of *PC1* and *PC2* and our empirical results on the strategy-performance relationship do not change. Although both variables significantly load on *PC3*, the component does not reflect a competitive strategy, has a low eigenvalue (1.046), and reduces the sample size due to missing values.

[69] An example of a firm with strong focus on efficiency is E.On. According to Miles and Snow's (1978) definition of defenders, E.On has a narrow product-market domain and is specialized in operating its power and gas networks. High capital expenditures suggest that the firm's primary emphasis is on increasing its production capacity and improving the efficiency of its operations. An example of a firm that focuses on differentiation is Beiersdorf. Consistent with Porter (1980) and Miles and Snow (1978), Beiersdorf has well-known brands (e.g., Niveau, Tesa, or Labello) and continuously aims at improving the quality and image of its products. This is manifested in high expenditures on R&D.

We employ several proxies for performance to analyze the effect of differentiation and efficiency on operating performance, market value, and firm growth. Return on assets (*roa*) and return on equity (*roe*) capture the firm's operating performance. Tobin's q (*tobinsq*) and the market-to-book ratio (*markettobook*) capture the firm's market value. Finally, we employ one-year growth of assets (*assetgrowth*) and sales (*salesgrowth*) to measure firm growth. We follow Mishra (2022) and use the performance in year t+1 as the dependent variable for two reasons. First, using lagged performance allows us to deal with potential simultaneity between strategy and performance. Second, competitive strategies reflect long-term investments requiring a time lag to be beneficial.

We include *efficiency*, *differentiation*, and an interaction term between both variables (*efficiency*×*differentiation*) to capture competitive strategy. Moreover, we control for several firm characteristics, including *log_assets, forsales, diversified,* and *leverage.* We also follow Spanos et al. (2004) and control for the firm's performance in year t to account for omitted/unobservable factors that may affect performance. Further, we include *marketgrowth, concentration*, and industry-fixed effects to account for industry-specific characteristics. Finally, we control for year-fixed effects to capture time effects. Note that we use robust standard errors to avoid heteroscedasticity in our models. Appendix 5.A provides definitions of all variables with Datastream identifiers.

3.4 Descriptive Statistics

Table 5.3 presents descriptive statistics for the variables in our empirical model. *differentiation* and *efficiency* range by construction from 0 to 100 and the mean values are 32.432 and 15.950, respectively.

Table 5.4 presents Spearman correlations between the variables. While we find some positive and significant correlations between *differentiation* and performance (i.e., *roa, tobinsq,* and *markettobook*) that are in line with our predictions, we find negative correlations between *efficiency* and performance (i.e., *tobinsq, markettobook,* and *salesgrowth)* suggesting that efficiency-based strategies may not be successful in Germany. Note that we also find significant correlations between explanatory variables. As these correlations are low, multicollinearity is not a problem in our models

Table 5.3: Descriptive Statistics on Panel B

Variables	Mean	Std. Dev.	25pct	75pct
Roa	3.828	10.601	1.800	7.860
Roe	6.397	28.049	2.510	16.780
Tobinsq	1.604	1.065	1.048	1.735
Markettobook	2.422	2.344	1.131	2.788
Assetgrowth	9.392	36.487	-3.060	12.560
Salesgrowth	10.631	39.934	-1.640	14.660
Efficiency	15.950	14.447	6.036	20.761
Differentiation	32.432	17.297	19.690	42.934
log_assets	12.980	2.202	11.424	14.295
Forsales	.473	.290	0.225	.7213
Diversified	.421	.494	.000	1.000
Leverage	.119	.120	.010	.195
Marketgrowth	.029	.079	-.017	.074
Concentration	.219	.100	.169	.265

This table presents descriptive results for the control and performance variables used in the regressions.

4. Results

4.1 Strategy types in Germany

While our PCA suggests that a firm's focus on efficiency and differentiation explains explain most of the variance of strategically relevant variables, we further analyze the development of the average focus on efficiency, differentiation, and the extent to which firms focus on both dimensions. Consistent with the arguments that efficiency-based strategies are outdated, we find German firms focus less on efficiency. On average, *efficiency* has decreased by 7.26% (from 17.833 in 2000 to 16.538 in 2019). Contrarily, *differentiation* has increased by 32.38% during the sample period (from 29.100 in 2000 to 38.522 in 2019) suggesting that German firms increasingly focus on differentiation.

We also find evidence for firms that combine efficiency and differentiation. According to Lillis and van Veen-Dirks (2008), we define firms with above-median focus on both efficiency and differentiation as firms with mixed strategy. Our results suggest that 1,091 firm-years (26.40% of the firm-years in Panel B) pursue a mixed strategy indicating that mixed strategies are popular in Germany.

Table 5.4: Correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
(1) roa	1.000													
(2) roe	**.914**	1.000												
(3) tobinsq	**.464**	**.433**	1.000											
(4) markettobook	**.393**	**.440**	**.940**	1.000										
(5) assetgrowth	**.429**	**.408**	**.299**	**.267**	1.000									
(6) salesgrowth	**.293**	**.271**	**.268**	**.240**	**.526**	1.000								
(7) differentiation	**.047**	-.017	**.181**	**.128**	**-.038**	**-.058**	1.000							
(8) efficiency	-.030	.018	**-.100**	**-.064**	.015	**-.056**	**.0801**	1.000						
(9) log_assets	**.059**	**.202**	-.030	**.049**	**.063**	-.013	**-.138**	**.374**	1.000					
(10) forsales	-.007	.015	-.017	-.023	-.021	**-.042**	**.046**	**.081**	**.298**	1.000				
(11) diversified	-.010	**.038**	**-.073**	**-.040**	.001	**-.032**	.008	**.173**	**.177**	.024	1.000			
(12) leverage	**-.098**	.010	**-.157**	**-.042**	.004	-.016	**-.083**	**.371**	**.337**	**.057**	**.180**	1.000		
(13) marketgrowth	**.052**	**.053**	**.155**	**.152**	**.080**	**.036**	.025	**-.047**	**-.047**	-.021	-.006	-.017	1.000	
(14) concentration	**.031**	**.089**	**.043**	**.077**	.009	**-.042**	.015	**.310**	**.310**	**.262**	-.019	**.182**	**.112**	1.000

This table presents Spearman correlations between the variables used in our regressions. ***Bold*** *if p-value <0.05 (2-tailed).*

4.2 Strategies and Performance

Table 5.5 summarized our empirical results for the strategy-performance relation. We analyze the effect of strategy on operating performance in models (1) and (2), on market value in models (3) and (4), and on firm growth in models (5) and (6).

Hypothesis 1 predicts that a firm's focus on efficiency is positively associated with performance. We find insignificant coefficients on *efficiency* in models (1) to (5) suggesting that efficiency based-strategies do not affect operating performance and market value. This could be an explanation for the finding that the focus on efficiency has diminished over time. The coefficient on *efficiency* is significant and positive only in model (6) where *salesgrowth* is the dependent variable (p=.011). However, our overall results lead us to reject hypothesis 1.

Hypothesis 2 predicts that a firm's focus on differentiation is positively associated with performance. Although some studies find a negative or no effect of differentiation-based strategies on performance, we find positive and significant coefficients on *differentiation* in most specifications. In particular, a one standard deviation increase in *differentiation* increases *roa* by 1.079 (p<0.01), *roe* by 1.744 (p=.023), *tobinsq* by 0.046 (p=.011), *markettobook* by 0.079 (p=.078), and *salesgrowth* by 1.242 (p=.045). This is in line with the arguments that differentiation-based strategies are beneficial due to technological developments and the ongoing process of globalization. Thus, we can confirm hypothesis 2.

Hypothesis 3a (3b) predicts that firms focusing on both efficiency and differentiation will have a lower (higher) performance. Consistent with Hypothesis 3a, we find negative and significant coefficients on *efficiency*×*differentiation* in model (1) and (6) (p<0.01 and p=0.087, respectively). While it has been argued that mixed strategies promise higher performance due to global competition and rapidly changing competitive environments, our results suggest that mixed strategies are associated with lower operating performance and firm growth.[70]

[70] Note that we find similar results when we follow Duanmu et al. (2018) and calculate the firm's focus on efficiency (differentiation) as the difference between firm's efficiency (differentiation) score and the industry-year's median efficiency (differentiation) score scaled by the range of this differences for each industry-year.

Table 5.5: Effects of Strategy on Performance

	(1) roa	(2) roe	(3) tobinsq	(4) markettobook	(5) assetgrowth	(6) salesgrowth
differentiation	0.062***	0.101**	0.003**	0.005*	0.057	0.072**
	(3.831)	(2.271)	(2.531)	(1.763)	(1.443)	(2.009)
efficiency	0.034	-0.007	-0.002	-0.006	0.061	0.168**
	(1.376)	(-0.088)	(-1.575)	(-1.321)	(0.939)	(2.556)
efficiency×differentiation	-0.002***	-0.003	-0.000	0.000	-0.003	-0.003*
	(-3.159)	(-1.585)	(-0.045)	(0.014)	(-1.592)	(-1.713)
log_assets	0.409***	1.750***	0.005	-0.000	-0.062	0.017
	(3.819)	(5.434)	(0.679)	(-0.025)	(-0.260)	(0.074)
forsales	-0.526	-2.325	-0.054	0.079	-2.769	-2.475
	(-0.689)	(-1.075)	(-1.106)	(0.599)	(-1.635)	(-1.320)
diversified	0.051	-0.138	-0.027	-0.037	-0.209	-0.806
	(0.159)	(-0.134)	(-1.450)	(-0.658)	(-0.273)	(-0.966)
leverage	1.873	1.285	-0.033	-0.016	-6.252**	-2.329
	(1.091)	(0.221)	(-0.273)	(-0.051)	(-2.113)	(-0.733)
marketgrowth	-0.796	-4.756	-0.015	-0.367	-9.230	20.313***
	(-0.270)	(-0.587)	(-0.102)	(-0.801)	(-1.145)	(2.724)
concentration	8.285***	15.453	0.658***	1.667***	5.157	-3.787
	(2.684)	(1.496)	(3.488)	(2.895)	(0.675)	(-0.552)
lag_performance	0.538***	0.487***	0.810***	0.790***	0.075***	0.115***
	(14.650)	(10.012)	(26.192)	(22.139)	(4.146)	(3.819)
Constant	-9.144***	-32.455***	-0.366***	-0.652**	-1.473	-1.011
	(-5.279)	(-5.564)	(-3.185)	(-2.206)	(-0.365)	(-0.250)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,133	4,133	4,133	4,133	4,133	4,133
Adj. R-squared	0.282	0.219	0.700	0.585	0.0544	0.0801

*This table presents ordinary least squares regressions of performance on competitive strategy. t-statistics are reported under each coefficient in parentheses. *, **, and *** denote significance level of 0.1, 0.05, 0.01, respectively.*

4.3 Robustness Checks

We conduct several tests to examine the robustness of our findings. As our sample consists of several large firms that are likely to pursue multiple strategies, the inclusion of firms with different segments can potentially bias our results. For example, a firm with a strong focus on efficiency in one segment and a strong focus on differentiation in another segment might have a moderate focus on both strategies on firm-level. Therefore, we restrict our sample to focused firms (*diversified*=0) and re-estimate our regressions. Our untabulated results are similar suggesting that the inclusion of firms with different segments has not biased our results.

We also analyze whether firms have to maintain their strategic focus to achieve a competitive advantage. Several scholars argue that the choice of a competitive strategy is a decision that has to be followed over a long time to pay off (Miles and Snow, 1978; Porter, 1980). Firms maintaining their strategic focus benefit from experience curve and learning (Leitner and Güldenberg, 2010) and strategic changes are often risky and require costly investments (Parnell, 2006b). Thus, we may have underestimated the impact of efficiency and differentiation on performance because our strategy measures only capture the strategic focus in a single year. We calculate the firm's long-run strategy as the three-year average of *efficiency* and *differentiation*, where higher values suggest a higher focus on the respective strategic dimension between year t-2 and year t. Our untabulated results confirm our previous findings.

To provide more evidence on the long-run relation between strategy and performance, we also calculate three-year averages of our performance measures as dependent variables. Spanos et al. (2004) argue that competitive strategies reflect long-term investments requiring a time lag to be beneficial. Thus, we might find positive effects of efficiency-based strategies or mixed strategies on performance if the time lag is longer than one year. We re-estimate our models using the average performance from year t+1 to year t+3 as the dependent variable and find similar results.

5. Conclusion

Despite the popularity of strategic frameworks, it has been argued that they are no longer applicable in today's business environment due to fundamental changes over the past 40 years, such as globalization, technological innovations, and increasing uncertainty. In addition, competitive strategies have been mainly studied in the U.S., but rarely in other countries. Thus, the applicability of strategic frameworks in countries like Germany is an open question. In this

study, we use an exploratory approach to identify strategy types and analyze how they are related to performance. Our results suggest that differentiation and efficiency still explain how firms compete. Nevertheless, firms increasingly focus on differentiation and less on efficiency. One potential reason for this decline is that efficiency-based strategies do not affect performance. We find only differentiation-based strategies to be positively related to performance.

5.1 Implications

Our results provide numerous theoretical and managerial implications. We inform managers concerned about promising strategies that only differentiation-based strategies are successful in Germany. Accordingly, German firms cannot outperform their competitors by focusing on efficiency or pursuing multiple strategies. In this context, we provide theoretical implications as we question the applicability of common strategic frameworks. While our results call for managers to reflect on their strategic focus, our results also imply that policymakers should encourage firms to focus more on efficiency. An example of a corresponding measure is the German Research & Development Tax Incentive Act 2020, which aims to increase R&D tax incentives and hence the focus on differentiation.

However, our results also have implications for researchers interested in the determinants and consequences of competitive strategies. Although most measurement approaches are designed to identify both highly-efficient and highly-differentiated firms (e.g., Abernethy et al., 2019; Bentley-Goode et al., 2017, 2019; Jiang et al., 2020), researchers should carefully consider whether certain strategy types really exist in their setting. As we observe both a decreasing focus on efficiency and no performance effect of efficiency-based strategies, research designs comparing highly-efficient and highly-differentiated firms appear not to be meaningful, at least in our German setting. We contribute to this literature by providing an exploratory approach that is useful to identify and analyze strategy types.

5.2 Suggestions for further research

We encourage further research to analyze why efficiency-based strategies are not related to performance in Germany. One explanation might be the fact that firms from emerging economies take the role of low-cost competitors. As we analyze only German firms, we call for research that examines industry-level competition in more detail and considers the extent to which German firms compete with foreign firms. This possibility has been insufficiently

considered in existing strategic frameworks. Moreover, we analyze the average effects of certain strategies, but it would be interesting to understand the conditions under which firms can successfully pursue efficiency-based strategies.

Additionally, we call for more exploratory research on competitive strategies in other countries. Although we expect to find similar results in comparable institutional contexts, we cannot guarantee that our results are generalizable. Furthermore, our sample period includes the financial crisis 2008, but more recent crises (i.e., Covid-19 and the war in Ukraine) may have affected the strategy-performance relationship differently. Given the lack of exploratory studies outside the U.S., we encourage further research to rely on our approach to conduct, for example, cross-country studies on competitive strategies. A cross-country study in the European Union might be a useful setting to analyze country-level differences in a large market with free trade among its members.

5.3 Limitations

Nevertheless, our study is also subject to limitations. We measure competitive strategies based on six variables that express the relative investments in certain areas but were unable to take the efficiency of strategic investments into account. For example, firms may offer high-quality products despite low R&D expenditures and customers may perceive other products as less unique despite high R&D efforts. We also classify competitive strategies relative to other German firms within the same industry, but we did not consider that (1) these firms are not necessarily competitors and (2) firms also compete with foreign firms or firms in other industries.

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Appendix 5.A: Variable Definitions

Performance	
roa	$= \frac{\text{net income + interest expense * (1 - tax rate)}}{\text{average of last year's and current year's total assets}} * 100$ (*WC08326),* winsorized at 1st and 99st percentiles.
roe	$= \frac{\text{net income - preferred dividend requirement}}{\text{average of last year's and current year's common equity}} * 100$ (*WC08301*), winsorized at 1st and 99st percentiles.
tobinsq	$= \frac{\text{market value of equity(}WC08001\text{)+total assets(}WC02999\text{)-book value of equity(}WC035($ / total assets (*WC02999*) winsorized at 1st and 99st percentiles.
markettobook	$= \frac{\text{market value of equity (}WC08001\text{)}}{\text{book value of equity (}WC03501\text{)}}$, winsorized at 1st and 99st percentiles.
assetgrowth	is firm's one-year growth rate of total assets (*WC08621*)
salesgrowth	is firm's one-year growth rate of sales (*WC08631*)

Strategy	
efficiency	is the transformed principal component score on PC2, where higher values indicate a greater focus on efficiency. See section 3.2 for a detailed description.
sgasales	$= \frac{\text{selling, general \& administrative expense (}WC01101\text{)}}{\text{net sales or revenues (}WC01001\text{)}}$.
wagesales	$= \frac{\text{salaries and benefit expenses (}WC01084\text{)}}{\text{net sales or revenues (}WC01001\text{)}}$.
rdsales	$= \frac{\text{research and development expense (}WC01201\text{)}}{\text{net sales or revenues (}WC01001\text{)}}$, Missing values are set to zero.
cogssales	$= \frac{\text{cost of goods sold excluding depreciation (}WC01051\text{)}}{\text{net sales or revenues (}WC01001\text{)}}$.
capacityutilization	$= \frac{\text{property, plant and equipment (net) (}WC02501\text{)}}{\text{net sales or revenues (}WC01001\text{)}}$.
capexsales	$= \frac{\text{capital expenditures (}WC04601\text{)}}{\text{net sales or revenues (}WC01001\text{)}}$.

Controls	
forsales	$= \frac{\text{international sales (}WC07101\text{)}}{\text{net sales or revenues (}WC01001\text{)}}$
diversified	is a binary variable that takes a value of 1 when the firm is diversified (i.e., reports segments from different industries using Fama and French's 12 industry classification). Non-classifiable segments with SIC code 9999 (*WC19506-WC19596*) are not considered.
leverage	$= \frac{\text{long term debt (}WC03251\text{)}}{\text{total assets (}WC02999\text{)}}$
marketgrowth	is the one-year growth rate of net sales or revenues (*WC01001*) in a given industry.
concentration	is the Herfindahl index based on net sales or revenues (*WC01001*) calculated by industry-year.
lag_performance	is firm's performance in t.

6 To diversify or not to diversify?

Questioning the Diversification Discount in Germany

Marc Eulerich Benjamin Fligge

Abstract. The decision to realign a firm through industrial diversification is highly relevant not only for the board, but also for shareholders and stakeholders, and is typically assessed with regard to its effect on market valuation. Although the fact that conglomerates trade at a discount seems to be common knowledge, the results in prior literature are ambiguous and outdated, especially for the German market. Against this background, we analyze how design choices explain the sensitivity of prior results. Our results suggest that conglomerates trade at a discount, with the size of the discount affected by, among others, the measures of excess value, the sample selection process, and the use of control variables. However, using a 2SLS approach, we find that the conglomerate discount is not evidence that diversification destroys value, but merely reflects the negative relation between the factors that cause firms to diversify and market valuation.

1 Introduction

Although diversification of investment portfolios is essential for investors, the business model of (unrelated) industrial diversification seems to be increasingly obsolete. There are numerous examples of large conglomerates that have recently split up and refocused on their core businesses. For instance, Joe Kaeser, CEO of Siemens AG, was working on radical streamlining of the Siemens conglomerate "to shed dinosaur structure" (McGee, 2019). Further examples of similar efforts are provided by ThyssenKrupp, Metro, and Daimler and can also be observed in U.S. firms such as General Electric, Honeywell, and United Technologies Corporation (Gordon and Schotter, 2017). This trend is reinforced by investors: Daniel Loeb, a shareholder of Sony, is striving for a spinoff of individual business units for what is already the second time in just six years (Wong, 2019).

The current trend toward refocusing on the core business is driven by previous research that finds conglomerates are traded at a discount (Berger and Ofek, 1995; Denis et al., 2002; Glaser and Müller, 2010). This so-called conglomerate or diversification discount seems to be such an established fact that it is even picked up by management textbooks and consulting firms (Boston Consulting Group, 2006; Hill and Jones, 2004). The economic disadvantages of conglomerates include coordination, compromise, and inflexibility costs due to increased complexity and agency problems that result in cross-subsidization. In addition, conglomerates' accounting data are less transparent and more difficult to evaluate (Bushman et al., 2004; Feldman, 2016; Gilson et al., 2001). CEOs often refer to this literature when they state their intention to "erase a so-called conglomerate discount" (Miller, 2020) by conducting spinoffs. However, estimates on the conglomerate discount vary in previous literature and range from, for example, 1% to 34% even for the same country (see Appendix 6.A).

Despite this multitude of empirical results and disadvantages of diversification, there are also arguments that suggest no value difference or even a conglomerate premium. Advocates of diversification state that conglomerates benefit from internal capital markets, economies of scope, a reduction in a firm's risk and effective tax rate, and an increase in debt capacity (Lewellen, 1971; Stein, 1997; Stulz, 1990; Weston, 1970). In this context, some more recent studies have shown that the diversification decision is endogenous and that the conglomerate discount decreases, disappears, and sometimes becomes a premium when endogeneity is considered (Ammann et al., 2012; Chang et al., 2016; Hoechle et al., 2012; Villalonga, 2004).

These conflicting results provide opposing implications for managers as to whether they should diversify or not. Most importantly, if the conglomerate discount is caused by self-selection bias (e.g., because low-value firms are more likely to diversify), firms considering to diversify do not need to fear negative market valuation consequences. However, even if there is a conglomerate discount after accounting for endogeneity, the size of the conglomerate discount informs managers about the costs of diversification. Managers may decide to diversify despite a conglomerate discount if they expect the benefits to outweigh the costs. Thus, the sensitivity of the existence and size of the conglomerate discount is of interest to practitioners.

In this study, we focus on the role of design choices in the conglomerate discount literature. Specifically, we explain how research design choices explain the sensitivity of prior research. Our overall research question is:

RQ: Is there a valuation difference between focused and diversified firms within the German capital market?

There are various arguments for why analyzing the German capital market is a reasonable choice. Most studies that identify a conglomerate discount rely on U.S. data. However, prior literature suggests that the conglomerate discount is not an overarching phenomenon, as country-specific characteristics (e.g., capital market maturity, investor protection, ownership structures, and corporate governance) have been found to affect the conglomerate discount (Fauver et al., 2003; Lins and Servaes, 1999; Rudolph and Schwetzler, 2013; Weiner, 2005). Thus, the valuation of conglomerates in Germany may deviate from the valuation of conglomerates in other countries. Although there are a few studies analyzing the German market, the results are ambiguous and potentially outdated. The most recent paper using German data is by Glaser and Müller (2010). Their sample period ranges from 2000 to 2006, so there is no reliable evidence of whether there was a valuation difference over the past 15 years. However, as the country-specific factors causing the conglomerate discount are found to vary over time, the valuation of conglomerates is also time-variant (Lee, Peng, and Lee, 2007). Changes in the ownership structure of German firms as well as regulations, such as modifications in segment reporting rules due to the adoption of IFRS 8, have affected the institutional setting, which in turn may have affected the valuation of conglomerates. Moreover, prior research on the conglomerate discount in Germany is subject to methodological limitations, as these works do not account for the endogeneity of the diversification decision. However, it is of importance for practitioners, researchers, and shareholders to know whether

diversification destroys value or whether this effect is, for example, driven by a sample selection bias.

For our empirical models, we analyze a sample of approximately 6,000 German firm-years between 2000 and 2019. Our initial results suggest that diversification is associated with an 11.5% lower market value. However, the conglomerate discount decreases to between 7.9% and 11.4% if we account for certain valuation issues (i.e., the book value of debt bias and the M&A accounting bias). Furthermore, we find variations in the conglomerate discount over time and across industries that affect the size of the discount.

We then focus on design choices related to endogeneity, as we find prior literature to employ different techniques to deal with different types of endogeneity. We find that the omission of relevant factors partially explains the conglomerate discount. The inclusion of additional control variables reduces the conglomerate discount, and the conglomerate discount even becomes insignificant with the inclusion of firm-fixed effects in one of three specifications. Furthermore, we employ a 2SLS approach to accounting for self-selection bias. Although we test various sets of instruments, the conglomerate discount disappears in each specification.

Taken together, we find a valuation difference between conglomerates and focused firms that is not caused by their diversification activities but simply reflects the negative relationship between the factors that lead firms to diversify and market valuation. While we find consistent evidence for this self-selection bias, the size of the discount is affected by design choices. Our results are of interest to both researchers and practitioners seeking to understand the conflicting results in prior literature. Moreover, we provide insights on the valuation of conglomerates in the German market that contradicts the common knowledge that conglomerates are discounted.

2 Literature Review

Although the association between diversification and market valuation has been analyzed in numerous studies, “the costs and benefits of corporate diversification and its overall effect on the valuation of multi-segment firms still remain a controversial issue” (Sturm and Nüesch, 2019, p. 251). The bibliometric study of Schäffer et al. (2011) identifies corporate diversification and internal capital markets as major research areas in the top four finance journals over the period from 1988 to 2007. According to this literature, the conglomerate discount or premium refers to the valuation difference between a conglomerate and its imputed value if each of its segments would operate as a separate firm. Although firms cannot actually

observe this valuation difference, practitioners (e.g., CEOs, leading newspapers such as the Financial Times, management textbooks, or consulting firms) often refer to the conglomerate discount after major restructuring decisions (Gordon and Schotter, 2017; McGee, 2019; Wong, 2019).

From a theoretical perspective, there are arguments for a conglomerate discount and arguments for a conglomerate premium. Both include effects on a firm's market valuation, but also "real" performance effects that influence a firm's market valuation indirectly. Accordingly, there are focused and diversified firms, and some firms decide to refocus, while others diversify.

2.1 Conglomerate Premium

Advocates of diversification state that conglomerates are associated with lower firm risk due to the combination of segments with imperfectly correlated earnings streams. Shareholders such as founders or founding families benefit from a firm's risk reduction, as they typically have a relatively undiversified personal portfolio (Anderson and Reeb, 2003). In addition, diversification reduces the default probability and therefore increases the market value of debt (Ammann et al., 2012; Glaser and Müller, 2010; Mansi and Reeb, 2002). Moreover, this coinsurance effect increases firms' debt capacity and creates value through two channels. First, it enables conglomerates to increase leverage and hence increase the interest tax shield. Second, the increased debt capacity enables conglomerates to make more investments than firms with less debt capacity could make (Berger and Ofek, 1995; Lewellen, 1971).

Furthermore, advocates of diversification state that conglomerates can not only make more investments but also allocate capital more efficiently within firms. This is due to the creation of internal capital markets ("bright side of capital"). Segments with high cash flow and poor investment opportunities can finance other segments with less cash flow but better investment opportunities ("winner picking"). This allows firms to make more value-increasing investments than their segments would make as separate firms (Stein, 1997; Stulz, 1990; Weston, 1970). Moreover, internal markets also allow for more efficient distribution of other resources such as human capital (Lang and Stulz, 1994).

Finally, conglomerates are considered to be more efficient due to synergies and economies of scope. Conglomerates can exploit firm-specific assets in other segments and hence provide more efficient operations and more profitable business lines than focused firms (Berger and Ofek, 1995; Chandler, 1977; Weston, 1970).

2.2 Conglomerate Discount

Despite the arguments for a diversification premium, there are also several arguments that suggest conglomerates trade at a discount. Although economies of scope are expected to increase efficiency, they entail costs that could be reduced and may offset the benefits of synergies.

Opponents of diversification also mention the dark side of internal capital markets, which emphasizes the inefficiencies of these markets. Divisional managers exert influence to increase assets under their control. As a result, less profitable divisions could be subsidized at the expense of more profitable divisions (Rajan et al., 2000; Scharfstein and Stein, 2000; Stulz, 1990). Moreover, agency problems and managers' rent-seeking behavior not only lead to inefficient cross-subsidization but also induce firms to retain or pursue a value-decreasing diversification strategy. Managers derive private benefits from diversification, as diversification increases the value of a manager's relatively undiversified personal portfolio (Jensen and Murphy, 1990), causes the manager to be indispensable to the firm (Shleifer and Vishny, 1989), and allows the manager to exploit the firm for his own purposes (Jensen, 1986; Purkayastha et al., 2021; Stulz, 1990). Moreover, managing a larger firm is associated with more power, prestige, and compensation (Jensen, 1986; Jensen and Murphy, 1990; Stulz, 1990).

Another explanation for a conglomerate discount is based on different assessments by investors and analysts compared to focused firms. Despite not affecting the "real" performance of a firm, conglomerates' accounting data are less transparent than those of focused firms (Bushman et al., 2004). As a result, conglomerates are more difficult for analysts to evaluate, and analysts' forecasts are less precise (Feldman, 2016; Gilson et al., 2001).

2.3 Prior Empirical Findings for Germany

Although practitioners often refer to the conglomerate discount, most studies that deal with the valuation of conglomerates rely on U.S. data. Other countries such as Germany are rarely analyzed. However, prior empirical results for the German market are mixed. Furthermore, they use a shorter period, do not include the trends of recent years, and finally, the German institutional setting, including the segment reporting rules, has changed. The following discussion should provide further insights into prior results.[71]

[71] Appendix 6.A provides an additional summary of the empirical findings for Germany.

The first empirical evidence of the valuation difference between conglomerates and focused firms in the German capital market comes from Lins and Servaes (1999). The authors examine the effect of diversification on firm value in Germany, Japan, and the UK in 1992 and 1994. While they show an average discount of approximately 10% in Japan and approximately 15% in the UK, no significant valuation difference can be identified for German firms. The working paper of Schwetzler and Reimund (2003) confirms that German conglomerates are not discounted. They examine German firms between 1998 and 2001 and find insignificant effects of diversification on market valuation. Schwetzler and Reimund (2003) argue that the measures of market valuation in previous research do not appropriately reflect cash holdings. Thus, they develop an adjusted measure of market value, which yields weak evidence for a conglomerate discount.

Fauver et al. (2003) analyze 35 countries, including Germany, in the period from 1991 to 1995. The results suggest that both the degree of development of the capital markets in the respective countries and the legal and regulatory environment are important factors influencing the value of diversification. Fauver et al. (2003) find evidence for a conglomerate discount, which varies across countries. However, in German firms, this discount becomes a premium of between 2% and 10.7%.

Although these results are completely different from international and especially U.S.-based studies (Berger and Ofek, 1995; Mansi and Reeb, 2002; Sturm and Nüesch, 2019), the valuation of German conglomerates was rarely studied in the following years. Univariate results in the discussion paper of Weiner (2005) suggest that German conglomerates are traded at a discount of approximately 3% to 10% on average. Further, Beckmann (2006) confirms the existence of a conglomerate discount, which increases with the number of unrelated segments. The study of Rustige and Grote (2009) analyzes in a sample of 184 acquisitions and 129 spinoffs whether the cumulative abnormal returns differ between the announcement of related and unrelated M&As. While unrelated acquisitions are associated with 5.1% to 7.9% less cumulative abnormal returns than related acquisitions, the announcements of unrelated spinoffs do not yield higher cumulative abnormal returns than related spinoffs.

The most recent paper on the valuation of conglomerates in Germany is the study of Glaser and Müller (2010). Building on the work of Mansi and Reeb (2002), they analyze in a sample of 4,070 firm-years between 2000 and 2006 whether the conglomerate discount is caused by the book value bias of debt. The valuation differences between focused and diversified firms are usually analyzed by using excess values (Berger and Ofek, 1995). However, these excess values

rely on the book value of debt, which does not capture the enhanced bondholder value due to risk reduction. In the first step, they document a conglomerate discount, which ranges from 7.7% to 13.9%. This discount decreases once the market value of debt is employed instead of the book value of debt and ranges from 6.7% to 8.2%.

To our knowledge, only two dissertations have been published since the study by Glaser and Müller (2010) focusing on diversification discounts. Interestingly, Kluge (2014) identifies a conglomerate discount in the period from 2004 to 2010, while Liu's (2016) results indicate a conglomerate premium in the period from 2005 to 2014.[72]

3 Methodology and Empirical Analysis

3.1 Sample Selection

Our sample consists of listed German firms between 2000 and 2019. We obtained data from Datastream. The sample period starts in 2000, as German firms have been required to disclose reliable business segment data since 2000. We do not consider years after 2019, as the market values of German firms are significantly affected by the COVID-19 pandemic in these years. Our initial sample consists of 13,207 firm-years of 1,180 unique firms.

Following prior research, we exclude 2,928 firm-years from the financial sector (i.e., those that primarily operate in SIC 6000-6999), as our valuation method requires several variables that are often not reported by financial firms because these variables are not meaningful for them. Missing financial data that are necessary to calculate control variables restrict our sample to 9,935 firm-years among 894 firms (Panel A). We use three different proxies for market valuation that require different financial data (*EV_Sales*, *EV_Merton*, and *EV_Goodwill*). Our final sample ranges from 4,455 to 5,630 firm-years depending on our measure of market value.

3.2 Measuring Diversification

Various approaches can be employed to operationalize conglomerates and the degree of diversification. Prior literature on diversification usually utilizes a binary variable that takes a value of 1 when the firm is a conglomerate and 0 when the firm is focused (Campa and Kedia, 2002; Chang et al., 2016; Mansi and Reeb, 2002). We follow Glaser and Müller (2010) and

[72] Additionally, there are cross-regional studies on the conglomerate discount that also analyze German conglomerates (e.g., Khan et al., 2021; Rudolph and Schwetzler, 2013). We did not discuss these studies as they did not present results for the German subsample.

classify all firms as focused when they have (1) only one operating segment or (2) more than one operating segment but all operate in the same two-digit SIC industry or (3) no business segment information was published. Firms are categorized as (3) if there is no information available on segment assets or segment sales or no specific segment descriptions in the database. Segments are treated as nonoperating segments if the segment description indicates that the segment is nonoperating, the segment SIC is 9999 (nonclassifiable establishment) or segment assets, or sales are negative or zero because such segments can be regarded as adjustment segments. Thus, our measure of diversification indicates whether a firm is unrelated diversified or not.

3.3 Measuring Market Value

We employ different types of excess values as proxies for market valuation. A firm's excess value is calculated as the natural logarithm of the ratio of a firm's actual value to its imputed value. A positive excess value suggests that the firm trades at a premium (i.e., the conglomerate's actual value is higher than its imputed value if each of its segments operated as a single-firm segment), while a negative excess value implies that the firm trades at a discount (i.e., the conglomerate's actual value is lower than its imputed).

Our primary measure of market value, *EV_Sales*, is the traditional Berger and Ofek (1995) excess value. The firm's actual value is the sum of the market value of equity and the book value of debt. We calculate the imputed value based on sales multiples, where the imputed value is the sum of the imputed values of its segments; each segment's imputed value is equal to the segment's sales multiplied by its industry median ratio of total capital to sales of focused firms. The industry median ratios are based on a 2-digit SIC grouping that includes at least five focused firms. Excess values are also calculated for focused firms. By construction, the median excess value of focused firms is zero. For some firms, the sum of segments' sales and the firm's sales differ. Following prior research, we exclude conglomerates whose segment sales deviate by more than 5% (Ammann et al., 2012; Hoechle et al., 2012). The segment sales are adjusted up or down if the deviation is less than 5%. Finally, we exclude extreme values, i.e., actual values that are either more than four times the imputed value (> 1.386) or less than one-fourth of the imputed value (< -1.386).

Additionally, we calculate *EV_Merton* and *EV_Goodwill* to account for two common biases in the diversification discount literature. Glaser and Müller (2010) show that measures of firm values based on book values of debt systematically undervalue conglomerates. They propose

using Eberhart's (2005) application of the Merton (1974) model to calculate the market value of debt and account for the fact that diversification enhances bondholder value due to a reduction in firm risk. Furthermore, Custódio (2014) argue that assets are typically reported at their transaction-implied value which often exceeds the target's pre-merger book value resulting in lower market-to-book ratios. To mitigate these measurement bias, we subtract goodwill from the book value of assets in measuring the firm value.

3.4 Empirical Model

To investigate the association between diversification and market value, we replicate the empirical design in Glaser and Müller (2010):

$$MARKET\ VALUE = \beta_0 + \beta_1 diversified\ firm\ (dummy) + \beta_2 ln(total\ assets) + \beta_3 operating\_income/total\ assets + \beta_4 capital\ expenditures/total\ assets + \beta_5 accounting\ standards$$

We employ measures of excess value based on Berger and Ofek (1995) (*EV_Sales),* Glaser and Müller (2010) (*EV_Merton),* and Custódio (2014) (*EV_Goodwill)* as proxies for firms' market value. *diversified firm (dummy)* is a binary variable that takes a value of 1 when the firm is diversified and zero when the firm is focused. Consistent with Glaser and Müller (2010), we control for firm size, profitability, capital expenditures, and accounting standards. Appendix 6.B provides the definitions of all variables with Datastream identifier.

Because our sample includes heterogeneous firms, which differ in size and thus cause heteroscedasticity, we use robust standard errors. We also employ year fixed effects to control for time effects influencing the diversification discount, which have been documented in prior literature (Berger and Ofek, 1995; Chang et al., 2016; Denis et al. 2002). We do not employ industry fixed effects because excess values reflect a firm's value relative to the median in an industry and are thus almost analogous to an industry fixed-effects estimator (Campa and Kedia, 2002).

4 Results

4.1 Descriptive Statistics

Table 6.1 provides descriptive statistics and univariate results for our sample. The means of *EV_Sales*, *EV_Merton*, and *EV_Goodwill* are -.104, -0.060, and -0.103, respectively. Consistent with the existence of a conglomerate discount, t-tests of means suggest that conglomerates have a lower *EV_Sales* (difference = -0.119, $p < 0.01$), *EV_Merton* (difference = -0.065, $p < 0.01$), and *EV_Goodwill* (difference = -0.125, $p < 0.01$). Furthermore, univariate results suggest that conglomerates hold more assets, generate more operating income, and have fewer capital expenditures.

Table 6.2 presents correlations between the variables in our models. We find significant negative Spearman and Pearson correlations between diversification and market value (*EV_Sales*, *EV_Merton*, and *EV_Goodwill*) that could indicate the existence of a conglomerate discount. In addition, we find significant correlations between explanatory variables. Since these correlations are low, multicollinearity is not a problem in our models.

Figure 6.1 shows the average sales-based excess values of conglomerates for which we have data on excess values for at least 15 years. While t-tests of means and correlations indicate that conglomerates are on average traded at a discount, Figure 6.1 presents some examples of conglomerates that are traded at a premium. Interestingly, we find 37.21% of the conglomerates in our sample to have an average sales-based excess value above zero (i.e., to be traded at a premium).

Table 6.1: Descriptive Statistics

Variables	Mean	Std. Dev.	25pct	75pct	Conglomerates (1)	Focused Firms (2)	Difference (1)-(2)
EV_Sales	-0.104	0.656	-0.605	0.372	-0.171	-0.052	-0.119***
EV_Merton	-0.060	0.636	-0.533	0.397	-0.095	-0.030	-0.065***
EV_Goodwill	-0.103	0.662	-0.601	0.389	-0.173	-0.048	-0.125***
Diversified firm (dummy)	0.474	0.499	0.000	1.000	1.000	0.000	1.000***
ln(total assets)	11.825	2.506	10.298	13.228	12.785	10.952	1.833***
Operating income/total assets	-0.023	0.226	-0.042	0.078	0.011	-0.054	0.065***
Capital expenditures/total assets	0.047	0.005	0.015	0.060	0.044	0.049	-0.005***

*This table presents descriptive statistics for the variables used in our regressions. We divide the sample into two groups: (1) conglomerates and (2) focused firms. Detailed variable definitions are available in Appendix 6.B. *, **, and *** denote significance level of 0.1, 0.005, 0.001, respectively, for the results of t-test of means.*

Table 6.2: Correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) EV_Sales	1.000	0.965***	0.960***	-0.057***	0.063***	0.207***	-0.022
(2) EV_Merton	0.964***	1.000	0.923***	-0.057***	0.038**	0.187***	-0.040***
(3) EV_Goodwill	0.960***	0.922***	1.000	-0.052***	0.028*	0.186***	0.011
(4) Diversified firm (dummy)	-0.053***	-0.054***	-0.051***	1.000	0.197***	0.021	0.057***
(5) ln(total assets)	0.055***	0.028*	0.016	0.237***	1.000	0.310***	0.189***
(6) Operating income/total assets	0.109***	0.085***	0.085***	0.056***	0.322***	1.000	0.114***
(7) Capital expenditures/total assets	0.014	-0.001	0.048***	0.020	0.042***	0.012	1.000

*This table presents Pearson (bottom half) and Spearman (top half) correlations between the variables used in our regression analyses. Detailed variable definitions are available in Appendix 6.B. *, **, and *** denote significance level of 0.1, 0.005, 0.001, respectively.*

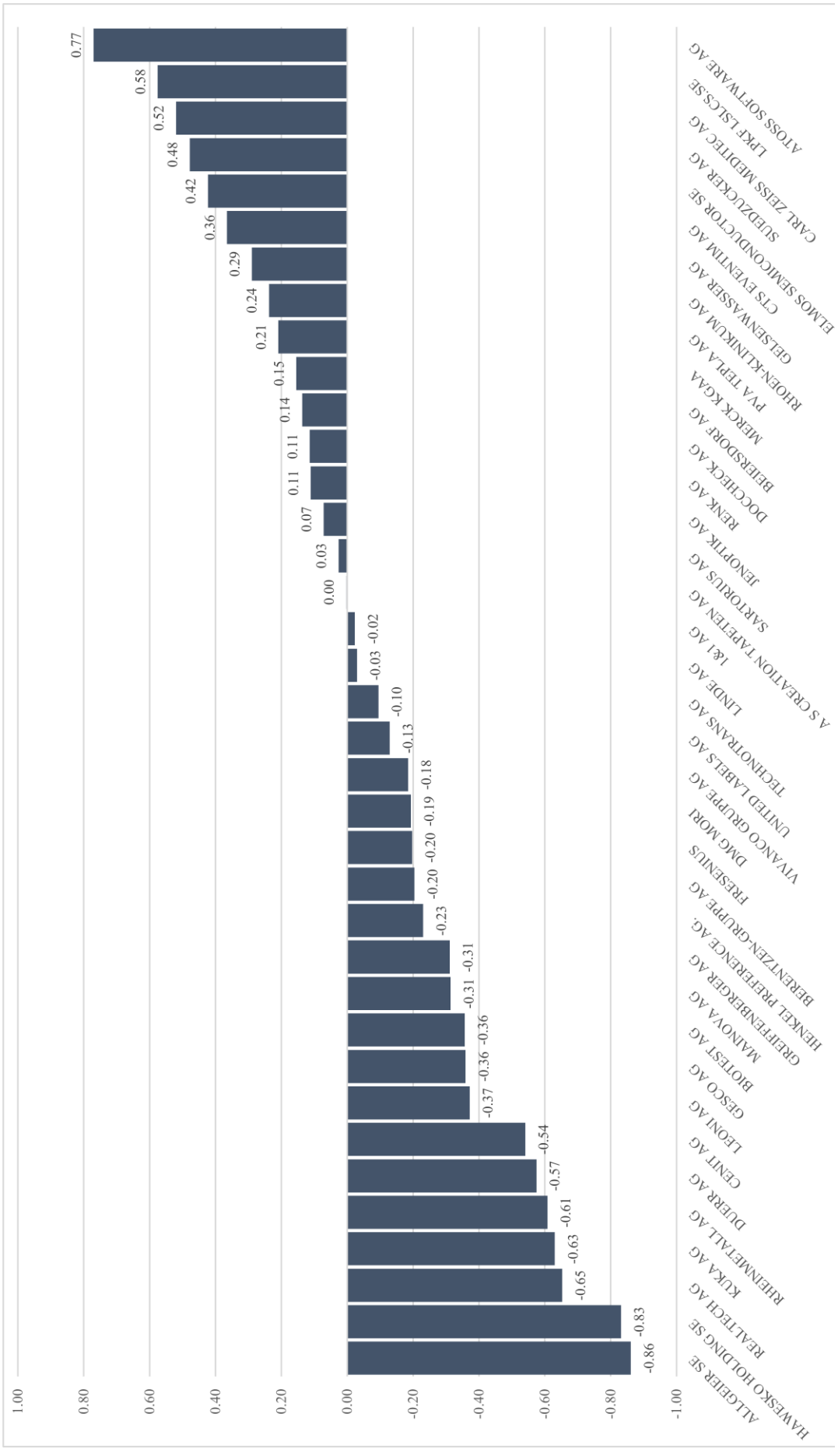


Figure 6.1: Average Conglomerate Valuation

One potential reason is that the benefits and costs of diversification can differ among firms (Bushman et al., 2004; Erdorf et al., 2013; Glaser et al., 2013). Consistent with this argument, we find that conglomerates traded at a premium are more likely to benefit from increased debt capacity by having higher leverage (difference = 0.016, $p < 0.01$). While conglomerates are expected to benefit from better investment opportunities through the creation of internal capital markets, the inability to increase leverage may inhibit the exploitation of these opportunities. Accordingly, conglomerates traded at a premium invest more in R&D relative to sales (difference = 0.027, $p < 0.01$) and have higher capital expenditures relative to sales (difference = 0.017, $p < 0.01$). We also find that conglomerates traded at a premium are more efficient (e.g., due to synergies and economies of scope), as evident in higher performance in terms of EBIT to sales (difference = 0.024, $p = 0.068$), return on assets (difference = 0.042, $p < 0.01$), growth of sales (difference = 0.081, $p < 0.01$), and growth of assets (difference = 0.069, $p < 0.01$).[73]

4.2 Empirical Results

Table 6.3 presents ordinary least squares regressions of diversification on market value. In line with prior research, we find conglomerates to be evaluated at a discount (Berger and Ofek, 1995; Glaser and Müller, 2010; Sturm and Nüesch, 2019). The coefficient on diversification is negative and significant at the 1% level in each regression. In particular, there is a discount of 11.5% in model (1). Consistent with prior literature (e.g., Custódio, 2014; Glaser and Müller, 2010), the conglomerate discount decreases to between 7.9% and 11.4% if we account for debt value and goodwill measurement biases.[74] The direction of all other associations with our control variables are consistent with prior literature.[75]

[73] As our research design does not allow us to analyze whether the mentioned differences are caused by diversification, we caution readers that valuation differences could also be a result of factors unrelated to diversification. For example, we find conglomerates traded at a premium to hold more assets (difference = 0.180, $p = 0.040$), be more likely to pay dividends (difference = 0.046, $p = 0.019$), and generate a higher proportion of sales in foreign countries (difference = 0.040, $p < 0.01$).

[74] As a robustness test, we also calculate excess values based on asset multipliers and find similar results. Our untabulated results suggest a conglomerate discount of 7.3% to 11.0% ($p<0.01$, respectively).

[75] Our previous approach assumes that conglomerates are homogeneous in their degree of diversification. However, 57.87% of the conglomerates in our sample operate in two different industries, 28.76% operate in three industries, 9.09% operate in four industries, and 4.28% operate in more than four industries. In untabulated results, we employ the number of operating segments as a proxy for the degree of diversification and find similar effects on excess values. Specifically, one additional operating segment decreases the firm's market value by 5.2% to 7.1% ($p<0.01$, respectively).

Table 6.3: Results of diversification and market value

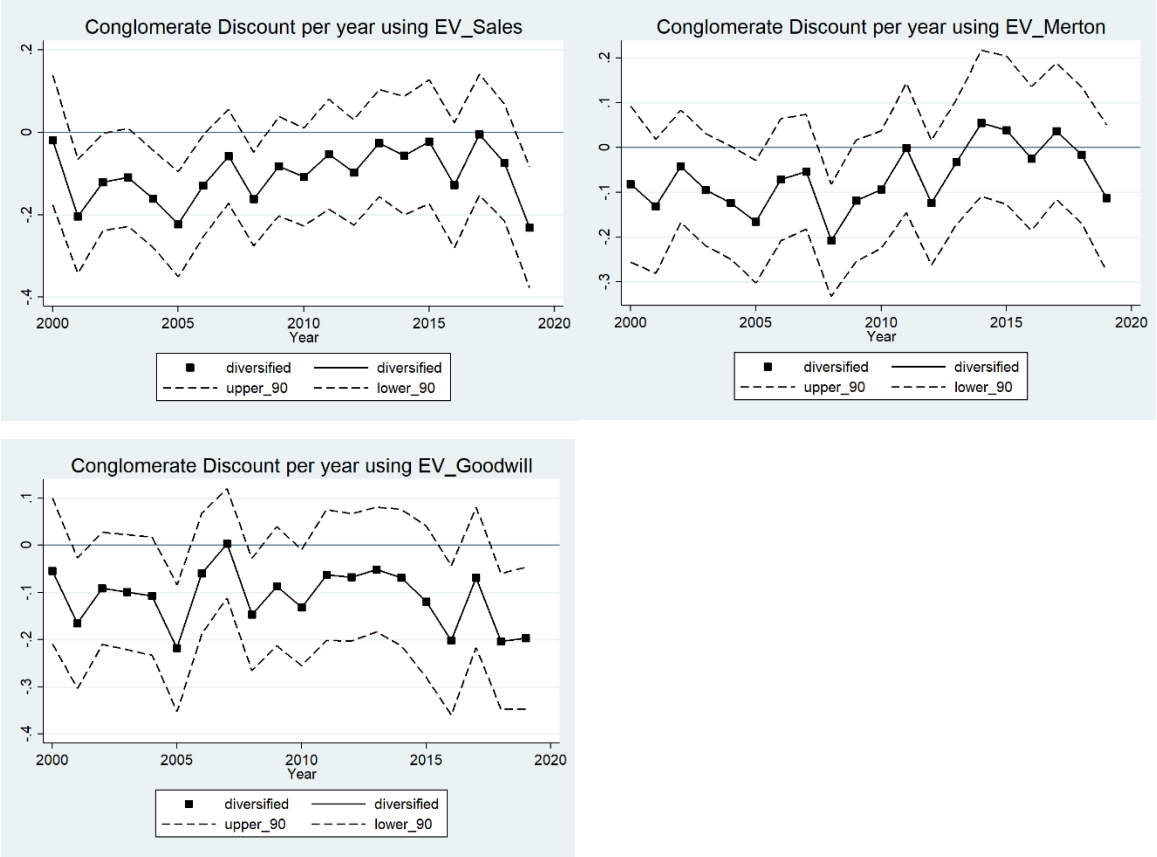
	EV_Sales	EV_Merton	EV_Goodwill
Diversified firm (dummy)	-0.115***	-0.079***	-0.114***
	(-6.536)	(-4.106)	(-6.282)
ln(total assets)	-0.007*	-0.002	-0.020***
	(-1.670)	(-0.445)	(-4.432)
Operating income/total assets	0.306***	0.344***	0.294***
	(5.043)	(4.796)	(4.833)
Capital expenditures/total assets	0.337*	0.577***	0.474**
	(1.653)	(2.702)	(2.305)
Constant	0.266***	0.137	0.444***
	(3.346)	(1.421)	(5.540)
Year fixed effects	Yes	Yes	Yes
Accounting standard fixed effects	Yes	Yes	Yes
Observations	5,630	4,455	5,469
Adj. R-squared	0.056	0.049	0.053

*This table presents ordinary least squares regressions of market value on diversification. Detailed variable definitions are available in Appendix 6.B. t-statistics are reported under each coefficient in parentheses. *, **, and *** denote significance level of 0.1, 0.05, 0.01, respectively.*

Our results contradict the findings of two seminal studies on the German market. While Lins and Servaes (1999) identify no effect of diversification on market valuation in 1992 and 1994, Fauver et al. (2003) find evidence for a conglomerate premium between 1991 and 1995. On the one hand, Glaser and Müller (2010) state that German firms have had to disclose segment information comparable to U.S. accounting rules since 2000. Thus, differences between the German market and other markets in samples taken before 2000 could be due to different accounting standards. On the other hand, the valuation of conglomerates in Germany may have become similar to the valuation of conglomerates in other countries due to globalization and the increasing activities of foreign investors.

To gain more insights into the conglomerate discount, we estimate the effect of diversification on market value for each year separately. Figure 6.2 presents coefficients and confidence intervals for those regressions. The coefficients on diversification are mostly negative and vary from -23.1% to +5.4% depending on the year and the measure of market value. This broad range of estimates potentially explains ambiguous results in prior literature. On the one hand, the conglomerate valuation appears to change over time. This observation is consistent with Lee, Peng, and Lee (2007) who argue that the valuation of conglomerates is affected by a country's institutional setting which also changes over time. On the other hand, we find differences between measures of market value, which call research designs into question that solely rely on one measure of market value.

Figure 6.2: Conglomerate Discount per Year



This figure presents estimates of the effect of diversification on market value (using EV_Sales, EV_Merton, and EV_Goodwill) for each year separately.

Volkov and Smith (2015) and Garrido-Prada, Delgado-Rodriguez, and Romero-Jordán (2019) argue and find that globally diversified firms benefit from easier access to external capital and a more efficient allocation of capital during periods of increased financial constraints. Contrarily, industrially diversified firms are as negatively affected by (local) recessions as focused firms. Consistent with these studies, we continue to observe a conglomerate discount during the financial crisis 2008. Our results in Figure 2 further indicate that changes in segment reporting resulting from the mandatory adoption of IFRS 8 in 2009 have not affected the valuation of conglomerates. Interestingly, we find mostly insignificant effects of diversification after 2014 and partly positive coefficients on diversification when *EV_Merton* is the dependent variable. This is of particular interest because we are not aware of any study that examines the conglomerate discount in Germany after 2014.

Finally, we analyze whether the conglomerate discount varies across industries. Table 6.4 presents OLS coefficients on diversification for each two-digit SIC code. Note that we do not tabulate industries with less than 100 observations in any of the three regressions. Consistent with Erdorf et al. (2013) and Santalo and Becerra (2008), our results suggest that the valuation

of conglomerates varies across industries. In particular, we find negative and significant coefficients on diversification across all three specifications for SIC codes 20, 35, 37, 59, and 73. However, we also identify industries where conglomerates are not traded at a discount (SIC codes 36, 38, 49, 80, and 87). Conglomerates operating in these industries are expected to suffer less from the disadvantages of diversification. Interestingly, we find firms operating in the motion pictures industry (SIC code 78) to be more likely to realize the advantages of diversification. We find positive and significant coefficients across all three specifications for firms operating in this industry indicating a conglomerate premium of 25.2% to 37.8%.

Table 6.4: Conglomerate Discount per Industry

Industry	SIC-Code	EV_Sales	EV_Merton	EV_Goodwill
Food and Kindred Products	20	-0.260***	-0.258***	-0.278***
Chemicals and Allied Industries	28	0.158*	0.138	0.157*
Industrial Machinery and Equipment	35	-0.141***	-0.102**	-0.148***
Electronic and Other Electric Equipment	36	-0.032	-0.011	-0.018
Transportation Equipment	37	-0.263***	-0.183**	-0.261***
Measuring, Analyzing, and Controlling Instruments; Photographic, Medical and Optical Goods; Watches and Clocks	38	-0.063	-0.057	-0.052
Postal Service, Couriers & Messengers, Warehousing & Storage	49	-0.055	0.194	-0.027
Miscellaneous Retail	59	-0.578***	-0.563***	-0.675***
Business Services	73	-0.091**	-0.092**	-0.120***
Motion Pictures	78	0.252**	0.257*	0.378***
Health Services	80	0.056	0.178	-0.086
Engineering, Accounting, Research, Management, and Related Services	87	-0.052	-0.027	0.039

*This table presents ordinary least squares regressions of market value on diversification per 2-digit SIC. We only display industries where the regressions include at least 100 firm-years. Detailed variable definitions are available in Appendix 6.B. *, **, and *** denote significance level of 0.1, 0.05, 0.01, respectively*

The heterogeneity of conglomerate valuations across industries is of particular interest in small industries. As the traditional excess value measure of Berger and Ofek (1995) requires at least 5 focused firms in each industry, the consideration of conglomerates in these industries depends on the sample selection process and the availability of data in the respective database. For example, we find 4 industries that fall just below this threshold (i.e., industries with 4 focused firms) resulting in missing excess values for 101 conglomerates that report segments operating in these industries.

4.3 Endogeneity

Several studies have shown that the conglomerate discount is endogenous, resulting in biased valuation differences between conglomerates and focused firms. However, prior literature provides mixed evidence on the endogeneity-adjusted conglomerate discount, ranging from

studies that find a decrease in the conglomerate discount to studies that find no conglomerate discount or even a premium (Ammann et al., 2012; Chang et al., 2016; Hoechle et al., 2012; Villalonga, 2004). In this context, both the type of endogeneity addressed and the methods vary, which may explain the sensitivity in prior literature.

We begin to analyze the effect of endogeneity on our results by focusing on the omission of relevant factors. To the extent that omitted variables correlate with the diversification decision and market valuation, our estimates of the conglomerate discount are biased. In Table 6.5, we show how the conglomerate discount is affected by the inclusion of additional factors. Specifically, we re-estimate our empirical model in Table 6.3, including lagged values of our control variables. According to Campa and Kedia (2002), we include 1- and 2-year lags of each control variable, which does not result in a loss of observations. Our results suggest that the conglomerate discount decreases to between 6.7% and 10.4%. In other words, we find a reduction of at least 1% in each specification by adding little information to our research design. We further include firm-fixed effects to account for (unobservable) firm-specific characteristics that are constant over time. Our results in Table 6.5 suggest that firm-specific characteristics partially cause the conglomerate discount. Specifically, we find a conglomerate discount of 6.3% (8.5%) when *EV_Sales* (*EV_Goodwill*) is the measure of market valuation and no conglomerate discount when *EV_Merton* is the dependent variable.

Table 6.5: Omitted Variables

	EV_Sales	EV_Merton	EV_Goodwill	EV_Sales	EV_Merton	EV_Goodwill
Diversified firm (dummy)	-0.104***	-0.067***	-0.103***	-0.063**	-0.043	-0.085***
	(-5.879)	(-3.485)	(-5.600)	(-2.246)	(-1.459)	(-2.899)
ln(total assets)	0.261***	0.287***	0.217***	0.371***	0.340***	0.320***
	(8.011)	(7.422)	(6.502)	(10.070)	(7.659)	(8.289)
Operating income/total assets	0.068	-0.000	0.085	0.038	0.001	0.062
	(1.018)	(-0.002)	(1.248)	(0.470)	(0.015)	(0.744)
Capital expenditures/total assets	0.140	0.375*	0.310	0.471*	0.534*	0.487*
	(0.670)	(1.747)	(1.459)	(1.799)	(1.941)	(1.754)
ln(total assets) (1 lag)	-0.094**	-0.141***	-0.061	-0.155***	-0.196***	-0.115***
	(-2.242)	(-2.698)	(-1.410)	(-4.501)	(-5.209)	(-3.495)
Operating income/total assets (1 lag)	0.020	0.079	0.019	0.010	0.123**	0.007
	(1.496)	(0.994)	(1.434)	(0.939)	(2.214)	(0.717)
Capital expenditures/total assets (1 lag)	0.078**	0.059**	0.073**	0.057*	0.053	0.051
	(2.217)	(2.142)	(2.116)	(1.676)	(1.588)	(1.446)
ln(total assets) (2 lag)	-0.171***	-0.148***	-0.173***	-0.119***	-0.090***	-0.119***
	(-6.442)	(-4.869)	(-6.055)	(-5.068)	(-3.730)	(-4.947)
Operating income/total assets (2 lag)	0.029	0.152*	0.028	0.018	0.159**	0.016
	(1.324)	(1.888)	(1.230)	(0.961)	(2.560)	(0.853)
Capital expenditures/total assets (2 lag)	-0.036**	-0.024*	-0.030*	-0.017	-0.018	-0.009
	(-2.117)	(-1.937)	(-1.817)	(-1.270)	(-1.338)	(-0.644)
Constant	0.054	0.003	0.254***	-1.260***	-0.786**	-1.012***
	(0.680)	(0.027)	(3.122)	(-3.641)	(-2.035)	(-2.663)
Firm fixed effects	No	No	No	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Accounting standard fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5,630	4,455	5,469	5,630	4,455	5,469
Adj. R-squared	0.056	0.049	0.053	0.058	0.052	0.057

*This table presents ordinary least squares regressions of market value on diversification. Detailed variable definitions are available in Appendix 6.B. t-statistics are reported under each coefficient in parentheses. *, **, and *** denote significance level of 0.1, 0.05, 0.01, respectively.*

In the next step, we account for a potential self-selection bias by estimating instrumental variables regressions. Estimates on differences between conglomerates and focused firms are only unbiased if the diversification status is randomly assigned. However, this assumption is unrealistic in the context of managerial decisions. 2SLS is a possible approach to eliminate this self-selection bias.[76] Following prior research (e.g., Ammann et al., 2012; Campa and Kedia, 2002; Villalonga, 2004), we analyze four different categories of instruments. First, we include two instruments capturing the attractiveness of the industry in a given year: the percentage of firms that are conglomerates and the percentage of sales accounted for by conglomerates. Industry-specific factors that affect the likelihood to diversify include, for example, industry regulation, market structure, technology, and business risks. Second, we consider time trends such as the existence of M&A waves by including the number and volume of M&A per industry-year. Third, we account for trends in macroeconomic conditions. As 2SLS estimates the effect of all instruments and control variables on the endogenous variable, we already capture time trends that are constant across firms through year fixed effects. Additionally, we include the regional growth in GDP and its lagged value to capture time trends that vary across firms. We use the first-digit postal codes of the firms' headquarters to assign a firm to a specific region and access data on regional GDP from the Federal Statistical Office of Germany. Fourth, we include a binary variable measuring whether firms are listed on a major exchange (i.e., DAX) as these firms are more visible and have higher analyst coverage, which in turn facilitates M&A activities and raising external financing.[77]

Table 6.6 presents our first-stage results on the determinants of diversification. We estimate the effect of our instruments and the control variables from Table 6.5 on diversification, analyzing separately each tuple of the four instrument categories that lead to 15 different combinations of instruments. However, we only tabulate tuples of instrument categories that sufficiently correlate with our diversification measure and do not produce overidentified models. Specifically, we require F-statistics for the joint significance of instruments to exceed 10 and perform Wooldridge's robust score test of overidentifying restrictions. We find 4 sets of

[76] Compared to Heckman's self-selection model, 2SLS allows us to utilize test statistics for instrumental variables, such as tests for the strength of instrumental variables and the test for overidentification (Chang et al., 2016)

[77] The mentioned instruments are valid to the extent that they affect the diversification decision and do not affect excess values, except by making diversification more or less likely. As excess values represent firm values relative to the median firm in the industry, they are, by construction, independent from industry-specific characteristics. Although macroeconomic factors and listing status have been frequently employed as instruments for diversification (Ammann et al., 2012; Campa and Kedia, 2002; Villalonga, 2004), they appear less independent from a firm's relative valuation.

instruments that are valid and have high explanatory power for the diversification decision.[78] Specifically, our instruments capture industry attractiveness in model (1), industry attractiveness and M&A activities in model (2), industry attractiveness and macroeconomic conditions in model (3), and industry attractiveness, M&A activities, and macroeconomic conditions in model (4). Our results suggest that the fraction of conglomerates and the number of M&A within the industry significantly affect the diversification decision ($p < 0.01$, respectively).

Our second-stage results are presented in Table 6.7. We analyze the effect of diversification on *EV_Sales*, *EV_Merton*, and *EV_Goodwill* for each set of instruments separately. Our results suggest that the self-selection bias causes the conglomerate discount. In each of the 12 regressions, we find consistently insignificant effects of diversification.

5. Conclusion

This study examines the association between diversification and market value. While advocates of diversification state that conglomerates benefit from, for example, internal capital markets, economies of scope, or a reduction in firm risk, several additional costs and agency problems arise due to diversification, which could cause a conglomerate discount. According to the different arguments, we find mixed evidence in previous literature on the existence and size of the conglomerate discount.

In this study, we focus on the role of design choices in the conglomerate discount literature. Specifically, we seek to explain how research design choices explain the sensitivity of prior research. We analyze the German market because it has rarely been studied and the few results are inconclusive. Our initial results suggest that conglomerates trade at a discount. However, design choices such as the measurement of excess values, the sample period, and the industry membership affect the size of the conglomerate discount. Moreover, we find that the omission of relevant factors partially explains the conglomerate discount. The inclusion of additional control variables reduces the conglomerate discount in each specification and the conglomerate discount even becomes insignificant after the inclusion of firm-fixed effects in one of three specifications. Finally, we employ a 2SLS and find no evidence of a discount after accounting for self-selection.

[78] Partial R-squared values are comparable to other studies in this research field (e.g., Campa and Kedia, 2002; Chang et al., 2016), indicating that our instruments are not weak.

Table 6.6: Determinants of Diversification

	(1)	(2)	(3)	(4)
Fraction of conglomerates in industry	0.675***	0.714***	0.654***	0.714***
	(13.528)	(13.860)	(12.450)	(13.185)
Fraction of industry-sales from conglomerates	0.002	-0.012	0.016	-0.006
	(0.069)	(-0.407)	(0.513)	(-0.182)
Number of M&A in industry		0.001***		0.001***
		(2.812)		(4.197)
Volume of M&A in industry		-0.000		-0.000
		(-0.431)		(-0.259)
GDP Growth			-0.384	-0.437
			(-0.372)	(-0.425)
GDP Growth (1 lag)			-0.877	-0.955
			(-0.844)	(-0.919)
ln(total assets)	0.022	0.021	0.031	0.030
	(1.002)	(0.974)	(1.351)	(1.309)
Operating income/total assets	-0.011	-0.004	-0.001	0.011
	(-0.264)	(-0.098)	(-0.027)	(0.238)
Capital expenditures/total assets	-0.000	0.053	-0.081	0.011
	(-0.002)	(0.337)	(-0.485)	(0.064)
ln(total assets) (1 lag)	-0.030	-0.031	-0.040	-0.040
	(-1.109)	(-1.131)	(-1.392)	(-1.380)
Operating income/total assets (1 lag)	0.000	-0.001	0.002	0.001
	(0.006)	(-0.040)	(0.113)	(0.049)
Capital expenditures/total assets (1 lag)	-0.002	0.001	-0.002	0.002
	(-0.108)	(0.029)	(-0.104)	(0.120)
ln(total assets) (2 lag)	0.051***	0.053***	0.050***	0.052***
	(3.116)	(3.239)	(2.860)	(2.964)
Operating income/total assets (2 lag)	0.003	0.003	0.002	0.002
	(0.313)	(0.270)	(0.195)	(0.135)
Capital expenditures/total assets (2 lag)	-0.008	-0.010	-0.009	-0.012*
	(-0.982)	(-1.240)	(-1.202)	(-1.662)
Constant	-0.414***	-0.480***	-0.353***	-0.451***
	(-6.749)	(-7.286)	(-4.587)	(-5.576)
Year fixed effects	Yes	Yes	Yes	Yes
Accounting standard fixed effects	Yes	Yes	Yes	Yes
Observations	5,346	5,346	4,746	4,746
Wooldridge's test statistic	0.942	0.239	0.291	0.241
F statistics for joint significance of instruments	119.110	62.369	54.533	40.247
Partial R-squared	0.036	0.037	0.036	0.040
Adj. R-squared	0.117	0.118	0.124	0.127

*This table presents 2SLS (first-stage) results. Detailed variable definitions are available in Appendix 6.B. t-statistics are reported under each coefficient in parentheses. *, **, and *** denote significance level of 0.1, 0.05, 0.01, respectively.*

Table 6.7: Instrumental Variables Regressions

	Second-stage results based on the instruments employed in model (1), Table 6			Second-stage results based on the instruments employed in model (2), Table 6		
	EV_Sales	EV_Merton	EV_Goodwill	EV_Sales	EV_Merton	EV_Goodwill
Diversified firm (dummy)	-0.092	-0.058	-0.138	-0.112	-0.039	-0.126
	(-0.992)	(-0.586)	(-1.444)	(-1.232)	(-0.417)	(-1.354)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Accounting standard fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5,346	4,254	5,192	5,346	4,254	5,192
Adj. R-squared	0.077	0.077	0.070	0.077	0.077	0.070

	Second-stage results based on the instruments employed in model (3), Table 6			Second-stage results based on the instruments employed in model (4), Table 6		
	EV_Sales	EV_Merton	EV_Goodwill	EV_Sales	EV_Merton	EV_Goodwill
Diversified firm (dummy)	-0.070	-0.047	-0.108	-0.102	-0.012	-0.090
	(-0.719)	(-0.466)	(-1.073)	(-1.103)	(-0.125)	(-0.957)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Accounting standard fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,746	3,779	4,593	4,746	3,779	4,593
Adj. R-squared	0.082	0.086	0.077	0.082	0.085	0.077

*This table presents 2SLS (second-stage) results. Detailed variable definitions are available in Appendix 6.B. t-statistics are reported under each coefficient in parentheses. *, **, and *** denote significance level of 0.1, 0.05, 0.01, respectively.*

We contribute to the literature and discussion on diversification in numerous ways. We offer a broader perspective on the valuation of conglomerates as we find a valuation difference between conglomerates and focused firms that is not caused by their diversification activities but simply reflects the negative relationship between the factors that lead firms to diversify and market valuation. While we find consistent evidence for this self-selection bias, the size of the discount is affected by design choices and thus explains the sensitivity in prior research. Our results are of interest to both researchers and practitioners seeking to understand the conflicting results in prior literature. Moreover, we provide insights on the valuation of conglomerates in the German market that contradicts the common knowledge that conglomerates are discounted.

While we believe that our results can inform practitioners, we caution readers that our study is subject to limitations. First, our study analyzes whether diversification affects market value on average. Nevertheless, scholars such as Sturm and Nüesch (2019) identify conditions that moderate the relation between diversification and market value. Thus, it is still possible that certain firms suffer from lower market value due to diversification. Second, we analyze diversification through the number and main industry of reported segments. However, segments can operate in multiple industries simultaneously. Moreover, restructuring and reporting decisions can affect the number of reported segments but not necessarily in which industries a firm operates. Third, since our sample has insufficient observations for firms that diversify or refocus, we could not analyze such changes. In this context, we caution readers that our excess values are limited to the availability of comparable but focused firms in Germany. Although using a European sample could help us increase the number of peer firms for each conglomerate, these companies are less comparable and may bias our results. Furthermore, the adjustment proposed by Boguth et al. (2022) would shift the problem from a small number of focused firms to a small number of comparable conglomerates.

Nevertheless, this study suggests numerous potential new research paths. Since the decision to diversify is still strategic, combining more strategy-related variables (e.g., strategy type) could generate further insights. It would also be interesting to extend the analysis of the diversification discount to more accounting-related questions, e.g., the use of aggressive reporting. Finally, a more detailed analysis of shareholder reactions to diversification could fill knowledge gaps.

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Appendix 6.A: Empirical Studies of the German Capital Market

Author(s) (Year)	Sample Size	Period	Valuation Difference	Findings
Lins and Servaes (1999)	401 German firm-years (and 2,318 firm-years from firms in Japan and UK)	1992 and 1994	No Valuation Difference	Lins and Servaes (1999) find no evidence of a conglomerate discount in Germany but a discount of approximately 10% in Japan and 15% in the UK. Moreover, concentrated ownership in the hands of insiders enhances the valuation of diversified firms in Germany but not in Japan or the UK.
Schwetzler and Reimund (2003)	1,052 German firm-years	1988 to 2001	No Valuation Difference	Schwetzler and Reimund (2003a) find no evidence of a conglomerate discount when they employ Berger and Ofek's (1995) excess value. However, they argue that this measure is biased because it does not reflect cash holdings and develop excess values on enterprise value basis. Using this variable, they find a weakly significant conglomerate discount of approximately 6%.
Fauver et al. (2003)	3,398 German firm-years (and 25,410 firm-years from other countries)	1991 to 1995	Conglomerate Premium 2% to 10.7%	Fauver, Houston and Naranjo (2003) analyze the association between diversification and market performance in a conglomerate setting and find evidence for a conglomerate discount. However, they also identify country-specific differences that interact significantly with diversification. Their study suggests that conglomerates in Germany are valuated at a premium of between 2% and 10.7%.
Weiner (2005)	6,308 German firm-years (and 27,493 firm-years from other countries)	1991 to 2003	Conglomerate Discount 3% to 10%	Univariate results suggest that firms in Germany are traded at a valuation discount of approximately 3% to 10% on average. The discount increases to between 21% and 23% if one uses comparable firms from a combined German and European sample.
Beckmann (2006)	2,440 German firm-years	1998 to 2001	Conglomerate Discount 17% to 23%	Univariate results suggest that conglomerates in Germany are traded at a valuation discount of approximately 17% to 23% on average. In addition, Beckmann (2006) finds consistently negative effects of the number of unrelated segments in a regression analysis, where the conglomerate discount increases with the number of unrelated segments.

Author(s) (Year)	Sample Size	Period	Valuation Difference	Findings
Rustige and Grote (2009)	184 acquisitions and 129 spinoffs of German firms	1996 to 2005	Mixed Evidence	Rustige and Grote (2009) analyze whether cumulative abnormal returns differ between the announcement of related and unrelated M&A. Unrelated acquisitions are associated with between 5.1% and 7.9% less cumulative abnormal returns than related acquisitions. However, announcements of unrelated spinoffs do not yield higher cumulative abnormal returns.
Glaser and Müller (2010)	4,070 German firm-years	2000 to 2006	Conglomerate Discount 7.7% to 13.9%	Glaser and Müller (2010) analyze whether the conglomerate discount is caused by the book value bias of debt. Their results suggest that conglomerates trade at a discount of between 7.7% and 13.9%. However, the diversification discount decreases once the market value of debt is employed instead of the book value of debt and ranges from 6.7% to 8.2%.
Kluge (2014)	1,638 German firm-years	2004 to 2010	Conglomerate Discount 1% to 34%	Univariate results suggest that firms in Germany are traded at a valuation discount of approximately 1% to 34% on average. In addition, Kluge (2014) finds a negative and significant effect of the on the number of unrelated segments on firm's market value.
Liu (2016)	3,240 German firm-years	2005 to 2014	Mixed Evidence -5.46% to 7.99%	Liu (2016) finds evidence for both a conglomerate premium and discount depending on the measure of market value. Overall, sales-based excess values produce a conglomerate discount, while asset-based excess values and hybrid excess values indicate a conglomerate discount. Diversification has no effect on liquidity-adjusted excess values. The results are robust to a number of robustness checks including a Heckman two-stage approach.

Appendix 6.B: Variable Definitions

Market Value

EV_Sales is the traditional excess value introduced by Berger and Ofek (1995). The excess value compares a firm's actual value to its imputed value if each of its segments operated as single-segment firms (see section 3.3 for a detailed description):

$$\text{EV\_Sales} = \ln\left(\frac{\text{actual value}}{\text{imputed value}}\right)$$

where

actual value = market value of equity (WC08001)+book value of debt (WC03255)

imputed value = $\sum$ multiplier × $\text{sales}_{\text{segment}}$ (WC19501-WC19591)

$\text{multiplier}_{\text{sales}}$ = industry median of focused firms $\left(\frac{\text{actual value}}{\text{sales (WC01001)}}\right)$.

EV_Merton is the excess value based on Glaser and Müller (2010). The authors employ Eberhart's (2005) application of the Merton (1974) model to estimate the market value of debt. Contrary to the traditional excess value, the firm's actual value is the sum of market value of equity and market value of debt, where the firm's market value of debt (V) is calculated by solving the following equations numerically:

$$E = VN(d_1) - e^{-rT}FN(d_2)$$

$$d_1 = \frac{\ln\left(\frac{V}{F}\right) + (r + 0.5\sigma_V^2)T}{\sigma_V\sqrt{T}}$$

$$d_2 = d_1 - \sigma_V\sqrt{T}$$

$$\sigma_E = \frac{V}{E_1} N(d_1)\sigma_V$$

with

σ_E = Standard deviation of daily stock returns over the past 125 trading days

T = 0.6 × short-term debt ratio (WC03051) + 6.3 × long-term debt ratio (WC03251)

r = 1-year EURIBOR

F = Total debt (WC03255) × $(1+i)^T$

$$i = \frac{\text{interest expense (WC01251)}}{\text{total interest bearing debt (WC03255)}}$$

E = market capitalization (WC08001)

EV_Goodwill is the excess value based on Custódio (2014). Contrary to the traditional excess value, goodwill (WC02502) is subtracted from the firm's actual value.

Control Variables

Diversified firm (dummy)	is a binary variable that takes a value of 1 when the firm is diversified and zero when the firm is focused (see chapter 3.2 for a detailed description).
accounting standard (dummy)	consists of three binary variables (WC07536). Each dummy is set to 1 if a specific accounting standard is used and 0 otherwise. Firms are grouped into US-GAAP, local GAAP (HGB), and IFRS.
total assets	WC02999
capital expenditures	WC04601
operating income	WC01250

Instrumental Variables

Fraction of conglomerates in industry	is the percentage of conglomerates that are conglomerates in the firm's industry-year.
Fraction of industry-sales from conglomerates	is the percentage of sales accounted for by conglomerates in the firm's industry-year.
Number of M&A in industry	is the number of M&A announced in the firm's industry-year.
Volume of M&A in industry	is the volume of M&A announced in the firm's industry-year.
GDP Growth	is the growth in GDP of the firm's region, where the region is based on the first-digit postual code of the firm's headquarter.
Major Index	is a binary variable indicating whether the firm is listed on a mahor exchange (i.e., DAX) based on WC05661.

7 Conclusion

Over the past few years, there has been a fundamental transformation in the understanding of corporate purpose and good corporate governance, which has created challenges in comprehending the activities of firms using widely accepted theoretical frameworks (Lund and Pollman, 2021). For example, many firms pursue ESG goals that are not primarily intended to increase shareholder value (Boffo, Marshall, and Patalano, 2020; Boffo and Patalano, 2020; Eulerich, Bonrath, and Lopez Kasper, 2022). This trend is even reinforced by large institutional investors that are expected to generate value for their investors (BlackRock, 2018; State Street, 2022; Vanguard, 2021). I argue that an influence-based definition of corporate governance is helpful in understanding these developments. Against this background, the focus of this dissertation was to analyze the association between corporate governance, strategy, and performance. Specifically, two research questions have been explored in the context of five essays.

First, this dissertation explores how employees' oversight activities affect corporate performance (RQ_1). In particular, I analyze the consequences of employees' influence through board-level employee representation. Having employee representatives on corporate boards increases the influence of employees within the firm and is therefore expected to affect the perceptions of good corporate governance and expectations regarding value distribution within the firm as well, which should ultimately affect performance. The results of essays (I) and (II) align with this argument, indicating that codetermination is associated with a decrease in market value, has no effect on profitability, and reduces aggressive financial and tax reporting.

While both essays provide some insights into the underlying mechanisms, the understanding of how codetermination affects the decision-making process of the supervisory board is still limited. To further explore this aspect, conducting interviews could shed light on employee representatives' incentives and perceptions of good corporate governance. Moreover, interviews can reveal instances where employee representatives have voted differently from shareholder representatives. Furthermore, essays (I) and (II) analyze the average effect of codetermination on performance. It would be interesting to examine the circumstances that either mitigate or enhance the ability of employee representatives to affect performance.

Second, this dissertation analyzes how specific organizational decisions affect corporate performance (RQ_2). Firms take measures to meet expectations regarding both performance and value distribution, but the benefits of these measures are not sufficiently clear, for example, due

to opposing results and arguments in the literature. Essays (III), (IV), and (V) explore the benefits from investing in internal audit activities beyond benchmark expectations, examine the strategy-performance relationship, and show the sensitivity of prior results on the market valuation of conglomerates.

By analyzing these specific organizational decisions, this dissertation provides a clearer understanding of their impact on corporate performance, thereby enriching the knowledge on effective decisions within organizations. However, it is crucial to note that essays (III), (IV), and (V) examine German firms. Exploring the effects of organizational decisions within a broader sample of European firms could generate a more comprehensive understanding and would provide insights into potential variations among European countries.

Collectively, this dissertation contributes to our understanding of the association between corporate governance, strategy, and performance. Nevertheless, there are still several important avenues for further research. While the essays within this dissertation primarily focus on analyzing the effect of corporate governance and organizational decisions on performance, further research may examine how corporate governance affects organizational decisions. For example, analyzing whether employee representatives' risk preferences increase the firm's likelihood to industrially diversify would provide more insights into the association between corporate governance, strategy, and performance and may also explain the negative relationship between codetermination and market value. Furthermore, this dissertation focuses on the firm's supervisory board structure to measure the influence of specific actors within the firm. Further research could also consider, among others, the dispersion of a firm's ownership structure, the analyst coverage, or the unionization rate. This might provide a more holistic view on the firm's perceptions of good corporate governance and expectations regarding value distribution within the firm. Finally, further research may analyze whether and the extent to which these factors affect the managers' compensation targets and their perceptions of performance expectations. By investigating how the influence of specific actors affects managerial incentives and perceptions, further research can uncover additional insights into the relationship between governance, strategy, and performance.

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