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**The effect of the passage of the Sarbanes-Oxley Act on the persistence in conservative- and aggressive reporting by Big 4 audit firms**

***Abstract***

Previous literature on the audit reporting style provides evidence of substantial observable differences in audit reporting across audit partners over time, while the literature of the passage of the Sarbanes-Oxley Act focuses on the criticism, costs as well as the benefits of the Act. This paper contributes to both streams of literature by examining the effect of the passage of the Sarbanes-Oxley Act on the persistence in conservative (aggressive) reporting by Big 4 audit firms and finds persistence in conservative (aggressive) reporting by Big 4 audit firms over time. Next to this, aggressive (conservative) reporting weakens the persistence in conservative (aggressive) reporting. Moreover, the passage of the Sarbanes-Oxley Act weakens the persistence in conservative reporting by Big 4 audit firms and has no effect on the persistence in aggressive reporting.

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## I Introduction

This paper examines the persistence in conservative and aggressive audit firm reporting and the effect of the passage of the Sarbanes-Oxley Act (SOX) on the persistence of both styles of reporting. Conservative audit firm reporting is defined as the issuance of a going-concern opinion, in a situation where the client does not fail, whereas. Aggressive audit firm reporting is defined as the lack of issuance of a going-concern opinion, in a situation where the client does fail. The study is supported by two streams of literature. The first stream is the literature concerning audit reporting style, which provides evidence that there are substantial observable differences in audit reporting across audit partners<sup>1</sup> over time (Beyer & Sridhar, 2006; Messier et al., 2008; Knechel et al., 2015). Prior research provides limited evidence of the persistence in audit firm reporting style. The second stream is the literature of the SOX that was implemented to create a greater responsibility for auditors in the enforcement of laws with regard to theft and fraud by corporate officers as well as enforcement by and regulations from the Public Company Accounting Oversight Board (Coates & Srinivasan, 2014). Next to the substantial evidence about the costs (Asthana et al., 2009) as well as the benefits (Cohen et al., 2008) of the Act, there seems to be a growth in conservatism after the passage of the SOX as well (Lobo & Zhou, 2006). Despite the increase in conservatism, there is limited evidence about the effects of the Act on audit reporting, in particular the persistence in audit firm reporting style. This study aims to contribute to both streams of literature by building upon the fields that have limited evidence.

There are reasons to believe that persistence in audit firm reporting style exists. Messier et al. (2008) suggests that the process of reporting errors by an audit partner is a process that is not randomly addressed. Both conservative- and aggressive errors could be subject in a persistent pattern of auditor reporting (Messier et al., 2008). Beyer and Sridhar (2006) supports this result by finding that the quality of an auditor is established, when an auditor has issued more audit opinions over time. These studies suggest that an auditor who made a conservative (aggressive) error in prior years is more likely to make a conservative (aggressive) error in issuing future audit opinions. If auditors act in the way that these

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<sup>1</sup> The terms “auditor” and “audit partner” are used interchangeably in this paper.

studies suggest, I would expect persistence in conservative (aggressive) reporting by audit firms over time. I explore this expectation in two sub-hypotheses.

There are reasons to believe that the passage of the SOX could influence the persistence in audit firm reporting style. The SOX literature shows that the Act would be seen as a generator of litigation. Section 302 as well as section 404 of the Act have created a larger public enforcement and therefore a larger legal liability on auditors as well as independent directors (Butler & Ribstein, 2006). As a consequence, auditors become more conservative after the passage of the SOX and have the incentive to issue a going-concern opinion more often (Geiger et al., 2005; Feldmann & Read, 2010).

The incentive of the auditors to issue a going-concern opinion more often after the passage of the SOX suggests that the likelihood of making conservative (aggressive) errors has risen (declined). If there are more (less) conservative (aggressive) errors in the post-SOX period, then the chance that the auditor has made more (less) prior conservative (aggressive) errors is greater as well. As a result, the prior conservative (aggressive) errors will explain the current conservative (aggressive) error better (worse) than is the case in the pre-SOX period, resulting in more (less) persistence in conservative (aggressive) audit reporting. Based on this reasoning, I would expect that the persistence of conservative reporting by audit firms is strengthened, and the persistence of aggressive reporting by audit firms is weakened after the passage of the SOX. I explore this expectation in two sub-hypotheses.

To establish persistence in the style of audit firm reporting, I use a logistic regression model, following Knechel et al. (2015) with the exception that I split the model of Knechel et al. (2015) in a logistic regression containing the Big 4 audit firms to establish persistence in conservative audit firm reporting and persistence in aggressive audit firm reporting, respectively. Adding an interaction variable to capture the effect of the interaction between prior conservative (prior aggressive) errors made by auditors and the passage of the Act, allows me to examine the effect of the SOX on the persistence in the style of audit firm reporting.

To maximize the power of both sets of logistic regressions, my sample ranges from 1992-2012, containing a 10 year time frame in the pre- and post-SOX period. After excluding

observations without an auditor opinion, an auditor identity, non-Big 4 audit firms and removing duplicates, my final sample has 121,575 observations.

I find that the prior conservative (prior aggressive) error influences the current conservative (aggressive) error, this influence is significantly positive, indicating persistence in conservative (aggressive) reporting by each Big 4 audit firm over time. The empirical evidence is consistent with Knechel et al. (2015).

Furthermore, I find that the prior aggressive (the prior conservative) error influences the current conservative (aggressive) error, this influence is significantly negative, indicating that aggressive (conservative) reporting weakens the persistence in conservative reporting by each Big 4 audit firm over time. The empirical evidence is consistent with Messier et al. (2008).

With regard to the passage of the SOX, I find that the interaction variable, which measures the effect of the interaction between the prior conservative error made by auditors and the passage of the SOX, operationalized as a dummy variable influences the current conservative error, this is significantly negative, indicating that the passage of the SOX weakens the persistence in conservative reporting by audit firms over time. The latter is in line with the alternative reasoning that auditors who made a prior conservative error are possibly aware that they made such an error, which could make them more focussed to issue the right auditor opinion in the following year, leading to a decrease in persistence of conservative reporting. The interaction variable, which measures the effect of the interaction between prior aggressive error made by auditors and the passage of the Act, operationalized as a dummy variable has no significant effect on the current aggressive error indicating that the passage of the SOX has no effect on the persistence in aggressive reporting by audit firms over time. The latter, is in line with the explanation that the passage of the SOX has no effect on the persistence in aggressive reporting, because of the endogeneity problems of the SOX, which make it difficult to draw the causal link between the passage of the SOX and the effect on the persistence in aggressive reporting.

To my knowledge, a few studies have examined the persistence in audit reporting by auditors. This paper contributes to different fields of literature. First, it contributes to the literature of audit reporting style by showing that audit firms are persistent in their auditing, both conservatively and aggressively over time and provides support for the findings of

Knechel et al. (2015). Second, this study appends to the literature of the SOX by finding a weaker relation in the persistence of conservative reporting by audit firms as well as no relation in the persistence of aggressive reporting by audit firms after the passage of the Act and therefore providing evidence that is not in line with the results of increased conservatism regarding persistence in audit reporting after the passage of the SOX (Feldmann and Read, 2010).

## **II Literature Review**

### **2.1. Decision-making process by audit partners**

Since the accounting scandals of Enron and WorldCom, decisions made by individual auditors are restricted by internal control measures such as internal reviews and second partner signoffs. However, these measures cannot completely prevent that the quality of these decisions differ between the engagements in a specific firm: the changing composition of teams could lead to various audit decisions and might lead to different effects on the audit quality (Causholli et al., 2013). Next to the various levels of aggregation, for instance team versus individual, there are researchers, who state that there are also differences at the level of individual auditors that influence the audit quality (DeFond & Francis, 2005).

Moreover, Nelson and Tan (2005) discusses the judgment and decision-making research in auditing and concludes that auditors are only able to form an overall assurance- or attestation opinion, if they perform a variety of tasks in advance. Before the auditor comes to an opinion, the auditors' personal attributes influence this outcome (Nelson & Tan, 2005). These are, for example: differences in incentives, preferences in risk, expertise as well as cognitive abilities (Knechel, 2000).

### **2.2. Audit reporting style**

Concluding that the decision-making process across audit firms and audit partners may vary based on their properties, does not automatically reveal the audit reporting style of each of them. However, the point remains that the information available about the firms and people, who conduct the audit is very little (Francis, 2011). Therefore, Francis (2011) provides a general framework for studying factors related to the audit quality on the

engagement-level and it is intended to take a more critical attitude towards conducting audit quality research. In fact, when audits are performed by competent people, then they are of a higher quality. In the study of Francis (2011), accurate reporting by the audit partner is when a client that does fail, is preceded by a going-concern opinion (GCO) or when an unqualified opinion<sup>2</sup> is issued to a client that does not fail. If there is no accurate reporting, there are two types of errors that can exist, namely, a Type I error and a Type II error. A Type I (II) error, also known as the conservative (aggressive) error, is the case when an auditor issues (does not issue) a GCO, while the client does not fail (fails). Francis (2011) finds that the sum of the Type I- and Type II errors gives a total error rate of almost ten percent, of which 93 (7) percent is a Type I (II) error.

Although it is likely that the chance of reporting a specific error by an audit partner is a randomly addressed process, personal attributes or, for instance, overconfidence, could create a persistent pattern of auditor reporting (Messier et al., 2008). In accordance with this view, Beyer and Sridhar (2006) finds evidence that the quality of an auditor is identified, when an auditor issues more audit opinions over time.

The view of Beyer and Sridhar (2006) as well as Messier et al. (2008) is supported by Knechel et al. (2015), who had the aim to get an understanding of audit quality by examining whether there are persistent variations in conservative- and aggressive audit reporting and to which extent they are attributable to prior audit reporting errors of audit partners for data from Sweden. In their research, they use the same terminology as Francis (2011) for defining the errors and define a client failure as a situation in which the client filed for bankruptcy within twelve months after the issuance of a GCO by the audit partner. This definition is supported by both Hopwood et al. (1989) and Feldmann and Read (2010), who find that there exists a strong association between the issuance of a GCO and a bankruptcy filing. Furthermore, they define the audit of a prior error as an error that occurs within a year of the current error, which is in contrast to Lennox (2000), who defines a prior error as the first time issuance of a GCO, because it is often the case that audit reporting is persistent, which is in line with Messier et al. (2008).

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<sup>2</sup> The terms “not issuing a going-concern opinion” and “unqualified opinion” as well as the terms “issuing a going-concern opinion” as well as “qualified opinion” are used interchangeably in this paper.

Knechel et al. (2015) regresses the prior Type I- as well as the prior Type II error as independent variable on both the probability of failing as auditor for the Type I- and the Type II error using a logistic model. Their results show a significantly positive relation between the prior Type I(II) error and the Type I (II) error, suggesting persistence in conservative (aggressive) audit reporting style by audit partners (Knechel et al., 2015). On the other hand, they also find a significantly negative relation between the prior Type II (I) error and Type I (II) error, suggesting that persistence in conservative (aggressive) audit reporting makes it less likely that the auditor will report aggressive (conservative) in future audit reports (Messier et al., 2008).

### **2.3. Economic consequences of audit reporting style**

Zeff (1978) describes economic consequences as the impact of accounting reports on the decision-making behavior of businesses, the government, unions, investors and creditors. Following this definition, the audit reporting style does have economic consequences: the decision-making process of audit firms, represented by audit partners, creates differences in the reliability of financial reporting, leading to deviations in the information risk of investors- as well as creditors and therefore differences in the cost of capital of a firm (Diamond & Verrecchia, 1991; Lambert et al., 2007). Moreover, Titman and Trueman (1986) suggests that persistence in conservative- as well as aggressive audit reporting decisions made by audit partners could have an effect on the quality of financial disclosure.

### **2.4. The passage of the Sarbanes-Oxley Act**

After the accounting scandals of Enron and Worldcom, the concerns about the relation between the public companies and the audit firms have increased. As a response to these concerns, the Senate and House of Representatives of the United States of America in Congress enacted The Public Company Accounting Reform and Investor Protection Act of 2002, generally known as the SOX. The main purposes of the passage of the SOX are to install the Public Company Accounting Oversight Board (PCAOB) to monitor and regulate auditing



as a quasi-public institution and to create a greater responsibility for auditors in the enforcement of laws with regard to theft and fraud by corporate officers as well as enforcement by and regulations from the PCAOB (Coates & Srinivasan, 2014). This was a change in comparison with the pre-SOX period: the obligations of auditors were restricted to state licensing as well as enforcing self-regulation to a constrained extent and influenced by audit firms with little own authority before the millenium (Coates & Srinivasan, 2014).

## **2.5. Criticism about the passage of the SOX**

Despite the good intentions behind the implementation of the SOX, there is also critique in the literature about the SOX. The SOX is, according to Romano (2005), a "federalized" corporate law and according to Cunningham (2003): "a political-legislative masterstroke that is an achievement that is not due to anything fairly characterized as sweeping substantive reform, which is a restatement with the force of federal law". Next to this, Coates (2007) argues that the implementation of the SOX is the outcome, created by administrative officials through strategies of rules as well as enforcement. DeFond and Francis (2005) supports these findings by criticising the lack of motivation by political expediency. Moreover, the SOX makes dramatic changes to some of the fundamental institutions that define auditing in the United States by the transformation from a self-regulated industry to an industry, that is directly controlled by a quasi-governmental agency (DeFond & Francis, 2005). Moreover, DeFond and Francis (2005) underscores that the emphasis that the SOX puts on audit committees, suggests that there is need for further research.

As a response to DeFond and Francis (2005), DeZoort et al. (2008) examines the differences in audit committee member judgements and perceptions before- and after the SOX was passed, and find that audit committee support for an audit-proposed adjustment has significantly increased in the post-SOX period. Furthermore, their findings imply that they believe more strongly that audit committees in the post-SOX period have more power and are more conservative than in the pre-SOX period.

Alternative evidence, next to the findings of DeZoort et al. (2008), against the argument that the SOX has little impact on the change in corporate governance, is the fact that the requirements of the SOX can serve as a foundation of suing shareholders under state

law, which can lead to changes in state law. The subsequent implication could be that the SOX would create new standards of behavior and therefore has significant effects on corporate governance (Ferola, 2007).

Next to the effectiveness of the SOX, there is also critique about its application. The SOX requires a direct change in business decisions, this is the opposite of the permitted business decisions regarding the market forces, which are familiar with the view of the traditional focus on disclosure by federal securities laws in the United States (Coates & Srinivasan, 2014).

However, this argument is not completely valid: section 404 of the SOX requires attestation of Internal Control (IC) systems, but has the room for discretion to give managers the possibility to use IC systems even when these systems contain weaknesses, if these weaknesses are disclosed as well as by the audit firm providing the attestation (Coates & Srinivasan, 2014). The discretion that section 404 of the SOX provides to managers is not a priori a concern. On the contrary, Ashbaugh-Skaife et al. (2009) finds that firms that have a greater propensity to report IC problems, but that choose to do not, noticed a decrease in cost of equity. On the other hand, there is also evidence that IC weaknesses have a persistent character (Johnstone et al., 2011).

## **2.6. Costs of the passage of the SOX**

The passage of the SOX has brought additional direct- as well as indirect costs with it (Coates & Srinivasan, 2014). Direct costs are in first place associated with the expenses for IC testing and reporting, which must be made to monitor and regulate auditing.

Subsequently, the audit fees increase to control the effectiveness of the IC. Regulators such as the Securities and Exchange Commission (SEC) anticipate these costs and have estimated that the internal costs, based on section 404(a), are at an amount of \$91.000 per filer.

However, the SEC did not have a benchmark for estimating the audit costs, based on section 404(b) (SEC, 2004). Most of the estimations of these direct costs are drawn from surveys in the literature, which have the drawback that respondents to these surveys are

biased. This represents the main problem of these direct costs: it is evident that these costs are related to the passage of the SOX, but estimating the exact amounts is a difficult task.

Despite these difficulties, literature has shown that general findings can be drawn: Coates (2007) finds that the costs of SOX are higher for larger firms, but that the relative number of SOX's costs decrease as percentage of the firm size.

Although the SEC estimates these direct costs, there are likely reasons that these estimations deviate from the actual costs. Asthana et al. (2009) finds that the fact that audit costs were increasing in the pre-SOX period was not taken into account, as well as the fact that some firms did not have effective IC systems in the pre-SOX period, while this was required. This makes it unfair to allocate all these costs to the passage of the SOX, but should therefore be attributed to firms that need to overcome their legal responsibility in the field of increased enforcement, which is partially caused by the passage of the SOX (Asthana et al., 2009).

As a reaction to Asthana et al. (2009), Iliev (2010) attempts to address these reasons by examining the increase in audit costs in the post-SOX period by splitting the sample of firms, based on the exemption of section 404 of the SOX. This exemption is created for firms with a market capitalization of \$75 million or less. Iliev (2010) finds that firms, which are around this capitalization cut-off, face higher audit costs compared to the other firms. Unfortunately, the study of Iliev (2010) has problems in generalizing the findings to the whole population, because his findings do not hold for larger firms.

Another source of direct costs, related to the passage of the SOX, are costs associated with litigation. Section 302, which describes the corporate responsibility of audit firms for financial reports, as well as Section 404, which describes the obligation of audit firms to attest to- and report on managements internal control assessment of the issuer. The SOX would be seen as a generator of litigation, since these sections have created a larger public enforcement and therefore a larger legal liability on auditors as well as independent directors (Butler & Ribstein, 2006). Brochet and Srinivasan (2014) supports this view by finding an increase in litigation in the period 2002 till 2004, following the passage of the SOX.

However, this research also finds a decrease in litigation after this period to the extent of the pre-SOX level (Coates & Srinivasan, 2014). This suggests that the SOX is not really used

by shareholders as a source to litigate companies or managers. Moreover, it is more likely that these costs are linked to a mismatch in conduct (Linck et al., 2009).

The increased public enforcement and increased legal liability on independent directors may create indirect costs as well (Coates & Srinivasan, 2014). For instance, the fear of this liability by directors increases the likelihood of lowering the investments as well as the willingness to take risk with the knowledge that there is more attention for the IC system.

This reasoning is supported by Kang et al. (2010), who finds that the investment-to-capital ratio dropped after the passage of the SOX compared to the pre-SOX period. More specifically, Barger et al. (2010) finds that firms increase their cash savings and decrease their investment in capital as well as capitalize the costs of research and development, leading to a reduction in leverage.

While Kang et al. (2010) and Barger et al. (2010) suggest that the decline in investment is due to the passage of the SOX, Albuquerque and Zhu (2013) finds that small firms, with a market capitalization under the benchmark of \$75 million, as well as firms that are not covered by the exemption of section 404 of the SOX, face a decrease in investment in 1999 and not after the passage of the SOX. Thus, Albuquerque and Zhu (2013) suggests that it more likely that the decrease in investment is due to a trend over time, rather than attributable to the passage of the SOX, which questions the reliability as well as the validity of the indirect costs of the SOX.

## **2.7. Benefits of the passage of the SOX**

The aim of the passage of the SOX is to create a greater responsibility for both managers and auditors. This leads to a positive impact on the quality of accounting as well as the audit and the inclusion of section 404 disclosures (Coates & Srinivasan, 2014).

There are many proxies used in the literature to define accounting quality. For instance, Cohen et al. (2008) defines accounting quality as the extent that the manager uses accrual-based earnings management. In the fifteen-year time frame before the passage of the SOX, they find an increase in accrual-based earnings management, which declines in the post-SOX period, indicating an improvement in accounting quality (Cohen et al., 2008).

However, the use of real earnings management has shown the opposite effect: the real earnings management, operationalized as the abnormal cash from operation as well as the abnormal discretionary expenses, decreases in the period before the passage of the SOX and increases afterwards (Chhaochharia & Grinstein, 2007). For example, this is the case when a firm has met the earnings expectations, which give the managers an incentive to use more real- and less accrual earnings management.

Another proxy to measure accounting quality is to look at how long it takes before the economic losses are integrated in the accounting numbers. Lobo and Zhou (2006) uses this approach and finds that timely loss recognition significantly increases in the period after the passage of the SOX.

Accounting quality is also operationalized with the use of CEO compensation. For instance, Qian et al. (2009) finds that firms that are above the threshold of \$75 million increase the insider ownership, but decrease the CEO compensation in the post-SOX period. This is in contrast to firms that are categorized under the exemption of section 404 of the SOX, which decrease the insider ownership, but increase the CEO compensation, suggesting an improvement in accounting quality with the notion that CEO compensation and the use of accruals are negatively associated. Cohen et al. (2008) supports this result by finding an increase in bonus compensation following the passage of the SOX.

The amount of restatements is a commonly used proxy for the quality of accounting quality as well. Immediately after the passage of the SOX, the number of restatements increased (Srinivasan et al., 2014). However, the average amount of restatements dropped after the passage of the SOX to the level in the pre-SOX period. Hennes et al. (2008) supports this view by finding more unintentional errors instead of intentional errors and a less negative market reaction on average after the announcement of a restatement.

Similarly, with the costs of the passage of the SOX, it brings difficulties to make causations between the passage of the SOX and these benefits. It could plausibly be validated as well that these benefits are the consequence of market discipline after the failure of internal controls rather than due to the passage of the SOX.

Another benefit of the passage of the SOX is the incorporation of the disclosure of section 404, which obliges firms to report IC weaknesses. When a firm reports IC weaknesses, it implies that a firm has accruals that do not fit properly into the cash flows,

with the consequence that management forecasts have a lower precision (Doyle et al., 2007). According to Kim et al. (2011), the research of Hammersley et al. (2008) suggests that there is an increase in the cost of debt as well as an increase in the cost of equity as a response to the negative reaction of investors to these disclosures.

However, the reporting of IC creates a greater persistence in earnings as well as the possibility to predict cash flows, which give managers less discretion to manage earnings (Altamuro & Beatty, 2010). Consequently, this lowers the variation in forecast errors by analysts (Arping & Sautner, 2013).

The final benefit is that an increase in accounting quality also has positive effects on the audit quality. DeFond and Lennox (2011) finds that almost half of the small audit firms leaves the public company audits market after the passage of the SOX. Consequently, the next auditor, who replaces the exiting auditor, audits the firm with higher quality and issues significantly more going-concern opinions than the former auditor. According to DeFond and Lennox (2011), it can likely be concluded that the inspections by the PCAOB, implemented by the passage of the SOX, increase the audit quality by forcing auditors of low quality out of the market. Raghunadan and Rama (2006) explains this reasoning by finding an increase in audit effort as well as improvement in the amount of work caused by the passage of section 404 of the SOX. Moreover, this increases the audit risk as well, possibly induced by the increased risk share of auditors caused by the SOX (Griffin & Lont, 2005).

However, Lennox & Pittman (2010) finds that firms do not take the information of the inspection, provided by the PCAOB, into account in the selection process of the auditor.

## **2.8. Growing conservatism after the passage of the SOX**

Basu (1997) defines conservatism as the reflection of earnings with “bad news” more quickly than those with “good news”. The latter provides reason to believe that the passage of the SOX has led to higher conservatism after the implementation of the Act, since Brochet and Srinivasan (2014) has found that litigation increases after the passage of the SOX. This gives managers the incentive to incorporate losses in the market price in an earlier stadium than gains, with the aim to avoid lawsuits by shareholders.

The study of Iliev (2010) supports this view by showing that firms, which are just above the exemption in section 404 of the SOX of \$75 million, significantly decrease their accruals as well as the discretionary accruals in comparison to the pre-SOX period. The findings of Iliev (2010) are in line with those of Lobo and Zhou (2006), who finds an increase in conservative financial reporting in the post-SOX period.

The increase in conservatism is not only the case in financial reporting, but in audit reporting as well: Feldmann and Read (2010) finds that the proportion of issuing a GCO strongly increased after the passage of the SOX, suggesting a more conservative audit reporting style by auditors. This finding is supported by Geiger et al. (2005), who finds similar results and relates the increase of issuing a GCO to changes in audit reporting decisions, rather than to characteristics of the client. The research of Fargher and Jiang (2008) finds a higher propensity to issue a GCO after the passage of the SOX as well, however, their results do not suggest that auditor conservatism holds in the long run.

Carey et al. (2012) supports this suggestion and attributes the increase in the issue of a GCO to an improvement in audit effort rather than to auditor conservatism. They present again the endogeneity problems of the passage of the SOX: it is likely that the SOX has implications for the increase in conservatism, but it is difficult to draw the causal link due to the presence of other variables, such as market discipline.

### **III Hypotheses Development**

#### **3.1. Development of Hypothesis 1a and 1b**

Messier et al. (2008) suggests that the process of reporting errors by an audit partner is not a randomly addressed process. Both conservative- and aggressive errors could be subject in a persistent pattern of auditor reporting. Beyer and Sridhar (2006) supports this view by finding that the quality of an auditor is established, when an auditor has issued more audit opinions over time.

This implies that an auditor who made a conservative (aggressive) error in prior years is more likely to make a conservative (aggressive) error in the issuance of future auditor opinions. In addition, this means that when an audit partner acts consistently conservative (aggressive), the audit partner has a higher propensity of making a

conservative (aggressive) error and is likely to be faced with a lower propensity of making an aggressive (conservative) error.

Combining these reasonings with Knechel et al. (2015), who finds persistence in both conservative- and aggressive audit reporting by audit partners for data from Sweden, leads to the formulation of the following two sub hypotheses:

**Hypothesis 1a: *There is persistence in conservative reporting by audit firms over time.***

**Hypothesis 1b: *There is persistence in aggressive reporting by audit firms over time.***

### **3.2. Development of Hypothesis 2a and 2b**

The concerns about the relation between public companies and audit firms have risen after the accounting scandals of Enron and WorldCom. To prevent such scandals of happening again, the SOX was introduced with the intent to create a greater responsibility for auditors in the enforcement of laws with regard to theft and fraud by corporate officers as well as enforcement by and regulations from the PCAOB (Coates & Srinivasan, 2014).

Besides the criticism, the costs as well as the benefits of the passage of the SOX, the SOX also led to an increasing tendency of conservatism. Lobo and Zhou (2006) and Iliev (2010) find an increase in conservative financial reporting in the period after the passage of the SOX.

The increase in conservative financial reporting has risen in audit reporting as well: Feldmann and Read (2010) finds that the proportion of issuing a GCO strongly increased in the post-SOX period. Geiger et al. (2005) agrees with this finding and explains this result by changes in audit reporting decisions.

The incentive of the auditors to more often issue a going-concern opinion after the passage of the SOX suggests that the likelihood of making conservative (aggressive) errors has risen (declined). If there are more (less) conservative (aggressive) errors in the post-SOX period, then the chance that the auditor has made more (less) prior conservative (aggressive) errors is greater as well. As a result, the prior conservative (aggressive) errors will explain the current conservative (aggressive) error better (worse) than is the case in the



pre-SOX period, resulting in more (less) persistence in conservative (aggressive) audit reporting.

Combining these reasonings with Geiger et al. (2005), Butler and Ribstein (2006) as well as Feldmann and Read (2010), leads to the formulation of the following two sub-hypotheses:

***Hypothesis 2a: The passage of the SOX strengthens the persistence of conservative reporting by audit firms over time.***

***Hypothesis 2b: The passage of the SOX weakens the persistence of aggressive reporting by audit firms over time.***

Although the SOX could be seen as a generator of litigation, the rise (decline) in the likelihood of making conservative (aggressive) errors could work in the opposite way for the persistence in conservative (aggressive) reporting. Auditors who made a prior conservative (aggressive) error are possibly aware that they made such an error, when they are issuing an auditor opinion in the next year. The increased threat of litigation, caused by the passage of the SOX, could make them more focussed to issue the right auditor opinion in the next year, leading to a decrease in persistence of conservative (aggressive) reporting.

Another possible outcome could be that the passage of the SOX has no effect on the persistence in conservative (aggressive) reporting, because of the endogeneity problems of the SOX, which make it difficult to draw the causal link between the passage of the SOX and the effect on the persistence in conservative (aggressive) reporting.

#### **IV Research Design**

To maximize the power of the tests, I make certain choices, regarding the research design. I start with a focus on the effect of persistence in conservative (aggressive) reporting by audit firms. Thereafter, I take a look at the effect of the passage of the SOX on this persistence, including industry- as well as time-fixed effects to mitigate omitted correlated variables.

#### **4.1. Identification of conservative (aggressive) reporting**

Prior literature relies on the Type I (II) error in the majority of the cases to identify conservative (aggressive) reporting by auditors. The Type I (II) error is often defined as the case when an auditor issues (does not issue) a GCO, while the client does not fail (fails) within the following twelve months (Francis, 2011; Knechel et al., 2015). An advantage of this approach is that it does not bring difficulties for researchers to measure conservative (aggressive) reporting, since data about the issuance of a GCO is widely available. This is also the case for the measurement of a potential failure of the client, for which researchers commonly use the bankruptcy of the client within one year after the issuance of an audit report (Feldmann & Read, 2010; Knechel et al., 2015).

While there are almost no differences in the measurement of conservative (aggressive) reporting, there are different interpretations in defining the prior Type I (II) error. Lennox (2000) interprets a prior Type I (II) error as the first-time appearance of the Type I (II) error, because it is often the case that audit reporting is persistent. However, Francis (2011) as well as Knechel et al. (2015) detect a prior error, if a Type I (II) error occurs in the year before the current Type I (II) error.

The difference between the two studies could be explained by the size of their sample: the amount of firm-year observations in Knechel et al. (2015) is more than four times larger than that of Lennox (2000)<sup>3</sup>, which could be a consideration in Knechel et al. (2015) to make the requirements for a prior error stricter and to avoid the situation of finding persistence for every firm in their sample.

In this paper, I choose to follow the definition used in Knechel et al. (2015) regarding conservative (aggressive) reporting and to interpret a prior error as the situation in which a Type I (II) error occurs in the year before the current Type I (II) error, since the sample in this research is almost five times that of Knechel et al. (2015).

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<sup>3</sup> Based on the sample of the sum of privately held firms and publicly listed firms of 24,566 firm year observations in Knechel et al. (2015) and the sample of 5,441 firms year observations in Lennox (2000).

## 4.2. Sample selection

I select the sample in the following way. First, I identify the fiscal years sample ranging from 1992-2012, containing a 10 year time frame in the pre- and post-SOX period, respectively. However, I need the years 1991 and 2013 as well to identify the prior- as well as the Type I (II) error. Therefore, I obtain data of the audit firms, auditor opinions, reason for deletion and Standard Industry Codes (SIC) for the fiscal years 1991 through 2013 in the Compustat database.

Second, I connect the audit firm with the corresponding auditor opinion to make it possible to find prior Type I (II)- and *current* Type I (II) errors. Therefore, I remove the firm-year observations, which do not match those two variables and thus misses at least one of the two variables.

In the third step, I remove firm-year observations that are not audited by one of the Big 4 audit firms. My sample shows in this stage of the sample selection that there is a gap between the Big 4 audit firms and the other audit firms: all the Big 4 audit firms have at least 27,000 firm-year observations, while the largest not Big 4 audit firm has slightly more than 6,000 firm-year observations. Therefore, I choose to remove those firm-year observations with a non-Big 4 audit firm to increase the power of the test on the persistence of conservative (aggressive) audit firm reporting.

Next, I remove the duplicates in the sample. After excluding the years 1991 as well as 2013, which I initially matched with the years within the examined sample to discover prior Type I (II)- as well as Type I (II) errors, I have a final sample of 121,575 firm-year observations. The procedures of the sample selection are illustrated in table 1.

Table 2 provides the yearly distribution of number of clients for each Big 4 audit firm with the most observations in 1998 (6,930) and the fewest in 1992 (4,317). With regard to each of the Big 4 audit firms has KPMG the most observations in 1996 (1,541), PwC in 1998 (2,178) and EY as well as Deloitte in 2002 (1,932 respectively 1,555). The fewest observations are for each of the Big 4 audit firms in 1992 (EY: 1,382; Deloitte: 1,077; KPMG: 1,119 and PwC: 739).

Table 3 provides the industry distribution of number of clients for each Big 4 audit firm with the most observations in the manufacturing industry (45,666) and the fewest in the industry of agriculture, forestry and fishing (393). This is in line with the amount of

**TABLE 1**  
**Sample selection procedure**

<b>Sample Selection Steps</b>	<b>No. of Obs.</b>
<i>Step 1: The prior- Type I (II) error sample</i>	
Audit firms and auditor opinions from the years 1991 to 2013	290,949
<i>Step 2: Excluding observations with missing values of audit firms and/or auditor opinions</i>	
Each audit firm is matched with an auditor opinion of that firm	62,827
<i>Step 3: Excluding Non-Big 4 audit firms</i>	
Excluding all the audit firms that are not EY, Deloitte, KPMG or PwC	88,210
<i>Step 4: Excluding Duplicates</i>	
Excluding multiple observations for one unique year for one unique firm	9,069
<i>Step 5: Excluding the years 1991 and 2013</i>	
Excluding the fiscal years 1991 and 2013, which were only needed to identify prior- Type I (II) errors	9,268
<i>Step 6: Final sample</i>	
The final sample used for the regressions and analyses	121,575

observations for each of the Big 4 audit firms: every Big 4 audit firm has the most observations in the manufacturing industry (EY: 14,593; Deloitte: 9,269; KPMG: 9,723 and PwC: 3,755) and the fewest in the industry of agriculture, forestry and fishing (EY: 137, Deloitte: 96, KPMG: 81 and PwC: 79).

#### **4.3. A note on auditor opinion**

The Compustat database categorizes the variable auditor opinion into six different categories:

1. Unaudited: this is the case when the financial statements were not audited, because the accounts are a representation of a consolidation and the letter of the auditors refers only to parents accounts.
2. Unqualified opinion: this is the label if the financial statements are fairly presented and the audit firm acknowledges that the accounting principles are in line with the financial statement as well as the consistency in their application and the adequacy of financial disclosure.

**TABLE 2****Yearly Distribution of number of clients for each of Big 4 audit firms**

Fiscal Year	EY	Deloitte	KPMG	PwC	Total	Percent	Cum.
1992	1,382	1,077	1,119	739	4,317	3.55%	3.55%
1993	1,484	1,142	1,230	830	4,686	3.85%	7.41%
1994	1,596	1,195	1,343	942	5,076	4.18%	11.58%
1995	1,807	1,288	1,525	1,029	5,649	4.65%	16.23%
1996	1,863	1,361	1,541	1,032	5,797	4.77%	21.00%
1997	1,835	1,321	1,502	1,090	5,748	4.73%	25.72%
1998	1,905	1,346	1,501	2,178	6,930	5.70%	31.42%
1999	1,816	1,339	1,447	2,090	6,692	5.50%	36.93%
2000	1,726	1,302	1,416	1,910	6,354	5.23%	42.15%
2001	1,690	1,263	1,331	1,744	6,028	4.96%	47.11%
2002	1,932	1,555	1,514	1,839	6,840	5.63%	52.74%
2003	1,866	1,475	1,459	1,759	6,559	5.40%	58.13%
2004	1,720	1,448	1,413	1,641	6,222	5.12%	63.25%
2005	1,733	1,460	1,433	1,555	6,181	5.08%	68.34%
2006	1,672	1,371	1,356	1,499	5,898	4.85%	73.19%
2007	1,591	1,320	1,247	1,413	5,571	4.58%	77.77%
2008	1,539	1,271	1,201	1,400	5,411	4.45%	82.22%
2009	1,497	1,247	1,201	1,410	5,355	4.40%	86.62%
2010	1,452	1,237	1,211	1,431	5,331	4.38%	91.01%
2011	1,494	1,219	1,232	1,420	5,365	4.41%	95.42%
2012	1,550	1,256	1,283	1,476	5,565	4.58%	100.00%
Total	35,150	27,493	28,505	30,427	121,575	100.00%	

3. Qualified opinion: this category contains financial statements that are fairly presented, but raise questions by the audit firm with regard to the limitation of the scope of examination or financial statement presentations that are unsatisfied.
4. No opinion: this is the case when an audit firm does not express an opinion with regard to the capability of the firm to continue business operations.
5. Unqualified opinion with additional language: this is the label when an audit firm issues a qualified opinion, but there is additional explanatory language added to the standard report.
6. Adverse opinion: this category contains financial statements that are not fairly presented and the audit firm does not agree that the accounting principles are in

**TABLE 3****Industry Distribution of number of clients for each of Big 4 audit firms**

Industry	EY	Deloitte	KPMG	PwC	Freq.	Percent	Cum.
Agriculture, Forestry and Fishing	137	96	81	79	393	0.32%	0.32%
Mining	1,931	2,113	3,169	3,006	10,219	8.41%	8.73%
Construction	447	332	201	225	1,205	0.99%	9.72%
Manufacturing	14,593	9,269	9,723	12,081	45,666	37.56%	47.28%
Transportation	3,485	4,076	2,781	3,755	14,097	11.60%	58.88%
Wholesale Trade	1,051	899	815	884	3,649	3.00%	61.88%
Retail Trade	1,906	2,222	1,784	1,366	7,278	5.99%	67.87%
Finance	4,926	4,054	4,729	3,859	17,568	14.45%	82.32%
Services	6,344	4,205	4,797	4,805	20,151	16.57%	98.89%
Other	330	227	425	367	1,349	1.11%	100.00%
Total	35,150	27,493	28,505	30,427	121,575	100.00%	

line with the financial statement as well as the consistency in their application and the adequacy of financial disclosure.

In the definition of an unqualified opinion, I keep only the firm-year observations of category two, because in this category there are no further actions required for the management. In case of the definition of a qualified opinion, I keep the firm-year observations of category three, five and six, because in those categories there is additional information required or the financial statements are not fairly presented. Category one as well as four are deleted in the second step of the sample selection process.

#### **4.4. Regression Model for Hypothesis 1a and 1b**

The key research design is to examine the persistence in conservative (aggressive) reporting by audit firms. Therefore, I focus on the research around the effect of the prior Type I (II) error on the Type I (II) error made by the auditor for each of the Big 4 audit firms. Adding a dummy variable for each of the Big 4 audit firms, allows me to examine the differences in persistence in conservative (aggressive) reporting between the Big 4 audit firms. In the main tests, I use the total sample period reaching from 1992 till 2012. I use the following regression to test Hypothesis 1a.

$$\begin{aligned}
Type\ I = & \beta_0 + \beta_1 P\_Type\ I * EY + \beta_2 P\_Type\ I * Deloitte + \beta_3 P\_Type\ I * KPMG \\
& + \beta_4 P\_Type\ I * PwC + \beta_5 P\_Type\ II * EY + \beta_6 P\_Type\ II * Deloitte \\
& + \beta_7 P\_Type\ II * KPMG + \beta_8 P\_Type\ II * PwC + \varepsilon
\end{aligned} \tag{1}$$

The variable *Type I* refers to the conservative error made by the auditor in the current year and occurs when the auditor issues a qualified opinion, while the audited firm does not file for bankruptcy within one year after the issuance of the opinion. In this regression, the coefficients of interest are the  $\beta_1$ ,  $\beta_2$ ,  $\beta_3$  and  $\beta_4$ , each of which captures the persistence in conservative reporting by auditors working for, respectively, EY, Deloitte, KPMG and PwC. The variables *EY*, *Deloitte*, *KPMG* and *PwC* are dummy variables which takes the value of 1 if the auditor works for the specific Big 4 audit firm, and 0 otherwise.

H1a predicts that the coefficients of the interaction between the prior Type I error and each of the Big 4 audit firms: EY ( $\beta_1$ ), Deloitte ( $\beta_2$ ), KPMG ( $\beta_3$ ) and PwC ( $\beta_4$ ) tends to be positive, suggesting persistence in conservative reporting by audit firms.

I control for the persistence in conservative reporting by auditors of the Big 4 firms by including the interaction effect of the variable *P\_Type II* in the regression, which occurs when the auditor made an aggressive error in the prior year and each of the Big 4 audit firms to control for each Big 4 audit firm separately.

H1a predicts that the coefficients of the interaction between the prior Type II error and each of the Big 4 audit firms: EY ( $\beta_5$ ), Deloitte ( $\beta_6$ ), KPMG ( $\beta_7$ ) and PwC ( $\beta_8$ ) tends to be negative, suggesting that aggressive reporting weakens persistence in conservative reporting by audit firms. To test Hypothesis 1b, I use the following regression.

$$\begin{aligned}
Type\ II = & \beta_0 + \beta_1 P\_Type\ II * EY + \beta_2 P\_Type\ II * Deloitte + \beta_3 P\_Type\ II * KPMG \\
& + \beta_4 P\_Type\ II * PwC + \beta_5 P\_Type\ I * EY + \beta_6 P\_Type\ I * Deloitte \\
& + \beta_7 P\_Type\ I * KPMG + \beta_8 P\_Type\ I * PwC + \varepsilon
\end{aligned} \tag{2}$$

The variable *Type II* refers to the aggressive error made by the auditor in the current year and occurs when the auditor issues an unqualified opinion, while the audited firm filed for bankruptcy within one year after the issuance of the opinion. In this regression, the coefficients of interest are the  $\beta_1$ ,  $\beta_2$ ,  $\beta_3$  and  $\beta_4$  each of which captures the persistence in

aggressive reporting by auditors working for, respectively, EY, Deloitte, KPMG and PwC. The variables *EY*, *Deloitte*, *KPMG* and *PwC* are dummy variables which takes the value of 1 if the auditor works for the specific Big 4 audit firm, and 0 otherwise.

H1b predicts that the coefficients of the interaction between the prior Type II error and each of the Big 4 audit firms: EY ( $\beta_1$ ), Deloitte ( $\beta_2$ ), KPMG ( $\beta_3$ ) and PwC ( $\beta_4$ ) tends to be positive, suggesting persistence in aggressive reporting by audit firms.

I control for the persistence in conservative reporting by auditors of the Big 4 firms by including the interaction effect of the variable *P\_Type I* in the regression, which occurs when the auditor made a conservative error in the prior year and each of the Big 4 audit firms to control for each Big 4 audit firm separately.

H1b predicts that the coefficients of the interaction between the prior Type I error and each of the Big 4 audit firms: EY ( $\beta_5$ ), Deloitte ( $\beta_6$ ), KPMG ( $\beta_7$ ) and PwC ( $\beta_8$ ) tends to be negative, suggesting that conservative reporting weakens persistence in aggressive reporting by audit firms.

#### **4.5. Regression Model for Hypothesis 2a and 2b**

To test the effect of the passage of the Sarbanes-Oxley Act on the persistence in conservative (aggressive) reporting by audit firms, I focus the research on the interaction effect of the prior Type I (II) error and the SOX on the Type I (II) error made by the auditor for each of the Big 4 audit firms. Adding a dummy variable for each of the Big 4 audit firms, allows me to examine the differences in persistence in conservative (aggressive) reporting as well as the differences in persistence in conservative (aggressive) reporting as a consequence of the passage of the SOX between the Big 4 audit firms. I use the following regression to test Hypothesis 2a.



$$\begin{aligned}
Type\ I = & \beta_0 + \beta_1 P\_Type\ I * EY + \beta_2 P\_Type\ I * Deloitte + \beta_3 P\_Type\ I * KPMG \\
& + \beta_4 P\_Type\ I * PwC + \beta_5 P\_Type\ I * EY * SOX \\
& + \beta_6 P\_Type\ I * Deloitte * SOX + \beta_7 P\_Type\ I * KPMG * SOX \quad (3) \\
& + \beta_8 P\_Type\ I * PwC * SOX + \beta_9 P\_Type\ II * EY + \beta_{10} P\_Type\ II * Deloitte \\
& + \beta_{11} P\_Type\ II * KPMG + \beta_{12} P\_Type\ II * PwC + \beta_{13} P\_Type\ II * EY * SOX \\
& + \beta_{14} P\_Type\ II * Deloitte * SOX + \beta_{15} P\_Type\ II * KPMG * SOX \\
& + \beta_{16} P\_Type\ II * PwC * SOX + Industry\ effects + Time\ fixed\ effects + \varepsilon
\end{aligned}$$

The variable *SOX* refers to the passage of the SOX and contains the fiscal years after the implementation of the Act (from 2002 till 2012). In this regression, the coefficients of interest are the  $\beta_1$ ,  $\beta_2$ ,  $\beta_3$  and  $\beta_4$ , each of which captures the persistence in conservative reporting by auditors working for, respectively, EY, Deloitte, KPMG and PwC as well as the variables  $\beta_5$ ,  $\beta_6$ ,  $\beta_7$  and  $\beta_8$ , which measure the interaction effect between the persistence in conservative reporting and the passage of the SOX of auditors working for, respectively, EY, Deloitte, KPMG and PwC.

H2a predicts that the coefficients of the interaction between the prior Type I error and each of the Big 4 audit firms: EY ( $\beta_1$ ), Deloitte ( $\beta_2$ ), KPMG ( $\beta_3$ ) and PwC ( $\beta_4$ ) tends to be positive as well as the coefficients of the interaction between the prior Type I error and the passage of the SOX for each of the Big 4 audit firms: EY ( $\beta_5$ ), Deloitte ( $\beta_6$ ), KPMG ( $\beta_7$ ) and PwC ( $\beta_8$ ), suggesting persistence in conservative reporting by audit firms as well as the fact that the passage of the SOX strengthens the persistence in conservative reporting.

I control for the interaction effect of the persistence in conservative reporting and the passage of the SOX by auditors of the Big 4 firms by including the variable *P\_Type II*, the interaction effect between the prior Type II error and each of the Big 4 audit firms as well as the interaction effect between the prior Type II error and the passage of the SOX for each Big 4 audit firm separately.

H2a predicts that the coefficients of the interaction between the prior Type II error and each of the Big 4 audit firms: EY ( $\beta_9$ ), Deloitte ( $\beta_{10}$ ), KPMG ( $\beta_{11}$ ) and PwC ( $\beta_{12}$ ) tends to be negative as well as the coefficients of the interaction between the prior Type I error and the passage of the SOX for each of the Big 4 audit firms: EY ( $\beta_{13}$ ), Deloitte ( $\beta_{14}$ ), KPMG ( $\beta_{15}$ )

and PwC ( $\beta_{16}$ ), suggesting that aggressive reporting weakens persistence in conservative reporting by audit firms as well as the fact that interaction between aggressive reporting and the passage of the SOX weakens the persistence in conservative reporting.

Furthermore, I control for industry effects as well as time fixed effects, which contains a shifting 4-year time frame from 1992-1996 to 2009-2012 to control for sensitivities of the passage of the SOX. I use the following regression to test Hypothesis 2b.

$$\begin{aligned}
 Type\ II = & \beta_0 + \beta_1 P\_Type\ II * EY + \beta_2 P\_Type\ II * Deloitte + \beta_3 P\_Type\ II * KPMG \\
 & + \beta_4 P\_Type\ II * PwC + \beta_5 P\_Type\ II * EY * SOX \\
 & + \beta_6 P\_Type\ II * Deloitte * SOX + \beta_7 P\_Type\ II * KPMG * SOX \quad (4) \\
 & + \beta_8 P\_Type\ II * PwC * SOX + \beta_9 P\_Type\ I * EY + \beta_{10} P\_Type\ I * Deloitte \\
 & + \beta_{11} P\_Type\ I * KPMG + \beta_{12} P\_Type\ I * PwC + \beta_{13} P\_Type\ I * EY * SOX \\
 & + \beta_{14} P\_Type\ I * Deloitte * SOX + \beta_{15} P\_Type\ I * KPMG * SOX \\
 & + \beta_{16} P\_Type\ I * PwC * SOX + Industry\ effects + Time\ fixed\ effects + \varepsilon
 \end{aligned}$$

The variable *SOX* refers to the passage of the Sarbanes-Oxley Act and contains the fiscal years after the implementation of the Act (from 2002 till 2012). In this regression the coefficients of interest are the  $\beta_1$ ,  $\beta_2$ ,  $\beta_3$  and  $\beta_4$ , each of which captures the persistence in aggressive reporting by auditors working for, respectively, EY, Deloitte, KPMG and PwC as well as the variables  $\beta_5$ ,  $\beta_6$ ,  $\beta_7$  and  $\beta_8$ , which measure the interaction effect between the persistence in aggressive reporting and the passage of the SOX of auditors working for respectively, EY, Deloitte, KPMG and PwC.

H2b predicts that the coefficients of the interaction between the prior Type II error and each of the Big 4 audit firms: EY ( $\beta_1$ ), Deloitte ( $\beta_2$ ), KPMG ( $\beta_3$ ) and PwC ( $\beta_4$ ) tends to be positive and that the coefficients of the interaction between the prior Type I error and the passage of the SOX for each of the Big 4 audit firms: EY ( $\beta_5$ ), Deloitte ( $\beta_6$ ), KPMG ( $\beta_7$ ) and PwC ( $\beta_8$ ) tends to be negative, suggesting persistence in aggressive reporting by audit firms as well as the fact that the passage of the SOX weakens the persistence in aggressive reporting.

I control for the interaction effect of the persistence in aggressive reporting and the passage of the SOX by auditors of the Big 4 firms by including the variable *P\_Type I*, the interaction effect between the prior Type I error and each of the Big 4 audit firms as well as the interaction effect between the prior Type I error and the passage of the SOX for each Big 4 audit firm separately.

H2b predicts that the coefficients of the interaction between the prior Type II error and each of the Big 4 audit firms: EY ( $\beta_9$ ), Deloitte ( $\beta_{10}$ ), KPMG ( $\beta_{11}$ ) and PwC ( $\beta_{12}$ ) tends to be negative as well as the coefficients of the interaction between the prior Type I error and the passage of the SOX for each of the Big 4 audit firms: EY ( $\beta_{13}$ ), Deloitte ( $\beta_{14}$ ), KPMG ( $\beta_{15}$ ) and PwC ( $\beta_{16}$ ), suggesting that conservative reporting weakens persistence in aggressive reporting by audit firms as well as the fact that interaction between conservative reporting and the passage of the SOX weakens the persistence in aggressive reporting.

Furthermore, I control for industry effects as well as time-fixed effects, which contains a shifting 4-year time frame from 1992-1996 to 2009-2012 to control for sensitivities of the passage of the SOX.

## **V Empirical Results**

### **5.1. Descriptive Statistics, Summary Statistics and Correlations**

Table 4 provides a description of the statistics of the Type I- and Type II error, categorized by audit firm and decomposed in a pre- and post-SOX period. It is worth to take notion that for every audit firm the Type I error rate is higher in the post-SOX period, fluctuating between 33.25% and 38.53%; than in the pre-SOX period, fluctuating between 20.94% and 23.64%; which provides suggestive evidence that is consistent with Hypothesis 2a. On the contrary of the Type II error rate, which fluctuates in the post-SOX period between 0.32% and 0.51%; which is lower than the fluctuation in the pre-SOX period between 0.99% and 1.43%; indicating suggestive evidence that is consistent with Hypothesis 2b. The total error rate for the sample as a whole is 30,44%; which is three times larger than the error rate in Lennox (2011). Decomposing the error rate gives a Type I (II) error percentage of 97% (3%), which is a higher (lower) Type I (II) error percentage than in Lennox (2011).

**TABLE 4**

**The description of the statistics of the Type I- and Type II error categorized by audit firm and decomposed in a pre- and post-SOX period**

Error	EY	Deloitte	KPMG	PwC	Total
Type I error	10.150	8.712	7.947	9.280	36.089
Total observations	35.150	27.493	28.505	30.427	121.575
Type I error rate	28.88%	31.69%	27.88%	30.50%	29.68%
Type II error	330	190	188	211	919
Total observations	35.150	27.493	28.505	30.427	121.575
Type II error rate	0.94%	0.69%	0.66%	0.69%	0.76%
Total error rate	29.82%	32.38%	28.54%	31.19%	30.44%
<b><i>Pre-SOX period</i></b>					
Type I error	3.414	2.987	3.109	2.934	12.444
Total observations	16.304	12.634	13.955	13.584	57.277
Type I error rate	20.94%	23.64%	22.28%	21.60%	21.73%
Type II error	233	143	138	145	659
Total observations	16.304	12.634	13.955	13.584	57.277
Type II error rate	1.43%	1.13%	0.99%	1.07%	1.15%
Total error rate	22.37%	24.77%	23.27%	22.67%	22.88%
<b><i>Post-SOX period</i></b>					
Type I error	6.736	5.725	4.838	6.346	23.645
Total observations	18.846	14.859	14.550	16.843	64.298
Type I error rate	35.74%	38.53%	33.25%	37.68%	36.77%
Type II error	97	47	50	66	260
Total observations	18.846	14.859	14.550	16.843	64.298
Type II error rate	0,51%	0,32%	0,34%	0,39%	0,40%
Total error rate	36.26%	38.85%	33.59%	38.07%	37.18%

Table 5 presents a summary of the variables used in the main tests. The mean of the Type I error (29.7%) is much higher than the Type II error (0.8%), which is the case for the prior Type I error compared with the prior Type II error as well.

**TABLE 5**  
**Summary Statistics for Variables Used in Main Analyses**

This table summarizes the descriptive statistics for variables in the main analyses. All variables are defined in the Appendix.

<i>Variables</i>	Obs.	Mean	STD	Minimum	Maximum
<i>Type I</i>	121.575	0.297	0.457	0	1
<i>Type II</i>	121.575	0.008	0.087	0	1
<i>P_Type I*EY</i>	121.575	0.083	0.275	0	1
<i>P_Type I*Deloitte</i>	121.575	0.070	0.254	0	1
<i>P_Type I*KPMG</i>	121.575	0.064	0.246	0	1
<i>P_Type I*PwC</i>	121.575	0.075	0.264	0	1
<i>P_Type II*EY</i>	121.575	0.003	0.053	0	1
<i>P_Type II*Deloitte</i>	121.575	0.002	0.041	0	1
<i>P_Type II*KPMG</i>	121.575	0.002	0.040	0	1
<i>P_Type II*PwC</i>	121.575	0.002	0.043	0	1
<i>P_Type I*EY*SOX</i>	121.575	0.054	0.227	0	1
<i>P_Type I*Deloitte*SOX</i>	121.575	0.045	0.208	0	1
<i>P_Type I*KPMG*SOX</i>	121.575	0.039	0.194	0	1
<i>P_Type I*PwC*SOX</i>	121.575	0.051	0.220	0	1
<i>P_Type II*EY*SOX</i>	121.575	0.001	0.027	0	1
<i>P_Type II*Deloitte*SOX</i>	121.575	0.000	0.018	0	1
<i>P_Type II*KPMG*SOX</i>	121.575	0.000	0.019	0	1
<i>P_Type II*PwC*SOX</i>	121.575	0.001	0.024	0	1

Table 6 shows the pair-wise Pearson Correlations between each of two variables. The two types of error are strongly correlated with the prior type error, suggesting evidence consistent with Hypothesis 1a as well as Hypothesis 1b. Furthermore, it is worth to note that the two types of error are significantly correlated with the interaction of the prior error and the SOX as well, providing suggestive evidence that is consistent with Hypothesis 2a and Hypothesis 2b

**TABLE 6**

**Pearson Correlations for Variables Used in Main Analyses**

This figure presents the Pearson correlations between each two variables used in the main tests. All variables are defined in the Appendix. The correlation coefficients in bold and italic are significant at the 0.05 level.

	1	2	3	4	5	6	7	8	9
1. Type I									
2. Type II	<b>-0.06</b>								
3. P_Type I*EY	<b>0.21</b>	<b>-0.02</b>							
4. P_Type I*Deloitte	<b>0.21</b>	<b>-0.02</b>	<b>-0.08</b>						
5. P_Type I*KPMG	<b>0.19</b>	<b>-0.02</b>	<b>-0.08</b>	<b>-0.07</b>					
6. P_Type I*PwC	<b>0.21</b>	<b>-0.02</b>	<b>-0.09</b>	<b>-0.08</b>	<b>-0.08</b>				
7. P_Type II*EY	<b>-0.02</b>	<b>0.40</b>	<b>-0.02</b>	<b>-0.01</b>	<b>-0.01</b>	<b>-0.02</b>			
8. P_Type II*Deloitte	<b>-0.02</b>	<b>0.30</b>	<b>-0.01</b>	<b>-0.01</b>	<b>-0.01</b>	<b>-0.01</b>	0.00		
9. P_Type II*KPMG	<b>-0.02</b>	<b>0.29</b>	<b>-0.01</b>	<b>-0.01</b>	<b>-0.01</b>	<b>-0.01</b>	0.00	0.00	
10. P_Type II*PwC	<b>-0.02</b>	<b>0.31</b>	<b>-0.01</b>	<b>-0.01</b>	<b>-0.01</b>	<b>-0.01</b>	0.00	0.00	0.00
11. P_Type I*EY*SOX	<b>0.18</b>	<b>-0.02</b>	<b>0.80</b>	<b>-0.07</b>	<b>-0.06</b>	<b>-0.07</b>	<b>-0.01</b>	<b>-0.01</b>	<b>-0.01</b>
12. P_Type I*Deloitte*SOX	<b>0.18</b>	<b>-0.02</b>	<b>-0.07</b>	<b>0.80</b>	<b>-0.06</b>	<b>-0.06</b>	<b>-0.01</b>	<b>-0.01</b>	<b>-0.01</b>
13. P_Type I*KPMG*SOX	<b>0.15</b>	<b>-0.01</b>	<b>-0.06</b>	<b>-0.06</b>	<b>0.77</b>	<b>-0.06</b>	<b>-0.01</b>	<b>-0.01</b>	<b>-0.01</b>
14. P_Type I*PwC*SOX	<b>0.19</b>	<b>-0.02</b>	<b>-0.07</b>	<b>-0.06</b>	<b>-0.06</b>	<b>0.81</b>	<b>-0.01</b>	<b>-0.01</b>	<b>-0.01</b>
15. P_Type II*EY*SOX	<b>-0.01</b>	<b>0.19</b>	<b>-0.01</b>	<b>-0.01</b>	<b>-0.01</b>	<b>-0.01</b>	0.00	0.00	0.00
16. P_Type II*Deloitte*SOX	<b>-0.01</b>	<b>0.12</b>	-0.01	-0.01	0.00	-0.01	0.00	<b>0.44</b>	0.00
17. P_Type II*KPMG*SOX	<b>-0.01</b>	<b>0.12</b>	<b>-0.01</b>	-0.01	-0.01	-0.01	0.00	0.00	<b>0.48</b>
18. P_Type II*PwC*SOX	<b>-0.01</b>	<b>0.16</b>	<b>-0.01</b>	<b>-0.01</b>	<b>-0.01</b>	<b>-0.01</b>	0.00	0.00	0.00

  

	10	11	12	13	14	15	16	17	18
11. P_Type I*EY*SOX	<b>-0.01</b>								
12. P_Type I*Deloitte*SOX	<b>-0.01</b>	<b>-0.05</b>							
13. P_Type I*KPMG*SOX	<b>-0.01</b>	<b>-0.05</b>	<b>-0.04</b>						
14. P_Type I*PwC*SOX	<b>-0.01</b>	<b>-0.06</b>	<b>-0.05</b>	<b>-0.05</b>					
15. P_Type II*EY*SOX	0.00	<b>-0.01</b>	<b>-0.01</b>	<b>-0.01</b>	<b>-0.01</b>				
16. P_Type II*Deloitte*SOX	0.00	0.00	0.00	0.00	0.00	0.00			
17. P_Type II*KPMG*SOX	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
18. P_Type II*PwC*SOX	<b>0.56</b>	<b>-0.01</b>	-0.01	0.00	-0.01	0.00	0.00	0.00	

**5.2. Results of Hypothesis 1a and 1b**

The results of Hypothesis 1a and 1b are presented in table 7. The first regression shows that the interaction effect of the prior Type I error and the specific Big 4 audit firm is significantly positive on the Type I error for each of the Big 4 audit firms at the 0.01 level,

indicating that Big 4 audit firms are persistent in conservative reporting. Furthermore, the control variables, represented as the interaction effect of the prior Type II error and the specific Big 4 audit firm, are significantly positive as well for each of the Big 4 audit firms at the 0.01 level, indicating that aggressive reporting weakens persistence in conservative reporting by Big 4 audit firms, which is in line with Messier et al. (2008). Taken together, this finding provides support for Hypothesis 1a.

The second regression shows that the interaction effect of the prior Type II error and the specific Big 4 audit firm is significantly positive on the Type II error for each of the Big 4 audit firms at the 0.01 level, indicating that Big 4 audit firms are persistent in aggressive reporting. Furthermore, the control variables, represented as the interaction effect of the prior Type I error and the specific Big 4 audit firm, are significantly positive as well for each of the Big 4 audit firms at the 0.01 level, indicating that conservative reporting weakens persistence in aggressive reporting by Big 4 audit firms, which is in line with Messier et al. (2008). Taken together, this finding provides support for Hypothesis 1b.

### **5.3. Results of Hypothesis 2a and 2b**

Table 8 presents the results of Hypothesis 2a and 2b. The third regression shows that including the SOX variables, the industry effect as well as the time-fixed effect do not change the persistence in conservative reporting of Hypothesis 1a: for each of the Big 4 firms, the interaction effect between the prior Type I error and the specific Big 4 firm on the Type I error still has a significantly positive effect at the 0.01 level as in the first regression to test Hypothesis 1a.

Surprisingly, the interaction between the prior Type I error, the specific Big 4 firm and the SOX has a significantly negative effect on the Type I error for each of the Big 4 firms varying between the 0.10 and 0.01 level, indicating that the passage of the SOX has weakened the persistence in conservative reporting. This is in line with the alternative reasoning that auditors who made a prior conservative (aggressive) error are possibly aware that they made such an error, which could make them more focussed to issue the right auditor opinion in the next year, leading to a decrease in persistence of conservative reporting. Furthermore, the interactions between the prior Type II error and the specific big 4 firm are significantly

**TABLE 7**  
**Results of Hypothesis 1a and 1b**

Variable	Predicted sign	(1) Type I	Predicted sign	(2) Type II
<i>P_Type I*EY</i>	+	2.1154*** <sup>4</sup> (93.99)	-	-1.6729*** (-4.05)
<i>P_Type I*Deloitte</i>	+	2.2917*** (92.88)	-	-1.3467*** (-3.52)
<i>P_Type I*KPMG</i>	+	2.1790*** (86.62)	-	-1.0186*** (-3.00)
<i>P_Type I*PwC</i>	+	2.2401*** (94.53)	-	-2.2742*** (-3.92)
<i>P_Type II*EY</i>	-	-0.6245*** (-3.36)	+	6.4001*** (49.82)
<i>P_Type II*Deloitte</i>	-	-0.6995*** (-2.84)	+	6.3095*** (40.40)
<i>P_Type II*KPMG</i>	-	-0.8859*** (-3.19)	+	6.3136*** (39.06)
<i>P_Type II*PwC</i>	-	-0.9671*** (-3.62)	+	6.2727*** (41.45)
<i>Intercept</i>	?	-1.6624*** (-177.52)	?	-5.7499*** (-94.33)
<i>Observations</i>		121,575		121,575
<i>Adjusted R<sup>2</sup></i>		17.56%		50.77%

negative on the Type I error for the Big 4 firms KPMG and PwC, indicating that aggressive reporting weakens the persistence in conservative reporting for KPMG and PwC. Interactions with the addition of the SOX variable are significantly negative on the Type I error for the Big 4 firms EY and Deloitte, indicating that aggressive reporting, after the passage of SOX, weakens the persistence in conservative reporting for EY and Deloitte. Taken together, these findings provide no support for Hypothesis 2a.

The fourth regression shows that including the SOX variables, the industry effect as well as the time fixed effect do not change the persistence in aggressive reporting of Hypothesis 1b: for each of the Big 4 firms, the interaction effect between the prior Type II

<sup>4</sup> \*= significant at a level of 0.10, \*\*=significant at a level of 0.05, \*\*\*=significant at a level of 0.01



**TABLE 8**  
**Results of Hypothesis 2a and 2b**

Variable	Predicted sign	(3)	Predicted sign	(4)
		Type I		Type II
<i>P_Type I*EY</i>	+	2.2514*** (56.58)	-	-2.0312*** (-2.85)
<i>P_Type I*Deloitte</i>	+	2.4107*** (56.53)	-	-1.8806*** (-2.64)
<i>P_Type I*KPMG</i>	+	2.4461*** (58.03)	-	-13.6677 (-0.01)
<i>P_Type I*PwC</i>	+	2.4012*** (56.43)	-	-2.5268** (-2.52)
<i>P_Type I*EY*SOX</i>	+	-0.1550*** (-3.08)	-	0.5768 (0.66)
<i>P_Type I*Deloitte*SOX</i>	+	-0.1244** (-2.28)	-	0.8172 (0.96)
<i>P_Type I*KPMG*SOX</i>	+	-0.2916*** (-5.31)	-	13.3484 (0.01)
<i>P_Type I*PwC*SOX</i>	+	-0.1008* (-1.89)	-	0.4338 (0.35)
<i>P_Type II*EY</i>	-	-0.2837 (-1.36)	+	6.2093*** (39.55)
<i>P_Type II*Deloitte</i>	-	-0.3925 (-1.46)	+	6.1407*** (33.63)
<i>P_Type II*KPMG</i>	-	-0.9323*** (-2.67)	+	6.1586*** (31.87)
<i>P_Type II*PwC</i>	-	-0.9094*** (-2.75)	+	6.1229*** (32.15)
<i>P_Type II*EY*SOX</i>	-	-1.4771*** (-2.90)	-	0.2105 (0.72)
<i>P_Type II*Deloitte*SOX</i>	-	-1.4650* (-1.88)	-	0.0794 (0.20)
<i>P_Type II*KPMG*SOX</i>	-	0.0178 (0.03)	-	-0.0201 (-0.05)
<i>P_Type II*PwC*SOX</i>	-	-0.4321 (-0.75)	-	0.3345 (1.01)
<i>Intercept</i>	?	-3.3849*** (-27.76)	?	-4.6887*** (-6.69)
<i>Observations</i>		121,575		121,575
<i>Adjusted R<sup>2</sup></i>		24.28%		51.85%

error and the specific Big 4 firm on the Type II error still has a significantly positive effect at the 0.01 level as in the second regression to test Hypothesis 1b.

Surprisingly, the interaction between the prior Type II error, the specific Big 4 firm and the SOX has no significant effect on the Type II error for each of the Big 4 firms, indicating that the passage of the SOX has no effect on the persistence in aggressive reporting. This is in line with the explanation that the passage of the SOX has no effect on the persistence in aggressive reporting, because of the endogeneity problems of the SOX, which make it difficult to draw the causal link between the passage of the SOX and the effect on the persistence in aggressive reporting. Next to this, the interactions between the prior Type I error and the specific big 4 firm are significantly negative on the Type II error for the Big 4 firms EY, Deloitte and PwC, indicating that conservative reporting, weakens the persistence in aggressive reporting for EY, Deloitte and PwC. Interactions with the addition of the SOX variable has no significant effect on the Type I error indicating that conservative reporting, after the passage of SOX, has no significant effect on the persistence in aggressive reporting. Taken together, these findings provide no support for Hypothesis 2b.

## **VI Conclusion**

Prior literature has documented that there are substantial observable differences in audit reporting across audit partners over time, but has provided limited evidence of the persistence in audit firm reporting style (Beyer & Sridhar, 2006; Messier et al., 2008; Knechel et al., 2015). Other literature has focussed on the Sarbanes-Oxley Act that was implemented to create a greater responsibility for auditors in the enforcement of laws with regard to theft and fraud by corporate officers as well as enforcement by and regulations from the Public Company Accounting Oversight Board (Coates & Srinivasan, 2014). Unfortunately, the literature provides limited evidence about the effects of the Act on audit reporting, in particular the persistence in audit firm reporting style. This study has the objective to contribute to both streams of literature by building on the fields that have limited evidence.

By the use of logistic regression, I find evidence that there is persistence in both conservative- and aggressive reporting by Big 4 audit firms over time, which is in line with

Knechel et al. (2015). Moreover I find that aggressive (conservative) reporting weakens the persistence in conservative (aggressive) reporting, which is in line with Messier et al. (2008).

Furthermore, I find that the passage of the SOX weakens the persistence in conservative reporting, which is in line with the alternative reasoning that auditors who made a prior conservative error are possibly aware that they made such an error, which could make them more focussed to issue the right auditor opinion in the next year, leading to a decrease in persistence of conservative reporting.

Next to this, I find that the passage of the SOX has no effect on the persistence in aggressive reporting, what is in line with the explanation that the passage of the SOX has no effect on the persistence in aggressive reporting, because of the endogeneity problems of the SOX, which make it difficult to draw the causal link between the passage of the SOX and the effect on the persistence in aggressive reporting.

This research was limited by the data about the audit firm level and focused on Big 4 audit firms. Future research could focus on the audit partner level and examine the persistence of conservative (aggressive) reporting for other important economic events, such as the financial crisis. Moreover, research should focus on the endogeneity problems of the SOX to mitigate the constraints to draw causal links.

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## APPENDIX

### Variable definitions

This appendix illustrates how variables are defined and measured.

<i>Variables</i>	Definitions
<b>Panel A: Variables used for Hypothesis 1a and 1b</b>	
<i>Type I</i>	Dummy variable that takes the value 1 if the auditor issues an qualified opinion, while the audited firm does not fail for bankruptcy within one year after the issuance of the opinion, 0 otherwise.
<i>Type II</i>	Dummy variable that takes the value 1 if the auditor issues an unqualified opinion, while the audited firm fails for bankruptcy within one year after the issuance of the opinion, 0 otherwise.
<i>P_Type I</i>	Dummy variable that takes the value of 1 if the auditor made a Type I error last year.
<i>P_Type II</i>	Dummy variable that takes the value 1 if the auditor made a Type II error last year, 0 otherwise.
<i>EY</i>	Dummy variable that takes the value 1 if the auditor works for the Big 4 audit firm Ernst & Young, 0 otherwise.
<i>Deloitte</i>	Dummy variable that takes the value 1 if the auditor works for the Big 4 audit firm Deloitte Touche Tohmatsu, 0 otherwise.
<i>KPMG</i>	Dummy variable that takes the value 1 if the auditor works for the Big 4 audit firm KPMG, 0 otherwise.
<i>PwC</i>	Dummy variable that takes the value 1 if the auditor works for the Big 4 audit firm PricewaterhouseCoopers, 0 otherwise.
<b>Panel B: Variables used for hypothesis 2a and 2b</b>	
<i>SOX</i>	Dummy variable that takes the value 1 if the fiscal year takes place after the passage of the SOX, 0 otherwise.
<i>Industry effects</i>	Variable that measures the sensitivity of a specific industry on the dependent variable.
<i>Time-fixed effects</i>	Variable that measures the sensitivity of a specific four year time frame on the dependent variable.