Essays on Financial Misreporting and Audit Quality

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Zusammenfassung

Diese Dissertation beinhaltet vier Beiträge. Die ersten drei Beiträge untersuchen Fragestellungen zur Prüfungsforschung mittels spieltheoretischer Modelle. Der vierte Beitrag nutzt eine experimentell empirische Methodik zur Analyse der inneren Rechtfertigung von Bilanzmanipulation.

Der erste Beitrag analysiert, wie sich die Veröffentlichung von Prüfungsschwerpunkten durch *Enforcement*-Institutionen auf Bilanzmanipulation und Prüfungsqualität und somit auf die Qualität der Finanzberichterstattung auswirkt. Dabei kann gezeigt werden, dass die Qualität der Finanzberichterstattung durch die Veröffentlichung sowohl steigen als auch sinken kann. Außerdem wird gezeigt, welche Faktoren vorliegen müssen, damit eine Veröffentlichung von Prüfungsschwerpunkten die Qualität der Finanzberichterstattung steigern kann und wie *Enforcement*-Institutionen diese Faktoren beeinflussen können.

Der zweite Beitrag untersucht, welche Effekte die Wahl des Abschlussprüfers durch eine unabhängige dritte Partei (bspw. eine Börse) auf Bilanzmanipulation und Investitionseffizienz hat. Der Beitrag zeigt auf, dass die Wahl des Abschlussprüfers durch eine dritte Partei die Investitionseffizienz nicht nur steigern, sondern auch senken kann. Die Wahl des Abschlussprüfers durch eine dritte Partei kann zwar Bilanzmanipulation mindern, Manipulation kann so jedoch nicht mehr zum Ausgleich vorsichtiger Rechnungslegung genutzt werden und somit Unterinvestitionen nicht verhindern. Der Beitrag zeigt auf, welche Faktoren zu einer Steigerung bzw. Senkung der Investitionseffizienz führen können.

Der dritte Beitrag analysiert, welche Faktoren zu einer Aufspaltung von Prüfungsgesellschaften in reine Prüfungs- und Beratungsgesellschaften – wie einst von EY geplant – führen. Es wird gezeigt, wie sich eine Aufspaltung auf die Prüfungsqualität auswirkt und, welche Rolle die Stärke des *Enforcement* hierbei spielt. Drei Effekte beeinflussen maßgeblich die Entscheidung zur Aufspaltung und ihre Folgen. Zum einen entsteht ein Unabhängigkeitskonflikt, da der Beratungspartner verhindern will, einen Versagungsvermerk zu erteilen. Zweitens entstehen Arbeitsanreize für den Beratungspartner, da dieser aus Angst vor Reputationsverlusten verhindern will, dass es zu einem Fehlurteil in der Prüfung kommt. Drittens ergeben sich Kostenvorteile aus dem simultanen Anbieten von Prüfung und Beratung. Die Stärke des *Enforcement* determiniert hierbei, welcher der ersten beiden Effekte überwiegt. Der kumulierte Effekt einer Aufspaltung hängt daher von den genannten Effekten und der Stärke des *Enforcement* ab.

Der vierte Beitrag untersucht die innere Rechtfertigung von Bilanzmanipulation. Dabei wird mittels eines *2x2 between-subjects* Experiments analysiert, ob ein exogen verursachter schlechter Umweltzustand zu höherer Manipulation führt, wenn andere Zustände bekannt sind. Der Beitrag macht deutlich, dass dies die Anspruchshaltung (*Entitlement*) eines Managers und somit die Manipulationswahrscheinlichkeit erhöht.

Summary

This dissertation comprises four articles. The first three articles analyze auditing research questions using analytical models. The fourth article uses an experimental empirical research method to analyze the rationalization of misreporting.

The first article analyzes how enforcement institutions' inspection focus disclosure influences the managers' misreporting, the auditors' effort choices, and thus the financial reporting quality. We, thereby, show that focus disclosure can enhance or deteriorate financial reporting quality. We also highlight conditions under which focus disclosure can yield a higher financial reporting quality and how enforcement institutions can influence these conditions.

The second article analyzes how third-party auditor hiring (e.g., by a stock exchange) affects entrepreneurs' misreporting choices and overall investment efficiency. I show that even though independence issues could be solved, third-party auditor hiring can enhance or deteriorate investment efficiency. Third-party hiring can harm investment efficiency as it reduces misreporting, and thus, misreporting cannot be used to compensate a conservative accounting system to prevent underinvestment. Further, I highlight conditions under which third-party hiring yields a higher or lower investment efficiency.

The third article analyzes driving forces for audit firm split-ups into stand-alone audit and advisory firms, such as the once planned EY split-up. In addition, we explore the potential consequences of audit firm split-ups on audit quality and the role of enforcement strength. We find that three effects determine split-up preferences and its consequences: First, as the advisory partner wants to prevent an adverse audit opinion to keep the client, independence problems arise. Second, as the advisory partner loses reputation in case of an audit failure, an advisory project creates positive effort incentives. Third, spillovers from audit to advisory lower the advisory partner's project costs. Enforcement strength, thereby, determines which of the first two effects dominates because enforcement strength determines effort incentives. These effects and, thus, enforcement strength determine the overall effect of audit split-ups on audit quality.

The fourth article analyzes the rationalization of financial misreporting. Using a *2x2 between-subjects* experiment, we find that an externally caused bad environmental state causes a higher misreporting likelihood. This effect only occurs if participants are aware of other environmental states. Observing other states where it is easier to achieve a bonus, managers in the bad environmental state feel a greater sense of *entitlement* and misreport more. Thus, we find that *entitlement* works as a mediator for financial misreporting.

Schlagwörter: Prüfungsaufwand · Prüfungsqualität · Prüferunabhängigkeit · Qualität der Finanzberichterstattung · Bilanzmanipulation · Durchsetzung von Rechnungslegungsnormen (*Enforcement*) · Ausgestaltung von *Enforcement* · Offenlegung von Prüfungsschwerpunkten · Prüferwahl · Investitionseffizienz · Nichtprüfungsleistungen · Aufspaltung von Prüfungsgesellschaften · Gewinnbeteiligungsregel · Persönliche Rechtfertigung von Betrug

Keywords: Audit Effort · Audit Quality · Auditor Independence · Financial Reporting Quality · Misreporting · Financial Enforcement · Enforcement Design · Enforcement Inspection Focus Disclosure · Auditor Hiring · Investment Efficiency · Non-Audit-Service · Audit Firm Split-up · Audit Firm Sharing Rule · Fraud Rationalization

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Chapter 1

Introduction

1.1 Motivation

Financial reporting quality is crucial to financial markets and corporate management. A high financial reporting quality can increase investment efficiency (e.g., Healy and Palepu, 2001) and provide accurate and useful information to managers, allowing them to improve organizational performance (e.g., Bushmann and Smith, 2001). Financial reporting quality can be divided into two main aspects. The first one is the quality of the preliminary financial statement, determined by financial misreporting, the firm's internal controls, and the manager's ability to comply with accounting regulations. The other aspect determining financial reporting quality is the quality of the statutory audit. A superior audit quality can build trust in the financial markets and, thereby, for example, reduce the cost of capital (e.g., Mansi et al., 2004).

This trust was harmed by a series of accounting scandals in the early 2000s, including the fall of Enron, Tyco International, Comroad, and WorldCom. In the aftermath of those scandals, regulators worldwide reacted by strengthening regulations both on the firms' and the auditors' side. For example, the Sarbanes-Oxley Act (SOX) 2002 in the USA or the Directive 2006/43/EC in the EU were enacted to enhance financial reporting quality and restore the trust of the financial markets in firms' financial statements. On the firm level, these reforms included the implementation of audit committees, strengthening internal controls, and higher penalties for non-compliance with accounting regulations. On the auditor side, SOX included regulations of the auditor-client relationship regarding non-audit services, client size, and mandatory audit partner rotation, as well as strengthening financial enforcement and the implementation of the Public Company Accounting Oversight Board (PCAOB) as an additional audit oversight body.

Research has examined these scandals, and the subsequent reforms in a variety of studies, for example, DeFond and Francis, 2005; Patterson and Smith, 2007; Weber et al., 2008 or Deng et al., 2012. Some of these studies have led to further regulations. However, the recent collapse of payment provider Wirecard in Germany, the overstated profits of UK

supermarket chain Tesco, and the cross-selling scandal of US bank Wells Fargo show that further development and assessment of financial reporting and auditor regulation is still crucial to improve financial reporting quality. It, thereby, is essential to study both sides of financial reporting quality; financial misreporting and audit quality. This dissertation, therefore, analyzes different aspects of auditor regulation in chapter 2, 3, and 4, whereas chapter 5 focuses solely on financial misreporting.

One aspect discussed in literature and politics to improve the financial reporting quality is the role of enforcement institutions. Enforcement describes procedures that examine whether firms' financial statements have been prepared in compliance with accounting regulations. Enforcement, thereby, only captures procedures performed above the firms' own internal controls and audits, including the statutory auditor (European Securities Regulators (CESR), 2003). The effect of this additional inspection by state authorities above the auditor on audit quality and financial reporting quality has been examined in various studies (e.g., Ball et al., 2000; Leuz et al., 2003; Lang et al., 2006; Kedia and Rajgopal, 2011 or Ernstberger et al., 2012). Analytical literature, thereby, mainly focuses on the strategic interaction between public and private enforcement institutions (Schantl and Wagenhofer, 2020) or the effects of enforcement on management decisions and auditors' effort choices and, therefore, on the financial reporting quality (e.g., Schantl and Wagenhofer, 2021; Ewert and Wagenhofer, 2019; Laux and Stocken, 2018; Koenigsgruber, 2012). However, research needs to sufficiently explain differences in the design of enforcement institutions in different countries in order to improve regulation. Examining these differences, one can find that the disclosure of enforcement institutions' inspection focus differs significantly. Some enforcement institutions, such as the German financial market authority, disclose detailed information regarding their inspection focus prior to the inspection, while others, such as the SEC, only disclose general information. If managers and auditors observe the inspection focus, they might emphasize the focus areas more and misreport within the non-focus areas. Studying the impact of inspection focus disclosure on audit effort and financial misreporting and, thus, on the financial reporting quality is vital to optimize enforcement institution design.

Another aspect raised when discussing audit quality is auditor hiring. The fact that auditors are hired by the firm itself or related bodies, such as the supervisory board or the shareholders themselves, is often perceived as a threat to auditor independence and, thus, to audit quality. Therefore, regulatory reforms often include stricter auditor selection and hiring regulations, such as fee caps, mandatory internal and external auditor rotation, or maximum client size regulations. Instead of further regulating the auditor-client relationship, one could fundamentally change it by having an independent third party select and hire the auditor (Healy and Palepu, 2003). All potential independence issues would be cleared if the firm can no longer terminate the auditing contract. However, other threats may arise, as the third party has its own interests. For example, a stock

exchange as a third party wants to maximize the overall investment level. Thus, studying the unintended consequences of fundamentally changing the auditor-client relationship by introducing third-party hiring on misreporting and investment efficiency is vital to enhance future regulations.

Another potential threat to auditor independence discussed in literature and politics is the role of non-audit services (e.g., DeFond et al., 2002; Ashbaugh et al., 2003; Knechel et al., 2012; Svanstroem, 2013). Therefore, the limitation of non-audit services provided by the auditor has been a key concern in various reforms. Debating the regulation of non-audit services, some also suggest an entire split-up of audit firms into stand-alone audit and advisory firms to clear any conflicts of interest (Kwarteng, 2021). However, even if all independence issues are solved, the overall effect of split-ups on audit quality remains ambiguous, as a split-up leads to a loss of advisory expertise for the audit, e.g., valuation or tax expertise (Beck and Wu, 2006). On September 8th, the Big-4 audit firm EY announced a plan to split up their audit and advisory business (EY, 2022). Remarkably, the split-up plan was developed by EY partners themselves and was not proposed or required by regulatory bodies. However, in 2023 EY decided to stop the execution of the split-up (Eaglesham, 2023). Thus, analyzing audit firm split-ups' determinants and consequences is vital to guide current and future regulations.

Besides audit quality, financial reporting quality is also influenced by financial misreporting. Drivers of financial misreporting have been discussed in accounting literature, as well as disciplines like law, ethics, and psychology. Identifying the drivers of financial misreporting is highly relevant for practice and theory alike. The most widely used framework to categorize fraud drivers is the fraud triangle from Cressey, D. R., 1953, which has been adopted in auditing standards worldwide (e.g., ISA 240 or AS 2401). According to the fraud triangle, three factors must be in place for individuals to commit fraud: (1) opportunity, (2) incentive, and (3) rationalization. The first and the second factor have already been examined in a variety of studies (for example: (1) Bruner et al., 2008; Trompeter et al., 2014 (2) Zhao and Chen, 2008; Magilke et al., 2009). Whereas the third factor, the rationalization of fraud, has received the least attention in accounting research (Hogan et al., 2008). However, the fact that managers who commit fraud need to justify their malign behavior for themself is crucial for fraud to occur. Understanding this self-justification can help auditors to improve their fraud considerations during the financial statement audit and managers when designing the firm's internal controls. Thus, gaining a deeper understanding of fraud rationalization is essential to guide practice and future regulations to prevent – or at least reduce – fraudulent reporting.

1.2 Contribution and Main Findings

This thesis consists of four articles. Table 1.1 provides an overview of the articles, the coauthors, and the presentations at international conferences and workshops.

Title	Coauthors	Conferences
Disclose or Conceal Enforcement Focus? The Effects on Misreporting, Audit Effort, and Financial Reporting Quality	Alexandra Lilge	ARFA 2022; EIASM Workshop on Accounting & Economics 2022; GEABA 2022; EIASM Workshop on Audit Quality 2022
Unintended Consequences of Third-Party Auditor Hiring	None	
Audit Firm Split-Up: The Effect on Audit Quality and the Role of Enforcement Strength	Alexandra Lilge	ARFA 2023; EAA 2023
Rationalization of Financial Misreporting: Does Entitlement Matter?	Alexandra Lilge	

Table 1.1: Article Overview.

Using a game-theoretic model, the first article *Disclose or Conceal Enforcement Focus? The Effects on Misreporting, Audit Effort, and Financial Reporting Quality* presented in Chapter 2 analyzes how enforcement institutions' inspection focus disclosure affects managers' misreporting and auditors' effort choices and, thereby, the financial reporting quality. Although one could expect that disclosing the inspection focus harms the financial reporting quality, the article shows that focus disclosure can also enhance the financial reporting quality. In addition, the article derives how enforcement institutions can influence the effect of focus disclosure by increasing the detection probability or the imposed penalties. By doing so, the article is closely related to Ewert and Wagenhofer, 2019 and Lazear, 2006. While Ewert and Wagenhofer, 2019 study the general effect of enforcement on an auditor's effort decision and a manager's misreporting decision, Lazear, 2006 analyzes various settings of inspection focus disclosures, such as speeding, tax fraud, or terrorism. The article *Disclose or Conceal Enforcement Focus?* combines those by analyzing the effect of enforcement focus disclosure on financial reporting quality.

The second article, entitled *Unintended Consequences of Third-Party Auditor Hiring*, presented in Chapter 3, uses a game-theoretic model to analyze the effect of third-party auditor hiring on an entrepreneur's misreporting choice and overall investment efficiency. Third-party auditor hiring could solve auditors' independence issues by eliminating clients'

threat to terminate the auditing contract. However, as the third party may have its own interests, new threats to audit quality could arise. The article, thereby, shows that third-party hiring by a stock exchange can also harm investment efficiency if an imperfect accounting system is in place. As under- and overinvestment problems can occur in an imperfect accounting system, the entrepreneur can engage in beneficial misreporting, i.e., misreporting that prevents underinvestment. Third-party hiring could prevent this beneficial misreporting. The article also highlights conditions under which third-party auditor hiring can increase beneficial misreporting and, therefore, investment efficiency.

The third article *Audit Firm Split-Up: The Effect on Audit Quality and the Role of Enforcement Strength* presented in Chapter 4 examines driving forces for audit firm split-ups into stand-alone audit and advisory firms. The article analyzes the potential consequences of those split-ups on audit quality and the role of enforcement strength. Using a game-theoretic model, the article derives three main drivers of audit firm split-ups: the probability that the audit firm issues an adverse audit opinion, the probability of an audit failure, and costs or knowledge spillovers from audit to advisory. The article also finds that these effects determine the overall effect of split-ups on audit quality. The enforcement strength, thereby, determines which of the first two effects dominates. Thus, the overall effect of split-ups on audit quality is ambiguous. By analyzing a sharing rule in an audit firm, the article is closely related to the literature on profit and risk sharing, especially to Liu and Simunic, 2005 and Liu and Chan, 2012. Liu and Simunic, 2005 analyze sharing rules between audit partners, while Liu and Chan, 2012 analyze the optimal sharing rule between an audit and an advisory partner who only provides non-audit-services. Chapter 4 adds to this by considering a setting where the advisory partner is also part of the audit process as an auditor's expert (e.g., valuation or tax experts) and has an outside option by splitting the audit firm.

The fourth article *Rationalization of Financial Misreporting: Does Entitlement Matter?* presented in Chapter 5 examines the rationalization of financial misreporting by using a *2x2 between-subjects* experiment. The article shows that a bad environmental state causes a greater sense of entitlement and, therefore, a higher rate and a higher degree of misreporting. These effects vanish if entrepreneurs are unaware of other environmental states. The article is closely related to Nichol, 2019 and Gravert, 2013. Nichol, 2019 shows that penalty contracts cause more misreporting due to a greater sense of entitlement. Gravert, 2013 finds that individuals, on average, steal more if their self-perceived effort and their earned bonus do not match. Chapter 5 combines these results and shows that in the financial reporting context entitlement can indeed be a mediator for financial misreporting.

Chapter 2

Disclose or Conceal Enforcement Focus? The Effects on Misreporting, Audit Effort, and Financial Reporting Quality*

Abstract

We examine how enforcement institutions' inspection focus disclosure influences financial reporting quality through managers' misreporting and auditors' effort choices. We find that disclosure can either enhance or deteriorate financial reporting quality and highlight the influential factors. We explore how enforcement institutions can influence these conditions by increasing the detection probability or the imposed penalties. Thus, we propose that enforcement institutions should carefully assess whether to disclose or conceal their inspection focus. Our model makes the empirical prediction that disclosing enforcement inspection focus is associated with higher misreporting and lower audit effort if the auditor's reaction to the disclosure is related to high costs.

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Note

A version of this paper has been published on SSRN (Available at SSRN: https://ssrn.com/abstract=4070328).

* This chapter is joint work with Alexandra Lilge (University of Hannover).

2.1 Introduction

Following the collapse of Wirecard due to financial statement fraud in 2020, the interaction between enforcement institutions and statutory auditors has drawn public attention. Despite being audited by a statutory auditor and the state enforcement institution, Wirecard filed for bankruptcy in 2020 and surprised most stakeholders. Since then, regulators proposed various potential reforms to annual audits and state enforcement institutions (Trentmann, 2022). Thus, studies investigating the design of enforcement institutions are vital to help regulators and enforcement institutions improve financial reporting quality (FRQ).

Enforcement institutions usually specify different areas of focus, which typically, comprise new standards or challenging areas in the current economic environment.[1] Moreover, some enforcement institutions disclose these focus areas prior to the inspection. Hence, firms are subject to an inspection, and the firms' auditors observe the enforcement focus. Thus, preparing or auditing the financial statement, firms' managers or auditors anticipate the areas the enforcement institution will inspect. Disclosing the inspection focus can thus create detrimental incentives to misreport or exert less audit effort in areas outside the enforcement institutions' focus. Hence, our study relates to Lazear, 2006, who discusses the consequences of the disclosure of exam material to students or speeding control locations to drivers. He shows that the effect of announcements (disclosure) is ambiguous.

In this study, we examine how enforcement institutions' disclosure of their inspection focus influences FRQ through managers' misreporting and auditors' effort (audit quality) choices. Although one could expect that disclosing the inspection focus can create harmful incentives, we show that focus disclosure can also enhance FRQ.

Examining the enforcement designs of different institutions in the US, Europe, and Australia reveals three aspects worth highlighting. Table 2.1 gives an overview of different enforcement institutions and their focus disclosures (the appendix provides a more detailed version). By analyzing auditors' and managers' reactions to enforcement focus disclosure, our model can explain these remarkable differences in enforcement designs worldwide.

[1] The ESMA, for example, states that one area of focus is "recognition and measurement of deferred tax assets" because forecasting future taxable profits in periods of low economic growth is challenging (ESMA, 2014).

Region	Institution	Disclosure	Disclosure Date	Fiscal Year	Enfor. Year
USA	SEC	General	March 2021	2021	2021
U.K.	FRC	Specific	Dec. 2021	2021	2022/2023
EU	ESMA	General	Oct. 2021	2021	2022
Germany	FFSA/BaFin	Specific	Oct. 2021	2021	2022
Australia	ASIC	General	Dec. 2021	2021	2022

Table 2.1: Enforcement Institution Overview.

First, we note that all intuitions disclose some sort of information about their inspection focus. Nevertheless, the second aspect is that the relevance of the information regarding the inspection focus varies from general terms like "Information Security and Operational Resiliency" (SEC, 2021) or "Climate-related Matters" (ESMA, 2021) to more specific disclosures like "IAS 12 Deferred Taxes" (FRC, 2021) or "Provisions" (ASIC, 2021). We assume that these general disclosures do not influence the decisions by auditors or managers', but specific disclosures might influence the auditors' effort, and thus the managers' misreporting. We refer to a general disclosure as "no-disclosure" and to specific disclosure as "focus disclosure."[2]

Third, the timing of the disclosure is relevant. Most institutions disclose the inspection focus for the upcoming inspection year at the fiscal year-end. Therefore, the fiscal year subject to the inspection with the disclosed focus is the same year the enforcement institution discloses its focus; thus, managers have already prepared the main financial statement components when the enforcement institution discloses its focus. However, the auditor has started the audit process, which usually starts at the end of the last audit but did not end it by stating its final audit opinion.[3] Thus, the auditor has already committed to an initial effort when the focus disclosure occurs, but can adjust the audit effort before forming a final audit opinion.

[2] The PCAOB states "the selection of focus areas may have become more predictable such that firms are able to better anticipate areas to be inspected and place more audit emphasis on those areas, potentially at the risk of reducing attention to other important audit areas" (PCAOB, 2021) and argues that focus disclosure can (negatively) influence auditors' effort choices.

[3] ISA 300 A2 states that "planning is not a discrete phase of an audit, but rather a continual and iterative process that often begins shortly after (or in connection with) the completion of the previous audit and continues until the completion of the current audit engagement." The phrasing in PCAOB AS 2101.05 is almost identical: "planning is not a discrete phase of an audit but, rather, a continual and iterative process that might begin shortly after (or in connection with) the completion of the previous audit and continues until the completion of the current audit."

To analyze the effect of the focus disclosure, we construct a game-theoretic model featuring a firm's manager ('he') and a statutory auditor ('she'). The manager can misreport earnings upward or downward when preparing the financial statement. Next, the auditor plans the audit of the firm's financial statement with a focus on the firm's material items as they affect financial statement users' decisions. During the audit process, the enforcement institution, depending on the regime, discloses (specific disclosure) or conceals (general disclosure) the inspection focus. The focus item thus either matches the firm's material item or not. A disclosed matching item signals to the auditor that an enforcement inspection of her client may lead to a penalty as the client's material item is the enforcement institution's focus. After observing the inspection report, the auditor can adjust her planned (ex-ante) audit effort upward. Nevertheless, as the auditor often has to hire experts or staff from other departments, an upward adjustment of an already planned audit effort is costly. We refer to the additional costs of the upward adjustment in the ex-ante planned audit effort as the "adjustment costs."

We examine the manager's misreporting and the auditor's effort choice under three different regimes: 1) no-enforcement, 2) enforcement and no focus disclosure (no-disclosure), and 3) enforcement and focus disclosure (disclosure). Comparing the first two regimes, we always find less misreporting by the manager under the no-disclosure regime. The auditor exerts higher effort when the penalty from enforcement is sufficiently high. The auditor faces two different effects. First, as the auditor faces a higher penalty for not detecting the manager's misreporting within the enforcement regime (potential enforcement penalty) audit effort incentives increase. Second, as the manager also faces a higher penalty for misreporting and, therefore, misreports less, audit effort incentives decrease. Consequently, if the auditor's penalty from enforcement is sufficiently high, the auditor chooses higher effort. The intuition behind these results is similar to the results of Ewert and Wagenhofer, 2019.

Next, comparing the results in the no-disclosure and disclosure regimes, we examine the impact of focus disclosure. Disclosure has three key opposing effects. First, if the focus disclosure matches the firm's material item, then the auditor emphasizes the focus area by adjusting her effort upward after observing the focus disclosure. Thus, if the focus disclosure matches the firm's material item, then the auditor's effort is higher in the disclosure regime compared to no-disclosure. Second, if the focus disclosure does not match the firm's material item, then the auditor de-emphasizes the non-focus area by not adjusting her effort upward. Moreover, the auditor anticipates an upward adjustment in the audit effort after observing a matching focus disclosure. Thus, her ex-ante planned audit effort, and, hence the audit effort for the non-focus area is lower in the disclosure regime compared to no-disclosure. The adjustment costs drive the magnitude of the higher emphasis on the focus area. If the adjustment is costly, the auditor's upward adjustment is small. When adjustment costs are high, the upward adjustment for the focus area cannot

outweigh the lower effort for the non-focus area; that is, the expected audit effort is lower under the disclosure regime.

As the manager anticipates the audit effort when he chooses to misreport, the focus disclosure also influences misreporting (third effect). In line with the expectations that focus disclosure can have detrimental incentive effects, the manager misreports more under the disclosure regime. When making the misreporting decision, the manager considers the potential return and costs. As the audit effort determines the misreporting detection probability, a higher audit effort decreases the potential return. Consequently, when the focus matches (does not match) the firm's material item, the manager anticipates higher (lower) audit effort and misreporting incentives decrease (increase). That is, the manager faces a *Detection Effect*, which decreases misreporting for a matching report, and an *Elusion Effect*, which increases misreporting for a non-matching report.

Besides these two opposing effects, we show that focus disclosure also has a *Shield Effect*, which increases manager's misreporting incentives. The manager receives a potential penalty from enforcement only if the focus matches the firm's material item. As the auditor chooses a higher audit effort in case of a matching report, the probability that the manager receives the penalty under disclosure is lower. Hence, the auditor shields the manager from the potential enforcement penalty. Thus, the manager's reaction is in line with expectations — disclosing what the institution will inspect to the parties subject to the inspection is detrimental. However, taking all effects together, we find higher FRQ under the disclosure regime when the higher expected audit effort dominates the higher misreporting. This effect occurs if adjustment costs are sufficiently low, and thus the expected audit effort is sufficiently high.

From these results, we derive following empirical predictions. First, enforcement focus disclosure is always associated with higher misreporting. Second, only if the auditor's adjustment costs are low, enforcement focus disclosure is associated with higher audit quality, and thus, higher FRQ. For example, the Big-4 audit firms may have lower adjustment costs relative to non-Big-4 audit firms. As Big-4 audit firms have greater infrastructure and more staff, adjustments to, and thus deviation from, the planned audit effort is less costly. Different proxies can be used to test these empirical implications, for example, using Brown et al., 2014 per country index for enforcement strength.

Our model is closely related to Ewert and Wagenhofer, 2019. Using an analytical model, Ewert and Wagenhofer, 2019 show that strong enforcement decreases earnings management and can improve financial reporting and audit quality. Hence, auditing and enforcement are substitutes in a strong enforcement setting but complements in a weak enforcement setting. Our study also relates to Lazear, 2006, who uses an analytical model to investigate various inspection focus disclosure settings, such as speeding, tax fraud, or terrorism. He shows that the effect of announcing inspections is ambiguous and can lead to higher or lower results, mainly depending on the costs of monitoring and auditing.

By considering financial misreporting and enforcement, we extend this literature. The financial reporting setting differs from the settings analyzed by Lazear, 2006. In Lazear, 2006, two parties interact: the monitoring party and the monitored party. In our setting, three parties interact: the monitoring party (enforcement institution), the monitored party (manager), and a party that both monitors and is monitored (auditor). The auditor and the manager interact strategically.

We also add to the overall analytical literature on enforcement (Koenigsgruber, 2012; Laux and Stocken, 2018; Schantl and Wagenhofer, 2020, 2021). As these prior works do not consider the effect of enforcement focus disclosure, we contribute to the literature by specifically analyzing the impact of inspection focus disclosure on audit effort and misreporting, which has implications for FRQ.

In addition, we contribute to the overall stream of literature on the effect of enforcement on FRQ and audit quality (Ball et al., 2000; Ernstberger et al., 2012; Kedia and Rajgopal, 2011; Lang et al., 2006; Leuz et al., 2003). Analyzing a sample of proactive financial reporting enforcement inspections by the UK Financial Reporting Review Panel, Florou et al., 2020 show that enforcement, in general, can increase audit effort. Also in context of UK's proactive financial reporting enforcement regime, Christensen et al., 2020 find that an increase in the likelihood of an inspection lowers equity values and that an increase in regulatory scrutiny decreases managers' investment horizon in selected industries.

The paper proceeds as follows. Section 2.2 describes the model setup. By comparing the financial reporting quality, Section 2.3 derives the equilibrium choices for each regime and the optimal enforcement regime. Section 2.4 concludes.

2.2 A Model of Enforcement and Inspection Focus

Players The game has two risk-neutral players: an auditor ('she') and a firm's manager ('he').

Timeline The game comprises six dates. At Date 1, the manager prepares the financial statement and can misreport it. At Date 2, the auditor starts to plan the audit of the firm's financial statement. During the audit planning, the auditor chooses the necessary audit procedures (audit effort). At Date 3, an enforcement institution potentially discloses a report about its enforcement focus, which the auditor observes during the audit. In reaction to the report, the auditor can adjust the planned audit effort upward. At Date 4, the auditor completes the audit. The firm and the auditor release the audited financial statement and the corresponding auditor's report. At Date 5, the financial market observes the audited financial statement and potentially detects a mistake (audit failure). At Date

6, the enforcement institution inspects the firm's audited financial statement, the final payoffs are realized, and the game ends. Figure 2.1 depicts the timeline of the game.[4]

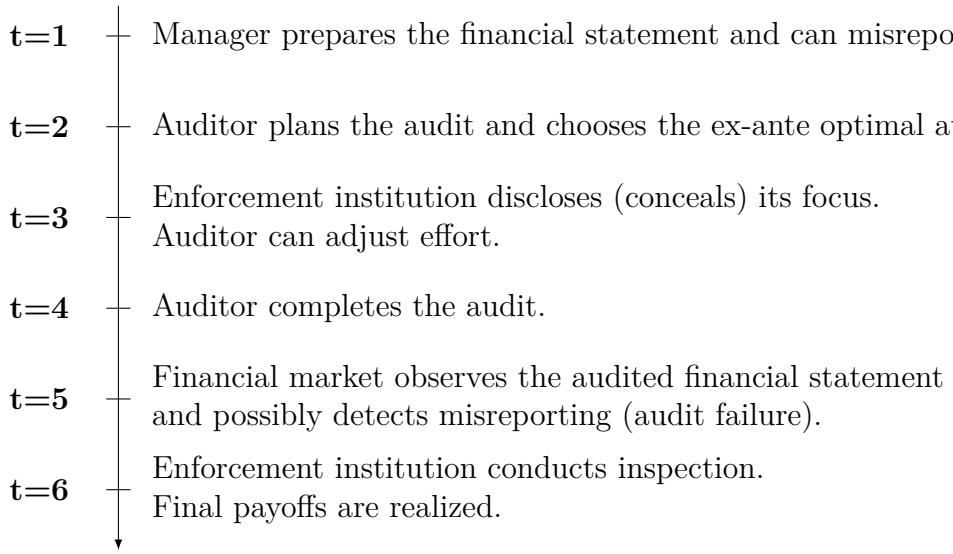


Figure 2.1: Timeline – Disclose or Conceal Enforcement Focus?

Misreporting Depending on the firm's financial performance, the manager can benefit from upward or downward misreporting. For example, an overall economic downturn or management turnover could create an incentive for big bath accounting (Pourciau, 1993). Beating analyst forecasts could create an incentive for upward misreporting (Payne and Robb, 2000), such as early recognition of revenue or increasing an asset write-off period. We model this incentive to misreport as a private benefit B, which the manager receives after successful misreporting, which the auditor does not detect.[5] The manager chooses his misreporting effort γ, which represents the probability that the manager successfully misreports. Such misreporting efforts could include the manager's effort to override the firm's internal controls. The higher the misreporting effort, the higher the probability that misreporting is successful. With probability $(1-\gamma)$, misreporting is unsuccessful, as the manager cannot override the firm's internal controls. We assume misreporting costs of $\frac{k\gamma^2}{2}$, with $k > 0$. These costs account for the moral costs of misreporting and overriding the firm's internal control system. We assume that the manager makes accounting choices and misreporting decisions throughout the year, such as consistently applying IFRS 15

[4] The financial market could also detect misreporting after the enforcement inspection. Nevertheless, this different timing of detection by the financial market does not change our results qualitatively.

[5] Modeling misreporting incentives as a private benefit B allows us to capture the benefits managers can gain from both upward and downward misreporting. As we are interested in the interaction of misreporting, audit effort, and enforcement focus disclosure, we model the firm's underlying financial performance as simply as possible. We concentrate chiefly on the resulting FRQ, which depends on the manager's misreporting, audit effort, and enforcement inspection. The firm's financial performance does not affect the FRQ.

"Revenue Recognition." In addition, managers of listed companies have already published several accounting choices via interim reports. Consequently, the accounting choices arising at year-end are limited. We therefore assume that though the manager observes the focus report before year-end, he cannot adjust his misreporting decision.[6]

Audit Planning At Date 2, the auditor accepts the audit engagement, which usually occurs during the fiscal year. The auditor starts with the audit planning right after acceptance and before the reporting date. During the audit process, the auditor audits the firm's financial statement and possibly detects misreporting. The auditor chooses audit effort e, with direct audit costs of $\frac{ce^2}{2}$, with $c > 0$. With probability e, the auditor collects enough evidence to detect the manager's misreporting. With probability $(1-e)$, the auditor does not detect the manager's misreporting.[7] We assume that if she detects misreporting, she complies with auditing standards.

Enforcement Institution Focus Report At Date 3, the enforcement institution discloses or conceals its area of focus. The firms' financial statement can comprise items from an item set $I \in \{I_1, I_2, I_3, ..., I_n\}$. For simplicity, we assume that the firm has one material item S from the item set I $(S \in I)$. The enforcement institution's focus is item F, which is also from the item set I $(F \in I)$. Assume, for example, that the enforcement focus item is "Provisions," but the firm's material item is "Financial Instruments." In this case, the enforcement institution does not focus on the firm's material item. However, if the firm's material item is "Provisions," the firm's material item is a focus. Thus, the firm has a high probability of facing an enforcement inspection. Hence, we assume that with some probability $\omega \in (0,1)$, the focus F matches the firm's material financial statement item S (matching report); that is, with probability ω, the firm's material item is a focus. Put formally, $Pr(F = S) = \omega$. Thus, the firm is subject to an enforcement inspection, potentially leading to penalties for the manager and the auditor. As both are only interested in inspections that may lead to a penalty, the enforcement focus disclosure signals whether the firm is subject to a relevant inspection or not. With probability $(1-\omega)$, the enforcement's focus is not the firm's material item; that is, the firm is not subject to a relevant enforcement inspection (non-matching report).

[6] Some authors, such as Dhaliwal et al., 2004, examine income tax expenses as a final last-minute chance to meet earnings targets via earnings management and find supporting evidence. However, we argue that these opportunities are strictly limited to certain items, such as income tax expenses. Once the auditor starts the audit — which happens before the focus disclosure — the manager commits to a specific pre-audited financial statement.

[7] One can argue that the audit engagement and the audit planning happen before the manager prepares the financial statement and chooses whether to misreport (Date 1), or that Date 1 and 2 can happen simultaneously. However, our analysis is robust to assuming that the auditor starts planning the audit before the manager's misreporting choice. Neither the auditor nor the manager can observe the other's choices. Therefore, the decisions are made strategically simultaneously.

Depending on the enforcement institution's design, the enforcement institution publishes a report, $r = F$, which discloses the focus. This report is public and observable to the manager and the auditor. The enforcement institution discloses its focus after the auditor has already planned the audit process but before the auditor completes the audit. The PCAOB acknowledges that "the selection of focus may have become more predictable" (PCAOB, 2021). Consequently, if the enforcement institution conceals its focus, then manager and auditor still anticipate that with probability ω, the firm will face an enforcement inspection. The enforcement institutions do not change their disclosure policy regularly but rather follow one implemented disclosure policy (disclose or conceal). Therefore, we do not endogenize the decision of whether to disclose or conceal the focus. Instead, we analyze two regimes: one where the enforcement institution discloses its focus and one where it does not.

Audit Effort Adjustment If the enforcement institution discloses its focus, then the auditor can adjust her planned audit effort. We assume that the ex-ante planned audit effort costs are sunk.[8] The auditor can exert more effort than originally planned (upward adjustment). Increasing the audit effort entails additional adjustment costs of $\theta > 0$, making the audit effort more costly than the ex-ante planned audit effort. The audit firm, for example, may need to allocate additional staff members from other departments, such as advisory or corporate finance, which usually have higher profit margins, and the auditor thereby incurs higher opportunity costs. Other examples are consulting with internal or external experts such as, valuation experts, to audit goodwill or pensions. In addition, the auditor might need to ensure a higher level of internal quality reviews in case of an enforcement inspection — a so-called second line of defense review.[9] Consequently, when the auditor adjusts her audit effort, the *normal costs* per unit, c, increase by factor θ. Thus, higher costs per unit, θc, arise for the unplanned higher audit effort, namely, for the difference between the ex-ante planned and the ex-post adjusted audit effort.[10]

Financial Market After publishing the audited financial statement, the financial market observes the financial statement and may learn about the firm's misreporting. The financial market can detect misreporting independently (e.g., through short-sellers) or

[8] Hence, the auditor will never choose to exert less effort than originally planned (downward adjustment).

[9] Our model is asymmetric in that the auditor can adjust her audit effort, and the manager cannot adjust his misreporting. The timing of the enforcement disclosure ensures that the manager cannot adjust his misreporting after the disclosure. The earliest disclosure date shown in Table 2.1 is October 2021 for fiscal year 2021. The main part of the audit takes place after the fiscal year. However, most of the financial reporting is prepared during the fiscal year. Thus, as explained previously, after the disclosure, the opportunities for the manager to adjust his misreporting are limited.

[10] This modelling is similar to Banker and Hughes, 1994 (*Newsboy-Problem*). They analyze pricing and capacity decisions when the costs of adding capacity before the actual demand is known are sunk, and adding capacity after the actual demand is known comprises further additional costs. The focus disclosure indicates the "actual demand" for audit efforts in our setting.

through the press or whistle-blowers, as in the Wirecard accounting scandal in 2020. In addition, Fang et al., 2016 show for a sample of Russel 3000 companies from 2005 to 2007, that short selling can reduce managers' earnings management and help reveal corporate fraud. We assume that the financial market detects misreporting with probability p. The detection of misreporting by the financial market is followed by damages of L_M and L_A for the manager and the auditor, respectively. The damage can comprise financial claims or reputation losses (Brocard et al., 2018). In the following, we refer to this as "liability."

Enforcement Inspection The enforcement institution becomes aware of the manager's misreporting when the financial market detects misreporting. Consequently, the enforcement institution conducts an inspection, resulting in enforcement damages for both the manager and auditor, depicted by R_M and R_A, respectively. Nevertheless, when the financial market does not detect misreporting, the enforcement institution can still do so. We assume that the enforcement institution commits to its focus, meaning that the institution inspects financial statements that contain the disclosed material item. With probability ω, the focus matches the firm's material item. The enforcement institution therefore inspects the firm's financial statement with probability ω. When the enforcement institution conducts an inspection, it detects the misreporting (not already detected by the auditor or the financial market) with probability a, resulting in the enforcement damage R_M (for the manager) and R_A (for the auditor). The enforcement damage can comprise reputation losses or a monetary penalty (Desai et al., 2006; Karpoff et al., 2008; Mande and Son, 2013). In the following, we refer to this as a "penalty."[11]

Distinction from Audit Oversight In contrast to financial enforcement, audit oversight bodies oversee the audit profession, for example, the APAS (Audit Oversight Body) in Germany or the PCAOB in the U.S. Audit oversight focuses only on the auditor's compliance with auditing standards and penalizes noncompliance. Consequently, compliance is independent of any potential misreporting or accounting mistakes. Audit oversight can lead to penalties for the auditor, even if the firm's financial statement is free from material misstatements and vice versa. Our study concentrates on financial enforcement and only partially considers audit oversight. Assuming that financial enforcement and audit oversight institutions work closely together, the detected audit failure by the financial enforcement institution may lead to an audit oversight inspection. We assume that if the

[11] Some enforcement institutions disclose their inspection findings. For instance, in the U.S., "the PCAOB posts all publicly available opinions, orders, termination of bars, and other Board enforcement actions, as well as related SEC and court actions on review of those sanctions"(PCAOB, 2022). Moreover, Sec. 109 Securities Trading Act (§ 109 WpHG) also requires the German Federal Financial Supervisory Authority (FFSA/BaFin) to publish its findings regarding a firm's financial statement. We refer to this approach as the "Blame & Shame" approach. Whenever the enforcement institutions publish the findings, the financial market will learn about the findings. The manager and auditor are subject to liabilities L_A and L_M with probability $p + (1-p)\omega a$.

auditor complies with auditing standards, then she always detects misreporting. If she does not detect misreporting $(1-e)$, then she receives audit oversight penalties, captured by R_A. If we further introduce full audit oversight within the model, there would also be the chance that the auditor receives penalties without any misreporting by the manager. However, as we are studying the strategic interaction between a manager and an auditor in the context of an enforcement inspection, we do not consider this case.[12]

Manager's Payoff The manager's ex-ante expected payoff is

$$V := \gamma(1-\hat{e})\left(B - p(L_M + R_M) - \omega a(1-p)R_M\right) - \frac{k\gamma^2}{2}. \tag{2.1}$$

The first term, $\gamma(1-\hat{e})\left(B - p(L_M + R_M) - \omega a(1-p)R_M\right)$, captures the manager's net benefit from misreporting; that is, his private benefit net of potential liability and penalty. This net benefit depends on the manager's misreporting effort and the manager's conjecture of the audit effort, denoted by $\hat{e}$. The second term, $\frac{k\gamma^2}{2}$, captures the manager's direct misreporting costs.

The manager's ex-ante expected payoff is identical in the disclosure and no-disclosure regime. Nevertheless, as the auditor can adjust her ex-ante planned audit effort after observing the focus, the conjectured audit level depends on the institution's disclosed focus. Thus, the conjectured audit level $\hat{e}$ is the only difference.

Audit Costs If the enforcement institution conceals its focus, then the auditor's ex-ante expected audit costs are

$$C_{nD} := \hat{\gamma}(1-e)\left(p(L_A + R_A) + \omega a(1-p)R_A\right) + \frac{ce^2}{2}. \tag{2.2}$$

The first term, $\hat{\gamma}(1-e)\left(p(L_A + R_A) + \omega a(1-p)R_A\right)$, captures the expected penalty and liability from not detecting the manager's misreporting, which depend on the audit effort and the auditor's conjecture of the manager's misreporting, denoted by $\hat{\gamma}$. The second term, $\frac{ce^2}{2}$, captures the direct audit effort costs.

If the enforcement institution discloses its focus, then the auditor's ex-ante expected audit costs are

$$C_D := \hat{\gamma}(1-e_{ex-post})\left(p(L_A + R_A) + \omega a(1-p)R_A\right) + \Phi, \tag{2.3}$$

[12] Comparing regimes 1 and 2 in section 2.3 partially replicates the results of Ewert and Wagenhofer, 2019. Hence, Ewert and Wagenhofer, 2019 show that their results hold when introducing audit oversight.

with

$$\Phi = \begin{cases} \frac{ce_{ex-ante}^2}{2}, & \text{if } e_{ex-post} = e_{ex-ante} \text{ and,} \\ \frac{ce_{ex-post}^2 + c\theta(e_{ex-post}^2 - e_{ex-ante}^2)}{2}, & \text{otherwise.} \end{cases}$$

The auditor can adjust her audit effort if the enforcement institution discloses its focus. The ex-ante audit effort (chosen before the enforcement institution discloses the report) is depicted by $e_{ex-ante}$. When the auditor chooses a higher audit effort ex-post, the costs of each additional amount of effort increase by θ. The probability of detecting the manager's misreporting is given by the ex-post adjusted audit effort, $e_{ex-post}$.

2.3 Optimal Enforcement Regime

We first analyze the optimal audit effort and misreporting and then explore the optimal enforcement design by comparing the FRQ in each regime. We solve the game by backward induction. The first step is to analyze the auditor's effort and the manager's misreporting decision. The auditor and manager do not choose their effort or misreporting simultaneously and cannot observe the other's choices while making their decision. They base their decisions on their conjecture about what the other party will choose (depicted by $\hat{e}$ and $\hat{\gamma}$), and thus the choices are strategically simultaneous. In equilibrium, the conjectured levels of effort and misreporting are correct.

2.3.1 No-Enforcement

As the benchmark case, we analyze the setting without enforcement (nE).

The auditor solves the following problem:

$$\min_e C_{nE} := L_A \hat{\gamma} p(1-e) + \frac{ce^2}{2}, \tag{2.4}$$

where $L_A \hat{\gamma} p(1-e)$ captures the auditor's liability when the financial market detects misreporting and $\frac{ce^2}{2}$ captures the direct audit effort costs. Solving Equation 2.4 for e yields the optimal audit effort given the conjectured misreporting, which we denote as e_{nE}:

$$e_{nE} = \frac{L_A p \hat{\gamma}}{c}. \tag{2.5}$$

The manager solves the following problem:

$$\max_\gamma V_{nE} := \gamma(1-\hat{e})(B - pL_M) - \frac{k\gamma^2}{2}, \tag{2.6}$$

where $\gamma(1-\hat{e})(B-pL_M)$ captures the manager's net benefit from successful misreporting and $\frac{k\gamma^2}{2}$ captures the direct misreporting costs. Solving Equation 2.6 for γ yields the optimal misreporting given the conjectured audit effort, which we denote as γ_{nE}:

$$\gamma_{nE} = \frac{(1-\hat{e})(B-pL_M)}{k}. \tag{2.7}$$

In equilibrium, each party correctly anticipates the other party's action. That is, the manager correctly anticipates the audit effort, e_{nE}, and the auditor correctly anticipates the misreporting, γ_{nE}.

Lemma 2.1 summarizes the optimal equilibrium audit effort and misreporting incorporating the other party's action.

Lemma 2.1. *Without enforcement, the auditor chooses the optimal audit effort*

$$e^*_{nE} = \frac{pL_A(B-pL_M)}{ck+pL_A(B-pL_M)},$$

and the manager chooses the optimal misreporting

$$\gamma^*_{nE} = \frac{c(B-pL_M)}{ck+pL_A(B-pL_M)}.$$

The auditor incorporates the manager's misreporting incentives into her audit effort decision, e^*_{nE}, and the manager incorporates the auditor's effort incentives into his misreporting decision, γ^*_{nE}. The intuition is as follows. When the auditor faces a higher expected liability, pL_A, she increases her effort, and thus increases the probability of detecting the manager's misreporting. Anticipating this, the manager chooses less misreporting. Similarly, when the manager faces a higher expected liability, pL_M, the auditor anticipates less misreporting and chooses lower audit effort.

2.3.2 No-Disclosure

Next, we analyze the setting with an enforcement institution that does not disclose its focus (nD).

The auditor solves the following problem:

$$\min_e C_{nD}, \tag{2.8}$$

with C_{nD} given in Equation 2.2. Solving Equation 2.8 for e yields the optimal audit effort given the conjectured misreporting, which we denote as e_{nD}:

$$e_{nD} = \frac{\hat{\gamma}(pL_A+(p+(1-p)\omega a)R_A)}{c}. \tag{2.9}$$

In addition to the direct effort costs and the expected liability, the audit effort includes the expected enforcement penalty, $(p+(1-p)\omega a)R_A$.

The manager solves the following problem:

$$\max_{\gamma} V, \tag{2.10}$$

with V given in Equation 2.1. Solving Equation 2.10 for γ yields the optimal misreporting given the conjectured audit effort, which we denote as γ_{nD}:

$$\gamma_{nD} = \frac{(1-\hat{e})(B-pL_M-(p+(1-p)\omega a)R_M)}{k}. \tag{2.11}$$

We define the probability of receiving an enforcement penalty, R_M or R_A, in the no-disclosure regime as

$$P(E,nD) := p+(1-p)\omega a. \tag{2.12}$$

Lemma 2.2 summarizes the optimal equilibrium effort and misreporting choices incorporating the other party's action.

Lemma 2.2. *Without disclosure, the auditor chooses the optimal audit effort*

$$e^*_{nD} = \frac{(pL_A+P(E,nD)R_A)(B-pL_M-P(E,nD)R_M)}{ck+(pL_A+P(E,nD)R_A)(B-pL_M-P(E,nD)R_M)},$$

and the manager chooses the optimal misreporting

$$\gamma^*_{nD} = \frac{c(B-pL_M-P(E,nD)R_M)}{ck+(pL_A+P(E,nD)R_A)(B-pL_M-P(E,nD)R_M)}.$$

2.3.3 Disclosure

In this section, we analyze the regime with enforcement focus disclosure (D). With probability ω, the focus matches the firm's material item. Thus, the firm is subject to an enforcement inspection (matching report).

The disclosure occurs after the auditor plans the audit effort, $e_{ex-ante}$. Nevertheless, the auditor can adjust her effort to $e_{ex-post}$, which leads to four options for the auditor after observing the disclosure r: 1) no adjustment to the planned effort, 2) changing the planned audit effort when the focus disclosure includes the firm's material item (matching report), 3) changing the planned audit effort when the focus disclosure does not include the firm's material item (non-matching report), 4) adjust the audit effort independent of the focus report. Intuitively, strategies 3) and 4) are not optimal. Observing a non-matching report, the auditor anticipates that she faces a lower expected penalty as the enforcement institution will never conduct an inspection that results in a penalty. Thus, choosing a

higher audit effort by adjusting the ex-ante planned audit effort upward is not optimal. In addition, upward adjustment is costlier than the ex-ante planned audit effort. Adjusting the audit effort independent of the focus report (4) — matching or non-matching focus disclosure — is therefore also not optimal. We provide more detailed proofs that strategies 3) and 4) are not optimal in the appendix.

1) Never adjust the ex-ante planned audit effort If the auditor never adjusts her effort, then her optimal audit effort is given by her ex-ante chosen effort, $e_D = e_{ex-ante}$. This effort does not depend on the focus report and is therefore identical to the optimal effort under the no-disclosure regime.[13] Consequently, the disclosure of the enforcement focus does not affect the auditor's effort ($e_D^* = e_{nD}^*$) and the manager's misreporting ($\gamma_D^* = \gamma_{nD}^*$).

2) Adjust the ex-ante planned audit effort in case of a matching report We analyze the optimal audit effort and misreporting by first deriving the optimal ex-post audit effort after observing a matching report. The auditor minimizes the audit costs,

$$\frac{ce_{ex-post}^2}{2} + \frac{c\theta}{2}(e_{ex-post}^2 - e_{ex-ante}^2) + \hat{\gamma}(1 - e_{ex-post})(pL_A + (p + (1-p)a)R_A). \tag{2.13}$$

In case of upward adjustments, the auditor faces costs of c for each unit of ex-ante planned effort and costs of θc for every unit above the ex-ante planned effort $e_{ex-ante}$. Moreover, the auditor now knows with certainty that the enforcement institution inspects the audited financial statement (if the financial market did not already detect a mistake) and expects damage R_A with probability $p + (1-p)a$ instead of $p + (1-p)\omega a$. Minimizing the audit cost in Equation 2.13, the auditor chooses

$$e_{ex-post,match} = \frac{\hat{\gamma}(pL_A + P(E,D)R_A)}{c(1+\theta)}, \tag{2.14}$$

with

$$P(E,D) := p + (1-p)a. \tag{2.15}$$

When planning the ex-ante audit effort, the auditor minimizes

$$\begin{aligned} &\omega(\frac{ce_{ex-post,match}^2}{2} + \frac{c\theta}{2}(e_{ex-post,match}^2 - e_{ex-ante}^2) + \hat{\gamma}(1 - e_{ex-post,match}) \\ &(pL_A + (p + (1-p)a)R_A)) + (1-\omega)(\frac{ce_{ex-ante}^2}{2} + \hat{\gamma}(1 - e_{ex-ante})p(L_A + R_A)). \end{aligned} \tag{2.16}$$

[13] Follows from inserting $e_{ex-ante} = e_{ex-post}$ into Equation 2.3.

The auditor anticipates an upward adjustment after observing the matching disclosure (probability ω) and chooses $e_{ex-post,match}$. The auditor will not adjust her audit effort after observing a non-matching report (probability $(1-\omega)$) and exerts the ex-ante planned audit effort of $e_{ex-ante}$. The auditor minimizes the ex-ante costs in Equation (2.16) by choosing an optimal ex-ante effort, which we denote as $e_{ex-ante,match}$:

$$e_{ex-ante,match} = \frac{(1-\omega)\hat{\gamma}p(L_A+R_A)}{c(1-\omega(1+\theta))}. \tag{2.17}$$

Equation 2.16 considers that the auditor is adjusting her ex-post effort upward after observing a matching report. Consequently, the ex-ante effort must be lower than the ex-post effort:

$$e_{ex-post,match} > e_{ex-ante,match} \implies \theta < \bar{\theta} := \frac{R_A(1-p)a(1-\omega)}{pL_A+P(E,nD)R_A}. \tag{2.18}$$

Thus, only if adjustment costs θ are low the auditor will adjust her effort upward after observing a matching report. If the adjustment costs are high; that is, $\theta > \bar{\theta}$, then the auditor never adjusts her effort upward (strategy 1). The manager anticipates that the audit effort depends on the focus disclosure, $e_{ex-post,match}$ with probability ω and $e_{ex-ante,match}$ with probability $(1-\omega)$. The manager maximizes

$$V_D := \omega\gamma(1-\hat{e}_{ex-post,match})(B-pL_M-P(E,D)R_M) \tag{2.19}$$

$$+(1-\omega)\gamma(1-\hat{e}_{ex-ante,match})(B-p(L_M+R_M))-\frac{k\gamma^2}{2}, \tag{2.20}$$

by choosing

$$\gamma_{D,match} = \frac{1}{k}(\omega(1-\hat{e}_{ex-post,match})$$

$$(B-pL_M-P(E,D)R_M)+(1-\omega)(1-\hat{e}_{ex-ante,match})(B-p(L_M+R_M))). \tag{2.21}$$

Lemma 2.3 summarizes the optimal equilibrium audit effort and misreporting, incorporating the other party's action.[14]

Lemma 2.3. *Under the disclosure regime, for* $\theta < \bar{\theta} = \frac{(1-p)a(1-\omega)R_A}{pL_A+P(E,nD)R_A}$*, the auditor chooses upward-adjusted audit effort after observing a matching report:*

$$e^*_{match,D} = \frac{(1-\omega(1+\theta))(pL_A+P(E,D)R_A)(B-pL_M-P(E,nD)R_M)}{\Omega},$$

[14] We assume that the private benefit from misreporting is sufficiently high to ensure that all equilibrium audit efforts and misreporting are > 0 and that the audit costs and misreporting costs are sufficiently high to ensure that all equilibrium audit efforts and misreporting are < 1.

the auditor never adjusts the audit effort and chooses the ex-ante planned effort after observing a non-matching report:

$$e^*_{non-match,D} = e^*_{ex-ante,D} = \frac{(1-\omega)(1+\theta)p(L_A+R_A)(B-pL_M-P(E,nD)R_M)}{\Omega},$$

the manager chooses the optimal misreporting:

$$\gamma^*_D = \frac{c(1+\theta)(1-\omega(1+\theta))(B-pL_M-P(E,nD)R_M)}{\Omega},$$

with

$$\Omega := ck(1+\theta)(1-\omega(1+\theta)) + \omega(1-\omega(1+\theta))(B-pL_M-P(E,D)R_M)(pL_A+P(E,D)R_A) + (1-\omega)^2(1+\theta)p(L_A+R_A)(B-p(L_M+R_M)).$$

Proof. See Appendix. □

2.3.4 Optimal Enforcement Regime

In this section, we examine whether the enforcement institution should disclose or conceal its enforcement focus. We define the optimal enforcement regime as the regime with the highest FRQ. Similar to Ewert and Wagenhofer, 2019, FRQ is the probability that the firm's financial statement is free from mistakes.[15] Put formally,

$$FRQ := (1-\gamma) + \gamma e. \tag{2.22}$$

FRQ has two parts. First, the probability that the financial statement is free from mistakes because the misreporting is not successful, $(1-\gamma)$. Second, the probability that the auditor detects the misreporting, γe. We do not consider the direct effect of enforcement as part of FRQ. When investors observe the potentially misreported financial statement, the enforcement institution has not conducted any inspections. Nevertheless, at the initial financial statement release, investors make decisions based on the financial statement, and in case of misreporting, investors' damages arise. Thus, we consider only the ex-ante (before the enforcement inspection) FRQ when the firm publishes the audited financial statement.

In the following, we first compare the FRQ under the no-enforcement regime to the no-disclosure regime, and then compare the no-disclosure regime to the disclosure regime.

2.3.4.1 No-Enforcement versus No-Disclosure

Proposition 2.1 summarizes the comparison of the no-enforcement and no-disclosure regimes.

[15] Ewert and Wagenhofer, 2019 analyze two types of FRQ. They differentiate between intentional and unintentional errors. As in our model, errors always arise from misreporting, we consider only one FRQ.

Proposition 2.1. *Under the no-disclosure regime:*

1. *The manager always engages in less misreporting compared to the no-enforcement regime,* $\gamma^*_{nE} > \gamma^*_{nD}$.

2. *The auditor chooses higher audit effort compared to the no-enforcement regime,* $e^*_{nE} < e^*_{nD}$*, for a high penalty,* $R_A > \bar{R}_A$.

3. *FRQ is higher than in the no-enforcement regime,* $FRQ^*_{nE} < FRQ^*_{nD}$*, for high costs* ck *or for low costs* ck *and a high penalty,* $R_A > \tilde{R}_A$.

Proof. See appendix. □

Part (1) of Proposition 2.1 shows that the manager always engages in less misreporting under the enforcement and no-disclosure regime. This result is quite intuitive. As the manager faces higher costs when misreporting is detected (R_M), and thus has less incentives to misreport, enforcement enhances the manager's misreporting decision.

Part (2) of Proposition 2.1 shows that the auditor chooses higher effort under the enforcement and no-disclosure regime when the auditor's penalty (R_A) is sufficiently high. The intuition is as follows. Under the no-disclosure regime, the auditor faces two ambiguous effects. First, the auditor faces higher expected audit costs under enforcement due to the additional penalty, R_A. Consequently, audit effort incentives increase (direct effect). However, the manager misreports less (Part (1), Proposition 2.1). Anticipating this lower probability of misreporting, the auditor needs to exert less audit effort to prevent an audit failure, and effort incentives decrease (indirect effect). When the penalty R_A is sufficiently high, the direct effect of higher expected audit costs outweighs the indirect effect of less misreporting, and enforcement enhances the auditor's effort decision.

Part (3) of Proposition 2.1 shows that the FRQ under enforcement and no-disclosure is higher when misreporting and audit effort costs, ck, are high. For high misreporting costs, k, misreporting incentives are low. Moreover, misreporting is even lower in the no-disclosure regime, and thus always dominates the (potentially) lower audit effort. Consequently, FRQ is always higher under enforcement and no-disclosure. When the costs are low, misreporting incentives are higher, and FRQ under no-disclosure is only higher when the auditor's penalty, R_A, is high. The reason is that the manager always misreports less, which decreases audit effort incentives. Thus, only for a high penalty, R_A, effort incentives are sufficiently high to ensure higher FRQ under the no-disclosure regime.

Proposition 2.1 partially replicates the findings from Ewert and Wagenhofer, 2019. Proposition 2 of Ewert and Wagenhofer, 2019 states that enforcement intensity strictly decreases the manager's misreporting. They define enforcement intensity as the probability that the enforcement institution detects a mistake. The effect on the audit effort depends on enforcement intensity. They show that audit effort decreases under high enforcement

intensity and that audit effort and enforcement are complements when enforcement intensity is low but substitutes when it is high.

Part (2) of Proposition 2.1 shows that the auditor chooses higher audit effort for a sufficiently high enforcement penalty. To further investigate the enforcement institution's potential to enhance audit effort, we analyze what determines the threshold $\bar{R}_A$, where a higher threshold implies that the audit effort is lower under the no-disclosure regime for more values of R_A. Put differently, an increasing threshold implies that the no-disclosure regime will lead to a higher audit effort less often. Besides increasing the auditor's enforcement penalty R_A, the enforcement institution can influence the manager's penalty (R_M) and the detection probability (a). Proposition 2.2 summarizes the results.

Proposition 2.2. *The enforcement penalty threshold* $\bar{R}_A$

1. *increases in the manager's enforcement penalty,* R_M*, and*

2. *increases in the enforcement institution's detection probability,* a*.*

Proof. See Appendix. □

Part (1) of Proposition 2.2 shows that if the manager's potential penalty increases, then the enforcement penalty threshold increases. This implies that audit effort with enforcement is only higher for a higher penalty, R_A. The intuition is as follows. The manager's enforcement penalty only indirectly affects the auditor's effort decision via the manager's misreporting decision. When the manager's penalty increases, misreporting decreases because the manager's expected payoff from misreporting is lower. Thus, we find a stronger negative indirect effect on the auditor's effort. A higher auditor enforcement penalty, R_A, is therefore necessary to increase direct effort incentives and thus to maintain a higher audit effort with enforcement and no-disclosure.

Part (2) of Proposition 2.2 shows that if the enforcement institution's probability of detecting a mistake increases, then the auditor's penalty threshold increases. The intuition of part (2) partially follows the intuition of part (1). If the detection probability increases, then misreporting decreases because the manager's expected payoff from misreporting is lower. This incentivizes the auditor to choose less audit effort (indirect effect). Nevertheless, as a higher detection probability increases the auditor's expected penalty, a higher a also increases effort incentives (direct effect). However, as the indirect effect dominates, a higher enforcement penalty, R_A, is necessary to increase direct effort incentives and maintain higher audit effort with enforcement.

2.3.4.2 No-Disclosure versus Disclosure

Next, we examine which enforcement design — disclosing or concealing the focus — leads to higher FRQ. When the auditor does not adjust her audit effort under the

disclosure regime (for $\theta > \bar{\theta}$), the manager's misreporting and the auditor's effort do not change compared to the no-disclosure regime. Thus, FRQ does not change.

Proposition 2.3 summarizes the results when the auditor adjusts her audit effort.

Proposition 2.3. *Under the disclosure regime, when adjustment costs are low, $\theta < \bar{\theta}$:*

1. *The auditor chooses higher (lower) audit effort with (without) an enforcement inspection compared to the no-disclosure regime, $e^*_{match,D} > e^*_{nD}$ ($e^*_{non-match,D} < e^*_{nD}$).*
2. *The expected audit effort is higher compared to the no-disclosure regime, $\omega e^*_{match,D} + (1-\omega)e^*_{non-match,D} > e^*_{nD}$, for low adjustment costs, $\theta < \min\{\tilde{\theta}, \bar{\theta}\}$.*
3. *The manager always misreports more compared to the no-disclosure regime, $\gamma^*_D > \gamma^*_{nD}$.*
4. *FRQ can be higher compared to the no-disclosure regime, $FRQ^*_D > FRQ^*_{nD}$ for low adjustment costs, $\theta < \min\{\tilde{\theta}, \bar{\theta}\}$.*

Proof. See Appendix. □

Part (1) of Proposition 2.3 shows that the auditor chooses higher or lower effort depending on the focus disclosure. This result is quite intuitive. When the auditor observes a matching report, she knows that the enforcement institution will conduct an inspection, which leads to a potential penalty of R_A. Therefore, the auditor prioritizes the focus area by exerting higher audit effort than under the no-disclosure regime. Before observing the focus disclosure, the auditor chooses a lower audit effort compared to the no-disclosure regime because she knows that she only faces a potential penalty R_A in case of a matching report, and she can adjust her effort upward after observing the disclosure. When she observes a non-matching report, then she will conclude that an adjustment is unnecessary because she will never face the additional penalty of R_A. Consequently, as the auditor places less emphasis on the non-focus area, the audit effort in case of a non-matching report is lower compared to the no-disclosure regime.

As the ex-post audit effort can be higher or lower in the disclosure regime compared to the no-disclosure regime, it is not obvious whether the expected audit effort is higher or lower. The audit effort with (without) an inspection, $e^*_{match,D}$ ($e^*_{non-match,D}$), is decreasing (increasing) in θ. When the adjustment costs are high, the auditor anticipates a costly adjustment, and therefore chooses a higher ex-ante audit effort and a lower ex-post upward adjustment. As the ex-post upward adjustment is small for high adjustment costs θ, the expected audit effort under disclosure is lower relative to the no-disclosure regime (Part (2), Proposition 2.3).

The intuition of the result in part (3) of Proposition 2.3 is as follows. Making his misreporting decision, the manager considers the net benefit of misreporting and his

direct misreporting costs. The resulting first-order condition (FOC) for the manager's misreporting problem given in Equation 2.19 is

$$\begin{aligned} FOC_D :=& \omega(1-\hat{e}_{match,D})(B-p(L_M+R_M)-(1-p)aR_M) \\ &+(1-\omega)(1-\hat{e}_{non-match,D})(B-p(L_M+R_M))-k\gamma=0. \end{aligned} \tag{2.23}$$

The FOC shows that the manager's misreporting incentives are lower when the anticipated audit effort, $\hat{e}_{match,D}$ or $\hat{e}_{non-match,D}$, is higher. The intuition is as follows. When the auditor exerts higher audit effort, she detects misreporting with a higher probability; thus, the net benefit of misreporting decreases. Considering the net benefit and costs of misreporting, the manager chooses to misreport less when the net benefit is low.

As part (1) of Proposition 2.3 shows, the anticipated audit effort in the disclosure and no-disclosure regimes differ. Comparing the FOC of the manager's misreporting problem under the disclosure and no-disclosure regimes explains why the manager misreports more in the disclosure regime. The FOC to the manager's misreporting problem under no-disclosure in Equation 2.10 is

$$FOC_{nD} := (1-\hat{e}_{nD})\,(B-p(L_M+R_M)-\omega a(1-p)R_M)-k\gamma. \tag{2.24}$$

A higher FOC under disclosure implies that the misreporting incentives under the disclosure regime are higher, and thus the manager misreports more:

$$\begin{aligned} &FOC_D - FOC_{nD} = \\ &\overbrace{\omega(\hat{e}_{nD}-\hat{e}_{match,D})(B-p(L_M+R_M))}^{\text{Detection Effect},<0} + \overbrace{(1-\omega)(\hat{e}_{nD}-\hat{e}_{non-match,D})(B-p(L_M+R_M))}^{\text{Elusion Effect},>0} \\ &\qquad + \underbrace{\omega((\hat{e}_{nD}-\hat{e}_{match,D})(-p(1-a)R_M))}_{\text{Shield Effect},>0} \end{aligned} \tag{2.25}$$

As the auditor chooses higher audit effort in case of a matching report and detects misreporting more often (and the manager correctly anticipates that), the misreporting incentives under disclosure are lower (*Detection Effect*). Nevertheless, in the case of a non-matching report, the auditor chooses lower audit effort under disclosure, and thus detects misreporting less often. The manager anticipates that he now has a higher chance of receiving the net benefit because the probability that the auditor does not detect the misreporting is higher; that is, the probability of eluding penalties and liabilities is higher. Consequently, misreporting incentives increase (*Elusion Effect*). Moreover, the manager faces a potential penalty from enforcement, R_M, only in case of a matching report. As the manager correctly anticipates that the auditor chooses a higher audit effort under disclosure, misreporting incentives increase. Put differently, by choosing a higher audit effort in case of a matching report, the auditor shields the manager from the potential

penalty, R_M (*Shield Effect*). The manager anticipates this outcome and thus his incentives to misreport increase. The *Shield Effect* and the *Elusion Effect* dominate the *Detection Effect*. Hence, the manager misreports more under the disclosure regime compared to the no-disclosure regime.

As misreporting is always higher under disclosure (Part (3) of Proposition 2.3), FRQ is always lower under disclosure regime when the expected audit effort is lower. FRQ can only be higher when the expected audit effort under disclosure is higher and dominates the higher misreporting (Part (4) of Proposition 2.3).

Figure 2.2 illustrates the audit effort in the disclosure and no-disclosure regimes. The auditor adjusts her audit effort under the disclosure regime for low audit costs, $\theta < \bar{\theta} = 0.50$. Moreover, the expected audit effort under the disclosure regime is higher for $\theta < \tilde{\theta} = 0.44$. However, with increasing θ, the audit effort after observing a matching disclosure decreases as ex-post adjustment gets too costly. With increasing θ, the ex-ante effort increases as the auditor anticipates that she will make a smaller upward adjustment after observing a matching report. For $\theta > \tilde{\theta} = 0.44$, the upward adjustment is so small that the expected audit effort under the disclosure is lower than under the no-disclosure regime.

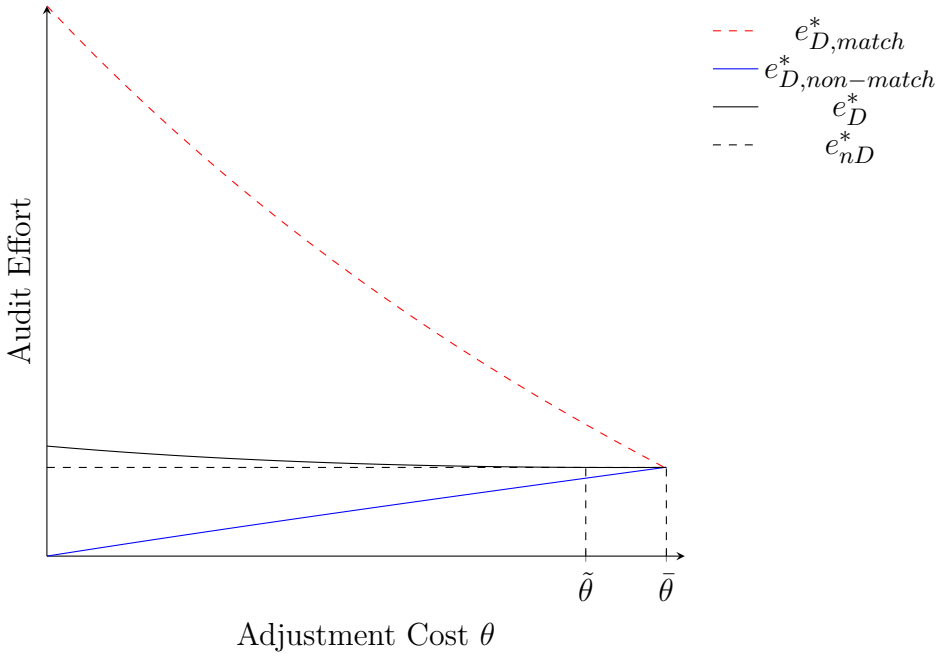


Figure 2.2: Audit Effort plotted for $a = 0.8, \omega = 0.2, B = 2, p = 0.4, L_M = R_M = L_A = 1, R_A = 1.5, c = k = 1, \bar{\theta} = 0.50, \tilde{\theta} = 0.44$.

Figure 2.3 shows that for sufficiently low adjustment costs, FRQ with disclosure exceeds that without disclosure. For sufficiently low adjustment costs, the expected audit effort under disclosure is significantly higher than under no-disclosure. Thus, the higher expected audit effort outweighs the higher misreporting, and FRQ is greater under the disclosure regime. Nevertheless, for high adjustment costs, FRQ is lower. For $\theta = \bar{\theta} = 0.5$,

FRQ under the disclosure regime is identical to that under the no-disclosure regime because the auditor never adjusts her audit effort.

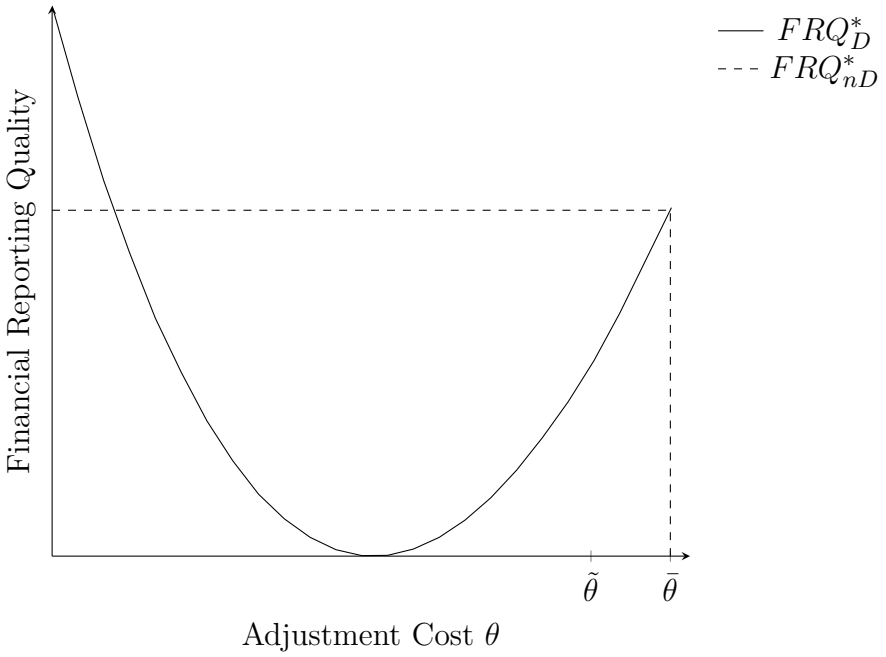


Figure 2.3: FRQ plotted for $a = 0.8, \omega = 0.2, B = 2, p = 0.4, L_M = R_M = L_A = 1, R_A = 1.5, c = k = 1, \bar{\theta} = 0.50, \tilde{\theta} = 0.44$.

Part (2) of Proposition 2.3 shows that the auditor chooses a higher expected audit effort only for sufficiently low adjustment costs, $\theta < \tilde{\theta}$. To further investigate the enforcement institution's potential to enhance audit effort, we analyze the determinants of the threshold $\tilde{\theta}$. A higher threshold implies that the auditor's upward adjustment is sufficiently high, so a higher expected audit effort results for more values of θ. Put differently, the expected audit effort under disclosure is more often higher compared to no-disclosure. The enforcement institution can only influence the auditor's and the manager's penalties ($R_{A,M}$) and the detection probability a. Proposition 2.4 summarizes how these parameters affect the adjustment costs threshold.

Proposition 2.4. *The adjustment costs threshold, $\tilde{\theta}$,*

1. *increases in the manager's enforcement penalty, R_M,*
2. *increases in the auditor's enforcement penalty, R_A, and*
3. *increases in the enforcement institution's detection probability, a.*

Proof. See Appendix. □

Part (1) of Proposition 2.4 shows that if the manager's potential penalty from enforcement increases, then the auditor's adjustment costs threshold increases (i.e., the expected

audit effort with disclosure is higher relative to the no-disclosure regime even for higher adjustment costs θ). The intuition is as follows. The manager's enforcement penalty only indirectly affects the auditor's effort decision via the manager's misreporting decision. If the manager's penalty from enforcement increases, then misreporting yields a lower expected payoff, and misreporting decreases. Moreover, misreporting is determined by the probability that the auditor does not detect the misreporting, which occurs with probability $(1-e)$. The manager incurs the enforcement penalty only in case of a matching report. Under disclosure, the auditor chooses a higher audit effort for a matching report, meaning that the probability of not detecting misreporting is lower compared to no-disclosure. As the misreporting is detected more often under disclosure, an increase in the penalty affects the manager's misreporting decision less under disclosure. Misreporting thus decreases less under the disclosure regime compared to the no-disclosure regime. Consequently, the indirect effect of less misreporting is smaller, and audit effort decreases less under disclosure. Thus, the expected effort level is higher in the disclosure case for more values of adjustment costs θ; that is, a higher $\tilde{\theta}$ threshold results.

Parts (2) and (3) show that if the auditor's expected penalty from enforcement (aR_A) increases, then the adjustment costs threshold increases as well (i.e., the expected audit effort with disclosure is higher compared to the no-disclosure regime even for higher adjustment costs θ). The first part of the intuition is similar to the intuition for part (1). If the enforcement institution's probability of detecting misreporting increases, then the manager's expected payoff from misreporting decreases. This increases the indirect negative effect on the auditor's effort choice. Moreover, as the auditor never receives an enforcement penalty for a non-matching report, her effort is determined only by the indirect effect through less misreporting. However, when the expected penalty from enforcement increases, the auditor is also subject to a direct effect in case of a matching report. The direct effect dominates, and the auditor chooses a higher expected effort level in the disclosure case for more values of adjustment costs θ; that is, a higher $\tilde{\theta}$ threshold results.

2.4 Concluding Remarks and Empirical Predictions

We extend the literature on enforcement design and auditor-enforcement interaction by studying the impact of the disclosure of enforcement focus on audit effort, managers' misreporting, and FRQ. Disclosure of enforcement focus shifts the audit effort toward the focus area. As the higher audit effort in case of an inspection results from upward adjustment after observing the report, the expected audit effort depends on the adjustment costs. Our results lead to the following empirical predictions:

1. The disclosure of enforcement inspection focus is associated with higher misreporting (earnings management).

2. If the auditor's adjustment costs are low — for example, for Big-4 auditors — disclosing the enforcement inspection focus is associated with higher audit quality.

3. If the auditor's adjustment costs are low, disclosing the enforcement inspection focus is associated with higher FRQ.

To measure differences in enforcement institutions, Brown et al., 2014 constructed an index to capture these differences between countries, which could be used to analyze our predictions.

As this study sheds light on enforcement focus disclosure, and thus enforcement design, our analysis has strong implications for enforcement institutions and audit practices. We suggest that to maximize FRQ, enforcement institutions should carefully assess whether auditors within their enforcement area face high or low adjustment costs. Adjustment costs could differ by region, industry, legal system, or audit firm size (e.g., Big-4 auditors have better infrastructures and, thus, have lower adjustment costs). Moreover, enforcement institutions and auditors should incorporate an element of unpredictability in the selection of the enforcement focus and audit procedures. In addition, we aim that auditing standards extend to include randomized audit procedures to reduce inefficient audit effort choices if the enforcement institution does disclose its inspection focus.

We designed our model to specifically analyze the effect of disclosing enforcement focus on FRQ, specifically in terms of audit quality and financial misreporting. However, our model does not include regulators overseeing the enforcement institution or law enforcement/criminal prosecution, which could affect auditors' and managers' decisions. We encourage future research to aim for more insights into the optimal financial enforcement design by incorporating these aspects.

2.5 Appendix

Proof of Lemma 2.3

Proof. To prove that strategy 3), where the auditor can adjust her planned audit effort when the focus report does not include the firm's material item (non-matching report) and 4), where she can always adjust her effort independent of the focus report, are not optimal, we first derive the optimal ex-post audit effort after observing a non-matching report.

Observing a non-matching report not comprising firm specific items Adjusting the effort upward results in audit costs of

$$\frac{ce_{ex-post}^2}{2} + \frac{c\theta}{2}(e_{ex-post}^2 - e_{ex-ante}^2) + \hat{\gamma}(1 - e_{ex-post})p(L_A + R_A), \tag{2.26}$$

resulting in the ex-post effort

$$e_{ex-post,non-match} = \frac{\hat{\gamma}p(L_A + R_A)}{c(1+\theta)}. \tag{2.27}$$

Next, we determine the ex-ante effort $e_{ex-ante}$ for both cases and prove that both strategies are not optimal behavior.

3) Adjust the ex-ante planned audit effort in case of a non-matching report The auditor's ex-ante costs are

$$\begin{aligned}\omega(&\frac{ce_{ex-ante}^2}{2} + \hat{\gamma}(1 - e_{ex-ante})(pL_A + (p + (1-p)a)R_A)) + (1-\omega)(\frac{ce_{ex-post,non-match}^2}{2} \\ &+ \frac{c\theta}{2}(e_{ex-post,non-match}^2 - e_{ex-ante}^2) + \hat{\gamma}(1 - e_{ex-post,non-match})p(L_A + R_A)).\end{aligned} \tag{2.28}$$

The auditor minimizes the ex-ante costs in Equation 2.28 by choosing

$$e_{ex-ante,non-match} = \frac{\omega\hat{\gamma}(pL_A + (p + (1-p)a)R_A))}{c(\omega(1+\theta) - \theta)}. \tag{2.29}$$

This case is an equilibrium when $e_{ex-ante,non-match} < e_{ex-post,non-match}$. We can show that the auditor will never adjust her effort upward after observing a non-matching report. The comparison yields

$$e_{ex-ante,non-match} > e_{ex-post,non-match} \implies -\theta p(L_A + R_A) - R_A(1-p)a\omega(1+\theta) < 0, \tag{2.30}$$

which is always true.

4) Adjust the ex-ante planned audit effort in case of a matching and a non–matching report The ex-ante audit costs are

$$\begin{aligned}&\omega(\frac{ce_{ex-post,match}^2}{2}+\frac{c\theta}{2}(e_{ex-post,match}^2-e_{ex-ante}^2)+\hat{\gamma}(1-e_{ex-post,match})(pL_A+(p+(1-p)a)R_A))\\&+(1-\omega)(\frac{ce_{ex-post,non-match}^2}{2}+\frac{c\theta}{2}(e_{ex-post,non-match}^2-e_{ex-ante}^2)\\&+\hat{\gamma}(1-e_{ex-post,non-match})p(L_A+R_A)),\end{aligned} \tag{2.31}$$

with the derivative with respect to $e_{ex-ante}$:

$$-c\theta e_{ex-ante}, \tag{2.32}$$

and the second-order condition (SOC):

$$-c\theta < 0. \tag{2.33}$$

Thus, choosing $e_{ex-ante} > 0$ never minimizes the ex-ante audit costs in Equation 2.31, and thus the auditor never adjusts the effort upward for both types of report (matching and non-matching).

Optimal Equilibrium Strategies Altogether, we have two possible equilibria. First, the auditor never adjusts her effort. The equilibrium audit effort and misreporting are identical to the equilibrium choices under the no-disclosure regime summarized in Lemma 2.2.

The second possible equilibrium is that the auditor adjusts her effort upward when she observes a matching report. This occurs when the audit adjustment costs are sufficiently low. As we are interested in the effect of adjustments after the disclosure of the inspection focus, we denote the resulting equilibrium effort and misreporting after adjustment, the optimal equilibrium effort and misreporting under the disclosure regime:

$$\begin{aligned}e_{D,match} &= e_{ex-post,match},\\ e_{D,non-match} &= e_{ex-ante,match},\\ \gamma_D &= \gamma_{D,match}.\end{aligned} \tag{2.34}$$

Inserting the other party's equilibrium strategies for the conjectured equilibrium strategies yields the equilibrium audit effort and misreporting stated in Lemma 2.3. □

Proof of Proposition 2.1

Proof. We prove the first part by comparing the manager's misreporting under both regimes:

$$\begin{aligned}
&\gamma^*_{nE} > \gamma^*_{nD} \\
\implies &\frac{c(B-pL_M)}{ck+pL_A(B-pL_M)} > \frac{c(B-pL_M-P(E,nD)R_M)}{ck+(pL_A+P(E,nD)R_A)(B-pL_M-P(E,nD)R_M)} \\
\implies &ckR_MP(E,nD)+(B-pL_M)R_AP(E,nD)(B-pL_M-P(E,nD)R_M)>0, \quad (2.35)
\end{aligned}$$

which is always true for interior solutions; that is, $B > pL_M + P(E,nD)R_M$.

We prove the second part by comparing the audit effort under both regimes:

$$\begin{aligned}
&e^*_{nE} < e^*_{nD} \\
\implies &\frac{pL_A(B-pL_M)}{ck+pL_A(B-pL_M)} < \frac{(pL_A+P(E,nD)R_A)(B-pL_M-P(E,nD)R_M)}{ck+(pL_A+P(E,nD)R_A)(B-pL_M-P(E,nD)R_M)} \\
\implies &0 < -pL_AR_M + R_A(B-pL_M-P(E,nD)R_M) \\
\implies &R_A > \frac{pL_AR_M}{B-pL_M-P(E,nD)R_M} = \bar{R}_A. \quad (2.36)
\end{aligned}$$

The audit effort is higher under the enforcement and no-disclosure regime when R_A is sufficiently high.

To prove the third part, we define the difference in FRQ as

$$\Delta FRQ := FRQ^*_{nE} - FRQ^*_{nD} \implies -\gamma^*_{nE}(1-e^*_{nE}) + \gamma^*_{nD}(1-e^*_{nD}) < 0. \quad (2.37)$$

We can show that ΔFRQ is decreasing in R_A:

$$\frac{\partial \Delta FRQ}{\partial R_A} = \frac{\partial \gamma^*_{nD}}{\partial R_A}(1-e^*_{nD}) - \frac{\partial e^*_{nD}}{\partial R_A}\gamma^*_{nD}, \quad (2.38)$$

with

$$\frac{\partial \gamma^*_{nD}}{\partial R_A} = \frac{-cP(E,nD)(B-pL_M-P(E,nD)R_M)^2}{(ck+(pL_A+P(E,nD)R_A)(B-pL_M-P(E,nD)R_M))^2} < 0, \quad (2.39)$$

and

$$\frac{\partial e^*_{nD}}{\partial R_A} = \frac{P(E,nD)ck(B-pL_M-P(E,nD)R_M)}{(ck+(pL_A+P(E,nD)R_A)(B-pL_M-P(E,nD)R_M))^2} > 0. \quad (2.40)$$

We know that $\Delta FRQ < 0$ for $R_A = \bar{R}_A$ (follows from the comparison of effort and misreporting). That is, $FRQ^*_{nE} < FRQ^*_{nD}$ for $R_A = \bar{R}_A$. Moreover, we show that $\Delta FRQ \gtrless 0$

for $R_A = 0$:

$$\Delta FRQ(R_A = 0) = -c^2k^2 + p^2L_A^2(B - pL_M)(B - pL_M - P(E,nD)R_M) \gtrless 0. \tag{2.41}$$

If the above term is negative, then from $\frac{\partial \Delta FRQ}{\partial R_A} < 0$ follows that $FRQ^*_{nE} < FRQ^*_{nD}$ for all R_A.

If the above term is positive, then from $\frac{\partial \Delta FRQ}{\partial R_A} < 0$ follows that there exists a threshold $\tilde{R}_A$ such that for all $R_A < \tilde{R}_A$, $FRQ^*_{nE} > FRQ^*_{nD}$ and for all $R_A > \tilde{R}_A$, $FRQ^*_{nE} < FRQ^*_{nD}$. □

Proof of Proposition 2.2

Proof. We prove the first part of Proposition 2.2 by taking the derivative of $\bar{R}_A$ with respect to R_M:

$$\frac{\partial \bar{R}_A}{\partial R_M} = \frac{pL_A(B - pL_M)}{(B - pL_M - P(E,nD)R_M)^2} > 0, \tag{2.42}$$

which is always true for interior solutions; that is, $B > pL_M + P(E,nD)R_M$. This proves that the threshold $\bar{R}_A$ increases in R_M.

To prove the second part of Proposition 2.2, we take the derivative of $\bar{R}_A$ with respect to a:

$$\frac{\partial \bar{R}_A}{\partial a} = \frac{(1-p)L_A p\omega R_M^2}{(B - pL_M - P(E,nD)R_M)^2} > 0, \tag{2.43}$$

which is always true. This proves that the threshold $\bar{R}_A$ increases in a. □

Proof of Proposition 2.3

Proof. We prove the first part of Proposition 2.3 by comparing the manager's misreporting under both regimes:

$$\begin{aligned} & \gamma^*_D > \gamma^*_{nD} \\ \implies & \omega(\theta(B - pL_M - P(E,nD)R_M) + (1-p)a(1-\omega)R_M) \\ & (-\theta(pL_A + P(E,nD)R_A) + R_A(1-\omega)a(1-p)) > 0. \end{aligned} \tag{2.44}$$

The first term is always positive following from the assumptions for interior solutions:

$$(B - pL_M - P(E,nD)R_M) > 0. \tag{2.45}$$

The second term is always positive, following from the assumptions for adjustments in the disclosure regime:

$$\theta < \bar{\theta} = \frac{R_A(1-\omega)a(1-p)}{pL_A + P(E,nD)R_A}. \tag{2.46}$$

We prove the second part of Proposition 2.3 by comparing the auditor's effort in case of an enforcement inspection:

$$\begin{aligned} & e^*_{D,match} > e^*_{nD} \\ \Longrightarrow\ & (ck(1-\omega(1+\theta)) + (1-\omega)(pL_A + P(E,nD)R_A)(B - p(L_M + R_M))) \\ & (-\theta(pL_A + P(E,nD)R_A) + R_A(1-\omega)a(1-p)) > 0. \end{aligned} \tag{2.47}$$

The first term is always positive following from the assumptions for interior solutions:

$$(B - pL_M - pR_M) > 0. \tag{2.48}$$

The second term is always positive following from the assumptions for adjustments in the disclosure regime:

$$\theta < \bar{\theta} = \frac{R_A(1-\omega)a(1-p)}{pL_A + P(E,nD)R_A}. \tag{2.49}$$

Comparing the auditor's effort in case of no enforcement inspection yields:

$$\begin{aligned} & e^*_{D,non-match} < e^*_{nD} \\ \Longrightarrow\ & (ck\omega(1+\theta) + \omega(pL_A + P(E,nD)R_A)(B - pL_M - P(E,D)R_M)) \\ & (\theta(pL_A + P(E,nD)R_A) - R_A(1-\omega)a(1-p)) < 0. \end{aligned} \tag{2.50}$$

The first term is always positive following from the assumptions for interior solutions:

$$(B - pL_M - P(E,D)R_M) > 0. \tag{2.51}$$

The second term is always negative following from the assumptions for adjustments in the disclosure regime:

$$\theta < \bar{\theta} = \frac{R_A(1-\omega)a(1-p)}{pL_A + P(E,nD)R_A}. \tag{2.52}$$

We prove the third part of Proposition 2.3 by comparing the expected effort under both regimes:

$$\begin{aligned}
&\omega e^*_{D,match} + (1-\omega) e^*_{D,non-match} \gtrless e^*_{nD} \\
&\quad \Longrightarrow (ck\omega\theta - (1-p)a\omega(1-\omega)R_M(pL_A + P(E,nD)R_A)) \\
&(\theta(pL_A + P(E,nD)R_A) - R_A(1-\omega)a(1-p)) \gtrless 0. \qquad (2.53)
\end{aligned}$$

The second term is always negative following from the assumptions for adjustments in the disclosure regime:

$$\theta < \bar{\theta} = \frac{R_A(1-\omega)a(1-p)}{pL_A + P(E,nD)R_A}. \qquad (2.54)$$

The first term is negative; hence, the expected effort with disclosure is higher when

$$\theta < \tilde{\theta} = \frac{(1-p)a(1-\omega)R_M(pL_A + P(E,nD)R_A)}{ck}. \qquad (2.55)$$

Consequently, for $\theta < \min\{\tilde{\theta}, \bar{\theta}\}$, $\omega e^*_{D,match} + (1-\omega) e^*_{D,non-match} > e^*_{nD}$.

The proof of part (3) of Proposition 2.3 also proves the necessary condition for higher FRQ stated in part (4). As misreporting is higher and the expected effort is only higher under the no disclosure regime for $\theta < \min\{\bar{\theta}, \tilde{\theta}\}$, FRQ can only be higher for $\theta < \min\{\bar{\theta}, \tilde{\theta}\}$. □

Proof of Proposition 2.4

Proof. We prove the first part of Proposition 2.4 by taking the derivative of $\tilde{\theta}$ with respect to R_M:

$$\frac{\partial \tilde{\theta}}{\partial R_M} = \frac{a(1-p)(1-\omega)(pL_A + P(E,nD)R_A)}{ck} > 0, \qquad (2.56)$$

which is always true. This proves that the threshold $\tilde{\theta}$ increases in R_M.

The derivative of $\tilde{\theta}$ with respect to R_A is

$$\frac{\partial \tilde{\theta}}{\partial R_A} = \frac{a(1-p)(1-\omega)P(E,nD)R_M}{ck} > 0, \qquad (2.57)$$

which is always true. This proves the second part of Proposition 2.4.

To prove the third part of Proposition 2.4, we take the derivative of $\tilde{\theta}$ with respect to a:

$$\frac{\partial \tilde{\theta}}{\partial a} = \frac{(1-p)(1-\omega)R_M(pL_A + pR_A + 2a\omega(1-p)R_A)}{ck} > 0, \qquad (2.58)$$

which is always true. This proves that the threshold $\tilde{\theta}$ increases in a. □

Blame & Shame Approach

Some enforcement institutions disclose information about the inspection and their findings to the public. Consequently, the financial market is always aware of enforcement findings. Thus, the manager and the auditor will expect an additional penalty, for example, in form of reputation losses. For instance, in the US, "the PCAOB posts all publicly available opinions, orders, termination of bars, and other Board enforcement actions, as well as related SEC and court actions on review of those sanctions"(PCAOB, 2022). Moreover, Sec. 109 Securities Trading Act (§ 109 WpHG) requires the German Federal Financial Supervisory Authority (FFSA/BaFin) to publish their findings regarding a firm's financial statement. We refer to this as the "Blame & Shame" enforcement approach.

Proof. In the following, we prove that our main results hold in the Blame & Shame approach.

No-Disclosure

First, we state the optimal audit effort and misreporting with the Blame & Shame approach under no-disclosure and compare it to the no-enforcement regime.

The auditor minimizes

$$\frac{ce^2}{2} + (L_A + R_A)(p + (1-p)a\omega)\hat{\gamma}(1-e), \tag{2.59}$$

the FOC is

$$\begin{aligned} ce - \hat{\gamma}P(E,nD)(L_A + R_A) &= 0 \\ \implies e_{nD}^{BS} &= \frac{\hat{\gamma}P(E,nD)(L_A + R_A)}{c}. \end{aligned} \tag{2.60}$$

The manager maximizes

$$\gamma(1-\hat{e})(B - P(E,nD)(L_M + R_M)) - \frac{k\gamma^2}{2}, \tag{2.61}$$

the FOC is

$$\begin{aligned} -k\gamma + (1-\hat{e})(B - P(E,nD)(L_M + R_M)) &= 0 \\ \implies \gamma_{nD}^{BS} &= \frac{(1-\hat{e})(B - P(E,nD)(L_M + R_M))}{k}. \end{aligned} \tag{2.62}$$

In equilibrium, the auditor and the manager choose the following effort and misreporting, respectively:

$$e_{nD}^{*,BS} = \frac{P(E,nD)(L_A+R_A)(B-P(E,nD)(L_M+R_M))}{ck+P(E,nD)(L_A+R_A)(B-P(E,nD)(L_M+R_M))}, \tag{2.63}$$

$$\gamma_{nD}^{*,BS} = \frac{c(B-P(E,nD)(L_M+R_M))}{ck+P(E,nD)(L_A+R_A)(B-P(E,nD)(L_M+R_M))}. \tag{2.64}$$

Compared to the no enforcement regime, the manager misreports less:

$$\begin{aligned} &\gamma_{nE}^{*} > \gamma_{nD}^{*,BS} \\ \implies &\frac{c(B-pL_M)}{ck+pL_A(B-pL_M)} > \frac{c(B-P(E,nD)(L_M+R_M))}{ck+P(E,nD)(L_A+R_A)(B-P(E,nD)(L_M+R_M))} \\ \implies &ck(L_M(1-p)\omega a+R_M P(E,nD)) \\ &+(B-pL_M)(L_A(1-p)\omega a+R_A P(E,nD))(B-P(E,nD)(L_M+R_M)) > 0, \end{aligned} \tag{2.65}$$

which is always true following from the assumptions for interior solutions:

$$(B-P(E,nD)(L_M+R_M)) > 0. \tag{2.66}$$

The auditor exerts higher audit effort when the penalty from enforcement is high:

$$\begin{aligned} &e_{nE}^{*} < e_{nD}^{*,BS} \\ \implies &\frac{pL_A(B-pL_M)}{ck+pL_A(B-pL_M)} < \frac{P(E,nD)(L_A+R_A)(B-P(E,nD)(L_M+R_M))}{ck+P(E,nD)(L_A+R_A)(B-P(E,nD)(L_M+R_M))} \\ \implies &R_A > \frac{L_A(p(B-pL_M)-P(E,nD)(B-P(E,nD)(L_M+R_M)))}{P(E,nD)(B-P(E,nD)(L_M+R_M))} = \bar{R}_A^{BS}. \end{aligned} \tag{2.67}$$

Next, we show that FRQ can be higher or lower depending on the costs ck or $R_A \gtrless \tilde{R}_A^{BS}$.

We compare:

$$\begin{aligned} \Delta FRQ &:= (1-\gamma_{nE}^{*})+\gamma_{nE}^{*}e_{nE}^{*} < (1-\gamma_{nD}^{*,BS})+\gamma_{nD}^{*,BS}e_{nD}^{*,BS} \\ &\implies \Delta FRQ := -\gamma_{nE}^{*}(1-e_{nE}^{*})+\gamma_{nD}^{*,BS}(1-e_{nD}^{*,BS}). \end{aligned} \tag{2.68}$$

We can show that ΔFRQ is decreasing in R_A:

$$\frac{\partial \Delta FRQ}{\partial R_A} = \frac{\partial \gamma_{nD}^{*,BS}}{\partial R_A}(1-e_{nD}^{*,BS}) - \frac{\partial e_{nD}^{*,BS}}{\partial R_A}, \tag{2.69}$$

with

$$\frac{\partial \gamma_{nD}^{*,BS}}{\partial R_A} = \frac{-cP(E,nD)(B-P(E,nD)(L_M-R_M))^2}{(ck+P(E,nD)(L_A+R_A)(B-P(E,nD)(L_M-R_M)))^2} < 0, \tag{2.70}$$

and

$$\frac{\partial e_{nD}^{*,BS}}{\partial R_A} = \frac{P(E,nD)ck(B-P(E,nD)(L_M+R_M))}{(ck+P(E,nD)(L_A+R_A)(B-P(E,nD)(L_M-R_M)))^2} > 0. \tag{2.71}$$

We know that $\Delta FRQ < 0$ for $R_A = \bar{R}_A^{BS}$ (follows from the comparison of effort and misreporting). That is, $FRQ_{nE}^{*} < FRQ_{nD}^{*,BS}$ for $R_A = \bar{R}_A^{BS}$. Moreover, we show that $\Delta FRQ \gtrless 0$ for $R_A = 0$:

$$\begin{aligned}&\Delta FRQ(R_A=0) = -c^2k^2(L_M(1-p)\omega a - P(E,nD)R_M) - 2ck(B-P(E,nD)(L_M+R_M))\\&(B-pL_M)L_A(1-p)\omega a + (B-P(E,nD)(L_M+R_M))(B-pL_M)(-P(E,nD)^2\\&(B-P(E,nD)(L_M+R_M))L_A^2 + p^2(B-pL_M)L_A^2) \gtrless 0.\end{aligned} \tag{2.72}$$

If the above term is negative, then from $\frac{\partial \Delta FRQ}{\partial R_A} < 0$ follows that $FRQ_{nE}^{*,BS} < FRQ_{nD}^{*,BS}$ for all R_A.

If the above term is positive, then from $\frac{\partial \Delta FRQ}{\partial R_A} < 0$ follows that there exists a threshold $\tilde{R}_A^{BS}$, such that for all $R_A < \tilde{R}_A^{BS}$, $FRQ_{nE}^{*,BS} > FRQ_{nD}^{*,BS}$ and for all $R_A > \tilde{R}_A^{BS}$, $FRQ_{nE}^{*,BS} < FRQ_{nD}^{*,BS}$.

This proves that the results in the Blame & Shame approach under no-disclosure are qualitatively identical to Proposition 2.1.

Disclosure

Second, we state the optimal audit effort and misreporting with the Blame & Shame approach under disclosure and compare it to the no-disclosure regime.

The auditor minimizes

$$C_D^{B\&S} := \hat{\gamma}(1-e)\left(p+\omega a(1-p)\right)(L_A+R_A)+\Phi. \tag{2.73}$$

The manager's ex-ante expected payoff is identical to the no-disclosure regime. The only difference is the conjectured audit level $\hat{e}$.

The derivation of the optimal audit effort and misreporting in the disclosure case is identical to the main proofs. Thus, two equilibria can result with no adjustment when the adjustment costs are high, $\theta > \bar{\theta}_{BS} = \frac{(1-p)a(1-\omega)}{P(E,nD)}$, or upward adjustment in case of a matching report when the adjustment costs are low $\theta < \bar{\theta}_{BS}$. For $\theta < \bar{\theta}_{BS}$, we derive the

following equilibrium effort and misreporting:

$$\begin{aligned}
\gamma_D^{*,BS} &= \frac{c(1+\theta)(1-\omega(1+\theta))(B-P(E,nD)(L_M+R_M))}{\Omega_{BS}},\\
e_{D,match}^{*,BS} &= \frac{(1-\omega(1+\theta))P(E,D)(L_A+R_A)(B-P(E,nD)(L_M+R_M))}{\Omega_{BS}},\\
e_{D,non-match}^{*,BS} = e_{ex-ante} &= \frac{(1-\omega)(1+\theta)p(L_A+R_A)(B-P(E,nD)(L_M+R_M))}{\Omega_{BS}}, \quad (2.74)
\end{aligned}$$

with

$$\begin{aligned}
\Omega_{BS} := {} & ck(1+\theta)(1-\omega(1+\theta))+\omega(1-\omega(1+\theta))(B-P(E,D)(L_M+R_M))P(E,D)(L_A+R_A)\\
& +(1-\omega)^2(1+\theta)p(L_A+R_A)(B-p(L_M+R_M)). \quad (2.75)
\end{aligned}$$

Comparison with no-disclosure reveals that the audit effort in case of a matching report is higher compared to no-disclosure:

$$\begin{aligned}
& e_{D,match}^{*,BS} > e_{nD}^{*,BS}\\
\implies & (ck(1-\omega(1+\theta))+(1-\omega)(B-p(L_M+R_M)))(-\theta P(E,nD)+(1-\omega)a(1-p))>0. \quad (2.76)
\end{aligned}$$

The first term is always positive following from the assumptions for interior solutions:

$$(B-pL_M-pR_M)>0. \quad (2.77)$$

The second term is always positive following from the assumptions for adjustments in the disclosure regime:

$$\theta<\bar{\theta}_{BS}=\frac{(1-\omega)a(1-p)}{P(E,nD)}. \quad (2.78)$$

The audit effort in case of a non-matching report is lower compared to no-disclosure:

$$\begin{aligned}
& e_{D,non-match}^{*,BS} < e_{nD}^{*,BS}\\
\implies & (ck\omega(1+\theta)+\omega P(E,nD)(L_A+R_A)(B-P(E,D)(L_M+R_M)))\\
& (\theta P(E,nD)-(1-\omega)a(1-p))<0. \quad (2.79)
\end{aligned}$$

The first term is always positive following from the assumptions for interior solutions:

$$B-P(E,D)(L_M+R_M)>0. \quad (2.80)$$

The second term is always negative following from the assumptions for adjustments in the disclosure regime:

$$\theta < \bar{\theta}_{BS} = \frac{(1-\omega)a(1-p)}{P(E,nD)}. \tag{2.81}$$

The expected audit effort under disclosure can be higher or lower:

$$\begin{aligned} & \omega e^{*,BS}_{D,match} + (1-\omega) e^{*,BS}_{D,non-match} \gtrless e^{*,BS}_{nD} \\ \Longrightarrow\ & (ck\omega\theta - (1-p)P(E,nD)(L_A+R_A)a\omega(1-\omega)(L_M+R_M))(\theta P(E,nD) \\ & \qquad - (1-\omega)a(1-p)) \gtrless 0. \end{aligned} \tag{2.82}$$

The second term is always negative following from the assumptions for adjustments in the disclosure regime:

$$\theta < \bar{\theta}_{BS} = \frac{(1-\omega)a(1-p)}{P(E,nD)}. \tag{2.83}$$

The first term is negative; thus, the expected effort with disclosure is higher when

$$\theta < \tilde{\theta}_{BS} = \frac{(1-p)a(1-\omega)(L_M+R_M)(L_A+R_A)P(E,nD)}{ck}. \tag{2.84}$$

The manager always misreports less under disclosure:

$$\begin{aligned} & \gamma^{*,BS}_{D} > \gamma^{*,BS}_{nD} \\ \Longrightarrow\ & \omega(\theta(B - P(E,nD)(L_M+R_M)) + (1-p)a(1-\omega)(L_M+R_M))(-\theta P(E,nD) \\ & \qquad + (1-\omega)a(1-p)) > 0. \end{aligned} \tag{2.85}$$

The first term is always positive following from the assumptions for interior solutions:

$$B - P(E,nD)(L_M+R_M) > 0. \tag{2.86}$$

The second term is always positive following from the assumptions for adjustments in the disclosure regime:

$$\theta < \bar{\theta}_{BS} = \frac{(1-\omega)a(1-p)}{P(E,nD)}. \tag{2.87}$$

As misreporting is higher and the expected effort is only higher under the no disclosure regime for $\theta < \min\{\bar{\theta}_{BS}, \tilde{\theta}_{BS}\}$, FRQ can only be higher for $\theta < \min\{\bar{\theta}_{BS}, \tilde{\theta}_{BS}\}$.

This proves that the results in the Blame & Shame approach under disclosure are qualitatively identical to Proposition 2.3.

Comparison of both Approaches

Figure 2.4 depicts FRQ for both approaches under the no-disclosure regime. We refer to the approach in the main paper as "regular." In the numerical example, as the manager faces the financial market liability with a higher probability, misreporting is lower under the Blame & Shame approach. As the manager misreports less, audit incentives decrease and the audit effort is lower. Dependent on the enforcement penalty, R_A, the effect of less misreporting dominates, and FRQ under the Blame & Shame approach is higher. For a sufficiently high enforcement penalty, R_A, the effect of less audit effort dominates; thus, FRQ under the Blame & Shame approach is lower.

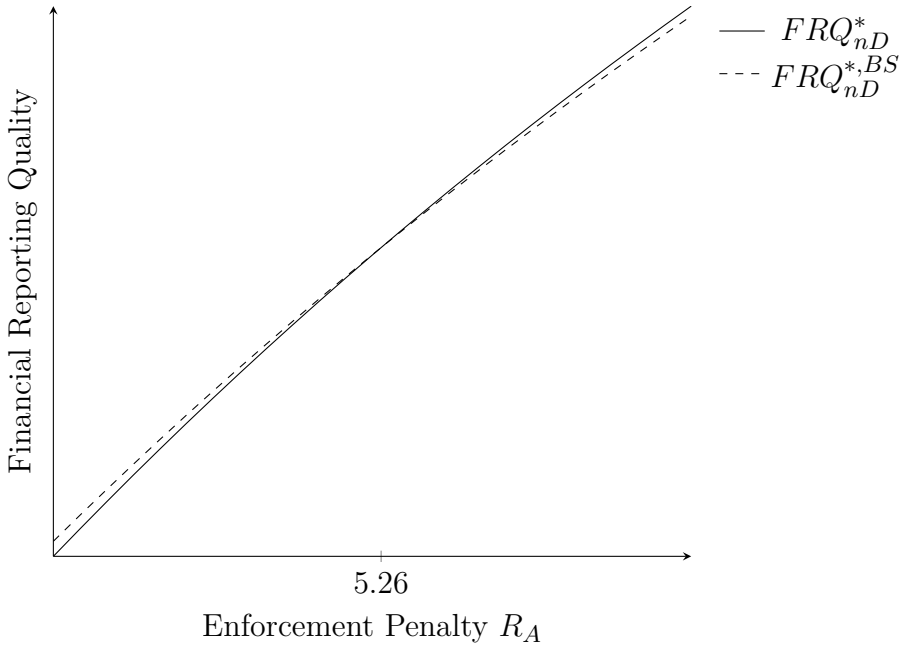


Figure 2.4: Financial Reporting Quality under the Regular Approach and the Blame & Shame Approach plotted for $a = 0.8, \omega = 0.2, B = 2, p = 0.4, L_M = R_M = L_A = 1, c = k = 1$.

Figure 2.5 depicts FRQ for both approaches under the disclosure regime. The audit effort is higher under the Blame & Shame approach compared to the regular approach for sufficiently low adjustment costs θ. However, misreporting is also higher within the Blame & Shame approach for sufficiently low adjustment costs. The effect of higher audit effort dominates the effect of higher misreporting. Consequently, the Blame & Shame approach can yield higher FRQ for sufficiently low adjustment costs. For sufficiently high adjustment costs, misreporting and audit effort are lower under the Blame & Shame approach. Hence, the lower misreporting dominates the lower audit effort; thus, FRQ is lower under the Blame & Shame approach.

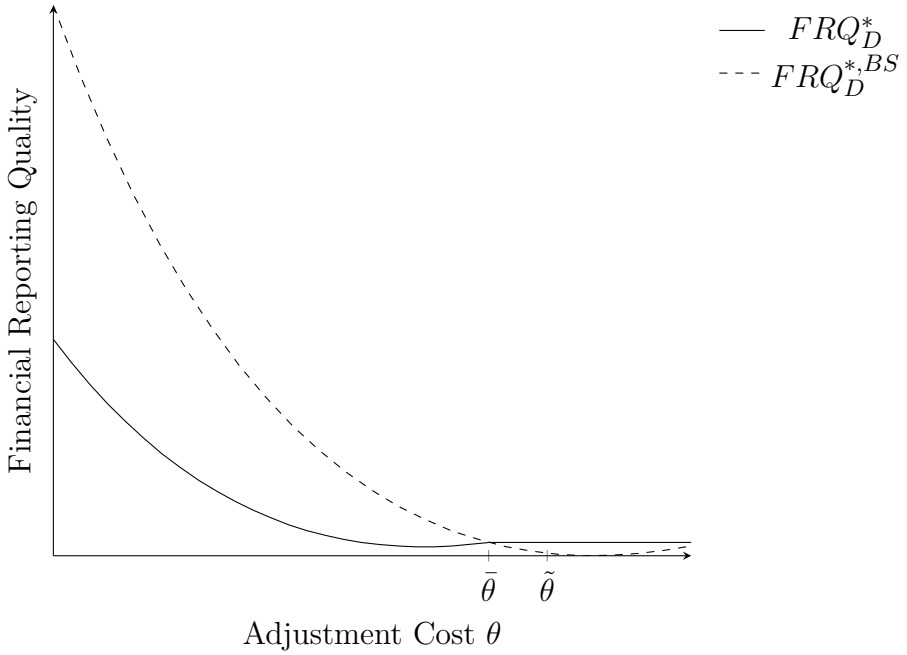


Figure 2.5: Financial Reporting Quality under the Regular Approach and the Blame & Shame Approach plotted for $a = 0.8, \omega = 0.2, B = 2, p = 0.4, L_M = R_M = L_A = 1, R_A = 6, c = k = 1, \bar{\theta} = 0.68, \tilde{\theta} = 0.77$.

□

Region	Inst.	Type of Institution	Disclosure	Examples:[a]	Disc. Date	Enf. year	Fiscal year
USA	SEC	Financial Markets	General	- Information Security and Operational Resiliency - Financial Technology (Fintech) and Innovation	Mar. 2021	2021	2020
U.K.	FRC	Accounting and Audit Oversight	Specific	- IFRS 3 - IAS 12 - Asset Impairments - Revenue Recognition	Dec. 2021	2022 2023	2021
EU	ESMA	Financial Markets	General	- Impacts of COVID-19 - Climate-related matters - Expected credit losses	Oct. 2021	2022	2021
Germany	FFSA	Financial Markets	Specific	- Impacts of COVID-19 - IT and Cybersecurity Risk	Oct. 2021	2022	2021
Australia	ASIC	Accounting and Audit Oversight	Specific	-Asset Valuations -Provisions -Solvency and Going Concern	Dec. 2021	2022	2021

Table 2.2: Enforcement Institution Overview – Detailed Version.

[a] We examined the focus reports of all institutions (See: ASIC, 2021; ESMA, 2021; FRC, 2021; SEC, 2021; FFSA, 2021).

Chapter 3

Unintended Consequences of Third-Party Auditor Hiring on Misreporting and Investment Efficiency

Abstract

I examine the effect of third-party auditor hiring on an entrepreneur's misreporting choice and the overall investment efficiency. Regulators focused on the auditor-client relationship since a variety of accounting scandals in the early 2000s, and the debate is still ongoing. In this paper, I analyze the effect of changing the auditor-client regulation fundamentally by letting a third party, e.g., a stock exchange, hire the auditor. Even though auditor's independence issues could be solved by introducing third-party hiring, I find that third-party hiring can increase or decrease misreporting and enhance or deteriorate investment efficiency. Further, I highlight conditions under which third-party auditor hiring can yield a lower investment efficiency. When discussing third-party hiring of auditors, regulators should carefully consider these unintended consequences of third-party hiring on investment efficiency.

3.1 Introduction

Following various accounting scandals in the early 2000s, including the downfall of Enron, Tyco International, and WorldCom, regulators tried to enhance auditor independence by regulating the auditor-client relationship regarding non-audit services, client size, or mandatory audit partner rotation.[1] However, the recent collapse of the German listed payment provider Wirecard due to financial statement fraud in 2020 has again drawn public and regulators' attention to the auditor-client relationship. The German government has addressed the Wirecard scandal by increasing auditor liability and tightening the mandatory auditor rotation. However, the impact of these reforms remains unclear. It is, therefore, still vital to analyze new approaches to auditor regulations.

In their 2010 green paper "Audit Policy: Lessons from the Crisis," the European Commission suggested inter alia that auditor independence problems could be solved by authorizing a third party to select and hire the auditor. Eliminating the firm's right to dismiss the auditor and the possibility for opinion shopping, would increase audit quality and auditor independence. However, as several comment letters objected auditor hiring by a regulator due to a potential increase in bureaucracy, the European Commission did not include third-party hiring in their 2011 white paper.[2] For example, the German chamber of public accountants answered that "auditor hiring by a third party, such as a regulatory authority, would counteract the efforts to reduce bureaucracy" (European Commission, 2011). However, Healy and Palepu, 2003 suggest third-party auditor hiring by a stock exchange instead of a regulator. This private sector approach could make third-party hiring feasible without further increasing bureaucracy.

In addition, third-party hiring is already applied for specific industries and companies in Germany. Audits of cooperative and savings banks are performed by auditors, whom the bank itself does not hire. For cooperative banks, the auditor is hired by the association of cooperative auditors (genossenschaftlicher Prüfungsverband), and for savings banks, by the savings bank association (Sparkassenverband). In both cases, the bank can not choose, hire, or terminate the auditing contract, which eliminates auditor independence issues. However, introducing third-party hiring for all listed companies may have unintended consequences. As a stock exchange benefits from the overall trading volume (i.e., investment level), new conflicts could arise, which affect misreporting and investment efficiency.[3]

[1] For example, Sarbanes-Oxley Act 2002 in the USA, Directive 2006/43/EC in the EU, or Audit Reform & Corporate Disclosure Act 2004 in Australia.

[2] European Commission, 30/11/2011, 2011/0359: "Proposal for a Regulation of the European Parliament and the Council on specific requirements regarding statutory audit of public-interest entities."

[3] According to NASDAQ's 2021 10-K Form, 64% of their annual revenue is generated through market services, including Equity Derivative Trading and Clearing, Cash Equity Trading, FICC, and Trade Management Services.

To explore these unintended consequences, studying the effects of new approaches to auditor hiring is crucial. Thus, I examine these unintended effects of third-party auditor hiring on an entrepreneur's misreporting choice and investment efficiency with a stock exchange as a third party.

I use a game-theoretic model featuring an entrepreneur ('she'), an investor ('he'), and a stock exchange. The entrepreneur seeks funding for a project, which can either be good or bad. A good project yields a positive return, whereas a bad one yields zero return. To receive funding, an independent auditor needs to audit the project. I consider two different settings, one where the entrepreneur hires the auditor and one where a stock exchange (third party) hires the auditor. Both choose between two different types of auditors: The first type fits the client and has a high probability of detecting the actual state of the project. For example, assume a highly specialized auditor for financial service companies who audits an insurance company. The second type does not fit the client and has a lower probability of detecting the true state of the project. For example, assume a specialized auditor for automotive companies auditing an insurance company. Choosing the fit auditor is associated with higher costs since specialization is costly.

The entrepreneur observes an accounting report from an accounting system. I analyze two different accounting systems: The first is a perfect or neutral accounting system as a benchmark case. The second is a downwards-biased imperfect accounting system (e.g., a conservative accounting system). In both systems, a bad project type always leads to a bad accounting signal. In addition, a good project always leads to a good accounting signal within the perfect accounting system. In comparison, a good project type can also lead to a bad accounting signal within the downwards-biased imperfect accounting system.

The entrepreneur always receives a private benefit if the project is funded. After observing the accounting signal, the entrepreneur chooses her optimal level of misreporting and prepares the financial statement. Thus, the entrepreneur potentially misreports a bad signal by reporting a good state to receive the private benefit. If the true project type is good, the entrepreneur gets a positive share of the project's return in addition to the private benefit. However, if the project's true type is bad and the entrepreneur reports a good type, the entrepreneur receives a penalty for misreporting. Misreporting is always detected since only the bad project type yields zero return.

After the entrepreneur prepares the financial statement, the auditor observes the entrepreneur's report. The auditor uses private knowledge from other clients or industries to investigate the project's true state. I assume that the auditor continuously detects the project's true state correctly if the project type is good, because the entrepreneur will always be able to provide sufficient audit evidence in those cases. Whenever the audit report states the project is good, investors fund the entrepreneur's project with capital. If the audit report states the project is bad, the investor does not provide any funding. Thus, the project does not take place.

The stock exchange receives a trading fee as a share of all invested capital. As reputation is critical for a stock exchange to attract capital, the stock exchange suffers reputational damage whenever the investor invests in a bad project, and third-party hiring is in place. As investors and the public would blame the stock exchange for not hiring the fit auditor, the stock exchange's reputational damage is higher whenever the unfit auditor was hired.

First, I analyze the optimal choices under the perfect accounting system as a benchmark case. As a good project type always leads to a good accounting signal within the perfect accounting system, the entrepreneur does not need the fit auditor to verify the good project type because both auditors always issue a good report. Thus, the entrepreneur does not benefit from hiring the fit auditor. Choosing the unfit auditor, misreporting is more likely to be successful and, thus, the project is funded more often if the true project type is bad. Following, within the perfect accounting system, the entrepreneur always chooses the unfit auditor. In addition, the unfit auditor is associated with lower audit costs.

With third-party hiring in place, the stock exchange also does not need the fit auditor to verify the good project type. Choosing the unfit auditor, the entrepreneur's misreporting is successful more often. Thus, investors invest in the project more often if the true project state is bad. This results in a higher trading/investment volume and therefore a higher return for the stock exchange. However, the stock exchange suffers greater reputational damages if the true project type is bad and the unfit auditor was appointed. Hiring the fit auditor is the stock exchange's only option to reduce the expected reputational damage. Thus, the stock exchange hires the fit auditor if the reputational damage is sufficiently high.

As the chances of successful misreporting are lower, the entrepreneur's misreporting level is always lower if the fit auditor is hired. Consequently, investment efficiency benefits from hiring the fit auditor. As the stock exchange hires the fit auditor more often, investment efficiency benefits from third-party hiring when a perfect accounting system is in place.

These results change for an imperfect accounting system. As the accounting signal is downwards-biased, a good project can now lead to a bad accounting signal. Whenever the entrepreneur herself states a project as bad, the auditor reduces the audit risk by following the entrepreneur's report. Misreporting a bad accounting signal with an underlying good project type, can prevent underinvestment and thus can be beneficial (*good misreporting*). Underinvestment is prevented more often if the fit auditor is hired because the fit auditor detects the true state with a higher probability. As the entrepreneur receives a share of the project's return if the project is funded, she benefits from hiring the fit auditor. However, if misreporting costs are high, the entrepreneur misreports less, i.e., she can not use beneficial misreporting to prevent underinvestment. Consequently, the entrepreneur does

not benefit from the fit auditor and, therefore, chooses the unfit auditor if misreporting costs are high.

The stock exchange (third party) hires the fit auditor if the probability of a good project is high or if the probability of a good project is low and the expected reputational damage is high. Moreover, I find that the misreporting level in response to the fit auditor is only higher if the probability of a good project is high or if the probability of a good project and the entrepreneur's private benefit from the funding are low. As the higher misreporting in response to an unfit auditor can compensate for the auditor's lower probability of detecting the project's true state, the investment efficiency can be higher in response to an unfit auditor. However, this is only the case, if the entrepreneur's private benefit from funding is low.

As far as I am aware, this study is the first theoretical model analyzing third-party hiring. The study contributes to various streams of literature. Literature examines a variety of potential threats to auditor independence. For example, dependent audit committee members can harm auditor independence (Berglund et al., 2018; Carcello and Neal, 2003; Trompeter, 1994; Vanstraelen, 2003). Trompeter, 1994 and Carcello et al., 2000 find that individual client importance could threaten auditor independence. Other aspects stressed in a variety of auditing literature are non-audit services (Ashbaugh et al., 2003; DeFond et al., 2002; Huang et al., 2007; Kinney et al., 2004; Knechel et al., 2012; Mishra et al., 2005; Svanstroem, 2013) or the auditor-client relationship (e.g., Carey and Simnett, 2006; Lennox and Park, 2007;Kealey et al., 2007; Dao et al., 2008; Davis et al., 2009). As a few statutory audit firms audit most listed companies, another concern is the auditor market concentration (e.g., Bandyopadhyay and Kao, 2001; Frankel et al., 2002; Dunn et al., 2011; Boone et al., 2012). As third-party hiring eliminates the threat of termination of the audit engagement, introducing third-party hiring eliminates these threats to audit quality. Thereby, the study also adds to the stream of literature on audit opinion shopping (e.g., Dye, 1991; Teoh, 1992; Lu, 2006). However, my model reveals potential unintended consequences of third-party hiring. I, thereby, contribute to the overall stream of literature on auditor independence and the auditor-client relationship by specifically analyzing the effect of third-party hiring on misreporting and investment efficiency. Besides extending this stream of literature, I am also extending the overall stream of literature on auditor hiring (e.g., Mayhew and Pike, 2004; Gold et al., 2018).

The paper proceeds as follows. The next Section describes the model setup (Section 3.2). Section 3.3 and 3.4, derive and compare the equilibrium choices and investment efficiency under different accounting systems. Section 3.5 concludes.

3.2 A Model of Auditor Hiring

Players I consider a model with three risk-neutral players: an entrepreneur ('she'), an investor ('he'), and a stock exchange.

Timeline The game comprises six dates. An entrepreneur seeks funding I for a project, which yields the return X_h if the type of the funded project is good and zero otherwise. At Date 1, nature draws the project's type, and auditor hiring takes place. The project type θ_i is good (θ_G) with probability $p \in (0,1)$ or bad (θ_B) otherwise. The auditor can also be of two types, fit or unfit. Thereby, γ denotes a binary variable which is 1 if the fit auditor is selected and 0 for the unfit. I examine two different regimes. One with an entrepreneur choosing the auditor and another where the stock exchange, as a third party, is choosing the auditor. At Date 2, the entrepreneur observes an imperfect accounting signal A_i with $i \in (G,B)$ about the state of her project, θ_i. At Date 3, the entrepreneur chooses her optimal level of misreporting (m) and prepares the financial statement of the project, S_i, stating the project as good S_G or bad S_B. At Date 4, the auditor observes the entrepreneur's report S_i. The auditor then conducts the audit and files the auditor's report R_i. At Date 5, the investor observes the auditor's report and decides whether to provide funding to the project or not. At Date 6, the final payoffs are realized. The game ends. Figure 3.1 depicts the timeline of the game.

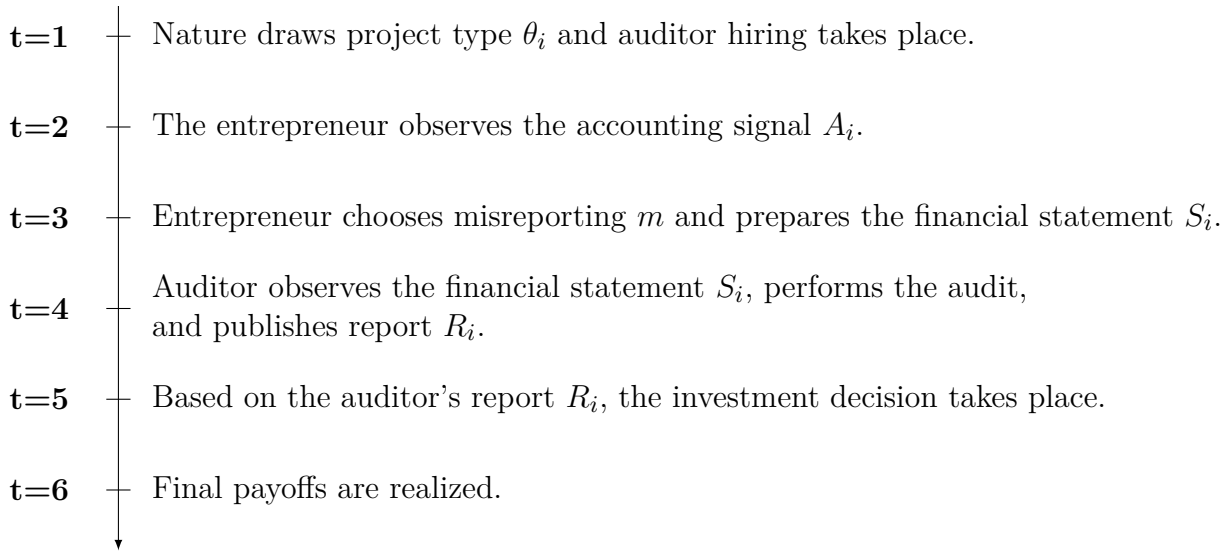


Figure 3.1: Timeline – Third-Party Auditor Hiring.

Auditor Hiring At Date 1, the entrepreneur or the stock exchange hires the auditor. The auditor can be of two types. Based on similar ideas by Basu and Ray, 2016 or Bleibtreu and Stefani, 2018, one auditor type is a perfect fit for the specific project due

to specialization. As an example, assume a highly specialized auditor for financial service companies who audits an insurance company. I refer to the perfect fit auditor as the "fit auditor." The other type is a less specialized one; however, still capable of providing sufficient audit services. I refer to this type as the "unfit auditor." During the audit, the auditor detects the true state with some probability, i.e., gathers sufficient audit evidence. The specialization factor $\beta \in (0,1)$ captures the lower degree of expertise of the unfit auditor in auditing a specific client and leads to a lower probability of verifying the true state. Following this, the probability of detecting the project's true state is strictly smaller in case of an unfit auditor, similar to Corona and Randhawa, 2010. Using an experimental research design Owhoso et al., 2002 provide evidence that specialization leads to higher efficiency in detecting errors. Considering the corresponding audit costs, I follow the stream of audit literature, which sees auditor specialization as a differentiation strategy, that will lead to higher audit fees by creating a market entrance barrier for competitors (e.g., Cahan et al., 2008). Therefore, I consider specialization to be costly with the same specialization factor $\beta \in (0,1)$ reducing the auditor's fee for the less specialized auditor. The audit costs for the fit auditor are denoted by k and for the unfit auditor by $k\beta$. The audit fee equals the audit costs. The auditor's detection probability q and the specialization discount β are common knowledge.

Project Type and Accounting System At Date 2, the entrepreneur observes the accounting signal A_i with $i \in (G,B)$, about the project type θ_i, which can either be good (θ_G) or bad (θ_B). The good project type yields a high outcome $X_h > 0$ if the project receives funding and 0 otherwise. The bad type θ_B yields a low outcome $X_l = 0$. The accounting signal captures all available internal information about the project. Similar to Bagnoli and Watts, 2005 (or, e.g., Chen et al., 2007; Dutta and Gigler, 2002), I consider a downwards-biased conservative accounting system, where the accounting system always gives the signal A_B if the true state is θ_B. However, if the true state is θ_G, the accounting system gives the signal A_G only with probability $\omega \in (0.5,1)$ and a bad signal with probability $1-\omega$.

Misreporting At Date 3, the entrepreneur prepares the firm's financial statement S_i with $i \in (G,B)$. She can misreport by stating a bad accounting signal as good. When choosing the misreporting level, she knows the selected auditor type and the accounting signal. However, the project's true state is unknown. Jensen, 1986 shows managers have incentives to grow their firms beyond the optimal size. Therefore, similar to Hellmann, 1998, I model an entrepreneur who receives a private benefit, depicted by $B > 0$, from a funded project, even if the project is not successful. A bad project always fails and yields an outcome of zero. Therefore, the entrepreneur receives a penalty $L > 0$ (with $L < B$) if she misreports and the true project type is bad (θ_B), and the investor funded

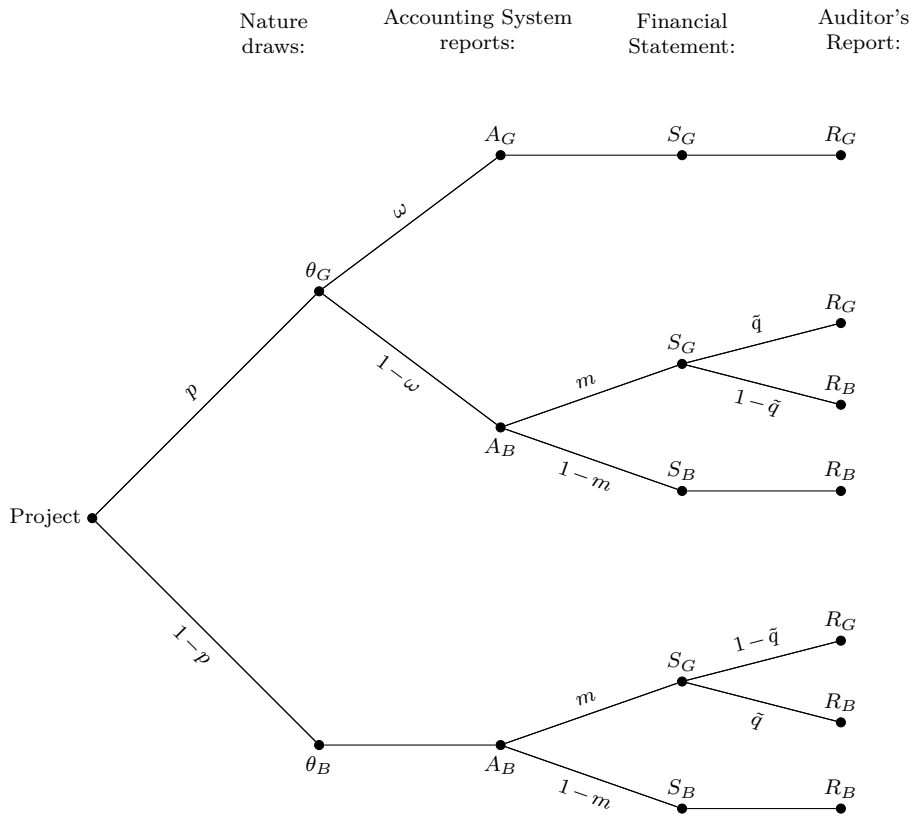
the project. The penalty accounts for all negative consequences of misreporting, such as financial claims or penalties, corporate downgrading, or reputational damages. Furthermore, misreporting is costly, e.g, moral costs or overriding the firm's internal control system. I assume misreporting costs of $\frac{cm^2}{2}$, with $c > 0$.

Audit Technology At Date 4, the auditor audits the firm's financial statement (i.e., the entrepreneur's report S_i). The auditor is, thereby, not modeled as a strategic player. I model the audit process similar to Schwartz, 1997 or Lu and Sapra, 2009. The auditor gathers audit evidence to assess the true state of the project θ_i. The auditor only observes the entrepreneur's report S_i (e.g., the preliminary financial statement). Thereby, I assume, that whenever the true state of the project is good and the entrepreneur issues the report S_G, the auditor files the report R_G. If the accounting signal is A_G, the entrepreneur will always provide sufficient evidence to prove the report to be right. Furthermore, if the entrepreneur herself states the project type as *bad*, the auditor will always file a report R_B because the auditor does not face any potential reputational damages or claims in this case and, thus, does not have any incentives to gather audit evidence. Within the remaining cases, $q \in (0,1)$ or $q\beta \in (0,1)$ with $q\beta < q$, capture the probability that the auditor detects the true state of the project. To illustrate the audit process within the model, assume an auditor with superior industry knowledge. Thus, the auditor can detect the project's true state, while the entrepreneur only observes the accounting signal A_i, containing only internal information. For example, when assessing whether a goodwill position has to be impaired or not, the entrepreneur observes the firm's projected future cash flows and the cost of capital. However, the auditor has additional knowledge of other clients' projected future cash flows in the industry and has more private information about different costs of capital, allowing the auditor to detect the project's true state. Figure 3.2 illustrates the potential audit outcomes in a game tree.

Entrepreneur's Payoff The entrepreneur's ex-ante expected payoff in case of a perfect accounting system is

$$\begin{aligned} V^{per.} := B(p+(1-p)m(\gamma(1-q)+(1-\gamma)(1-q\beta)))+\alpha(X_h p-\gamma k-(1-\gamma)k\beta) \\ -(1-p)\frac{cm^2}{2}-L(1-p)(m(\gamma(1-q)+(1-\gamma)(1-q\beta))). \end{aligned} \tag{3.1}$$

The first term, $B(p+(1-p)m(\gamma(1-q)+(1-\gamma)(1-q\beta)))$, captures the entrepreneur's expected private benefit from a project which receives funding. The benefit depends on the entrepreneur's misreporting effort and the auditor's type. The second term, $\alpha(X_h p-\gamma k-(1-\gamma)k\beta)$, captures the expected net benefit from a successful investment and depends on the entrepreneur's share of the project's outcome (α), the auditor's type, the degree of spe-



with

$$\tilde{q} = \begin{cases} q & \text{if } \gamma = 1 \\ q\beta & \text{if } \gamma = 0 \end{cases}$$

Figure 3.2: Game Tree.

cialization, and the audit costs (k). The third term, $(1-p)\frac{cm^2}{2}$, captures the entrepreneur's direct expected cost of misreporting. The last term, $L(1-p)(m(\gamma(1-q)+(1-\gamma)(1-q\beta)))$ captures her expected penalty from misreporting.

If the accounting system is imperfect, the entrepreneur's ex-ante expected payoff is

$$\begin{aligned} V^{imp.} := B(p(\omega+(1-\omega)m(\gamma q+(1-\gamma)q\beta)+(1-p)m(\gamma(1-q)+(1-\gamma)(1-q\beta)))) \\ +\alpha(X_h p(\omega+(1-\omega)m(\gamma q+(1-\gamma)q\beta))) - \gamma k-(1-\gamma)k\beta-((1-p)+p(1-\omega))\frac{cm^2}{2} \\ -L(1-p)m(\gamma(1-q)+(1-\gamma)(1-q\beta)). \end{aligned} \tag{3.2}$$

Within an imperfect downwards-biased accounting system, the accounting system gives the accounting signal A_G only with probability $\omega \in (0.5,1)$, if the true state is

θ_G. Thus, the accounting signal can be bad, A_B, even if the true state is good. Misreporting, thereby, can compensate the downwards-biased accounting system, if the true state is good, but the accounting signal is bad. In this case, the entrepreneur does not suffer any penalties for misreporting, because the project will yield the high return of X_h.

Stock Exchange's Payoff Within the second regime, I examine the effects of a stock exchange hiring the auditor. The stock exchange receives a fee, s, as a share of all investments. As the stock exchange wants to attract capital, reputation is critical (Chemmanur and Fulghieri, 2006). Thus, the stock exchange receives a reputational damage of D whenever the investor invests in a bad project. Thereby, the reputational damage is higher if the unfit auditor was chosen. As the stock exchange is in charge of hiring the auditor, investors and the public would blame the stock exchange for not hiring the fit auditor. Thus, the reputational damage is certain to some degree. For simplification, I only model the difference in reputational damages. Following, within the model, the stock exchange only suffers the differential damage D if the unfit auditor was selected ($\gamma = 0$). Therefore, the stock exchange's ex-ante expected payoff is

$$SE^{per.} := Is(p + (1-p)\hat{m}(\gamma(1-q) + (1-\gamma)(1-q\beta))) - D((1-\gamma)(1-p)\hat{m}(1-q\beta)). \tag{3.3}$$

The first term, $Is(p + (1-p)\hat{m}(\gamma(1-q) + (1-\gamma)(1-q\beta)))$, captures the benefit from investing. The benefit mainly depends on the stock exchange's trading fee $s \in (0,1)$ and the probability of investing, including the entrepreneur's misreporting and the auditor type. Thereby, $\hat{m}$ denotes the conjecture of the entrepreneur's misreporting. The second term, $D((1-\gamma)(1-p)\hat{m}(1-q\beta))$, captures the downside of choosing the unfit auditor. Whenever an audit failure occurs, i.e., the auditor files R_G with θ_B being the true state, the stock exchange suffers reputational damage for choosing the (unfit) auditor.

If the accounting system is imperfect, the stock exchange's ex-ante expected payoff is

$$\begin{aligned} SE^{imp.} := Is(p(\omega + (1-\omega)\hat{m}(\gamma q + (1-\gamma)q\beta) + (1-p)\hat{m}(\gamma(1-q) + (1-\gamma)(1-q\beta)))) \\ -D(1-\gamma)(1-p)\hat{m}(1-q\beta). \end{aligned} \tag{3.4}$$

Investor's Payoff The investor invests if his ex-ante expected payoff from investing is positive. The investor pays the trading fee s to the stock exchange when investing. For a perfect accounting system, the investor's ex-ante expected payoff after observing R_G is

$$U_I^{R_G,per.} := (1-\alpha)X_h Pr(\theta_G|R_G) - I(1+s) - (1-\alpha)(\gamma k + (1-\gamma)k\beta). \tag{3.5}$$

The first term, $(1-\alpha)X_h Pr(\theta_G|R_G)$, captures the expected benefit from investing, depending on the probability that R_G actually follows from θ_G. The second term, $-I(1+s)-(1-\alpha)(\gamma k+(1-\gamma)k\beta)$, captures the actual costs of investing, including the investment amount I, the stock exchange trading fee s, and the proportionate audit costs. The investor bears part of this audit costs ($(1-\alpha)k$), as the audit costs reduce the project's return.

The investor's ex-ante expected payoff after observing R_B is

$$U_I^{R_B,per.} := -I(1+s)-(1-\alpha)(\gamma k+(1-\gamma)k\beta). \tag{3.6}$$

If he observes the report R_B, the investor knows with certainty that the project type is bad and that he will not receive X_h in return. Therefore, an investment does not yield a positive payoff for the investor.

If the accounting system is imperfect and the investor observes R_G, his ex-ante expected payoff is given by

$$U_I^{R_G,imp.} := (1-\alpha)X_h Pr(\theta_G|R_G)-I(1+s)-(1-\alpha)(\gamma k+(1-\gamma)k\beta). \tag{3.7}$$

If he observes R_B his ex-ante expected payoff is

$$U_I^{R_B.imp.} := (1-\alpha)X_h Pr(\theta_G|R_B)-I(1+s)-(1-\alpha)(\gamma k+(1-\gamma)k\beta). \tag{3.8}$$

$Pr(\theta_G|R_G)$ thereby differs between the imperfect and the perfect system due to the conservative accounting signal and a different level of misreporting. If the accounting system is imperfect, there is a probability that a good project underlies a bad report. Therefore, the investor may invest even if he observes a report R_B.

3.3 Perfect Accounting System

This section examines a benchmark case with a perfect accounting system, where the accounting signal A_i matches the project's true state θ_i. Thus, the entrepreneur always observes the project's true state. I solve this game by backward induction. First, I examine the investor's investment decision, then the entrepreneur's optimal level of misreporting, and afterward, the entrepreneur's and the stock exchange's auditor hiring decision. As the entrepreneur chooses the misreporting level at Date 3 and, therefore, after the auditor hiring and after observing the accounting signal (the true state), the misreporting levels are the same for both auditor hiring settings.

3.3.1 Investment Decision

The investor invests if his ex-ante expected payoff from investing is positive. The investor's ex-ante expected payoff observing R_G is

$$U_I^{R_G,per.} := (1-\alpha)X_h Pr(\theta_G|R_G) - I(1+s) - (1-\alpha)(\gamma k + (1-\gamma)k\beta), \tag{3.9}$$

which is positive for

$$X_h > X_{h,per.}^{\gamma=1} \equiv \frac{I(1+s)+(1-\alpha)k}{(1-\alpha)Pr(\theta_G|R_G)^{\gamma=1}}, \tag{3.10}$$

if the fit auditor is selected and

$$X_h > X_{h,per.}^{\gamma=0} \equiv \frac{I(1+s)+(1-\alpha)k\beta}{(1-\alpha)Pr(\theta_G|R_G)^{\gamma=0}}, \tag{3.11}$$

if the the unfit auditor is selected, with $Pr(\theta_G|R_G)^{\gamma=0} < Pr(\theta_G|R_G)^{\gamma=1}$. However, the comparison of $X_{h,per.}^{\gamma=1} \gtrless X_{h,per.}^{\gamma=0}$ still depends on β and, therefore, it depends on β whether the investor invests for lower X_h if the fit or unfit auditor is chosen. The investor, thereby, observes which auditor is hired. As an example, assume that an insurance company hires an auditor who previously audited another insurance company. For simplification, I assume that X_h always exceeds $X_{h,per.}^{\gamma=1}$ and $X_{h,per.}^{\gamma=0}$, i.e., the investor always invests for both auditors if the audit report states the project as good.[4]

Within the perfect accounting system, the investor's ex-ante expected payoff observing R_B is always negative. As the investor knows that he will never receive the return X_h after observing R_B, he will never invest.

3.3.2 Entrepreneur's Misreporting Choice

When observing that the fit auditor ($\gamma = 1$) is chosen and the true state is bad, the entrepreneur solves the following misreporting problem:

$$\max_m B(m(1-q)) - \frac{cm^2}{2} - L(m(1-q)). \tag{3.12}$$

The first term, $B(m(1-q))$, captures the entrepreneur's private benefit from misreporting. The second term, $-\frac{cm^2}{2}$, captures the direct costs of misreporting. The last term, $-L(m(1-q))$, accounts for the expected penalty from misreporting. Solving Equation

[4] Note that this assumption does not influence the results. Nevertheless, if X_h would only exceed one of the thresholds, the entrepreneur and the stock exchange both might hire another auditor, as the investor would not invest otherwise. However, I do not consider this cases, since I am interested in the differences in misreporting and investment efficiency.

3.12 for m, yields the optimal misreporting, which I denote as $m^{per.}_{\gamma=1}$:

$$m^{per.}_{\gamma=1} = \frac{(B-L)(1-q)}{c}. \tag{3.13}$$

When observing that the unfit auditor ($\gamma = 0$) is chosen and the true state is bad, the entrepreneur solves the following misreporting problem:

$$\max_m B(m(1-q\beta)) - \frac{cm^2}{2} - L(m(1-q\beta)). \tag{3.14}$$

Equation 3.14 differs from Equation 3.12 as the unfit auditor detects the true state with a lower probability, $(1-q\beta) > (1-q)$. Solving Equation 3.14 for m, yields the optimal misreporting, which I denote as $m^{per.}_{\gamma=0}$:

$$m^{per.}_{\gamma=0} = \frac{(B-L)(1-q\beta)}{c}. \tag{3.15}$$

To ensure $m^{per.}_{\gamma=0}$ and $m^{per.}_{\gamma=1} \in (0,1)$, I assume that

$$(B-L)(1-q\beta) < c \; and \; B > L. \tag{3.16}$$

3.3.3 Auditor Hiring

3.3.3.1 Entrepreneur

First, I analyze a setting where the entrepreneur chooses the auditor. The entrepreneur, thereby, chooses the auditor, who leads to a higher payoff for her. Recall that $X_h > max\{X_h^{\gamma=1}, X_h^{\gamma=0}\}$, i.e., the investor always invests, after observing R_G.

The fit auditor yields the payoff denoted as $V^{per.}_{\gamma=1}$:

$$V^{per.}_{\gamma=1} := B(p+(1-p)m^{per.}_{\gamma=1}(1-q)) + \alpha(X_h p - k) - (1-p)\frac{c(m^{per.}_{\gamma=1})^2}{2} - L(1-p)(m^{per.}_{\gamma=1}(1-q)), \tag{3.17}$$

and the unfit auditor yields the payoff denoted as $V^{per.}_{\gamma=0}$:

$$V^{per.}_{\gamma=0} := B(p+(1-p)m^{per.}_{\gamma=0}(1-q\beta)) + \alpha(X_h p - k\beta) - (1-p)\frac{c(m^{per.}_{\gamma=0})^2}{2} - L(1-p)(m^{per.}_{\gamma=0}(1-q\beta)). \tag{3.18}$$

Comparing both payoffs and solving for c yields that the entrepreneur will choose the fit (unfit) auditor for all $c < (>)\bar{c}$ with $\bar{c} = \frac{-(L-B)^2(1-p)q(2-q-q\beta)}{2k\alpha} < 0$. Consequently, the entrepreneur always chooses the unfit auditor.

Lemma 3.1 summarizes the entrepreneur's optimal auditor hiring choice.

Lemma 3.1. *Within the perfect accounting system, the entrepreneur always chooses the unfit auditor.*

Proof. See appendix. □

The intuition is as follows. As both auditors always verify a true good state correctly, within the perfect accounting system, the entrepreneur does not need the fit auditor to verify the true good state. Within the perfect accounting system misreporting only takes place if the true underlying state is bad. Thus, choosing the unfit auditor leads to a higher probability of successful misreporting. If the investor invests in a bad project, i.e., misreporting is successful, the entrepreneur receives the private benefit. Therefore, the entrepreneur receives the private benefit with a higher probability if the unfit auditor is hired. In addition, costs for the unfit auditor are lower, as specialization is costly. Thus, the entrepreneur always chooses the unfit auditor.

3.3.3.2 Stock Exchange

Second, I analyze a setting with a stock exchange as a third party appointing the auditor. The stock exchange chooses the auditor who maximizes its expected payoff. The stock exchange anticipates the entrepreneur's misreporting level. The conjecture of the entrepreneur's misreporting is denoted by $\hat{m}$ and is correct in equilibrium. The stock exchange's utility from choosing the fit auditor is:

$$SE^{per.}_{\gamma=1} := Is(p+(1-p)\hat{m}^{per.}_{\gamma=1}(1-q)), \tag{3.19}$$

and for the unfit auditor is:

$$SE^{per.}_{\gamma=0} := Is(p+(1-p)\hat{m}^{per.}_{\gamma=0}(1-q\beta)) - D((1-p)\hat{m}^{per.}_{\gamma=0}(1-q\beta)). \tag{3.20}$$

Lemma 3.2 summarizes the stock exchange's optimal auditor hiring choices.

Lemma 3.2. *Within the perfect accounting system, the stock exchange chooses:*

1. *the fit auditor for $D > \bar{D}$, and*
2. *the unfit auditor for $D < \bar{D}$.*

The threshold $\bar{D}$ is defined in the appendix.

Proof. See appendix. □

The intuition is as follows. The stock exchange always receives the trading fee s as a share of every investment. Thus, the trading fee sets an incentive to maximize investments. Within the perfect accounting system, the stock exchange does not need the fit

auditor ($\gamma = 1$) to verify the true good state. However, as the stock exchange suffers reputational damage, if the project state is bad and the unfit auditor is chosen, the advantage of choosing the fit auditor is a lower expected reputational damage. Following, the stock exchange will choose the fit auditor only for a sufficiently high expected reputational damage $D > \bar{D}$. When choosing the less specialized unfit auditor, the probability of successful misreporting increases and, therefore, the probability of overinvestments. As the stock exchange charges a fee s for every investment, the stock exchange benefits from overinvesting. Thus, the stock exchange chooses the unfit auditor for $D < \bar{D}$.

3.3.4 Comparison of Misreporting and Investment Efficiency

Within the previous section, I examine the optimal auditor hiring choices of the entrepreneur and the stock exchange. Next, I analyze the effect of auditor selection on investment efficiency. First, I compare the misreporting level in response to the fit and the unfit auditor. Second, I analyze the probability of under- and overinvestment for the fit and unfit auditor. Third, I examine the investment efficiency and the implications for the auditor hiring regime. An investment is efficient when under- or overinvestment do not occur. Thus, investment efficiency increases if under- or overinvestment decreases.

Proposition 3.1 summarizes the comparison of the misreporting levels within the perfect accounting system.

Proposition 3.1. *Within the perfect accounting system, the entrepreneur always misreports more if the unfit auditor is chosen,* $m^{per.}_{\gamma=0} > m^{per.}_{\gamma=1}$.

As derived in the previous section (Equation 3.22 and 3.21) the entrepreneur chooses the following misreporting level:

$$m^{per.}_{\gamma=0} = \frac{(B-L)(1-q\beta)}{c}, \tag{3.21}$$

if the unfit auditor is chosen or

$$m^{per.}_{\gamma=1} = \frac{(B-L)(1-q)}{c}, \tag{3.22}$$

if the fit auditor is chosen. As β discounts the probability of detecting the true state and, therefore $q\beta < q$, the probability of successful misreporting, i.e., receiving the private benefit B, is always higher in response to the unfit auditor. Thus, the entrepreneur misreports more in response to the unfit auditor.

Proposition 3.2 summarizes the results of the investment efficiency analysis within the perfect accounting system.

Proposition 3.2. *Within the perfect accounting system, the investment efficiency is always lower if the unfit auditor is chosen.*

Proof. The proof follows from Proposition 3.1. □

As I am considering a perfect accounting system, the entrepreneur is aware of the project's type, and a good project type will always lead to an auditor's report R_G. Thus, underinvestment can not occur, and the entrepreneur only misreports in response to a bad project type. Moreover, the misreporting level, as well as the probability of successful misreporting, i.e., the auditor reports R_G when the true type is θ_B, is always higher in response to an unfit auditor. Consequently, the probability of overinvestment is higher, and thus, the investment efficiency is always lower if the unfit auditor is chosen.

Corollary 1 summarizes the effect of third-party hiring on investment efficiency.

Corollary 1. *Within the perfect accounting system, the expected investment efficiency is higher if third-party hiring is in place.*

Proposition 3.2 states that the investment efficiency is lower if the unfit auditor is chosen. Consequently, choosing the fit auditor is always preferable for a perfect accounting system. Figure 3.3 summarizes the auditor hiring according to Lemma 3.1 and 3.2.

		Stock Exchange:	
		$D > \bar{D}$	$D < \bar{D}$
Entrepreneur:	$\gamma = 1$	$\gamma = 1$	$\gamma = 0$
	$\gamma = 0$	$\gamma = 0$	$\gamma = 0$
	$\gamma = 1$	$\gamma = 1$	$\gamma = 0$
	$\gamma = 0$	$\gamma = 0$	$\gamma = 0$

Figure 3.3: Auditor Hiring (Perfect Accounting System).

As Figure 3.3 illustrates, the entrepreneur always chooses the unfit auditor. Nevertheless, for $D > \bar{D}$, the stock exchange chooses the fit auditor. Therefore, investment efficiency would benefit from third-party hiring within the perfect accounting system.

3.4 Imperfect Accounting System

This section examines the optimal choices under an imperfect accounting system. The accounting system is downwards-biased, where a bad project type is always depicted correctly. However, if the true state is θ_G, the accounting system gives the signal A_G only with probability $\omega \in (0.5, 1)$ and the signal A_B with probability $(1 - \omega)$. Thus, now underinvestment problems can occur. I solve the game by backward induction.

3.4.1 Investment Decision

The investor invests if his ex-ante expected payoff from investing is positive. The investor's ex-ante expected payoff observing R_G is

$$U_I^{R_G,imp.} := (1-\alpha)X_h Pr(\theta_G|R_G) - I(1+s) - (1-\alpha)(\gamma k + (1-\gamma)k\beta), \tag{3.23}$$

which is positive for

$$X_h > X_{h,imp.}^{\gamma=1} \equiv \frac{I(1+s)+(1-\alpha)k}{(1-\alpha)Pr(\theta_G|R_G)^{\gamma=1}}, \tag{3.24}$$

if the fit auditor is selected and for

$$X_h > X_{h,imp.}^{\gamma=0} \equiv \frac{I(1+s)+(1-\alpha)k\beta}{(1-\alpha)Pr(\theta_G|R_G)^{\gamma=0}}, \tag{3.25}$$

if the unfit auditor is selected, with $Pr(\theta_G|R_G)^{\gamma=0} < Pr(\theta_G|R_G)^{\gamma=1}$. Within the imperfect accounting system, the conditional probability is affected by the probability of a correct accounting signal (i.e., level of conservatism), ω, and the entrepreneur's misreporting level. In addition, the comparison of $X_{h,imp.}^{\gamma=1} \gtrless X_{h,imp.}^{\gamma=0}$ also depends on β and therefore, it depends on the specialization factor (β) and the entrepreneurs misreporting (m) whether the investor invests for lower X_h if the fit or unfit auditor is chosen. Following, for simplification, I assume that X_h always exceeds $X_{h,imp.}^{\gamma=1}$ and $X_{h,imp.}^{\gamma=0}$, i.e., the investor always invests for both auditors if the audit report states the project as good.[5]
As a good project (θ_G) could be stated as a bad one (R_B), the investor's ex-ante expected payoff observing R_B could be positive. However, I assume that the probability of a bad report with an underlying good project is sufficiently low so that the investor will never invest when observing R_B. I assume that:

$$(1-\alpha)X_h Pr(\theta_G|R_B) < I(1+s) + (1-\alpha)(\gamma k + (1-\gamma)k\beta). \tag{3.26}$$

3.4.2 Entrepreneur's Misreporting Choice

When observing A_B and the fit auditor is hired ($\gamma = 1$), the entrepreneur solves the following problem:

$$\max_m Pr(\theta_G|A_B)(m(q(B+\alpha X_h))) + Pr(\theta_B|A_B)m(1-q)(B-L) - \frac{cm^2}{2}. \tag{3.27}$$

The first term, $Pr(\theta_G|A_B)(m(q(B+\alpha X_h)))$, captures the probability that the entrepreneur will receive a private benefit from misreporting and her share of a successful project if

[5] Note that this assumption does not influence the results. Nevertheless, if X_h would only exceed one of the thresholds, the entrepreneur and the stock exchange both might hire another auditor, as the investor would not invest otherwise.

the true state of the project is good, but the accounting signal is A_B. Misreporting can neutralize the conservative accounting system and can lead to lower underinvestment. The second term, $Pr(\theta_B|A_B)m(1-q)(B-L)$, captures the case where the true state is bad, and the accounting signal is A_B. In this case, the entrepreneur will receive a private benefit but also a penalty for misreporting. The last term, $\frac{cm^2}{2}$, accounts for the direct costs of misreporting. Solving Equation 3.27 for m yields the optimal misreporting, which I denote as $m_{\gamma=1}^{imp.}$:

$$m_{\gamma=1}^{imp.} = \frac{L(p-1)(q-1)+B(p+q+pq(\omega-2)-1)+pq\alpha(\omega-1)X_h}{c(p\omega-1)}. \tag{3.28}$$

When observing that the unfit auditor ($\gamma = 0$) is chosen and the signal is bad, the entrepreneur solves the following problem:

$$\max_m Pr(\theta_G|A_B)(m(q\beta(B+\alpha X_h)))+Pr(\theta_B|A_B)m(1-q\beta)(B-L)-\frac{cm^2}{2}. \tag{3.29}$$

Equation 3.29 differs from Equation 3.27 as the unfit auditor has a lower probability of detecting the true state of the project $(1-q\beta) > (1-q)$. Solving Equation 3.29 for m yields the optimal misreporting, which I denote as $m_{\gamma=0}^{imp.}$:

$$m_{\gamma=0}^{imp.} = \frac{L(p-1)(q\beta-1)+B(p+q\beta+pq\beta(\omega-2)-1)+pq\beta\alpha(\omega-1)X_h}{c(p\omega-1)}. \tag{3.30}$$

To ensure $m_{\gamma=0}^{imp.}$ and $m_{\gamma=1}^{imp.} \in (0,1)$, I assume that

$$\begin{aligned} max\{\bar{L},\hat{L}\} < c(p\omega-1) \text{ and } B > L, \\ with\ \bar{L} = L(p-1)(q\beta-1)+B(p-1+q\beta+pq\beta(\omega-2))+pq\beta\alpha(\omega-1)X_h \\ and\ \hat{L} = L(p-1)(q-1)+B(p-1+q+pq(\omega-2))+pq\alpha(\omega-1)X_h. \end{aligned} \tag{3.31}$$

Comparing $m_{\gamma=1}^{imp.}$ and $m_{\gamma=0}^{imp.}$ reveals that misreporting in response to a fit auditor can be both higher or lower than to an unfit one. The intuition is as follows. As the accounting system states a good project as bad with probability $(1-\omega)$, the entrepreneur can engage in *good misreporting* to neutralize the downwards-biased accounting system. In that case, misreporting reduces underinvestment, and, therefore, she will choose a higher degree of misreporting in response to a fit auditor in some cases. As the good auditor detects the true state and agrees with the entrepreneur more often, *good misreporting* is more likely to be successful in response to a fit auditor. The benefit of hiring the unfit auditor, i.e., higher successful misreporting if the true state is bad as in the benchmark case, still exists, but in some cases, the benefit of hiring the fit auditor is higher.

3.4.3 Auditor Hiring

3.4.3.1 Entrepreneur

First, I analyze a setting where the entrepreneur chooses the auditor. She chooses the auditor, who leads to a higher payoff for her.

The fit auditor yields the expected utility, denoted as $V_{\gamma=1}^{imp.}$:

$$\begin{aligned} V_{\gamma=1}^{imp.} := B(p(\omega+(1-\omega)m_{\gamma=1}^{imp.}q)+(1-p)m_{\gamma=1}^{imp.}(1-q)) \\ +\alpha(X_h p(\omega+(1-\omega)(m_{\gamma=1}^{imp.}q))-k) \\ -((1-p)+p(1-\omega))(\frac{c(m_{\gamma=1}^{imp.})^2}{2})-(1-p)(1-q)Lm_{\gamma=1}^{imp.}, \end{aligned} \tag{3.32}$$

and the unfit auditor yields the expected utility denoted as $V_{\gamma=0}^{imp.}$:

$$\begin{aligned} V_{\gamma=0}^{imp.} := B(p(\omega+(1-\omega)m_{\gamma=0}^{imp.}q\beta)+(1-p)m_{\gamma=0}^{imp.}(1-q\beta)) \\ +\alpha(X_h p(\omega+(1-\omega)(m_{\gamma=0}^{imp.}q\beta))-k\beta) \\ -((1-p)+p(1-\omega))(\frac{c(m_{\gamma=0}^{imp.})^2}{2})-(1-p)(1-q\beta)Lm_{\gamma=0}^{imp.}. \end{aligned} \tag{3.33}$$

Comparing both expected payoffs and solving for c yields that the entrepreneur will choose the fit auditor for all $c<\tilde{c}$, with $\tilde{c}>0$. Consequently, the entrepreneur will choose the unfit auditor for $c>\tilde{c}$.

Lemma 3.3 summarizes the entrepreneur's optimal auditor hiring choices.

Lemma 3.3. *Within the imperfect accounting system, the entrepreneur chooses*

1. *the unfit auditor for $c>\tilde{c}$, and*
2. *the fit auditor for $c<\tilde{c}$.*

The threshold $\tilde{c}$ is defined in the appendix.

Proof. See appendix. □

The intuition is as follows. As the entrepreneur knows that the accounting system is downwards-biased, i.e., the accounting system states a good project as a bad project with probability $(1-\omega)$, she needs the fit auditor to verify the true good state. In this case, the entrepreneur can mitigate the downwards-biased accounting system through misreporting and choosing the fit auditor. The fit auditor detects the true underlying state with a higher probability than the unfit auditor. Thus, choosing the fit auditor yields a higher probability of receiving funding for the project. Hereby, the auditor reduces the disadvantages of an imperfect accounting system.
However, if $c>\tilde{c}$, costs for misreporting are high and she will misreport less. Following

this, she knows bypassing the downwards-biased accounting system by stating a bad signal as good is unlikely. Therefore, the entrepreneur can use the fit auditor less often to verify the true good state and prevent underinvesting. In addition, choosing the unfit auditor leads to lower audit costs and a higher probability of successful misreporting in case of a bad project state. Thus, for high c the benefits of an unfit auditor dominate.

3.4.3.2 Stock Exchange

Second, I analyze a setting with a stock exchange as a third party choosing the auditor. The stock exchange also chooses the auditor who maximizes its expected utility. The stock exchange anticipates the entrepreneur's misreporting level. The conjecture of the entrepreneur's misreporting is denoted by $\hat{m}$ and is correct in equilibrium. The stock exchange's utility from choosing the fit auditor is:

$$SE_{\gamma=1}^{imp.} := Is(p(\omega + (1-\omega)m_{\gamma=1}^{imp.}q) + (1-p)m_{\gamma=1}^{imp.}(1-q)), \tag{3.34}$$

and for the unfit auditor:

$$SE_{\gamma=0}^{imp.} := Is(p(\omega + (1-\omega)m_{\gamma=0}^{imp.}q\beta) + (1-p)m_{\gamma=0}^{imp.}(1-q\beta)) - D((1-p)m_{\gamma=0}^{imp.}(1-q\beta)). \tag{3.35}$$

Lemma 3.4 summarizes the stock exchange's optimal auditor hiring choices.

Lemma 3.4. *Within the imperfect accounting system, the stock exchange always chooses the fit auditor for $p > \frac{1}{2-\omega}$. For $p < \frac{1}{2-\omega}$, the stock exchange chooses :*

1. *the fit auditor for $D > \tilde{D}$, and*
2. *the unfit auditor for $D < \tilde{D}$.*

The threshold $\tilde{D}$ is defined in the appendix.

Proof. See appendix. □

The intuition is as follows. Within the imperfect accounting system, the stock exchange faces potential underinvestment if the true state is good (prob. p) and overinvestment if the true state is bad (prob. $(1-p)$). As the stock exchange charges a fee s on every investment, the stock exchange benefits from overinvestment and suffers from underinvestment. Therefore, the stock exchange wants to minimize underinvestment and maximize overinvestment. As the probability of detecting the true state is higher in response to a fit auditor, choosing the fit auditor will reduce underinvestment. However, choosing the unfit auditor increases the probability of overinvestment in the bad state. Following this, the stock exchange chooses the fit auditor for high p, i.e., for a high probability of an underlying good project type and thus, a high probability of underinvestment. For low p the

probability of underinvestment problems is also low. Thus, the intuition is the same as in the benchmark case, where underinvestment problems do not occur. For low p, the stock exchange's only advantage of choosing the fit auditor is a lower expected reputational damage. Thus, the stock exchange will only choose the fit auditor for sufficiently high expected reputational damage $D > \tilde{D}$.

3.4.4 Comparison of Misreporting and Investment Efficiency

Next, I examine the effect of the fit and unfit auditor on investment efficiency under the imperfect accounting system. First, I compare the level of misreporting in response to the fit and unfit auditor. Second, I analyze the probability of under- and overinvestment in response to the auditor's type. Third, I examine investment efficiency.

Proposition 3.3 summarizes the comparison of the misreporting levels within the imperfect accounting system.

Proposition 3.3. *Within the imperfect accounting system, misreporting is higher,*

1. *in response to the fit auditor ($m^{imp.}_{\gamma=1} > m^{imp.}_{\gamma=0}$), if $p > \frac{1}{2-\omega}$ or if $p < \frac{1}{2-\omega}$ and the entrepreneur's private benefit is sufficiently low ($B < \bar{B}$), and*

2. *in response to the unfit auditor ($m^{imp.}_{\gamma=0} > m^{imp.}_{\gamma=1}$) if $p < \frac{1}{2-\omega}$ and the entrepreneur's private benefit ($B > \bar{B}$) is sufficiently high.*

The threshold $\bar{B}$ is defined in the appendix.

Proof. See appendix. □

The intuition is as follows. In the imperfect accounting system, there are two cases in which the entrepreneur can misreport. First, the case of *good misreporting* in response to an accounting signal A_B with the project's true state being θ_G. When the accounting signal is A_B, although the true state is good, misreporting can prevent underinvestment, i.e., misreporting is good (*good misreporting*). Second, the case of *bad misreporting* if the true state is θ_B, i.e., misreporting leads to overinvestment. Within both cases, the entrepreneur's misreporting decision is affected by different probabilities of receiving the audit report R_G. *Good misreporting* is successful if the auditor detects the true underlying project's type and *bad misreporting* if the auditor does not detect the true underlying state. Consequently, the probability of successful *good (bad)* misreporting is higher for the fit (unfit) auditor. Furthermore, if *good misreporting* is successful, the entrepreneur does not face a potential penalty because the true state is θ_G, and good projects never fail. Instead, she receives a positive share α of the project's return, X_h, in addition to the private benefit B. If *bad misreporting* is successful, i.e., the auditor does not detect the true project state, the entrepreneur faces the penalty L and only receives the private benefit

B. Therefore, she benefits more from *good misreporting* than from *bad misreporting*, put formally $\alpha X_h + B > B - L$.

If the probability of a good project type (p) is high, the chances for *good misreporting* are also high. Thus, the entrepreneur will choose a higher level of misreporting in response to the fit auditor. If the probability p is low, the entrepreneur will still benefit more from successful *good misreporting* than from successful *bad misreporting*. However, the opportunity for *good misreporting* occurs less often, and the probability of successful *bad misreporting* is higher in response to the unfit auditor. For high B, the entrepreneur's expected benefit from successful *bad misreporting* is sufficiently high compared to the expected outcome from *good misreporting*. Therefore, misreporting will be higher in response to the unfit auditor if the entrepreneur's private benefit B is sufficiently high.

Proposition 3.4 summarizes the results of the investment efficiency analysis within the imperfect accounting system.

Proposition 3.4. *Within the imperfect accounting system, investment efficiency is lower,*

1. *if the unfit auditor is chosen for $\tilde{B} < B$, and*
2. *if the fit auditor is chosen for $B < \tilde{B}$.*

The threshold $\tilde{B}$ is defined in the appendix.

Proof. See appendix. □

The intuition is as follows. Two factors are determining the investment efficiency, the entrepreneur's misreporting level, and the auditor's probability of detecting the project's true state. As the probability of detecting the true underlying project type is lower for the unfit auditor ($q\beta < q$), overinvesting is always higher in response to the unfit auditor if $m^{imp.}_{\gamma=0} > m^{imp.}_{\gamma=1}$. However, the underinvesting probability can be lower for the unfit auditor because a higher misreporting level in response to the unfit auditor can compensate for the unfit auditor's lower probability of detecting the true state in case of an accounting signal A_B with a true project type θ_G.

If $m^{imp.}_{\gamma=1} > m^{imp.}_{\gamma=0}$, both the entrepreneur's misreporting and the probability of detecting the true state are higher in response to the fit auditor. Consequently, the probability of underinvesting is always higher for the unfit auditor. As the lower misreporting level in response to the unfit auditor can compensate the unfit auditor's lower probability of detecting the true state in case of an accounting signal A_B with a project type θ_B, overinvesting can be lower for the unfit auditor. Thus, as the misreporting level depends on the entrepreneur's private benefit, the investment efficiency can be higher in response to the unfit auditor if the private benefit B is sufficiently low. If the private benefit B is

sufficiently high, the benefit of bad misreporting is high and thus, misreporting in response to the unfit auditor is higher.

Corollary 2 summarizes the effect of third-party hiring on investment efficiency.

Corollary 2. *The expected investment efficiency can be higher or lower within the imperfect accounting system if third-party hiring is in place.*

Figure 3.4 summarizes the auditor hiring according to Lemma 3.3 and 3.4:

if $p < \frac{1}{2-\omega}$:

Entrepreneur:	Stock Exchange: $D > \tilde{D}$	Stock Exchange: $D < \tilde{D}$
$c > \tilde{c}$	$\gamma = 1$ $\gamma = 0$	$\gamma = 0$ $\gamma = 0$
$c < \tilde{c}$	$\gamma = 1$ $\gamma = 1$	$\gamma = 0$ $\gamma = 1$

if $p > \frac{1}{2-\omega}$:

Entrepreneur:	Stock Exchange: $D > \tilde{D}$	Stock Exchange: $D < \tilde{D}$
$c > \tilde{c}$	$\gamma = 1$ $\gamma = 0$	$\gamma = 1$ $\gamma = 0$
$c < \tilde{c}$	$\gamma = 1$ $\gamma = 1$	$\gamma = 1$ $\gamma = 1$

Figure 3.4: Auditor Hiring (Imperfect Accounting System).

As Figure 3.4 illustrates, the stock exchange chooses the fit auditor for all $p > \frac{1}{2-\omega}$ and for $p < \frac{1}{2-\omega}$ if the penalty D is sufficiently high. Thus, there are more cases where the stock exchange chooses the fit auditor. However, Proposition 3.4 states that the investment efficiency can be higher for the unfit auditor if the entrepreneur's private benefit is sufficiently low ($B < \tilde{B}$). Therefore, third-party hiring is only beneficial for investment efficiency if the entrepreneur's private benefit from misreporting is sufficiently high.

3.5 Concluding Remarks

By studying the effect of third-party hiring on an entrepreneur's misreporting level and investment efficiency, I extend the stream of literature on auditor hiring.

I find that third-party auditor hiring is beneficial for investment efficiency if a perfect accounting system is in place. However, my analysis shows that third-party auditor hiring within an imperfect accounting system can enhance or deteriorate investment efficiency. As under- and overinvestment problems can occur within the imperfect accounting system, the entrepreneur can engage in *good misreporting* to equalize the downwards-biased accounting system. In addition, the entrepreneur's misreporting level can be both higher or lower in response to a fit auditor, depending on the entrepreneur's private benefit. As the entrepreneur receives a private benefit from funding and a share of the project outcome in case of *good misreporting* and only a private benefit in the case of *bad misreporting*, the entrepreneur chooses a higher misreporting in response to an unfit auditor only if the private benefit is sufficiently high.

Therefore, under- and overinvestment can be both higher or lower in response to an unfit auditor. Overinvestment is always higher if misreporting is higher in response to an unfit auditor. However, as misreporting can compensate for the unfit auditor's lower probability of detecting the true state, the underinvestment problem can be lower in response to an unfit auditor. Thus, a lower underinvestment level can compensate for a higher overinvestment level. The entrepreneur's private benefit, thereby, determines overinvestment. Thus, if the entrepreneur's private benefit is sufficiently low, investment efficiency can be higher in response to an unfit auditor.

If third-party auditor hiring is in place, the stock exchange chooses the fit auditor more often. Receiving a fee from every investment, the stock exchange benefits from a high investment level. As the fit auditor decreases the underinvestment probability, the stock exchange chooses the fit auditor if the probability of a good project is high. As the stock exchange benefits from overinvestment, the stock exchange chooses the unfit auditor if the probability of a good project is low. However, for sufficiently high reputational damage, the stock exchange always chooses the fit auditor because the reputational damage only occurs if the unfit auditor is chosen. The entrepreneur herself hires the fit auditor only if misreporting costs are low. In total, the fit auditor gets hired more often if third-party hiring is in place. However, as the investment efficiency can be higher or lower in response to a fit auditor, third-party hiring is only beneficial if the entrepreneur's private benefit from receiving funding is high.

As most accounting systems are downwards-biased to some degree, my model shows that the investment efficiency would only benefit from third-party auditor hiring if the entrepreneur's private benefit from funding is high. Therefore, I suggest that regulators should carefully assess circumstances where third-party auditor hiring could enhance or deteriorate investment efficiency.

3.6 Appendix

Proof of Lemma 3.1

Proof. To prove Lemma 3.1, I first derive the optimal level of misreporting in response to the fit ($m^{per.}_{\gamma=1}$) and the unfit auditor ($m^{per.}_{\gamma=0}$). Inserting $\gamma = 1$ into Equation 3.12 (case of the fit auditor) and taking the derivative with respect to m yields the first-order condition (FOC):

$$B(1-q) - cm^{per.}_{\gamma=1} - L(1-q) = 0. \tag{3.36}$$

Solving the FOC for the optimal level of misreporting in response to the fit auditor yields

$$m^{per.}_{\gamma=1} = \frac{(B-L)(1-q)}{c}. \tag{3.37}$$

The second-order condition proves that $m^{per.}_{\gamma=1}$ is a maximum:

$$-c < 0. \tag{3.38}$$

Inserting $\gamma = 0$ into Equation 3.14 (case of the unfit auditor) and taking the derivative with respect to m yields the first-order condition (FOC):

$$B(1-q\beta) - cm^{per.}_{\gamma=0} - L(1-q\beta) = 0. \tag{3.39}$$

Solving the FOC for the optimal level of misreporting in response to the unfit auditor yields

$$m^{per.}_{\gamma=0} = \frac{(B-L)(1-q\beta)}{c}. \tag{3.40}$$

The second-order condition proves that $m^{per.}_{\gamma=0}$ is a maximum:

$$-c < 0. \tag{3.41}$$

Comparing the optimal misreporting in response to a fit and an unfit auditor reveals that misreporting in response to the unfit auditor is always higher:

$$\begin{aligned} & m^{per.}_{\gamma=0} > m^{per.}_{\gamma=1} \\ \implies & \frac{(B-L)(1-q\beta)}{c} > \frac{(B-L)(1-q)}{c} \\ \implies & \beta < 1, \end{aligned} \tag{3.42}$$

which is always true.

With the optimal level of misreporting in response to the fit and unfit auditor, I can now prove Lemma 3.1 by comparing the entrepreneur's expected payoff in response to the fit $V_{\gamma=1}^{per.}$ (Equation 3.17) and to the unfit auditor $V_{\gamma=0}^{per.}$(Equation 3.18):

$$\begin{aligned} & V_{\gamma=1}^{per.} > V_{\gamma=0}^{per.} \\ \implies & B(p+(1-p)m_{\gamma=1}^{per.}(1-q))+\alpha(X_h p-k)-(1-p)\frac{c(m_{\gamma=1}^{per.})^2}{2}-(1-p)Lm_{\gamma=1}^{per.}(1-q) \\ & > \\ & B(p+(1-p)m_{\gamma=0}^{per.}(1-q\beta))+\alpha(X_h p-k\beta)-(1-p)\frac{c(m_{\gamma=0}^{per.})^2}{2}-(1-p)Lm_{\gamma=0}^{per.}(1-q\beta) \\ & \implies c > \underbrace{\frac{-(L-B)^2(1-p)q(2-q-q\beta)}{2k\alpha}}_{<0} = \bar{c}, \end{aligned} \tag{3.43}$$

which is always true. This proves that the entrepreneur always chooses the unfit auditor. □

Proof of Lemma 3.2

Proof. To prove Lemma 3.2, I compare the stock exchange's expected payoff in response to the fit auditor $SE_{\gamma=1}^{per.}$ (Equation 3.19) and to the unfit auditor $SE_{\gamma=0}^{per.}$(Equation 3.20):

$$\begin{aligned} & SE_{\gamma=1}^{per.} > SE_{\gamma=0}^{per.} \\ \implies & Ism_{\gamma=1}^{per.}(1-q) > Ism_{\gamma=0}^{per.}(1-q\beta) - Dm_{\gamma=0}^{per.}(1-q\beta) \\ \implies & D > \bar{D}, \end{aligned} \tag{3.44}$$

with $\bar{D} = \frac{qsI(\beta-1)(q+q\beta-2)}{(q\beta-1)^2}$. This proves, that the stock exchange always chooses the fit auditor if $D > \bar{D}$. □

Proof of Lemma 3.3

Proof. To prove Lemma 3.3, I first derive the optimal level of misreporting in response to the fit ($m_{\gamma=1}^{imp.}$) and the unfit auditor ($m_{\gamma=0}^{imp.}$). Inserting $\gamma = 1$ into Equation 3.27 (case of the fit auditor) and taking the derivative with respect to m yields the first-order condition (FOC):

$$\frac{p(1-\omega)}{p(1-\omega)+(1-p)}(q(B+\alpha X_h))+\frac{(1-p)}{p(1-\omega)+(1-p)}(1-q)(B-L)-cm_{\gamma=1}^{imp.}=0. \tag{3.45}$$

Solving the FOC for the optimal level of misreporting in response to the fit auditor yields

$$m_{\gamma=1}^{imp.} = \frac{L(p-1)(q-1)+B(p+q+pq(\omega-2)-1)+pq\alpha(\omega-1)X_h}{c(p\omega-1)}. \tag{3.46}$$

The second-order condition proves that $m_{\gamma=1}^{imp.}$ is a maximum:

$$-c < 0. \tag{3.47}$$

Inserting $\gamma = 0$ into Equation 3.29 (case of the unfit auditor) and taking the derivative with respect to m yields the first-order condition (FOC):

$$\frac{p(1-\omega)}{p(1-\omega)+(1-p)}(q\beta(B+\alpha X_h))+\frac{(1-p)}{p(1-\omega)+(1-p)}(1-q\beta)(B-L)-cm_{\gamma=0}^{imp.}=0. \tag{3.48}$$

Solving the FOC for the optimal level of misreporting in response to the unfit auditor yields

$$m_{\gamma=0}^{imp.}=\frac{L(p-1)(q\beta-1)+B(p+q\beta+pq\beta(\omega-2)-1)+pq\beta\alpha(\omega-1)X_h}{c(p\omega-1)}. \tag{3.49}$$

The second-order condition proves that $m_{\gamma=0}^{imp.}$ is a maximum:

$$-c < 0. \tag{3.50}$$

With the optimal level of misreporting in response to the fit and unfit auditor, I can now prove Lemma 3.3 by comparing the entrepreneur's expected payoff in response to the fit $V_{\gamma=1}^{imp.}$ (Equation 3.32) and to the unfit auditor $V_{\gamma=0}^{imp.}$(Equation 3.33):

$$\begin{aligned}
& V_{\gamma=1}^{imp.} > V_{\gamma=0}^{imp.} \\
\implies & B(p(1-\omega)m_{\gamma=1}^{imp.}q+(1+p)m_{\gamma=1}^{imp.}(1-q))+\alpha(X_h p(1-\omega)m_{\gamma=1}^{imp.}q-k) \\
& -((1-p)+p(1-\omega))\frac{c(m_{\gamma=1}^{imp.})^2}{2}-(1-p)Lm_{\gamma=1}^{imp.}(1-q) \\
& > \\
& B(p(1-\omega)m_{\gamma=0}^{imp.}q\beta+(1+p)m_{\gamma=0}^{imp.}(1-q\beta))+\alpha(X_h p(1-\omega)m_{\gamma=0}^{imp.}q\beta-k\beta) \\
& -((1-p)+p(1-\omega))\frac{c(m_{\gamma=0}^{imp.})^2}{2}-(1-p)Lm_{\gamma=0}^{imp.}(1-q\beta) \\
& \implies c < \tilde{c}
\end{aligned} \tag{3.51}$$

with $\tilde{c}=\frac{1}{2k\alpha(p\omega-1)}(q(B+L(-1+p)+Bp(-2+\omega)+p\alpha(-1+\omega)X_h)(L(-1+p)(-2+q+q\beta)$ $+B(-2+q+q\beta+p(2+q(1+\beta)(-2+\omega)))+pq\alpha(1+\beta)(-1+\omega)X_h))$, which can be higher or lower zero. This proves that the entrepreneur always chooses the fit auditor if $c<\tilde{c}$. □

Proof of Lemma 3.4

Proof. To prove Lemma 3.4, I compare the stock exchange's expected payoff in response to the fit auditor $SE^{imp.}_{\gamma=1}$ (Equation 3.34) and to the unfit auditor $SE^{imp.}_{\gamma=0}$(Equation 3.35):

$$\begin{aligned} & SE^{imp.}_{\gamma=1} > SE^{imp.}_{\gamma=0} \\ \implies Is(p(\omega+(1-\omega)m^{imp.}_{\gamma=1}q)+(1-p)m^{imp.}_{\gamma=1}(1-q)) &> Is(p(\omega+(1-\omega)m^{imp.}_{\gamma=0}q\beta)) \\ &\quad +(1-p)m^{imp.}_{\gamma=0}(1-q\beta) \\ &\quad -D((1-p)m^{imp.}_{\gamma=0}(1-q\beta)) \\ \implies Is(p\omega-(p-1+q+pq(\omega-2)m^{imp.}_{\gamma=1})) &> psI\omega-((p-1)D(q\beta-1)+sI(p-1+q\beta+ \\ &\quad pq\beta(\omega-2)))m^{imp.}_{\gamma=0} \\ \implies D &> \tilde{D} \end{aligned} \tag{3.52}$$

with $\tilde{D}=-\frac{1}{(p-1)(q\beta-1)(L(p-1)(q\beta-1)+B(p-1+q\beta+pq\beta(\omega-2))+pq\alpha\beta(\omega-1)X_h)}(Isq(\beta-1)$ $(L(p-1)(q-2+q\beta+p(3+q(1+\beta)(\omega-2)-\omega))+B(q-2+q\beta+p(2+q(1+\beta)(\omega-2)))$ $(1+p(\omega-2))+p\alpha(p-1+q+q\beta+pq(1+\beta)(\omega-2))(\omega-1)X_h))$, which can be higher or lower zero. This proves that the stock exchange always chooses the fit auditor if $D>\tilde{D}$. The threshold $\tilde{D}$ is always negative if $p>\frac{1}{2-\omega}$. Thus, for $p>\frac{1}{2-\omega}$, the stock exchange always chooses the fit auditor. □

Proof of Proposition 3.3

Proof. To prove Proposition 3.3, I first derive the threshold $\bar{B}$ by comparing the entrepreneur's misreporting in response to the fit (Equation 3.28) and to the unfit (Equation 3.30) auditor.

$$\begin{aligned} & m^{imp.}_{\gamma=1}-m^{imp.}_{\gamma=0}=0 \\ \implies & L(p-1)(q-1)+B(p+q+pq(\omega-2)-1)+pq\alpha(\omega-1)X_h-L(p-1)(q\beta-1) \\ & +B(p+q\beta+pq\beta(\omega-2)-1)+pq\beta\alpha(\omega-1)X_h=0 \\ & \implies B=\frac{L(p-1)(p\omega-1)-p\alpha(\omega-1)X_h}{1+p(\omega-2)} \end{aligned} \tag{3.53}$$

To assess whether misreporting in response to the fit ($m^{imp.}_{\gamma=1}$) or unfit ($m^{imp.}_{\gamma=0}$) auditor is higher if $B>\bar{B}$, I compare the difference in derivatives with respect to B:

$$\frac{\partial m^{imp.}_{\gamma=1}}{\partial B}-\frac{\partial m^{imp.}_{\gamma=0}}{\partial B}\gtrless 0. \tag{3.54}$$

Thereby, two cases result: first, if $p > \frac{1}{2-\omega}$ and second, if $p < \frac{1}{2-\omega}$. Starting with the first one, for $p > \frac{1}{2-\omega}$:

$$\frac{\partial m_{\gamma=1}^{imp.}}{\partial B} > \frac{\partial m_{\gamma=0}^{imp.}}{\partial B}. \tag{3.55}$$

From this follows, that $m_{\gamma=1}^{imp.} > m_{\gamma=0}^{imp.}$ if $B > \bar{B}$. For $p > \frac{1}{2-\omega}$ the threshold $\bar{B}$ is negative, i.e., $B > \bar{B}$ is always true. Thus, the entrepreneur always misreports more in response to the fit auditor if $p > \frac{1}{2-\omega}$. Considering the second case of $p < \frac{1}{2-\omega}$ yields

$$\frac{\partial m_{\gamma=1}^{imp.}}{\partial B} < \frac{\partial m_{\gamma=0}^{imp.}}{\partial B}. \tag{3.56}$$

From this follows, that $m_{\gamma=1}^{imp.} > m_{\gamma=0}^{imp.}$ if $B < \bar{B}$ and $m_{\gamma=1}^{imp.} < m_{\gamma=0}^{imp.}$ if $B > \bar{B}$. For $p < \frac{1}{2-\omega}$ the threshold $\bar{B}$ is positive. In this case, the entrepreneur always misreports more in response to the fit auditor if $B < \bar{B}$ and in response to the unfit auditor if $B > \bar{B}$. □

Proof of Proposition 3.4

Proof. To prove Proposition 3.4, I first derive the probability for under- and overinvestment in response to the fit and the unfit auditor. For the fit auditor, the investment efficiency is given by:

$$IE_{\gamma=1} := p((1-\omega)((1-m_{\gamma=1}^{imp.}) + m_{\gamma=1}^{imp.}(1-q))) + (1-p)(m_{\gamma=1}^{imp.})(1-q), \tag{3.57}$$

and for the unfit auditor, the investment efficiency is given by:

$$IE_{\gamma=0} := p((1-\omega)((1-m_{\gamma=0}^{imp.}) + m_{\gamma=0}^{imp.}(1-q\beta))) + (1-p)(m_{\gamma=0}^{imp.})(1-q\beta). \tag{3.58}$$

Comparing the investment efficiency in response to the fit and unfit auditor and solving for B yields

$$\begin{aligned} & IE_{\gamma=1} > IE_{\gamma=0} \\ \implies B > \tilde{B} = & \frac{1}{2-q(1+\beta)+2p(q-2+q\beta)+p^2(2+q(1+\beta)(\omega-2)\omega)} \\ & (L(p-1)(p\omega-1)(2-q(1+\beta)+p((q-1+q\beta)\omega-1)) \\ & -p\alpha(\omega-1)(1-q(1+\beta)+p(q(1+\beta)\omega))X_h-1). \end{aligned} \tag{3.59}$$

Therefore, the investment efficiency is higher in response to the fit auditor if $B > \tilde{B}$ and higher in response to the unfit auditor if $B < \tilde{B}$. □

Chapter 4

Audit Firm Split-Up: The Effect on Audit Quality and the Role of Enforcement Strength*

Abstract

Using a game-theoretic model, we examine reasons and driving forces for audit firm split-ups, like the one planned by EY. In addition, we analyze potential consequences of audit firm split-ups on audit quality and the role of enforcement strength. We find three effects determining the split-up decision and its consequences. First, as the advisory partner wants to prevent an adverse audit opinion to keep the client, independence problems arise. Second, as the advisory partner loses reputation in case of an audit failure, an advisory project creates positive effort incentives. Third, spillovers from audit to advisory lower the advisory partner's project costs. We show that the enforcement institution's ability to detect material misstatements within the audited financial statement determines which of the first two effects dominates. Strong enforcement increases the reputation effect, setting positive effort incentives resulting in a lower preference to split the audit firm and a higher audit quality of the combined firm if the advisory projects' return is high. Thus, the overall effect of split-ups on audit quality is ambiguous, depending on the enforcement environment and the spillover from audit to advisory for advisory projects.

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* This chapter is joint work with Alexandra Lilge (University of Hannover).

4.1 Introduction

"Audit quality is going to be better!"

HYWEL BALL *Managing Partner, EY UK*

On September 8th, the Big-4 audit firm EY announced to let all global partners vote to separate the firm into two stand-alone firms, an audit and an advisory firm (EY, 2022). Interestingly, besides EY, all other Big-4 audit firms always contradicted any split-up rumors. Moreover, EY Israel's managing partner, Doron Sharabany, told the Financial Times that "from our point of view in the Israel business, the split will not create benefits,"(Foley and O'Dwyer, 2022a). The different decisions between Big-4 audit firms and between locations could be an indicator that split-up preferences differ between member firms and regions. Surprisingly, in 2023 EY also announced to step back from the split-up plan and continue working as a combined firm (Eaglesham, 2023).

Besides this once planned EY split-up, regulators around the globe have also restarted a discussion to split up audit firms to increase auditors' independence. In 2021, UK's former business secretary Kwasi Kwarteng proposed "a new regulator [...] will also have the power to impose an operational split between the audit and non-audit functions of accountancy firms, to reduce the risk of any conflicts of interest that may affect the standard of audit they provide" Kwarteng, 2021. Thus, studying the determinants and consequences of audit firm split-ups is vital to guide current and future regulations, as well as audit firms' split-up decisions.

This paper examines the driving forces of audit firm split-ups, its consequences for audit quality, and the role of enforcement strength. We, therefore, construct a game-theoretic model featuring an advisory partner ('she') and an audit partner ('he'). Together they form an audit firm that offers audit and advisory services (non-audit services). The audit firm's audit client wants to comply with accounting standards, yet with some probability, the client's financial statement still comprises a material misstatement. Although the audit client wants to comply with accounting standards, material misstatements can result from low expertise, weak internal controls, or high inherent risks (ISA 315 (Revised)). Whenever the audit firm does not detect the material misstatement, but enforcement institutions do, the audit firm suffers some damage, e.g., legal claims or enforcement penalties. Enforcement strength determines the probability of detecting material misstatements that were not detected during the audit. The audit firm (e.g., its headquarter) sets a sharing rule, which ensures the optimal level of audit effort by determining the share of the potential damage each partner has to bear.

The audit partner wants to reduce his audit costs, including the potential damage, by choosing his audit effort. The advisory partner supports the audit partner with specific expertise during the audit (e.g., auditor's expert role according to ISA 620). For example,

she supports as a valuation expert who audits the client's goodwill position. Moreover, after the audit, the advisory partner wants to acquire an advisory project, which creates independence problems. Whenever the client receives an adverse audit opinion or an audit failure occurs, the client goes bankrupt or at least switches to another audit firm and does not hire the advisory partner. Thus, the potential advisory project influences the optimal audit effort. Therefore, the audit failure risk and adverse audit opinion probability set incentives to split up the audit firm and offer the advisory service in a stand-alone advisory firm. Nevertheless, within the combined audit firm, the advisory project's costs are lower due to spillovers from audit procedures ("Audit-Advisory-Spillover"). Potential spillovers are, for example, knowledge spillovers or lower costs of acquiring new clients since the advisory partner is already familiar with the client and has gained a certain reputation. Besides this audit-related client, the advisory partner has another advisory client unrelated to the audit.

Turning to the results, we examine the preferences to split up the audit firm, its effects on audit quality, and the role of enforcement strength. Comparing the advisory partner's payoff, we find three factors determining the advisory partner's preference for a split-up. The first is the Audit-Advisory-Spillover, the second is the audit failure probability, and the third is the adverse audit opinion probability. The first occurs because the advisory partner can conduct the advisory project with lower costs because she benefits from audit-advisory spillovers within a combined audit firm. This sets an incentive to not split up the audit firm. Nevertheless, the audit failure probability and the adverse audit opinion probability set an incentive to leave the firm. When an audit fails, the audit firm and the advisory partner lose their reputation and, therefore, all advisory clients (*Reputation Effect*). Moreover, after an adverse audit opinion, the advisory partner loses the audit client for the advisory project (*Independence Effect*). Thus, as the advisory partner acquires the advisory project with a lower probability in the combined audit firm than in the stand-alone advisory firm, the audit's outcome risks the advisory partner's future returns. The audit effort in the combined audit firm determines both probabilities. Intuitively, one could expect that the advisory partner prefers a combined audit firm for weak enforcement environments since the probability of an audit failure is low and, thus, the audit risk is low. However, counter-intuitively, we show that the preference to split the audit firm is decreasing for strong enforcement environments. The intuition is as follows. The audit and the advisory partner's audit-related efforts increase in the enforcement strength resulting in two opposing effects regarding the split-up preference: the audit failure probability decreases, whereas the adverse audit opinion probability increases. Decreasing audit failure probability increases the probability that the advisory partner acquires advisory projects in the combined audit firm (high *Reputation Effect*), decreasing the preference to split up the audit firm. The increasing adverse audit opinion probability increases the preference to split up the audit firm (high *Independence Effect*). As the

enforcement strength determines the audit risk and, thus, the consequences of an audit failure, the effect of decreasing audit failure probability dominates for strong enforcement environments.

Turning to the consequences of audit firm split-ups, we explore the effects on audit quality. We find three opposing effects that drive audit firm split-ups' ambiguous effect on audit quality. First, intuitively an audit firm split-up solves the underlying independence problem. As the audit firm's audit effort is independent of future advisory projects in a stand-alone audit firm, the audit effort can increase in case of a split-up (*Independence Effect*). Opposing, second, as the advisory partner loses not only the audit-related advisory project but all advisory projects in case of an audit failure, advisory projects can also set strong effort incentives to reduce the audit failure risk (*Reputation Effect*). The third effect is the loss of audit-related advisory expertise within the stand-alone audit firm. As advisory knowledge, e.g., valuation or tax expertise, is needed to receive the highest level of audit quality, audit quality suffers from the loss of the advisory partner as an auditor's expert (*Expertise Effect*). Following, the audit firm split-up effect on audit quality is ambiguous. We find that enforcement strength determines which of these effects dominates and, thus, enforcement strength determines whether audit firm split-ups increase audit quality.

As described, the advisory projects in the combined audit firm set negative effort incentives through the audit client (*Independence Effect*) and positive effort incentives through all other clients (*Reputation Effect*). Thus, higher audit-advisory spillovers resulting in a higher return from advisory projects can decrease or increase the audit quality in the combined audit firm, dependent on which effect dominates. As the audit failure risk is low for a low enforcement strength, the *Reputation Effect* is low, and the *Independence Effect* dominates. Consequently, for high audit-advisory spillovers, i.e., cost benefits, the audit quality in the combined audit firm is low, and a split-up can increase the audit quality. Counter-intuitively, we show that although advisory projects with high spillovers create strong independence problems, a split-up can decrease the audit quality for a high enforcement strength. As the audit failure risk is high in that case, the *Reputation Effect* dominates and, thus, for high audit-advisory spillovers, the audit quality in the combined audit firm is higher, and a split-up decreases audit quality.

Besides spillovers from audit to advisory, the complexity of the audit client determines the audit quality. In case of a complex client, e.g., banks or insurance companies, the audit partner needs more expert support from the advisory partner. Thus, the effect of losing advisory expertise is high for complex clients. If enforcement strength is high and the loss of advisory expertise is high, an audit firm split-up decreases audit quality. Nevertheless, if enforcement strength is low and the client is less complex, an audit firm split-up will likely increase audit quality by solving the independence problem.

The results on audit quality have strong empirical implications. If enforcement strength is low, we predict that audit firm split-ups are associated with higher audit quality for less complex clients. If enforcement strength is high, we predict that audit quality will decrease for complex clients, e.g., multinational corporations, insurance companies, or banks. Moreover, the audit quality will increase (decrease) if enforcement strength is high and spillovers from audit to advisory are low (high).

Considering an advisory partner who contributes to the audit process as an auditor's expert, we add to the stream of literature on the effects of non-audit services (NAS) (e.g., DeFond et al., 2002, Ashbaugh et al., 2003, Kinney et al., 2004, Mishra et al., 2005, Wu, 2006, Huang et al., 2007, Knechel et al., 2012, Svanstroem, 2013). Especially to those arguing that the joint provision of audit and advisory can be beneficial via knowledge spillovers (e.g., Simunic, 1984 or Beck and Wu, 2006). In addition, our paper is closely related to the literature on profit and risk sharing (e.g., Levin and Tadelis, 2005, Liu and Simunic, 2005, Liu and Chan, 2012, Balachandran and Ramakrishnan, 1987, Chan and Pae, 1998, Huddart and Liang, 2005). Our model is especially related to Liu and Simunic, 2005 and Liu and Chan, 2012. Liu and Simunic, 2005 analyze the effect of sharing rules between audit partners on the audit production decision. Building on this, Liu and Chan, 2012, consider not only an audit partner but also an advisory partner. They then analyze the optimal sharing rule within an audit firm that provides audit and non-audit services to its clients. However, within their model, the audit partner conducts the audit on his own. We add to this by analyzing a setting where the advisory partner is also part of the audit process as an auditor's expert (e.g., valuation, pension, or tax experts). We also add to the literature stream on auditor independence (e.g., Lee and Gu, 1998, Liu and Simunic, 2005, Arya and Glover, 2014) and to the overall analytical auditing literature. Ye, 2022 provides a detailed overview of this literature.

The paper proceeds as follows. Section 4.2 describes the model setup. Section 4.3 derives the optimal efforts. Next, Section 4.4, discusses the advisory and audit partners' split-up preference as well as the effect of split-ups on audit quality. Section 4.5 concludes.

4.2 An Audit-Advisory Split-Up Model

Players There are two risk-neutral players: an advisory partner ('she') and an audit partner ('he'). Both players either form a combined audit firm offering audit and advisory services or a stand-alone audit and a stand-alone advisory firm. The audit partner wants to minimize his expected audit costs, which include direct costs and potential damages from audit failures. The advisory partner in a combined audit firm can support the audit partner with advisory expertise during the audit (e.g., valuation or tax services) and wants to acquire future advisory projects. Moreover, she offers advisory services to another advisory client. As this advisory service is unrelated to the audit engagement, we refer to this as the "advisory client project."

Timeline The game comprises four dates. At Date 1, the audit and the advisory partner choose their audit-related efforts, and the first advisory project (advisory client project) takes place. At Date 2, the audit firm completes the audit and files an audit report. At Date 3, an enforcement institution potentially detects an undetected material misstatement within the audited financial statement ("audit failure"). At Date 4, if the client has received an unqualified audit opinion at Date 2 and no audit failure occurred at Date 3, the advisory partner conducts an advisory project for the audit client. We refer to this as the "audit client project." Moreover, she conducts another advisory client project in t=4 if no audit failure occurred at Date 3.[1] Afterwards, the game ends. In case of an audit firm split-up, the advisory partner in the stand-alone advisory firm can conduct both advisory projects at Date 1 and 4. Figure 4.1 depicts the timeline of the game.

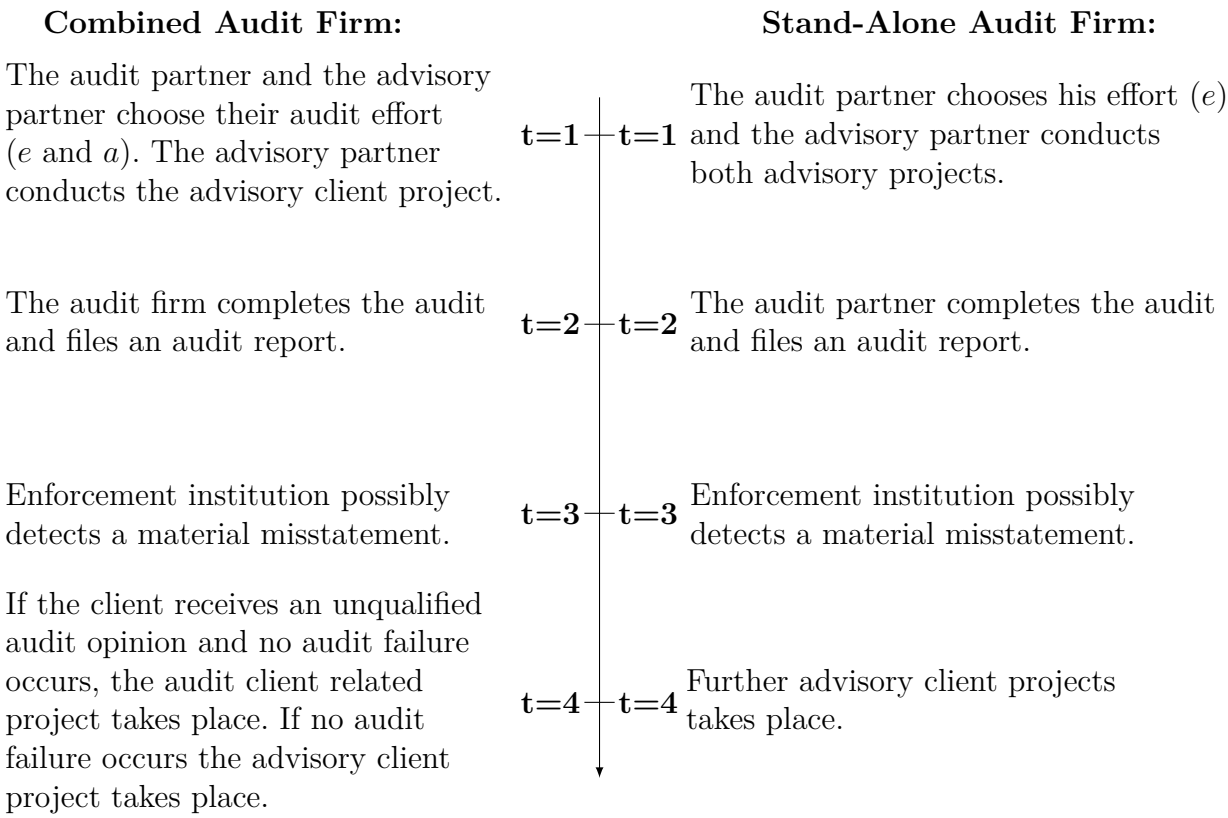

Figure 4.1: Timeline – Audit Firm Split-Up.

Audit Service We assume the audit client wants to comply with accounting standards. With probability p, the client meets this target, and the financial statement complies with accounting regulations. Following, $1-p$ captures the audit client's risk of material misstatements as described in ISA 315 (Revised) or SAS 145. It includes both the inherent

[1] The periods t=1 to t=3 can be interpreted as one fiscal year. Consequently, in t=4, the audit ends, and a (new) advisory project can be offered.

risk, e.g., the nature of the client or external factors, and the control risk, such as the control environment, control activities, and effectiveness of internal controls. Thus, p can be interpreted as the strength of the internal controls or the management's accounting expertise.

During the audit, the audit partner usually gets support from experts. We, therefore, assume that the audit partner needs advisory expertise (i.e., auditor's expert according to ISA 620) in specific audit areas, such as valuation expertise when auditing goodwill or tax expertise when auditing complex tax accounting positions. The auditor uses the advisory partner as an auditor's expert since she has gained a specific competence in a certain area (we refer to this as "advisory area"). The relevance of the advisory expertise during the audit differs between audit clients. For example, the relevance of the goodwill position for the audit is higher when auditing a multinational firm with high and complex goodwill amounts. Thus, the relevance of the advisory area for the audit is also high compared to the audit of a firm with immaterial goodwill positions.

Within the model, we capture the relevance of the area audited by the audit partner without advisory expertise by $\lambda \in (0,1)$ (we refer to this as "non-advisory area"). To audit this area, the audit partner chooses the audit effort e with direct effort costs of $\frac{ce^2}{2}$, with $c > 0$. If $\lambda < 1$, the advisory partner's expertise is needed for the financial statement audit, i.e., auditing the advisory area has a certain relevance for the overall audit. Thus, $1-\lambda$ depicts the relevance of auditing the advisory partner's competence area (advisory area). The advisory partner chooses the expert effort a with direct effort costs of $\frac{ca^2}{2}$.[2]

The audit partner detects a mistake in his area λ with probability e. Within the advisory area, $1-\lambda$, the advisory partner detects mistakes with probability a. Thus, the audit and advisory partner's efforts complement each other. The audit and advisory partner both need to work to sufficiently reduce the detection risk and, thus, the audit risk. We refer to this kind of spillover as "Advisory-Audit-Spillover." Saying to the Financial Times that "[audit and consulting] skills are complementary" Sandy Peters, CFA Institute Spokesperson, former KPMG Partner and an opponent of Big-4 split-ups, raised this aspect within the EY split-up discussion (Foley and O'Dwyer, 2022b).

Within the model, we assume that in case of a split-up, the audit partner can engage an external expert to support the audit for a fixed fee F. The external expert then also chooses the expert effort a with direct effort costs of $\frac{ca^2}{2}$.

Audit Failure At Date 3, the client's financial statement and the audit report are published.[3] We thereby assume that by conducting further inspections — at the client

[2] Note that the advisory area is not necessarily a whole audit area or an entire financial statement item. For example, the audit and advisory partner both exert effort to audit goodwill. Nevertheless, the higher and more complex the goodwill audit procedures, the more relevant is the advisory partner's support.

[3] We assume that the audit firm always reports a misstatement when detected.

and the audit firm level — enforcement institutions can detect audit failures with some probability. We capture this probability with the detection probability $q \in (0,1)$ and refer to this probability as "enforcement strength."[4] If the enforcement institution detects an audit failure, the audit firm will suffer enforcement penalties and potential financial claims by investors (e.g., Brocard et al., 2018, Desai et al., 2006, Karpoff et al., 2008, Mande and Son, 2013). We refer to all of this as "damage." Within the model, D captures all potential damages from audit failures.

If the audit partner hires an external expert, he is still solely responsible for the audit opinion (ISA 620 (3)). However, we assume that there is some probability ω that the audit partner receives damage compensation from the external expert if there is a mistake in the external expert's area, leading to the audit failure.

Audit Firm Sharing Rule Similar to the theoretical model of Liu and Chan, 2012, we model an audit firm with two partners, an advisory and an audit partner. Both work independently, and the audit firm (e.g., the headquarter) can control the audit and advisory partner's effort through the sharing rule γ, which determines the share of the damage D the audit partner has to bear in case of an audit failure and α, which determines the share of the audit fee for the audit partner. Consequently, the advisory partner bears $1-\gamma$ share of the damage and receives $1-\alpha$ share of the audit fee.

In contrast to Liu and Chan, 2012, within our model, the advisory partner is not only conducting an advisory project (NAS) but works as an ISA 620 auditor's expert within the financial statement audit. In the case of the once planned EY split-up, "some of EY's 70,000 tax professionals do audit-related work [...] and consulting work" according to the Wall Street Journal (Eaglesham, 2022). This illustrates the high relevance of advisory expertise within the audit process. Our model also differs from Liu and Chan, 2012 because they analyze a setting prior to SOX where the audit partner could receive a share of the advisory project return and explore how the new regulation affects the sharing rule. As the audit partner is no longer allowed to receive a share from the advisory project's return, we always assume that the advisory partner receives the whole return from advisory projects. Moreover, in contrast to Liu and Chan, 2012, both partners have an outside option by offering the audit or advisory service in a stand-alone firm.

Advisory Project We assume two types of advisory projects. The first is a project for an advisory client unrelated to the audit and, is therefore not subject to any regulatory

[4] As the financial market, e.g., through media coverage or short sellers searching for incorrect financial statements (Fang et al., 2016), or audit oversight institutions could also detect a material misstatement that was not detected during the audit, one could also include this and refer to q as an overall detection probability. Nevertheless, the enforcement strength is one significant determinant of this overall detection probability.

restrictions. The second is a project for the audit client and is therefore subject to audit restrictions. In the stand-alone advisory firm, both clients are unrelated to an audit.

At Date 1, the advisory partner within the stand-alone audit firm conducts two advisory client projects. In contrast, the advisory partner within the combined firm conducts one advisory client project in addition to the audit-related expert service. As many regulations prohibit simultaneous audit and advisory services, the advisory project related to the audit client has to take place after the financial statement audit, i.e., in the future (Date 4).[5]

At Date 4, the advisory partner within the stand-alone audit firm again conducts two advisory client projects. In contrast, the advisory partner within the combined firm conducts another advisory client project and can conduct an advisory project for the audit client. Nevertheless, in the combined audit firm, both clients — advisory and audit client — may not hire the advisory partner of the combined audit firm. Whenever the audit client receives an adverse audit opinion, or an audit failure occurs, the audit client goes bankrupt, i.e., the game ends.[6] Thus, the advisory partner is only hired from the audit client if the audit client has received an unqualified audit opinion and no audit failure occurs. As both — probability of an unqualified audit opinion and no audit failure — depend on the audit, the audit client advisory project creates independence problems. Moreover, an audit failure results in a loss of reputation. We, therefore, assume that in case of an audit failure, the advisory client also does not hire the advisory partner in t=4. An adverse audit opinion, on the other hand, is not harmful, and the advisory client still hires the advisory partner. When taking the ex-ante decisions in t=1, we assume a discount of $\delta \in (0,1)$ for the return of all projects which take place at Date 4. If δ is high, the advisory partner values future returns higher, i.e., discounts the future returns less.

We also associate direct costs with the advisory project. These costs differ whether an advisory partner within a combined audit firm or a stand-alone advisory firm conducts the advisory project. The costs associated with the advisory project within the combined audit firm are captured by $v \in (0,1)$ and within the stand-alone advisory firm by $r \in (0,1)$, with $r > v$. This modeling is similar to Liu and Chan, 2012. By assuming higher costs for the stand-alone advisory firm, we capture potential knowledge spillovers between audit and advisory on the one hand and potential client acquisition costs on the other. For example, a valuation advisory partner who regularly audits goodwill impairment tests is already familiar with various business risks and legal or financial structures. This creates spillover effects when calculating the costs of capital or when creating financial models for other clients. Following this, the partner has no further costs of acquiring specific knowledge. We

[5] For example Regulation (EU) No 537/2014 of the European Parliament requires the prohibition of the provision of certain non-audit services such as consultancy and advisory services by auditors of public-interest entities.

[6] One could also argue the client does not go bankrupt but changes the auditor after an adverse audit opinion.

refer to this kind of spillover as "Audit-Advisory-Spillover". An alternative explanation for the cost difference would be additional costs for acquiring new outside clients in the stand-alone advisory firm, i.e., marketing costs. These do not occur or are significantly lower if the advisory partner has already established a brand or reputation from auditing. Thus, the combined audit firm's advisory partner costs are lower than a stand-alone advisory firm's costs.

The client benefits from the advisory service. The advisory service, for example, leads to more efficient processes and, therefore, reduces costs or increases sales. We, thereby, assume a high demand (over-demand) of advisory services so that all advisory partners get hired (if the audit client is not bankrupt). Thus, the fee for the advisory service equals the client's benefit from the advisory service. For simplicity, we assume a benefit of 1 and, thus, the advisory project yields a rent of $(1-v)$ for advisory partners in a combined audit firm and of $(1-r)$ for advisory partners in a stand-alone advisory firm.

4.3 Optimal Audit Effort and Audit Fee

4.3.1 Audit and Advisory Services in a Combined Audit Firm

This section analyzes the audit effort and audit fee of a combined audit firm that offers both audit and advisory services. We solve this game by backward induction. Thus, we first analyze the audit and advisory partner's optimal audit and expert effort. Next, we derive the audit firm's optimal sharing rule.

The audit partner faces audit costs of

$$C^A := \frac{ce^2}{2} + q(1-p)\gamma(1-\lambda e-(1-\lambda)a)D, \tag{4.1}$$

where the first part, $\frac{ce^2}{2}$, captures the direct effort costs and the second part, $q(1-p)\gamma(1-\lambda e-(1-\lambda)a)D$, the expected damage. The audit partner minimizes his audit costs by choosing

$$e(\gamma) = \frac{\gamma q(1-p)\lambda D}{c}. \tag{4.2}$$

The advisory partner faces costs of

$$C^C := \frac{ca^2}{2} + q(1-p)(1-\gamma)(1-\lambda e-(1-\lambda)a)D$$
$$-(1-v)\left(1+\delta\left(\underbrace{(p+(1-p)(1-q)(1-\lambda e-(1-\lambda)a))}_{Pr(NoAF,NoAO)}+\underbrace{(p+(1-p)((1-q)+q(\lambda e+(1-\lambda)a)))}_{Pr(NoAF)}\right)\right). \tag{4.3}$$

Compared to the audit partner, the advisory partner's costs additionally comprise the expected net return from the advisory projects (second line in Equation 4.3). As it is prohibited in most countries that the audit partner receives a share from the advisory project, the advisory partner receives the whole return. In t=1, the advisory partner offers the advisory service to the advisory client and receives a return of $(1-v)$. As the audit is ongoing, offering advisory services to the audit client is prohibited. In t=4, the advisory partner can offer the advisory service to both the advisory and the audit client. Nevertheless, both clients do not hire the advisory partner in case of an audit failure (reputation loss). Moreover, the audit client does not hire the advisory partner in case of an adverse audit opinion. Thus, the advisory partner offers advisory services to the advisory client and receives the return $(1-v)$ when no audit failure occurs, which happens with probability $Pr(NoAF)$. She offers the advisory services to the audit client and receives the return $(1-v)$ when no audit failure occurs, and no adverse audit opinion was released, which happens with probability $Pr(NoAF, NoAO)$. The expected return from t=4 is discounted by δ.

The advisory partner minimizes her costs by choosing

$$a(\gamma) = \frac{(1-p)(1-\lambda)((1-\gamma)q(1-p)\lambda D - \delta(1-v)(1-2q))}{c}. \tag{4.4}$$

Setting the sharing rule, the audit firm minimizes its audit costs, i.e., minimizes the audit fee. In a setting where the audit and the advisory partner have no outside option (i.e., a split-up is not possible), the audit firm would reduce the audit fee using the net return from the advisory project (cross-financing). As a result, in equilibrium, the audit and the advisory partner receive their expected costs to break even and receive *zero* return ex-ante. However, whenever the advisory partner can offer the advisory service in a stand-alone advisory firm, the advisory partner has an outside option of $(1-r)$ for each client. Thus, the advisory partner leaves the combined audit firm as long as the ex-ante expected return is lower than $2(1-r)(1+\delta)$. This implies that no combined audit firm exists where the advisory partner receives *zero* ex-ante expected return. Moreover, due to price competition in the audit market, the audit partner always receives his reservation utility (*zero*) in both the combined and the stand-alone audit firm. Consequently, as the audit partner prefers a combined audit firm as long as the audit fee is lower compared to a stand-alone audit firm, the advisory partner has more bargaining power than the audit partner within the audit firm. We, therefore, assume that the audit firm cannot reduce the audit fee by the advisory project's net return to ensure that the advisory partner's ex-ante expected return is sufficiently high to keep her in the combined audit firm. Thus, the advisory partner ex-ante expects to receive the whole net return from the advisory project. The audit firm minimizes the audit fee by choosing the optimal sharing rule γ:

$$\min_{\gamma} C := \frac{ce(\gamma)^2}{2} + \frac{ca(\gamma)^2}{2} + q(1-p)(1-\lambda e(\gamma) - (1-\lambda)a(\gamma))D. \tag{4.5}$$

Lemma 4.1 summarizes the resulting optimal sharing rule and the optimal audit and expert effort. All proofs are stated in the appendix.

Lemma 4.1. *1. The audit firm offers the audit and advisory partner a sharing rule of* $\gamma^* = \frac{Dq\lambda^2 - (1-2q)(1-v)\delta(1-\lambda)^2}{Dq((1-\lambda)^2+\lambda^2)}$ *and* $\alpha^* = \frac{C^A(e^*,a^*)}{C(e^*,a^*)}$ *to ensure that the audit and advisory partner's effort minimize the audit fee and the audit partner offers the minimum audit fee.*

2. The audit partner chooses audit effort of $e^* = \frac{(1-p)\lambda(Dq\lambda^2 - (1-2q)(1-v)\delta(1-\lambda)^2)}{c((1-\lambda)^2+\lambda^2)}$.

3. The advisory partner chooses expert effort of $a^* = \frac{(1-p)(1-\lambda)(Dq(1-\lambda)^2 - (1-2q)(1-v)\delta\lambda^2)}{c((1-\lambda)^2+\lambda^2)}$.

4. The equilibrium audit fee is given by $C(e^*, a^*)$.

Deriving the audit and the advisory partner's ex-ante expected return by considering the share of the audit fee and the corresponding costs yields that the audit partner's ex-ante expected return is *zero*. The advisory partner's ex-ante expected return is $(1-v)(1+\delta(Pr(NoAF)+Pr(NoAF,NoAO)))$. Thus, the audit fee increases by not using the expected net return from the advisory project to reduce the audit fee. As the advisory partner now receives a share of a higher audit fee compared to her costs, the audit firm ensures that ex-ante, the advisory partner expects to receive the whole net return of the advisory project.

4.3.2 Audit and Advisory Services in Stand-Alone Firms – With an External Expert

This section analyzes a split-up setting with a stand-alone audit and advisory firm. The stand-alone audit firm hires an external expert to support him during the audit by auditing the advisory area.

In the stand-alone audit firm, the audit partner faces audit costs of

$$C^A_{S,E} = C_{S,E} := \frac{ce^2}{2} + q(1-p)(1-\lambda e - (1-\lambda)a)D + F - q(1-p)(1-\lambda)a\omega D. \tag{4.6}$$

In addition to the direct effort costs and the expected damage, the audit firm faces additional costs of hiring the external expert, F. Nevertheless, in case of an undetected mistake in the advisory area (the external experts' competence area), the audit firm can receive the damage from the external expert with probability ω. As the audit firm always comprises all partners, the audit firm's cost for the audit equals the partners' costs. Thus, the costs of the audit partner equal the costs of the audit firm in a stand-alone audit firm.

The audit partner minimizes the audit costs by choosing

$$e^*_{S,E} = \frac{q(1-p)\lambda D}{c}. \tag{4.7}$$

The external expert faces an expected return from the audit of

$$C^C_{S,E} = F - q(1-p)(1-\lambda)(1-a)\omega D - \frac{ca^2}{2}. \tag{4.8}$$

The external expert receives the fixed fee F and has direct effort costs of $\frac{ca^2}{2}$ and an expected damage of $q(1-p)(1-\lambda)(1-a)\omega D$.

The outside expert maximizes the expected return by choosing

$$a^*_{S,E} = \frac{D(1-p)q(1-\lambda)\omega}{c}. \tag{4.9}$$

Lemma 4.2 summarizes the resulting optimal sharing rule and effort.

Lemma 4.2. *1. The audit partner always receives the total share of the audit fee and the expected damage, $\gamma^*_{S,E} = 1$ and $\alpha^*_{S,E} = 1$.*

2. The audit partner chooses audit effort of $e^*_{S,E} = \frac{q(1-p)\lambda D}{c}$.

3. The external expert chooses expert effort of $a^*_{S,E} = \frac{D(1-p)q(1-\lambda)\omega}{c}$.

4. The equilibrium audit fee is given by $C_{S,E}(e^*_{S,E}, a^*_{S,E})$.

In a stand-alone advisory firm, the advisory partner receives an expected return of

$$2(1-r) + 2(1-r)\delta. \tag{4.10}$$

4.3.3 Audit and Advisory Services in Stand-Alone Firms – Without an External Expert

This section analyzes a split-up setting with a stand-alone audit and advisory firm. The stand-alone audit firm wants to hire an external expert to support the audit. However, the audit firm might not hire an external expert because no external expert offers such a service or hiring an external expert is too expensive. Thus, we analyze a setting where the audit partner does not hire an external expert.

In the stand-alone audit firm, the audit partner faces audit costs of

$$C^A_S = C_S := \frac{ce^2}{2} + q(1-p)(1-\lambda e - (1-\lambda)a)D. \tag{4.11}$$

In the stand-alone audit firm, the audit firm no longer has advisory expertise. Thus, a mistake within the advisory expertise area, $(1-\lambda)$, is never detected.

The audit partner minimizes the audit costs by choosing

$$e_S^* = \frac{q(1-p)\lambda D}{c}. \tag{4.12}$$

Lemma 4.3 summarizes the resulting optimal sharing rule and effort.

Lemma 4.3. *1. The audit partner always receives the total share of the audit fee and the expected damage, $\gamma_S^* = 1$ and $\alpha_S^* = 1$.*

2. The audit partner chooses audit effort of $e_S^* = \frac{q(1-p)\lambda D}{c}$.

3. The equilibrium audit fee is given by $C_S(e_S^*)$.

4.4 Split-Up Preference and Audit Quality

After deriving the optimal audit effort and the equilibrium audit fee for a combined audit firm and a stand-alone audit firm with and without an external expert, we investigate the effects of a split-up within this section.

4.4.1 Split-Up Preferences

We first explore under which circumstances combined audit firms split into a stand-alone audit and advisory firm.

The advisory partner prefers to split a combined audit firm if her ex-ante expected net return in a stand-alone advisory firm is higher than in a combined audit firm. Put formally, the advisory partner wants to split a combined audit firm and, thus, leaves the audit firm if

$$\begin{aligned} &2(1-r)(1+\delta) > (1-v)(1+\delta(Pr(NoAF)+Pr(NoAF,NoAO))) \\ \implies &Preference := 2(1-r)(1+\delta) - (1-v)(1+\delta(Pr(NoAF)+Pr(NoAF,NoAO))) > 0. \end{aligned} \tag{4.13}$$

A positive *Preference* indicates that the advisory partner wants to split up the audit firm. Three effects influence the advisory partner's preference. First, in a combined audit firm, the advisory partner benefits from the Audit-Advisory-Spillover and can offer the advisory project with costs v instead of r, with $r > v$. Second, the advisory partner can only offer her services to the advisory client in t=1 and, thus, "loses" potential returns from the audit-related advisory project due to audit regulation. Third, the advisory and audit client do not hire the advisory partner in case of an audit failure. Moreover, the audit client does not hire the advisory partner in case of an adverse audit opinion. The audit, therefore, can be seen as a potential risk for the advisory partner as the audit opinion can result in reputation losses or the threat of switching to another advisory (or audit) firm. Within this setting, the audit and the expert effort of the combined audit

firm influence both the audit failure probability and the probability of an adverse audit opinion. Thus, the audit and expert effort influence the advisory partner's preference.

Lemma 4.4. *Suppose the audit and advisory partner's audit and expert effort increase for exogenous reasons. Then the advisory partner's split-up preference increases (decreases) if the enforcement strength is low (high), i.e.,* $q < \frac{1}{2}$ *(*$q > \frac{1}{2}$*).*
Formally:

$$\frac{dPreference}{de}, \frac{dPreference}{da} > (<)0 \text{ if } q < (>)\frac{1}{2}. \tag{4.14}$$

Higher audit and expert effort decrease the audit failure probability while it increases the adverse audit opinion probability. Moreover, the split-up preference decreases for a decreasing audit failure probability and increases for an increasing adverse audit opinion probability. Enforcement strength, thereby, determines which effect of higher audit and expert effort (lower audit failure probability or higher adverse audit opinion probability) dominates. The intuition is as follows. If the audit and the advisory partner do not detect a mistake, an audit failure occurs with probability q, and the advisory partner loses both (all) clients (*Reputation Effect*). In contrast, if they detect a mistake, they have to publish an adverse audit opinion, and the advisory partner loses (only) the audit client (*Independence Effect*). Consequently, the absolute downside of an audit failure is higher (two (all) clients versus one client), whereas the probability of an audit failure is reduced by the enforcement strength q. If the enforcement strength q is sufficiently high ($q > \frac{1}{2}$), the audit failure risk is high. Therefore, the *Reputation Effect* dominates and, thus, the split-up preference decreases for increasing effort. Nevertheless, if the enforcement strength q is sufficiently low ($q < \frac{1}{2}$), the audit failure risk is low, thus, the *Independence Effect* dominates, and the split-up preference increases.

To further explore the split-up preference, we next investigate the audit effort.

Proposition 4.1. *The audit and the advisory partner's audit and expert effort*

1. *increase (decrease) in the advisory costs of the combined audit firm,* v*, if enforcement strength is low (high), i.e.,* $q < (>)\frac{1}{2}$*,*
2. *increase in the enforcement strength,* q*,*
3. *increase in the damage,* D*.*

Counter-intuitively, a change in the advisory project's net return (higher v) affects the audit partner's and advisory partner's audit effort similarly, although only the advisory partner benefits from the advisory project. First, consider the advisory partner's effort incentives. The return from the advisory project sets positive and negative effort incentives. Higher costs v reduce this return. In case of an audit failure, the advisory partner

loses the return from the advisory client (*Reputation Effect*). A lower return due to higher costs v reduces the expected downside of an audit failure and sets negative effort incentives (lower *Reputation Effect*). Nevertheless, the advisory partner loses the return from the audit client in case of an adverse audit opinion (*Independence Effect*). With higher costs v, the potential loss from an adverse audit opinion decreases; thus, the *Independence Effect* is lower. This sets positive effort incentives. If enforcement strength is high ($q > \frac{1}{2}$), the audit failure risk is high, the lower *Reputation Effect* dominates, and the audit effort decreases in v. If enforcement strength is low ($q < \frac{1}{2}$), the audit failure risk is low, the lower *Independence Effect* dominates, and the audit effort increases in v.

The sharing rule γ^* ensures sufficiently high audit and expert efforts. Whenever the effort incentives of one partner are already high without a high share of the expected damage, the share of this partner can be lower and vice versa. Thus, if the advisory partner faces positive (negative) effort incentives, her share $(1-\gamma^*)$ decreases (increases). This indirect effect on her expert effort never dominates so that positive (negative) effort incentives are never dominated by a decreasing (increasing) share $(1-\gamma^*)$. Nevertheless, a lower (higher) share for the advisory partner implies a higher (lower) share for the audit partner. For example, consider the case of negative effort incentives (lower *Reputation Effect*) for the advisory partner resulting from an increase in v ($q > \frac{1}{2}$). The advisory partner's share increases to ensure a sufficiently high expert effort. As the advisory partner's share increases, the audit partner's share decreases; thus, his effort incentives decrease, resulting in lower audit effort. For $q < \frac{1}{2}$, the advisory partner's share decreases as she already has strong positive effort incentives (lower *Independence Effect*) for increasing v. Consequently, the audit partner's share and his audit effort increase.

Intuitively, the audit and the expert effort increase in the damage D and the enforcement strength q. Both — D and q — increase the expected damage in case of an audit failure and therefore increase effort incentives.

After analyzing the audit and expert effort, which indirectly affects the preference, Proposition 4.2 now summarizes the cost and damage effects on the advisory partner's split-up preference.

Proposition 4.2. *The advisory partner's split-up preference*

1. *decreases in the advisory costs of the stand-alone advisory firm, r,*
2. *increases in the advisory costs of the combined audit firm, v,*
3. *increases (decreases) in the enforcement strength, q, if $q < (>)\bar{q}$,*
4. *increases (decreases) in the damage, D, if $q < (>)\frac{1}{2}$.*

The results in part (1) and (2) of Proposition 4.2 are intuitive. The advisory partner faces higher costs in a stand-alone advisory firm since she does not benefit from Audit-Advisory-Spillovers. The higher these costs in the stand-alone advisory firm r are, the

higher the benefit from Audit-Advisory-Spillovers and, consequently, the lower the preference to offer the advisory project in a stand-alone advisory firm (part (1)). The higher the costs in the combined audit firm v are, the lower the benefit from Audit-Advisory-Spillovers and the higher the preference to split the audit firm (part (2)).

Lemma 4.4 and Proposition 4.1 show that the audit and expert effort can increase or decrease the preference, and both efforts can increase or decrease in v. This indirect effect on the preference through effort is always positive and increases the split-up preference. This result is because whenever the audit and expert effort increase, increasing audit and expert effort also increase the split-up preference. Both efforts increase when the effect of lower *Independence Effect* for increasing v dominates for $q < \frac{1}{2}$. Moreover, if $q < \frac{1}{2}$, the audit failure risk is low and higher audit and expert effort increases the preference as both increase the adverse audit opinion probability. For $q > \frac{1}{2}$, the audit failure risk is high, the audit and expert effort decrease in v, and lower audit and expert effort increases the split-up preference. Thus, the indirect effect is positive.

The intuition of the results in part (3) and part (4) of Proposition 4.2 is similar. The enforcement strength q and the damage D affect the split-up preference through the audit failure and adverse audit opinion probability. The audit and expert effort increase in both the enforcement strength and the damage. Moreover, the audit failure probability directly increases in the enforcement strength q. If the enforcement strength is low, the audit failure risk is low, the effect of a higher adverse audit opinion probability dominates, and the preference increases in the effort. Consequently, the preference increases in the enforcement strength q or the damage D. If the enforcement strength is high, the audit failure risk is high, and the preference decreases in the enforcement strength q and the damage D. Figure 4.2 depicts the advisory partner's preference (plotted for $p = 0.1, v = 0.8, r = 0.9, \delta = 0.85, \lambda = 0.91, \omega = 0.2, D = 2.5, c = 2.04$).

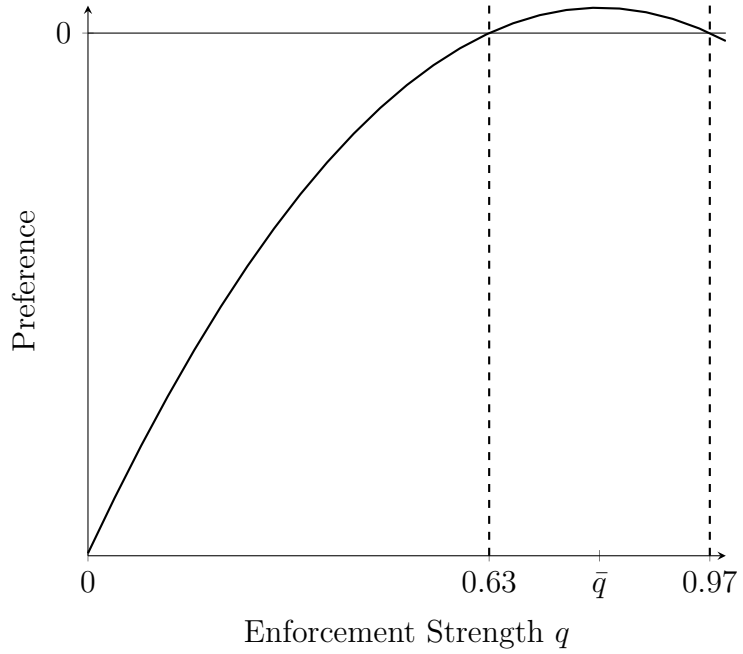

Figure 4.2: Advisory Partner's Split-Up Decision. The black line depicts $Preference$. For $q < 0.63$ and $q > 0.97$, the preference is negative; thus, the advisory partner prefers not to split up, i.e., staying in the combined audit firm. For $q \in (0.63, 0.97)$, the preference is positive; thus, the advisory partner prefers the stand-alone advisory firm.

4.4.2 Audit Quality

Next, we investigate the effects of an audit firm split-up on audit quality. We define audit quality (AQ) as the probability that the auditor detects a material misstatement. For a combined audit firm, the audit quality is given by

$$AQ := \lambda e^* + (1-\lambda)a^*, \tag{4.15}$$

whereas the audit quality in a stand-alone audit firm with an external expert is given by

$$AQ_{S,E} := \lambda e^*_{S,E} + (1-\lambda)a^*_{S,E}, \tag{4.16}$$

and without an external expert by

$$AQ_S := \lambda e^*_S. \tag{4.17}$$

Proposition 4.3 summarizes the comparison of audit quality.

Proposition 4.3. *1. An audit firm split-up into a stand-alone audit firm with an external expert increases (decreases) the audit quality if*

(a) $q < \frac{1}{2}$, $\lambda < \frac{1}{2}$ *and* $v < (>)\bar{v}_E$,

(b) $q > \frac{1}{2}$ *and* $v > (<)\bar{v}_E$,

(c) $q < \frac{1}{2}$ *and* $\lambda > \frac{1}{2}$.

2. *An audit firm split-up into a stand-alone audit firm without an external expert increases (decreases) the audit quality if*

   (a) $q < \frac{1}{2}$, $\lambda < \frac{1}{2}$, *and* $v < (>)\bar{v}$,

   (b) $q > \frac{1}{2}$, $\lambda > \frac{1}{2}$, *and* $v > (<)\bar{v}$,

   (c) $q < (>)\frac{1}{2}$ *and* $\lambda > (<)\frac{1}{2}$.

3. *The audit quality is always higher in a stand-alone audit firm with an external expert than without one.*

EY's UK chair and managing partner, Hywel Ball, told the Financial Times that "Audit quality is going to be better" after the firms' once planned split-up (O'Dwyer, 2022). Opposing, our model shows that the effect of split-ups on audit quality is ambiguous. The advantage of a combined audit firm is the advisory partner's expertise in the advisory area of the audit (*Expertise Effect*). At the same time, the disadvantage is the independence problem resulting from potential returns from future advisory projects (*Independence Effect*). Nevertheless, as returns from other advisory projects are lost in case of an audit failure, the advisory projects can also set strong effort incentives due to a fear of losing reputation, i.e., revenue (*Reputation Effect*).

Part (1) of Proposition 4.3 shows that the effect of split-ups on audit quality depends on the enforcement strength q and the advisory costs v.[7] Proposition 4.1 shows that the *Independence Effect* dominates and the audit and expert effort increase in v if the enforcement strength is low ($q < \frac{1}{2}$, part 1.a). Moreover, in the stand-alone audit firm, the return from the advisory project, i.e., $1 - v$, does not affect the audit and expert effort as the independence problem is solved. For low costs, $v < \bar{v}_E$, the return from the advisory project is high; thus, the independence problem is high, resulting in low audit effort and, thus, a lower audit quality in the combined audit firm. For high costs, $v > \bar{v}_E$, the independence problem is low, resulting in high audit effort and, thus, a higher audit quality in the combined audit firm.

Nevertheless, if enforcement strength is low and the *Independence Effect* dominates and the relevance of the advisory area is low ($\lambda > \frac{1}{2}$), an audit firm split-up always increases the audit quality (part 1.c). This result is because the *Independence Effect* leads to lower audit quality in the combined audit firm. Moreover, as the relevance of the advisory area is low, an audit firm split-up and, therefore, auditing the advisory area with the help of an external expert instead of the help of the advisory partner can never severely harm the

[7] Note that similar results can be derived with δ instead of v. Higher v decreases the return from the advisory project in the combined firm due to higher costs. Similarly, lower δ decreases the return from the advisory project in the combined firm due to higher discounting.

audit quality. Consequently, the audit quality is always higher in the stand-alone audit firm.

If enforcement strength is high ($q > \frac{1}{2}$), the audit failure risk is high, and the *Reputation Effect* dominates. Proposition 4.1 shows that the audit and expert effort decrease in v. Consequently, the audit quality is lower (higher) in the combined audit firm for $v > (<) \bar{v}_E$ (part 1.b).

The intuition behind the results in part (2) of Proposition 4.3 is similar to the intuition of part (1). Depending on enforcement strength, the *Independence Effect* or *Reputation Effect* dominates, and the audit quality can increase or decrease in case of a split-up for $v >$ or $< \bar{v}$. Moreover, if enforcement strength is low and the relevance of the advisory area is low, an audit firm split-up always increases audit quality. Nevertheless, as the stand-alone audit firm without an external expert does not have the competence to audit the advisory area $(1 - \lambda)$, the audit quality can decrease in case of a split-up if the relevance of the advisory area is high. If enforcement strength is high ($q > \frac{1}{2}$), the *Reputation Effect* dominates, resulting in positive effort incentives in the combined audit firm. Moreover, if the advisory partner is more relevant during the audit process, $\lambda < \frac{1}{2}$, the loss of advisory expertise in the stand-alone audit firm (*Expertise Effect*) is high. Consequently, solving the independence problem cannot outweigh the loss of the strong effort incentives set by the *Reputation Effect* and the advisory partner's expertise in the combined audit firm. Thus, an audit firm split-up always decreases audit quality.

A stand-alone audit firm with an external expert always offers a higher audit quality than one without an external expert. This results from a loss of advisory expertise (part (3) of Proposition 4.3).

4.4.3 External Expert Hiring

The audit fee offered by the stand-alone audit firm determines whether an audit firm is competitive in the audit market. The audit firm offering the lowest audit fee always wins the client. Consequently, the audit firm never hires an external expert if the audit fee with an external expert is higher than the audit fee without one. Proposition 4.4 summarizes the audit fee comparison.

Proposition 4.4. *A stand-alone audit firm with an external expert offers a higher audit fee than one without an external expert if the costs of hiring an external expert are high, $F > \tilde{F}$.*

The result is intuitive. As the audit fee covers all audit costs, a high fee for an external expert, F, increases the audit fee. Thus, a stand-alone audit firm with an external expert offers a higher audit fee if the costs for an external expert are sufficiently high.

Corollary 3. *If the stand-alone advisory firm's return from advisory projects is high, i.e., r is low; a stand-alone audit firm does not hire an external expert resulting in lower audit quality.*

From Proposition 4.4 follows that a high fee for an external expert, F, results in a high audit fee. Consequently, the audit firm decides not to hire an expert to have a competitive advantage. As an advisory partner who offers the service of an external expert can receive a return of $(1-r)$ from an advisory project, the expected return from the external expert service has to be higher than $(1-r)$ to compensate for all opportunity costs. Otherwise, no advisory partner offers external expert services. Thus, the higher the return from advisory projects, the higher the fee F to hire an advisory partner as an external expert. Nevertheless, the higher the fee F, the higher the audit fee, and, thus, the audit firm more often chooses not to hire an external expert. As Proposition 4.3 shows, the stand-alone firm without an external expert offers a lower audit quality.

4.4.4 Numerical Example

In the following, we use a numerical example to depict the expected audit quality and audit fee in the audit market. We assume that $D = 1, p = 0.5, c = 0.5, r = 0.9$. We depict two different cases: 1) $q < \frac{1}{2}$ and $\lambda < \frac{1}{2}$ and 2) $q > \frac{1}{2}$ and $\lambda > \frac{1}{2}$.

4.4.4.1 Low Enforcement Strength

First, we consider the low enforcement strength, $q < \frac{1}{2}$ and $\lambda < \frac{1}{2}$.[8] We assume that $q = 0.4$ and $\lambda = 0.45$.

The higher the advisory project costs within the combined audit firm, the higher the preference to split up the audit firm. The advisory partner prefers a combined audit firm for $v < 0.84$ and a stand-alone advisory firm for $v > 0.84$.

We next analyze the audit fee to explore the partner's split-up preference. Comparison of the audit fee within the stand-alone audit firm with and without an external expert shows that in case of a split-up, the audit partner never hires an external expert:

$$C_{S,E}(e^*_{S,E}, a^*_{S,E}) = 0.166028 + F > C_S(e^*) = 0.1919 \quad \text{with } F > 0.1. \tag{4.18}$$

Note that the external expert's fee also has to compensate for the opportunity costs $(1-r)$, i.e., it must be at least $(1-r)$. Otherwise, the external expert would always prefer to offer stand-alone advisory services. Consequently, the audit fee without an external expert is always lower than with an external expert. The audit partner, therefore, never hires an external expert. Figure 4.3 depicts the audit fee. For $v > 0.84$, the advisory partner offers the advisory service in a stand-alone advisory firm. As the audit fee of the combined audit firm is lower compared to the audit fee of a stand-alone audit firm, the audit partner prefers a combined audit firm. Thus, the audit partner has a competitive disadvantage resulting from an audit firm split-up. This result can explain why EY planned that advisory partners

[8] The audit quality in the combined audit firm is always lower for this numerical example and $\lambda > \frac{1}{2}$, see Proposition 4.3.

compensate audit partners from the money raised in the once planned IPO of the new stand-alone advisory firms. It was planned that advisory partners would have compensated the audit partners with $ 2 million or even more, according to the Wall Street Journal (Eaglesham and Brown, 2022).

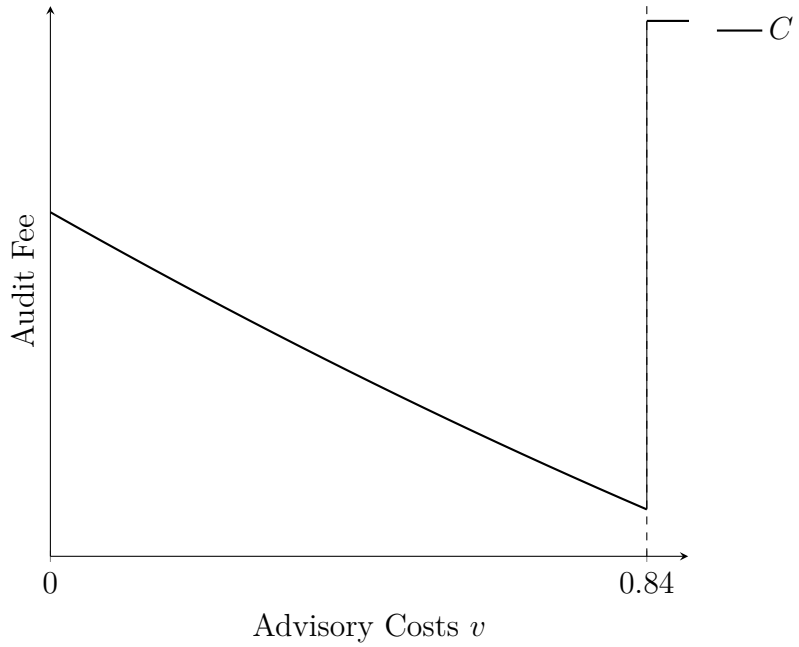

Figure 4.3: Audit Fee C. The black line depicts the audit fee (for $v < 0.84$ given by $C(e^*, a^*)$ and for $v > 0.84$ given by $C_S(e_S^*, a_S^*)$). For $v < 0.84$ the advisory partner prefers a combined audit firm. As the audit fee within the combined audit firm is lower, the audit partner also prefers a combined audit firm. For $v > 0.84$ the advisory partner prefers a stand-alone advisory firm. As the audit fee within the combined audit firm is lower, the audit partner still prefers a combined audit firm.

Figure 4.4 depicts the audit quality. For $v < (>)\bar{v}$, the audit quality in the combined audit firm is lower (higher) than the audit quality in the stand-alone audit firm. The audit firm split-up for all $v > 0.84$ decreases the audit quality.

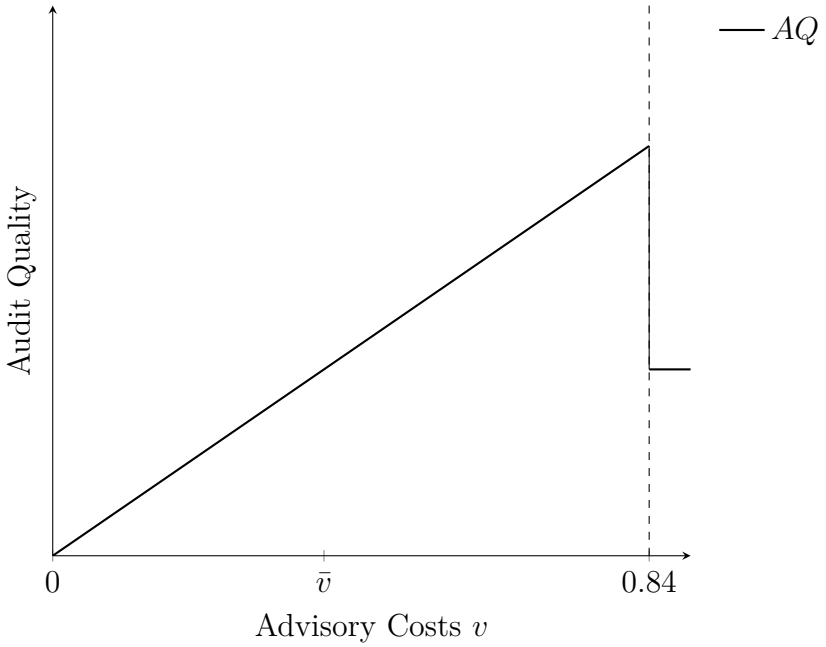

Figure 4.4: Audit Quality AQ. The black line depicts the audit quality (for $v < 0.84$ given by AQ and for $v > 0.84$ given by AQ_S).

4.4.4.2 High Enforcement Strength

Second, we consider the case of a high enforcement strength, $q > \frac{1}{2}$ and $\lambda > \frac{1}{2}$.[9] We assume that $q = 0.6$ and $\lambda = 0.55$. The advisory partner prefers a combined audit firm for $v < 0.83$ and a stand-alone advisory firm for $v > 0.83$.

A comparison of the audit fee within the stand-alone audit firm with and without the external expert shows that in case of a split-up, the audit partner never hires an external expert:

$$C_{S,E}(e^*_{S,E}, a^*_{S,E}) = 0.239943 + F > C_S(e^*) = 0.272775 \quad \text{with } F > 0.1. \tag{4.19}$$

Figure 4.5 depicts the audit fee. For $v > 0.83$, the advisory partner offers the advisory service in a stand-alone advisory firm. As the audit fee is higher in a stand-alone audit firm, the audit partner has a competitive disadvantage resulting from an audit firm split-up.

[9] The audit quality in the combined audit firm is always higher for this numerical example and $\lambda < \frac{1}{2}$, see Proposition 4.3.

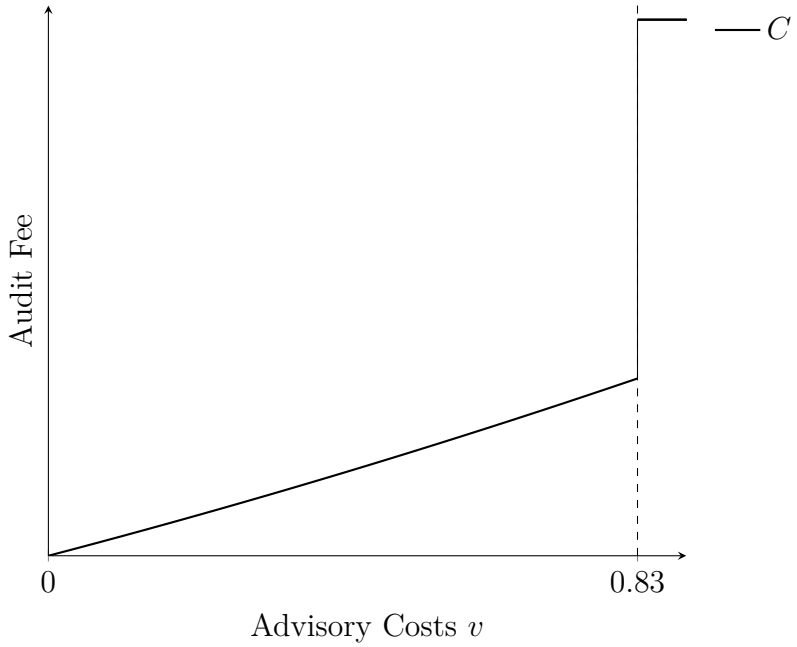

Figure 4.5: Audit Fee C. The black line depicts the audit fee (for $v < 0.83$ given by $C(e^*, a^*)$ and for $v > 0.83$ given by $C_S(e_S^*, a_S^*)$). For $v < 0.83$ the advisory partner prefers a combined audit firm. As the audit fee within the combined audit firm is lower, the audit partner also prefers a combined audit firm. For $v > 0.83$ the advisory partner prefers a stand-alone advisory firm. As the audit fee within the combined audit firm is lower, the audit partner still prefers a combined audit firm.

Figure 4.6 depicts the audit quality. For $v > (<)\bar{v}$, the audit quality in the combined audit firm is lower (higher) than the audit quality in the stand-alone audit firm. The audit firm splits up for all $v > 0.83$, and thus, increases the audit quality.

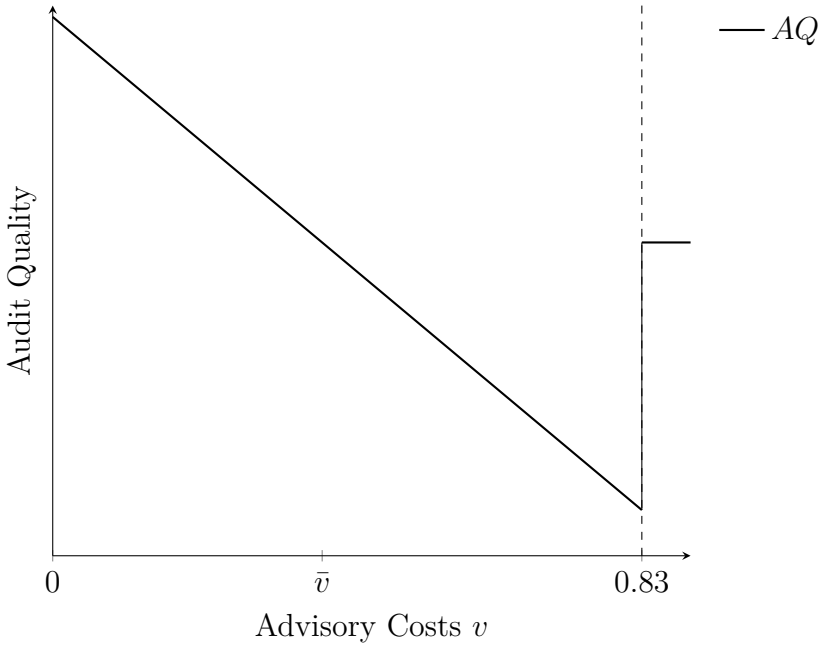

Figure 4.6: Audit Quality AQ. The black line depicts the audit quality (for $v < 0.83$ given by AQ and for $v > 0.83$ given by AQ_S).

4.4.4.3 Discussion

The numerical examples show that depending on enforcement strength, an audit firm split-up can increase or decrease audit quality. In a low enforcement strength environment, the *Independence Effect* dominates, i.e., the audit failure risk is low, and the advisory partner has strong negative effort incentives to prevent an adverse audit opinion. The advisory service within a combined audit firm sets negative incentives and, thereby, can lead to a lower audit quality. A lower audit quality in the combined audit firm arises when the advisory project's return is high, i.e., v is low. Nevertheless, the higher the costs v, the lower the return and, thus, the lower the independence problem within a combined audit firm. As the advisory partner prefers a split-up for high costs v, the split-up decreases the audit quality due to the loss of advisory expertise.

In an environment with a high enforcement strength, the audit failure risk is high, and the advisory service within the combined audit firm sets positive effort incentives. Thus, a higher audit quality in the combined audit firm arises when the advisory project's return is high, i.e., v is low. The *Reputation Effect*, which ensures a high audit quality, decreases with increasing v, and a lower audit quality in the combined audit firm results. As the advisory partner wants to split up the audit firm for high costs v, the split-up increases the audit quality.

The results imply that consequences of an audit firm split-up depend on enforcement strength, i.e., the enforcement environment. Thus, the consequences can differ between regions and entities. Enforcement strength can differ between regions since the political

and institutional framework differs. For example, the institutional framework differs in the degree of investor protection, the efficiency of the judicial system, or corruption between countries. In addition, resources and expertise of enforcement institutions may differ as well. Moreover, since enforcement institutions' focus differs, enforcement strength can also differ between entities. For example, enforcement institutions may focus more on highly regulated companies such as banks or insurance companies. One could also argue that enforcement institutions may focus more on Big-4 clients or companies at the center of public debates. Brown et al., 2014 constructed an index designed to capture differences in enforcement strength between countries. This index could be used to test our results empirically.

4.5 Concluding Remarks and Empirical Predictions

This paper analyzes forces that drive potential audit firm split-ups, its consequences for audit quality, and the role of enforcement strength.

We show that the audit failure risk and the adverse audit opinion probability determine advisory partners' audit firm split-up decision. As both effects are always present, enforcement strength determines which effect dominates and, thus, whether a split-up is preferred or not. Enforcement strength can, thereby, differ not only between regulations but also between audit firms and even clients because large listed companies are more in the focus of enforcement institutions. This may explain why some audit firms split up while others may not and why some audit firms may not split up in every country. EY Israel, for example, rejected the global EY split-up plans from the beginning (Foley and O'Dwyer, 2022a).

We demonstrate that besides the loss of expertise and cost spillover from audit to advisory, enforcement strength is crucial when assessing the effect of audit firm split-ups on audit quality. Our results highlight three effects that influence audit quality in a combined audit firm: the *Expertise Effect*, the *Independence Effect*, and the *Reputation Effect*. The first, the *Expertise Effect*, is the direct effect of losing advisory expertise due to the split-up. The second, the *Independence Effect*, describes the independence problem arising because the advisory partner wants to prevent an adverse audit opinion which sets negative effort incentives. The third effect, the *Reputation Effect*, captures the fear of a loss of reputation and the loss of potential revenues from advisory arising in case of an audit failure, which sets positive effort incentives. We show that enforcement strength determines whether the *Independence* or the *Reputation Effect* dominates. The fear of an audit failure is high in a strong enforcement environment. Therefore, advisory projects within a combined audit firm set strong positive effort incentives, and the *Reputation Effect* dominates. Nevertheless, in a low enforcement strength environment, the *Independence Effect* dominates.

Consequently, we demonstrate that audit quality can increase or decrease after an audit firm split-up. The concern of worsening the audit quality by losing advisory expertise was also raised within the once planned EY split-up. Sandy Peters, a former KPMG Partner and senior head of global advocacy at the CFA Institute told the Financial Times, "there is $5tn of goodwill on the books of US public companies that need to be impairment tested. Are those skills all staying on the audit side?"(Foley and O'Dwyer, 2022b). Our model includes these concerns and shows that audit quality can indeed suffer from the loss of expertise but can also suffer from the loss of reputation concerns. Nevertheless, audit quality can also benefit from an audit firm split-up depending on the enforcement environment. We derive the following predictions for empirical testing from our model:

1. Audit quality will increase for less complex clients if enforcement strength is low.
2. Audit quality will likely decrease for complex clients if enforcement strength is high.
3. Audit quality will decrease in low enforcement strength environments if audit-advisory spillovers in the combined firm are low.
4. Audit quality will decrease in high enforcement strength environments if audit-advisory spillovers in the combined firm are high.

Testing these predictions can help to gain insights into potential effects of audit firm split-ups, which can guide regulators and audit firms. Our model shows that benefits from audit firm split-ups can differ between countries and audit firms as enforcement strength differs. These results imply that audit firms should carefully assess whether to propose a split-up or not because some member firms may reject the proposal. As the effect on audit quality is also ambiguous, regulators should only propose or approve audit firms to split up depending on their specific enforcement environment.

4.6 Appendix

Proof of Lemma 4.1

Proof. The audit firm minimizes the audit cost given in Equation 4.5. The first-order condition (FOC) is given by

$$\frac{dC}{d\gamma} = c\left(\frac{de(\gamma)}{d\gamma} + \frac{da(\gamma)}{d\gamma}\right) - q(1-p)D\left(\lambda\frac{de(\gamma)}{d\gamma} + (1-\lambda)\frac{da(\gamma)}{d\gamma}\right) = 0, \tag{4.20}$$

with $e(\gamma)$ and $a(\gamma)$ given in Equation 4.2 and 4.4. Inserting the derivatives of $e(\gamma)$ and $a(\gamma)$ with respect to γ and rearranging yields the optimal liability sharing rule:

$$\gamma^* = \frac{Dq\lambda^2 - (1-2q)(1-v)\delta(1-\lambda)^2}{Dq((1-\lambda)^2+\lambda^2)}. \tag{4.21}$$

Inserting γ^* in $e(\gamma)$ and $a(\gamma)$ yields the optimal audit and expert effort:

$$\begin{aligned} e^* &= \frac{(1-p)\lambda(Dq\lambda^2 - (1-2q)(1-v)\delta(1-\lambda)^2)}{c((1-\lambda)^2+\lambda^2)} \text{ and} \\ a^* &= \frac{(1-p)(1-\lambda)(Dq(1-\lambda)^2 - (1-2q)(1-v)\delta\lambda^2)}{c((1-\lambda)^2+\lambda^2)}. \end{aligned} \tag{4.22}$$

After the audit firm chooses the optimal liability sharing rule to ensure the optimal audit effort, the audit firm chooses the optimal audit fee sharing rule to ensure that the audit partner offers the optimal (cost-minimizing) audit fee. The audit firm thereby sets the audit fee sharing rule α so that the audit partner's offer equals the audit firm's audit cost given the optimal audit effort, $C(e^*, a^*)$. The partner offers this audit fee if he breaks even:

$$\alpha C(e^*, a^*) - C^A(e^*, a^*) = 0 \implies \alpha^* = \frac{C^A(e^*, a^*)}{C(e^*, a^*)}. \tag{4.23}$$

□

Proof of Lemma 4.4

Proof. To prove Lemma 4.4, assume that the audit and expert efforts e and a are exogenously given. Taking the derivative of *Preference* yields

$$\begin{aligned} \frac{dPreference}{de} &= (1-p)(1-2q)(1-v)\delta\lambda > 0 \text{ if } q < \frac{1}{2}, \\ \frac{dPreference}{da} &= (1-p)(1-2q)(1-v)\delta(1-\lambda) > 0 \text{ if } q < \frac{1}{2}. \end{aligned} \tag{4.24}$$

□

Proof of Proposition 4.1

Proof. Taking the derivatives of e^* and a^* with respect to v, q, and D proves Proposition 4.1.

$$\begin{aligned}
\frac{de^*}{dv} &= \frac{(1-p)(1-2q)\delta(1-\lambda)^2\lambda}{c-2c(1-\lambda)\lambda} > 0 \text{ if } q < \frac{1}{2} \\
\frac{de^*}{dq} &= \frac{(1-p)\lambda(D\lambda^2+2(1-v)(1-\lambda)^2\delta)}{c-2c(1-\lambda)\lambda} > 0 \\
\frac{de^*}{dD} &= \frac{(1-p)q\lambda^3}{c-2c(1-\lambda)\lambda} > 0
\end{aligned} \tag{4.25}$$

$$\begin{aligned}
\frac{da^*}{dv} &= \frac{(1-p)(1-2q)\delta(1-\lambda)\lambda^2}{c-2c(1-\lambda)\lambda} > 0 \text{ if } q < \frac{1}{2} \\
\frac{da^*}{dq} &= \frac{(1-p)(1-\lambda)(D(1-\lambda)^2+2(1-v)\lambda\delta)}{c-2c(1-\lambda)\lambda} > 0 \\
\frac{da^*}{dD} &= \frac{(1-p)q(1-\lambda)^3}{c-2c(1-\lambda)\lambda} > 0
\end{aligned} \tag{4.26}$$

□

Proof of Proposition 4.2

Proof. Taking derivatives of *Preference* with respect to r, v, q, and D proves Proposition 4.2.

$$\begin{aligned}
\frac{dPreference}{dr} &= -2(1+\delta) < 0 \\
\frac{dPreference}{dv} &= 1+\delta(Pr(NoAF)+Pr(NoAF,NoAO))+\delta(1-v)(1-p)(1-2q) \\
&\quad \left(\lambda\frac{de^*}{dv}+(1-\lambda)\frac{da^*}{dv}\right) > 0 \\
\frac{dPreference}{dq} &= \delta(1-v)(1-p)\left(2(1-\lambda e^*-(1-\lambda)a^*)+(1-2q)(\lambda\frac{de^*}{dv}+(1-\lambda)\frac{da^*}{dv})\right) > 0 \text{ if } q < \bar{q} \\
\text{with } \bar{q} &= \frac{2c(1-2\lambda(1-\lambda))+(1-p)(D+8(1-v)\delta(1-\lambda)^2\lambda^2-2D(1-\lambda)\lambda(2-(1-\lambda)\lambda)}{4(1-p)(D+4(1-v)\delta(1-\lambda)^2\lambda^2-2D(1-\lambda)\lambda(2-\lambda(1-\lambda)))} \\
\frac{dPreference}{dD} &= \frac{(1-p)^2(1-2q)q(1-v)\delta(1-2(1-\lambda)\lambda(2-(1-\lambda)\lambda))}{c-2c(1-\lambda)\lambda} > 0 \text{ if } q < \frac{1}{2}
\end{aligned} \tag{4.27}$$

□

Proof of Proposition 4.3

Proof. Comparing the audit quality in the combined and stand-alone audit firm with an external expert given in Equation 4.15 and 4.16 yields

$$AQ_{S,E} = AQ \implies v = \bar{v}_E = 1 - \frac{Dq(1-\omega-2\lambda(1-(1-\lambda)\omega))}{2(1-2q)\delta\lambda^2}. \tag{4.28}$$

As the audit effort in the combined audit firm is increasing (decreasing) in v if $q < (>)\frac{1}{2}$, the audit quality in the stand-alone audit firm is higher if $v > (<)\bar{v}_E$ and $q > (<)\frac{1}{2}$. Moreover, $\bar{v}_E > 1$, for $q < \frac{1}{2}$ and $\lambda > \frac{1}{2}$ and, thus, $v < \bar{v}_E$ and audit quality is higher in the stand-alone audit firm.

Comparing the audit quality in the combined and stand-alone audit firm without an external expert given in Equation 4.15 and 4.17 yields

$$AQ_S = AQ \implies v = \bar{v} = 1 - \frac{Dq(1-2\lambda)}{2(1-2q)\delta\lambda^2}. \tag{4.29}$$

As the audit effort in the combined audit firm is increasing (decreasing) in v if $q < (>)\frac{1}{2}$, the audit quality in the stand-alone audit firm is higher if $v > (<)\bar{v}$ and $q > (<)\frac{1}{2}$.

Moreover, $\bar{v} > 1$, for $q < \frac{1}{2}$ and $\lambda > \frac{1}{2}$ and, thus, $v < \bar{v}$ and the audit quality is higher in the stand-alone audit firm. For $q > \frac{1}{2}$ and $\lambda < \frac{1}{2}$, $\bar{v} > 1$ as well and, thus, $v < \bar{v}$ and the audit quality is lower in the stand-alone audit firm. □

Proof of Proposition 4.4

Proof. Comparing the audit fee in the stand-alone audit firm with and without an external expert given in Equation 4.11 and 4.6 yields

$$\begin{aligned} & C_{S,E}(e^*_{S,E}, a^*_{S,E}) > C_S(e^*_S) \\ \implies & F > \tilde{F} = \frac{D(1-p)q(1-\lambda)\left(c + D(1-p)q(1-\lambda)(1-\omega)\right)\omega}{c}. \end{aligned} \tag{4.30}$$

□

Chapter 5

Rationalization of Financial Misreporting: Does Entitlement Matter?*

Abstract

To investigate the rationalization of financial misreporting, we examine the effects of an externally caused bad environment on misreporting and entitlement. We conduct a *2x2 between-subjects* experiment, manipulating the environmental state and the awareness of those environmental states. We predict and find that a bad environmental state causes a higher rate and a higher degree of misreporting. This effect occurs due to a greater sense of entitlement among participants in response to a bad environmental state. We also show that this effect vanishes if managers are unaware of other environmental states. As managers cannot blame the bad environmental state when they are not aware of better environmental states, the sense of entitlement is lower. As a result, a bad environmental state does not cause a higher rate and a higher degree of misreporting if managers are unaware of other states.

* This chapter is joint work with Alexandra Lilge (University of Hannover).

5.1 Introduction

"What drives financial crime?" — Since the early 1950s, this question has often been discussed in accounting research literature and other disciplines such as law, ethics, psychology, or criminology. Especially after the recent accounting scandal involving the German listed payment provider Wirecard the question of how financial fraud arises is still of fundamental significance and yet has not been adequately answered. A series of accounting scandals in the early 2000s already raised the public's attention on the auditing profession. As a result, the fraud triangle was embedded into auditing standards around the globe.[1] The fraud triangle systematizes fraud risk factors — examined by a great variety of studies — to detect and prevent financial statement fraud. These fraud risk factors are (1) *opportunity*, (2) *incentive*, and (3) *rationalization*.

The Association of Certified Fraud Examiners estimates the annual fraud costs at approximately 3,6 Billion USD, with an average loss per case of 1,5 Million USD (ACFE, 2020). This figure includes all subcategories of fraud, such as corruption, asset misappropriation, and financial statement fraud. Together with the recent accounting scandal, these numbers show that although the risk factors identified in the fraud triangle have already been studied, accounting research needs to offer a deeper understanding of the fraud risk factors. Accounting literature mainly analyzes two ((1)*opportunity* and (2) *incentive*) of the three fraud risk factors (Hogan et al., 2008; Murphy and Dacin, 2011; Trompeter et al., 2014). This paper aims to analyze the third fraud risk factor *rationalization* within an experimental setup. In more detail, we further analyze in which situations the feeling of entitlement is used as a rationalization of fraud. Feeling entitled means that one believes she or he deserves more, is entitled to more than others, or is entitled to a specific benefit (Campbell et al., 2004). The feeling of entitlement can arise either as an individual trait (Lerner, 1987) or as a situation-dependent result (O'Leary-Kelly et al., 2017). This paper aims to investigate in an experimental setup how external factors affect fraudulent behavior, such as misreporting, and whether fraudulent behavior can be explained by a greater sense of entitlement induced by these external factors.

We add to the existing literature by further exploring the fraud risk factor *rationalization* and the effect of entitlement. In an experimental setup, Nichol, 2019 finds that penalty contracts cause more misreporting than bonus contracts. The reason for this is a greater sense of entitlement. The feeling of entitlement, therefore, serves as a *rationalization* for fraudulent behavior. In a psychological experiment, Gravert, 2013 finds that individuals are more likely to steal if their payoff depends on effort rather than coincidence. If one's self-perceived effort and actually earned payoff deviate, one feels entitled to a higher payoff and, consequently, has a stronger predisposition to steal.

[1] To bring a better understanding of potential fraud risks into the auditing profession, the IAASB in 2009 and the PCAOB in 2005 included the fraud triangle into their standards of auditing (AS 2401 and ISA 240).

In a firm, several situations can occur where managers feel entitled to a specific bonus. It is important to explore these situations to analyze the third fraud risk factor *rationalization*. A better understanding of *rationalization* can, for example, help auditors when analyzing fraud risk within firms. For example, exogenous factors that a firm's manager cannot influence can lead to situations where the earned bonus deviates from the self-perceived effort. Managers are usually paid using performance-based compensations to align shareholders' and managers' incentives, thereby giving incentives to work. As the managerial effort is unobservable, financial performance serves as a surrogate. However, it does not perfectly reflect the actual effort. The firm's financial performance is influenced by various factors, including exogenous factors that cannot be influenced through managerial decisions. Some examples are changing competitors or consumer behavior and political or legal actions which change the firm's environment. These examples all influence the firm's environmental state. As the manager's effort is only one determinant of financial performance, these exogenous factors can also influence performance-based compensation. In more concrete terms, even if the manager works hard, the bonus can be poor due to a bad environmental state. Being aware that performance-based compensation is low due to exogenous factors, managers can feel entitled to a higher bonus which can result in managerial fraud.[2]

Using an experimental setup, we analyze the following research questions: Is misreporting greater in response to bad environmental states? Does a greater sense of entitlement drive this greater misreporting? Does the effect vanish if managers are unaware of different environmental states?

We use a *2x2 between-subjects* experiment to investigate the effect of environmental states (Good/Bad) and situational awareness (Aware/Unaware) on financial misreporting and the perceptions of entitlement to a higher bonus. To analyze the effect of environmental states, we manipulate participants' time to perform a real-effort task. Independent of the time, both groups have the same earnings target to receive a bonus payment. The bonus payment is based on the reported results, not the score. To analyze the effect of situational awareness, only one group of each environmental state knows that other participants have more or less time to perform the task. By manipulating situational awareness, we can explore the sense of entitlement that actually arises due to different external factors.

Our setting is based on the assumption that a firm's manager can influence the firm's performance to a certain degree by exerting effort. Despite the managerial effort, a firm is subject to a specific environmental state that also affects the firm's performance. There-

[2] This can occur even if the principal and the agent have the same information about the environmental state. Since the principal only observes the final output and the environmental state without observing the agent's effort, a low output can result from shirking or a bad environmental state. A rational principal would not condition the bonus payment on the environmental state since paying a bonus in case of a bad environmental state sets incentives to shirk.

fore, the firm's performance combines the environmental state and the manager's effort accomplished at year-end. Knowing her own effort level and the environmental state, the manager has private information about the firm's performance. The stakeholders have no information about the firm's performance. Therefore, the reported firm's outcome serves as a benchmark for the manager's bonus payment.

Our study has three main results. First, we find that a bad environmental state causes a higher likelihood and a higher degree of fraud. Second, this higher degree of fraud is caused by a greater sense of entitlement to receive a higher bonus. Third, the sense of entitlement vanishes if participants are unaware of different environmental states. These findings have important implications for both theory and practice.

From a theoretical perspective, our study contributes to the research on financial misreporting caused by a lower hurdle to rationalize fraudulent behavior (e.g., Gravert, 2013). From a practical perspective, the rationalization factor "may not be susceptible to observation by the auditor" (PCAOB AS 2401.A2). Therefore, our study informs auditors, board members, senior management, and enforcement bodies of situations in which financial misreporting might arise due to a lower hurdle to rationalize fraudulent behavior. This knowledge, for example, enables auditors to perform a more detailed fraud risk assessment and potentially increases the probability of detecting financial misreporting. A higher probability of detecting fraudulent acts reduces the factor *opportunity* within the fraud triangle. Our results suggest that auditors and board members should indeed be aware of managers' entitlement to reduce the probability of financial misreporting within the firm.

The paper proceeds as follows. In the next section, we discuss relevant academic literature and institutional auditing frameworks on fraud risk factors, emphasizing *rationalization* (Section 5.2). Next, in Section 5.3 and 5.4 we develop our hypotheses and describe our experimental methodology. Section 5.5 reports the results of the experiment. Section 5.6 provides a supplemental analysis of our results. The last section concludes by discussing limitations and opportunities for future research (Section 5.7).

5.2 Background

The fraud triangle is the keystone in auditors' fraud risk assessment both within the PCAOB- and the ISA-Framework. The fraud triangle follows from Cressey, D. R., 1953 "Other People's Money." According to the fraud triangle theory, three factors must be in place for individuals to commit fraud. These fraud risk factors outlined by the fraud triangle are (1) *opportunity*, (2) *incentive*, and (3) *rationalization*. Figure 5.1 illustrates the fraud triangle.

Regarding the first factor *incentive*, existing literature already suggests that the decision to commit fraud is closely associated with the manager's compensations and incentives structures, the timing of management stock sales, poor performance, or the need

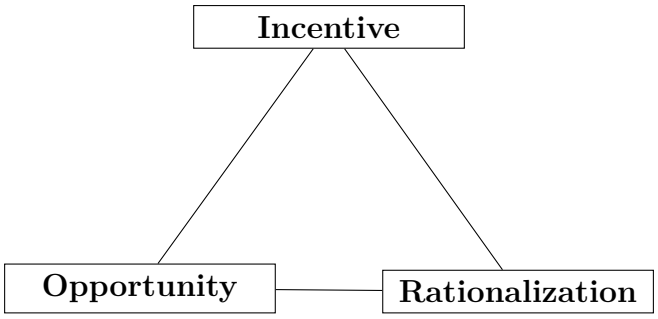

Figure 5.1: Fraud Triangle.

for external financing (Trompeter et al., 2014). Bruner et al., 2008 found evidence that an increasing level of equity compensation increases the level of effort and the amount of fraud. Controlling for the firm, governance, and CEO personality, Johnson et al., 2009 found that managers of fraud firms have significantly larger incentives from unrestricted stock holdings than control firms do. Efendi et al., 2007 also show that CEOs having a sizable amount of stock options increases the likelihood of a misstated financial statement. Using a sample of CEOs' stock option awards from 1992 to 2002, Lie, 2005 found that there are negative abnormal stock returns before award dates and positive afterward, suggesting that awards may have been backdated. This evidence for the involvement of a large number of firms in stock option backdating shows that compensation based on stock options provides strong incentives for fraud. The effect of performance-based compensation on financial misreporting has been examined by Burns and Kedia, 2006. They state that stock options transform CEO wealth to a convex function of the stock option price itself, which limits the detection risk of misreporting. Besides incentives from compensation, Koh et al., 2008 analyze the effect of potential pressure to meet analysts' estimates on earnings management and conclude that incentives may arise from managers' goal to beat or meet analyst forecasts. Moreover, research has already acknowledged that incentives to misstate earnings are not only driven by monetary motivations. Several findings also suggest that variables like stress (Langton and Piquero, 2007) or social status (Engdahl, 2009) can motivate fraud as well.

Both the ISA 240 and the PCAOB AS 2401.85 state several examples of incentives or pressure for auditors to consider within their fraud risk assessment. They can be categorized into four main categories. First, incentives or pressure might arise if the financial stability or profitability is threatened by economic, industry, or entity operating conditions. Second, within the firm, there might exist excessive pressure for management to meet the requirements or expectations of third parties. Third, there might be information available that indicates managers' or the board of directors' personal financial situation is threatened by the entity's financial performance. Fourth, there is excessive pressure on management or operating personnel to meet financial targets set up by the board of

directors or management, including sales or profitability incentive goals. These categories match the academic literature.

In addition to this first component (*incentive*), the fraud triangle concept also requires a perceived *opportunity* to be in place. *Opportunity*, thereby, is determined by the possibilities of collusion, management override, the control environment, activities, communication, and monitoring. Dechow et al., 1996 show that fraud firms are more likely to have less independent boards and are more likely to have a founding CEO. By analyzing the relationship between staggered boards and financial reporting fraud, Zhao and Chen, 2008 found that, on the one hand, staggered boards lower the likelihood of fraud to occur, and on the other hand, they reduce the magnitudes of unexpected accruals. Analyzing the relationship between audit committee stock options and accounting restatements, Archambeault et al., 2008 show a significant positive relationship between both factors. However, they only find these results for short-term stock options. The authors conclude that if the audit committee is not motivated to monitor managers' decision-making due to financial incentives, opportunities for other individuals to conduct fraud increases. Using experimental data, Magilke et al., 2009 support these results by showing that stock-based compensated audit committee members favor more aggressive reporting than committee members who are not compensated via stock options. In addition to this, Faber, 2005 indicates that fraud firms have a lower quality of corporate governance mechanisms. Using a sample of 87 fraud firms, he shows that fraud firms have less independent board members, fewer audit committee meetings, fewer finance experts on the audit committee, and, more often, a CEO who is also the chairman of the board of directors. Fraud firms are also less likely to be audited by a Big-4 audit firm. The effect of weaknesses in corporate governance has also been analyzed by Collins et al., 2009, who show a significant positive relationship between weaker governance structures and executive stock option backdating. Additionally, findings such as Smith et al., 2000 suggest that weaknesses in internal controls are also related to the propensity of a manager to commit fraud. Collectively, these results show, indeed, a relationship between opportunity and fraud.

In practice, the PCAOB AS 2110 states four categories of factors that potentially lead to fraud opportunities. For example, the nature of the industry or the entity's operations, such as unusually related party transactions, provide opportunities to engage in fraudulent financial reporting. According to AS 2401.85, opportunities might also arise from ineffective management monitoring, such as a single person's dominance. Other factors stated in AS 2110.85 are complex or unstable organizational structures and an inefficient or deficient internal control environment. As with the incentive/pressure factor, the AS.2110.85 also shows a close relationship between the framework categories and academic literature.

The third fraud risk factor of the triangle is *rationalization*. Rationalization thereby describes the fact that the decision-maker who commits fraud needs to justify his malign behavior as proper behavior. Literature overviews show that this factor has received the

least amount of attention from accounting researchers (e.g., Hogan et al., 2008 and Murphy and Dacin, 2011). However, non-accounting literature already examines the rationalization of fraud and crime in various settings. The cognitive dissonance theory states that individuals will rationalize deviant behavior to improve their self-concept (Festinger, 1957). In a paper review, Fritsche, 2005 finds that deviant activities can be predicted by examining the extent to which a decision-maker can rationalize his, for example, fraudulent behavior. He calls for additional research to examine under which conditions rationalization will occur.

The sense of entitlement can serve as such a rationalization for fraud. Campbell et al., 2004 define psychological entitlement as a stable and pervasive sense that one deserves more and is therefore entitled to more than others. Moreover, benefit-specific entitlement is the sense that an individual deserves/is entitled to a specific benefit. In four studies Campbell et al., 2004 present and test a Psychological Entitlement Scale to measure psychological entitlement. They also show that a high psychological entitlement is positively associated with immoral behavior. In addition, a high psychological entitlement is positively associated with a higher perceived self-deserved compensation if a firm faces budget cuts.

Nichol, 2019 finds that penalty contracts cause more misreporting due to a greater sense of entitlement relative to bonus contracts. The results in Nichol, 2019 indicate that a penalty contract can increase effort. However, it also increases misreporting. Individuals with a penalty contract more often feel entitled to the whole payment. Consequently, entitlement can serve as a way to rationalize fraudulent behavior. Different studies about lying also confirm this. Gravert, 2013 finds that if payoff depends on effort rather than coincidence, individuals, on average, steal more. He concludes that individuals who exert effort feel like they deserve the payoff. This is because one's self-perceived effort and the earned payoff might not match. Consequently, the individual steals, i.e., commits fraud. To further analyze the sense of entitlement and its effect on financial fraud, we want to consider a manager who has incentives and the opportunity to commit fraud in a setting where she might feel more entitled to a higher bonus payment due to exogenous factors compared to a setting where she feels less entitled to a higher bonus payment. That is, her self-perceived effort does not match her earned payoff due to exogenous factors.

As in academic literature, practice also shows how hard it is to grasp the rationalization factor because the factor "may not be susceptible to observation by the auditor" (PCAOB AS 2401.A2). However, the AS 2401.A2 lists circumstances that might promote rationalization, such as ineffective communication, implementation, support, or enforcement of the entity's values or ethical standards or a known history of violations of securities laws or other laws and regulations. Besides that, the auditor can detect rationalization by observing a strained relationship between the client and the auditor. Nevertheless, it is difficult to observe the existence and the degree of rationalization. Therefore, we will

analyze the effect of exogenous factors on managers' rationalization of fraud. This paper offers initial insights for auditors to include certain factors in their assessment of fraud risk factors.

5.3 Hypotheses Development

A great share of public companies uses performance-based compensation for at least their upper management. Firms use bonus schemes based on the firm's financial performance to align agents' incentives with investors' interests. However, the firm's financial performance is influenced by a great variety of different factors. Some of those can be influenced by the firm's management. For example, the management might expand sales and profits by investing in the right marketing channel. In addition to these manageable factors, there are also exogenous factors affecting the firm's performance, the industry, or even the whole economy. For example, sales might be influenced by changes in competitors' behavior, consumer behavior, and political or legal actions. Thus, management effort is only one determinant of the firm's financial performance. Therefore, the manager's bonus can be poor, although the manager worked hard. Studies already show that misreporting is greater in case of a poor financial performance of the firm, whenever the manager cannot meet earnings forecasts, or wants to avoid losses (Burgstahler et al., 2006; Garcia Lara et al., 2009; Rosner, 2003).

Theoretical literature shows that managers substitute effort with manipulation. Goldman and Slezak, 2006 show in a theoretical model that stock-based compensation, i.e., performance-based compensation, acts as a double-edged sword. On the one hand, performance-based compensation induces managers to exert effort, increasing the firm value. On the other hand, given that managers can manipulate their performance, performance-based compensation also induces managers to manipulate. Costly manipulation then decreases the firm value by wasting the firm's resources. This economic prediction that performance-based compensation increases manipulation is supported by various empirical literature (Bergstresser and Philippon, 2006; Burns and Kedia, 2006; Cheng and Warfield, 2005; Efendi et al., 2007; Harris and Bromiley, 2007; Johnson et al., 2009; Zhang et al., 2008). In an experiment, Bruner et al., 2008 show that the use of equity-based compensation also has the unintended consequence of manipulation.

Moreover, empirical studies suggest that corporate fraud, i.e., manipulation, is high if firm performance declines (Harris and Bromiley, 2007; Johnson et al., 2009; Rosner, 2003). As previously discussed, poor financial performance depends on various reasons. Following economic theory, the strength of the substitution of effort and manipulation depends on the effort cost, manipulation cost, and productivity. A poor economic condition can be interpreted as low productivity. In a poor economic condition, a manager's outcome will ultimately be lower for the same effort level, i.e., the effort is less productive. The lower the effort's productivity, the higher the incentive to manipulate performance in-

stead. Nevertheless, as the manager makes the manipulation decision after observing that he failed (due to low effort or a poor economic condition), the effort itself or the economic condition do not influence a manager's manipulation decision following economic theory. Thus, the manager chooses a manipulation level independent of productivity. However, the lower the manager's productivity, the higher the probability that the manager will misreport. Thus, managers in poor economic conditions will manipulate more often than managers in good economic conditions. We, therefore, predict:

H1: Misreporting will be greater in response to a bad environmental state.

However, misreporting is not only driven by financial incentives. Whenever exogenous factors drive this poor performance, managers might rationalize fraudulent behavior by feeling entitled to a higher bonus, i.e., a bonus that matches their self-perceived effort (Gravert, 2013).

Economic theory predicts that managers manipulate more often whenever a firm's performance is poor. However, economic theory would also predict that a manager's manipulation is not affected by other firms' conditions. The economic theory usually assumes monetary incentives define managers' utilities. Knowing that other firms are in a better economic condition does not change a manager's utility and, therefore a manager's manipulation decision. However, we predict that misreporting will be greater in response to a bad environmental state if the manager is aware of the bad environmental state and feels entitled to a higher bonus. The intuition behind this is as follows: The manager is aware that compared to other firms, he or she is in a bad environment which makes achieving a profit more difficult. Observing other firms benefiting from a better environment makes the manager feel entitled to a higher bonus. By misreporting, the manager can receive a bonus that matches her self-perceived effort. Kajackaite, 2018 finds in an experiment that the moral cost of lying about luck is less costly than lying about performance. Receiving a lower bonus due to a poor economic environment can be attributed to luck (or misfortune) more than effort; therefore, rationalization for misreporting is easier. Fraudulent behavior can be better rationalized if a manager feels entitled to the result of the misreporting, i.e., a higher bonus. In this context, Nichol, 2019 finds that penalty contracts cause a greater sense of entitlement and, thereby, misreporting. Relative to bonus contracts, penalty contracts induce entitlement because a penalty feels like losing already earned money. We, therefore, predict that managers who feel entitled in response to a bad environmental state will misreport more often. Thus, entitlement serves as a mediator. Figure 5.2 illustrates the mediating effect of entitlement. We predict the following:

H2: Greater misreporting from a bad environmental state will be accompanied by a greater sense of entitlement.

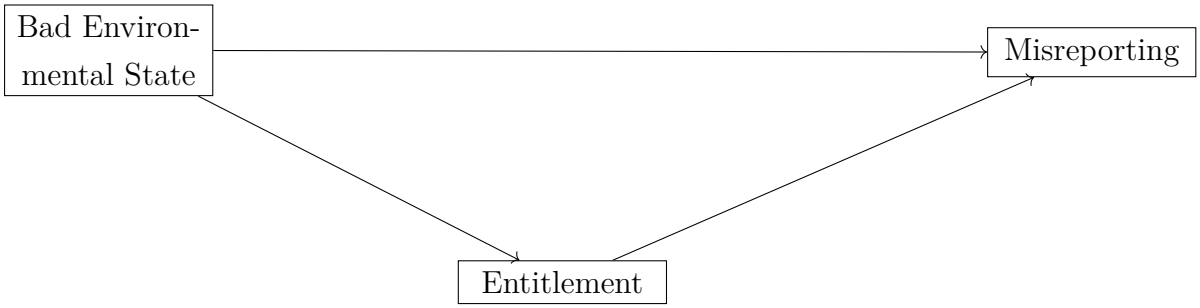

Figure 5.2: Mediating Effect of Entitlement.

As entitlement describes the psychological perception of the right to receive a certain benefit, this psychological perception has to be triggered, for example, by outside factors. We assume that observing other managers in a better economic condition can trigger this psychological perception of entitlement. Thus, we predict the following:

H3: The environmental state only affects entitlement and therefore misreporting if managers are aware of different conditions.

5.4 Method

As described in the prior section management decisions (e.g., regarding effort) are only one determinant of the firm's financial performance. We assume that a firm is subject to a specific environmental state. Within this state, the manager can influence the firm's performance by choosing effort. At the end of the year, the firm's performance results from a) the environmental state and b) the manager's effort. Knowing the outcome of these combined factors at year-end, the manager has to report the firm's financial performance to the stakeholders. The reported result is also the benchmark for the manager's year-end bonus. This setup will be the base for our experimental analysis.

We use a *2x2 between-subjects* experiment to analyze the effects of exogenous environmental states (Good/Bad) and environmental state awareness (Aware/Unaware) on financial misreporting driven by entitlement. 13 sessions of the experiment were run at the computer lab of the Leibniz University Hanover in 2020 and 2021 using otree Software (Chen et al., 2016). Within the sessions, the number of participants varied from 7 to 16 with an average of 10 participants.[3] The participants were randomly assigned to one of the four treatment groups. The whole process was administered via computer to minimize

[3] The number of participants varied in each session due to the changing COVID-19 restrictions.

the interaction between the participants and the experimenter. Within the lab, each computer was separated by a divider for privacy. In addition, all places were equipped with pens and paper. On average, the experiment took about 30 minutes.

126 undergraduate and graduate students from Leibniz University Hanover were recruited. Each student participated in only one session. 47.62% of the participants are female, and one participant (0.79%) identifies as non-binary. The average age is 24.82. After the experiment, the participants completed a post-experimental questionnaire and received their cash payments. The average payment is 9.05 Euro with a minimum of 2 Euro and a maximum of 12 Euro. At the start of every session, participants receive general information about the experiment and their tasks. Participants complete a short practice task. Receiving information about the official round, participants learn about their environmental states (Good/Bad) and the real effort task. Moreover, one part of the group will learn that they are randomly subjected to an environmental state and that both a good and a bad state exist. The other group only knows its own environmental state. This manipulation reflects whether a manager is aware/unaware of the other firms' conditions. Afterward, all participants were required to complete a pre-experiment quiz. They could only proceed with the experiment if they answered all questions correctly. After the experiment, all participants completed a post-experiment questionnaire. Figure 5.3 summarizes the timeline of the experiment.

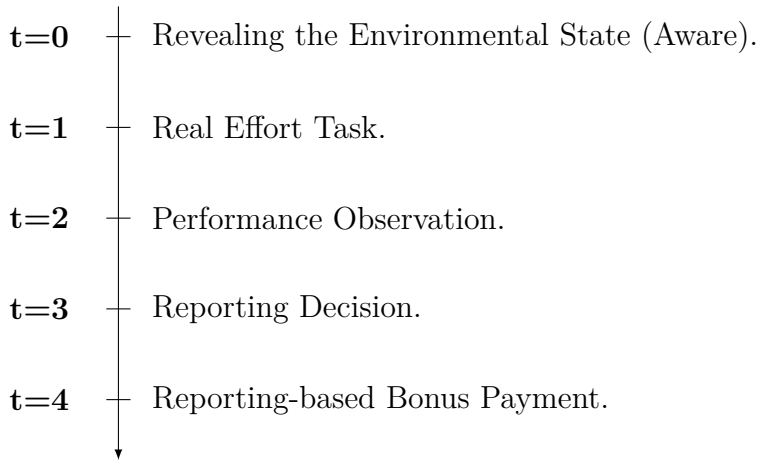

Figure 5.3: Timeline of the Experiment.

Experimental Task During the mentioned effort task, participants had to count how often the digit 1 occurs in a binary code. Every participant receives a fixed participation fee and can get a bonus. In order to get a bonus, the participant has to count at least 35 out of 50 lines of binary code correctly. The participant receives a higher bonus for every correct line above this threshold. In the good condition, the participants have seven and

a half minutes to complete the task. In the bad condition, the participants must count the same number of lines in four minutes. The participants know how much time they have, i.e., the environmental state. However, only in the "Aware" condition, participants receive the information that there is one group with a state "Good" and one group with a "Bad" state, i.e., information on whether other participants have more or less time. After counting the lines, the participants see their results, i.e., how many lines are counted correctly.[4] The participants have to report their results. The final payment will be based on the reported result. The participants know they can lie about their correct result without fearing consequences. Fischerbacher and Föllmi-Heusi, 2013 show in an experiment that even if individuals have incentives to be dishonest and have to fear no consequences from lying in form of a penalty, they still do not always report the payoff-maximizing result. Moreover, they find that 39% are fully honest, and the rest are only partial liars. Economists often assume that a person would always lie if the benefits outweigh the penalty. Gravert, 2013 also finds that only 44% of the participants decide to take (a part of) the undeserved payoff. Both studies suggest that there are moral costs of lying. Analyzing the optimal manipulation, economists often assume some costs of manipulation in the form of reputation damages or monetary consequences. However, including the moral costs of lying, individuals will never choose full manipulation (given the cost of lying is not too small). Consequently, to analyze the effect of an environmental state on entitlement and misreporting, we do not need to include a penalty for misreporting. Due to the moral costs of lying, we assume that not all participants choose the highest amount of fraud, i.e., report 50 correct lines.

Compensation Every participant received a participation fee of 2 EUR. During the experiment, the participants did not receive any further fixed wages. Additional payments are only based on the reported performance. Within the experiment, we use "EUC" as a game currency. The real-world currency exchange rate is 50 EUC = 1 EUR. The participant's effort is increasing the firm's outcome by 100 EUC for every binary line reported as counted correctly. The highest possible outcome is 5.000 EUC or 50 lines reported as counted correctly. The firm's outcome serves as a benchmark for the manager's bonus. The manager receives 10% of the firm's outcome as a bonus if she beats the earnings target of 3.500 EUC. If she does not beat the target, she will not receive any bonus at all. We set the time for the bad and good state to ensure that the bad group will (on average) not beat the earnings target and the good state group will.

Manipulation The first factor we manipulated is the *Environmental State*, which can either be good or bad. Within the good environmental state, participants have 7.5 minutes to count 50 lines of binary code and only 4 minutes in the bad state. Participants

[4] The participants only see the total amount of correct lines. They do not see which lines are correct.

were randomly assigned to an environmental state by the computer. The other factor we manipulated is *Awareness* of other *Environmental States*. We manipulated awareness by presenting the following text:[5]

Aware: "You are in the good (bad) environmental state. Therefore, you will have 7 Minutes and 30 Seconds (4 Minutes) to count 50 lines of binary code. Being in a good (bad) environmental state makes it easier (harder) for you to reach the earnings target. Other managers are in the bad (good) environmental state and have less (more) time."

Unaware: "You have 7 Minutes and 30 Seconds (4 Minutes) time to count 50 lines of Binary Code."

Measures Our primary dependent variable to test H1 and H2 is *Misreporting*. We measured the variable in likelihood and degree of misreporting. We adopted both measures from Nichol, 2019 — *Misreporting Likelihood* and *Dishonesty*. The measure *Misreporting Likelihood* is binary coded. If the reported performance differs from the actual performance, the variable is 1 and 0 otherwise. The other variable used to measure the degree of misreporting is *Dishonesty*. It reports the percentage of the maximum possible amount of misreporting used by the participant. We calculated this measure as (Reported Score - Actual Score)/(5.000 - Actual Score). Using *Dishonesty*, we capture the fact that our report is restricted to 5.000 EUC. For example, a participant in the good condition scoring 4.000 EUC is more restricted in their misreporting decision relative to a participant in bad condition scoring only 2.000 EUC.

The second dependent variable we used to test H2 is *Entitlement*. We also adapted this measure from Nichol, 2019, who modified her questions from the Psychological Entitlement Scale (PES) by Campbell et al., 2004 to create a better fit within her accounting setup. Campbell et al., 2004 show that entitlement is driven by the sense of deserving and being entitled to more. They also provide evidence for the reliability of this concept from nine different studies. We modified this measure to fit it into our experimental setup. Within the analysis *Entitlement* is the mean of the following two questions. Participants answered those on a five-point Likert scale, with "1" being labeled "strongly disagree" and "5" as "strongly agree."

1. "I feel entitled to receive a higher bonus than the one based on my actual score."
2. "I feel entitled to receive a bonus based on untruthful reporting."

5.5 Results

Preliminary Analysis In total, 126 students participated in the experiment. We had 118 usable observations after eliminating those who reported less than what they had

[5] The experiment language was German. All experimental descriptions and questions are translated.

scored and those whose actual score was high enough to receive the highest bonus without misreporting.[6] Through our post-experimental questionnaire, we gathered data showing that, on average, students participated seriously and were motivated to perform at a high level of effort.[7] The level of *Effort* is similar in all groups with the average effort level of 4.55 in the Aware/Bad Condition, 4.48 in the Aware/Good Condition, 4.46 in the Unaware/Bad Condition, and 4.12 in the Unaware/Good Condition.[8] Moreover, the actual score of the participants is positively correlated with *Effort* (p-value of 0.0166*, not tabulated).[9] On average, all students in all groups agreed with the statement that it is morally wrong to submit an overstated report. We checked the misreporting opportunity awareness of the participants by asking pre-experimental questions about the environmental group and the experimental setup. Only students who answered the pre-experimental questions correctly were able to proceed. Therefore, we have ensured that all participants were aware of the possibility of misreporting and that misreporting does not have any negative consequences.

The distribution of gender (male, female, non-binary) is even across all conditions. The highest percentage of female participants can be found in the Aware/Good condition with 56.00%. The lowest percentage can be found in the Unaware/Good condition with 41.18%. To ensure that there are no significant differences in gender between the conditions, we conducted a chi-square test. The test shows that the proportion of female participants does not vary significantly between conditions (χ^2=3.79, df=6, p=0.7).

Participants' performance is measured by *Actual Score, Reported Score* and *Bonus*, with *Bonus* resulting from the *Reported Score*. *Actual Score* gives the participants' actual score and *Reported score* the participants' reported score. *Bonus* is coded as a 1 if the participants' actual score is above 3500 and therefore qualified for a bonus and 0 otherwise. In total, 37 participants qualified for a bonus payment based on the actual score (31,36%). All participants that qualified for a bonus payment based on their actual score were in a good environmental state. In total, 62.71% in the good environmental state qualified for a bonus, and no participants in the bad environmental state. The minimum value of *Actual Score* is 0, and the maximum is 4900 with a mean of 2911 (SD = 1100). The *Reported Score* varies from a minimum of 1400 to a maximum of 5000 with a mean of 4092 (SD=981).

[6] The four participants who achieved the highest possible score (target score) were all in the *Good Environmental State* condition.

[7] *Effort* is measured with the post experimental question: "I tried my best in this experiment." The participants were asked after finishing the experiment if they agree with the statement on a five-point Likert scale, with "1" being labeled "strongly disagree" and "5" as "strongly agree."

[8] The mean response and the standard deviation can also be found in Table 5.7

[9] To further analyze the participants' effort level, we run two linear regressions with *Effort* as the dependent variable and the manipulations *Awareness* and *Environmental State*. The linear regression shows that both manipulations — *Awareness* and *Environmental State* — do not lead to significantly greater or lower *Effort* (p-values of 0.16 and 0.15, not tabulated). This result further supports that the participants in all four conditions exerted the same level of effort and, thereby, implies that we can neglect potential effects from different effort levels on entitlement and misreporting.

Table 5.1 gives the descriptive statistics of performance. Tables 5.2 and 5.3 give the misreporting scores. Similar to Nichol, 2019 we use two different measures for misreporting: *Misreporting Likelihood* and *Dishonesty*. Measuring whether participants overstated their score or not, *Misreporting Likelihood* is a binary variable which is 1 if they misreported and 0 otherwise (Table 5.2). The mean of *Misreporting Likelihood* is 0.64 (SD=0.48). The lowest mean is found in the Aware/Good condition (Mean=0.4, SD=0.49), and the highest in the Aware/Bad condition (Mean=0.81, SD=0.4). The conditions Unaware/Good (Mean=0.64, SD=0.48) and Unaware/Bad (Mean=0.65, SD=0.48) show almost the same means. The second misreporting measure *Dishonesty* captures the degree to which participants overstated their actual score (Table 5.3). It is calculated as (*Reported Score-Actual Score*)/(5000-*Actual Score*) and gives the percentage of an overstatement based on the actual available possibility for misreporting. The mean of *Dishonesty* is 0.48. The highest mean can be found in the Unaware/Bad condition (Mean=0.60, SD=0.46) and the lowest in the Aware/Good condition (Mean=0.29, SD=0.41). These descriptive statistics show significant variations across the conditions regarding the mean value of both misreporting measures.

Hypothesis 1: H1 predicts that misreporting will be greater in response to a bad environmental state. To test H1, we run an ANOVA with two manipulations: *Awareness* and *Environmental State* and two dependent variables: *Misreporting Likelihood* and *Dishonesty*. We tested for both variables separately. Tables 5.2 and 5.3 give the results. Both tables show the main effect of *Environmental State* in the predicted direction. The effect is significant in the predicted direction with a p-value of < 0.04 for the dependent variable *Misreporting Likelihood* and with a p-value of < 0.03 for the dependent variable *Dishonesty*. In addition, simple effects testing (not tabulated) also shows that a bad *Environmental State* leads to significantly greater *Misreporting Likelihood* with a p-value of 0.00163** (t= 3.227 and df= 114) and to significantly greater *Dishonesty* with a p-value of 0.037* (t=2.110 and df= 114)[10]. We, therefore, conclude that the manipulation bad *Environmental State* indeed leads to a greater level of misreporting. H1 is therefore supported.

Hypothesis 2: H2 predicts that greater misreporting from a bad environmental state will be accompanied by greater entitlement. We explained the theoretical connection between entitlement and misreporting in section 5.2 and 5.3. Following Nichol, 2019, we use the mean of the following two answers in the post-experimental questionnaire to measure the perception of entitlement:

[10] Within the paper, we denote significance at the 1%, 5%, and 10% levels with ***, **, and *.

1. "I feel entitled to receive a higher bonus than the one based on my actual score."
2. "I feel entitled to receive a bonus based on untruthful reporting."

Table 5.4 shows how participants in the different conditions, on average, responded to these statements. The highest mean of the first statement can be found in the Aware/Bad Condition with 3.68. The lowest in the Aware/Good condition with 2.72. For the second statement, the highest mean of 2.96 can be found in the Unaware/Bad Condition, and the lowest again in the Aware/Good Group with 1.68. For *Entitlement* (average of both measures), the Aware/Bad and Unaware/Bad give the same mean with 3.23. The lowest mean can be found in the Aware/Good condition with 2.20. For testing the mediating effect of entitlement, like (Nichol, 2019) we use the approach suggested by Baron and Kenny, 1986. Therefore, we test the following four conditions: (1) misreporting is significantly greater in response to a bad environmental state (H1), (2) entitlement is also significantly greater in response to a bad environmental state, (3) misreporting significantly increases from entitlement when controlling for the manipulated variables, and (4) the effect of a bad environmental state will vanish completely or partially, in case of full or partial mediation (Nichol, 2019, MacKinnon et al., 2002 and Baron and Kenny, 1986). The first condition is already tested within in first hypothesis (see paragraph hypothesis 1 and tables 5.2 and 5.3). To test the second condition, we run a full factorial model with both manipulations (*Awareness* and *Environmental State*) as fixed factors and *Entitlement* as the dependent variable. We found a highly significant main effect of *Environmental State* in the predicted direction ($p < 0.001$). This proves the second condition. Testing the third and fourth conditions, we added *Entitlement* as a covariate to a full factorial model with our two misreporting measures as dependent variables. We tested the dependent variable *Misreporting Likelihood* and *Dishonesty* in separate models. Table 5.5 gives the results, showing that *Entitlement* indeed increases misreporting when controlling for *Awareness* and *Environmental State*. The effect is significant with a p-value < 0.001 for both *Misreporting Likelihood* and *Dishonesty*. Therefore, the third condition holds as well. When adding *Entitlement* to the model, the effects of *Awareness* and *Environmental State* are insignificant for both *Misreporting Likelihood* and *Dishonesty*, which sets strong support for condition 4. Following, all conditions are fulfilled, and these results support *Entitlement* as a mediator for *Environmental State* on misreporting. H2 is therefore supported.

Hypothesis 3: H3 predicts that the environmental state influences entitlement and misreporting only when managers are aware of the different conditions. That implies that a significant difference in means between groups can only be found for the Aware/Good and Aware/Bad groups. Thus, both — entitlement and misreporting — would not be significantly different in all other groups. To test this hypothesis, we conduct a Tukey

post-hoc test for *Misreporting Likelihood*, *Dishonesty*, and *Entitlement* (see Table 5.6),[11] which reveals a significant difference (p-value < 0.05) between the *Misreporting Likelihood* of the groups Aware/Good and Aware/Bad (-0.41, 95%, CI [-0.73,-0.08]). The difference between all other groups is not significant. Figure 5.4 depicts the results of the Tukey post-hoc test for *Misreporting Likelihood* and shows that the difference between the conditions Aware/Good and Aware/Bad (1) is the greatest (significant) difference. Comparing the unaware conditions (Unaware/Good and Unaware/Bad (6)) does not show a significant difference.

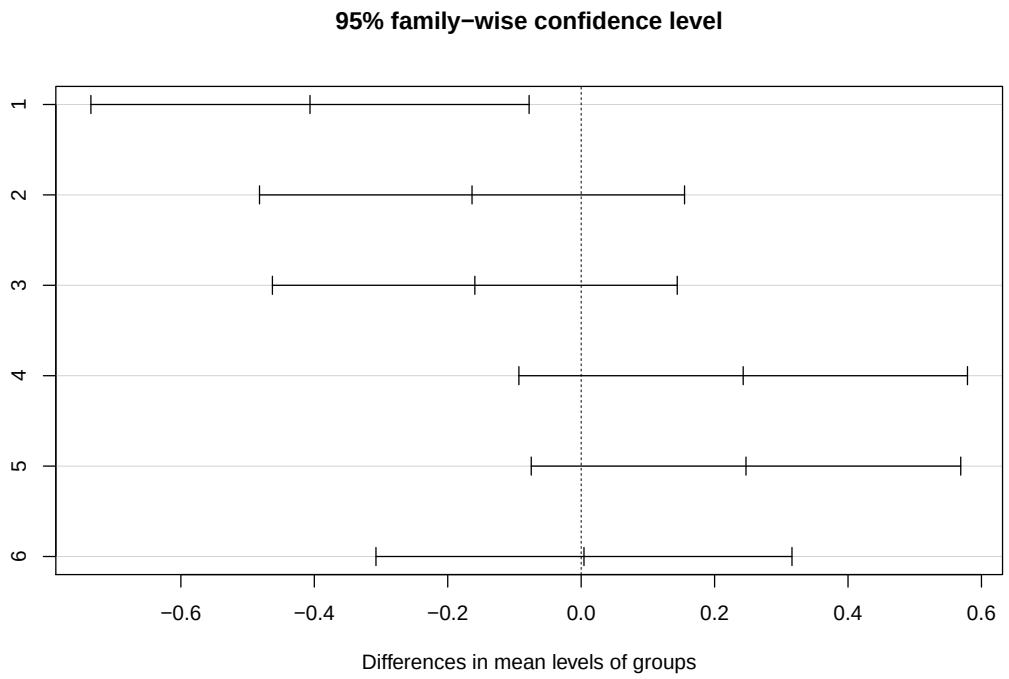

Figure 5.4: Differences in *Misreporting Likelihood* between 1) Aware/Good and Aware/Bad, 2) Unaware/Bad and Aware/Bad, 3) Unaware/Good and Aware/Bad, 4) Unaware/Bad and Aware/Good, 5) Unaware/Good and Aware/Good, 6) Unaware/Good and Unaware/ Bad.

Moreover, the difference in means between the *Entitlement* of the groups Aware/Good and Aware/Bad is significant (p-value < 0.05), (-1.03, 95%, CI[-1.74,-0.31]) and the difference of the groups Unaware/Bad and Aware/Good (p-value < 0.05), (1.03, 95%, CI[0.30,1.76]). In contrast, all other differences are not significant. Figure 5.5 depicts the results of the Tukey post-hoc test for *Entitlement* and shows that the difference between the conditions Aware/Good and Bad (Aware and Unaware) (1 and 4) is the greatest (significant) difference. Comparing the unaware conditions (Unaware/Good and Unaware/Bad (6)) does not show a significant difference. This result implies that participants in the bad condition felt significantly more entitled than participants in the Aware/Good condition.

[11] Homogeneity of variances was asserted using Levene's Test which showed that equal variances could be assumed (p = 0.35 *Misreporting Likelihood*, p =0.52 *Dishonesty*, p=0.54 *Entitlement*).

Moreover, for the Aware/Bad condition, this significant greater sense of entitlement led to a higher misreporting likelihood (see Figure 5.4).

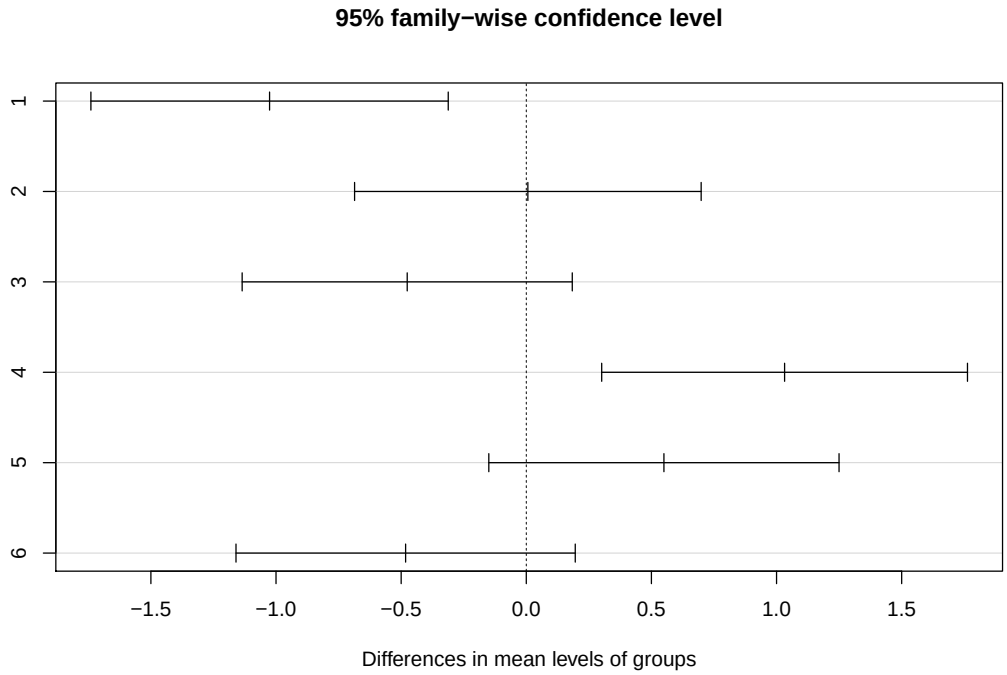

Figure 5.5: Differences in *Entitlement* between 1) Aware/Good and Aware/Bad, 2) Unaware/Bad and Aware/Bad, 3) Unaware/Good and Aware/Bad, 4) Unaware/Bad and Aware/Good, 5) Unaware/Good and Aware/Good, 6) Unaware/Good and Unaware/ Bad.

The results of the Tukey post-hoc test show that only if at least one group is aware of the other condition significantly different levels of entitlement and misreporting result. This supports H3.

5.6 Supplemental Analysis

Besides the experimental design, the sense of entitlement may be influenced by socio-demographic factors (e.g., gender, age, etc.). As a robustness to show that the sense of entitlement is only influenced by the experimental design (awareness of the environmental state), we run a linear regression with *Entitlement* as the dependent variable and the manipulations *Age*, *Gender*, *Income*, and *Economics*. The variable *Economics* is a binary variable, being 1 if the participants are economics students and 0 otherwise. Since economics students may be more familiar with behavioral economics, these students may be less prone to these behaviors and instead behave fully rationally. Adding *Economics* as a manipulation, we show that economics students do not behave significantly different than other students. Table 5.8 gives the results and shows that none of the socio-demographic factors has significant influence on the sense of entitlement.

Moreover, Panel B and C of Table 5.8 give the results for two linear regressions with *Misreporting Likelihood* and *Dishonesty* as a dependent variable and the manipulations *Entitlement*, *Age*, *Gender*, *Income*, and *Economics*. The results show that only the sense of entitlement has significant influence on the misreporting decision.

To further analyze the rationalization of misreporting, we also analyze if the perception of *Fairness* could also be a mediator between *Environmental State* and *Misreporting* and how *Entitlement* and the perception of *Fairness* interact. Therefore, we measure *Fairness* by calculating the mean of the following two answers in the post-experimental questionnaire:

1. "I was treated fairly in this experiment."
2. "The target score was fair."

Table 5.9 shows how participants in the different conditions, on average, responded to these two statements. The highest mean of the first and second statements can be found in the Aware/Good Condition, with 4.24 for the first and 3.52 for the second statement. The lowest mean response for the first statement is 2.94 within the Aware/Bad condition, and for the second statement, 1.79 within the Aware/Bad condition. For *Fairness* (Average of both measures), the Aware/Good gives the highest mean with 3.88 compared to 2.53 within the Aware/Bad condition. The difference in means within the Aware condition is 1.35 compared to 1.01 for the Unware condition.

To formally test the potential mediating effect of entitlement, we used the same steps as for testing H2. First, we run a full factorial model with the two manipulations as fixed factors and *Fairness* instead of *Entitlement* as the dependent variable. Panel A of Table 5.10 gives the result and shows a main effect of *Environmental State* on *Fairness* in the predicted direction, with a p-value of $<0.01^{***}$. Second, we run a full factorial model with *Fairness* as a covariant and the two manipulations as fixed factors. Again we test *Misreporting Likelihood* and *Dishonesty* as dependent variables separately. Recalling the results from Table 5.2 and 5.3, the models in Panel B and C of Table 5.10 show that *Environmental State* is not significant if *Fairness* is added to the models, which provides support for the argument that *Fairness* might also mediate the effect of *Environmental State* on misreporting. Following this result, we run a linear regression with *Fairness* as a dependent variable and *Entitlement* as an independent variable, which reveals a negative correlation (-0.37) with a p-value of $<0.01^{***}$. These results indicate the close relationship between the sense of *Entitlement* and the perception of *Fairness*. The higher the sense of entitlement, the lower the perceived fairness.

5.7 Concluding Remarks

Adding to the research on the *Fraud-Triangle* by Cressey, D. R., 1953 with (1) *opportunity*, (2) *incentive*, and (3) *rationalization* as fraud risk factors, the results of this study show that entitlement caused by a bad external environment can indeed rationalize fraudulent behavior. We found that the degree and frequency of misreporting are higher in response to a bad environmental state. Second, we show that entitlement is higher in response to a bad environmental state and works as a mediator between a bad environmental state and misreporting. Third, we show that these effects vanish if managers are unaware of the different environmental states, showing that awareness of different environmental states can trigger a sense of entitlement. We, therefore, suggest that both internal and external auditors should consider a potential effect of entitlement when conducting the fraud risk assessment in advance of the audit. Our results are also relevant to raise shareholders' and board members' awareness of potential circumstances that can increase the likelihood of entitlement and misreporting. Thus, management oversight could be increased in case of negative outside circumstances.

One important limitation of our experiment is that participants were not exposed to a risk of a penalty. However, in reality, financial statements are audited by statuary auditors, and internal reports are audited by internal audits, which may lead to a penalty for the manager if misreporting is detected. This potential penalty may cause not only a different response in the degree of misreporting but also a different response in frequency. The effect of entitlement may not be strong enough to overcome potential penalties. Thus, further research may take potential audits and penalties into account. In addition, we suggest that further research should also examine other factors that may create a sense of entitlement by considering different personality traits. As the degree of entitlement can differ between people based on personality traits, participants may respond differently to a bad environmental state in both misreporting frequency and degree.

5.8 Appendix

Table 5.1: Descriptive Statistics of Performance.

Panel A: Mean (Standard Deviation) Actual Score		
	Good Environmental State	*Bad Environmental State*
Aware	3884 (914.63) n=25	2348.39 (367.97) n=31
Unaware	3458.82 (1102.17) n=34	2000 (629.63) n=28
Panel B: Mean (Standard Deviation) Reported Score		
	Good Environmental State	*Bad Environmental State*
Aware	4308 (719.4) n=25	3780.65 (975.31) n=31
Unaware	4411.76 (581.97) n=34	3853.57 (1342.83) n=28

Actual Score is the score earned during the experiment without any misreporting.
Reported Score is the score reported by the participant after the task, including misreporting.
Awareness was manipulated by splitting the participants in two groups. One was told that there is another group being in a good/bad condition. The other were not aware that there are different groups/conditions.
Environmental State was manipulated by splitting the participants in two groups. One with 7.5 minutes time and the other with only 4 minutes time.

Table 5.2: The Effect of Awareness and Environmental State on Misreporting Likelihood.

Panel A: Frequency of Misreporting Likelihood

	Good Environmental State	*Bad Environmental State*
Aware	10 (40.00%) n=25	25 (80.65%) n=31
Unaware	22 (64.71%) n=34	18 (64.29%) n=28

Panel B: Analysis of Variance

Factor	*Df*	*Sum of Squares*	*F*	*p-value*
Awareness	1	0.012	0.054	0.8159
Environmental State	1	1.059	4.823	0.0301*
Awareness x Environmental State	1	1.227	5.590	0.0198*
Error	114			

Misreporting Likelihood is a binary variable which is 1 if the participant misreported and 0 otherwise.

Table 5.3: The Effect of Awareness and Environmental State on Dishonesty.

Panel A: Mean (SD) of Dishonesty

	Good Environmental State	*Bad Environmental State*
Aware	0.2890 (0.4133) n=25	0.5293 (0.3702) n=31
Unaware	0.4804 (0.4186) n=34	0.5972 (0.4621) n=28

Panel B: Analysis of Variance

Factor	*Df*	*Sum of Squares*	*F*	*p-value*
Awareness	1	0.363	2.026	0.1574
Environmental State	1	0.897	5.001	0.0273*
Awareness x Environmental State	1	0.111	0.619	0.4332
Error	114			

Dishonesty is calculated as (*Reported Score*-*Actual Score*)/(5000-*Actual Score*).

Table 5.4: Descriptive Statistics of Entitlement.

1. I deserve to receive a higher bonus than the one based on my actual score.		
	Good Environmental State	*Bad Environmental State*
Aware	2.72 (1.25) n=25	3.68 (1.47) n=31
Unaware	3.06 (1.11) n=34	3.5 (1.48) n=28

2. I feel entitled to receive a bonus based on untruthful reporting.		
	Good Environmental State	*Bad Environmental State*
Aware	1.68 (1.12) n=25	2.77 (1.41) n=31
Unaware	2.44 (1.29) n=34	2.96 (1.45) n=28

3. Entitlement (Mean of the Above)		
	Good Environmental State	*Bad Environmental State*
Aware	2.2 (0.86) n=25	3.23 (1.19) n=31
Unaware	2.75 (0.96) n=34	3.23 (0.94) n=28

Entitlement is the mean of the response to statement one and two. Participants answered those on a five-point Likert scale with "1" being labeled strongly "disagree" and "5" as "strongly agree."

Table 5.5: The Mediating Effect of Entitlement on Misreporting.

Panel A: Analysis of Variance with Entitlement as a Dependent Variable				
Factor	*Df*	*Sum of Squares*	*F*	*p-value*
Awareness	1	1.18	1.133	0.2894
Environmental State	1	15.98	15.402	**0.001*** **
Awareness x Environmental State	1	2.15	2.073	0.1526
Error	114			
Panel B: Analysis of Variance for Entitlement, Awareness, and Environmental State on Misreporting Likelihood				
Factor	*Df*	*Sum of Squares*	*F*	*p-value*
Entitlement	1	6.776	38.507	**<0.001*** **
Awareness	1	0.017	0.099	0.75394
Environmental State	1	0.022	0.122	0.7272
Awareness x Environmental State	1	0.632	3.589	0.0607
Error	113			
Panel C: Analysis of Variance for Entitlement, Awareness, and Environmental State on Dishonesty				
Factor	*Df*	*Sum of Squares*	*F*	*p-value*
Entitlement	1	4.633	30.861	**<0.001*** **
Awareness	1	0.165	1.096	0.297
Environmental State	1	0.058	0.387	0.535
Awareness x Environmental State	1	0.006	0.043	0.836
Error	113			

We analyzed the mediating effect of ***Entitlement*** according to the scheme suggested by Baron and Kenny, 1986. Controlling for the manipulated variables the only significant effect on Misreporting (***Likelihood*** and ***Dishonesty***) is ***Entitlement***.

Table 5.6: Comparison of Means — Misreporting and Entitlement.

Panel A: Analysis of Difference of Means for *Misreporting Likelihood* as a Dependent Variable, 95 % family-wise confidence level			
Group	*Diff*	*CI*	*p-value*
Aware/Good-Aware/Bad	-0.41	-0.73 - -0.08	**0.008****
Unaware/Bad-Aware/Bad	-0.16	-0.48 - 0.15	0.54
Unaware/Good-Aware/Bad	-0.16	-0.46 - 0.14	0.52
Unaware/Bad-Aware/Good	0.24	-0.09 - 0.58	0.24
Unaware/Good-Aware/Good	0.25	-0.07 - 0.57	0.19
Unaware/Good-Unaware/Bad	0.004	-0.31 - 0.32	1
Panel B: Analysis of Difference of Means for *Dishonesty* as a Dependent Variable, 95 % family-wise confidence level			
Group	*Diff*	*CI*	*p-value*
Aware/Good-Aware/Bad	-0.24	-0.54 - 0.06	0.16
Unaware/Bad-Aware/Bad	0.07	-0.22 - 0.36	0.93
Unaware/Good-Aware/Bad	-0.05	-0.32 - 0.22	0.97
Unaware/Bad-Aware/Good	0.31	0.004 - 0.61	**0.05****
Unaware/Good-Aware/Good	0.19	-0.10 - 0.48	0.32
Unaware/Good-Unaware/Bad	-0.12	-0.40 - 0.17	0.70
Panel C: Analysis of Difference of Means for *Entitlement* as a Dependent Variable, 95 % family-wise confidence level			
Group	*Diff*	*CI*	*p-value*
Aware/Good-Aware/Bad	-1.03	-1.74 - -0.31	**0.002****
Unaware/Bad-Aware/Bad	0.01	-0.69 - 0.70	1
Unaware/Good-Aware/Bad	-0.48	-1.14 - 0.18	0.24
Unaware/Bad-Aware/Good	1.03	0.30 - 1.76	**0.002****
Unaware/Good-Aware/Good	0.55	-0.15 - 1.25	0.18
Unaware/Good-Unaware/Bad	-0.48	-1.16 - 0.20	0.25

Table 5.7: Descriptive Statistics of Post-Experimental Questionnaire Response.

Descriptive Statistics of Post-Experimental Questionnaire Responses - Mean (SD):

Questionnaire items:[a]	*Aware/Good*	*Aware/Bad*	*Unaware/Good*	*Unaware/Bad*
1. I deserve the bonus I received based on my report.	3.88 (1.42)	3.35 (1.40)	3.56 (1.19)	3.25 (1.27)
2. I feel entitled to receive the bonus based on my report.	3.76 (1.50)	3.55 (1.21)	3.65 (1.26)	3.29 (1.28)
3. I deserve to receive a higher bonus than based on my actual score.	2.76 (1.39)	3.58 (1.31)	3.00 (1.33)	3.57 (1.32)
4. I feel entitled to receive a higher bonus than based on my actual score.	2.72 (1.25)	3.58 (1.47)	3.06 (1.11)	3.50 (1.48)
5. I deserve the bonus I received based on untruthful reporting.	1.88 (1.24)	2.97 (1.38)	2.29 (1.27)	2.82 (1.49)
6. I feel entitled to receive a bonus based on untruthful reporting.	1.68 (1.12)	2.77 (1.41)	2.44 (1.29)	2.96 (1.45)
7. I was satisfied with my actual score.	3.44 (1.13)	2.65 (1.36)	3.12 (1.30)	2.71 (1.19)
8. I was honest in this experiment.	3.44 (1.79)	2.68 (1.59)	2.97 (1.72)	2.86 (1.73)
9. My choices in this experiment were ethical.	4.08 (1.26)	3.55 (1.27)	3.56 (1.19)	3.96 (0.98)
10. It is wrong to submit an untruthful report.	4.28 (0.83)	3.77 (1.24)	3.71 (0.89)	3.68 (1.20)
11. I tried my best in this experiment.	4.48 (0.90)	4.55 (0.50)	4.12 (1.18)	4.46 (0.82)
12. I was treated fairly in this experiment.	4.24 (0.86)	2.94 (1.27)	3.71 (1.23)	3.14 (1.38)
13. The target score was fair.	3.52 (1.17)	2.13 (0.98)	3.24 (1.21)	1.79 (1.21)

[a] All Questions were asked in German after the experiment. Responses are based on a five-point Likert scale with "1" being labeled "strongly disagree" and "5" as "strongly agree."

Table 5.8: Socio-Demographic Effects.

Panel A: Effects on Entitlement

Coefficients	*Estimate*	*Standard Error*	*t-value*	*Pr(>|t|)*
Intercept	3.085	0.438	7.049	**<0.001*** **
Age	-0.170	0.154	-1.107	0.271
Gender	0.314	0.202	1.553	0.123
Income	-0.195	0.109	- 1.783	0.077
Economics	0.422	0.234	1.803	0.074

Note: n=118; $R^2 = 0.09263$; Adj.$R^2 = 0.06051$; F(4,113)=2.884; p < 0.02567

Panel B: Socio-Demographic Effects on Misreporting Likelihood

Coefficients	*Estimate*	*Standard Error*	*t-value*	*Pr(>|t|)*
Intercept	-0.123	0.210	-0.568	0.559
Entitlement	0.209	0.038	5.558	**<0.001*** **
Age	0.076	0.062	1.232	0.221
Gender	0.016	0.082	0.200	0.842
Income	-0.049	0.044	-1.102	0.273
Economics	0.144	0.095	1.518	0.132

Note: n=118; $R^2 = 0.2764$; Adj.$R^2 = 0.2441$; F(5,112)=8.55; p-value < 0.001

Panel C: Socio-Demographic Effects on Dishonesty

Coefficients	*Estimate*	*Standard Error*	*t-value*	*Pr(>|t|)*
Intercept	-0.137	0.192	-0.713	0.477
Entitlement	0.167	0.034	4.864	**<0.001*** **
Age	0.036	0.056	0.629	0.531
Gender	0.047	0.075	0.633	0.528
Income	-0.033	0.041	-0.803	0.424
Economics	0.152	0.087	1.757	0.0817

Note: n=118; $R^2 = 0.2764$; Adj. $R^2 = 0.2441$; F(5,112)=8.55; p-value < 0.001

Age takes 1 if the student is less than 20 years old, 2 for 20-24, 3 for 25-40, and 4 if the student is older than 30 years old.
Gender takes 1 if the student is female, 2 if the student is male and 3 for non-binary.
Income takes 1 if the student's monthly after-tax household income is between 0 and 500 Euros, 2 if it is between 500 and 1,000 Euros, 3 if it is between 1,500 and 2,500 Euros, 4 if it is between 2,500 and 3,000 Euros and 5 if it exceeds 3,500 Euros.
Economics takes 1 if the student studies management or economics.

Table 5.9: Descriptive Statistics of Fairness.

1. I was treated fairly in this experiment.		
	Good Environmental State	*Bad Environmental State*
Aware	4.24 (0.86) n=25	2.94 (1.27) n=31
Unaware	3.71 (1.26) n=34	3.14 (1.38) n=28

2. The target score was fair.		
	Good Environmental State	*Bad Environmental State*
Aware	3.52 (1.17) n=25	2.13 (0.98) n=31
Unaware	3.24 (1.21) n=34	1.79 (1.21) n=28

3. Fairness (Mean of the Above)		
	Good Environmental State	*Bad Environmental State*
Aware	3.88 (0.9) n=25	2.53 (0.94) n=31
Unaware	3.47 (1.1) n=34	2.46 (1.11) n=28

Fairness is the mean of the response to statement one and two. Participants answered those on a five-point Likert scale with "1" being labeled "strongly disagree" and "5" as "strongly agree."

Table 5.10: Alternative Mediating Effect of Fairness on Misreporting.

Panel A: Analysis of Variance with Fairness as Dependent Variable				
Factor	*Df*	*Sum of Squares*	*F*	*p-value*
Awareness	1	0.41	0.377	0.541
Environmental State	1	39.84	36.761	**0.001*** **
Awareness x Environmental State	1	0.85	0.783	0.378
Error	114			
Panel B: Analysis of Variance for Fairness, Awareness, and Environmental on Misreporting Likelihood				
Factor	*Df*	*Sum of Squares*	*F*	*p-value*
Fairness	1	2.287	10.810	**0.0013** **
Awareness	1	0.001	0.005	0.941
Environmental State	1	0.108	0.511	0.476
Awareness x Environmental State	1	1.033	4.883	**0.0291***
Error	113			
Panel C: Analysis of Variance for Fairness, Awareness, and Environmental State on Dishonesty				
Factor	*Df*	*Sum of Squares*	*F*	*p-value*
Fairness	1	1.613	9.253	**0.003** **
Awareness	1	0.292	1.674	0.198
Environmental State	1	149	0.853	0.358
Awareness x Environmental State	1	0.068	0.389	0.534
Error	113			

Fairness gives the average response to the statements: 1. "I was treated fairly in this experiment" and 2. "The target score was fair" on a five-point Likert scale with "1" being labeled "strongly disagree" and "5" as "strongly agree." We analyzed the mediating effect of ***Fairness*** as an alternative mediator for ***Entitlement*** according to the scheme suggested by Baron and Kenny, 1986. Controlling for the manipulated variables, ***Fairness*** is still the only variable with a significant effect on Misreporting (***Likelihood*** and ***Dishonesty***).

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