

# From Fair Value to NFTs: Essays on Transparency and Regulation in Financial Markets

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# Abstract

This dissertation addresses the complex relationship between transparency, financial statements, and regulatory oversight in the global financial landscape. Four chapters explore different facets of this complex interaction. Chapter 2 analyzes the legislative process of the Financial Market Integrity Strengthening Act, focusing on the restructuring of the enforcement framework. The analysis shows that the legislator only incorporated the professionals' recommendations to a limited extent into the final legislation, and that the law appears to place the main responsibility for the failures in the Wirecard case on the FREP even before the conclusion of the legal proceedings. Chapter 3 examines the impact of enforcement costs on voluntary delisting and downlisting decisions in Germany, thus contributing to the discourse on the trade-off between listing incentives and costs. The results suggest that an error announcement itself is not a driving factor. Rather, the analysis points to the enforcement process itself as a significant financial burden for firms. Chapter 4 focuses on fair value adjustments on investment property and its characteristics as a recurring income that has at the same time non-recurring characteristics. The results indicate limited positive reactions to positive earnings surprises when fair value adjustments materially affect reported earnings. This suggests that fair value adjustments, having characteristics of non-recurring earnings, are viewed by investors with heightened uncertainty and perceived risk due to their uncertain translation into future cash flows, while such uncertainty is reduced in transparent real estate markets. The final chapter shifts to the NFT market, which operates in an unregulated but transparent environment. The analysis suggests that experienced investors outperform, indicating a degree of information inefficiency. Moreover, traders with more transactions may benefit more from pump-and-dump schemes, highlighting the need for a regulatory framework despite theoretical transparency.

# Zusammenfassung

Die vorliegende Dissertation befasst sich mit der komplexen Beziehung zwischen Transparenz, Finanzberichterstattung und Regulatorik in der globalen Finanzlandschaft. In vier Kapiteln werden verschiedene Facetten dieser Aspekte untersucht. In Kapitel 2 wird der Gesetzgebungsprozess des Gesetzes zur Stärkung der Finanzmarktintegrität analysiert, wobei der Schwerpunkt auf der Umstrukturierung der Bilanzkontrolle in Deutschland liegt. Die Analyse zeigt, dass der Gesetzgeber die Empfehlungen der Interessensgruppen nur in begrenztem Umfang in das endgültige Gesetz aufgenommen hat und dass das Gesetz die Hauptverantwortung für die Versäumnisse im Fall Wirecard bereits vor Abschluss des Gerichtsverfahrens der Deutschen Prüfstelle für Rechnungslegung zuzuweisen scheint. Kapitel 3 untersucht die Auswirkungen von Enforcement-Kosten auf freiwillige Delisting- und Downlistingentscheidungen in Deutschland und leistet damit einen Beitrag zum Diskurs über die Balancierung zwischen Anreizen und Kosten einer Börsennotierung. Die Ergebnisse legen nahe, dass eine Fehlerbekanntmachung selbst kein treibender Faktor ist. Vielmehr weist die Analyse darauf hin, dass der Enforcement-Prozess selbst eine erhebliche finanzielle Belastung für die Unternehmen darstellt. Kapitel 4 befasst sich mit Anpassungen des Fair Values von als Finanzinvestition gehaltenen Immobilien und deren Charakteristik als wiederkehrende Erträge, die gleichzeitig Merkmale einmaliger Erträge aufweisen. Die Ergebnisse deuten auf eingeschränkt positive Reaktionen auf positive Gewinnüberraschungen hin, wenn Fair-Value-Anpassungen die ausgewiesenen Gewinne wesentlich beeinflussen. Dies impliziert, dass Investoren Anpassungen des Fair Values aufgrund ihrer unsicheren Umsetzung in künftige Cashflows mit erhöhter Unsicherheit begegnen, während diese Unsicherheit auf transparenten Immobilienmärkten geringer ausfällt. Das letzte Kapitel befasst sich mit dem Markt für Non-Fungible Tokens, der in einem unregulierten, aber zugleich transparenten Umfeld operiert. Die Analyse zeigt, dass erfahrene Investoren höhere Erträge erzielen, was auf eine vorhandene Informationsineffizienz des Marktes hindeutet. Außerdem können erfahrenere Händler stärker von Pump-and-Dump-Mechanismen profitieren, was die Notwendigkeit eines regulatorischen Rahmens trotz theoretischer vollständiger Transparenz unterstreicht.

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# Chapter 1

## Synopsis

In the ever-changing environment of global finance, the interrelated concepts of (market) transparency, financial statements, and regulatory oversight play a central role in shaping the stability, trustworthiness, and efficiency of capital markets. This thesis embarks on a comprehensive exploration of various aspects related to the complex relationship between transparency, exemplary in terms of financial statements of market constituents, and the regulatory framework that governs these markets. Within this context, this thesis addresses the challenges and complexities that arise, especially the ongoing trade-off between regulatory changes that often increase the cost (of being listed) for applicants on the one hand, while increasing transparency (and thus lowering cost of capital) on the other.

Transparency within capital markets represents the foundation of investor confidence and market efficiency. It revolves around the disclosure of accurate, accessible, and timely information by companies and other market participants. Market transparency enables investors to make informed decisions, promotes fair competition, and encourages the efficient allocation of capital. It connects investors, companies, and regulatory authorities to ensure that markets operate with integrity. Transparency is even associated with promoting a firm's innovation efforts, as it reduces the sensitivity of management turnover to poor innovation performance and increases innovation efficiency by serving a governance function that facilitates the efficient allocation of research and development capital (Zhong 2018). However, achieving transparency is not without its challenges and is not necessarily associated with exclusively positive effects (Di Maggio and Pagano 2018), and its level can vary significantly across different markets and firms (Bleck and Liu 2007; Kaufmann and Weber 2010; Madhavan 1996).

Financial statements are central to the 'transparency equation'. They are aimed to provide a true and fair view of a company's financial health, performance, and risks. As such, they serve as the primary source of information for investors, creditors, and other stakeholders to guide their investment decisions. However, the quality and comprehensiveness of financial statements can be subject to manipulation or misrepresentation, posing serious risks to investors and market stability (Barth and Schipper 2008; Bleck and Liu 2007; Kaufmann and Weber 2010; Watanabe et al. 2019).

Regulatory oversight is intended to protect market integrity and is charged with ensuring that transparency is maintained and financial statements are reliable. Regulators



establish and enforce rules, (accounting) standards, and mechanisms that govern the behavior of market participants. The resulting regulatory framework is essential to deter and detect fraudulent activities, prevent market abuse, and mitigate systemic risk (Barth and Schipper 2008; Bleck and Liu 2007; Watanabe et al. 2019). While regulation plays an important role in these aspects and promotes market transparency, it also poses complex challenges. The cost-benefit trade-off associated with regulation and transparency is a key challenge. While regulation enhances transparency by imposing disclosure requirements and standards, it also imposes costs on market participants (Admati and Pfleiderer 2000; Verrecchia 1983; Watanabe et al. 2019; Zingales 2009). Compliance costs, administrative burdens, and legal obligations can be burdensome for firms. Balancing regulatory action with associated costs is an ongoing challenge, especially as underregulation may expose markets to undue risk.

In this thesis, all four chapters deal with different facets of the complex relationship between regulation and transparency in the financial sector. First, chapter 2 addresses a recent legislative change aimed at increasing market transparency and preventing future instances of fraud. This chapter, titled *‘Die Neuregelung von Bilanzkontrolle und Abschlussprüfung im Jahr 2021 – Meinungsstand und Evolution des Gesetzentwurfs zum FISG’* (Berninger et al. 2023) and published in *Zeitschrift für Bankrecht und Bankwirtschaft*, examines the legislative process of the Financial Market Integrity Strengthening Act (FISG) in Germany with a focus on the interplay of different interest groups. Specifically, it analyzes the statements and influence of external stakeholders in shaping the final legislation. These regulatory changes in Germany were caused by the loss of trust in the German capital market precipitated by the Wirecard AG accounting fraud scandal. The repercussions of this scandal extended beyond the auditor, implicating both the German Financial Reporting Enforcement Panel (FREP) and the Federal Financial Supervisory Authority (BaFin). This, in turn, led to a significant restructuring of the enforcement framework in Germany. Consequently, one of the notable outcomes of the legislative process was the abolition of the unique "hybrid" enforcement system, characterized by the coexistence of a private law association and a regulatory authority — a pioneering approach established in 2003. This reform represented perhaps the most profound and contentious change in the financial regulatory landscape with the enactment of the FISG. Simultaneously, the subsequent legislative process provides a unique opportunity to systematically assess the current prevailing opinions regarding

accounting enforcement in Germany and analyze its implications for the FISG legislative process.

Thus, chapter 2 focuses on an in-depth analysis of 44 statements submitted by diverse stakeholders concerning the initial draft of the FISG. The analysis shows that the legislator only marginally heeded the statements and recommendations of the professional community. Nevertheless, substantial modifications were made to the draft during the legislative process of the FISG. Interestingly, these alterations did not directly align with the input provided in the statements. Furthermore, this study highlights the prevailing sentiment that the enactment of the FISG, even before the conclusion of the legal proceedings regarding the Wirecard case, was accompanied by a tendency to place the majority of blame for the failures in the Wirecard case on the FREP. This viewpoint tends to disregard the positive and historically successful aspects of the two-tier enforcement procedure. Regrettably, none of the strengths associated with this system have been incorporated into the new regulatory framework.

While chapter 2 delved into the legislative reform of the FISG that brought about substantial modifications to the enforcement framework in Germany and therefore focused on the legislator, chapter 3, titled *'Evaluating the Impact of Enforcement Costs and Earnings Management on Listing Decisions: Evidence from Delistings and Downlistings in Germany'*, takes an opposing perspective and focuses on the addressee of the legislation and how they deal with the regulatory environment. Specifically, it examines delisting and downlisting decisions in Germany. The primary aspect of this chapter revolves around the influence of enforcement costs on these decisions. This analysis contributes to the broader body of research exploring the listing gap, a phenomenon observed in both European and U.S. financial markets, and the complex cost-benefit dynamics associated with being a publicly listed company. Within this context, the chapter highlights the significance of enforcement costs as a pivotal component of listing expenses and a potential constraint on the incentives for listing.

Both before and after the legislative reform detailed in chapter 2, Germany's primary enforcement mechanism for addressing accounting errors remains a naming-and-shaming approach. This approach requires that errors detected by the responsible regulatory authority be publicly disclosed, thereby ensuring transparency for investors. This disclosure process provides the basis for the analysis of how enforcement costs

influence decisions related to delistings and downlistings, as it distinctly identifies companies that have incurred costs as a consequence of the enforcement system.

Thus, applying logistic regression, the study analyzes voluntary delistings and downlistings in Germany spanning the period from 2004 to 2021. It uses the error announcements of the 'naming-and-shaming' approach to reflect the particular involvement with the enforcement system. This approach serves as an indicator of the extent to which companies have been involved in enforcement processes, thus shedding light on the costs borne. It further addresses the recurrent involvement with the enforcement system for companies that repeatedly had errors in their financial statements within a defined timeframe. Additionally, the study examines the potential impact of earnings management as a precursor to accounting errors, as it may lead to increased enforcement activity and, subsequently, increased listing costs.

The findings suggest that a singular error announcement does not appear to be a driving factor behind decisions to delist or downlist. Instead, the analysis points toward the enforcement process itself as a significant financial burden for firms. This is because, following the disclosure of an error, the costs have already been incurred and settled. This aligns with the results on the impact of another subsequent exposure to the enforcement system, causing high enforcement costs to reoccur, which suggests that several temporally contiguous error announcements increase the delisting probability. Furthermore, the findings suggest an increased reliance on earnings management leading up to delisting events as such practices may be strategically employed to enhance the perception of the company's financial health and mitigate the risk of involuntary delisting which retains the company the option to engage in an organized delisting process. Thus, the results underline the dilemma of regulators, whereby they must at the same time not overly restrict the incentives for listings through costs, but at the same time create transparency and ensure financial market integrity with their regulatory efforts.

In addition to the regulatory instrument of enforcement discussed in chapters 2 and 3, accounting standards are a second central aspect of the infrastructure of financial markets, whose revisions and new versions are aimed at increasing market transparency. A key approach to this was the shift in the accounting regime from historical cost to marking to market, which is, among other things, intended to limit managers' ability to disguise the firm's true financial performance and therefore result in more transparent

financial reports and reduce information asymmetry (Bleck and Liu 2007). The resulting increased transparency reduces information risk and, as theoretical research suggests, can reduce the cost of capital since it reduces the non-diversifiable risk that arises from information asymmetry or increases the average accuracy of investors' estimates of a firm's future cash flows (Barth and Schipper 2008; Barth et al. 2013; Lambert et al. 2007). Thus, in theory, this reform should be strived for equally by all stakeholders. However, there are also several dissenting opinions against this reform, which are mainly based on the impracticability of implementing the market/fair value approach, since the fair value is rarely available in reality (Bleck and Liu 2007). Chapter 4, titled '*Value Effects of Non-Recurring Earnings and Uncertainty - Insights from Fair Value Adjustments in the Real Estate Industry*', contributes to this discussion.

It focuses on the characteristic of fair value adjustments of investment property which represent recurring earnings that always relate to investment property but represent non-recurring earnings at the same time and their interplay with earnings surprises, investor perceptions, and stock market reactions, using a dataset of the real estate sector. Given the central character of investment property in the real estate sector and the possible adoption of fair value accounting under IAS 40 for fiscal years beginning on or after January 1, 2005, this sector offers a suitable setting for the study. Furthermore, chapter 3 extends the existing literature on investors' reactions to earnings surprises by considering the breakdown of earnings, specifically with respect to gains or losses recognized in income statements resulting from fair value adjustments as a type of recurring, but simultaneously non-recurring earnings, applied to investment property. The empirical analysis draws from a dataset derived from financial statements of real estate companies applying International Financial Reporting Standards. The dataset spans the period from 2006 to the recently disclosed financial statements in 2023. A multi-country short-term event study approach with subsequent regression analysis is applied. Additionally, transparency data describing the level of transparency of the real estate markets of the countries represented in the dataset is included in the analysis to identify potential differences in the assessment of fair value adjustments by investors.

Primarily, the study offers additional evidence that unexpected developments in earnings, measured by Funds from Operations (FFO), notably influence investor sentiment in the real estate sector. In this context, it contributes further insights to the ongoing discussion

on the informativeness of Funds from Operations (FFO) for the real estate sector, emphasizing its substantial importance. Secondly, the results reveal a nuanced relationship between fair value adjustments on investment property and investor perception. While investors generally react positively to earnings surprises, this positive sentiment is notably muted when fair value adjustments have a major impact on reported earnings. This emphasizes the unique characteristics of fair value adjustments as non-recurring earnings, which represent unrealized gains or losses and may not reliably translate into future cash flows. Therefore, investors perceive them with heightened uncertainty and associate a greater level of risk with these adjustments. Thirdly, the findings suggest that in real estate markets characterized by higher levels of transparency, investors tend to show more favorable reactions to fair value adjustments. This highlights the meaning of verifiability in financial reporting as it reduces uncertainty and its consequential impact on investor responses. Thus, the findings raise questions about whether investors fully accept fair value accounting of investment property as an accurate reflection of a firm's financial performance because of their non-recurring character and whether it is perceived as reducing information asymmetry.

Chapter 5, titled *'Investment in non-fungible tokens (NFTs): the return of Ethereum secondary market NFT sales'* (Klein et al. 2023) and published in the *Journal of Asset Management*, concludes this thesis and takes a different perspective on the interplay between regulation and transparency. Unlike chapters 2 to 4, which dealt with specific regulatory aspects and their implications for various aspects of market transparency, chapter 5 shifts the focus to a market environment that has different characteristics than traditional capital markets. This chapter examines the market for Non-Fungible Tokens (NFTs), which stands in contrast to the settings in chapters 2 to 4 as it operates in a nearly completely unregulated environment. At the same time, this unregulated market theoretically offers the highest level of transparency. The regulatory landscape for NFTs, as well as cryptocurrencies in general, is slowly evolving on a global scale, presenting challenges to regulators (Bao and Roubaud 2022; Maouchi et al. 2022). In this context, the central objective primarily revolves around the establishment of a regulatory framework to prevent money laundering and market manipulation, both of which are persistent issues associated with cryptocurrencies and NFTs (Dowling 2022; Silva and Da Mira Silva 2022). The pursuit of transparency in this context is closely tied to the entities responsible for issuing crypto assets and the trading platforms rather than the transactions

themselves. This perspective is reflected in recent regulatory initiatives, such as the Markets in Crypto-Assets Regulation (MiCA) enacted by the European Securities and Markets Authority (ESMA). Nevertheless, it's important to note that the maximum transparency inherent to NFT trades, even in the absence of regulation, is based on the fact that ownership is validated and recorded on the blockchain. Consequently, all transactions are openly accessible and can be accessed and analyzed by anyone.

In this study, leveraging the inherent transparency of the Ethereum secondary NFT market, an analysis of resale performance spanning from June 2017 to December 2021 is conducted. The approach used in this study involves computing investor returns by considering individual purchase and sale prices, inclusive of associated fees. Moreover, the analysis extends beyond the methods employed in existing studies, which typically rely on price index models based on aggregated average prices or are confined to a specific NFT collection. Instead, the study adopts a unique approach that allows us to assess the returns of each individual resale, and distinct from price index models, we're able to calculate the actual realized returns of individual traders.

The findings suggest that the total number of transactions of a trader exerts a positive influence on trader returns. This implies that experienced investors outperform their less-experienced counterparts, even after factoring in various types of transaction costs, which suggests a level of information inefficiency in NFT markets. Furthermore, the results indicate that traders with a higher number of transactions may benefit more from pump-and-dump schemes, a characteristic often associated with NFT markets. This dynamic potentially results in higher returns for such traders, questioning if NFT pricing is actually driven by human value traits, as posited in prior research. Thus, with regard to pump-and-dump schemes as an instrument of market manipulation, the results illustrate the need for regulatory frameworks to protect market participants, despite the theoretical existence of maximum transparency in NFT and crypto markets.

In conclusion, the thesis provides a textured image of the ongoing struggle to balance transparency and regulatory intervention in diverse financial landscapes. The findings underscore the need for adaptive regulatory frameworks that consider the unique characteristics of each market, acknowledging the evolving nature of financial systems and the sensitive balance between transparency, regulatory costs, and market integrity.

## Chapter 2

Die Neuregelung von Bilanzkontrolle und  
Abschlussprüfung im Jahr 2021 – Meinungsstand  
und Evolution des Gesetzentwurfs zum FISG

## Abstract

„Erst wenn (kapitalmarktseitige) Offenlegungspflichten durch eine wirksame Um- und Durchsetzungsinfrastruktur sekundiert werden, können diese tatsächlich bestehende Informationsasymmetrien im Kapitalmarkt abbauen und so zur Steigerung der Markteffizienz beitragen.“ In kaum einer Frage kumuliert sich der Gehalt dieser Aussage (vgl. Berninger 2020, S. 35) gegenwärtig stärker als in der Diskussion um ein effektives System der (externen) Bilanzkontrolle. Der Fall Wirecard hat hier zuletzt tradierte (deutsche) Ansätze auf eine harte Probe gestellt und den Gesetzgeber zu einer umfangreichen Novellierung veranlasst. Doch ist die Abkehr vom zweistufigen Enforcement wirklich der große Wurf oder nur ein „Schnellschuss“? Der Beitrag widmet sich hierzu dem Gesetzgebungsprozess des FISG und analysiert insbesondere, welche externen Interessensgruppen sich mit Kritik und Anregungen zum System der Bilanzkontrolle in den Gesetzgebungsprozess eingebracht und in welcher Form diese Beiträge Eingang in den verabschiedeten Gesetzentwurf gefunden haben.

This chapter has been published as:

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## Chapter 3

# Evaluating the Impact of Enforcement Costs and Earnings Management on Listing Decisions: Evidence from Delistings and Downlistings in Germany

## Abstract

This paper examines the decision to delist or downlist in the German stock market, focusing on the role of enforcement costs and earnings management. The study analyzes delistings and downlistings from 2004 to 2021, taking into account different market segments with varying regulatory requirements. Logistic regression is applied, using published accounting errors as a proxy for enforcement system involvement and induced costs. The findings indicate that error announcements themselves do not drive delisting or downlisting decisions. Instead, the costs incurred during the enforcement process, regardless of the audit outcome, play a significant role in influencing these decisions. The study also reveals a higher utilization of earnings management prior to delistings, suggesting its use as a strategy to mask financial distress and mitigate the risk of involuntary delisting.

Overall, this research contributes to the understanding of the cost-benefit trade-off of being listed and the decision to delist or downlist. The results highlight the need to balance enforcement and compliance costs with the benefits of maintaining market integrity. The findings have implications for regulators and policymakers in shaping regulations that minimize undue burdens on companies while ensuring market transparency and investor protection.

This chapter is a working paper and has not been published yet.

Berninger, Marc; Lattermann, Fritz; Schiereck, Dirk (2023): Evaluating the Impact of Enforcement Costs and Earnings Management on Listing Decisions: Evidence from Delistings and Downlistings in Germany. Working Paper.

# Evaluating the Impact of Enforcement Costs and Earnings Management on Listing Decisions: Evidence from Delistings and Downlistings in Germany

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December 21, 2023

## **Abstract**

This paper examines the decision to delist or downlist in the German stock market, focusing on the role of enforcement costs and earnings management. The study analyzes delistings and downlistings from 2004 to 2021, taking into account different market segments with varying regulatory requirements. Logistic regression is applied, using published accounting errors as a proxy for enforcement system involvement and induced costs. The findings indicate that error announcements themselves do not drive delisting or downlisting decisions. Instead, the costs incurred during the enforcement process, regardless of the audit outcome, play a significant role in influencing these decisions. The study also reveals a higher utilization of earnings management prior to delistings, suggesting its use as a strategy to mask financial distress and mitigate the risk of involuntary delisting.

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**Keywords:** Delistings, Downlistings, Enforcement, Earnings Management, Financial Reporting

**JEL classification:** G30, G38

## 1. Introduction

The decision to be listed on a stock exchange comes with significant benefits, such as access to additional equity and increased visibility for the company (Kim and Weisbach 2008; Bancel and Mittoo 2009; Bharath and Dittmar 2010; Ewens and Farre-Mensa 2020, 2022). However, it also entails compliance and enforcement costs, as companies have to comply with various regulatory requirements and financial reporting standards. These costs have been increasing in recent years, with more stringent regulations being implemented in response to financial scandals and market disruptions, particularly within the European Union as well as the USA (Berninger et al. 2018; Enriques and Volpin 2007; Hopt 2015; Hostak et al. 2013; Martinez and Serve 2017; Lattanzio et al. 2023) which might lead to a reevaluation of the listing benefits over costs and reconsidering the decision being listed, with a decline of listed firms of about 50% since 1996 in the US (Eckbo and Lithell 2022). Given that the decision to delist or downlist impacts a company's ability to raise additional equity, access liquidity, and maintain market visibility, it necessitates thorough evaluation. Nevertheless, a large number of European corporates (e.g. between 2005 and 2016, approx. 2,500 delistings were identified for 13 large European stock markets by Berninger et al. (2018) and US firms have withdrawn their listings over the last decades (Doidge et al. 2017; Kahle and Stulz 2017). These declining listing numbers led to extensive research on the 'listing gap', which focused primarily on the causes and consequences (Doidge et al. 2017; Eckbo and Lithell 2022; Lattanzio et al. 2023). Besides, delisting decisions also challenge the objectives of the recent EU Listing Act, which is intended to simplify stock market access, particularly for SMEs, and to simplify the post-admission obligations, making a listing more attractive. It is this very aspect that is being opposed by rising compliance and enforcement costs.

On the other hand, enforcement and compliance requirements are an essential aspect of maintaining financial market integrity, especially to ensure investor protection and foster price transparency (Austin 2017). However, these requirements also impose significant costs on companies, particularly those listed on regulated markets. In Germany, the financial reporting enforcement system has recently undergone significant changes with the Act to Strengthen Financial Market Integrity, which raised the issue of financial reporting enforcement in Germany back into public debate. The reorganization was prompted by the failure of the previous two-tier procedure in the 'Wirecard Case', raising concerns about the effectiveness of the enforcement system (Peters-Olbrich 2022)

Consequently, the question arises to what extent rising enforcement costs are of relevance in delisting and downlisting decisions as regulators strive to balance incentives for stock market listings and financial market integrity. In addition, companies may engage in earnings management to avoid regulatory scrutiny or to meet market expectations. However, earnings management may also trigger enforcement proceedings as a strong connection to the improper application of accounting standards can be presumed since previous literature identified it as an applied instrument prior to fraud (Ettredge et al. 2010; Perols and Lougee 2011; Rahman et al. 2016; Md Nasir et al. 2018). Thus, enforcement could increase even more.

While previous studies have explored factors like size, profitability, or liquidity (Martinez and Serve 2017) influencing delisting and downlisting decisions, the role of enforcement costs and their impact on these decisions has been relatively underexplored, in particular for the European listing environment. This paper seeks to fill this gap by examining the influence of enforcement costs on the decision to delist or downlist, shedding light on an important but often overlooked aspect of the cost-benefit trade-off of being listed. Additionally, since previous studies have often treated all listed companies uniformly without considering the potential heterogeneity in regulatory exposure. This study differentiates between companies listed on various market segments at Deutsche Börse<sup>1</sup> to examine how different levels of regulation may impact delisting and downlisting decisions. Moreover, while earnings management has been extensively studied in the context of financial reporting and corporate governance, its specific role in delisting and downlisting decisions has not been comprehensively explored. We also contribute to the literature by investigating the extent to which earnings management is utilized as a strategy prior to delistings and how it may influence companies' decisions to delist or downlist as increased earnings management activities may lead to more complex financial statements, necessitating more extensive and costly external audits by independent auditors to ensure compliance with accounting standards and regulations or even trigger costly investigation by enforcement authorities.

Our study focuses on delistings and downlistings from 2004 to 2021 in Germany. To capture the different regulatory requirements the companies were exposed to before the decision, we differentiate between the individual market segments on which the

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<sup>1</sup> Deutsche Börse distinguishes between the Prime Standard, the General Standard and the so-called Regulated Unofficial Market, which each come with different regulatory requirements for constituents.

companies were listed before the decision. We apply logistic regression and use published accounting errors from the Federal Gazette (Bundesanzeiger), which have to be published once the enforcement authorities have identified material errors in the financial reporting of a company, to reflect the particular involvement with the enforcement system and the costs induced as a result. We further address the recurrent involvement with the enforcement system for companies that repeatedly had errors in their financial statements within a specific timeframe.

Our results suggest that single error announcements do not appear to significantly encourage a delisting or downlisting decision, and thus, concerning downlistings, they deviate from the results of Hitz et al. (2020), whose results suggest such a relationship, although the results could differ due to different dataset compositions and the definition of the error announcement variable. However, our results do not indicate that compliance and enforcement costs have an insignificant impact on the cost-benefit trade-off. Rather, we argue that our findings imply that the enforcement process exerts substantial financial burdens on firms instead of the error announcement itself since after the disclosure the costs have already been incurred and paid. At the same time, our results suggest that another subsequent exposure to the enforcement system, causing high enforcement costs to reoccur, eventually induces a delisting decision. In addition, we find mostly significant results inducing a more extensive use of earnings management prior to delistings, concluding that it might be used to improve the image of the company's financial standing, reduce the possibility of involuntary delisting, which helps to protect both the reputation of the company and the value of its shares, and to preserve the option to rather lead the company into an ordered delisting (Teoh et al. 1998; Yang 2006; Leuz et al. 2008; Cornanic and Novak 2015).

Overall, our study contributes to the literature on the cost-benefit trade-off of being listed and the decision to delist or downlist (Martinez and Serve 2017; Bessler et al. 2022) by analyzing the impact of enforcement costs using a unique proxy that has not yet been used for delistings in Germany as well as examining the role of earnings management as a potential trigger for enforcement activities. Our findings have important implications for regulators and policymakers, as they highlight the need to balance the costs of enforcement and compliance with the benefits of maintaining market integrity.

The remainder of the paper is organized as follows. Section 2 provides a short description of the stock market environment, the different market segments, and the enforcement

mechanism in Germany. Section 3 summarizes the literature on the cost-benefit trade-off and delisting or downlisting decisions with a focus on regulatory requirements and earnings management. Section 4 outlines the research design and motivates the variables of interests and controls. Section 5 describes the preparation of our sample and provides descriptive statistics. Section 6 presents the results and robustness checks, followed by a discussion of our findings in section 7. Section 8 concludes.

## **2. Stock market environment and the enforcement mechanism in Germany**

In general, the overall German stock market is categorized into EU-regulated and non-regulated markets, with varying compliance and regulatory requirements. The regulated market has higher requirements, such as compliance with a corporate governance code, quarterly reporting, and mandatory disclosure of director's dealings<sup>2</sup> (Hitz et al. 2012; Bessler et al. 2022), which is costly for companies (Iliev 2010; Leuz and Wysocki 2016). Moreover, and especially notable regarding our analysis is that only companies listed on the regulated market are subject to the enforcement system. The by far most important and widely known German stock exchange, the Frankfurt Stock Exchange, additionally separates the regulated market into two segments, *Prime Standard* and *General Standard*. These segments are each characterized by different listing requirements, with the Prime Standard having the highest requirements. Whereas the General Standard imposes only the minimum requirements mandated by the European Union (EU) and initial listing requirements are the same for both segments, notable distinctions arise in the ongoing obligations. Specifically, the Prime Standard necessitates e.g. quarterly financial reporting, mandates a minimum of one annual analyst conference, and enforces the maintenance of a corporate calendar with regular updates. Moreover, all disclosures and ad-hoc announcements are required to be presented in German and English (Bessler et al. 2021).

Since the non-regulated market is explicitly not subject to the enforcement system, companies can therefore avoid it both by delisting and downlisting. A 'real' downlisting is commonly referred to as a transfer from the regulated to the non-regulated market (Leuz et al. 2008; Berninger et al. 2019). As explained later, we also consider a segment change

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<sup>2</sup> The list of requirements is exemplary, as within the regulated market the requirements differ for the individual market segments. For example, quarterly reporting is only mandatory in the Prime Standard of the Frankfurt Stock Exchange. Detailed information for the segments of the various stock exchanges is provided by the respective stock exchanges.

from Prime Standard to General Standard, as this also reduces the requirements and thus the costs, although the company is still subject to the enforcement system.

The financial reporting enforcement system in Germany was recently<sup>3</sup> reorganized as part of the Act to Strengthen Financial Market Integrity due to its often criticized role in the Wirecard case. The previous two-tier system, with the German Financial Reporting Enforcement Panel (Deutsche Prüfstelle für Rechnungslegung) serving as the first tier and BaFin as the second tier, has been replaced by a new system in which BaFin has sole responsibility (Federal Financial Supervisory Authority 2022). As a result, the BaFin is now responsible for both ad hoc and sampling examinations of financial reports and also has more competencies than before. However, the fundamental aspect of the sanctioning mechanism has remained basically unchanged. The foundation of the sanctioning is still based on the disclosure of identified errors in financial reports by the companies. All disclosures are also available in the Federal Gazette (Bundesanzeiger). This mechanism is often referred to as the "naming and shaming" approach, as market participants are informed of the situation and may act accordingly (Hitz et al. 2012).

### **3. The decision to voluntary delist or downlist**

#### **3.1. Overview and the cost-benefit trade-off**

The worldwide decreasing number of listed firms in the last decades, often referred to as the 'listing gap' (Doidge et al. 2017; Kahle and Stulz 2017; Eckbo and Lithell 2022; Lattanzio et al. 2023) has been the subject of several studies examining the reasons for delisting decisions in terms of various aspects and with a focus on different markets. The analysis of delisting decisions with regard to the underlying reasons first requires differentiation between voluntary and involuntary delistings. For our study, we define voluntary delistings using the terminology of Macey et al. (2008), Leuz et al. (2008), Kashefi Pour and Lasfer (2013), and Martinez and Serve (2017). Thus, a voluntary delisting occurs when a listed company has merged with another company or when the delisting was preceded by a public takeover offer. Generally, it could also be described as the company's decision rather than the decision of the stock market authority. Consequently, it is an involuntary delisting if the decision was not made by the company but by a third party. Specifically, if the decision was made by the stock exchange because

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<sup>3</sup> The "Gesetz zur Stärkung der Finanzmarktintegrität" (Act to Strengthen Financial Market Integrity) took effect in full on 1 January 2022.



the company does not meet the listing requirements or is in insolvency, financial restructuring, or liquidation. Since we refer to voluntary delistings in our analyses, we similarly limit the literature review to studies on voluntary delistings and their causes. Since, according to existing literature, the downlisting (respectively going dark) decision is also essentially driven by the same reasons, we also include the related studies on downlistings in this section.

A major aspect that has been addressed in several studies is weighing the benefits and costs of being public (Bessler et al. 2022; Martinez and Serve 2017). The basic assumption is that if the costs of being public exceed the benefits of the listing, companies will decide to delist. The benefits of a listing include several aspects. First and foremost, it provides access to capital and liquidity, which can be summarized as financial flexibility, as examined by Kim and Weisbach (2008), Pagano et al. (1998), Bancel and Mittoo (2009), Amihud and Mendelson (1988), Bharath and Dittmar (2010), among others. On the other hand, the benefits of a listing are accompanied by listing costs. For example, DeAngelo et al. (1984) and Lehn and Poulsen (1989) name the costs as a major reason for withdrawing from the stock exchange. Listing fees, trading costs, and stockholder servicing costs or agency costs are regularly named in this context. Furthermore, compliance costs and tax incentives have to be considered in the cost-benefit trade-off (Leuz et al. 2008; Lehn and Poulsen 1989; Marosi and Massoud 2007; Jensen 1986).

As presented so far, the research on the cost-benefit trade-off involves various aspects. Several studies focus on some of these aspects in particular and examine them based on different markets, using different market and accounting variables. Subsequently, the hypotheses investigated in this research area are reviewed, starting with hypotheses on various financials.

### **3.2. Financials**

The first hypothesis is the size hypothesis, which suggests that smaller firms are more likely to delist than larger firms when costs outweigh the benefits of being listed. Since high costs are a greater burden on smaller companies, they are consequently more likely to delist if costs increase or benefits decrease, especially since larger companies benefit from fixed cost depression, which enables them to better absorb listing costs (Buzby 1975; Firth 1979; Chow and Wong-Boren 1987; Cooke 1992; Wallace et al. 1994; Raffournier 1995; Zarzeski 1996; Naser et al. 2002; Alsaeed 2006). Overall, the studies

provide persuasive evidence for this hypothesis, both for the USA (Kim and Lyn 1991; Opler and Titman 1993; Kieschnick 1998; Engel et al. 2007; Leuz et al. 2008; Bartlett 2009), the UK (Weir et al. 2008; Aslan and Kumar 2011; Kashefi Pour and Lasfer 2013) and for continental Europe (Martinez and Serve 2011; Thomsen and Vinten 2014; Bessler et al. 2022). In addition, various studies have been directed at the company performance hypothesis, suggesting that unprofitable companies are more likely to delist, as delisting reduces explicit and implicit listing costs (Bessler et al. 2022), and managers might want to disguise poor future prospects and/or financial distress by delisting (Leuz et al. 2008). Supporting evidence is provided by Leuz et al. (2008), Martinez and Serve (2011), Kashefi Pour and Lasfer (2013), Thomsen and Vinten (2014), Hansen and Öqvist (2015), Doidge et al. (2017), and Bessler et al. (2022). Additionally, the probability of delisting increases if the company is undervalued, as financing new projects using equity is less attractive and, in this case, managers can derive greater benefit from going private transactions (Maupin et al. 1984; Myers and Majluf 1984; Kim and Lyn 1991; Opler and Titman 1993; Weir et al. 2005b; Renneboog et al. 2007; Bharath and Dittmar 2010; Geranio and Zanotti 2012; Croci and Del Giudice 2014; Thomsen and Vinten 2014; Bessler et al. 2022). Similarly, the probability of delisting increases with lower stock liquidity, as the benefits of being listed decrease with lower visibility for investors (Engel et al. 2007; Bharath and Dittmar 2010; Mehran and Peristiani 2010; Martinez and Serve 2011; Achleitner et al. 2013; Kashefi Pour and Lasfer 2013; Bessler et al. 2022). Moreover, higher leverage is associated with a greater probability of delisting, as companies could not benefit from the listing in terms of raising equity. While the results of Leuz et al. (2008) and Bessler et al. (2022) do not completely confirm this hypothesis, it is supported by the results of Bharath and Dittmar (2010), Mehran and Peristiani (2010), Aslan and Kumar (2011), Kashefi Pour and Lasfer (2013), and Balios et al. (2015). Studies on delistings also examine the reduction of agency costs by delistings, commonly referred to as the free cash flow (FCF) hypothesis, which suggests that agency costs arise from management's use of FCF for unprofitable projects with a negative net present value to pursue managerial objectives that may conflict with shareholder interests. While there are mixed results for the USA (Maupin et al. 1984; Lehn and Poulsen 1989; Kim and Lyn 1991; Opler and Titman 1993; Servaes 1994; Kieschnick 1998; Halpern et al. 1999; Marosi and Massoud 2007; Leuz et al. 2008; Bharath and Dittmar 2010; Doidge et al. 2010; Chaplinsky and Ramchand 2012), the UK and continental Europe studies show more consistent results that mainly reject this hypothesis (Weir et al. 2005a, 2005b; Renneboog et al. 2007; Andres et al. 2007;

Geranio and Zanotti 2012; Kashefi Pour and Lasfer 2013; Weir and Wright 2006; Aslan and Kumar 2011; Thomsen and Vinten 2014; Achleitner et al. 2013).

### **3.3. Regulatory requirements, compliance and enforcement costs**

Another strand of literature focused on the impact of regulatory requirements on the delisting decision. Regulatory requirements for public companies, dealing with enforcement activities by authorities, and the resulting compliance costs may cause the balance between the benefits and costs of a listing to shift. High or rising compliance costs, especially in the event of regulatory changes, are often considered to be a significant driver of delistings. This applies in particular to the U.S. market, which has been thoroughly examined and discussed in terms of the significance of the enactment of the Sarbanes-Oxley Act (SOX) in 2002. Nevertheless, the related studies do not allow a final conclusion to be drawn, leading Martinez and Serve (2017) to conclude that the debate on the impact of SOX on delistings is still ongoing. Thus, Marosi and Massoud (2007), Leuz et al. (2008), and Hostak et al. (2013) conclude that SOX and the related compliance costs had a material impact on the delisting decision.<sup>4</sup> This applies in particular to small, less liquid, poorly performing companies, for which compliance costs are particularly challenging (Engel et al. 2007). Simultaneously, various studies question this finding and provide alternative explanations for the increased number of delistings after the enactment of SOX or highlight the positive effects of SOX (Leuz 2007; Bartlett 2009; Gao et al. 2013; Coates and Srinivasan 2014; Doidge et al. 2017). This discussion was also addressed for continental European markets. As an alternative to SOX, reference was made in particular to the extent of corporate governance regulation (Thomsen and Vinten 2014) or the enactment of other national regulatory changes (Martinez and Serve 2011), essentially confirming the hypothesis (Berninger et al. 2018). In addition to compliance costs in general, the impact of the mandatory adoption of IFRS on the delisting decision was also subject of various studies regarding the European markets. The results of the studies coincide substantially and describe delisting as a consequence of increased compliance costs due to IFRS (Vulcheva 2011; Brüggemann et al. 2013; Hitz and Müller-Bloch 2016; Gutierrez et al. 2017; Hitz et al. 2020). Specifically, Hitz et al. (2020) analyzed the effect of error announcements on downlistings of German companies and found that

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<sup>4</sup> Bessler et al. (2012) and Chaplinsky and Ramchand (2012) analyzed the relation between SOX and cross-delistings and consider it to be equally significant.

censured companies are more likely to downlist, supporting the argument that enforcement actions increase the cost of a listing.

### **3.4. Earnings management prior to delistings or downlisting**

Apart from the factors influencing the delisting decision, there is only scarce literature on earnings management in the context of delistings. While the literature has identified various incentives, such as bonus targets, stock-based compensation, pending regulatory changes, as well as budget expectations and earnings forecasts, that drive managers and companies to engage in earnings management (Hall and Stammerjohan 1997; Kasznik 1999; Dechow and Skinner 2000; Saleh and Ahmed 2005; Petrovits 2006; Campbell et al. 2015), delisting as another incentive, in particular, has received little attention. In addition, corresponding studies focus mainly on involuntary delistings. Thus, Yang (2006) analyzed companies at risk of involuntary delisting and argued that they have incentives to manipulate their share prices through earnings management. Similarly, Cornanic and Novak (2015) identified higher performance-adjusted discretionary accruals for companies at risk of involuntary delisting. Besides, Campbell et al. (2015) compared the use of earnings management prior to involuntary and voluntary delistings. They found that companies engage more in earnings management prior to an involuntary delisting than companies do before a voluntary delisting, arguing that earnings management is used to delay or stop the threat of an upcoming involuntary delisting. In their analysis of voluntary delistings, Leuz et al. (2008) find that delisted companies have higher accruals, with their results robust to different methods of measuring earnings management. For the Athens Stock Exchange, Yiannoulis (2019) likewise analyzed the impact of earnings management on the probability of delisting and found a significant positive correlation, using the Beneish M-score (Beneish 1999) as a measure of earnings management. Data and descriptive statistics

### **4. Sample construction**

Since we examine delistings, downlistings, and the change from Prime Standard to General Standard, we use different matched sub-datasets for our analyses. The different datasets cover different scenarios and differentiate between the segments in which the companies were listed before their decision for delisting or downlisting. All sub-datasets derive from our initial dataset according to the scenarios under consideration. The initial dataset comprises all companies listed in Germany, including potential delisting and

downlisting dates, irrespective of the stock exchange segment. We included various data sources to create this dataset, which spans from 2004 (the year after Deutsche Börse's resegmentation) to 2021. In 2003, Deutsche Börse underwent a reorganization of its market segments, with the introduction of the Prime Standard and General Standard with staggered listing requirements (Bessler et al. 2022).

First, the dataset is based on information kindly provided by Deutsche Börse. The lists provided contained the companies listed in the different listing segments of the Frankfurt Stock Exchange (Prime Standard, General Standard, Entry Standard, or Scale/Open Market) at the end of each year from 2012 to 2021. Companies that had multiple share classes listed were removed in a further step and only included once. As a second data source, we used the manually collected list of error announcements from the Federal Gazette (Bundesanzeiger). Missing companies were added to the dataset. Since companies listed in other regulated markets in Germany are also subject to enforcement and thus error announcements have also been issued for those companies, the dataset contains a few companies that were not listed on Deutsche Börse or were not listed during the entire period. As we distinguish in our analyses between the segments from which delisting and downlisting (as well as segment changes from Prime Standard to General Standard) took place, we require information on the listing segment in the entire observation period in order to consider potential changes prior to 2012. To extend the dataset back to 2003, we first manually researched ad-hoc announcements, press articles, annual reports, and other information for the companies in the dataset to identify the segments they were listed in from 2003 to 2011. To include companies delisted before 2012 in the dataset, public information from the trading venue of Deutsche Börse, Xetra, was used as a third data source. Xetra publishes information on its homepage about when a company was admitted to trading, when it changed its listing segment, or when it was delisted. Companies that were not yet included in the dataset were included based on this information. To validate the segment changes or delistings of all companies that have ever been listed in the Prime Standard, we used the constituent list of the “Prime All Share Index” from Deutsche Börse as the fourth data source.

As our analysis refers to German companies and essentially to delisting and downlisting decisions, we removed foreign companies (identified by non-German ISINs) and companies that were exclusively listed on “Freiverkehr”. In total, this provides us with a

dataset of 863 companies for which we can track the listing segment at the end of each year from 2003 to 2021. This allows us to identify down- and delistings.

We created different matched sub-datasets that differ in terms of the segments in which the companies were listed at the time of the event (delisting, downlisting to Freiverkehr, change from Prime Standard to General Standard). This allows us to investigate potential differences in motives for delisting or downlisting that may be related to the regulatory requirements prevalent in the listing segment before the event. To determine the treatment groups of the partial datasets, we identify the companies that had a respective event (voluntary delisting or downlisting) in one year and meet the definition of the partial dataset with regard to the initial segment. We do not consider delisted or downlisted companies that have filed for insolvency prior to the event in order to analyze only voluntary delistings and downlistings. Exemplary, all companies are identified for one dataset that have delisted directly from the Prime Standard. Table 1 summarizes the definition of the treatment groups of each dataset.

### **Matching procedure and control sample**

To obtain the control group of each dataset, we use a matching algorithm that is based on the algorithms applied e.g. by Achleitner et al. (2013), Klein and Zur (2009), Weir et al. (2005a), or North (2001). We use a matching approach due to the definition of the dummy variable for error announcements, which equals one if an error announcement by the enforcement authority occurred at most 3 years before the delisting or downlisting event, respectively the corresponding matching year. In principle, only companies that meet the same conditions as the treatment group, with respect to the analyzed segment(s), are used as the control group. This ensures that the companies compared are subject to the same regulatory requirements and that the results are not biased by any regulatory differences. In contrast to Achleitner et al. (2013), Klein and Zur (2009), Weir et al. (2005a), and North (2001) who identified just one match for each observation of the treatment group, we assign two observations from the control group to each observation from the treatment group. Similar to their approaches, as the next step we identify companies of the same industry based on SIC codes. Finally, we use companies whose sales of the year prior to the event are closest to the observation of the treatment group as matched companies. Additionally, we use exclusively companies that have not been delisted or downlisted in the period from 2003 to 2021 for matching.

As emphasized above, we create different sub-datasets based on listing segments, which represent different regulatory requirements, to analyze the impact of enforcement on delisting and downlisting decisions that may differ depending on the severity of the requirements. Table 1 summarizes the definitions of the treatment and control groups for each dataset included in our analyses.

#	Treatment group	Control group	Size
1	Delisted companies, independent of the segment they delisted from	Companies without delisting	531
2	Companies delisted from the regulated market	Companies listed in the regulated market without delisting	435
3	Companies delisted from Prime Standard	Companies listed in the Prime Standard without delisting	195
4	Companies delisted from General Standard	Companies listed in the General Standard without delisting	249
5	Downlisted companies, independent of the segment they delisted from	Companies without downlisting	198
6	Companies downlisted from Prime Standard	Companies listed in the Prime Standard without downlisting	72
7	Companies downlisted from General Standard	Companies listed in the General Standard without downlisting	105
8	Segment change from Prime Standard to General Standard	Companies listed in the Prime Standard without segment change	225

This table shows the different datasets included in our analyses. These differ in the segment in which the companies were listed before a delisting or downlisting. Dataset #1 also contains delistings of companies that were listed on the Open Market prior to delisting. This is because companies were also included that downlisted to the Open Market prior to delisting during the sample period from 2003 to 2021. Dataset #2 excludes these companies.

Table 1: Definition of sub-datasets

## 5. Methodology

Our analysis consists of several stages. In the first step, we run a logit regression for the subsets of data presented in section 7.1 as a baseline. In order to examine factors influencing the delisting or downlisting decision, we define the dependent variable as a dummy variable that equals 1 if the company has either delisted or downlisted in the corresponding year. To evaluate the impact of compliance or, more specifically, enforcement costs on the probability of delisting and downlisting, we use the error announcements made by the FREP. We argue that enforcement costs arise from a disclosed accounting error that may lead the management to re-evaluate the decision of the listing. Our argument thus joins the discussions on the consequences of regulatory changes, such as the enactment of the SOX (Engel et al. 2007; Leuz 2007; Marosi and Massoud 2007; Leuz et al. 2008; Bartlett 2009; Gao et al. 2013; Hostak et al. 2013; Coates and Srinivasan 2014; Doidge et al. 2017; Martinez and Serve 2017), other national

regulatory changes (Martinez and Serve 2011; Thomsen and Vinten 2014; Berninger et al. 2018) or the mandatory introduction of IFRS (Vulcheva 2011; Brüggemann et al. 2013; Gutierrez et al. 2017; Hitz et al. 2020) with previously mixed results, some finding a link and others do not find such impact on listing decisions. These studies are all mainly based on the premise that these events increase the costs of being listed and thus outweigh the benefits of listing, resulting in a company's decision to delist or downlist to mitigate costs of regulatory requirements. To examine this, we include a dummy variable that equals 1 if the company of the treatment group or the matched companies were subject to an error announcement in the three years preceding the year under consideration. We use a maximum time lag of 3 years to cover delays in the execution of the delisting or downlisting decision due to strategic, regulatory, or organizational reasons, and simultaneously to ensure temporal coherence.

Additionally, in the context of delistings, we examine the extent to which multiple error announcements in this 3-year window affect delisting and downlisting decisions. Moreover, our analysis considers various characteristics of the error announcements, which are described in Table 2, to potentially provide a more nuanced understanding of the effects of the nature of the error announcements on delisting and downlisting decisions.

As already outlined, error announcements publicize errors in companies' financial statements. It can therefore reasonably be assumed that the reported errors relate to cases in which companies have attempted to exert influence by means of earnings management and exceeded limits, which was accordingly sanctioned by the authorities. This assumption is in line with existing literature, finding earnings management to be an applied instrument prior to fraud (Ettredge et al. 2010; Perols and Lougee 2011; Rahman et al. 2016; Md Nasir et al. 2018). In addition, earnings management may be used prior to delistings and downlistings to mask financial distress and mitigate the risk of involuntary delisting, as well as to preserve the manager's reputation and the company's share value (Teoh et al. 1998; Yang 2006; Leuz et al. 2008; Cornanic and Novak 2015), whereas this reasoning could be applied to voluntary delistings. Due to the link between reporting errors and earnings management, we include a proxy for earnings management. To address and analyze the use of earnings management in advance of delistings and downlistings in our baseline model, we use performance-adjusted discretionary accruals,



a model by Kothari et al. (2005), which is originally based on the Jones-model (Jones 1991) and went through several stages of further development.

Aside from the variables of interest, we include various control variables to control for other factors that encourage a delisting or downlisting decision in our models. These are various balance sheet ratios and capital market indicators. Firstly, we include the free float as an explanatory variable, which reflects the higher complexity of a delisting process as the free float increases. Listing provides numerous advantages such as low cost of capital raising and greater visibility to a broad investor base. Besides investors, the benefits of visibility also relate to the attractiveness for analysts, potential new employees, and customers and suppliers (Bolton and Thadden 1998; Bancel and Mittoo 2001, 2009; Amihud 2002; Boot et al. 2006, 2008; Mehran and Peristiani 2010). Since share liquidity is often named in the context of visibility, the hypothesis arises that a higher probability of delisting follows from limited share liquidity (Engel et al. 2007; Bharath and Dittmar 2010; Martinez and Serve 2011; Achleitner et al. 2013; Kashefi Pour and Lasfer 2013; Bessler et al. 2022). We evaluate these benefits and control for the incentive for delisting or downlisting in case of little share liquidity by including turnover by volume. To mitigate extreme values and assuming a non-linear correlation, we apply the natural logarithm. We further control for the company performance hypothesis using Return on Assets (ROA). As noted by Leuz et al. (2008), Martinez and Serve (2011), and Bessler et al. (2022), this decision serves to reduce or eliminate explicit and implicit listing costs. Additionally, Leuz et al. (2008) argue that managers want to disguise poor future prospects and/or financial distress by delisting. In this regard, it has to be emphasized that Engel et al. (2007) argue that costs from regulatory requirements are particularly challenging for poorly performing companies. Following this reasoning, companies with poor performance are therefore assumed to have a greater probability of delisting. As outlined above, financial flexibility is one of the key benefits of a stock market listing. To be able to finance further growth and new projects at attractive conditions using new equity, the company needs a high or at least appropriate valuation. Consequently, if the company is undervalued, the costs of listing may exceed the benefits that favor the decision to delist. At the same time, greater gains are to be achieved by means of going private transactions for managers if the company is undervalued. This may also encourage the decision to delist (Myers and Majluf 1984; Kim and Lyn 1991; Renneboog et al. 2007; Bessler et al. 2022). Therefore, we incorporate TobinsQ as a proxy for market

valuation to control for the potential incentive to delist or downlist resulting from undervaluation. Additionally, we use the time since the IPO (*ipoage*), as the delisting or downlisting decision may be less straightforward for companies that have been established on the capital market for a long time and have a long trading record (Espenlaub et al. 2016).

Since access to equity is a key benefit of a listing for companies that may have limited access to other financing due to high leverage (Kim and Weisbach 2008), we control for the capital structure of companies in the context of a delisting and downlisting. It is argued that companies have higher leverage prior to a delisting because they failed to reduce their leverage after the IPO by not raising additional equity and thus could not take advantage of the benefits of the listing. Moreover, leverage might be at a high level due to unprofitability (Bancel and Mittoo 2009; Kashefi Pour and Lasfer 2013). To address this in the model, we include leverage as the last control variable.

Finally, this results in the following baseline model:

$$(1) De - / Downlisting_{i,t} = \beta_0 + \beta_1 error\_ann_{i,t-1/2/3} + \beta_2 kothari\_mod_{i,t-1} + \beta_3 freefloat_{i,t-1} + \beta_4 ln\_turnover_{i,t-1} + \beta_5 roa_{i,t-1} + \beta_6 TobinsQ_{i,t-1} + \beta_7 ipoage_{i,t-1} + \beta_8 leverage_{i,t-1} + \varepsilon_{i,t}$$

All variables described are lagged by one year, except the variables related to error announcements, as these do not relate to the reporting date or the fiscal year. To ensure the strength and reliability of our findings, we subject our results to robustness tests across multiple dimensions, which we elaborate on in section 7.2. Using these tests, we aim to provide further support and credibility to our conclusions and enhance the overall robustness of our analysis. Since matches are selected exclusively from the same years for our matching approach, there is no need to additionally control for year-fixed effects in the regression analyses.

## 6. Descriptive statistics

In this section, we present descriptive statistics for all variables included in our analyses. Initially, Table 2 shows an overview of the variables including the data sources. The relevance and reasoning behind selected variables are detailed in section 5.

## Delistings and Downlistings

Variable	Definition	Data source
De- / Downlisting	Dummy variable that equals one if the company delisted or downlisted in the respective year	Information provided by Deutsche Börse to the authors, Refinitiv Worldscope / Datastream, hand-collected ad-hoc announcements, and company information
error_ann	Dummy variable that equals one if an error announcement by the enforcement authority occurred at most 3 years before the delisting or downlisting event	Hand-collected error announcements from the Federal Gazette (Bundesanzeiger)
multiple_errors	Dummy variable that equals one if multiple independently issued error announcements by the enforcement authority occurred at most 3 years before the delisting or downlisting event	Hand-collected error announcements from the Federal Gazette (Bundesanzeiger)
auditduration	Duration of the audit by the enforcement authority in days	Hand-collected error announcements from the Federal Gazette (Bundesanzeiger)
errorcount	Total number of reported errors in the error announcement	Hand-collected error announcements from the Federal Gazette (Bundesanzeiger)
finstatements	Dummy variable that equals one if at least one reported error relates to the financial statements (and not all to the notes or the group management report)	Hand-collected error announcements from the Federal Gazette (Bundesanzeiger)
resultimpact	Dummy variable that equals one if at least one reported error affects the company's net income	Hand-collected error announcements from the Federal Gazette (Bundesanzeiger)
kothari_mod	Proxy for earnings management calculated based on performance-adjusted discretionary accruals (Kothari et al. 2005)	Author's calculation based on data from Refinitiv Worldscope / Datastream
mod_jones_mod	Alternative proxy for earnings management (Dechow et al. 1995)	Author's calculation based on data from Refinitiv Worldscope / Datastream
freefloat	Percentage of total shares that are not restricted and can be publicly traded	Refinitiv Worldscope /Datastream
ln_turnover	Natural logarithm of the total number of traded shares over the year	Refinitiv Worldscope /Datastream
roa	Net income divided by total assets	Refinitiv Worldscope /Datastream
tobinsQ	Total liabilities plus market value of equity minus book value of equity divided by total assets	Author's calculation based on data from Refinitiv Datastream
ipoage	Years since the IPO	Refinitiv Worldscope /Datastream
leverage	Total liabilities divided by the book value of equity	Refinitiv Worldscope /Datastream

Table 2: Description of variables

To enhance clarity, we solely focus on datasets #1 and #5, which comprise all delisted (#1) and downlisted (#5) companies, without distinguishing between the original segments. Table 3 shows the comparison of the variables for dataset #1, which encompasses all delisted firms and their control group, and Table 4 presents the data for dataset #5, which includes all downlisted firms and their control group. For each variable shown in the tables, we report the test results using t-test, Wilcoxon-Mann-Whitney test, and Mood's median test. Given the non-normal distribution of the variables<sup>5</sup>, we determine the Wilcoxon-Mann-Whitney (ranksum) test as the more appropriate method for comparing the means.

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<sup>5</sup> All of the variables shown in Table 3 and Table 4 are not normally distributed according to the Shapiro-Wilk test at a 1% significance level.

## Delistings and Downlistings

Variables	Delisted companies			Matching Group			Difference in mean			Difference in median	
	N	mean	median	N	mean	median	mean dif	t-Test	ranksum Test	median dif	median-Test
error_ann	177	0.085	0.000	354	0.082	0.000	0.003			0.000	
auditduration	177	83.723	0.000	354	64.995	0.000	18.728			0.000	
errorcount	177	0.447	0.000	354	0.317	0.000	0.130			0.000	
finstatements	177	0.124	0.000	354	0.093	0.000	0.031			0.000	
resultimpact	177	0.102	0.000	354	0.071	0.000	0.031			0.000	
kothari_mod	177	0.137	0.100	354	0.144	0.050	-0.007		***	0.050	***
mod_jones_mod	177	0.135	0.102	354	0.134	0.048	0.001		***	0.054	***
freefloat	177	25.390	11.000	354	57.712	55.500	-32.322	***	***	-44.500	***
In turnover	177	4.131	4.265	354	5.841	5.874	-1.710	***	***	-1.609	***
roa	177	-0.019	0.021	354	0.014	0.034	-0.033	*	**	-0.013	*
tobinsq	177	2.126	1.525	354	1.925	1.344	0.201		***	0.181	***
ipoage	177	16.803	15.000	354	16.686	15.000	0.117			0.000	
leverage	177	1.345	0.959	354	-0.245	1.020	1.590			-0.062	

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

Table 3: Descriptive statistics of delisted companies vs. matched companies (dataset #1)

## Delistings and Downlistings

Variables	Downlisted companies			Matching Group			Difference in mean			Difference in median	
	N	mean	median	N	mean	median	mean dif	t-Test	ranksum Test	median dif	median-Test
error_ann	66	0.197	0.000	132	0.167	0.000	0.030			0.000	
auditduration	66	160.757	0.000	132	107.856	0.000	52.901			0.000	
errorcount	66	1.091	0.000	132	0.545	0.000	0.546	*		0.000	
finstatements	66	0.242	0.000	132	0.174	0.000	0.068			0.000	
resultimpact	66	0.151	0.000	132	0.129	0.000	0.022			0.000	
kothari_mod	66	0.112	0.088	132	0.069	0.044	0.043	***	***	0.044	***
mod_jones_mod	66	0.175	0.111	132	0.116	0.045	0.059		***	0.066	***
freefloat	66	47.560	41.500	132	48.106	48.000	-0.546			-6.500	
In turnover	66	4.077	4.381	132	5.282	5.480	-1.205	***	***	-1.098	***
roa	66	-0.158	0.005	132	0.005	0.021	-0.163	**	**	-0.016	
tobinsq	66	1.447	1.143	132	1.443	1.205	0.004			-0.062	
ipoage	66	14.621	12.500	132	14.098	13.000	0.523			-0.500	
leverage	66	2.261	0.988	132	3.045	0.822	-0.784			0.166	

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

Table 4: Descriptive statistics of downlisted companies vs. matched companies (dataset #5)

First, it is apparent that delisted firms are not more frequently and severely affected by error announcements as there is no significant difference. The characteristics of such announcements also do not exhibit significant differences between delisted firms and their control group. Furthermore, the comparison of earnings management proxies shows that delisted companies use these instruments more extensively, especially considering the difference in median, which is more robust to outliers. This applies to both, delisted and downlisted companies. In each case, the results of the Wilcoxon-Mann-Whitney test and Mood's median test are significant at the 1% level. T-tests, on the other hand, show no significance.

In Table 3, the comparison shows that delisted firms have a significantly lower free float than their control group which is reasonable in accordance with the German regulations on squeeze-outs as a type of voluntary delisting. Moreover, the results for stock liquidity ( $ln\_turnover$ ) are comparable in Table 3 and Table 4. According to all tests performed, these companies have significantly lower stock liquidity and thus lower visibility in the stock market, resulting in lower attractiveness for investors (Engel et al. 2007; Bharath and Dittmar 2010; Mehran and Peristiani 2010; Martinez and Serve 2011; Achleitner et al. 2013; Kashefi Pour and Lasfer 2013; Bessler et al. 2022). As a result, these companies are unable to sufficiently benefit from the advantages of a listing, which may encourage a delisting or downlisting decision. Additionally, the comparison suggests that delisted and downlisted companies are less profitable as measured by  $ROA$ , indicating that listing costs and costs of regulatory requirements are particularly challenging for such companies, resulting in a delisting or downlisting decision to reduce such costs (Leuz et al. 2008; Martinez and Serve 2011; Kashefi Pour and Lasfer 2013; Thomsen and Vinten 2014; Hansen and Öqvist 2015; Doidge et al. 2017; Bessler et al. 2022). However, while the tests in Table 3 show consistent significance, the significance level is lower. This applies partially also to Table 4 with a non-significant Mood's median test. Besides, delisted companies (Table 3) appear to be valued higher, measured by  $Tobinsq$ , than their control group which is contrary to expectations and the argumentation that a high valuation is required to use the benefits of a listing in terms of raising further equity at attractive conditions to fund new projects (Maupin et al. 1984; Myers and Majluf 1984; Kim and Lyn 1991; Opler and Titman 1993; Weir et al. 2005b; Renneboog et al. 2007; Bharath and Dittmar 2010; Geranio and Zanotti 2012; Croci and Del Giudice 2014; Thomsen and Vinten 2014; Bessler et al. 2022). With exception of the t-test, the comparison shows a

positive as well as significant difference. For the remaining variables, we do not find significant differences.

A comparison of delisted and downlisted companies shows that downlisted companies are on average more frequently subject to error announcements. We also find that, on average, delisted companies make slightly more use of earnings management instruments, according to the Kothari model<sup>6</sup>. In addition, as expected, delisted companies have a lower free float. Besides, downlisted companies are on average less profitable, as measured by ROA.

## **7. Empirical Analysis**

### **7.1. Results**

#### **7.1.1. Delistings**

In this section, we present our baseline logit regression results for the subsets of delisting firms, defined in section 4. Table 5 shows the results.

The results show no evidence for an impact of a single error announcement (and thus the presumably only one-time involvement with the enforcement system), and hence the related enforcement costs, on the probability of delisting. This fits into the literature on the SOX enactment, which does not consider the increased requirements and thus costs for compliance, in a broad sense, to be a major driver of delistings (Leuz 2007; Bartlett 2009; Gao et al. 2013; Coates and Srinivasan 2014; Doidge et al. 2017). It simultaneously contradicts the reasoning of Marosi and Massoud (2007), Leuz et al. (2008), and Hostak et al. (2013), who identify the cost component as a major driver.

Simultaneously, we find that an increased level of earnings management positively affects the probability of delisting in the succeeding year. Except for model 4.1, the results are significant at least at the 5% level. These results extend the literature, as this relation has previously been examined and identified essentially only for involuntary delistings (Teoh et al. 1998; Yang 2006; Leuz et al. 2008; Cornanic and Novak 2015), while managers in the context of voluntary delistings may seek and pursue comparable objectives with earnings management. Besides, our results confirm first evidence from Yiannoulis (2019),

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<sup>6</sup> The methodological approach to quantify the extent to which companies rely on earnings management is described in detail in section 5.



who reported comparable results for delistings on the Athens Stock Exchange investigating voluntary and involuntary delistings at the same time.

For our controls, the results are shown below. As expected, the coefficient of the free float is consistently negative and significant at the 1% level. This reflects the simpler realization of a delisting procedure, also considering the legal requirements if ownership of a company is less widely dispersed. Similarly, the results regarding stock liquidity, quantified by *ln\_turnover*, are in line with expectations. Consistently negative and significant coefficients, with the exception of model 3.1, confirm the findings of previous studies that lower stock liquidity is connected with a decline of the benefits of a listing, such as visibility to a broad investor base and the ability to raise relatively low-cost capital. Moreover, previous findings concerning the impact of a firm's profitability on the probability of delisting are partially confirmed. For models 1.1 and 3.1, we find negative and (partly slightly) significant results for *roa*, supporting the argument that managers want to disguise potential financial distress or poor future prospects by delisting, whereas this does not hold for models 2.1 and 4.1. Whereas the previous results on controls were essentially in line with expectations, our results on the valuation of a company (*tobinsQ*) contradict the expectations. A higher valuation and the resulting possibility of financing future growth on better terms would suggest negative coefficients. However, the results partly show the opposite. Moreover, our results fit into the mixed evidence on the impact of *leverage* on delisting probability. Confirming the findings of Bessler et al. (2022) for the German stock market, we do not find evidence for this relation, which is typically explained by the unused access to equity as a key benefit of being public and which might be a peculiarity of the German market, where debt financing is traditionally more predominant (Antoniou et al. 2008).

Further, we analyze the same datasets but examine the impact of multiple independently issued error announcements on delisting probability (models 1.2, 2.2, 3.2). While the results described earlier are unchanged for the remaining variables, the results suggest that with multiple error announcements, the delisting probability increases, suggesting that multiple confrontations with the enforcement system further increase enforcement costs and favor this decision.

## Delistings and Downlistings

	(1.1)	(2.1)	(3.1)	(4.1)	(1.2)	(2.2)	(3.2)
Variables	Delisting	Delisting	Delisting	Delisting	Delisting	Delisting	Delisting
error_ann	-0.187 (0.378)	0.068 (0.480)	-0.335 (0.679)	0.295 (0.512)			
kothari_mod	0.314** (0.124)	0.771*** (0.252)	2.856** (1.183)	0.157 (0.707)	0.312** (0.123)	0.762*** (0.250)	2.743** (1.108)
freefloat	-0.039*** (0.006)	-0.047*** (0.008)	-0.072*** (0.014)	-0.031*** (0.010)	-0.039*** (0.006)	-0.047*** (0.008)	-0.073*** (0.015)
ln_turnover	-0.384*** (0.073)	-0.319*** (0.087)	-0.120 (0.126)	-0.247*** (0.088)	-0.380*** (0.073)	-0.313*** (0.087)	-0.086 (0.122)
roa	-0.835* (0.506)	0.103 (0.587)	-1.571* (0.939)	0.751 (0.654)	-0.838* (0.502)	0.086 (0.590)	-1.523 (0.936)
tobinsq	-0.009 (0.025)	0.141 (0.091)	-0.186 (0.122)	0.398*** (0.133)	-0.010 (0.025)	0.145 (0.093)	-0.177 (0.122)
ipoage	-0.007 (0.015)	0.003 (0.016)	0.009 (0.026)	-0.034* (0.019)	-0.007 (0.015)	0.004 (0.016)	0.009 (0.026)
leverage	0.003 (0.003)	0.021 (0.049)	0.142* (0.083)	0.003 (0.003)	0.003 (0.003)	0.021 (0.050)	0.155* (0.083)
multipleerrors					2.133*** (0.768)	2.454*** (0.802)	3.168*** (1.033)
Constant	2.889*** (0.499)	2.285*** (0.567)	2.393*** (0.825)	1.257* (0.666)	2.855*** (0.496)	2.245*** (0.561)	2.177*** (0.763)
Observations	531	435	195	249	531	435	195
Pseudo R-squared	0.282	0.329	0.393	0.234	0.283	0.332	0.399

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

*The enumeration of the models follows the systematic 'x.y', where 'x' stands for the used sub-dataset and 'y' consecutively numbers the models for the corresponding sub-datasets.*

Table 5: Baseline models of multivariate analysis of delistings

Summing up, we do not find any evidence that a single error announcement increases the likelihood of delisting. However, we did find that multiple independently issued error announcements do increase the probability of delisting, indicating that the increased enforcement costs associated with multiple errors and audits may be a factor in the decision to delist. Furthermore, our results suggest that earnings management is employed prior to voluntary delistings. In addition, our analyses confirmed the importance of free float, stock liquidity, and profitability in the delisting decision, which is consistent with previous research. However, we found that our results on Tobin's Q were not in line with expectations.

### **7.1.2. Downlistings**

While we previously focused on the delisting decision, we additionally analyze the downlisting decision using similar models. The corresponding results are shown in Table 6. With regard to error announcements, the results are essentially consistent with the observations made in the context of delistings. However, a significant result emerges for the first time for Model 7.1, which examines downlistings from the General Standard. This potentially implies that especially for those companies that are already exposed to lower compliance and enforcement costs due to their segment decision, an error announcement, and related costs, reinforce the intention for a downlisting. Additionally, the results regarding the extent of earnings management are more inconclusive, with significant results in Models 5.1 and 8.1 only.

In addition, differences can be seen in the effect of free float and ROA. While the free float shows consistent significant results for delistings, no significance is found for downlistings. This matches expectations, especially since downlistings do not require that a shareholder holds more than any thresholds to execute squeeze-outs as a type of voluntary delisting. The results for ROA consistently suggest that, as expected, less profitable companies are more likely to consider downlisting to reduce compliance and enforcement costs that further reduce profitability. In the case of such companies, downlisting can serve as a viable alternative, as it allows them to maintain the benefits of regulated share trading while alleviating the strain on their financial performance. Regarding undervaluation, Models 7.1 and 8.1 demonstrate that companies are more likely to downlist from General Standard or change segments when they are undervalued. This finding is consistent with the argument that when companies are undervalued, the potential benefits of raising additional capital through a public offering are reduced, and

as a result, they may seek to minimize their listing costs by transitioning to less regulated segments. Especially when undervalued, managers might tend to cut costs by downlisting or switching segments if listing in a more regulated segment is not properly valued.

Variables	(5.1) Downlisting	(6.1) Downlisting	(7.1) Downlisting	(8.1) Segment change
error_ann	0.569 (0.409)	-2.014 (1.373)	1.299** (0.546)	-0.153 (0.780)
kothari_mod	7.943*** (3.033)	2.823 (4.382)	5.681 (3.501)	7.554*** (2.113)
freefloat	-0.004 (0.006)	-0.008 (0.012)	-0.006 (0.008)	-0.040*** (0.010)
ln_turnover	-0.359*** (0.088)	-0.434** (0.187)	-0.365*** (0.120)	-0.099 (0.095)
roa	-2.297** (1.005)	-1.293** (0.520)	-2.888** (1.202)	-1.658*** (0.635)
tobinsq	-0.139 (0.213)	0.197 (0.296)	-0.423** (0.210)	-0.414*** (0.127)
ipoage	-0.002 (0.022)	-0.013 (0.037)	-0.019 (0.045)	0.011 (0.019)
leverage	-0.020 (0.018)	0.381** (0.148)	0.006 (0.024)	0.040 (0.092)
Constant	0.592 (0.769)	1.166 (1.325)	1.133 (1.099)	1.407* (0.757)
Observations	198	72	105	225
Pseudo R-squared	0.171	0.220	0.206	0.213

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

*The enumeration of the models follows the systematic 'x.y', where 'x' stands for the used sub-dataset and 'y' consecutively numbers the models for the corresponding sub-datasets.*

Table 6: Baseline models of multivariate analysis of downlistings

### 7.1.3. Characteristics of error announcements

Since the scope of error announcements can vary considerably and the number and severity of the detected errors differ, we further analyze the characteristics of error announcements and their relevance for companies' delisting or downlisting decisions. In particular, this is intended to test for a substantial impact of more severe error announcements on these decisions. As described above, we find predominantly insignificant results for the impact of an error announcement in itself on the probability of delisting or downlisting. However, it could be argued that more severe errors also

result in higher follow-up costs and are followed by different decisions. Results are shown in Table 7 and *Table 8* and the following conclusions apply both to delistings and downlistings.

In addition to the number of reported errors, the relation of the error to the financial statements, and the classification of whether the error changes the net profit or loss for the year, we have considered the duration of the FREP's examination. While the results for the control variables remain consistent, our findings on the characteristics of error announcements align with our previous conclusions. Specifically, we do not observe significant effects for the number of errors, the relation to financial statements, or the impact of the error on the net result. These variables collectively serve as proxies for the errors' severity<sup>7</sup>, and the findings apply equally to delistings and downlistings. Furthermore, we find no evidence that the duration of the FREP's examination impacts delisting probability, suggesting that the consequences of enforcement proceedings are similar regardless, especially since the costs are incurred during the process and not with the publication of the error. Thus, our findings, with respect to downlistings, are contrary to the results of Hitz et al. (2020) in this respect as well, who also differentiated comparable characteristics of error announcements in their analyses.

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<sup>7</sup> In essence, our conclusions remain unchanged when examining the proxies individually in separate models.

## Delistings and Downlistings

	(1.3)	(2.3)	(3.3)	(4.2)
Variables	Delisting	Delisting	Delisting	Delisting
auditduration	0.000 (0.001)	0.001 (0.001)	0.000 (0.001)	0.001 (0.002)
errorcount	0.019 (0.099)	-0.099 (0.109)	-0.326*** (0.126)	0.049 (0.161)
finstatements	-0.431 (0.842)	-0.589 (1.162)	2.197 (1.392)	-1.408 (1.468)
resultimpact	0.398 (0.661)	0.895 (0.954)	-0.158 (1.209)	0.862 (1.087)
kothari_mod	0.319** (0.124)	0.749*** (0.262)	2.742** (1.136)	0.186 (0.697)
freefloat	-0.039*** (0.006)	-0.047*** (0.008)	-0.075*** (0.016)	-0.031*** (0.010)
ln_turnover	-0.386*** (0.073)	-0.312*** (0.086)	-0.051 (0.126)	-0.246*** (0.089)
roa	-0.818* (0.495)	0.151 (0.588)	-1.118 (1.069)	0.746 (0.665)
tobinsq	-0.015 (0.027)	0.129 (0.090)	-0.149 (0.119)	0.401*** (0.137)
ipoage	-0.008 (0.015)	0.001 (0.016)	0.009 (0.027)	-0.035* (0.020)
leverage	0.002 (0.003)	0.021 (0.046)	0.180** (0.084)	0.004 (0.003)
Constant	2.886*** (0.500)	2.279*** (0.560)	1.955** (0.767)	1.268* (0.667)
Observations	531	435	195	249
Pseudo R-squared	0.282	0.334	0.412	0.236

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

*The enumeration of the models follows the systematic 'x.y', where 'x' stands for the used sub-dataset and 'y' consecutively numbers the models for the corresponding sub-datasets.*

Table 7: Multivariate analysis of error characteristics for delistings

## Delistings and Downlistings

	(5.2)	(6.2)	(7.2)	(8.2)
Variables	Downlisting	Downlisting	Downlisting	Segment change
auditduration	-0.000 (0.002)	-0.012** (0.006)	0.003 (0.003)	-0.005 (0.004)
errorcount	0.274* (0.142)	0.599 (0.419)	-0.064 (0.127)	-0.459 (0.403)
finstatements	0.496 (1.149)	3.597 (2.254)	-0.794 (1.915)	4.274 (2.942)
resultimpact	-1.098 (0.756)		0.871 (1.134)	
kothari_mod	7.656** (2.988)	3.494 (4.258)	4.872 (3.600)	7.625*** (2.108)
freefloat	-0.002 (0.006)	-0.009 (0.014)	-0.006 (0.009)	-0.040*** (0.010)
ln_turnover	-0.366*** (0.089)	-0.496*** (0.184)	-0.346*** (0.118)	-0.092 (0.097)
roa	-2.232** (1.014)	-1.399*** (0.471)	-2.877** (1.299)	-1.536** (0.649)
tobinsq	-0.081 (0.200)	0.187 (0.315)	-0.463** (0.210)	-0.434*** (0.146)
ipoage	-0.001 (0.022)	-0.009 (0.037)	-0.017 (0.046)	0.013 (0.019)
leverage	-0.021 (0.019)	0.509** (0.227)	0.020 (0.027)	0.040 (0.095)
Constant	0.395 (0.768)	1.302 (1.372)	1.148 (1.111)	1.386* (0.803)
Observations	198	72	105	225
Pseudo R-squared	0.190	0.259	0.200	0.222

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

*The enumeration of the models follows the systematic 'x.y', where x stands for the used sub-dataset and y consecutively numbers the models for the corresponding sub-datasets.*

Table 8: Multivariate analysis of error characteristics for downlistings

### 7.2. Robustness checks

To further examine and prove the validity of our results, we additionally perform several robustness checks.

First, we alter the way earnings management is proxied. Since various models for determining earnings management are discussed in the literature, these models may lead to different results to some extent. We used the performance-adjusted discretionary accruals (Kothari model) for our main analyses in section 7.1 and therefore test our results for robustness by using the Modified-Jones model in this section. As shown in

Table 9, although the results using the Modified-Jones model continue to suggest a positive correlation, however, the statistical evidence is noticeably weakened. This especially applies to Models 5.3 to 8.3 in the context of downlistings, while the results regarding delistings (models 1.4, 2.4, 3.4, and 4.3) continue to show stronger, but compared to the analysis in section 7.1 weaker, evidence.



## Delistings and Downlistings

	(1.4)	(2.4)	(3.4)	(4.3)	(5.3)	(6.3)	(7.3)	(8.3)
Variables	Delisting	Delisting	Delisting	Delisting	Downlisting	Downlisting	Downlisting	Segment change
error_ann	-0.202 (0.380)	0.088 (0.489)	-0.171 (0.774)	0.366 (0.502)	0.392 (0.405)	-2.052 (1.324)	1.170** (0.542)	-0.419 (0.862)
mod_jones_mod	0.285** (0.124)	0.335 (0.559)	4.155** (2.119)	-0.620 (0.571)	0.246 (0.347)	9.052* (5.134)	0.298 (0.335)	7.394*** (2.049)
freefloat	-0.039*** (0.006)	-0.046*** (0.008)	-0.068*** (0.015)	-0.031*** (0.010)	-0.004 (0.006)	-0.007 (0.012)	-0.006 (0.008)	-0.038*** (0.010)
ln_turnover	-0.383*** (0.072)	-0.318*** (0.085)	-0.100 (0.118)	-0.236*** (0.088)	-0.379*** (0.084)	-0.425** (0.189)	-0.363*** (0.113)	-0.106 (0.097)
roa	-0.813 (0.496)	0.172 (0.616)	-0.075 (1.177)	0.532 (0.704)	-3.014*** (0.881)	-0.168 (0.574)	-3.410*** (1.218)	0.034 (0.841)
tobinsq	-0.007 (0.025)	0.149* (0.086)	-0.058 (0.113)	0.439*** (0.136)	-0.067 (0.209)	0.183 (0.299)	-0.493** (0.208)	-0.454** (0.194)
ipoage	-0.006 (0.015)	0.004 (0.016)	0.008 (0.025)	-0.034* (0.020)	-0.010 (0.022)	-0.013 (0.038)	-0.028 (0.048)	0.014 (0.019)
leverage	0.003 (0.003)	0.021 (0.048)	0.158* (0.084)	0.004 (0.003)	-0.010 (0.012)	0.461*** (0.166)	0.006 (0.023)	0.009 (0.095)
Constant	2.874*** (0.495)	2.271*** (0.555)	1.793** (0.787)	1.260* (0.668)	1.312* (0.713)	0.327 (1.391)	1.810 (1.125)	1.385* (0.803)
Observations	531	435	195	249	198	72	105	225
Pseudo R-squared	0.281	0.325	0.385	0.236	0.132	0.277	0.186	0.230

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

*The enumeration of the models follows the systematic 'x.y', where x stands for the used sub-dataset and y consecutively numbers the models for the corresponding sub-datasets.*

Table 9: Robustness check for results on earnings management using the Modified-Jones-Model

Second, since comparable small sample sizes are present for some of our subsets and delisting and downlisting decisions related to error announcements are relatively rare events, we repeat our analyses using the firthlogit methodology to address these challenges in dealing with the available data. In the first place, this methodology addresses the challenge of small sample sizes in maximum likelihood estimation. Moreover, it is designed for the analysis of rare events and allows for higher precision in the estimation of individual parameters in these cases (Firth 1993). The results shown in Table 10 are very close to the results of our baseline logit model, thus supporting the robustness of our findings.

## Delistings and Downlistings

VARIABLES	(1.5) Delisting	(2.5) Delisting	(3.5) Delisting	(4.4) Delisting	(5.4) Downlisting	(6.4) Downlisting	(7.4) Downlisting	(8.4) Segment change
error_ann	-0.167 (0.384)	0.067 (0.432)	-0.276 (0.693)	0.282 (0.529)	0.600 (0.415)	-1.430 (1.032)	1.175** (0.563)	-0.145 (0.679)
mod_jones_mod	0.346** (0.145)	0.846** (0.336)	2.658*** (0.830)	0.229 (0.543)	8.175*** (2.444)	2.659 (3.214)	5.075 (3.196)	7.228*** (2.112)
freefloat	-0.038*** (0.004)	-0.045*** (0.005)	-0.068*** (0.010)	-0.030*** (0.007)	-0.004 (0.006)	-0.007 (0.012)	-0.005 (0.008)	-0.038*** (0.008)
ln_turnover	-0.376*** (0.062)	-0.315*** (0.073)	-0.121 (0.114)	-0.237*** (0.079)	-0.337*** (0.088)	-0.360* (0.185)	-0.330*** (0.112)	-0.091 (0.090)
roa	-0.777 (0.536)	0.169 (0.558)	-1.418* (0.832)	0.624 (0.645)	-0.959* (0.513)	-0.828** (0.362)	-2.449** (1.248)	-1.639*** (0.542)
tobinsq	-0.001 (0.027)	0.096 (0.087)	-0.196 (0.129)	0.374*** (0.138)	-0.133 (0.193)	0.141 (0.279)	-0.305 (0.240)	-0.357*** (0.097)
ipoage	-0.006 (0.013)	0.004 (0.014)	0.015 (0.021)	-0.032* (0.017)	-0.002 (0.022)	-0.012 (0.039)	-0.015 (0.035)	0.011 (0.021)
leverage	-0.001 (0.003)	-0.002 (0.003)	0.132 (0.089)	-0.001 (0.003)	-0.011 (0.011)	0.308* (0.176)	0.001 (0.025)	0.034 (0.052)
Constant	2.799*** (0.444)	2.316*** (0.526)	2.234*** (0.804)	1.202** (0.608)	0.498 (0.802)	0.943 (1.451)	0.865 (1.076)	1.260* (0.645)
Observations	531	435	195	249	198	72	105	225

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

*The enumeration of the models follows the systematic 'x.y', where x stands for the used sub-dataset and y consecutively numbers the models for the corresponding sub-datasets.*

Table 10: Robustness check using firthlogit regression

In addition to the aforementioned model specifications, we also incorporated additional controls to account for other potential confounding factors, including the lag to the error announcement (up to 3 years) and outliers in the earnings management measures. Moreover, in untabulated results, we accounted for industry-fixed effects in our models to mitigate the possibility of omitted variable bias and used probit regression. Notably, all of these modifications yielded consistent and robust results, thereby supporting the validity of our findings.

In summary, our several robustness checks indicate that the results for earnings management are not different from the results from Table 5 and Table 6. The same applies to a large extent also to the results for the control variables, the significances of *free float*, *ln\_turnover* as well as *ROA* remain unchanged. As before, we do not find a consistent significant impact of the error announcements on the probability of delisting and downlisting.

## **8. Discussion**

In this section, we discuss the findings presented in section 7. First, we focus on the relevance of enforcement costs in the decision to leave the regulated market or even terminate the listing. Second, we address the relationship between earnings management and the probability of delisting and downlisting.

By analyzing the specific German setting of enforcement, we address the cost-benefit trade-off of being public. Previous studies have failed to provide conclusive evidence regarding the extent to which compliance costs, particularly those related to enforcement, influence delisting or downlisting decisions. One plausible argument suggests that an error announcement induces high enforcement costs that may surpass the benefits of being public, ultimately leading to the decision to reduce or completely avoid these costs by downlisting or delisting. Hitz et al. (2020) examined a sample of downlisting announcements in Germany from 2009-2015 and provided first evidence supporting this reasoning, highlighting the significance of error announcements in downlisting decisions. As known, besides a downlisting, the intention of avoiding excessive compliance or enforcement costs might also be achieved by a delisting. Given that delisting can also serve the purpose of avoiding excessive compliance or enforcement costs, we expand upon this analysis by considering delistings besides downlistings from 2004 to 2021, which

encompasses the entire period of the enforcement mechanism in Germany. Regarding delistings, our models reveal consistent results, suggesting that the announcement of a reporting error does not appear to encourage a delisting decision. Our results regarding the downlistings are comparable in general and thus, these are contrary to the findings of Hitz et al. (2020). This discrepancy may be due to the varying structure of the dataset and a broader time frame, or a different definition of the error announcement dummy.<sup>8</sup>

Nevertheless, our results suggest that the error announcement itself is not a strong driver of delisting or downlisting decisions. In fact, the enforcement costs used as rationale do not arise with the announcement of the reporting error, but rather from the enforcement authority's audit process. These costs may include information preparation and the commitment of personnel resources and are incurred regardless of whether the audit resulted in an error announcement. Since these costs are incurred similarly for all companies that were audited and since the audited companies are not publicly disclosed, these effects cannot be captured in the analyses. However, it is important to note that our findings do not suggest that compliance or enforcement costs do not have a substantial impact on the cost-benefit trade-off, but rather raise the question of which aspects of an enforcement system impose considerable costs on companies. Though, recently adopted changes to the enforcement system in Germany provide the opportunity to control for this effect in the future. The Financial Market Integrity Strengthening Act (FISG), enacted following the Wirecard scandal, provides an opportunity to conduct follow-up research as under this legislation the BaFin, as responsible enforcement authority, has been authorized to publish the commencement of an audit process alongside the error findings (Berninger et al. 2023). Additionally, multiple error announcements, which equals more intensive involvement with the enforcement system, appear to encourage delisting decisions, further illustrating the relevance of enforcement costs for delistings.

Since error announcements disclose errors in the financial statements of companies, one could infer that such errors may stem from situations where companies have engaged in earnings management, exceeding acceptable limits, and subsequently facing regulatory sanctions. Thus, error announcements and earnings management might be related. For

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<sup>8</sup> Hitz et al. (2020) used a panel dataset and focused on the period from 2009 to 2015. They further considered the announcement of a planned downlisting as the “downlisting event” and examined error announcements using a dummy variable that equals 1 if the announcement occurred in the year preceding the announcement, and only in the year immediately preceding it.

this reason, our models also address the relevance of earnings management prior to delisting or downlisting and its impact on the probability. To accurately assess and discuss the results, it is crucial to differentiate between delistings and downlistings. Our results indicate that, with respect to delistings, the use of earnings management is a prevalent strategy implemented in advance of delisting efforts. Managers may resort to such tactics to mask financial distress and mitigate the risk of involuntary delisting, thus preserving the company's and their own reputation and share value. This argument aligns with previous studies conducted in different settings, such as Teoh et al. (1998), Yang (2006), Leuz et al. (2008), and Cornanic and Novak (2015), analyzing companies at risk of involuntary delisting. Therefore, one might argue that managers strive to avoid involuntary delistings and prefer to carry out voluntary delistings in a well-organized and managed process that preserves the company's image and is executed with the highest share price possible. The consequence is that this mechanism would also apply to voluntary delistings. Our results lend support to this argument. At the same time, the argument of Cornanic and Novak (2015) that companies facing the risk of involuntary delisting try to increase their share price by earnings management can also be applied to voluntary delistings, especially in the context of mergers and acquisitions with the objective of achieving a higher valuation.

In summary, our findings additionally highlight the significance of earnings management as a strategy employed by managers to mitigate the adverse consequences of delistings, which, in addition to involuntary delistings, also applies to voluntary delistings. However, in the case of downlistings, there is no additional incentive for companies to use earnings management to influence their image or share price, as downlistings are solely based on a company's decision and not on that of another institution. Our results are in line with this argument, as we find that earnings management does not have a consistent significant connection to downlisting probability, especially considering the robustness checks conducted in section 7.2.

### **9. Conclusion**

In this study, we examine delisting and downlisting decisions in the German stock market between 2004 and 2022. We focus on different segments of the German stock market to analyze the impact of different levels of regulation.

While controlling for a variety of widely researched hypotheses in the context of delisting and downlisting decisions, the study primarily focused on the impact of enforcement costs on the decision to delist or downlist using observable error announcements companies have to disclose in case of identified material financial reporting errors by the German enforcement authorities. As financial reporting errors are related to the utilization of accounting leeway, where barely acceptable limits may be exceeded, we secondarily focused on earnings management prior to delisting or downlisting events.

Our analysis indicates that single error announcements are not the reason for delisting or downlisting decisions, with only occasional evidence of an impact on downlistings from the General Standard. Instead, we argue that the costs incurred during the audit process, irrespective of the audit's result, may encourage delisting and downlisting decisions, assuming that enforcement costs and regulatory requirements are nevertheless material in assessing the cost-benefit trade-off of being listed. As the German enforcement system, up to 2021, does not allow to identify all companies which were subject to audit by the enforcement authorities (independent of the result of the examination), further research may address this reasoning since in the new enforcement system, starting 2022, audits without error findings might be disclosed as well. Simultaneously, our results suggest that companies that are once again exposed to an enforcement process and thus high enforcement costs are more likely to delist. Moreover, our findings suggest that companies tend to use earnings management as an instrument prior to delistings. We conclude that managers use this instrument to disguise financial distress and reduce the risk of involuntary delisting, with the objective of preserving their own and the company's reputation and being able to execute a delisting under their control.

This study contributes to the literature on delistings and downlistings by analyzing the role of enforcement costs and earnings management in these decisions, extending evidence by Bessler et al. (2022) on delistings in Germany with these aspects, and simultaneously challenging findings by Hitz et al. (2020), providing an alternative, but not necessarily opposing, approach on the impact of the enforcement system on downlisting decisions. Additionally, the study provides new evidence on how companies in Germany may resort to earnings management prior to voluntary delistings, and consequently not exclusively prior to involuntary delistings, and sheds light on the specific aspects of the enforcement system that impose considerable costs on companies.

## Chapter 4

# Value Effects of Non-Recurring Earnings and Uncertainty - Insights from Fair Value Adjustments in the Real Estate Industry



## Abstract

Guided by the imperative of financial statements to present a "true and fair view," we explore the impact of unexpected earnings developments, measured through Funds from Operations (FFO), on investor sentiment. We use a dataset encompassing real estate companies and market transparency data from 2006 to 2023 and employ a multi-country event study and subsequent regression analysis. A central aspect of our study centers on the characteristics of fair value adjustments for investment property. These adjustments signify recurring earnings (or losses) consistently associated with investment property, while simultaneously representing non-recurring earnings (or losses). Our findings reveal that while investors generally respond positively to FFO-surprises, this sentiment is muted when fair value adjustments have a major impact on reported earnings, as they represent not reliably recurring earnings which may result in investors perceiving them with a higher level of uncertainty and associate a greater level of risk with these adjustments. Moreover, we find that real estate markets characterized by higher transparency elicit more favorable investor responses to fair value adjustments, underscoring the importance of verifiability in financial reporting as it can reduce uncertainty.

This chapter is a working paper and has not been published yet.

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# Value Effects of Non-Recurring Earnings and Uncertainty - Insights from Fair Value Adjustments in the Real Estate Industry

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December 21, 2023

## **Abstract**

Guided by the imperative of financial statements to present a "true and fair view," we explore the impact of unexpected earnings developments, measured through Funds from Operations (FFO), on investor sentiment. We use a dataset encompassing real estate companies and market transparency data from 2006 to 2023 and employ a multi-country event study and subsequent regression analysis. A central aspect of our study centers on the characteristics of fair value adjustments for investment property. These adjustments signify recurring earnings (or losses) consistently associated with investment property, while simultaneously representing non-recurring earnings (or losses). Our findings reveal that while investors generally respond positively to FFO-surprises, this sentiment is muted when fair value adjustments have a major impact on reported earnings, as they represent not reliably recurring earnings which may result in investors perceiving them with a higher level of uncertainty and associate a greater level of risk with these adjustments. Moreover, we find that real estate markets characterized by higher transparency elicit more favorable investor responses to fair value adjustments, underscoring the importance of verifiability in financial reporting as it can reduce uncertainty.

## 1. Introduction

IAS 1.15 stipulates a fundamental requirement for financial statements: They must '*present fairly*' an entity's financial position and performance. This embodies the concept of providing a '*true and fair view*' through financial reporting. Financial statements are intended to be a comprehensive reflection of a company's financial health. In this pursuit of presenting a true and fair view, financial reporting encompasses various elements, including the choice of accounting policies and the treatment of certain items. In research on financial reporting, the treatment of non-recurring items and their subsequent impact on market valuation has gained considerable attention. Existing empirical research highlights that the market tends to assign a lower valuation multiple to non-recurring items due to their perceived transience. For this reason, investors attach less importance to them when assessing future profitability (Strong and Walker 1993; Elliott and Hanna 1996; Cready et al. 2010). However, the majority of literature still focuses on non-recurring items explicitly identified and labeled in the income statement. This aspect differentiates our analysis from the previous literature. Instead, we focus on fair value adjustments of investment property, which have a similar character to extraordinary items, as their revaluation in the subsequent fiscal year lacks reliable similarity since the upward or downward revaluation of this item is mainly attributable to exogenous factors. While sharing characteristics with 'genuine' non-recurring items, fair value adjustments distinguish themselves by being integral to the normal business operations of real estate firms and featuring prominently in regular income statements. Besides, they are of substantial importance for real estate companies, which should justify their significance for investors. For this reason, the real estate industry features an ideal setting for our analysis. In addition, it is precisely this sector that is currently facing several challenges as this era is marked by economic turbulence, fluctuating interest rates, and evolving market dynamics. As interest rates experience upward pressure and investment property values exhibit volatility, the real estate sector finds itself at a crossroads. Recent financial reports have unveiled substantial losses incurred by real estate companies, largely attributed to fair value adjustments<sup>9</sup>. Investors, both institutional and individual, are increasingly vigilant about the accuracy and implications of fair value accounting. These fair value adjustments, which account for unrealized gains or losses on investment

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<sup>9</sup> See, for example, the half-year results of the ADLER Group S.A.

property, have come under heightened scrutiny as they carry the potential to significantly impact financial statements. Investors seek clarity on how to interpret these adjustments and how they may influence their perceptions of real estate companies. This raises the fundamental question of whether investors perceive fair value adjustments with a degree of uncertainty, attribute a heightened risk to their impact on company valuation, and what factors might contribute to shaping this perception.

As the descriptive analyses of our dataset show, fair value adjustments of real estate companies have a substantial impact on reported earnings. In our sample, the companies report an average fair value increase of about €77 million per year and company, with average annual earnings of about €181 million, totaling €118 billion for the observation period. As such, they also have the potential to significantly influence whether expectations regarding earnings are met or even exceeded. This illustrates the relevance of this accounting topic with regard to the interpretation of earnings surprises (in the real estate sector) by investors if fair value adjustments represent a material share of earnings. While first evidence on investor reactions to earnings surprises in this sector suggests that stock prices fundamentally react positively (negatively) to positive (negative) earnings surprises (Gyamfi-Yeboah et al. 2012a; Gyamfi-Yeboah et al. 2012b; Price et al. 2012), to the best of our knowledge, our study is the first to integrate the unique non-recurring characteristics of fair value adjustments into this context. Hence, our analysis provides a first comprehensive examination of the interplay between fair value accounting as a proxy for non-recurring earnings, earnings surprises, investor perceptions, and stock market reactions within the real estate sector.

For our analyses, we use a comprehensive dataset sourced from financial statements of real estate companies and hand-collected real estate market transparency data spanning from 2006 to the recently disclosed financial statements for 2023. We limit our dataset to IFRS adopters, as the fair value approach is widely used in this context. Similarly, the analysis could also be extended to various local GAAPs. Implementing a multi-country event study approach with subsequent regression analysis, we address the issue of earnings surprises in the real estate sector and extend existing literature to this context. Using Funds from Operations (FFO) as our primary metric, we assess the impact of unexpected earnings developments on investor sentiment. A key aspect of our study lies in the uncertainty and specific risk linked to fair value adjustments by investors within

the real estate sector. We seek to analyze the impact of these adjustments as a special type of non-recurring earnings on investor perceptions and subsequent stock market responses. Furthermore, we examine the relevance of transparency within real estate markets for investor reactions to fair value adjustments.

Our findings are revelatory in several respects. Firstly, we provide further evidence that earnings surprises, when measured through FFO, significantly sway investor sentiment within the real estate sector. In doing so, we make an additional contribution to the ongoing discourse regarding the informative value of Funds from Operations (FFO) for the real estate sector, underscoring its significance. This also aligns with previous findings in cross-industry studies, highlighting the relevance of earnings surprises for this specific industry. Secondly, we find a multi-layered relationship between fair value adjustments and investor perception. While investors generally respond positively to FFO-surprises, this sentiment is significantly muted when fair value adjustments have a major impact on reported earnings. This emphasizes the unique characteristics of fair value adjustments as non-recurring earnings, which represent unrealized gains or losses and may not reliably translate into future cash flows. Therefore, investors perceive them with heightened uncertainty and associate a greater level of risk with these adjustments. Thirdly, our findings show that in real estate markets characterized by higher levels of transparency, investors tend to react more favorably to fair value adjustments. This illustrates the meaning of verifiability in financial reporting and its impact on investor responses as it reduces uncertainty.

Summing up, our study contributes to a more comprehensive understanding of the impact of fair value accounting, using the example of the real estate sector. It illustrates the intricacies of investor perception, the role of transparency, the complexities introduced by fair value adjustments, and their unique characteristics as recurring earnings that always relate to investment property but represent non-recurring earnings at the same time.

The remainder of this paper is structured as follows: Section 2 describes the option to use the fair value approach for the accounting of investment property and highlights the prevalence of the fair value approach for different countries based on existing literature. We present related studies and derive our hypotheses in section 3. Section 4 discusses the methodology of event studies and explains the regression models used subsequently,

including the variables employed. Our dataset compilation and processing procedures are detailed in section 5, with section 6 offering descriptive statistics, insights into the extent and significance of fair value adjustments in our sample, and event study results. Section 7 presents our findings and section 8 concludes.

## **2. Accounting of investment property – the Fair Value approach**

Fair value measurements hold a substantial role in financial reporting, particularly in relation to long-lived assets, with investment property holding a unique role. The unique role is based on the fact that for some companies, investment property represents a major element of the balance sheet total and thus fair value adjustments are potentially of considerable relevance. This applies in particular to companies in the real estate sector, whose main business activity consists of holding real estate for capital appreciation and generating rental income. The accounting treatment of investment property is regulated by IAS 40, which came into effect on January 1, 2005. Therein investment property is defined as

*“property (land or a building or part of a building or both) held (by the owner or by the lessee under a finance lease) to earn rentals or for capital appreciation or both (IAS 40.5).”*

Additionally, the standard provides further specifications including examples and negatives. If the characteristics of investment property match, companies can select between fair value accounting and the cost model.

The applicable definition of fair value is derived from IFRS 13, which defines it as

*“the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date (IFRS 13.9)”*.

Under the fair value model, assets find recognition on the balance sheet at their fair value, with any ensuing adjustments in fair values being recognized in the income statement (Sellhorn and Stier 2019; Schmidt 2020), albeit devoid of direct cash implications.

A central area of research pertains to the prevalence of fair value accounting, particularly in light of the alternative option of selecting the cost model. In summary, empirical studies highlight considerable cross-country variations in the utilization of fair value accounting. For instance, Cairns et al. (2011) reveal that a majority of firms in the UK and Australia employ fair value accounting, albeit their analysis extends beyond investment property

exclusively. Correspondingly, Christensen and Nikolaev (2013) find that 77% of UK companies with investment property opt for fair value accounting, in contrast to only 23% of German companies. In the context of German real estate firms, Schmidt (2020) notes a relatively limited resistance to fair value accounting among listed entities. Among 29 German real estate firms analyzed, 28 opted for fair value accounting for investment property. This preference for fair value accounting among listed firms is potentially influenced, at least in part, by listing requirements mandating fair value determination and disclosure in the notes, even when adopting the cost model (Sellhorn and Stier 2019). The widespread application of fair value accounting for investment property further illustrates the relevance of our study, as the results are consequently relevant for a large part of the companies for which fair value accounting of investment property is applicable.

Further research continues to highlight significant international disparities (Kvaal and Nobes 2010, 2012; Nobes and Stadler 2013; Nobes and Stadler 2015). For instance, the adoption of fair value accounting ranges from as low as 3% for Italian and South Korean companies to a notable 94% for entities headquartered in Hong Kong. Within a narrower focus, a study by Müller et al. (2015) exclusively targeting real estate firms, wherein investment property is a key asset class, emphasizes the dominance of fair value accounting across a sample encompassing 15 European countries. Hence, it is evident that fair value accounting for investment property is far from being a negligible occurrence, underscoring the significance of the posed issue.

### **3. Literature & Hypotheses Development**

Research within the area of accounting and capital markets, particularly concerning earnings announcements, has a rich and extensive lineage, constituting one of the most vigorously explored domains in accounting research (Lev 1989; Fink 2021). Meanwhile, earnings surprise has emerged as a robust predictor of forthcoming performance, explaining the significance for comprehending capital market reactions following the disclosure of financial results (Taylor 2011). The foundation for this linkage rests upon the extraction of valuable and novel insights embedded within financial figures. Consequently, the anticipation is that stock market responses would be discernible in instances where the disclosed information deviates from pre-release expectations. This was first demonstrated by Ball and Brown (1968). Such stock market reactions arising

from earnings surprises upon, or soon after, earnings announcements align with Fama's (1970) framework of the efficient capital market. However, a substantial body of literature has examined various dimensions of the post-earnings-announcement drift (PEAD), a phenomenon that characterizes an investor's tendency to underreact to new earnings-related information. Stocks accommodate the impact of this new information by adjusting their prices, yet this adjustment is not instantaneously consummated; rather, the effect of the information becomes manifest over several months, constituting a distinct capital market anomaly.<sup>10</sup>

While the PEAD as a capital market anomaly, and particularly the effect of earnings surprises, has received substantial academic attention, there exists relatively little research on short-term capital market reactions to earnings surprises, particularly with regard to factors that might shape the perception of earnings surprises. As posited by Stunda and Typpo (2004), the existence of transitory items within earnings can diminish their significance to investors. This observation, for example, motivates a deeper examination of earnings characteristics and their role in shaping investors' perceptions of earnings surprises. Our study focuses on the impact of fair value adjustments on investors' assessment of earnings surprises. As described in section 2, fair value adjustments assume particular relevance in the context of investment property, a sector central to real estate. Consequently, our study addresses this gap, specifically delving into fair value adjustments as potential drivers of investors' reactions to earnings surprises within the real estate sector.

As a start to our study, we therefore begin by examining the response to earnings surprises in general for the real estate sector, considering the unique attributes of the sector. In line with the findings of Gyamfi-Yeboah et al. (2012a) and Gyamfi-Yeboah et al. (2012b), we build our argumentation upon the common finding that favorable (negative) news leads to positive (negative) abnormal stock returns. However, unlike industry-independent studies, it is imperative to acknowledge that the conventional earnings metric, included in most studies of earnings announcements, might be less relevant within

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<sup>10</sup> For detailed literature reviews on capital market research in accounting or specifically on PEAD over various decades, see Lev and Ohlson (1982), Bernard (1989), Kothari (2001), Richardson et al. (2010), Taylor (2011) and Fink (2021). Additionally, Price et al. 2012 examined the PEAD especially for REITs as parts of the real estate sector.



the context of real estate firms. This is due to the potential limited informativeness of traditional earnings for assessing the (future) performance of such entities. A common argument regarding the superiority of Funds from Operations over traditional earnings relates to the more pronounced relevance of FFO for future cash flows and thus for abnormal returns (Gyamfi-Yeboah et al. 2012b). While debates of the past haven't culminated in a definitive consensus regarding whether Funds from Operations offers a superior performance evaluation metric for real estate companies (Fields et al. 1998; Gore and Stott 1998; Vincent 1999; Stunda and Typpo 2004; Baik et al. 2008; Ben-Shahar et al. 2011; Gyamfi-Yeboah et al. 2012a; Seok et al. 2020; Feng et al. 2022), contemporary consensus leans towards FFO's incremental superiority over net income. However, net income still retains a significant explanatory role that cannot be dismissed. Thus, we argue, in line with the findings of Gyamfi-Yeboah et al. (2012a) and Gyamfi-Yeboah et al. (2012b), that unexpected positive developments in the FFO-metric drive positive stock market reactions for the real estate sector:

H1: Unexpected positive developments in the FFO-metric drive positive stock market reactions for real estate companies.

However, should there exist some degree of uncertainty among investors about the disclosed financial figures, their responses may be different. A study by Francis et al. (2007) examines the role of information uncertainty within the context of the PEAD phenomenon. They reveal that in scenarios characterized by increased uncertainty, initial market reactions are more muted. They use Bayesian decision theory for explanation, which posits that investors inclined towards minimizing losses would rationally assign lesser weight to information that carries greater noise (i.e., increased uncertainty). Evidence by Ecker et al. (2006) aligns. Francis et al. (2007) link this behavior, in particular, to the extent by which earnings serve to explain cash flows. Given the well-entrenched practice of employing discounted future cash flows as a basis for company valuation (Kothari 2001; Bandyopadhyay et al. 2017), this rationale holds credibility.

We now apply this reasoning to the discussion on fair value adjustments applied within real estate firms. As explained in section 3, fair value adjustments for investment property represent unrealized gains or losses, wherein the ensuing influence on future cash flows is at least uncertain. Moreover, according to Stunda and Typpo (2004), investors attach

less importance to earnings if they contain more transitory items, which indisputably encompass fair value adjustments of investment property.

Amidst the broader concerns prevailing within the professional and academic community regarding the reliability and precision of fair value adjustments, partially attributed to the limited understanding of external appraisers, along with the specifics of IAS 40, or the scarcity of active markets for determining fair values (Dietrich et al. 2000; Bleck and Liu 2007; Singleton-Green 2007; Nellesen and Zuelch 2011; Al-Khadash and Khasawneh 2014), it is certain that fair value adjustments represent unrealized gains (or losses), simultaneously constituting non-recurring effects, even amidst the nearly continuous rise in real estate prices over the past decade (see section 6). Thus, they coexist with reliably recurring lease income from (long-term) lease agreements, introducing a notable level of risk and uncertainty in comparison.

The findings of Bandyopadhyay et al. (2017) align with this, indicating that fair value adjustments wield a more positive connotation and exhibit enhanced predictive capability for future cash flows within firms characterized by higher accounting conservatism as uncertainty might be reduced with increased conservatism. Following this reasoning, and in combination with the concerns that unrealized gains and losses reported by fair value adjustments could lead to increased earnings volatility and thus investor confusion (Al-Khadash and Khasawneh 2014), significant fair value adjustments in financial reports could potentially increase investor uncertainty and weaken or negate the fundamentally positive reactions to positive news as they potentially question the structure of the reported earnings due to the nature of fair value adjustments as a non-recurring effect. Therefore, we formulate hypothesis 2 as:

H2: Positive stock market reactions to positive earnings surprises are mitigated if fair value adjustments have a major impact on reported earnings.

Of course, this shouldn't be interpreted as a statement that an increase in fair values is universally met with negative sentiment from investors. An upward revaluation of investment property should inherently garner a more favorable response compared to a downward revaluation. The potential uncertainty and associated risk linked to substantial fair value adjustments, as discussed earlier, could potentially be mitigated under circumstances where these adjustments are more transparent, expected, and

verifiable by investors. In addition, Barth and Schipper (2008) and Barth et al. (2013) argue that increasing transparency (in financial reporting) reduces information risk and information asymmetry, leading to lower capital costs and an increase in the accuracy of investor estimates of future cash flows. With these considerations in mind, we posit that within more transparent real estate markets, positive fair value adjustments are more prone to be positively construed by investors, in contrast to less transparent markets where especially increases might encounter hurdles in being substantiated and are subject to more uncertainty and therefore pose a higher risk to investors. Hence, these may be factored more strongly into the company's valuation, which gives rise to Hypothesis 3:

H3: With increased transparency in the real estate market and thus better verifiability of fair value adjustments, these revaluations are reflected more positively.

#### **4. Methodology**

Our study employs a two-step research design to investigate the dynamics of capital market reactions within a cross-country context. The initial step encompasses a (multi-country) short-term event study approach (MacKinlay 1997; Campbell et al. 2010), enabling us to quantify short-term market responses to earnings announcements.

In the last decades, event studies have developed into an essential research method in financial research, enabling the examination of market responses to specific events (Kothari and Warner 2007), such as earnings announcements, mergers, or policy changes. This methodology is anchored in the efficient market hypothesis (EMH) posited by Fama (1970), which contends that in an efficient market, asset prices instantaneously and fully reflect all available information. Thus, event studies are used, among other things, to empirically test the efficiency of financial markets by assessing whether prices adjust promptly and accurately to new information.

The efficient market hypothesis classifies financial markets into three forms of efficiency: weak, semi-strong, and strong. In the context of event studies, the semi-strong form of efficiency is most relevant. It posits that stock prices incorporate all publicly available information, including past prices and trading volumes, as well as all public information, such as earnings announcements and economic data, promptly and accurately. Consequently, if a market is semi-strong efficient, abnormal returns should not persist

after the release of new information because stock prices should instantaneously adjust to reflect this information (Fama 1970).

In event studies, the expected regular stock returns of the relevant firm(s) on the event day and several days preceding and following the event are calculated using an estimation window preceding the event under examination. Various models are available for this purpose. A main method for assessing stock price reactions to events is the market model. It posits that, in an efficient market, stock returns are primarily influenced by broader market movements. It postulates that the expected return on a stock ( $E(R_{i,t})$ ) is a function of the expected return on the market ( $E(R_{m,t})$ ) multiplied by a stock's beta ( $\beta_i$ ) (MacKinlay 1997):

$$E(R_{i,t}) = \alpha_i + \beta_i * E(R_{m,t}) + \varepsilon_{i,t} \quad (1)$$

In this equation,  $\alpha_i$  represents the stock's abnormal return, which captures the portion of the return not explained by market movements. In an efficient market,  $\alpha_i$  should be zero on average, implying that stock prices adequately adjust to market information.

While the market model provides a valuable framework, it has limitations, particularly in capturing the full range of factors influencing stock returns. To address these limitations, Fama and French (1996) extended the model to incorporate three factors: market risk, size, and value. The size factor acknowledges that small-cap stocks tend to outperform large-cap stocks over time. It quantifies the excess return of a portfolio of small-cap stocks over a portfolio of large-cap stocks. The value factor recognizes that value stocks (those with low price-to-book ratios) tend to outperform growth stocks (those with high price-to-book ratios). It quantifies the excess return of a portfolio of value stocks over a portfolio of growth stocks. Fama and French (1996) extended the market model by incorporating these factors to explain stock returns more comprehensively. Their model, known as the Fama and French three-factor model became an important addition to the existing models in event studies. It acknowledges that stock returns can be influenced not only by overall market movements but also by factors like company size and valuation. For both models described, a major issue in the application lies in the selection of a suitable reference market for the companies of interest.

To assess market reactions to an event, Cumulative Abnormal Returns (CARs) are calculated. CARs capture the cumulative effect of abnormal returns over a specific time

window surrounding the event (= the event window). CARs are calculated by summing the abnormal returns over the event window, as expressed by the formula (MacKinlay 1997):

$$CAR_i(t_1, t_2) = \sum_{t=t_1}^{t_2} [R_{i,t} - E(R_{i,t})] \quad (2)$$

where:

$CAR_i(t_1, t_2)$  represents the cumulative abnormal return of company  $i$  from  $t_1$  to  $t_2$ .

$R_{i,t}$  represents the actual return for stock  $i$  at time  $t$ .

$E(R_{i,t})$  represents the expected return for stock  $i$  at time  $t$ , as estimated by the market model, the Fama and French three-factor model or other models.

We calculate CARs during the vicinity of earnings announcements that serve as events. Both the market model and the Fama and French three-factor model (Fama and French 1996) are employed, encompassing diverse short-term event windows. Given the international scope of our data, we use country-specific local indices provided by Refinitiv<sup>11</sup> to determine CARs. We apply an estimation window of 241 days which ends 10 days before the event. To obtain the required factors for the Fama and French three-factor model we refer to the Kenneth R. French data library, which provides monthly updates of the factors (French 2023).

Building upon this foundation, we subsequently employ multivariate Ordinary Least Squares (OLS) regression analysis to examine the interplay between characteristics of reported earnings of real estate firms and ensuing capital market reactions.

Central to our study is the examination of the influence exerted by earnings characteristics, along with their origins and in particular the effect of non-recurring items, on capital market responses. To calculate the FFO-surprise, we adopt a seasonal random walk model focused on Funds from Operations, a pivotal financial metric for the real estate sector (Fields et al. 1998; Gore and Stott 1998; Vincent 1999; Stunda and Typo 2004; Baik et al. 2008; Ben-Shahar et al. 2011; Gyamfi-Yeboah et al. 2012a; Seok et al. 2020; Feng et al. 2022). Unlike earnings, estimates from analysts for this metric are notably limited, prompting us to compute the unexpected result as the variance between

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<sup>11</sup> To clarify, we use the benchmark local stock market indices for each company Refinitiv assigns to the companies (code: INDXL).

the current FFO and the previous year's equivalent. As a scaling factor, we use the market capitalization at the end of the fiscal year corresponding to the event date (Pinnuck 2014).

Further enriching our models are two interaction terms. For the first term, we construct a dummy variable (*Material FV-adj.*) that equals one if a positive earnings surprise arises solely from non-cash-relevant and unrealized fair value adjustments. We employ this approach to determine the financial statements where fair value adjustments (or more broadly, one-off effects) wield a substantial impact on the newly disclosed information for the capital market. The calculation of the dummy variable is based on earnings forecasts provided by analysts. Interacted with the FFO-surprise, this interaction explains variances in investor responses under such circumstances. Secondly, we incorporate hand-collected transparency data to ascertain whether fair value adjustments are more favorably linked with countries with a more transparent real estate market, premised on the notion that value developments are more easily comprehensible which decreases investor uncertainty.

Supplementary control factors are drawn from extant literature on stock market reactions to earnings announcements. First, we employ the market-to-book ratio of equity (*GROWTH*), a measure of growth, calculated as the market value of common equity divided by the book value of common equity at the fiscal year-end (Kama 2009). Secondly, we control for size using the log-normal of the market value of equity (*SIZE*) (Ball and Kothari 1991; Kama 2009). Additionally, we include leverage (*LEV*) as a standard control variable in value relevance studies (of fair value adjustments) as in Fan and Wong (2002) and So and Smith (2009) as well as the change in leverage since fair value adjustments directly impact the leverage which is a key benchmark for the real estate sector (McDonald 1999; Giacomini et al. 2015). Besides, we include the Kothari-model (Kothari et al. 2005) as a proxy for assessing the extent to which earnings management instruments (*EM*) are deployed. This allows us to disentangle the potential impact of fair value adjustments from broader earnings management activities (Keung et al. 2010; Louis and Sun 2011). Lastly, we incorporate a control variable representing the number of days following the fiscal year-end when earnings were disclosed (*DELAY*). This control aligns with the insights of (Ball and Kothari 1991), who posit that adverse news tends to be unveiled later in the reporting cycle. By including this control, we account for potential temporal variations in the release of financial information.

Moreover, year-fixed effects are included, resulting in models of the following structure:

$$CAR_{i,j} = FFO_{surprise} + Material\ FV - adj. * FFO_{surprise} + FV - adj.\ per\ TA * Transparency + Controls + Fixed\ Effects + \varepsilon_i \quad (3)$$

## 5. Sample description

The underlying framework guiding the compilation of our dataset hinges upon the enactment date of IAS 40 for fiscal years commencing in or after 2005. Consequently, preceding the data refinement process, our dataset encompasses the entirety of companies within the real estate sector (categorized under TRBC code 6010), which prepared their financial statements by IFRS between 2006 and 2022, thereby necessitating the application of IAS 40. The sourcing of data was conducted through the Refinitiv database.

This initial dataset consists of 1,528 companies, contributing to approximately 17,000 individual observations from 83 countries. The process of data refinement encompasses a series of methodical stages. Primarily, to ensure the exclusive consideration of entities applying IAS 40, fiscal years without data on fair value adjustments were excluded. Additionally, we excluded entities without analyst coverage or appropriate data on analyst forecasts since we need this information for our models. Besides, we excluded observations in which earnings announcements were made more than 4 months after the closure of the fiscal year. This step considers the typical disclosure timelines of publicly listed companies and eliminates irregular reporting delays to minimize confounding events with negative news upon disclosure.

Furthermore, for comprehensive analysis, we drew upon the Refinitiv / Worldscope database to collect supplementary essential data. This encompasses data for executing the event study approach, alongside other variables used within the regression analyses. In addition, we use hand-collected data on the transparency level of the real estate markets in our analyses. For this purpose and similar to Newell (2016), we use the *Global Real Estate Transparency Index*, which is prepared every 2 years by Jones Lang LaSalle Inc. in cooperation with LaSalle Investment Management. Specifically, we extracted the ‘*composite score*’ from the reports, which serves as an indicator of the transparency levels characterizing real estate markets across different countries.

Table 11 summarizes the sampling procedure.

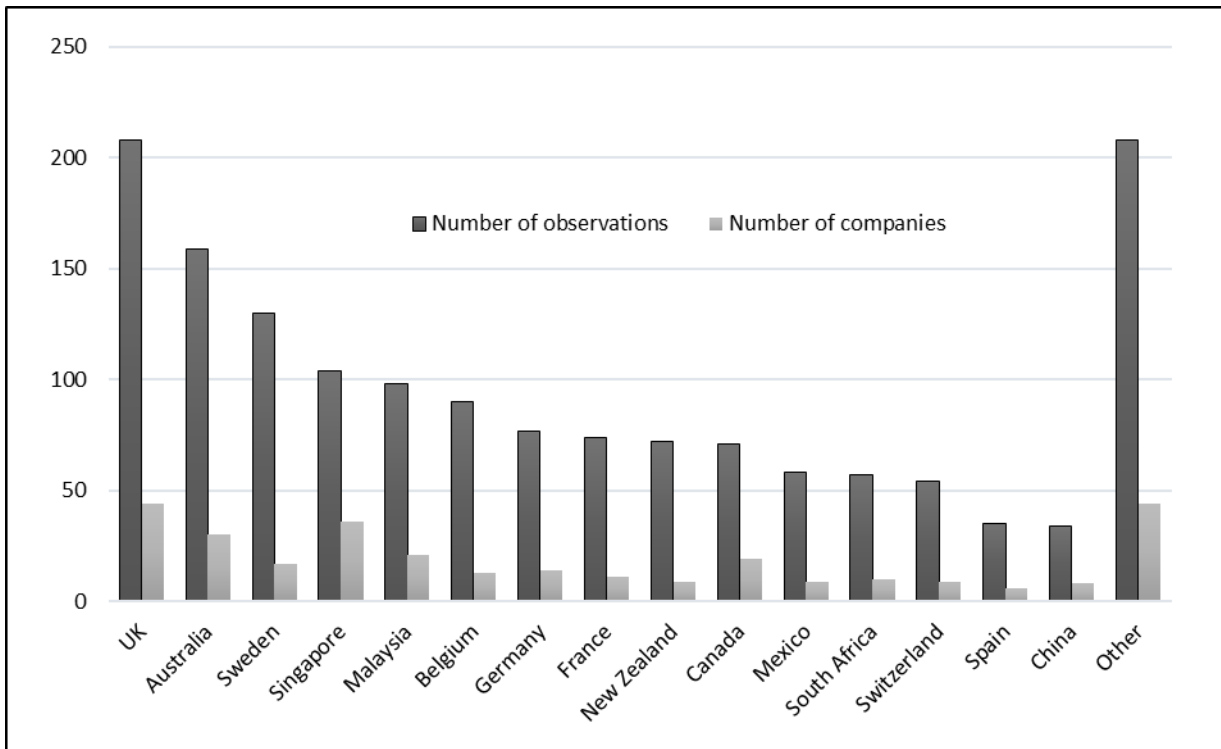
## Fair Value Adjustments

<b>Initial sample</b>		
Number of companies		1,528
Observations / company years		16,963
Sample processing	Dropped observations	Remaining observations
- less: observations without fair value adjustments	- 8,699	8,264
- less: no analyst coverage / analyst earnings forecast	- 4,715	3,549
- less: earnings announcement more than 4 months after fiscal year-end	- 644	2,905
- less: missing variables of interest / controls	- 1,093	1,812
- less: missing stock returns or market returns; liquidity requirements are not met for the event study approach	- 277	1,535
<b>Final sample</b>		
Observations / company years		1,535
Number of companies		286

Table 11: Description of sampling procedure

Additionally, Figure 1 provides a visual representation of the countries encompassed within our final sample. Notably, the data highlights that the United Kingdom and Australia feature prominently within our dataset, aligning with their documented emphasis on fair value accounting for investment property, as described by Cairns et al. (2011). Furthermore, it is evident that Sweden and Germany among European countries are also strongly represented, aligning with the findings of Schmidt (2020) on the relevance of fair value accounting in Germany. Besides, it's worth noting the substantial presence of Singapore and Malaysia within our dataset. In these regions, the utilization of fair value accounting for investment property holds notable significance, as exemplary also shown by Tan et al. (2014) for Malaysia.





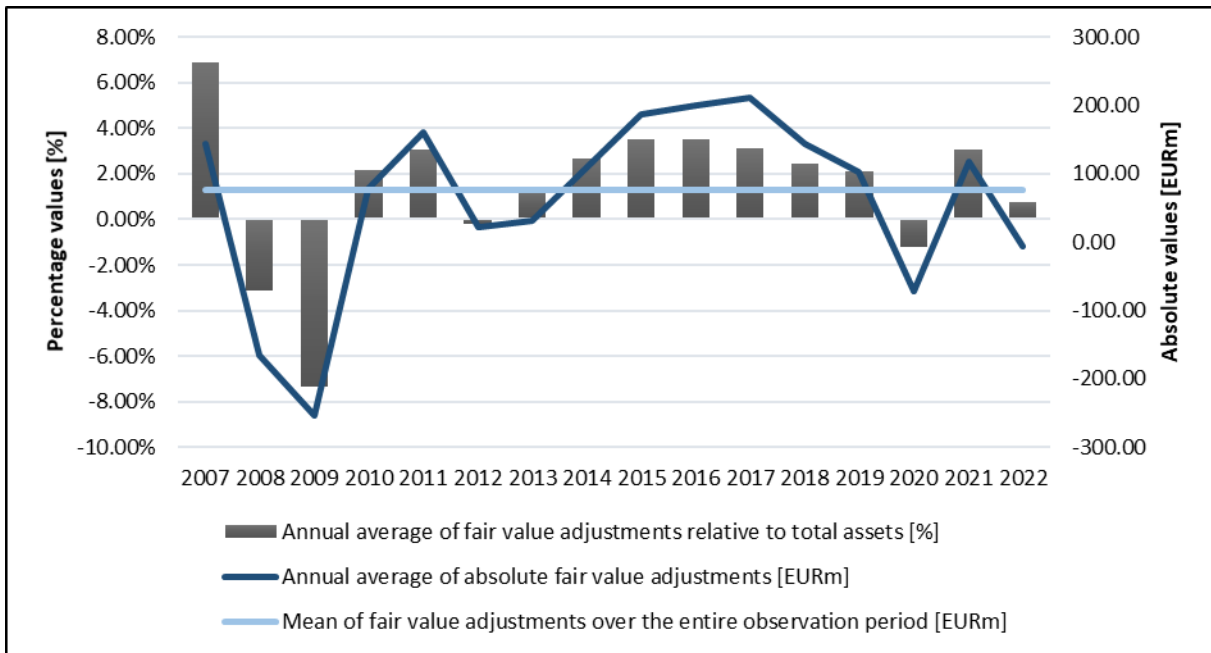
This figure shows the number of observations/companies by country in the final sample. The most important constituents in the group 'Other' are Norway, Austria, Brazil, Hong Kong and Malaysia.

Figure 1: Representation of countries in the final sample

## 6. Descriptive statistics and the importance of Fair Value adjustments in real estate markets

To illustrate the relevance of fair value adjustments for real estate companies and their income statements, we use selected financial metrics from our dataset. We base this on all observations for which all necessary data for our base models are available ( $n = 1535$ ). Figure 2 shows the annual average fair value adjustments relative to total assets. It shows that in 12 of 16 years, the average adjustment was positive. Besides the remarkable reductions in 2008 and 2009 as a result of the financial crisis, economic recession in some countries, and other factors such as the denationalization of real estate markets in some countries as an initiative of the Organization for Economic Cooperation and Development (OECD) and the European Union (Realtor 2009), companies almost continuously reported increases in the fair value of their portfolios as earnings.

## Fair Value Adjustments



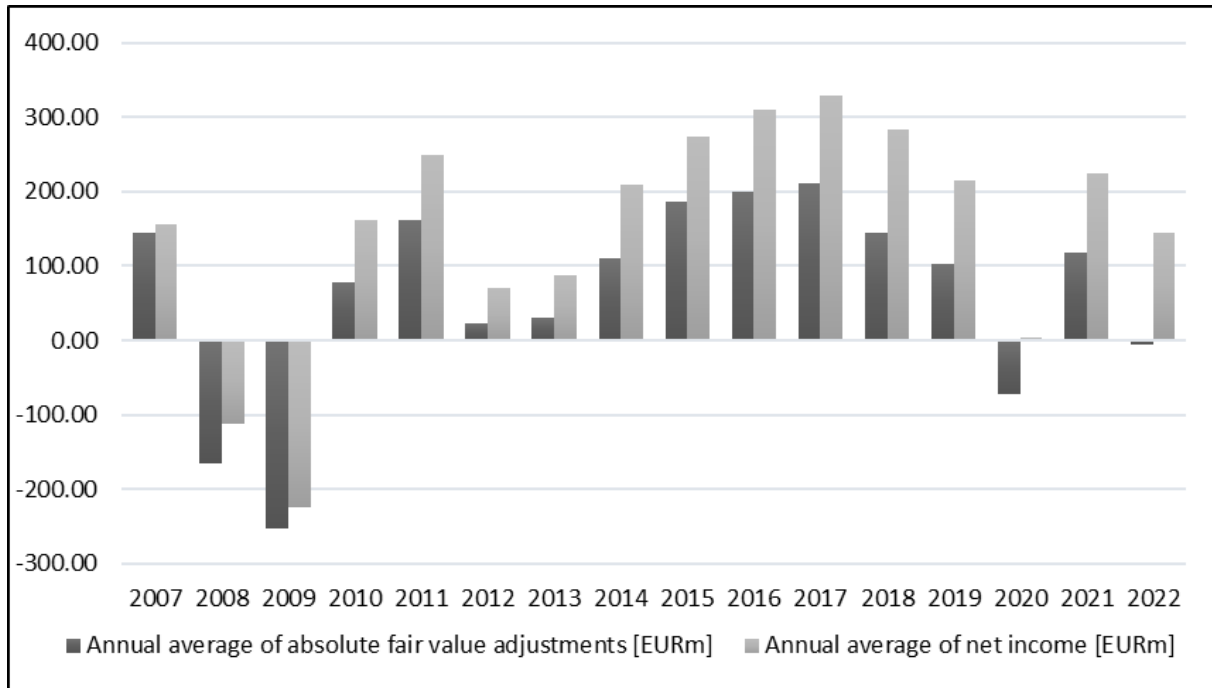
This figure shows the extent and significance of fair value adjustments in the dataset. The pillars show the annual average of fair value adjustments relative to total assets in percent (left scale). The dark blue line represents the average annual fair value adjustments in absolute terms (right scale). The light blue line further displays the average fair value adjustments in absolute terms over the entire observation period (right scale).

Figure 2: Annual average of fair value adjustments

Figure 2 also illustrates the economic magnitude of fair value adjustments. Although the average absolute fair value adjustments per year vary over the observation period, our dataset shows an average fair value increase of about €77 million per year and company, with average earnings of about €181 million. Over the entire observation period, this results in an increase in fair values of substantial €118 billion. This highlights the potentially large share of unrealized gains in reported earnings and the significance of non-recurring earnings in recent years. The economic impact is further illustrated when examining the annual trends. Beyond the initial notable deviations at the beginning of our observation period, it is discernible that, on average, total assets exhibited an annual increase of approximately 2% during the years spanning from 2010 to 2022 as a result of fair value adjustments. Furthermore, during the period from 2014 to 2018, this annual increase even surpasses the 3% mark. These findings further underscore the enduring impact of fair value adjustments on total assets, highlighting a persistent upward trajectory throughout our study period.

This is further illustrated in Figure 3, which shows the reported average earnings (net income) alongside the fair value adjustments for the corresponding years. The mere visual observation illustrates the potential correlation of positive (negative) fair value

adjustments to positive (negative) earnings as well as the share of fair value adjustments in earnings. As such, both figures also have a highly significant (p-value of 0.00) correlation coefficient of 0.826. Certainly, this result is not surprising, given that fair value adjustments are directly included in net income. However, the very high correlation coefficient, combined with the graphically illustrated dependencies, illustrates the substantial impact of fair value adjustments, and thus non-recurring items, on companies' earnings.



This figure compares the average annual fair value adjustments and the average annual net income in absolute terms.

Figure 3: Comparison of average annual fair value adjustments vs. annual reported earnings

Besides, Table 12 provides a concise overview of pertinent financial statements and market data essential for our ensuing analyses, as depicted in Panel A. Furthermore, Panel B shows pairwise correlations.

Apparent within the data is a noteworthy divergence in the reported total assets recorded on the balance sheet, alongside the portfolios designated as investment property, demonstrating considerable variations in size across our sample. Concurrently, it is evident that a substantial proportion of these total assets comprises investment property accounted for under the framework of fair value accounting, which further underlines the relevance of the fair value issue discussed in our study. Correspondingly, the absolute amount of fair value adjustments within the sample also varies greatly according to the size of the companies.

## Fair Value Adjustments

### Panel A: Selected descriptive statistics

Variables	Mean	Median	SD	Max	Min
Total Assets (TA)	4,986.27	2,092.23	8,083.96	65,003.20	18.01
Investment Property	3,971.66	1,893.79	5,937.38	58,071.80	27.00
FV adjustments (absolute)	76.85	23.90	434.92	4,304.58	-4,837.20
FV adjustments (per TA)	0.02	0.01	0.05	0.37	-0.69
FFO-Surprise	0.00	0.01	0.58	6.29	-10.94
JLL composite score (Transparency)	1.82	1.80	0.48	3.14	1.22
Market-to-book-ratio of equity ( <i>GROWTH</i> )	1.21	0.95	5.34	201.24	-0.69
Log normal of market value of equity ( <i>SIZE</i> )	6.92	6.95	1.31	10.43	-0.15
Leverage ( <i>LEV</i> )	1.77	0.84	12.94	387.79	-19.96
Change in Leverage (LEV_change)	-31.77	-0.37	1,946.59	31,194.53	-40,470.52
Kothari-model ( <i>EM</i> )	-9.07	-10.51	38.09	328.25	-329.34

### Panel B: Pairwise correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1) CAR [-1;1]	1.000								
(2) FFO-surprise	0.146***	1.000							
(3) FV-adj. per TA	0.014	0.062**	1.000						
(4) GROWTH	-0.002	0.016	0.028	1.000					
(5) SIZE	-0.067***	0.049*	0.151***	0.026	1.000				
(6) LEV	-0.007	-0.002	-0.010	0.761***	-0.044*	1.000			
(7) LEV_change	-0.011	0.025	-0.013	0.377***	0.005	0.518***	1.000		
(8) EM	-0.047*	-0.093***	0.144***	-0.009	-0.014	0.035	0.026	1.000	
(9) DELAY	-0.054**	-0.023	-0.042*	0.013	-0.178***	0.078***	0.002	0.082***	1.000

Table 12: Descriptive statistics

## Fair Value Adjustments

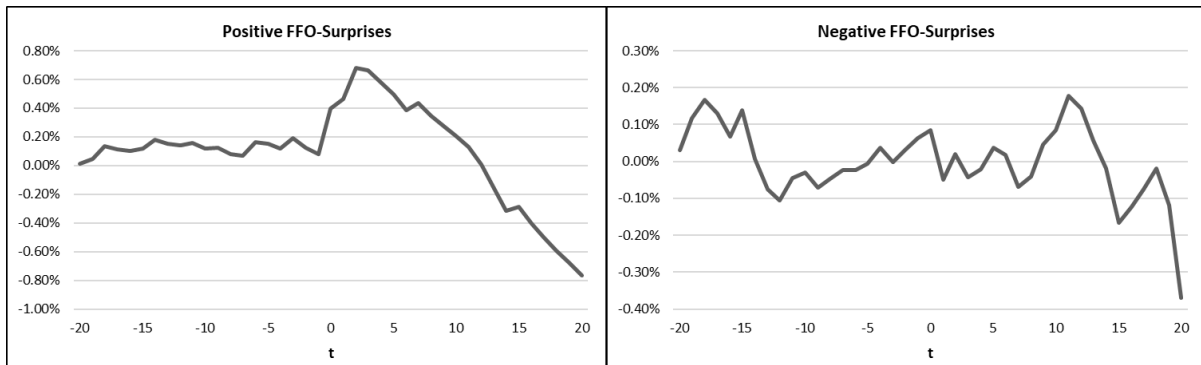
Event window		CAAR	t-test (p-value   sig)	Patell-test (p-value   sig)	Wilcoxon-test (p-value   sig)
<i>Panel A: Market model</i>					
[-1 ; 1]	Highest quartile	0.57%	0.002   ***	0.000   ***	0.010   **
	Positive surprise	0.34%	0.000   ***	0.000   ***	0.003   ***
	Negative surprise	-0.08%	0.546	0.574	0.569
	Lowest quartile	-0.02%	0.895	0.337	0.542
[0 ; 1]	Highest quartile	0.63%	0.000   ***	0.000   ***	0.002   ***
	Positive surprise	0.39%	0.000   ***	0.000   ***	0.000   ***
	Negative surprise	-0.11%	0.312	0.891	0.437
	Lowest quartile	-0.12%	0.397	0.390	0.576
[0 ; 2]	Highest quartile	0.95%	0.002   ***	0.000   ***	0.010   **
	Positive surprise	0.61%	0.000   ***	0.000   ***	0.000   ***
	Negative surprise	-0.04%	0.755	0.509	0.381
	Lowest quartile	0.03%	0.875	0.085   *	0.337
<i>Panel B: Fama and French three-factor model</i>					
[-1 ; 1]	Highest quartile	0.39%	0.021   **	0.000   ***	0.046   **
	Positive surprise	0.26%	0.003   ***	0.000   ***	0.055   *
	Negative surprise	-0.19%	0.165	0.399	0.528
	Lowest quartile	-0.20%	0.218	0.702	0.534
[0 ; 1]	Highest quartile	0.39%	0.005   ***	0.000   ***	0.040   **
	Positive surprise	0.26%	0.000   ***	0.000   ***	0.046   **
	Negative surprise	-0.16%	0.158	0.799	0.620
	Lowest quartile	-0.21%	0.117	0.870	0.501
[0 ; 2]	Highest quartile	0.82%	0.000   ***	0.000   ***	0.003   ***
	Positive surprise	0.45%	0.000   ***	0.000   ***	0.001   ***
	Negative surprise	-0.11%	0.430	0.519	0.775
	Lowest quartile	-0.13%	0.453	0.624	0.734

Table 13: Cumulative average abnormal returns around earnings announcements

Table 13 summarizes our short-term event study results, separately for positive (highest quartile) and negative (lowest quartile) FFO-surprises. We've employed both the market model (*Panel A*) and the Fama and French three-factor model (*Panel B*) to assess stock price reactions across various event windows. It's noteworthy that results from both models align closely. As anticipated, we consistently observe highly significant positive stock price reactions in response to positive FFO-surprises. Conversely, negative FFO-surprises appear to yield negative stock price reactions, although these reactions don't reach statistical significance. This is contrary to the findings of Gyamfi-Yeboah et al. (2012a) and Gyamfi-Yeboah et al. (2012b), who reported significant negative stock price

reactions to negative FFO-surprises in their samples as well. Nevertheless, our findings reinforce the premise that the earnings announcements comprise new and relevant information for investors, triggering notable and statistically significant short-term reactions in stock prices.

For a visual representation of these short-term responses, Figure 4 depicts the reactions separately for positive and negative FFO-surprises. It is evident that the earnings announcements seem to tend to convey new information, or at least are perceived as such. The graphs highlight that when FFO-surprises are positive, there are notable positive reactions. Conversely, this effect is notably absent for negative FFO-surprises, as no undisputed trends are observable.



The figure shows the average abnormal returns around the event dates for positive (left) and negative (right) FFO-Surprises. It is based on the market model.

Figure 4: Average abnormal returns around the events

## 7. Results

First, we examine the potential impact of FFO-surprises on capital market reactions in a baseline model, which is continuously extended in the subsequent analyses. As explained in section 4, we incorporate control variables encompassing customary metrics associated with earnings surprise and value-relevance studies (particularly regarding fair value adjustments), such as the market-to-book ratio of equity (*GROWTH*), the natural logarithm of the market value of equity (*SIZE*), serving as a size variable, leverage (*LEV*), and the change of the leverage (*LEV\_change*) (Ball and Kothari 1991; Fan and Wong 2002; Kama 2009; So and Smith 2009; Fink 2021). In addition, we include an earnings management measure using the Kothari-model (*EM*) in our analyses, since, for example, if investors perceive that small or minimal positive earnings surprises are more inclined to be a consequence of earnings manipulation compared to other types of earnings surprises, they are likely to view these earnings surprises as less indicative of the

company's future profitability. Additionally, if investors believe that such earnings surprises are more likely due to the management of analyst expectations than those in different ranges, these earnings surprises are likely to be relatively less 'surprising'. Consequently, they would have a diminished impact on investors' assessments of the firm's performance (Keung et al. 2010; Louis and Sun 2011). Importantly, by doing so, it allows us to separate the influence of fair value adjustments (or non-recurring items) since these fair value adjustments might be also connected to investors feeling uncertain about how to assess earnings announcements if they also suggest the presence of a high level of earnings management. Finally, we control for how many days after the end of the fiscal year the earnings were announced (*DELAY*), because as Ball and Kothari (1991) state, bad news is typically disclosed later, and there may be anticipatory adjustments in stock prices preceding such disclosures.

Table 14 presents the baseline model results for different event windows and methods used to calculate CARs.

## Fair Value Adjustments

Number	(1.1)	(2.1)	(3.1)	(4.1)	(5.1)	(6.1)
Variables	Market model			Fama and French three-factor model		
	CAR [-1;1]	CAR [0;1]	CAR [0;2]	CAR [-1;1]	CAR [0;1]	CAR [0;2]
FFO-surprise	0.010*** (0.002)	0.012*** (0.002)	0.012*** (0.002)	0.013*** (0.002)	0.012*** (0.002)	0.013*** (0.002)
GROWTH	-0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	0.000 (0.001)
SIZE	-0.002*** (0.001)	-0.002*** (0.001)	-0.003*** (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.002** (0.001)
LEV	0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.001)
LEV_change	-0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
EM	-0.000 (0.000)	-0.000* (0.000)	-0.000 (0.000)	-0.000* (0.000)	-0.000*** (0.000)	-0.000 (0.000)
DELAY	-0.000*** (0.000)	-0.000** (0.000)	-0.000* (0.000)	-0.000** (0.000)	-0.000* (0.000)	0.000 (0.001)
constant	0.047*** (0.010)	0.040*** (0.009)	0.050*** (0.010)	0.035*** (0.011)	0.036*** (0.010)	0.034*** (0.010)
Year-fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,535	1,535	1,535	1,253	1,253	1,212
R-squared	0.057	0.065	0.061	0.076	0.070	0.083

Robust standard errors in parentheses  
\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 14: Baseline models – The link between FFO-surprises and stock market reactions in the real estate sector

The results reveal consistently positive coefficients with a high level of statistical significance for the primary variable of interest, FFO-surprise. Thus, the results of the baseline model are fundamentally in line with expectations. They indicate that new and relevant information is disclosed in the earnings announcements, with an unexpected positive development of FFO correspondingly resulting in a positive price response.<sup>12</sup> These findings lend robust support to our first research hypothesis, affirming that the established effect of earnings surprises can be extended to the real estate sector, particularly when considering the key performance metric of FFO, which holds particular relevance within this industry. Thus, our results support the findings of Gyamfi-Yeboah et al. (2012a) and Gyamfi-Yeboah et al. (2012b) on stock price reactions to FFO-surprises.

<sup>12</sup> In untabulated results, we only find very limited significant results for the traditional earnings surprise, which further highlights the relevance of the FFO figure for the real estate sector.



## Fair Value Adjustments

Thus, we are also providing a further contribution to the discussion on the informative value of FFO for the real estate sector and emphasizing its importance.

Subsequently, we extend our model by incorporating the interaction term introduced in section 4, focusing on the unique implications of fair value adjustments as a proxy for non-recurring effects within earnings announcements. We present the findings in Table 15.

Number	(1.2)	(2.2)	(3.2)	(4.2)	(5.2)	(6.2)
Variables	Market model			Fama and French three-factor model		
	CAR [-1;1]	CAR [0;1]	CAR [0;2]	CAR [-1;1]	CAR [0;1]	CAR [0;2]
FFO-surprise	0.013*** (0.002)	0.015*** (0.002)	0.016*** (0.002)	0.014*** (0.002)	0.013*** (0.002)	0.014*** (0.002)
Material FV-adj. x FFO-surprise	-0.017*** (0.005)	-0.018*** (0.004)	-0.021*** (0.005)	-0.006 (0.006)	-0.009 (0.006)	-0.012* (0.007)
GROWTH	-0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	0.000 (0.001)
SIZE	-0.002*** (0.001)	-0.002*** (0.001)	-0.003*** (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.002** (0.001)
LEV	0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.001)
LEV_change	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.001)
EM	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000* (0.000)	-0.000*** (0.000)	-0.000 (0.000)
DELAY	-0.000*** (0.000)	-0.000** (0.000)	-0.000* (0.000)	-0.000** (0.000)	-0.000* (0.000)	0.000 (0.001)
constant	0.018*** (0.007)	0.017*** (0.006)	0.019*** (0.007)	0.003 (0.007)	0.007 (0.007)	0.007 (0.008)
Year-fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,535	1,535	1,535	1,253	1,253	1,212
R-squared	0.066	0.077	0.074	0.077	0.072	0.086

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 15: Market reactions to material fair value adjustments

To begin, it's essential to highlight the persistent validity of the previously discussed findings, which continue to reinforce Hypothesis 1. Simultaneously, we observe a mitigation of this effect when fair value adjustments exert a particularly pronounced influence on earnings announcements. Consequently, the models exhibit negative coefficients, predominantly accompanied by statistical significance with the exceptions of models 4.2 and 5.2. Thus, the results suggest that very remarkable fair value adjustments

increase investor uncertainty and dampen market reactions (Ecker et al. 2006; Francis et al. 2007). At the same time, the results support the argument that fair value adjustments are subject to higher risk as they represent unrealized gains (or losses) and could be characterized as non-recurring effects which are associated with greater uncertainty and risk for the future performance of the company in relation to more reliably recurring lease income. In summary, except for models 4.2 and 5.2, our findings offer support for Hypothesis 2.

Next, we include the transparency of real estate markets and, consequently, the verifiability of fair value adjustments, which partly counteracts the uncertainty from the rationale for hypothesis 2. It's worth noting that this expansion leads to a reduction of the sample size since, as described in section 4, the used transparency values are collected only biennially. Our a priori expectation is that in more transparent markets, fair value adjustments will receive a more favorable appraisal. The results presented in Table 16 validate these expectations. Specifically, across all models, the results consistently exhibit positive coefficients, coupled with statistical significance. Thus, our findings lend robust support to Hypothesis 3. Consequently, we discern that fair value adjustments are attributed a higher weighting by investors if they are replicable and the market is generally transparent, since in this scenario, especially increases can be verified more accurately and are subject to less uncertainty for predicting future profitability and therefore pose a lower risk to investors. Furthermore, the results for the reduced sample substantiate our previously described findings concerning Hypotheses 1 and 2. Particularly within the context of Hypothesis 2, these results exhibit an even higher degree of consistency.

## Fair Value Adjustments

Number	(1.3)	(2.3)	(3.3)	(4.3)	(5.3)	(6.3)
Variables	Market model			Fama and French three-factor model		
	CAR [-1;1]	CAR [0;1]	CAR [0;2]	CAR [-1;1]	CAR [0;1]	CAR [0;2]
FFO-surprise	0.015*** (0.002)	0.017*** (0.002)	0.017*** (0.002)	0.018*** (0.002)	0.016*** (0.002)	0.017*** (0.002)
Material FV-adj. x FFO-surprise	-0.025*** (0.008)	-0.029*** (0.007)	-0.033*** (0.008)	-0.032*** (0.008)	-0.034*** (0.007)	-0.060*** (0.010)
FV-adj. per TA x Transparency	0.140*** (0.049)	0.167*** (0.045)	0.152*** (0.050)	0.140*** (0.054)	0.146*** (0.051)	0.119** (0.054)
GROWTH	-0.001 (0.001)	-0.001 (0.001)	0.001 (0.001)	-0.001 (0.001)	-0.002 (0.001)	0.002 (0.001)
SIZE	-0.004*** (0.001)	-0.004*** (0.001)	-0.004*** (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.003** (0.001)
LEV	0.000 (0.000)	0.001** (0.000)	0.000 (0.000)	0.000 (0.000)	0.001*** (0.000)	-0.001 (0.000)
LEV_change	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)
EM	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	-0.000** (0.000)	-0.000*** (0.000)	-0.000 (0.000)
DELAY	-0.000* (0.000)	-0.000* (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
constant	0.028*** (0.010)	0.028*** (0.009)	0.028*** (0.010)	0.003 (0.010)	0.006 (0.010)	0.013 (0.010)
Year-fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	774	774	774	619	619	597
R-squared	0.103	0.145	0.122	0.124	0.133	0.155

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 16: The role of transparency for fair value adjustments

In summary, we conclude that FFO-surprises within the real estate sector tend to be generally perceived and valued positively by investors. These findings align with established relations between earnings surprises and stock market reactions documented in prior research, but our study extends these insights to the unique context of the real estate sector and its key performance indicators, further supporting the first insights from Gyamfi-Yeboah et al. (2012a) and Gyamfi-Yeboah et al. (2012b). Moreover, our results provide empirical support for the uncertainty and risk linked to substantial fair value adjustments as a proxy for non-recurring earnings, as these represent unrealized gains or losses and, above all, not reliably recurring future cash flows (Stunda and Typpo 2004; Francis et al. 2007), a crucial factor in company valuation. The significance of investor

uncertainty concerning fair value adjustments becomes even more evident in transparent markets, where the reported fair value adjustments are more replicable. In such settings, investors tend to react more positively to fair value adjustments when assessing the new information conveyed in earnings announcements.

### **8. Conclusion**

Our study has provided profound insights into the interplay of fair value accounting, surprising results in earnings announcements, and investor perceptions within the real estate sector. Initially, our study examined the relationship between earnings surprises, measured through Funds from Operations, and stock market reactions within the real estate industry. Our results unequivocally confirm that earnings surprises hold a significant sway over investor sentiment within this sector. This aligns with the first findings of Gyamfi-Yeboah et al. (2012a) and Gyamfi-Yeboah et al. (2012b) for Real Estate Investment Trusts and existing research in broader finance, indicating that investors within the real estate market are equally responsive to unexpected earnings developments. Therefore, we are making an additional contribution to the discourse on the informativeness of Funds from Operations (FFO) for the real estate sector, underscoring its significance.

Building upon this foundation, we further broadened the scope of our study to encompass the central focus of this study. We aimed to analyze the extent to which the attributes and factors surrounding reported earnings impact their processing and interpretation within the capital market. Specifically, our study addressed the issue of non-recurring earnings, a distinctive feature of the real estate sector's accounting practices as investment property is of major relevance in this sector and is revalued annually under the fair value approach, which does not, however, represent reliably recurring earnings. We found that while investors generally respond positively to FFO-surprises, this sentiment is moderated or even negated when earnings surprises are accompanied by substantial fair value adjustments, and thus by off-off effects. This uncertainty among investors can be attributed to the unique characteristics of these adjustments. First, they represent unrealized gains and losses that may not reliably translate into future cash flows, and therefore investor reactions tend to be more muted as the major impact of the fair value adjustments on reported earnings causes greater investor uncertainty (Ecker et al. 2006; Francis et al. 2007). Second, fair value adjustments may be considered as transitory items,

as they don't consistently recur and are subject to a high degree of uncertainty, a factor that investors tend to consider to a lesser extent (Stunda and Typpo 2004). Thus, the results illustrate the uncertainty surrounding non-recurring earnings and the risk that investors attach to them. Besides, the findings underscore the need for a nuanced understanding of fair value adjustments in the real estate context, the impact that non-recurring earnings can potentially have on the income statement and its consequences.

Since our findings suggest that fair value adjustments might be treated with uncertainty and caution by investors, we extend our analysis to account for market transparency. We find that in markets characterized by higher levels of transparency, investors tend to react more favorably to fair value adjustments. This supports the argument that if fair value adjustments are more verifiable due to increased transparency, investors accord them higher weight in the assessment of future profitability. Thus, our findings indicate that comprehensibility and clarity in financial reporting mitigate the uncertainty associated with these adjustments, highlighting the importance of transparent financial and real estate markets for investors.

While our study provides valuable insights, it may be subject to some limitations and provides a scope for future research. For example, our results may have lost some of their explanatory power because several observations had to be excluded due to missing data, or the impact of broader macroeconomic factors could have been more reflected in the analyses. In future research, potential differences between real estate firms that are primarily operating in the residential real estate market vs. the commercial and office real estate market may deserve further exploration. We also emphasize that extending the study to firms reporting under national accounting standards, which also allow fair value accounting for investment property, could extend and validate our findings.

In conclusion, this study bridges the gap between non-recurring earnings using fair value accounting as a consistently recurring proxy, earnings surprises, and investor perceptions, using the real estate sector as an example. It highlights the importance of transparency in the assessment of fair value adjustments by investors and offers practical guidance for firms operating in this industry. Additionally, by deepening our understanding of the intricacies within the real estate market, our research contributes to a more informed and nuanced approach to financial reporting and investor relations within this dynamic sector.

## Chapter 5

Investment in non-fungible tokens (NFTs): the return of Ethereum secondary market NFT sales

## Abstract

The increasing attention to non-fungible tokens (NFTs) since 2021, and many reports of remarkable returns by traders of NFTs raise the question of the actual returns in the whole NFT market. We examine the returns of NFT resales using data of 2.12 million secondary market NFT trades on Ethereum's five largest marketplaces starting in June 2017 until December 2021 at the individual transaction level and trader level and control for transaction costs by implementing a linear regression model and nonparametric tests. We find that the majority of resales are in profit and a high concentration of profits at the trader level, with the top 10% of traders accounting for the majority of profits, and we identify differences in profits for the analyzed NFT categories. Our results show that experienced investors systematically outperform inexperienced investors, indicating information inefficiency in the NFT market, while we do not find clear evidence for the underperformance of more expensive NFTs compared to less expensive ones. Additionally, we find indications of the importance of pump-and-dump schemes on the level of returns.

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## Declaration of honor

I declare upon my word of honor that the doctoral thesis submitted herewith is my own work. All sources and aids used have been listed. All references or quotations in any form and their usage have been clarified.

The dissertation has not been submitted for examination purposes to any institution before.