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Accounting, Auditing & Control

Consequences of possible disclosure of Critical Audit Matters on goodwill impairment recognition

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Abstract

Goodwill should not be amortized but tested for impairment based on its current fair value under ASC 350. This approach allows managers to incorporate their self-interests in these estimates. On the other hand, auditors should provide additional information about these managerial estimates if they identified them as Critical Audit Matters during the audit under AS 3101. I examine whether the possibility of receiving CAMs is associated with goodwill impairment loss recognition using a difference in differences research design. Taking benefit from the staggered implementation of AS 3101, the treatment group consists of large accelerated filers, while the control group is from non-large accelerated filers. I do not find significant evidence that possible CAMs affect goodwill impairment loss recognition. Furthermore, I perform an additional test on a propensity matched sample as the parallel trend is violated. The findings are consistent with the results of the main analysis.

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1. Introduction

This paper aims to provide evidence whether there is a significant association between goodwill impairment recognition and the possible disclosure of Critical Audit Matters in the auditor's report.

Goodwill is not amortized annually but tested for impairment based on its current fair value under Accounting Standard Codification (ASC) 350 in the United States of America. Consequently, it must be impaired if its current fair value is lower than its carrying amount, in this way managers must determine a fair value estimate. However, this task is extremely hard, since the asset is not actively traded in the market (Stein, 2019). Therefore, this process can be easily biased and can provide opportunities to use it for the managers' interest (Filip et al., 2015). Several studies find evidence that goodwill impairment loss recognition can be used for earnings management to avoid timely write-offs (e.g. Watts, 2003; Ramanna and Watts, 2012; Li and Sloan, 2017).

On the other hand, the Public Accounting Oversight Board (PCAOB) introduced AS 3101 in 2017, which requires the identification and disclosure of Critical Audit Matters to the auditor's report. The main goal of this new standard is to reduce the information asymmetry between the management and other stakeholders by providing additional information about the firm's financial statements (PCAOB, 2017b). As Critical Audit Matters are one of most important expansions to the auditor's report in the USA since the 1940s (Burke et al., 2023), it is crucial to examine its indirect consequences in practice, as well. As mentioned above, this paper aims to analyze the association between goodwill impairment loss recognition and the possibility of receiving CAMs.

Examining this association contributes to the academic literature since there is a tension in the existing literature related to this topic. There are studies which suggest that managers might be more motivated not to delay goodwill impairment loss recognition since the introduction of CAMs. Firstly, Gold et al. (2020) find that managers may be disincentivized to engage in aggressive accounting decisions because of the presence of CAMs. Furthermore, they also find evidence that firms with higher goodwill amount are more likely to receive goodwill-related CAMs suggesting that managers who did not impair goodwill have higher possibility to receive goodwill-related CAMs as a signal of more complex and possibly more self-driven estimates. Moreover Fuller (2015) and Kang (2019) conclude that managers may obliged to share more information about their estimates if CAM disclosure is present which suggest that they might be motivated to avoid receiving CAMs.

On the other hand, there is evidence that the introduction of CAMs does not have an impact on goodwill impairment loss recognition. Gutierrez et al. (2018) and Liao et al. (2022) conclude that the expanded report does not have incremental information for investors suggesting that managers might ignore the possibility of receiving CAMs as it might not be important for these stakeholders. Moreover, Cowle and Rowe (2022)

and Minutti-Meza (2021) provide evidence that auditors might not be motivated to disclose CAMs either, as their reputation may be damaged. Based on these prior findings, I formulate my hypothesis as following: *The possible disclosure of CAM to the auditor's report is not associated with goodwill impairment recognition.*

To provide evidence useful for practitioners and try to ease this tension in the literature, I conduct the main analysis using difference in differences research design. Following Burke et al. (2023), I take benefit from the staggered implementation of the new standard, since large accelerated filers were mandated to adopt it for fiscal years ending on or after 30 June 2019 and it came into force for fiscal years ending on or after 15 December 2020 for all other filers (PCAOB, 2017b). Consequently, I conduct the main analysis on a sample from 2017-2020 consisting of 979 control firm-years (non-large accelerated filers) and 2791 treatment observations (large accelerated filers). In addition to the basic difference in differences research design, I include managerial incentives, firm-level, debt contracting and governance & monitoring control variables (Glaum et al., 2018) and industry fixed effects based on Gutierrez et al. (2018), as well. The dependent variable is the amount of goodwill impairment loss deflated by the total assets in the beginning of the year (Ramanna and Watts, 2012).

As a first step of the analysis, I conduct statistical tests regarding the parallel trend before the introduction of Critical Audit Matters. The results indicate that the trend is violated, in this way I conduct an additional test on a propensity score matched sample. Furthermore, I use three models to test my hypothesis in the main analysis. In the first one, neither control variables, nor fixed effects are included. The second model contains every control variable and fixed effects, while the third one only control variables. None of the models provide significant evidence to reject my null hypothesis. Thus, they suggest that there is no significant association between the possibility of receiving Critical Audit Matters and goodwill impairment loss recognition. These findings are consistent with the results of the analysis on a propensity score matched sample of 366 observations.

This paper contributes to the existing literature in several ways. Firstly, prior studies (Liao et al., 2022, Gutierrez et al., 2018; Burke et al., 2023; Bérard et al., 2019) examine the consequences of Critical Audit Matters from the investors' perspective focusing on the usefulness of the expanded audit report. In contrast with these studies, I put the emphasis on the firms' and managers' financial reporting decisions regarding goodwill by examining if they react to the new standard focusing on one of the assets that exposed to managerial influence the most. The findings add to this line of literature that not only investors do not react to CAMs, but managers either. Furthermore, I add to Gold et al.'s (2020) experimental study by performing archival research as a continuance of their study. In addition, they examine whether the presence of CAMs has an impact on the executives' behaviour. In contrast to this analysis, I study if the possibility of receiving can even affect their reporting decisions regarding goodwill. Furthermore, I contribute to this study by showing that managers do not change their

decisions significantly regarding goodwill impairment because of the bare possibility of receiving CAMs. Moreover, there are several studies (e.g. Li et al., 2011; Ramanna and Watts, 2012; Li and Sloan, 2017) examining the impact of SFAS 142 which is a predecessor of ASC 350 on goodwill impairment loss recognition. They all find that the introduction of fair value-based impairment may have resulted in temporarily inflated earnings and may be used to avoid timely loss recognition. I contribute to this line of literature by examining if the introduction of CAMs can prevent at some extent the explosion of ASC 350. Lastly, the findings add to this line of literature by providing evidence that CAMs cannot prevent the incorporation of private incentives in the fair value estimate of goodwill significantly.

As the impact of the introduction of Critical Audit Matters on goodwill impairment recognition requires academic insights, the topic of this thesis can be useful for several practitioners, as well. Since goodwill is expected to become more and more important in the future (Filip et al., 2015), it is essential for standard setters or board members, managers to have an understanding how goodwill is affected by CAMs. This perspective can be also useful for investors to understand the trustworthiness of these unverifiable estimates, for regulators who might aim to prevent the incorporation of self-interests in the estimates and for firms to know in which areas they should improve their controls to decrease this type of earnings management.

Furthermore, the results of this paper might affect the abovementioned practitioners in different ways. Firstly, it indicates for standard setters and regulators that CAMs does not significantly affect the recognition of goodwill impairment loss, therefore other regulations are needed in case of preventing the explosion of fair value-based impairment. Secondly, investors may have more information about the estimates thanks to the expanded report, although the trustworthiness of these estimates may not have improved significantly. Lastly, firms also should pay attention to these estimates as auditors might not be able to detect self-interests with possibility of disclosing CAMs either.

The remainder of this paper is structured as follows: the second chapter provides an introduction of existing relating literature to build a theoretical framework. Then, based on these prior studies, I develop my hypothesis. Next, in the third chapter, I provide further information about the sample selection process and the research design. Next, I perform analyses and demonstrate the results of my both tests. Lastly, I provide a conclusion to close this paper.

2. Theoretical background and hypothesis development

As I investigate whether the possibility of receiving Critical Audit Matters is associated with goodwill impairment loss recognition, I demonstrate the results of prior studies in connection with my topic in this section. To build up the theoretical framework, I investigate the prior research of earnings management, then goodwill

impairment, lastly CAMs, focusing especially on relations among them. The last part of this chapter contains the hypothesis development.

2.1. Earnings management

Healy and Wahlen (1999) argue that managers should be permitted to incorporate their private information about the firm's performance in the financial reporting. It includes the use of different estimates, reporting methods, and disclosures to convey more information to the stakeholders. However, this flexibility could lead to earnings management, in which financial statements do not reflect the true underlying economic performance of the given firm. According to the authors' definition, earnings management is *"when managers use judgment in financial reporting and in structuring transactions to alter financial reports to either mislead some stakeholders about the underlying economic performance of the company or to influence contractual outcomes that depend on reported accounting numbers."* (Healy and Wahlen, 1999, p.368)

If the abovementioned flexibility is sometimes used for earnings management, what are the managers' incentives to engage in such manipulations? Apart from the incentives included in the definition, Healy and Wahlen (1999) list 3 motives that could lead to earnings management: capital market motivations, contracting motivations and regulatory motivations. Regarding capital market motivations, prior to management buyouts Perry and Williams (1994) find negative unexpected accruals which decrease the income of the firm, consequently leading to a lower purchase price. On the other hand, several studies (e.g., Teoh et al., 1998a; Teoh et al., 1998b) show evidence that prior to equity offers, managers tend to overstate earnings. Lastly, prior research (e.g., Burgstahler and Eames, 2006) also finds that managers try to at least meet the analysts' expectations to satisfy the firm's investors. Furthermore, in case of contracting motivations, prior research (e.g., Healy and Palepu, 1990) finds little evidence that managers use earnings management when the firm is close to the lending covenants. In addition, managers have incentives to manage earnings in case of management compensation contracts to increase their bonuses (Guidry et al., 1999, Healy, 1985; and Holthausen et al., 1995). Lastly, regulatory considerations can also create incentives for managers to manipulate earnings. For instance, Watts and Zimmerman (1978) find evidence that firms under an anti-trust investigation tend to manage their earnings downward to seem less profitable.

Moreover, not only accruals can be used to manage earnings. Roychowdhury (2006) distinguishes between accrual-based earnings management and real activities manipulation and finds evidence that managers use real activities to manipulate earnings to avoid reporting losses, as well. The former refers to the circumstances where accruals are managed to serve managers' incentives but have no direct cash flow consequences. On the other hand, real activities manipulation is defined as following:

Departures from normal operational practices, motivated by managers' desire to mislead at least some stakeholders into believing certain financial reporting goals have been met in the normal course of operations. These departures do not necessarily contribute to firm value even though they enable managers to meet reporting goals. *(Roychowdhury, 2006, p. 337)*.

It involves aggressive price discounts which aim to accelerate sales volumes but can also lead to lower profit margins in the future. Moreover, delaying write-offs or understating provisions for bad debt expenses are also examples. These activities might increase the firms' performance in the present but will have a negative effect on the cash flow in the future *(Roychowdhury, 2006)*.

The operationalization of earnings management is still a concerning point among academics. One of the most widespread approaches is the Jones's model. Jones (1991) measures earnings management as the discretionary portion of total accruals since accruals require the most judgement of the management and includes most of the uncertainty. However, because of the model's limitations, I use goodwill impairment recognition as a proxy for earnings management in my research. I explain why I think goodwill impairment is a good proxy for earnings management below.

2.2. Goodwill impairment

Under Accounting Standards Codification (ASC) 350 in the United States of America, goodwill should not be amortized, but tested for impairment using its current fair value. Based on this standard, goodwill must be impaired if its carrying value is greater than its fair value, consequently management must determine a fair value estimate to decide whether a write-off is needed. However, it is extremely hard to develop an estimate since the asset is not actively traded in the market. Thus, assumptions can be biased easily to avoid reporting the true amount of loss (Stein, 2019). Goodwill impairment is tested in its reporting unit level and includes 2 steps: in the first step the total fair value of the reporting unit is determined and compared to its book value. If the book value is higher than the estimated fair value, the fair value of the unit's goodwill is determined. In case of lower fair value, the goodwill will be written off. Lastly, the amount of impairment of different reporting units will be aggregated (Ramanna and Watts, 2012).

Based on the abovementioned process, goodwill impairment is in the managers' discretion and provides opportunities to use it for their own interests (Filip et al., 2015). Filip et al. (2015) find that firms that postpone recognizing impairment, manage their level of cashflows upward compared to those firms which record goodwill impairment. Furthermore, cash flow management is more important for firms which have larger amount of goodwill. Moreover, they point out to the importance of goodwill by stating that in the future there will be a higher chance that a firm will grow through acquisitions and mergers than through organic growth. Consequently, its portion of total assets will increase making it even more important (Filip et al., 2015).

In addition, unlike other assets, once goodwill was written-down, it cannot be written-up. This paper also suggests that on average there are more benefits of delaying goodwill impairment recognition than costs of it (Filip et al., 2015). Moreover, the impairments of other long-lived assets and investment securities are influenced by goodwill impairment which also shows the importance of goodwill (Stein, 2019). Li et al. (2011) also point out to the importance of goodwill and its impairment loss recognition by examining the consequences of Statements of Financial Accounting Standards (SFAS) 142 which standard ended the amortization of goodwill in 2001, and was superseded by ASC 350. They find evidence that market reacts to the announcement of goodwill impairment loss and revises its expectations downwards because of failing to take benefits from prior acquisitions. Furthermore, the goodwill impairment loss recognition also affects the sales growth negatively in the upcoming 2 years (Li et al., 2011).

Furthermore, based on prior research, goodwill can be used for earnings management as its impairment is in the managers' discretion. Watts (2003) finds that the current standards allow managers to use this form of impairment tests for manipulating earnings. The author points out that the valuation of future cashflows is needed for the assessment of goodwill impairment. However, this estimate is unverifiable and extremely subjective, consequently it can lead to overstated net assets. In addition, Ramanna and Watts (2012) and Li and Sloan (2017) suggest that management uses their discretion over impairments to inflate goodwill balances and as a result, to avoid timely write-offs.

In addition, as a form of earnings management, managers may have different levels and types of incentives to delay goodwill impairment loss recognition based on the evidence provided by prior literature. Hodder and Sheneman (2022) conclude if managers have high incentives to manage earnings, it is less likely that they will report impairment. Moreover, Glaum et al. (2018) show that goodwill impairment is related to managerial and firm-level incentives, as well. In addition, based on the unverifiable discretion impairment test allows for managers, Ramanna and Watts (2012) find evidence that executives have debt covenant contracting, as well as compensation contracting incentives to avoid goodwill impairment loss recognition. Furthermore, Beatty and Weber (2006) conclude that a CEO with a longer tenure is less likely to record an impairment.

Finally, prior research also provides evidence that goodwill impairment was of high importance of an audit even before the introduction of Critical Audit Matters (CAMs). PCAOB (2017a) highlights that there are audit deficiencies in evaluation of managers' goodwill impairment analyses. Furthermore, based on Ayres et al. (2019), this evaluation can also be biased. They argue that auditors can minimize managers' ability to use goodwill impairment for earnings management theoretically. However, the contrasting incentives between managers and auditors can strain their relationship. The authors find economically significant evidence that recognizing

goodwill impairment loss can lead to auditor dismissals. This suggests that goodwill impairment even plays a role in changing auditors. Furthermore, Carcello et al. (2020) examine if there is an association between nonaudit services and goodwill impairment loss recognition. The authors state that nonaudit fees affect audit independence detrimentally. They conclude that there is a negative association between them, which also provide evidence that auditors have a very important role in recording goodwill impairment. Lastly, Ghosh and Xing (2021) find that auditors put more effort in testing larger amounts of goodwill and testing the magnitude of goodwill impairment loss if goodwill should be impaired.

2.3. Critical Audit Matters

The Public Company Accounting Oversight Board (PCAOB) introduced Critical Audit Matters (CAMs) with its new standard called AS 3101, *The Auditor's Report on an Audit of Financial Statements When the Auditor Expresses an Unqualified Opinion* (the "final standard" or "AS 3101") in 2017. The new standard main goal is to share additional information with the investors and other users of the auditor's report beside the pass or fail opinion. Consequently, it is to protect the interest of investors and the public by providing informative, accurate and most importantly independent third-party opinion about a firm's financial statements. Furthermore, auditors gain insight into issues that require challenging, subjective, and complex judgement from the management, however investors and other users did not have this information which led to heightened information asymmetry between management and investors. This new standard aims to reduce this asymmetry as well (PCAOB, 2017b). PCAOB defines Critical Audit Matter:

> As any matter arising from the audit of the financial statements that was communicated or required to be communicated to the audit committee and that relates to accounts or disclosures that are material to the financial statements and involved especially challenging, subjective, or complex auditor judgment. (PCAOB, 2017b, p.16)

According to the Board, CAMs identify areas in the financial statements that investors have high interest in, such as management estimates, significant unusual transactions or areas including heightened audit and financial statement risk. These identified matters must be included in the auditor's report which also describes how they were addressed during the audit and which accounts or disclosures they are related to. Additionally, Critical Audit Matters are determined based on a principle-based framework where the required audit effort depends on the nature complexity of the audit. Lastly, AS 3101 is effective from 30 June 2019 for large accelerated filers and from 15 December 2020 for all others in the United States of America (PCAOB, 2017b). Appendix 4 illustrates an example of CAM related to goodwill.

2.4. Hypothesis development

There is prior evidence related to my topic that the possibility of receiving CAMs may motivate managers not to delay impairment as it is more likely that auditors will pay more attention to it given its nature and their responsibility identifying Critical Audit Matters. Burke et al. (2023) find that CAMs relating to intangible assets, revenue, and mergers and acquisitions are the most frequently reported. The findings suggest that auditors pay even heightened attention to these matters and understanding managers' estimates thanks to the introduction of CAMs since these accounts, including goodwill, are exposed to managers' valuation, and consequently used for earnings management the most. In addition, Gold et al. (2020) conclude that managers that received a report with CAMs show lower tendency for making aggressive financial reporting decisions compared to those received a report without CAMs. These findings show that beside the heightened attention of auditors, managers react to CAMs and may incorporate fewer private incentives in their estimates to avoid receiving CAMs for the next year. Moreover, Gold et al. (2020) also find that managers receiving a report with goodwill-related CAMs chose a higher goodwill amount, suggesting that managers who did not impair goodwill are more likely to get goodwill-related CAMs as a signal for more complex and probably more self-served estimates. In addition, Gutierrez et al. (2018) find that CAMs can improve audit quality, as well, which also suggests that the level of earnings management is lower and consequently, there might be less avoidance of recognizing goodwill impairment loss.

Moreover, CAM disclosure emphasizes the accounts which are difficult to audit since they involve higher level of management's subjective judgement and as a result, higher measurement uncertainty (e.g. PCAOB 2017b; Christensen et al. 2014). In addition, receiving Critical Audit Matters can be costly for managers as they might have to share information about the estimates which serves self-interested incentives (e.g. Robinson et al. 2011; Nagar et al., 2003). Kang (2019) also shows evidence that the audit committee asks more information on the management's estimates in case of CAM disclosures. Furthermore, Fuller (2015) concludes that managers even include more disclosures about their estimates when a CAM disclosure is present. Additionally, Hollie (2020) finds that CAMs identify those accounts of the financial statements that have the most uncertainty. These findings of prior literature suggest that managers also have incentives to avoid receiving CAMs and sharing more information about their estimates. Therefore, they might be more likely to lower the level of earnings management and to record a goodwill impairment loss.

On the other hand, some evidence indicates that managers may not be more motivated to record goodwill impairment loss after the introduction of CAMs. Tan and Yeo (2022) find evidence that the possibility of CAM disclosure does not always lead to more conservative financial reporting. They conclude that if CAM originates from a distant auditor, managers use more conservative accounting estimates, although if it comes from a close auditor, they may be engaged in more aggressive accounting

estimates. Furthermore, Gutierrez et al. (2018) and Liao et al. (2022) also conclude that the expanded audit report does not include incremental information for investors by examining a sample from the United Kingdom (former) and in case of the latter from China and Hong Kong suggesting that managers might ignore the possibility of receiving CAMs as they know that this additional information may not be important for investors. Moreover, Cowle and Rowe (2022) find evidence that the market penalizes auditors who are more critical with their clients. They argue that these auditors are less attractive in the audit market and companies are affected by this information during the auditor selection process. Lastly, Minutti-Meza (2021) concludes that CAMs can cause longer negotiations, and strained communication between clients and auditors as well as, increasing the litigation risk. These findings suggest that auditors may not be motivated to disclose CAMs either, as their reputation might be damaged.

Based on the prior research and the contradictory results provided by earlier studies on the consequences of CAM, I formulate my research question: ***Is there an association between goodwill impairment recognition and the possible disclosure of CAMs?***

Lastly, based on my research question, I develop my hypothesis that I test in the following chapter:

Hypothesis: *The possible disclosure of CAM to the auditor's report is not associated with goodwill impairment recognition.*

3.   Research design

This chapter aims to describe the research design used to test my hypothesis. In addition, I also include the sample selection process as well as the final sample.

3.1. Sample selection

As mentioned above, AS 3101 did not become effective for all firms in the US at the same time. The auditors of large accelerated filers were mandated to adopt the new standard for fiscal years ending on or after 30 June 2019 and for other filers it was effective for years ending on or after 15 December 2020 (PCAOB, 2017b). I follow Burke et al. (2022) by taking benefit from this staggered implementation and use a difference in differences research design to examine the effect of Critical Audit Matters on the recognition of goodwill impairment loss. Consequently, the treatment group consists of large accelerated filers and the control group are all others.

I download my main data from Compustat for the years 2017 to 2020. As CAMs must be included from end of June 2019, I have 2.5 years in the pre-period. In addition, since the standard came into force for all other filers on 15.12.2020, I exclude firm-year observations with fiscal year ending after this date. Furthermore, following Ramanna and Watts (2012) and Filip et al. (2015), financial institutions (SIC codes 6000-6999) and firm-years with negative equity are eliminated considering the special

case of the financial sector and the fact that a goodwill impairment is less compelling for firms with negative equity. In addition, I concentrate on the US firms, consequently I use a sample with firms with headquarters in the USA. Then, based on Carcello et al. (2020) I only include firm-years for which the amount of goodwill is higher than 0.5% of the total revenue as these firms are suspected to impair this asset.

After these steps, I match my data from Compustat with Audit Analytics to identify large accelerated filers and the given firms' auditors. In case of missing values, the observations are eliminated. Lastly, I also include data from BoardEx to determine if there was a change in CEO during the fiscal year. If there is more than 1 person with the title of CEO, I calculate the average tenure of the executives which shows if each officer is new in the position. After the elimination of observations with any missing values, I have a total sample of 3770 firm-years with a treatment group of 2791 observations and a control group consisting of 979 observations. Table 1 describes the major steps of my sample selection process.

Sample selection process	Sample size
Sample downloaded without SIC codes 6000-6999	21 535
Exclusion of observations with fiscal years ending after 15.12.2020	*-4 050*
	17 485
Elimination of observations with headquarters other than USA	*-3 976*
	13 509
Exclusion of observations for which goodwill is less than 0.5% of total revenue	*-6 486*
	7 023
Elimination of all observations with any missing values	*-3 026*
	3 997
Exclusion of firm-years with negative value of equity	*-227*
	3 770
where:	
Treatment group	**2 791**
Control group	**979**

Table 1: Sample selection process

3.2. Description of tested models

I operationalise my theoretical constructs as following to test my hypothesis: The avoidance of goodwill impairment recognition is considered as a tool of accrual-based earnings management based on prior research listed in the previous chapter. As a result, following Ramanna and Watts (2012), my dependent variable is the amount of goodwill impairment deflated by the total assets in the beginning of year. In addition, the first independent variable is CAM, which is a dummy variable that equals one for firms that can receive CAM (i.e. the treatment group), zero otherwise. Moreover,

following Burke et al. (2022), POST is also a dummy variable, one for year-ends on or after 30 June 2019, zero otherwise.

Based on Glaum et al. (2018), I identify the following types of control variables that are added to my model: managerial incentives, firm-level, debt contracting and Governance & Monitoring. Firstly, CEO_TURN captures the managerial incentives, and equals one if there was a change in CEO in the current year, and zero otherwise. The authors find that a new CEO may have incentives to clean out the goodwill from previous acquisitions and be reluctant to write down the new ones. Secondly, I add firm-level control variables, GW/TA should be included because the possibility of recording goodwill impairment is greater for firms which have higher amount of goodwill. Furthermore, the authors also find a significant association between ROA and goodwill impairment, therefore I also include it in my model as a control variable. Next, larger firms are more likely to recognise goodwill impairment, as a result I include SIZE in my model captured by assets (Glaum et al., 2018). In addition, it is also important to control for the recent acquisitions, in this way I add GW_AC which is an indicator variable equals one if the firm completed an acquisition that resulted in an increased goodwill amount during the current year, zero otherwise (AbuGhazaleh et al., 2011). The last control variable in this group is MTB, since firms with a market-to-book ratio less than one is more likely to experience a goodwill impairment (Carcello et al., 2020).

Moreover, I also include LEVERAGE, which is my debt contracting control variable since Filip et al. (2015) find evidence that financial leverage is negatively associated with earnings management. Lastly, BIG4 is used for controlling for governance and monitoring features and is an indicator variable, equals one if the firm is audited by a Big4 company and zero otherwise (Glaum et al., 2018). In addition, following Gutierrez et al. (2018) I also incorporate industry fixed effects using Standard Classification Codes in my models[1] . Appendix 1 provides further information about the variables.

Taken as a whole, I test the following regression model. Model I only includes CAM, POST and CAM×POST, while Model II incorporates industry fixed effects and control variables. Lastly, model III does not include fixed effects:

Goodwill impairment= β_0 + β_1*CAM + β_2*POST+ β_3*CAM*POST +Controls + ε

The coefficient of interest is β_3 as it captures the differences between the two groups in the post period, in this way it shows the real effect of the introduction of Critical Audit Matters on goodwill impairment loss recognition. The Libby boxes (Figure 1) conclude the concepts and how they are operationalized in my model above.

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[1] *I only use industry fixed effects since the time indicator variable incorporates most of the effect of year fixed effects.*
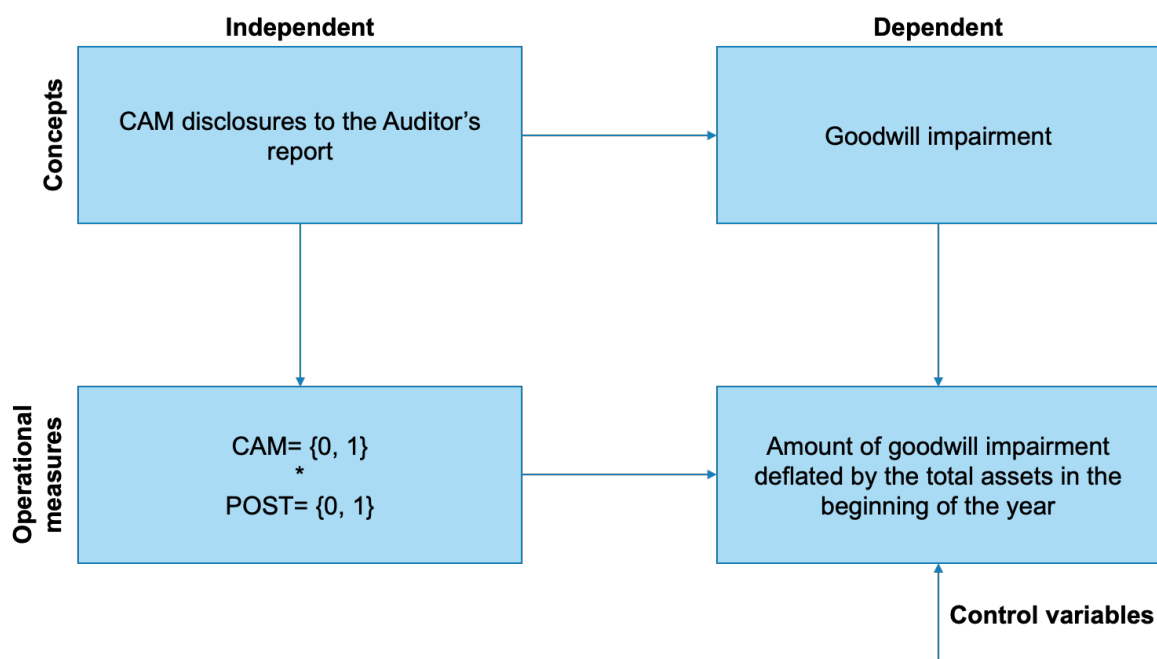
Figure 1: Libby boxes

4. Empirical results and analysis

This chapter contains the descriptive statistics of the main sample with the evaluation of the deemed parallel trend between the treatment and control group before the intervention. After that I present the results of the main test and decide if the null hypothesis can be rejected. Lastly, to enhance the validity of my main test, I conduct a robustness check using a propensity score matched sample.

4.1. Descriptive statistics

First of all, I winsorize every independent continuous variable at 1% and 99% to control for the outliers presented in the descriptive statistics in Appendix 2. Appendix 2 also shows that the results are almost the same for the samples with and without winsorization. Table 2 contains the comparative descriptive statistics for this winsorized sample. The first two tables above represent the pre-period for non-large accelerated filers and for large accelerated filers, respectively. There are differences between the two samples before the treatment. Firstly, only 37% of the given firm-years are audited by a Big4 auditor in the control group, while this ratio is 92% in the treatment group. Secondly, 25% of the control group acquired goodwill in the examined period, compared to 40% in the treatment group. Furthermore, an average firm-year is loss-making based on the mean value of ROA, while the average return on assets is 5% in the treatment group. Lastly, means of the size and market to book ratio are also higher for large accelerated filers. Based on these differences, I perform t-tests for continuous variables and chi-square tests for categorical variables to examine whether the parallel trend is valid before the treatment.

The last column shows the results from these tests. The means of the variables are significantly different at 10%, 5% and 1% for each variable, expect for CEO_TURN. These tests indicate that the parallel trend assumption is violated, and a robustness test is needed to verify my results. Consequently, I perform my regression on a propensity score matched sample following the main analysis.

The other two tables below show the statistics after the new regulation comes into force. I also perform tests to examine whether the means of the two groups are significantly different. The last column indicates the same results as for the pre-period that the differences are significant, expect for the variable capturing if it was a change in the role of CEO or not, similarly to the pre-period. Furthermore, Figure 2 presents the average goodwill impairment loss deflated by total assets in the beginning of the year by year and groups. This figure shows that the average does not change in 2019, however there is a slight increase in case of large accelerated filers in 2020.
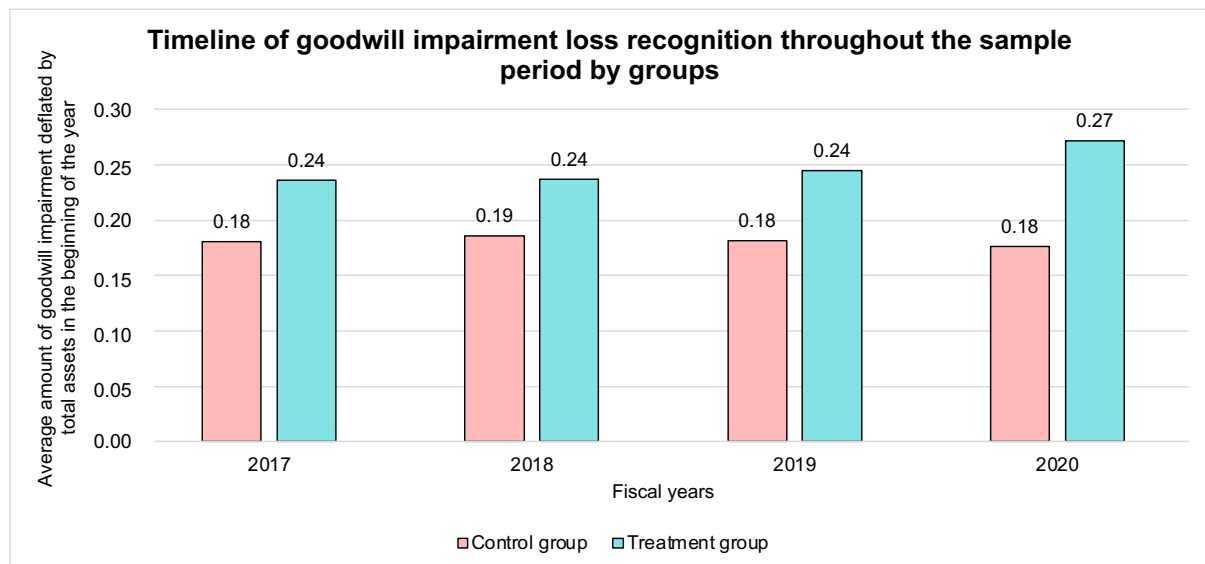
Figure 2: Average goodwill impairment deflated by total assets in the beginning of the year by group and year

4.2. Results and analysis of main test

Table 3 shows the results from the main analysis. The first model presented in column (1) does not contain any control variables, only the independent variables are included. The only significant variable is CAM whose coefficient indicates that there is a positive relation between the type of the given firm (large accelerated filer or not) and goodwill impairment. It suggests that if a company is a large accelerated filer, its goodwill impairment is 5.3% larger than non large accelerated filers' holding everything else constant. On the other hand, the variable POST, and the variable of interest are not significantly associated with goodwill impairment loss recognition. Lastly, the adjusted R^2 is only 0.013 which also shows the weakness of this model.

WINSORIZED

CAM=0 POST=0 Variable	N	Mean	Median	St. Dev.	Min	Max	CAM=1 POST=0 Variable	N	Mean	Median	St. Dev.	Min	Max	T-test/chi-square test
Goodwill impairment	588	0.18	0.12	0.19	0.002	1.44	Goodwill impairment	1677	0.24	0.19	0.23	0.001	3.33	-6.22***
BIG4	588	0.37	0	0.48	0	1	BIG4	1677	0.92	1	0.27	0	1	769.42***
CEO_TURN	588	0.18	0	0.39	0	1	CEO_TURN	1677	0.17	0	0.38	0	1	0.21
GW_AC	588	0.25	0	0.43	0	1	GW_AC	1677	0.4	0	0.49	0	1	42.167***
LEVERAGE	588	0.17	0.13	0.17	0	0.5	LEVERAGE	1677	0.25	0.26	0.18	0	0.65	-9.67***
GW/TA	588	0.16	0.12	0.12	0.002	0.37	GW/TA	1677	0.21	0.18	0.15	0.001	0.52	-8.12***
ROA	588	-0.02	-0.001	0.11	-0.19	0.19	ROA	1677	0.05	0.05	0.06	-0.05	0.15	-14.68***
SIZE	588	5.36	5.51	1.31	2.69	8.33	SIZE	1677	8.17	8.06	1.49	4.98	11.15	-43.14***
MTB	588	2.06	1.80	1.09	0.12	3.87	MTB	1677	3.71	3.07	2.2	0	7.4	-23.56***

CAM=0 POST=1 Variable	N	Mean	Median	St. Dev.	Min	Max	CAM=1 POST=1 Variable	N	Mean	Median	St. Dev.	Min	Max	T-test/chi-square test
Goodwill impairment	391	0.18	0.11	0.18	0.002	1.54	Goodwill impairment	1114	0.25	0.21	0.23	0.001	3.2	-6.13***
BIG4	391	0.35	0	0.48	0	1	BIG4	1114	0.92	1	0.27	0	1	534.78***
CEO_TURN	391	0.19	0	0.39	0	1	CEO_TURN	1114	0.2	0	0.4	0	1	0.15
GW_AC	391	0.23	0	0.42	0	1	GW_AC	1114	0.38	0	0.49	0	1	28.49***
LEVERAGE	391	0.23	0.18	0.19	0	0.59	LEVERAGE	1114	0.3	0.30	0.18	0	0.69	-6.35***
GW/TA	391	0.15	0.11	0.12	0.002	0.36	GW/TA	1114	0.21	0.19	0.15	0.002	0.54	-7.95***
ROA	391	-0.02	-0.004	0.09	-0.17	0.16	ROA	1114	0.04	0.04	0.06	-0.06	0.15	-12.26***
SIZE	391	5.38	5.58	1.3	2.75	8.4	SIZE	1114	8.29	8.16	1.36	5.49	10.84	-37.62***
MTB	391	1.86	1.58	1.07	0	3.63	MTB	1114	3.89	3.17	04.Feb	0	7.92	-22.56***

Table 2: Descriptive statistics of the winsorized sample

Note: This table provides the descriptive statistics of the four subsamples where CAM=0 POST=0; CAM=1 POST=0; CAM=0 POST=1; CAM=1 POST=1. The last column contains the results of the significance analysis of the differences in means where *p<0.1, **p<0.05, ***p<0.01. All variables are defined in the Appendix.

In the second model (column (2)) beside the control variables, industry fixed effects are also included. This model suggests that there is no significant relation between CAM, POST or CAM×POST and goodwill impairment loss recognition. However, some control variables are significant. Firstly, CEO_TURN is significant at 5% suggesting that if there is a new CEO, the goodwill impairment loss recognition is

	Results from main analysis		
	Dependent variable= Goodwill impairment		
	(1)	(2)	(3)
CAM	0.053***	0.004	0.008
	(0.010)	(0.009)	(0.008)
POST	-0.003	-0.003	0.002
	(0.014)	(0.009)	(0.009)
CAM×POST	0.015	0.012	0.006
	(0.017)	(0.010)	(0.010)
BIG4		-0.004	-0.0001
		(0.008)	(0.007)
CEO_TURN		0.012**	0.010*
		(0.006)	(0.006)
GW_AC		0.067***	0.064***
		(0.005)	(0.005)
LEVERAGE		0.012	0.004
		(0.016)	(0.013)
GW/TA		1.131***	1.140***
		(0.020)	(0.015)
ROA		0.041	-0.009
		(0.040)	(0.035)
SIZE		-0.003	-0.003*
		(0.002)	(0.002)
MTB		-0.0003	0.002*
		(0.001)	(0.001)
Constant	0.184***		-0.014
	(0.009)		(0.011)
Industry fixed effects	-	Included	-
Observations	3770	3770	3770
R2	0.014	0.675	0.649
Adjusted R2	0.013	0.646	0.648
Residual Std. Error	0.219 (df = 3766)	0.131 (df= 3462)	0.131 (df = 3758)
F Statistic	18.013*** (df = 3; 3766)	23.43*** (df= 307; 3462)	631.237*** (df = 11; 3758)
Note:			*p<0.1; **p<0.05; ***p<0.01

Table 3: Results from main analysis
Note: This table presents the estimations of model (1), (2) and (3) on the full winsorized sample. Model (1) does not include any control variables or fixed effects. Model (2) includes control variables and industry fixed effects, while model (3) only control variables. Z-statistics are presented in parentheses under the coefficients. All variables are defined in the Appendix.

higher on average by 1.2%. This result is in line with Glaum et al. (2018) who also find that new CEOs tend to clean out the goodwill from previous acquisitions. Furthermore, GW_AC which shows if there is a new goodwill acquisition in the given fiscal year is also significant. If there is a new acquisition, the goodwill impairment loss recognition is 6.7% higher on average than otherwise. The evidence of significant association is in line with AbuGhazaleh, Al-Hares and Roberts' (2011) findings. Finally, GW/TA is also significantly and positively associated with goodwill impairment recognition. It indicates that higher amount of goodwill may result in higher goodwill impairment. The adjusted R^2 of this model is larger than the previous one, it is 0.646.

In my last model, I exclude the industry fixed effects. The independent variables and the interaction term are not significantly associated with the outcome variable. However, just like in case of the second model, there are control variables that are significant. Apart from the variables which are also significant in the second model, SIZE and MTB are additional ones. There is a negative relation between the size of the firm and goodwill impairment loss recognition suggesting that larger firms are less likely to recognise loss. This finding contradicts Glaum et al. (2018) results who find evidence that larger firms tend to record more loss. Lastly, the market to book ratio is significantly and positively associated with goodwill impairment at 10% contradicting Carcello et al. (2020) findings. The adjusted R^2 stays around the same level as for the second model with 0.648.

Overall, every examined model suggest that I should not reject the null hypothesis that: '*The possible disclosure of CAM to the auditor's report is not associated with goodwill impairment recognition.*' Based on my sample and my models, I do not find evidence that there is a significant association between the disclosure of CAM to the auditor's report and goodwill impairment loss recognition.

4.3. Robustness check

As the parallel trend assumption of my main analysis is violated, I perform a robustness test to verify my results. This robustness test involves an analysis on a propensity score matched sample.[2] The main goal of the matching process is to obtain a sample consisting of matched observations from the control group and the treatment group that are similar to each other in the pre-period. Therefore, I match firms using each control variable of the main model in the pre-period and only include those in the sample used for further analysis that have pairs in 2017 and 2018.[3] Furthermore, I use the following specifications in the matching process with a logistic model based on Burke et al. (2023): I do not allow replacement, in this way every control observation can be only matched once (Shipman et al., 2017) and use a caliper width of 0.1. In

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[2] *I construct the propensity score matched sample based on Greifer's (2023) description of MatchIt package in R.*
[3] *The pre-period consists of 2017 and 2018. I match the observations in the pre period and only retain those firms in the sample that have pairs in 2017 and 2018 to make sure that the two groups are more similar to each other based on not only one, but two years.*

addition, I perform a 1-to-1 matching following Liao et al. (2022) since I aim to match each control observation to one treatment one (Shipman et al., 2017). At the end I have a full sample of 366 observations with a control group consisting of 200 and a treatment group consisting of 166 observations.[4] Figure 3 shows the propensity scores of the observations in the pre-period by groups where 0 represents non-large accelerated filers and 1 the large accelerated filers. The propensity scores of the two groups overlap each other, which indicates that the matching was successful. Lastly, I also evaluate the descriptive statistics of this new sample in the pre-period to ensure that the parallel trend assumption is valid. Appendix 3 contains the descriptive statistics of the propensity score matched sample.
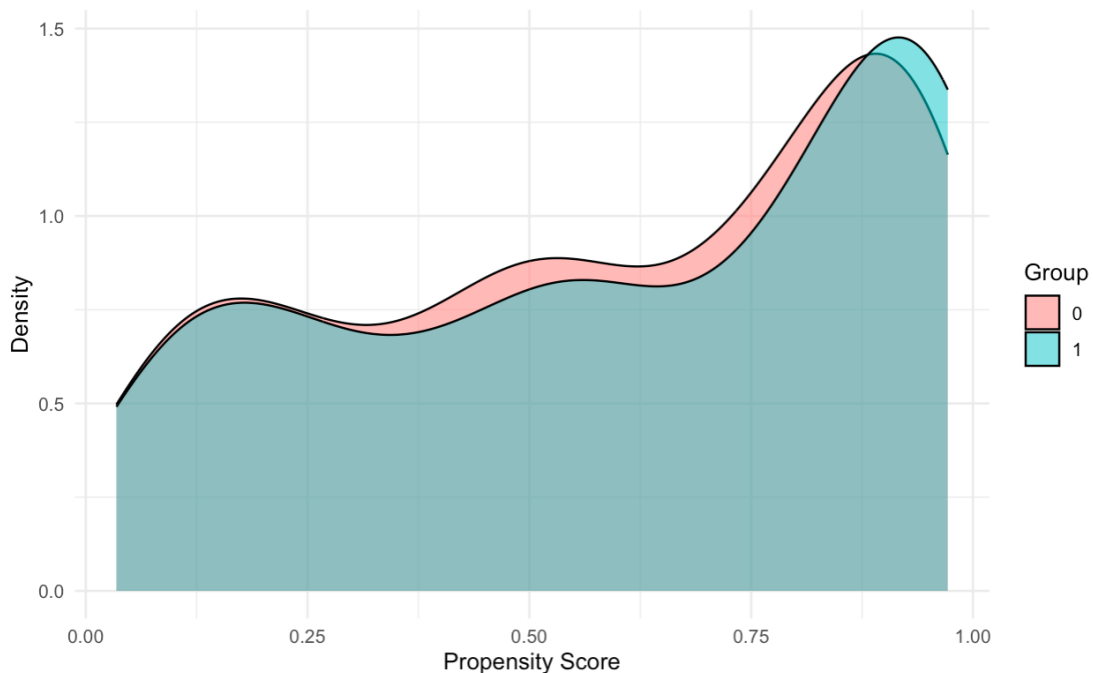
Figure 3: Propensity scores of matched sample by groups
Note: This figure presents the propensity scores of the two groups of the matched sample in the pre-period.

Based on Shipman et al. (2017), I also perform t-tests and chi-square tests for categorical variables, similarly to the main sample. Appendix 3 contains the results of these tests. The difference in means of LEVERAGE and MTB are still significant at 10%, 5% and 1%. Furthermore, difference in the mean of BIG4 is significant at 10% and 5%, while the other means are not significantly different from each other. To overcome these unbalanced covariates, I also conduct a model in which these variables are not included. Apart from these variables, the parallel trend assumption is not violated anymore.

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[4] *The full sample also including the post-period consists of 366 observations. The sample sizes of the control and treatment group are different because of two reasons. Firstly, I have an unbalanced panel as I do not have observations for each firm in every year. The second reason is specified in the previous footnote.*

	(1)	(2)	(3)	(4)
Results from propensity score matched sample				
Dependent variable= Goodwill impairment				
CAM	-0.006	-0.005	-0.002	-0.003
	(0.023)	(0.022)	(0.011)	(0.011)
POST	-0.019	-0.010	-0.009	-0.008
	(0.028)	(0.014)	(0.013)	(0.013)
CAM×POST	0.052	0.021	0.030	0.031
	(0.041)	(0.020)	(0.019)	(0.019)
BIG4		-0.018	-0.003	
		(0.019)	(0.010)	
CEO_TURN		0.022	0.025**	0.025**
		(0.014)	(0.012)	(0.012)
GW_AC		0.079***	0.075***	0.075***
		(0.013)	(0.011)	(0.010)
LEVERAGE		0.103**	0.016	
		(0.051)	(0.026)	
GW/TA		1.130***	1.181***	1.185***
		(0.067)	(0.037)	(0.036)
ROA		0.131	0.136**	0.133**
		(0.081)	(0.059)	(0.057)
SIZE		-0.005	-0.012**	-0.011**
		(0.008)	(0.005)	(0.004)
MTB		0.0001	-0.001	
		(0.004)	(0.002)	
Constant	0.194***		0.055	0.046
	(0.015)		(0.035)	(0.030)
Industry fixed effects	-	*Included*	-	-
Observations	366	366	366	366
R2	0.005	0.842	0.792	0.791
Adjusted R2	-0.003	0.788	0.785	0.787
Residual Std. Error	0.182 (df= 362)	0.084 (df= 271)	0.084 (df= 354)	0.084 (df= 357)
F Statistic	0.655 (df= 3; 362)	15.4*** (df= 94; 271)	122.203*** (df= 10; 354)	169.110*** (df= 8; 357)
Note:				*p<0.1; **p<0.05; ***p<0.01

Table 4: Results of robustness test
Note: This table presents the estimations of model (1), (2), (3) and (4) on the propensity score matched sample. Model (1) does not include any control variables or fixed effects. Model (2) includes control variables and industry fixed effects, while model (3) only control variables. Model (4) excludes the variables that differences in means are still significant. Z-statistics are presented in parentheses under the coefficients. All variables are defined in the Appendix.

Table 4 shows the results of the analysis performed on the propensity score matched sample. The first column depicts the model in which no control variables are included, there is no significant variables and the adjusted R^2 is also only -0.003. Moreover, the second model includes the control variables and industry fixed effects. None of the variables of interest are significantly associated with goodwill impairment, although there are some significant controls. GW_AC, LEVERAGE and GW/TA are positively associated with the outcome. They suggest that if there is a new acquisition of goodwill, the ratio of goodwill impairment loss and the amount of total assets in the beginning of the year would be 7.9% higher. In addition, larger goodwill amounts mean

higher recognition of goodwill impairment loss. Lastly, in case of higher leverage, firms may also record a higher goodwill impairment loss. This model has the highest adjusted R^2 with 0.788.

Moreover, none of the coefficients of interest are significant in the next model in which industry fixed effects are not included. Furthermore, beside the control variables significant in the second model (expect for LEVERAGE), CEO_TURN, ROA and SIZE also have significant association with the outcome at 10% and 5%. This suggests that a firm with higher return on assets may record higher amount goodwill. Additionally, this model verifies the results of my main analysis that larger firms may be more reluctant to record goodwill impairment. Lastly, CEO_TURN suggests that new CEOs may be more likely to write down goodwill, this finding is consistent with the results of my main hypothesis. The adjusted R^2 is 0.785 for this model.

In the last model in column (4), I do not include control variables that could violate the parallel trend. The results shows that the coefficients of interest are insignificant which is consistent with all other models. The adjusted R^2 is also similar to the others with 0.787.

Overall, the robustness test is consistent with the findings of the main analysis that there is no significant evidence regarding the association between the possibility of receiving CAMs and goodwill impairment loss recognition.

5.   Conclusion

After the introduction of fair value-based impairment of goodwill, the earnings may have become inflated as a result of avoiding timely loss recognition. This new approach allows managers to incorporate their self-interest in the estimates and use goodwill for earnings management (e.g. Watts, 2003; Ramanna and Watts, 2012; Li and Sloan, 2017). On the other hand, because of the mandated disclosure of Critical Audit Matters to the auditor's report, auditors should provide a detailed description of these unverifiable estimates if they identified them as CAMs during the audit (PCAOB, 2017b). Therefore, the research question of this paper is whether a significant association between the possibility of receiving Critical Audit Matters and goodwill impairment loss recognition exists. After examining the mixed evidence provided by prior literature, I conduct the main analysis using a difference in differences research design. Because of the violation of the parallel trend assumption, I perform an additional test on a propensity score matched sample. Neither of the analyses provide evidence that there is a significant association between the possibility of receiving critical audit matters and goodwill impairment loss recognition.

These findings contribute to the existing literature in several ways. Firstly, Gutierrez et al. (2018) and Liao et al. (2022) find significance evidence that investors do not react to the expanded report. I add to this line of studies by provide evidence that firms do not react either regarding goodwill to the introduction of CAMs.

Furthermore, I add to Gold et al. (2020) findings that managers change their reporting behaviour when CAMs are disclosed by showing that their decisions are not influenced by the bare possibility of receiving CAMs. Thirdly, I also contribute to the literature about the explosion of the fair value-based impairment of goodwill by providing evidence that the new standard itself might not an effective way to prevent the incorporation of self interest in the fair value estimates. Moreover, there are several types of practitioners who are affected by this research and its findings. Firstly, companies still cannot rely only on auditors to shed light on this type of earnings management as their expanded report might not result in a more trustworthy fair value estimate. Furthermore, as this standard may not increase recording impairment loss, standard setters and regulators may work on a separate standard focusing only on goodwill impairment to solve the problem with using estimates based on fair value. Lastly, as managers might not react to the introduction of CAMs barely, auditors may pay even more attention to the understanding of these management estimates.

These findings are consistent with the following assumptions. Gutierrez et al. (2018) and Liao et al. (2022) find that the expanded report does not provide incremental information for the investors. Therefore, managers might ignore the possibility of receiving CAMs as they know that they may not influence investors' perceptions. As a result, they might not be urged to incorporate less self-interest in their estimates. Furthermore, the market penalizes auditors who are more critical with their clients (Cowle and Rowe, 2022), and CAMs can even lead to tension between auditors and management. The results of this paper suggest that auditors might be reluctant to disclose Critical Audit Matters which may also lead to the fact that managers ignore their possible presence. Lastly, an alternative explanation for the results can be that the new standard was issued in 2017 (however it came into force in 2019) providing firms at least 1.5 years to prepare for this large change. Therefore, during that time they could have normalized the goodwill balances and recorded timely write-offs. As a result, I do not find significant evidence since my sample period is from 2017 and the change in accounting practices regarding goodwill impairment loss recognition might have started in 2017.

Similarly to other studies, this research also has limitations. Firstly, I use a difference in differences research design which relies on a parallel trend assumption before the intervention. Although all firms are in the same jurisdiction, operating in similar environment, there might be significant differences between large accelerated filers and non-large accelerated filers. These differences can be regulations, size, power among others. To solve this problem, I conduct an analysis on a propensity score matched sample, but there still can be omitted factors (differences between the two groups of firms, such as other regulation only affecting one group) that could bias the analysis. Furthermore, there are only 1.5 years between the implementation of the new standard of the two groups. This time might not be enough to examine the effect on the treatment group. In connection with time, firms might have started to adapt to

the new standard in 2017 when it was issued. This hypothesised early change in reporting practices regarding goodwill might also bias my research.

Lastly, there are several interesting research questions came up regarding this study. Firstly, as mentioned above, it can be useful to examine whether firms started to change their practices regarding goodwill impairment loss recognition after the issuance of the new standard in 2017. This research might complement this study and give a more complete picture about the introduction of CAMs. Secondly, it can be interesting to examine this topic using different control and treatment groups that might be more comparable. The sample could consist of firms from also other countries to find more similar ones with staggered implementation of CAMs. Lastly, it would be essential to examine with the use of archival data if firms after actually receiving CAMs related to goodwill, record higher amount of impairment as a complement of Gold et al. (2020) study, as well.

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Appendices

Appendix 1: Variable description

Variables	Description	Source of data
Dependent variable		
Goodwill	The amount of goodwill impairment deflated by the total assets in the beginning	Compustat
Independent variables		
CAM	Indicator variable, 1 for large accelerated filers, 0 otherwise	Audit Analytics
POST	Indicator variable, 1 for fiscal years ending on or after 30.06.2019, 0 otherwise	Compustat
Control variables		
Managerial incentives		
CEO_TURN	Indicator variable, 1 if there was a change in CEO in the current year, and 0	Bordex
Governance & Monitoring		
BIG4	Indicator variable, 1 if the firm is audited by a Big4 company, 0 otherwise	Audit Analytics
Debt contracting		
LEVERAGE	Total debt divided by total asset	Compustat
Firm-level		
GW/TA	Goodwill amount before impairment divided by total assets before impairment of goodwill for firm i in year t	Compustat
ROA	Net income divided by the average of total assets at the beginning of the year and at the end of the year	Compustat
SIZE	The natural log of total assets before goodwill impairment for firm i in year t	Compustat
GW_AC	Indicator variable, 1 if the firm completed an acquisition that resulted in an increased goodwill amount during the current year, 0 otherwise	Compustat
MTB	Market-to-book ratio, calculated by multiplying the number of outstanding shares and the share price divided by the book value of equity	Compustat
Fixed effects		
Industry	SIC codes	Compustat

Appendix 2: Descriptive statistics without winsorization

CAM=0 POST=0									CAM=1 POST=0								
Variable	N	Mean	Median	St. Dev.	1st Qu.	3rd Qu.	Min.	Max.	Variable	N	Mean	Median	St. Dev.	1st Qu.	3rd Qu.	Min.	Max.	T-test/chi-square test
Goodwill impairment	588	0.18	0.12	0.19	0.05	0.27	0.002	1.44	Goodwill impairment	1677	0.24	0.19	0.23	0.08	0.34	0.001	3.33	-6.22***
BIG4	588	0.37	0	0.48	0	1	0	1	BIG4	1677	0.92	1	0.27	1	1	0	1	769.42***
CEO_TURN	588	0.18	0	0.39	0	1	0	1	CEO_TURN	1677	0.17	0	0.38	0	0	0	1	0.21
LEVERAGE	588	0.18	0.13	0.18	0.001	0.31	0	0.76	LEVERAGE	1677	0.25	0.26	0.18	0.11	0.38	0	0.87	-8.11***
GW/TA	588	0.17	0.12	0.16	0.05	0.26	0.002	0.8	GW/TA	1677	0.21	0.18	0.16	0.08	0.31	0.001	0.74	-5.22***
ROA	588	-0.07	-0.001	0.25	-0.1	0.05	-1.98	0.63	ROA	1677	0.04	0.05	0.13	0.02	0.09	-1.92	0.77	-10.20***
SIZE	588	5.36	5.51	1.34	4.32	6.31	1.73	8.89	SIZE	1677	8.19	8.06	1.56	7.1	9.19	3.96	13.18	-42.16***
GW_AC	588	0.25	0	0.43	0	1	0	1	GW_AC	1677	0.4	0	0.49	0	1	0	1	42.17***
MTB	588	30	1.80	655.61	1.26	2.86	0.12	15900.07	MTB	1677	6.03	3.07	21.23	1.9	5.37	0	540.01	0.88

CAM=0 POST=1									CAM=1 POST=1								
Variable	N	Mean	Median	St. Dev.	1st Qu.	3rd Qu.	Min.	Max.	Variable	N	Mean	Median	St. Dev.	1st Qu.	3rd Qu.	Min.	Max.	T-test/chi-square test
Goodwill impairment	391	0.18	0.11	0.18	0.04	0.26	0.002	1.54	Goodwill impairment	1114	0.25	0.21	0.23	0.09	0.35	0.001	3.2	-6.13***
BIG4	391	0.35	0	0.48	0	1	0	1	BIG4	1114	0.92	1	0.27	1	1	0	1	534.78***
CEO_TURN	391	0.19	0	0.39	0	0	0	1	CEO_TURN	1114	0.2	0	0.4	0	0	0	1	0.15
LEVERAGE	391	0.23	0.18	0.2	0.06	0.38	0	0.79	LEVERAGE	1114	0.3	0.30	0.18	0.17	0.43	0	0.81	-6.11***
GW/TA	391	0.17	0.11	0.15	0.05	0.26	0.002	0.89	GW/TA	1114	0.21	0.19	0.15	0.08	0.32	0.002	0.76	-4.54***
ROA	391	-0.07	-0.004	0.21	-0.09	0.04	-1.75	0.44	ROA	1114	0.03	0.04	0.12	0.01	0.08	-1.4	0.97	-8.92***
SIZE	391	5.38	5.58	1.32	4.34	6.38	1.89	8.86	SIZE	1114	8.32	8.16	1.48	7.33	9.2	3.94	13.22	-36.69***
GW_AC	391	0.23	0	0.42	0	0	0	1	GW_AC	1114	0.38	0	0.49	0	1	0	1	28.49***
MTB	391	2.91	1.58	5	1.05	2.66	0	50.01	MTB	1114	7.42	3.17	38.03	1.93	5.86	0	1102.02	-3.86***

Note: *p<0.1, **p<0.05, ***p<0.01

Appendix 3: Descriptive statistics of propensity score matched sample

Propensity score matched sample													
CAM=0 POST=0							CAM=1 POST=0						
Variable	N	Mean	Median	St. Dev.	Min	Max	Variable	N	Mean	Median	St. Dev.	Min	Max	T-test/chi-square test
Goodwill impairment	140	0.19	0.14	0.19	0.002	1.09	Goodwill impairment	112	0.19	0.14	0.16	0.002	0.89	0,00
BIG4	140	0.77	1	0.42	0	1	BIG4	112	0.62	1	0.49	0	1	6.43**
CEO_TURN	140	0.17	0	0.38	0	1	CEO_TURN	112	0.15	0	0.36	0	1	0.18
GW_AC	140	0.28	0	0.45	0	1	GW_AC	112	0.33	0	0.47	0	1	0.79
LEVERAGE	140	0.22	0.19	0.2	0	0.69	LEVERAGE	112	0.14	0.09	0.14	0	0.36	3.73***
GWTA	140	0.17	0.14	0.14	0.002	0.44	GWTA	112	0.15	0.13	0.1	0.001	0.35	1.32
ROA	140	0.01	0.02	0.07	-0.09	0.14	ROA	112	0.02	0.04	0.09	-0.11	0.2	-0.97
SIZE	140	6.64	6.65	0.86	4.97	8.33	SIZE	112	6.4	6.20	1.36	3.98	8.73	1.63
MTB	140	2.81	2.26	1.74	0.4	5.53	MTB	112	3.79	2.97	2.17	0.61	7.15	-3.88***

*Note: *p<0.1, **p<0.05, ***p<0.01*

Appendix 4: Example of Goodwill related Critical Audit Matters in Automatic Data Processing, Inc's auditor's report for the Year Ended on June 30, 2022

Goodwill – Employer Services Reportable Segment— Refer to Notes 1 and 7 to the financial statements

Critical Audit Matter Description

The Company's evaluation of goodwill for impairment involves the comparison of the fair value of each reporting unit to its carrying value. The Company uses the discounted cash flow model to estimate fair value, which requires management to make significant estimates and assumptions related to forecasts of future revenue and operating margin. In addition, the discounted cash flow model requires the Company to select an appropriate weighted average cost of capital based on current market conditions as of June 30, 2022. Changes in these assumptions could have a significant impact on either the fair value, the amount of any goodwill impairment charge, or both.

Forecasts of future revenue and operating margin from the Company's next-gen platform, for which there is limited historical data, contribute significantly to the estimate of fair value of a reporting unit within the Employer Services reportable segment with approximately $678 million of goodwill as of June 30, 2022. Given the limited historical data associated with the Company's next-gen platform, significant management judgment was required to forecast future revenue and operating margin to estimate the fair value of the reporting unit. In turn, a high degree of auditor judgment and an increased extent of audit effort were required when performing

audit procedures to evaluate the reasonableness of management's estimates and assumptions related to the forecasts of revenue and operating margin and the selection of the weighted average cost of capital, including the involvement of our fair value specialists.

How the Critical Audit Matter Was Addressed in the Audit

Our audit procedures related to the forecasts of future revenue and operating margin and the selection of the weighted average cost of capital used by management to estimate the fair value contributed by the next-gen platform included the following, among others:
- We tested the effectiveness of controls over management's goodwill impairment evaluation, including those over the determination of the fair value of the reporting unit within the Employer Services reportable segment, such as controls related to management's forecasts of future revenue and operating margin and the selection of the weighted average cost of capital.
- With the assistance of our fair value specialists, we evaluated the reasonableness of the valuation models, methodology, and significant assumptions used by the Company, specifically the weighted average cost of capital including:
  - Testing the mathematical accuracy of the Company's calculation of the weighted average cost of capital.
  - Developing a range of independent estimates and compared to the weighted average cost of capital selected by management.
- We evaluated management's ability to accurately forecast future revenue and operating margin by comparing actual results to management's historical forecasts. Due to the limited historical data for the next-gen platform, we evaluated the reasonableness of management's revenue and operating margin forecasts by comparing the forecasts to (1) the historical operating results of the Company's similar existing platforms, (2) the limited operating results to date of the next-gen platform, (3) internal communications to management and the board of directors, and (4) external communications made by management to analysts and investors.