Thèse délivrée par

L'Université de Lille,

N° attribué par la bibliothèque

__|__|__|__|__|__|__|__|__|__|

THÈSE

Pour obtenir le grade de Docteur en Sciences de Gestion

Présentée et soutenue publiquement par

Amal Hsissou

Le 02 Décembre 2022

COMPTABILISATION DES ACTIFS INCORPORELS : CAS DU GOODWILL

JURY

Directeur de thèse :

Monsieur Pascal Alphonse, professeur à l'université de Lille – IAE

Membres du jury:

Rapporteurs :

Monsieur Pascal Barneto, professeur à l'université de Bordeaux - IAE

Monsieur Yves Mard, professeur à l'université Clermont Auvergne - IAE

Examinateurs :

Madame Amal Aouadi, maître de conférence à l'université de Lille – IAE

Monsieur Walid Ben Amar, professeur à l'université d'Ottawa - Telfer School of Management

Monsieur Pascal Grandin, professeur à l'université de Lille – IAE, président du jury

Remerciements

J'adresse en premier lieu mes remerciements chaleureux au professeur Pascal Alphonse qui a bien voulu diriger mes travaux. J'ai beaucoup appris grâce à son expertise et ses connaissances, mais je suis également très reconnaissante pour ses encouragements, sa confiance et sa bienveillance.

Je remercie sincèrement les membres du jury d'avoir accepté de revoir mes travaux. C'est un privilège et un grand honneur de compter dans mon jury de thèse les professeurs Pascal Barneto, Yves Mard, Walid Ben Amar, Amal Aouadi et Pascal Grandin.

Je remercie également tous les membres du laboratoire LUMEN. Je tiens à remercier plus particulièrement Fréderic Romon qui m'a accompagné sur une partie de ce travail. Je lui suis très reconnaissante pour ses conseils, sa disponibilité et sa bonne humeur.

Je remercie l'école doctorale 74 et particulièrement Sophie Ranchy et Françoise Vanhulle pour leur accompagnement administratif, leur disponibilité et leur gentillesse.

Je tiens également à remercier Aymen Abbadi et Jean Marc Petit avec lesquels j'ai collaboré pour mes premières expériences d'enseignement. Je les remercie pour la confiance qu'ils m'ont accordée.

Mes remerciements vont à Meryem El Assad qui partage à mes cotés depuis le début cette expérience de vie qu'est le doctorat. Je remercie également mes compagnons de route Thi Le Giang Vu, Rania Chaabane, Mai Nguyen et Hong Tram Dang.

Cette thèse n'aurait certainement jamais abouti sans l'affection, la confiance et la patience de mes proches : mes parents Keltoum et Youssef, ma sœur Hind et mon mari Valentin. Je les remercie pour leur indéfectible soutien tout au long de ce travail.

Index

Presentation rules

- The number of tables, figures and footnotes are incremented from the start of the thesis.

- The number of hypotheses and equations are incremented from the beginning of each chapter.

- The list of abbreviations and the list of tables and figures are at the end of the thesis.

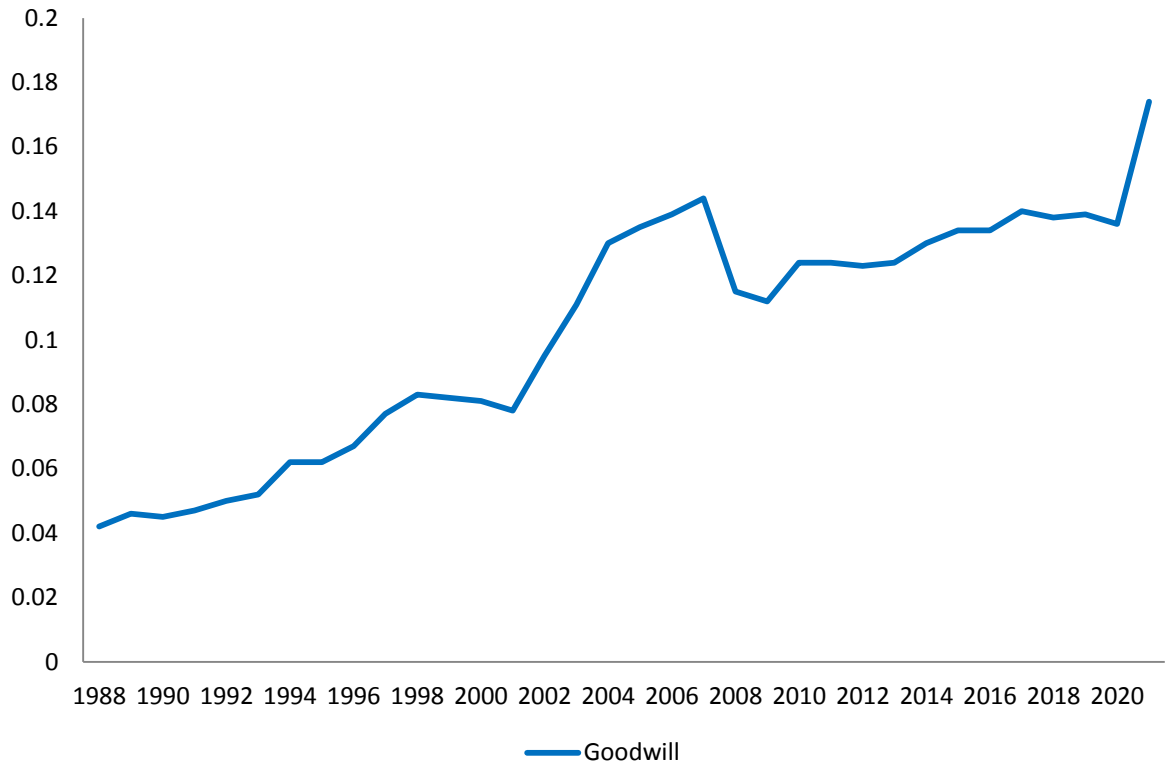
- The references of each chapter are presented at the end of the chapter.

General introduction

1. First overview

Mergers and acquisitions are a key strategy to accelerate growth and expand. After a decline of these operations in 2020 due to the Coronavirus pandemic, mergers and acquisitions skyrocketed in 2021. According to Refinitiv, an all-time record of 5.9 trillion dollars in over 63000 mergers and acquisitions was set in 2021, up 64% from a year earlier. Gains in M&A[1] have been spread over the globe, with the US leading the field with deals up by 82%. Not surprisingly, the percentage of goodwill in total assets for US firms increased from less than 5% to more than 18% over the past decades. The enormous size of goodwill highlights the active M&A activities in the past decades. The figure below presents the evolution of goodwill as a percentage of total assets for US firms from 1988 to 2021.

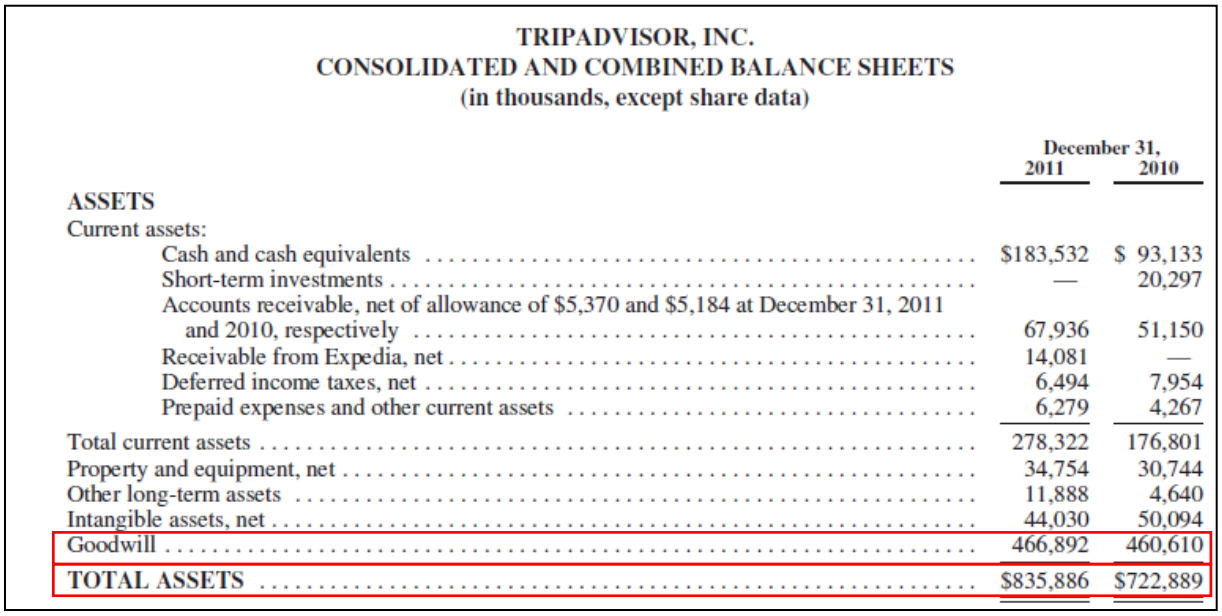
Figure 1: Evolution of goodwill as a percentage of total assets for U.S. firms from 1988 to 2021



[1] M&A = Mergers and Acquisitions

Goodwill can represent a large share of the company's assets. For example, Tripadvisor Inc. recorded a goodwill figure of $460 million USD in 2010 and $466 million USD in 2011, representing respectively 63.7% and 55% of its total assets.

Figure 2: Extract from Tripadvisor Inc. consolidated balance sheets of 2011

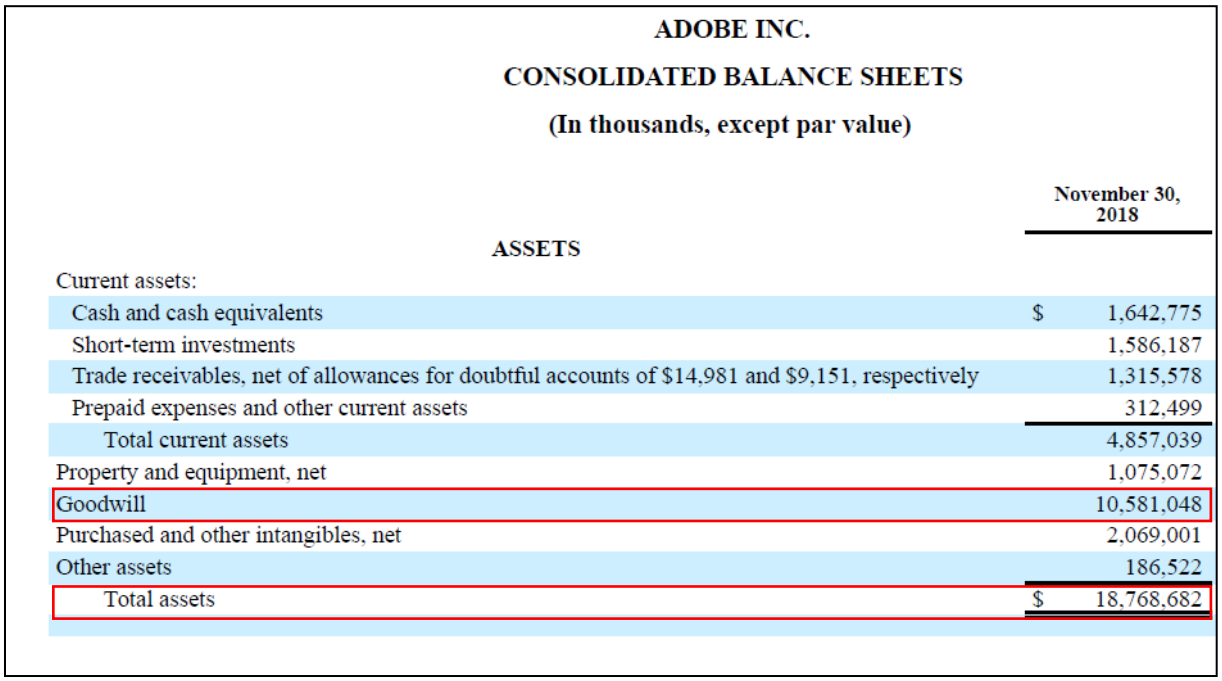


TRIPADVISOR, INC.
CONSOLIDATED AND COMBINED BALANCE SHEETS
(in thousands, except share data)

	December 31, 2011	2010
ASSETS		
Current assets:		
Cash and cash equivalents	$183,532	$ 93,133
Short-term investments	—	20,297
Accounts receivable, net of allowance of $5,370 and $5,184 at December 31, 2011 and 2010, respectively	67,936	51,150
Receivable from Expedia, net	14,081	—
Deferred income taxes, net	6,494	7,954
Prepaid expenses and other current assets	6,279	4,267
Total current assets	278,322	176,801
Property and equipment, net	34,754	30,744
Other long-term assets	11,888	4,640
Intangible assets, net	44,030	50,094
Goodwill	466,892	460,610
TOTAL ASSETS	$835,886	$722,889

Similarly, Adobe Inc. recorded a goodwill figure of $10 billion USD in 2018 which represented 56% of its total assets.

Figure 3: Extract from Adobe Inc. consolidated balance sheets of 2018



ADOBE INC.
CONSOLIDATED BALANCE SHEETS
(In thousands, except par value)

	November 30, 2018
ASSETS	
Current assets:	
Cash and cash equivalents	$ 1,642,775
Short-term investments	1,586,187
Trade receivables, net of allowances for doubtful accounts of $14,981 and $9,151, respectively	1,315,578
Prepaid expenses and other current assets	312,499
Total current assets	4,857,039
Property and equipment, net	1,075,072
Goodwill	10,581,048
Purchased and other intangibles, net	2,069,001
Other assets	186,522
Total assets	$ 18,768,682

Given the importance of acquisitions to firms and the large proportions of goodwill, accurate accounting of goodwill is critical to maintain a high-quality balance sheet. Goodwill is an intangible asset associated with a business combination. It is the portion of the purchase price that is higher than the fair market value of the acquired company's net assets. Goodwill is reported as an intangible asset on the acquiring company's balance sheet. Goodwill represents the value of an acquired business that cannot be attributed to other recognizable net assets, including the value of synergies expected from the business combination. Goodwill can also be the result of an erroneous estimation of the value of the acquired company. Goodwill does not generate independent cash flows, cannot be transferred independently and cannot be measured directly. Therefore, it is not possible to determine the recoverable amount of goodwill independently from other assets since goodwill does not generate cash flows of its own; rather it contributes to the cash flows of CGUs [2](IFRS[3]) or reporting units[4] (US GAAP[5]). As such, goodwill must be allocated to CGUs/reporting units that are expected to benefit from the synergies of the business combination.

2. Goodwill Regulation

The accounting of goodwill was subject to important changes in the last two decades, under both US GAAP and IFRS.

2.1 US GAAP

The Financial Accounting Standards Board issued ASC[6] 350, formerly SFAS[7] 142: Goodwill and Other Intangible Assets in 2001. Previous standards presumed that goodwill and all other intangible assets were wasting assets (that is, finite lived), and thus the amounts assigned to them should be amortized; it also mandated an arbitrary

[2] CGU = Cash Generating Unit = the smallest identifiable group of assets that generates cash inflows that are largely independent of the cash inflows from other assets or groups of assets (IFRS regulation).
[3] IFRS = International Financial Reporting Standards
[4] A reporting unit is the same as, or one level below, an operating segment. One level below an operating segment is referred to as a component. A component of an operating segment is required to be identified as a reporting unit if the component is a business for which discrete financial information is available and segment management regularly reviews the operating results. (US GAAP regulation).
[5] US GAAP = United States Generally Accepted Accounting Principles
[6] ASC = Accounting Standards Codification
[7] SFAS = Statement of Financial Accounting Standards

ceiling of 40 years for that amortization. With ASC 350, goodwill and intangible assets that have indefinite useful lives will not be amortized but rather tested at least annually for impairment. Goodwill is now impaired based on a comparison of a fair-value estimate of goodwill with its book value. According to the FASB[8], the changes included in the statement will improve financial reporting because the financial statements of entities that acquire goodwill and other intangible assets will better reflect the underlying economics of those assets. The enhanced disclosures about goodwill and intangible assets subsequent to their acquisition will also provide users with a better understanding of the expectations and changes in those assets over time, thereby improving their ability to assess future profitability and cash flows.

2.2 IFRS

The International Accounting Standards Board followed a similar path to the FASB with the aim to move toward international convergence. Until 2004, IAS 22 imposed on listed companies to systematically amortize their goodwill, on a maximum time period of 20 years. Since January 2005, IFRS 3 "Business combinations" and IAS[9] 36 "Impairment of Assets" replaced systematic amortization by impairment testing. According to the IASB[10], the main goal of this reform is to enhance the relevance, the reliability and the comparability of goodwill related information. In fact, goodwill is not meant to be reduced by the effect of time, but is intended to boost firm's expansion through the development of the acquired company.

2.3 The process of goodwill impairment

Under IFRS 3, goodwill is required to be tested for impairment at least once a year[11], or more frequently if there are any indications of impairment. Likewise, goodwill has to be

[8] FASB = Financial Accounting Standards Board

[9] IAS = International Accounting Standards

[10] IASB = International Accounting Standards Board

[11] The International Accounting Standards Board is discussing a proposal to remove the requirement for the goodwill impairment test to be performed annually, in the absence of any indicators of possible impairment.

tested for impairment at least on an annual basis under ASC 350[12]. An impairment charge is recognized when the recoverable amount of the asset/CGU/reporting unit goodwill is allocated to, is smaller than its carrying amount. A carrying amount is the amount at which an asset is recognized in the balance sheet (including goodwill). A recoverable amount is the higher of the asset's fair value less cost of disposal if available (the price that would be received to sell an asset) and its value in use (the present value of future cash flows expected to be derived from the asset/CGU/reporting unit). Goodwill cannot be tested for impairment as an individual asset since it is impossible to determine its recoverable amount (it does not generate any cash flows on its own and its fair value cannot be determined as it cannot be sold separately). Figure 4 below summarizes the impairment process and presents the definitions of the important concepts of the impairment test. We provide the following example to illustrate goodwill impairment. Company A acquires company B for $200 million USD while B's fair value of net assets is $195 million USD. Company A allocates all the goodwill to CGU1 ($5 million USD). Two years later, CGU1's market value is estimated at $62 million USD and management projects its value in use to $63 million USD. CGU1's carrying amount is $60 million USD.

Impairment = carrying amount – recoverable amount

Impairment = (balance sheet value of CGU1 + goodwill) – max(fair value;value in use)

Impairment = (60 + 5) – max (62 ; 63)

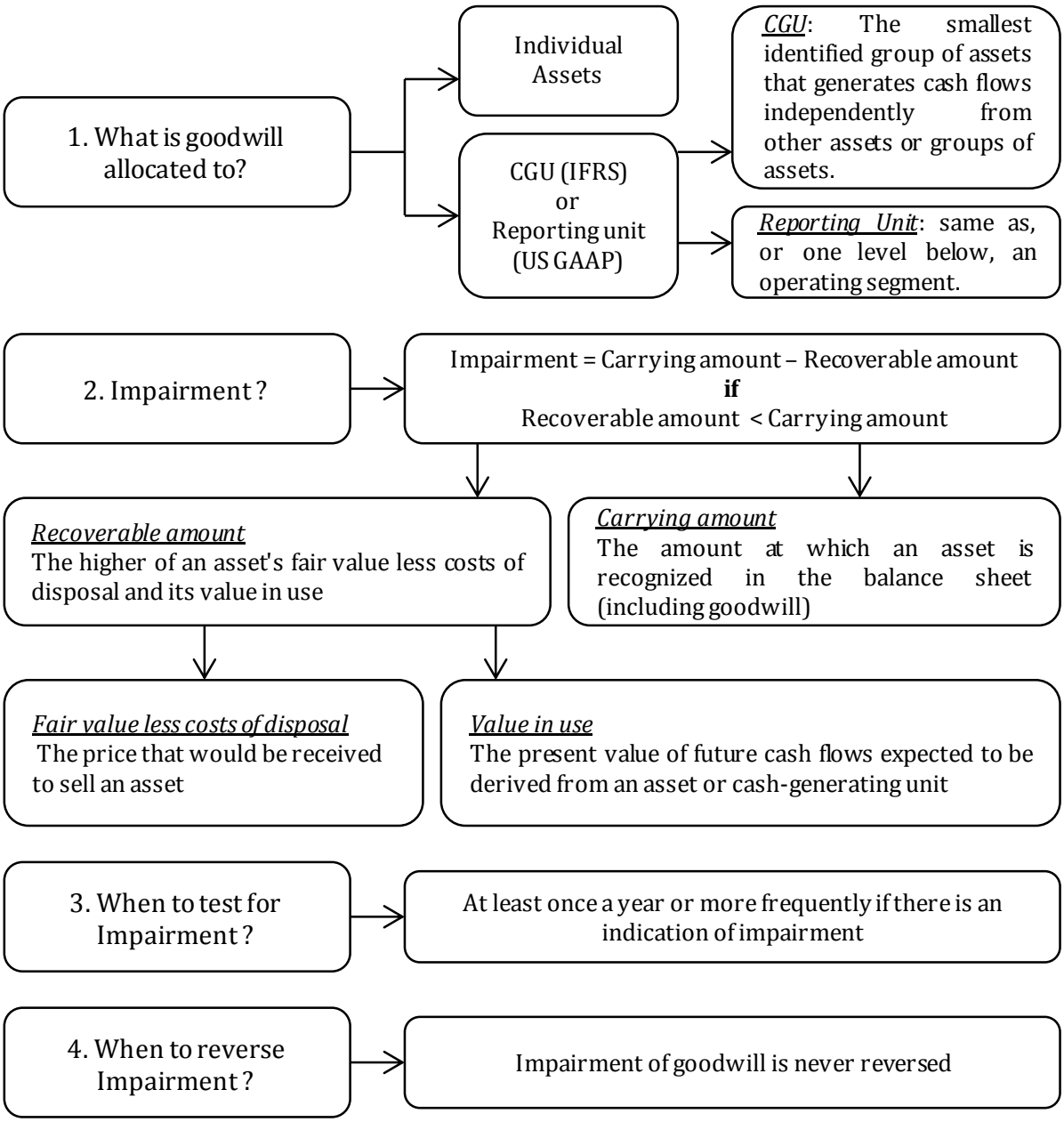
Impairment = 65 - 63

Impairment = 2

Company A has to record an impairment loss of $2 million USD. The journal entry is to debit impairment of goodwill and to credit goodwill.

[12] ASC 350 allows entities to first make a qualitative assessment to determine whether it needs to make a quantitative test. The quantitative impairment test is required only if the fair value of a reporting unit is likely to be lower than the carrying amount.

Figure 4: The impairment process



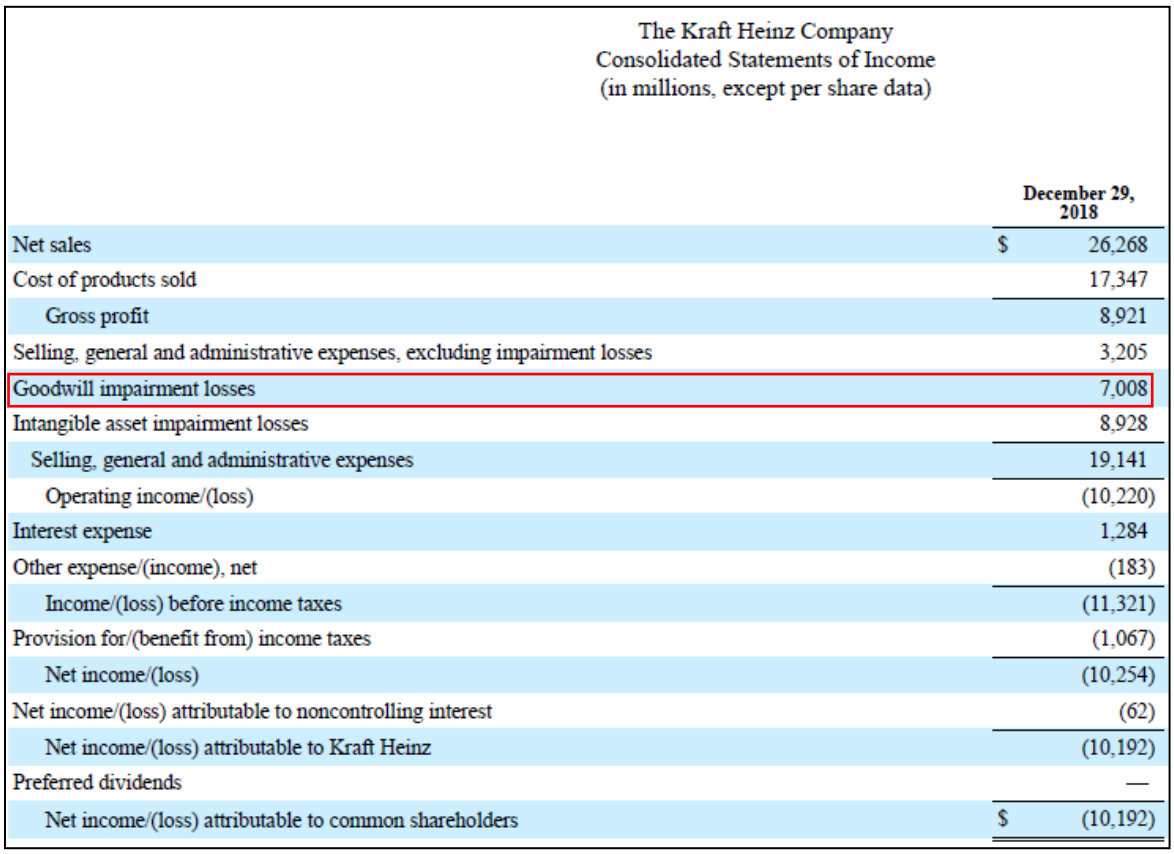
Impairment testing instead of systematic amortization seems naturally and rationally more adequate. Nevertheless, the impairment approach has been the subject of debate since its introduction. On one side, the recognition of a non systematic goodwill impairment loss, based on fair value and the estimation of future cash flows, would reflect much precisely the economic reality of companies. The previous amortization method assumed a systematic decline and a finite lifetime of goodwill value, which is not adequate with the purpose of goodwill. The impairment approach allows managers to convey private information on future cash flows, which helps stakeholders and investors assess the success of an acquisition and the firm's performance. On the other side, the

main criticism faced by the impairment approach is the high degree of discretion on the testing process which can lead to a delayed recognition of necessary goodwill impairment. Goodwill, unlike tangible assets, is a specific non-listed asset that is not separable and for which the value is estimated with discounted projected cash flows. It is a sensitive asset for which impairment tests rely on multiple fair value assessments allowing discretion in the choice to impair the asset or not (Filip et al. 2015). The impairment testing process relies on managers' assumptions and estimations concerning the future economic development. Therefore, managers can engage in opportunistic behaviors and may overstate, understate, or simply not recognize an existing economic impairment depending on their reporting incentives. The concerns on the opportunism in goodwill impairment are a serious matter for both professionals and academics as the implications of an impairment charge can have a considerable impact on companies' reported results. In 2018, The Kraft Hein Company reported a goodwill impairment of $7 billion USD which represented at the time 6.77% of its total assets[13] as presented in figure 5 below. General Motors Company and Subsidiaries reported a goodwill impairment of $27 billion USD in 2012 which represented at the time 18% of its total assets[14] as shown in figure 6 below. The importance of goodwill impairment in firms' accounts, in addition to the criticism of the impairment approach in both the academic and professional spheres have incited the FASB and IASB to modify their initial statements on goodwill impairment.

[13] The Kraft Hein Company recorded $103 billion USD of total assets in 2018

[14] General Motors Company and Subsidiaries recorded $149 billion USD of total assets in 2012

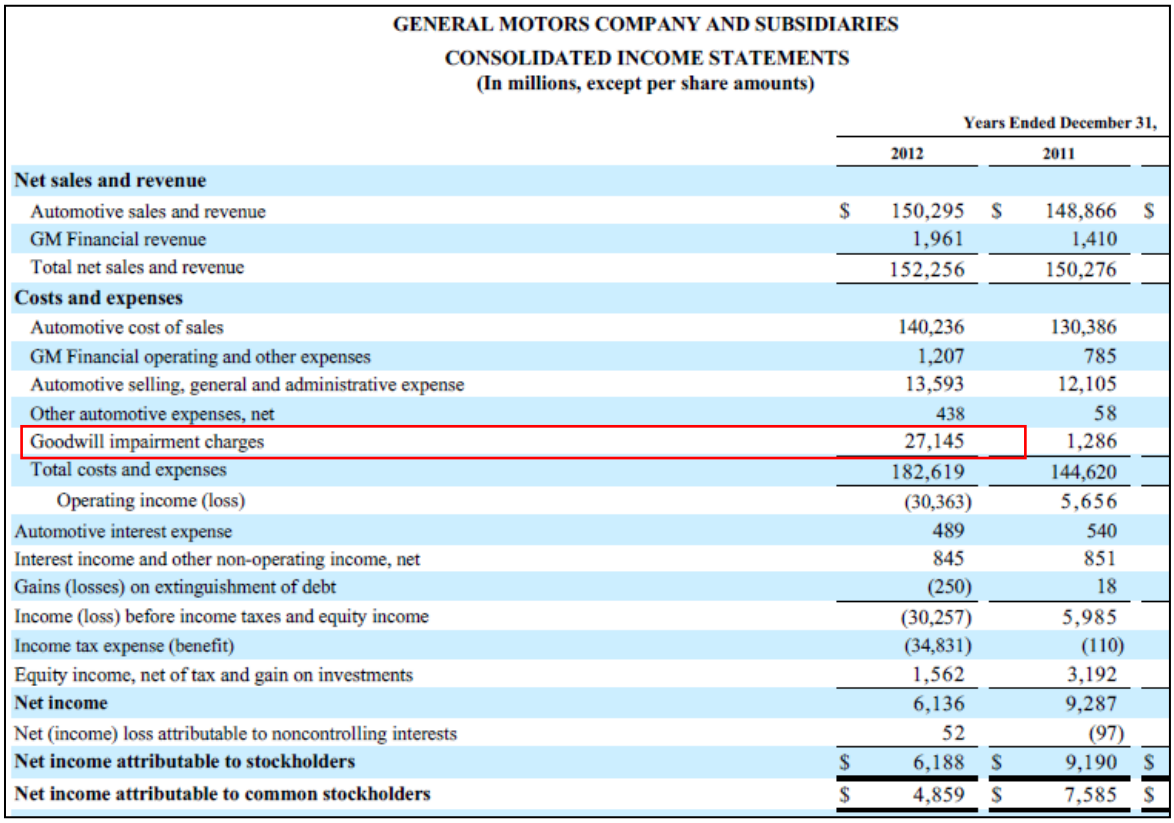
Figure 5: Extract from The Kraft Heinz Company consolidated statements of income of 2018



The Kraft Heinz Company
Consolidated Statements of Income
(in millions, except per share data)

	December 29, 2018
Net sales	$ 26,268
Cost of products sold	17,347
Gross profit	8,921
Selling, general and administrative expenses, excluding impairment losses	3,205
Goodwill impairment losses	7,008
Intangible asset impairment losses	8,928
Selling, general and administrative expenses	19,141
Operating income/(loss)	(10,220)
Interest expense	1,284
Other expense/(income), net	(183)
Income/(loss) before income taxes	(11,321)
Provision for/(benefit from) income taxes	(1,067)
Net income/(loss)	(10,254)
Net income/(loss) attributable to noncontrolling interest	(62)
Net income/(loss) attributable to Kraft Heinz	(10,192)
Preferred dividends	—
Net income/(loss) attributable to common shareholders	$ (10,192)

Figure 6: Extract from General Motors Company and Subsidiaries consolidated statements of income of 2012



GENERAL MOTORS COMPANY AND SUBSIDIARIES
CONSOLIDATED INCOME STATEMENTS
(In millions, except per share amounts)

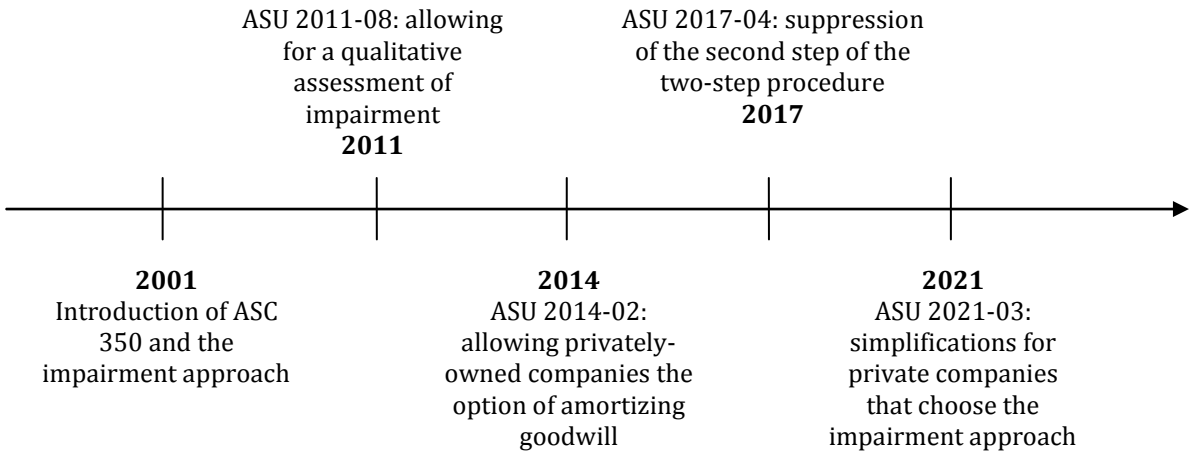
	Years Ended December 31, 2012	2011	
Net sales and revenue			
Automotive sales and revenue	$ 150,295	$ 148,866	$
GM Financial revenue	1,961	1,410	
Total net sales and revenue	152,256	150,276	
Costs and expenses			
Automotive cost of sales	140,236	130,386	
GM Financial operating and other expenses	1,207	785	
Automotive selling, general and administrative expense	13,593	12,105	
Other automotive expenses, net	438	58	
Goodwill impairment charges	27,145	1,286	
Total costs and expenses	182,619	144,620	
Operating income (loss)	(30,363)	5,656	
Automotive interest expense	489	540	
Interest income and other non-operating income, net	845	851	
Gains (losses) on extinguishment of debt	(250)	18	
Income (loss) before income taxes and equity income	(30,257)	5,985	
Income tax expense (benefit)	(34,831)	(110)	
Equity income, net of tax and gain on investments	1,562	3,192	
Net income	6,136	9,287	
Net (income) loss attributable to noncontrolling interests	52	(97)	
Net income attributable to stockholders	$ 6,188	$ 9,190	$
Net income attributable to common stockholders	$ 4,859	$ 7,585	$

2.4 *Regulation amendments*

→ By the FASB

After issuing ASC 350, FASB issued several updates (ASU[15] 2011-08, ASU 2014-02, ASU 2017-04 and ASU 2021-03) as a response to concerns expressed by companies and their stakeholders about the cost and complexity of the goodwill impairment testing. Several adjustments to the impairment procedure have been made with the aim of simplifying the test such as the possibility to assess impairment based on qualitative factors, the suppression of the second step of the two-step procedure[16], and an alternative allowing private companies[17] to choose to amortize goodwill on a straight-line basis. Figure 7 below presents the timeline of the important dates and changes of ASC 350 since its introduction.

Figure 7: Timeline of ASC 350 changes



[15] ASU= Accounting Standards Update

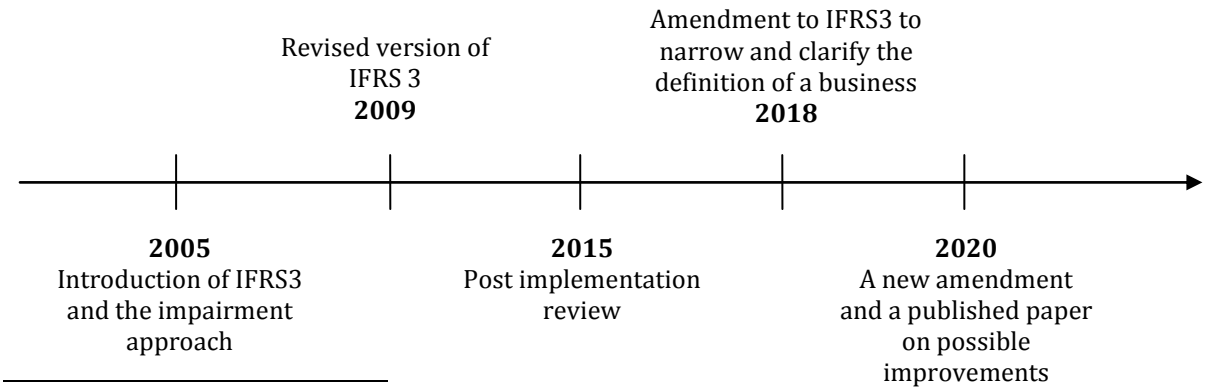
[16] The two step procedure consisted of a first estimation of the fair value of the companies reporting unit and then a comparison with its carrying amount. When the fair value of the reporting unit is greater than its carrying amount, there is no impairment and the test is completed. Otherwise when the fair value of the reporting unit is lower than its carrying value, the second step should be performed to measure the amount of impairment loss. In the second step, the company shall compare the implied fair value of the reporting unit goodwill (a hypothetical purchase price allocation) with the carrying amount of that goodwill. If the carrying amount exceeds the implied fair value of that goodwill, an impairment loss shall be recognized. Upon adoption of the revised guidance, a goodwill impairment loss will be measured as the amount by which a reporting unit's carrying amount exceeds its fair value, not to exceed the carrying amount of goodwill. IAS 36 would also not proceed to step 2, but would calculate the write-down at the completion of the step 1.

[17] Private companies can choose to amortize goodwill on a straight line basis over a period not exceeding 10 years. Private companies which choose the impairment approach benefit from a simplification introduced in 2021 (ASU 2021-03) permitting the identification and evaluation of goodwill impairment at the end of the reporting period, and not at each triggering event occurring during the reporting period.

→ By the IASB

Since its introduction in 2005, the IASB has released a revised version of IFRS 3 "Business Combinations" in 2009[18], and has published a post implementation review in 2015 after receiving skeptical feedback on the impairment approach. A statement summarizing the post implantation review's main outcome says: "*Many participants think that the impairment test is complex, time-consuming and expensive and involves significant judgments, especially in determining the assumptions used in the value in use calculation and in allocating goodwill to the cash-generating units (CGUs)*". The Board is therefore investigating how to make improvements to IFRS 3 "*Business Combinations"* and IAS 36 "*Impairment of Assets*." "*We could consider improvements to the impairment model; particularly whether there is scope for simplification*." IASB has also issued two amendments for IFRS 3 in 2018 and 2020 and published a discussion paper on possible improvements for reported information about acquisitions of businesses to help investors assess how successful those acquisitions have been. Figure 8 below presents the timeline of the important dates and changes of IFRS 3 since its introduction.

Figure 8: Timeline of IFRS 3 changes

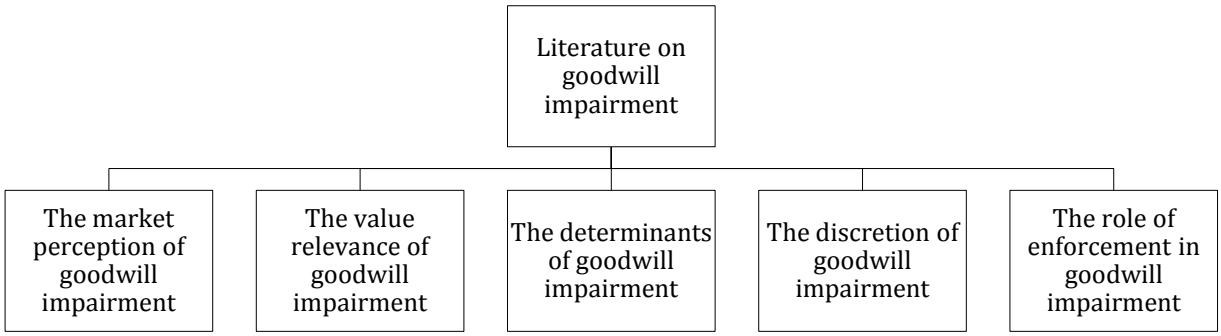


[18] Four years after the first introduction of IFRS 3 "Business combinations", the IASB released a revised version of the norm. IFRS 3 (Revised) is applied prospectively to business combinations occurring in the first accounting period beginning on or after 1 July 2009. One of the changes brought by the revised IFRS 3 is the treatment of goodwill and non controlling interests. The revised standard gives entities the option, on a transaction-by-transaction basis, to measure non-controlling interests at the fair value of their proportion of identifiable assets and liabilities or at full fair value. Choosing one method or the other has an impact on the amount recognised as goodwill. Goodwill can be measured in two different ways. For the partial method, goodwill is the difference between the consideration paid and the purchaser's share of identifiable net assets acquired. This is a partial goodwill method because the non-controlling interest is recognised at its share of identifiable net assets and does not include any goodwill. Goodwill can also be measured on a 'full goodwill' basis; it means that goodwill is recognised in a business combination for the non-controlling interest in a subsidiary as well as the controlling interest. This is one of the major differences with the US GAAP standard: under US GAAP, the non-controlling interest must be measured at fair value, and full goodwill is always recognised.

3. Literature review

The complexities introduced by the accounting treatment of goodwill have always interested professionals and regulators, but also academics. Due to the similarity of ASC 350 and IFRS 3, studies regarding goodwill impairment, whether subjected to US GAAP or IFRS, will be discussed jointly below. We classify the existing empirical literature on goodwill impairment in five categories:

Figure 9: Empirical literature on goodwill impairment



3.1 Literature on the market perception of goodwill impairment

The first category revolves around the market perception of goodwill impairment. The loss from goodwill impairment is inevitably interpreted as an indicator of the failure of prior M&A (Hribar and Chung, 2021). Knauer & Wöhrmann (2016) find a negative capital market reaction to announcements of unexpected goodwill write-offs. The results indicate that the market reaction is associated with managers explaining the write-down decision and depends on the verifiability of these explanations. Investors react more negatively when an unverifiable internal explanation is given and less negatively when a verifiable external explanation is provided. Hirschey and Richardson (2002) confirm a significant negative announcement effect of 2% to 3 % on average during the two-day event window surrounding the announcement date of goodwill impairment. However, a large share of the negative market reaction is already observed in the year prior to the announcement. Li et al. (2011) and Bens et al. (2011) both analyze the information content of goodwill impairments and find that investors and financial analysts revise their expectations downward on the announcement of an impairment loss. However, Bens et al. (2011) point out that this reaction is attenuated for firms with low information asymmetry. The market reaction is also less significant

for firms facing the greatest difficulty in conducting sophisticated impairment tests (small firms), suggesting that the market views these write-offs as less credible.

Table 1: Studies on the market perception of goodwill impairment

Authors (year)	Accounting regime	Paper title	Main findings
Bens et al (2011)	US GAAP	The Information Content of Goodwill Impairments and SFAS 142	Goodwill impairments induce a significant negative stock market reaction.
Hirschey and Richardson (2002)	US GAAP	Information content of accounting goodwill numbers	A significant negative announcement is observed during the announcement of goodwill impairment.
Knauer and Wohrmann (2016)	IFRS	Market Reaction to Goodwill Impairments	Negative capital market reaction to the announcements of unexpected goodwill write-offs.
Li et al (2011)	US GAAP	Causes and consequences of goodwill impairment losses	Both investors and financial analysts revise their expectations downward on the announcement of an impairment loss.

3.2 Literature on the value relevance of goodwill impairment

The second category of studies investigates the value relevance, reliability and informativeness of goodwill impairment. The main outcome of the studies presented in the previous category is that goodwill impairment generates a negative capital market reaction, suggesting that these impairments are value relevant for capital markets. Lapointe-Antunes et al (2009) examine the value relevance of goodwill impairment losses. Their results show a negative association between goodwill impairment losses per share and share price. They conclude that this result suggests that investors perceive goodwill impairment losses as being a sufficiently reliable measure of a reduction in the value of goodwill to incorporate them in their valuation assessments. The authors also find that investors put a higher valuation weight on losses reported by firms that are expected to record a loss. A similar result is observed by AbuGhazaleh et al (2012). Their empirical results reveal a significant negative association between reported goodwill impairment losses and market value, suggesting that these impairments are perceived by investors to reliably measure a decline in the value of goodwill and incorporated in their firm valuation assessments. Godfrey and Koh (2009) document a strong negative association between U.S. firms' investment opportunities and goodwill impairment write-offs in the first years after SFAS 142 introduction.

Therefore, the goodwill accounting practices in the initial impairment regime years appear to match firms' economic circumstances. Overall, the findings support the arguments underpinning the introduction of SFAS 142 as a mean of providing information relevant to users of financial statements. All the above studies regarding the value relevance of goodwill impairment support the arguments for allowing accounting flexibility within regulation since they all conclude that goodwill impairment is value relevant, is perceived by investors to reliably measure a decline in the value of goodwill, and is a rightful reflection of a firm's investment opportunities.

Table 2: Studies on the value relevance of goodwill impairment

Authors (year)	Accounting regime	Paper title	Main findings
AbuGhazaleh et al (2012)	IFRS	The Value Relevance of goodwill impairments: UK Evidence	Impairments are perceived by investors to reliably measure a decline in the value of goodwill and incorporated in their firm valuation assessments.
Godfrey and Koh (2009)	US GAAP	Goodwill impairment as a reflection of investment opportunities	Impairment write-offs are negatively associated with firms' underlying investment opportunities and are providing information relevant to users of financial statements.
Lapointe-Antunes et al (2009)	Canadian GAAP[19]	Value relevance and timeliness of transitional goodwill-impairment losses: Evidence from Canada	Investors perceive impairment losses as being sufficiently reliable measurements of a reduction in the value of goodwill to incorporate them in their valuation assessments.

3.3 Literature on the determinants of goodwill impairment

A third category of goodwill impairment literature revolves around the determinants leading to the write off. Li (2016) argues that managerial ability plays a role in the reporting of goodwill impairment. His findings suggest that more-able managers better prevent goodwill impairment and better reduce the magnitude of goodwill impairment losses, relative to less-able managers. Olante (2013) investigates whether goodwill impairment arises from overpayment for the target at the time of the acquisition or from a subsequent deterioration of goodwill values. The results indicate that 37.4% of goodwill impairment losses in the study sample were predictable based on overpayment

[19] Section 3062 of the Canadian Institute of Chartered Accountants' Handbook in Canada requires the application of the non-amortization and impairment rules for existing goodwill; similar to ASC 350 and IFRS 3.

indicators, thus supporting the hypothesis that these losses were at least partially the consequence of overpayment for the target at acquisition. More specifically the analysis shows that the occurrence of a goodwill impairment loss is positively and strongly related with the percentage of stock in the consideration. That is, the higher the percentage of the purchase price paid for with the acquiring firm's stock, the higher the likelihood that the acquisition will result in a goodwill impairment loss. Gu and Lev (2011) point out that the root cause of many goodwill write-offs is the buyers' overpriced shares at acquisition. Overpriced shares provide managers with strong incentives to exploit the overpricing by acquiring businesses, often paying more than the acquisition's synergies, setting the stage for subsequent goodwill write-offs.

Table 3: Studies on the determinants of goodwill impairment

Authors (year)	Accounting regime	Paper title	Main findings
Gu and Lev (2011)	US GAAP	Overpriced Shares, Ill-Advised Acquisitions, and Goodwill Impairment	The root cause of many goodwill write-offs is the buyers' overpriced shares at acquisition.
Li (2016)	US GAAP	Managerial ability and goodwill impairment	More-able managers better prevent goodwill impairment and better reduce the magnitude of goodwill impairment losses.
Olante (2013)	US GAAP	Overpaid acquisitions and goodwill impairment losses - Evidence from the US	Goodwill impairments are at least partially the consequence of overpayment for the target at acquisition.

3.4 Literature on the discretion of goodwill impairment

The fourth category of literature regarding goodwill impairment, and definitely the richest, is the literature investigating the discretion of the impairment approach. Several studies look into the discretion, the timeliness, the earnings management and the opportunistic motives driving the impairment testing. Ramanna and watts (2012) investigate a sample of firms with market indications of goodwill impairment. They find that the frequency of goodwill non-impairment in this sample is 69%. They test whether the goodwill non impairment can be attributed to managers' private information on positive future cash flows, but they find no evidence to confirm this story. They also investigate whether non impairment in the sample under SFAS 142 is associated with motives predicted by agency theory to affect management choice and find some

evidence of association between goodwill non-impairment and CEO[20] compensation, CEO reputation, and debt covenant violation concerns. The debt covenants hypothesis is based on the assumption that managers of highly leveraged firms have incentives to engage in income-increasing earnings management to avoid costly debt covenant violations (Watts and Zimmermann (1986)). The discretion offered by the ASC 350 can allow highly leveraged firms the opportunity to avoid or delay an impairment charge to respect the debt covenant. CEO compensation, CEO reputation, and changes in the CEO position can also influence the reporting of goodwill impairment. CEOs whose compensation is based on high proportions of bonus could try to minimize the impairment loss. In contrast, new CEOs might report higher impairments, blaming the low performance and failure of the acquisition on the old management, while creating an opportunity to inflate future earnings. Similar conclusions, regarding the debt covenant and the CEO aspects can be found in the studies of Beatty and Weber (2006), Zang (2008), Masters-Stout et al (2008) and AbuGhazaleh et al (2011). All three studies provide evidence that new CEOs impair more goodwill than their senior counterparts. Beatty and Weber (2006) confirm the CEO compensation theory by affirming that managers with earnings-based bonuses will be less likely to record a goodwill impairment charge and will record lower charges. Zang (2008) confirms the debt covenant violation theory by proving evidence that more highly leveraged firms report lower goodwill impairment. Beatty and Weber (2006) also states that firms are less likely to take a write-off when they have less slack in their net worth covenant and the covenant is affected by accounting changes.

The discretion of the impairment approach can also result in untimely loss recognition and postponing of economically due impairments. Li (2017) indicates that managers have exploited the discretion afforded by SFAS 142 to delay goodwill impairments, which has resulted in relatively inflated goodwill balances and temporarily inflated earnings and stock prices. AbuGhazaleh et al (2011) reveal that goodwill impairments are likely to be associated with income smoothing and big bath reporting behaviors. To avoid or reduce goodwill write-offs, managers have to manipulate the elements of the impairment test. Avallone and Quagli (2015) find that the growth rate manipulation is a significant explanatory variable in avoiding or reducing the amount of the impairment

[20] CEO = Chief Executive Officer

write-off. Filip et al (2015) argue that real activities manipulation is used to avoid goodwill impairment losses. Specifically, they document that firms suspected of postponing goodwill impairment losses exhibit significantly positive discretionary cash flows compared to other firms.

In spite of the large literature affirming the idea that the discretion of goodwill impairment is used opportunistically by firms, there are some studies who claim the opposite. Jarva (2009) finds that goodwill write-offs under SFAS 142 are associated with future expected cash flows as mandated by the standard. He also examines a sample of non-impairment firms in which there are indications that goodwill is impaired and fails to find convincing evidence that these firms are opportunistically avoiding impairments. Similarly, Jordan et al. (2015) find evidence suggesting that goodwill impairments are not being recorded opportunistically to take big baths but instead are being recognized only after multiple years of substandard earnings have occurred, thus indicating managers are recording these impairments to provide relevant information to financial statement users.

Table 4: Studies on the discretion of goodwill impairment

Authors (year)	Accounting regime	Paper title	Main findings
AbuGhazaleh et al. (2011)	IFRS	Accounting Discretion in Goodwill Impairments: UK Evidence	Goodwill impairments are likely to be associated with recent CEO changes, income smoothing and big bath reporting behaviors.
Avallone and Quagli (2015)	IFRS	Insight into the variables used to manage the goodwill impairment test under IAS 36	The growth rate manipulation is a significant explanatory variable in avoiding or reducing the amount of the impairment write-off.
Beatty and Weber (2006)	US GAAP	Accounting Discretion in Fair Value Estimates: An Examination of SFAS 142 Goodwill Impairments	Firms' debt contracting, bonus, turnover, and exchange delisting incentives affect their decisions to accelerate or delay expense recognition.
Filip et al. (2015)	US GAAP	Using Real Activities to Avoid Goodwill Impairment Losses: Evidence and Effect on Future Performance	Firms suspected of postponing goodwill impairment losses exhibit significantly positive discretionary cash flows compared to other firms
Jarva (2009)	US GAAP	Do Firms Manage Fair Value Estimates? An Examination of SFAS 142 Goodwill Impairments	Goodwill write-offs are associated with future expected cash flows as mandated by the standard.
Jordan and	IFRS	Do Canadian Companies	Goodwill impairments are not being

Clark (2015)		Employ Big Bath Accounting When Recording Goodwill Impairment?	recorded opportunistically to take big baths but instead are being recognized only after multiple years of substandard earnings have occurred.
Li (2017)	US GAAP	Has goodwill accounting gone bad?	Some managers have exploited the discretion afforded by SFAS 142 to delay goodwill impairments, thus temporarily inflating earnings and stock prices.
Masters-Stout et al. (2008)	US GAAP	Goodwill impairments and chief executive officer tenure	New CEOs impair more goodwill than their senior counterparts.
Ramanna and Watts (2012)	US GAAP	Evidence on the Use of Unverifiable Estimates in Required Goodwill Impairment	Association between goodwill non-impairment and CEO compensation, CEO reputation, and debt covenant violation concerns.
Zang (2008)	US GAAP	Discretionary behavior with respect to the adoption of SFAS no. 142 and the behavior of security prices	More highly leveraged firms (firms that have undergone a recent management change) report lower (greater) goodwill impairment.

3.5 Literature on the role of enforcement in goodwill impairment

The studies presented above regarding the discretion of goodwill impairment present different conclusions. Most of the results conclude the existence of an opportunistic use of goodwill impairment, but a few studies suggest that managers write down goodwill in an effort to convey relevant information to financial statement users. The studies presented were conducted on different samples: either US, Canadian or European firms. We suspect that the differences in institutional settings might influence the use of discretion. This argument leads us to the fifth category of studies regarding goodwill impairment which are the studies investigating the role of enforcement in the impairment testing. Glaum et al. (2018) indicate that goodwill impairment tends to be timely for firms in high enforcement countries, whereas firms in low enforcement countries tend to be less responsive to declines in the economic value of goodwill. CEO compensation concerns affect the impairment decision for firms in low enforcement, and CEO reputation concerns and management preference for smooth earnings influence goodwill impairment decisions in high as well as low enforcement countries. The findings also indicate that private monitoring through institutional investors substitute for public enforcement in the context of goodwill impairment when a country's enforcement regime is relatively weak. The differences between high and low enforcement country are also the subject of the study of Filip et al. (2020). Their findings

indicate that firms in high-enforcement countries use a higher discount rate to test goodwill for impairment than firms in low-enforcement countries. They also find that suspect firms (firms suspected to delay the recognition of goodwill impairment) exhibit higher upward cash flow management in high enforcement countries than in low-enforcement countries. Finally, they show that suspect firms in high-enforcement countries are more likely to eventually impair goodwill. André et al. (2016) investigate goodwill impairment reporting differences between U.S. and European firms. The findings indicate that while median levels of goodwill on the books are relatively similar between U.S. and European firms, there are indications that U.S. firms were more likely to impair when there is economic indicators of potential impairment, in particular in the early years of the financial crisis in 2008–2009. They further document that U.S. firms, when they impair, impair a much greater percentage of their goodwill. European firms are more likely to impair on multiple years, however, even the cumulative impairments never approach the level U.S. firms take, be it in one or multiple years. The authors conclude there is clear evidence that U.S. firms are timelier in their impairment of goodwill.

Table 5: Studies on the role of enforcement in goodwill impairment

Authors (year)	Accounting regime	Paper title	Main findings
André et al. (2016)	IFRS and US GAAP	Examining the Patterns of Goodwill Impairments in Europe and the U.S.	While median levels of goodwill on the books are similar between U.S. and European firms, U.S. firms are more likely to impair goodwill, impair a greater percentage and perform timelier impairments.
Filip et al. (2020)	IFRS	Managerial discretion to delay the recognition of goodwill impairment: The role of enforcement	Firms in high-enforcement countries use a higher discount rate to test goodwill for impairment than firms in low-enforcement countries. Second, firms exhibit higher upward cash flow management in high enforcement countries than in low-enforcement countries.
Glaum and Wyrwa (2018)	IFRS	Goodwill impairment: The Effects of Public Enforcement and Monitoring by Institutional Investors	Whereas goodwill impairment tends to be timely for firms in high enforcement countries, firms in low enforcement countries tend to be less responsive to declines in the economic value of goodwill.

3.6 Literature summary

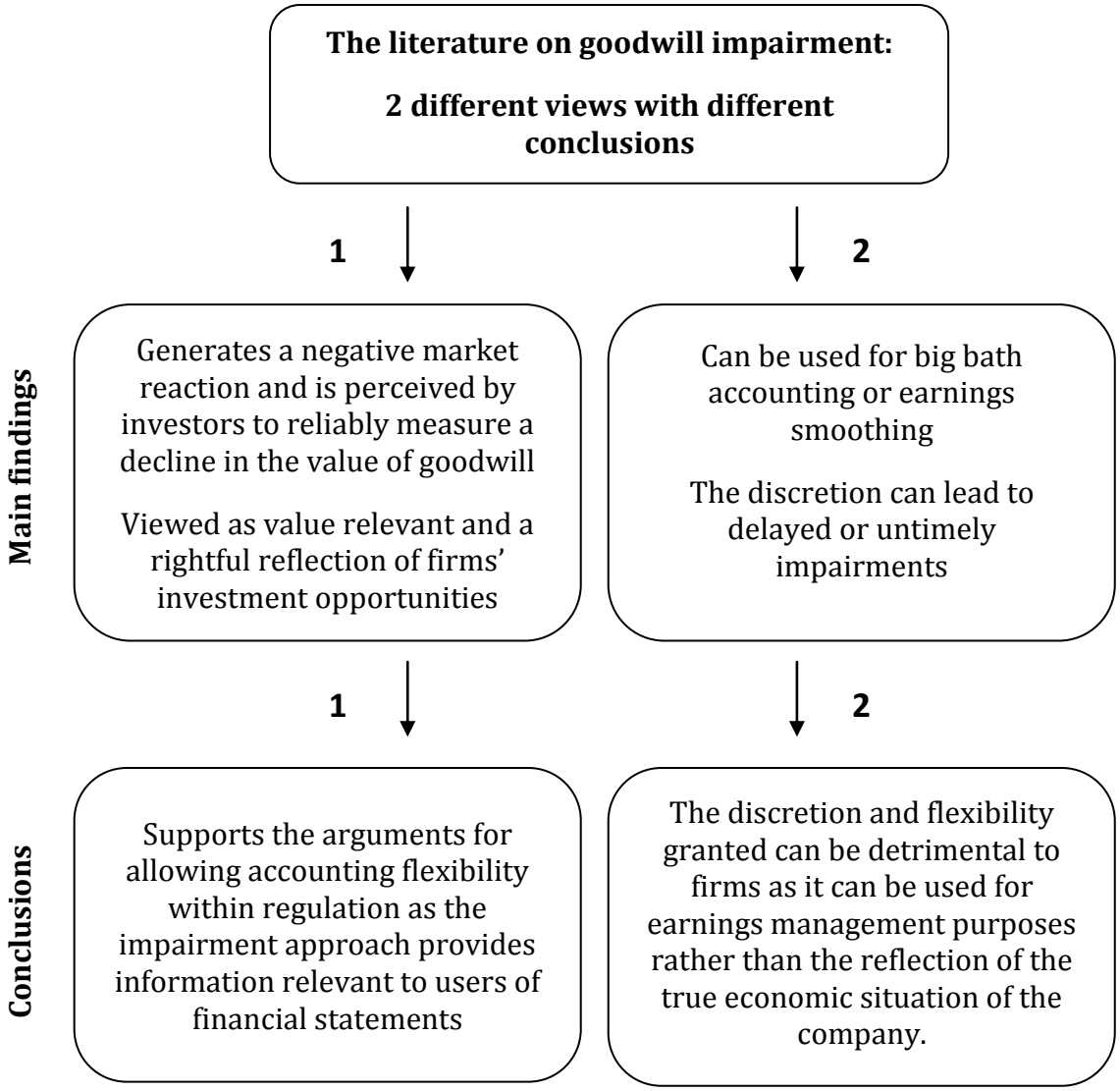
The literature on goodwill impairment can be summarized in the two statements below:

→ The announce of goodwill impairment generates a negative market reaction, for both investors and financial analysts. Goodwill impairment is viewed as value relevant, is perceived by investors to reliably measure a decline in the value of goodwill, and is a rightful reflection of a firm's investment opportunities. Overall, these findings support the arguments for allowing accounting flexibility within regulation. Specifically, the introduction of the impairment approach provides information relevant to users of financial statements.

→ Overpaid acquisitions can lead to impairment, while more-able managers better prevent it and reduce its magnitude. Goodwill impairment can be used for big bath accounting or earnings smoothing incentives. The discretion of goodwill impairment can lead to delayed or untimely impairments. These findings suggests that the discretion and flexibility granted with the impairment approach can be detrimental to firms as it can be used for earnings management purposes rather than the reflection of the true economic situation of companies.

Figure 10 below summarizes the conclusions of the literature on goodwill impairment.

Figure 10: Conclusions of the literature on goodwill impairment



4. Motivation of the thesis

The reviewed literature presents heterogeneous results. One side of the literature supports the introduction of goodwill impairment as it results to be informative and value relevant, while another side suggests the discretion of impairments is used opportunistically by firms. This thesis is built around the ongoing debate on the effectiveness and reliability of goodwill impairments. One of the main purposes of the introduction of the impairment approach is to provide managers the opportunity to convey their private information credibly to stakeholders through financial statements. The enhanced disclosures are supposed to provide users with a better understanding of the expectations and changes over time, thereby improving their ability to assess future

profitability and cash flows. The first chapter of the thesis explores this aspect of future cash flow assessment. Specifically, we investigate the impacts of goodwill and its impairment on cash flow prediction. Since goodwill is associated with high information asymmetry and opacity, we first argue that firms with important amounts of goodwill are associated with lower cash flow predictability. Second, we argue that goodwill impairment can increase cash flow predictability. The discretion in goodwill impairment is an opportunity for managers to exercise accounting judgment and convey their private information therefore improving future cash flow prediction. This first chapter is an inspection of goodwill and its impairment on a micro level.

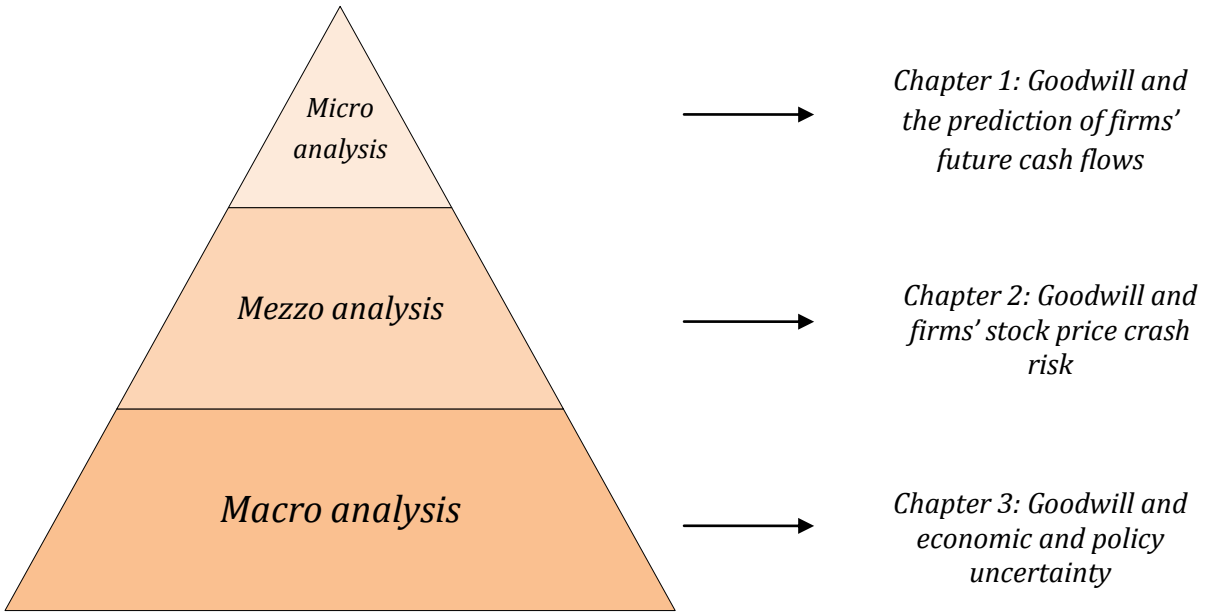
The second chapter explores goodwill and its relation to the stock market. In a sense, this second analysis is conducted at a mezzo level. Specifically, we investigate the effect of goodwill on firms' stock price crash risk. The motivation to conduct this research rises from the literature on stock price crash risk which argues that information asymmetry and bad news hoarding are key elements leading to stock price crash risk. In this essay we argue that goodwill can be positively associated with stock price crash risk. Goodwill is subject to important discretion in its accounting, which creates important information asymmetry. Goodwill impairment was also proven by prior literature to be delayed and used for earnings management motives. These different aspects of goodwill accounting are defined by literature as driving elements of stock price crash risk. On the other hand, several studies on stock price crash risk suggest that the financial reporting environment is an important determinant of crash risk. DeFond et al. (2015) and Kim and Zhang (2016) show that International Financial Reporting Standards and accounting conservatism increase transparency and reduce crash risk. Moreover, the literature on the value relevance of goodwill impairments documents that investors view reported impairment as reliable and informative. In this essay, we test whether firms which do not refrain from goodwill impairment and perform frequent impairments reduce their stock price crash risk.

The third chapter of this thesis investigates the impact of environmental uncertainty on goodwill impairment. This third analysis is therefore conducted on a macro level. We choose to focus on environmental uncertainty, specifically economic and policy uncertainty, as it can have a direct impact on goodwill impairment. Uncertain outcomes can directly lead to goodwill impairment as accounting conservatism increases in

periods of uncertainty (Dai and Ngo, 2020). Uncertainty can however result in more earnings management and reporting opacity. According to Jin et al. (2019), when economic policy is relatively uncertain, it is easier for managers to distort financial information, as unpredictable economic policy changes make assessing the existence and impact of hidden adverse new more difficult for investors and creditors. This third chapter is complemented with an analysis on the role of the CEO in goodwill impairment. Prior research on behavioral corporate finance and managerial psychological traits suggests that overconfident CEOs tend to be overoptimistic about uncertain outcomes and believe they have greater control over uncertain events. Therefore, we examine whether firms report more goodwill impairment when facing high uncertainty and then examine if the same pattern is observable for firms with overconfident CEOs.

The dissertation is thought of as a global analysis on goodwill and its impairment on different scales. The first chapter focuses on the firm's side (micro scale). The second chapter investigates the relation to the stock market (mezzo scale) and the third chapter examines the association with the general environment of the firm (macro scale). The figure below summarizes the three level analyses on goodwill and its impairment (micro – mezzo - macro) conducted throughout the three chapter of this dissertation.

Figure 11: Three level analyses (micro - mezzo - macro)



As an introduction to the three research questions presented above, a descriptive analysis is provided. This prelude is primarily a descriptive analysis of goodwill and goodwill impairment data used throughout the different chapters. We start by analyzing goodwill and goodwill impairment magnitudes, patterns and evolution during the years of the sample. We conduct descriptive statistics on indicators defined by prior literature as key elements impacting goodwill impairment. We do not develop any new hypothesis for testing but we discuss previously established arguments defined by prior literature.

5. Sample and methodology

Empirical methodology is used throughout the thesis. Each research question is answered by the exploitation of quantitative data and the application of statistical models. However, we situate the use of quantitative data in a process of hypothesis testing. The employed empirical methodology is certainly not used in a "data mining" perspective nor employed in an inductive approach. Our work is based primarily on the deployment of an argument based on the existing literature. On the grounds of the results within this literature, we develop our hypotheses and confront them with the facts within the framework of the empirical work we carry out. Therefore, our work falls fully within the framework of experimental sciences and adopts a positivist approach.

We work with a sample of U.S. listed firms from 2003 to 2020. The U.S. setting is particularly appropriate to answer our research questions. The U.S. market is one of the widest in term of listed companies. It also concentrates a large share of the world's mergers and acquisitions. Finally, the FASB introduced impairment of goodwill in 2001 which offers us a large set of data to work on. ASC 350 was introduced in 2001 but was required to be applied starting with fiscal years beginning after December 15, 2001. We therefore excluded observations of 2001 and of the initial adoption year (2002) and decided to start our analysis in 2003. The initial adoption year (2002) was a specific period where firms had to adapt to the new impairment approach. The decision to exclude the adoption year was made to capture the "standard" impairment behavior and to draw conclusions that can be generalized. It is important to note that all the analyses conducted in this dissertation were tested on a sample which included 2002. All the

regression results remain the same when including 2002. The only difference when including 2002 is found in descriptive statistics.

The first and second essays are based on a sample of U.S. listed firms from 2003 to 2020 composed of 40046 observations. We included in this sample firms with and without goodwill in the balance sheet. The third essay is based on a more restricted sample of U.S. listed firms from 2003 to 2020 composed of 29740 observations. All firms selected in this sample have goodwill in the balance sheet. The differences in the samples are implemented to fit each research question.

We use panel data in the three essays of this thesis. Panel data fits the studies because it allows the investigation of company data on both cross-sectional and time series dimensions. By combining the two dimensions, panel data is efficient and produces informative data, more variability, less collinearity among variables and more degrees of freedom. The three studies use quantitative data collected from different well-known databases: Compustat, CRSP, Execucomp and IBES. For a small set of observations, consolidated financial statements were inspected to compare the values of the database to the values of the financial statement. This verification was done for some data outliers and for randomly selected observations. Complementary data was collected from the internet (uncertainty data from Baker, Bloom and Davis' website on economic policy uncertainty[21], volatility index "VIX" from Yahoo! Finance[22] and GDP[23] growth data from the World Bank website[24]). All the statistical analyses in the three essays were carried out using STATA 14 software.

6. Main findings and contributions

6.1 Main findings of the three essays

→ The first essay explores the matter of future cash flow prediction. Specifically, we investigate the impacts of goodwill and its impairment on cash flow prediction. Since

[21] https://www.policyuncertainty.com/
[22] https://fr.finance.yahoo.com/quote/%5EVIX/history?p=^VIX
[23] GDP = Gross Domestic Product
[24] https://www.worldbank.org/en/home

goodwill is associated with high information asymmetry and opacity, we first argue that firms with important amounts of goodwill are associated with lower cash flow predictability. Second, we argue that goodwill impairment can increase cash flow predictability. The discretion in goodwill impairment is an opportunity for managers to exercise accounting judgment and convey their private information therefore improving future cash flow prediction. Our results indicate that goodwill decreases the predictability of cash flows while goodwill impairment increases it. Our results indicate that goodwill impairment, in addition to increasing predictability, results in higher future cash flows.

→ In the second essay, we argue that goodwill can be positively associated with stock price crash risk. Goodwill is subject to important discretion in its accounting, which creates important information asymmetry between managers and investors and can lead to stock price crash risk. Our results also show that it is the magnitude of goodwill that influences stock price crash risk, not its presence in the balance sheet. We also document that firms who report frequent goodwill impairments decrease their stock price crash risk. This additional finding is coherent with recent literature linking stock price crash risk to financial reporting transparency. In additional analyses, we demonstrate that the positive relation between goodwill magnitude and stock price crash risk only holds for firms with higher goodwill values (goodwill higher than the industry-year fourth quartile). Finally, we demonstrate that other intangible assets do not necessarily drive stock price crash risk upwards.

→ In the third essay, we test if firms report more goodwill impairment in periods of high uncertainty, and then we examine whether the same pattern is observable for firms with overconfident CEOs. Prior research on the topic suggests that overconfident CEOs tend to be overoptimistic about uncertain outcomes and believe they have greater control over uncertain events. Our results show that there is more goodwill impairment in periods of high uncertainty. Second, we examine if firms with overconfident CEOs also exhibit higher impairments in periods of high uncertainty. We find that in periods of high uncertainty, firms with overconfident CEOs report smaller goodwill impairments compared to other firms, even when the firm's economic performance is low. Table 6 below summarizes the three research questions with the main findings.

Table 6: Summary of the three research questions

	Chapter 1	Chapter 2	Chapter 3
Title	The effect of goodwill and its impairment on cash flow prediction	Goodwill and stock price crash risk	Economic policy uncertainty and goodwill impairment
Main research question *(Sub questions)*	Does goodwill decrease earnings' ability to predict future cash flows? *(What about the impact of goodwill impairment on cash flow prediction?)*	Does goodwill increase stock price crash risk? *(What about the impact of goodwill impairment on stock price crash risk? And other intangible assets?)*	Does environmental uncertainty lead to more goodwill impairment? *(Do firms with overconfident CEO's also report more goodwill impairment in periods of high uncertainty?)*
Sample	40 046 observations from 4 811 U.S listed firms from 2003 to 2020	40 046 observations from 4 811 U.S listed firms from 2003 to 2020	29 740 observations from 3 513 U.S listed firms having goodwill in the balance sheet from 2003 to 2020
Main findings	✓ Goodwill decreases the predictability of cash flows ✓ Goodwill impairment increases the predictability of cash flows ✓ Goodwill impairment results in higher future cash flows	✓ Goodwill magnitude increases stock price crash risk, but it is not the case with all intangible assets. ✓ A single goodwill impairment has no impact on stock price crash risk ✓ Frequent goodwill impairments reduce stock price crash risk	✓ Firms impair more goodwill in periods of high uncertainty ✓ Firms with overconfident CEO's report smaller goodwill impairments in periods of uncertainty compared to other CEO's

6.2 Contributions

→ *Empirical contributions:*

Taken together, the results of our research present several contributions. Goodwill impairment can be an effective mechanism. In most of our analyses we find a strong association between performance attributes of the firm and goodwill impairment. However, due to the discretion in the testing process, goodwill impairment can be easily affected by many factors, whether internal or external to the firm. The impact of these different factors does not automatically lead to opportunistic impairments. We found strong evidence suggesting firms report higher impairments when facing uncertainty. This is a rightful application of ASC 350 recommendations. Environmental uncertainty generally leads to uncertain outcomes for firms and thus presents a strong motive for goodwill impairment. Managers are recording these impairments when facing uncertainty to provide relevant information to financial statement users. Our results also indicate that the discretion in impairment testing allows managers to convey their private information credibly to stakeholders as the prediction of future cash flows is improved with goodwill impairment. The only difference between the precepts of ASC 350 and the reality of firms is that goodwill impairment seems to occur after several years of profitability decrease, instead of being recognized to indicate a future decline in profitability. Nevertheless, there are factors that can lead to opportunistic behaviors regarding goodwill impairment. While we found that most firms report higher amounts of goodwill impairment when facing uncertainty, firms with overconfident CEOs do not follow the same pattern. In periods of uncertainty, overconfident CEOs report smaller impairments compared to their counterparts even if the firm is underperforming economically. However, the stock market balances out the opportunistic behavior around goodwill impairment. Our results indicate that firms with high magnitudes of goodwill in the balance sheet face a greater stock price crash risk, but if these firms report frequent goodwill impairments, their crash risk reduces.

Taken together, these results counterbalance the debate around a possible return to the amortization method. The impairment method better reflects the consumption of goodwill than arbitrary amortization, enables managers to convey private information on future cash flows, and helps stakeholders to assess the success of an acquisition and

the firm's future performance. The challenge for regulators is to implement an optimal degree of discretion which allows enough latitude to convey necessary information while reprimanding any opportunistic behavior.

→ *Academic contributions:*

This dissertation contributes to the academic literature in a number of ways. Broadly, the thesis contributes to the literature investigating the efficiency of a specific fair value oriented standard: goodwill impairment. Moreover, it adds to other different streams of literature. Our findings contribute to the ongoing and fundamental issue of accounting which is cash flow prediction. It also presents new arguments for the literature on the impact of companies' environment on financial reporting and corporate decision making. It relates to the literature of behavioral corporate finance that examines the impact of managerial psychological traits, such as overconfidence, on various corporate policies and outcomes. Finally, it contributes to the literature on stock price crash risk and its association to financial reporting transparency.

The results of the dissertation confirm that financial reporting depends on both accounting regulation and the choices of economic actors, which places the thesis within the framework of the positive accounting theory (Watts and Zimmermann (1986). The results also highlight the real effect of accounting choices, even for accounting items which do not generate cash flows. The importance of the informational role of accounting items is also highlighted in this dissertation.

→ *Managerial contributions:*

This thesis is built around the ongoing debate on the effectiveness and reliability of goodwill impairments. From the results of our three essays and the existing literature, we find that the impairment method better reflects the consumption of goodwill than arbitrary amortization, enables managers to convey private information on future cash flows, and helps stakeholders to assess the success of an acquisition and the firm's future performance. These findings highlight the importance of the disaggregation of earnings. Each component of earnings, such as goodwill impairment, has significant informational relevance. However, the discretion and opportunism in goodwill impairment should not be overlooked and must be addressed properly. We find that overconfidence in top executives leads to opportunistic behavior around goodwill

impairment. This result highlights the importance of executive recruitments, whose profiles have a direct impact on financial reporting and the quality of accounting information. Nevertheless, our findings indicate that the stock market balances out the opportunistic behavior around goodwill impairment. Our results show that firms with high magnitudes of goodwill in the balance sheet face a greater stock price crash risk, but if these firms report frequent goodwill impairments, their crash risk reduces. This finding highlights a market-firm feedback effect. The stock market reacts to accounting information and sends back value relevant information to firms.

The findings of this thesis can be of particular interest to auditors when assessing goodwill impairment tests in practice. Moreover, they have implications for regulators and standard setters who are constantly trying to improve goodwill regulation by launching post implementation reviews, issuing several updates over the years, and proposing options aiming to simplify the impairment method.

→ *Theoretical contributions:*

Our findings call attention to certain fundamental questions in financial accounting related to goodwill. Looking at firm's balance sheets, we provide examples where goodwill represents more than half of the total assets of a firm (see the cases of Tripadvisor inc. and Adobe inc. in section 1). The results of the analyses conducted in the three essays of the dissertation indicate that higher values of goodwill can be problematic as it can result in decreased predictability of future cash flows and increased stock price crash risk for firms. These conclusions raise questionings about the purchase price allocation after operations of mergers and acquisitions and the initial recognition of intangible assets. According to Carvalho et al. (2016), a big part of the purchase price is allocated to goodwill after an acquisition due to the difficulty in individually estimating other intangible assets. Olante (2013) suggests that large amounts of goodwill with respect to the price paid are more likely to include elements other than the synergies stemming from the combination and the value of the target. These aspects of purchase price allocation and intangible assets recognition are directly linked to our findings on the impact of important amounts of goodwill as it is the root of the phenomenon of large goodwill figures.

A dissertation on goodwill also raises questions on internally generated goodwill. As defined by Johnson and Petrone (1998), internally generated goodwill represents the ability of a company as a stand-alone business to earn a higher rate of return on an organized collection of net assets than would be expected if those assets had to be acquired separately. Internally generated goodwill is not recorded in the accounting system and exists independently from any business combination. However, it becomes part of the recorded external goodwill when a company is acquired (Casta, Paugam and Stolowy, 2011). Since the only way to recognize internally generated goodwill is through the recorded external goodwill, it could be an incentive for managers to inflate the amount of external goodwill recognized after an acquisition. This dissertation focuses on goodwill and its impairment but represents a part of a larger picture of questionings on mergers and acquisitions, purchase price allocation, recognition of intangible assets and internally generated goodwill.

7. Conclusion

This introduction presents the research subject of the dissertation. First, it starts with an overview of goodwill accounting regulation under both US GAAP and IFRS. Second, a presentation and classification of the existing literature is presented to help categorize the three essays of the thesis, to evaluate the essays' contributions, and to gain an overview of the various research streams. Afterwards, the motivation of this research is presented based on the findings and gaps highlighted in the literature review. The importance of each research question is explained in this section. The next part of the introduction addresses the sample and research methodology chosen in this dissertation. The next section exposes the main findings of each research question and presents the general contributions of the thesis.

The rest of this dissertation is structured as follows: a prelude of descriptive analysis on goodwill and goodwill impairment data used throughout the thesis is provided. This descriptive analysis is followed by chapters 1, 2 and 3 which present the three research essays of the dissertation. These essays can be read independently and address the research questions specified in this introduction. The essays can be read separately but also constitute three topics related to goodwill impairment and are therefore

interconnected. The three essays form a global analysis on goodwill and its impairment on different scales: micro – mezzo – macro. All three chapters have a similar structure. After an introduction, background information concerning the research question is provided, prior literature is presented, and the essays' hypotheses are developed. Afterwards, the research design is explained starting with the sample selection, the specification of the empirical models and the definition of the variables. The results are then discussed, including a descriptive analysis of the sample, regression results, and additional tests to assess the robustness of the results. All of the essays finish with a conclusion.

8. References

AbuGhazaleh, M., N., Al-Hares, M. O., Haddad, A., O., (2012). The Value Relevance of goodwill impairments: UK Evidence. I*nternational Journal of Economics and Finance*, 4 (4), 206-216.

AbuGhazaleh, N., Al-Hares, O., and Roberts, C., (2011), Accounting Discretion in Goodwill Impairments: UK Evidence. *Journal of International Financial Management & Accounting,* 22(3), 165-204.

André, P., Filip, A., Paugam, L., (2016). Examining the Patterns of Goodwill Impairments in Europe and the US. *Accounting in Europe*, 13 (3), 329–352.

Avallone, F., Quagli, A., (2015), Insight into the variable used to manage the goodwill impairment test under IAS 36, *Advances in Accounting, incorporating Advances in International Accounting*, 31, 107-114.

Baker S. R., Bloom N. and Davis j. S., (2016), Measuring Economic Policy Uncertainty. *The Quarterly Journal of Economics*, 131(4), 1593–1636.

Beatty, A., Weber, J., (2006). Accounting Discretion in Fair Value Estimates: An Examination of SFAS 142 Goodwill Impairments. *Journal of Accounting Research*, 44 (2), 257-288.

Bens, D., A., Heltzer, W., Segal, B., (2011). The Information Content of Goodwill Impairments and SFAS 142. *Journal of Accounting, Auditing & Finance,* 26(3), 527–555.

Carvalho C., Rodrigues, A.M., Ferreira, C. (2016). The recognition of goodwill and other intangible assets in business combinations – the Portuguese case. *Australian Accounting review*, 26, 4 – 20.

Casta, J.F., Paugam, L., Stolowy, H. (2011). An explanation of the nature of internally generated goodwill based on aggregation of interacting assets. *SSRN electronic journal*: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1716907

Chen, J., Hong, H., Stein, J.,C., (2001). Forecasting crashes: trading volume, past returns, and conditional skewness in stock prices. *Journal of Financial Economics*, 61 (3), 345–381.

Cheng, P., Man, P., Yi, C., H., (2013). The impact of product market competition on earnings quality. *Accounting and Finance*, 53, 137-162.

Chung, B., H., Hribar, P., (2021). CEO overconfidence and the timeliness of goodwill impairments. *The Accounting Review*, 96(3), 221-259.

Dai, L., Ngo, P., (2020). Political uncertainty and accounting conservatism. *European Accounting Review*, 30(2), 1–32.

DeFond, M., L., Hung, M., Li, S., Li, Y., (2015).Does Mandatory IFRS Adoption Affect Crash Risk? *The Accounting Review*, 90 (1), 265–299.

Dhole S., Liu L., Lobo J. G. , Mishra S., (2021). Economic policy uncertainty and financial statement comparability. *Journal of accounting and public policy*, 40(1), 1-21.

Filip, A., Lobo, G., J., Paugam, L., (2020). Managerial discretion to delay the recognition of goodwill impairment: The role of enforcement*. Journal of Business Finance and Accounting*, 48 (1-2), 36 – 39.

Filip, A., Jeanjean, T., and Paugam, L., (2015), Using Real Activities to Avoid Goodwill Impairment Losses: Evidence and Effect on Future Performance, *Journal of Business Finance and Accounting*, 42(3-4), 515 – 554.

Financial Accounting Standards Board (2001), Statement of Financial Accounting Standards No. 142: Goodwill and Other Intangible Assets.

Finch, N. (2009). The CEO's impairment test. *Critical Perspectives on Accounting*, 20(7), 872-872.

Glaum, M., Landsman, W., R., Wyrwa, S., (2018). Goodwill impairment: The Effects of Public Enforcement and Monitoring by Institutional Investors. *The Accounting Review*, 93 (6), 149-180.

Godfrey, J., M., Koh, P-S., (2009). Goodwill impairment as a reflection of investment opportunities. *Accounting and Finance*, 49, 117–140.

Gu, F., Lev, B., (2011). Overpriced Shares, Ill-Advised Acquisitions, and Goodwill Impairment. *The Accounting Review*, 86 (6), 1995-2022.

Hirschey, M., Richardson, V., J., (2002). Information content of accounting goodwill numbers. *Journal of Accounting and Public Policy*, 21(3), 173–191.

Hutton , A., P., Marcus, A., J., Tehranian, H., (2009). Opaque financial reports, R2, and crash risk. *Journal of Financial Economics*, 94, 67–86.

International Accounting Standards Board (2001), IAS 36: Impairment of Assets

International Accounting Standards Board (2004), IFRS 3: Business Combinations

Jarva, H., (2009). Do Firms Manage Fair Value Estimates? An Examination of SFAS 142 Goodwill Impairments. *Journal of Business Finance & Accounting*, 36(9-10), 1059–1086.

Jin J. Y., Kanagaretnam K., Liu Y., Lobo G. J., (2019) Economic policy uncertainty and bank earnings opacity. *Journal of accounting and public policy*, 38, 199-218.

Johnson, L., K. Petrone, (1998). Is goodwill an asset? *Accounting Horizons*, 12, 293-303.

Jordan, C., E., Clark, S., J., (2015), Do Canadian Companies Employ Big Bath Accounting When Recording Goodwill Impairment? *International Journal of Economics and Finance,* 7 (9), 159-168.

Kim, J.B., Zhang, L., (2016). Accounting Conservatism and Stock Price Crash Risk: Firm-level Evidence. *Contemporary Accounting Research,* 33 (1), 412–441.

Knauer, T., Wöhrmann, A., (2016). Market Reaction to Goodwill Impairments. *European Accounting Review*, 25 (3), 421-449.

Lapointe-Antunes, P., Cormier, D., Magnan, M., (2009). Value relevance and timeliness of transitional goodwill-impairment losses: Evidence from Canada. *The International Journal of Accounting,* 44, 56–78.

Li, J., Myers, S., C., (2006).R2 around the world: New theory and new tests. *Journal of Financial Economics,* 79, 257–292.

Li, K., K., Sloan, R., G., (2017). Has goodwill accounting gone bad? *Review of Accounting Studies*, 22, 964–1003.

Li, S., (2016). Managerial ability and goodwill impairment. *Advances in Accounting, incorporating Advances in International Accounting*, 32, 42–51.

Li, Z., Shroff, P., K., Venkataraman, R., Zhang, I., X., (2011). Causes and consequences of goodwill impairment losses. *Review of Accounting Studies*. Vol. 16 (4), 745–778.

Malmendier, U., Tate, G., (2005). CEO overconfidence and corporate investment. *Journal of Finance*, 60 (6), 2661-2700.

Masters-Stout, B. Costigan, M. L. and Lovata, L. M. (2008), Goodwill Impairments and Chief Executive Officer Tenure. *Critical Perspectives on Accounting*, 19, 1370-1383.

Murugaboopathy, P., Dogra, G., (2021). Global M&A volumes hit new record in 2021, overtaking last year's haul. *Reuters*, from https://www.reuters.com/business/global-markets-ma-2021-08-12/

Olante, M., E., (2013). Overpaid acquisitions and goodwill impairment losses — Evidence from the US. *Advances in Accounting, incorporating Advances in International Accounting*, 29, 243–254.

Ramanna, K. Watts, R. L. (2012), Evidence on the Use of Unverifiable Estimates in Required Goodwill Impairment. *Review of Accounting Studies*, 17 (4), 749-780.

Watts, R. L. Zimmermann, J. L. (1986), Positive Accounting Theory, *New Jersey: Pearson*.

Zang, Y. (2008). Discretionary behavior with respect to the adoption of SFAS no, 142 and the behavior of security prices, *Review of Accounting and Finance*, 7 (1), 38-68.

Prelude: Descriptive analysis

1. Introduction

Since its introduction in 2001, the goodwill impairment approach sparked debate in the academic and professional spheres. According to the FASB[25], the impairment approach can improve financial reporting because the financial statements of entities with goodwill will better reflect their underlying economics. The previous method presumed goodwill was a finite lived asset, and thus the amounts assigned to it had to be amortized. The amortization method assumed a systematic decline of goodwill value, a finite lifetime of the goodwill, and denied the possibility of an appreciation of the goodwill. In that sense, the recognition of a non systematic goodwill impairment loss, based on fair value and the estimation of future cash flows, should normally reflect much precisely the economic reality of companies. However, previous literature documented that the granted discretion can be used for opportunistic motives. The impairment-only approach has met with sharp criticism since its introduction. Despite the multitude studies on the topic, the available evidence does not allow for an unambiguous answer to the question whether goodwill information has improved or deteriorated following the introduction of the impairment-only approach.

This prelude is primarily a descriptive analysis of goodwill and goodwill impairment data used throughout the different chapters. We start by analyzing goodwill and goodwill impairment magnitudes, patterns and evolutions during the years of the sample. We conduct descriptive statistics on indicators defined by prior literature as key elements impacting goodwill impairment. We do not develop any new hypotheses for testing but we discuss previously established arguments defined by prior literature. Our analysis is primarily descriptive; however, we conduct a regression which includes all the elements tested separately during this chapter.

The results of the descriptive analysis we conduct confirms all the arguments made by prior literature while the result of our regression model presents more nuanced conclusions. Overall the findings indicate that goodwill impairment is related to performance attributes of the firm. This result is an indication that firms are rightfully applying the recommendation of ASC 350. For the opportunism concerns, our results

[25] Financial Accounting Standards Board

indicate that some specific situations can lead to opportunistic impairment or avoidance of impairment.

The rest of this prelude is structured as follows: section 2 presents the sample selection process. Section 3 presents general statistics on goodwill and goodwill impairment. Section 4 discusses arguments of opportunism in goodwill impairment while section 5 discusses goodwill impairment's relation to performance attributes of the firm. Finally, section 6 presents a regression model for goodwill impairment.

2. Sample selection

Throughout the dissertation, we work with a sample of US listed firms from 2003 to 2020. The US setting is particularly appropriate to answer our research questions. The US market is one the widest in term of listed companies. It also concentrates a large share of the world's mergers and acquisitions. Finally, the FASB introduced impairment of goodwill in 2001 which offers us a large set of data to work on. ASC 350 was introduced in 2001 but was required to be applied starting with fiscal years beginning after December 15, 2001. We therefore excluded observation of 2001 and of the initial adoption year (2002) and decided to start our analysis in 2003. Data of 2002 was however used to compute changes of variables.

We obtain annual financial statement information for all publicly traded firms incorporated in the U.S. from Compustat. We initially downloaded a sample of all North-American companies from 2002 to 2020. The initial number of firm-years is 211215, to which we subtracted observations with missing data and observations of firms operating in the financial sector, in utilities and in mining. We excluded companies operating outside of the United States (we deleted observations of Canadian firms and firms based in the United States but incorporated or listed elsewhere). We also deleted all observations prior to 2003. Depending on the research question, we used different samples. In one sample we included all firms with and without goodwill in the balance sheet. This sample results in 40046 observations and we call it sample A. We used another sample which only includes firms with goodwill in the balance sheet. This sample results in 29740 observations and we call it sample B. Finally, we use a third sample including only observations with goodwill impairment and call it sample C (constituted of 3665 observations). The table below summarizes the different samples used in this thesis.

Table 7: The different samples used in this thesis

Sample A	Firms with and without goodwill	40046 observations
Sample B	Only firms with goodwill	29740 observations
Sample C	Only firms with goodwill impairment	3665 observations

3. Goodwill and goodwill impairment general statistics

3.1 Goodwill and goodwill impairment percentages in our samples

Figure 12 below presents the percentages of observations with and without goodwill in sample A. The results indicate that approximately three quarters of the sample exhibit goodwill in the balance sheet (74%). This first result comes as no surprise since the M&A activities in the past decades has been quite important. However, within sample B (only observations with goodwill), there is very few goodwill impairment. This is shown in figure 13 where the results indicate only 12% of observations report goodwill impairment while 88% do not.

Figure 12: Percentages of goodwill and no goodwill observations in the entire sample (sample A)

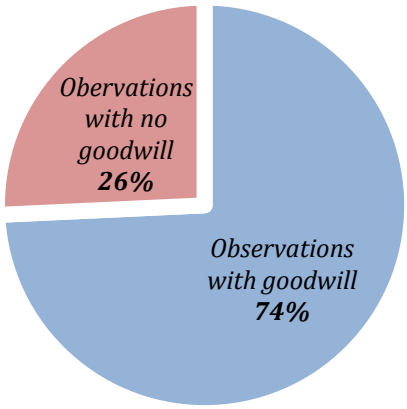
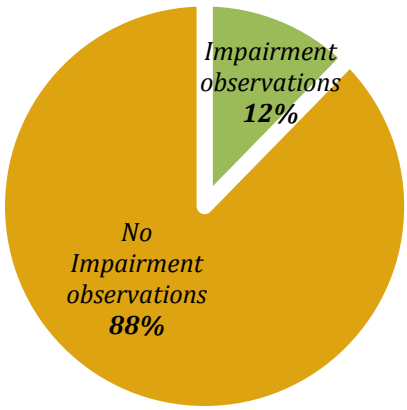


Figure 13: Percentage of impairment and no impairment observations within the sample of firms with goodwill (sample B)



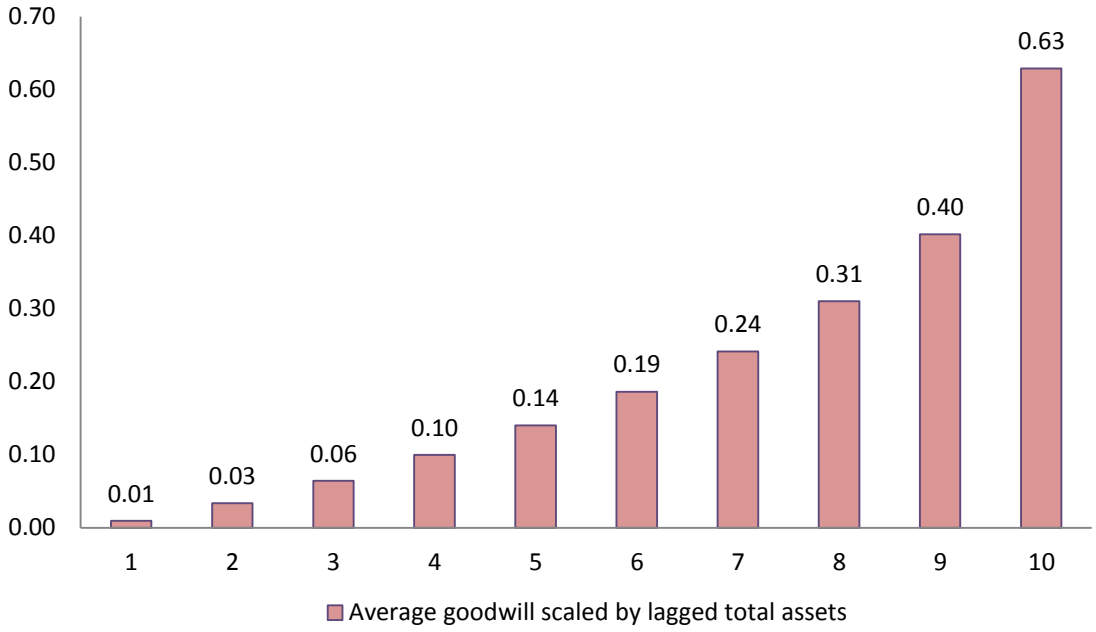
3.2 Goodwill and goodwill impairment distribution

The complexities introduced by the impairment approach can probably explain firms' reluctance to goodwill impairment (only 12% of observations with goodwill report goodwill impairment). Previous literature documented that firms tend to use the discretion around goodwill impairment for opportunistic motives. Filip et al. (2015) show that managers delay the recognition of goodwill impairment in accounting books by manipulating upward current cash flows. Ramanna and Watts (2012) investigate determinants of goodwill impairments in the USA for the period 2003 to 2006. Using a sample of 124 observations from listed firms whose goodwill is likely to be impaired; they investigate whether non-impairment in the sample is associated with motives predicted by agency theory to affect management choice. They find some evidence of association between goodwill non-impairment and CEO compensation, CEO reputation, and debt covenant violation concerns. Li (2017) also argues that some managers have exploited the discretion afforded by SFAS 142 to delay goodwill impairments, thus temporarily inflating earnings and stock prices.

These findings suggest that the discretion and flexibility granted with the impairment approach can be detrimental to firms as it can be used for earnings management purposes rather than the reflection of the true economic situation of companies. This is particularly true since goodwill is an important asset in the balance sheet representing on average for our sample (sample B) 21% of total assets; with software and pharmaceutical industries taking the lead with goodwills on average representing respectively 25% and 24% of total assets.

Figure 14 below presents the mean of goodwill scaled by lagged total assets for its ten deciles' distribution (sample B). Goodwill ranges from 1% to 63% of total assets.

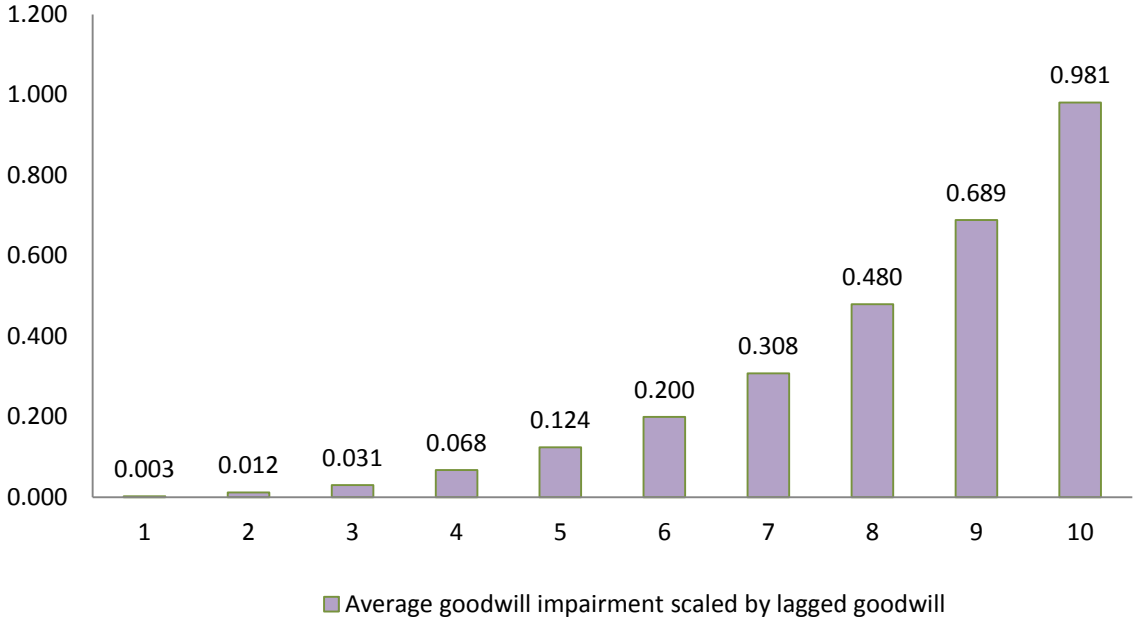
Figure 14: Deciles' distribution of goodwill



Goodwill impairment, although not very frequent on our sample B (3665 observations with impairment and 26 075 without), is also of importance to firms' balance sheets and income statements. On average, it represents 4.8% of goodwill in sample B (only firms with goodwill in the balance sheet) and 35.2% if we consider only observations with impairments (sample C)[26]. The observations with goodwill impairment range from 0.3% to 98% of goodwill as shown below in the deciles distribution (figure 15).

[26] The percentages of goodwill impairment presented are based on a ratio of goodwill impairment scaled by lagged goodwill. When scaled by lagged total assets, goodwill impairment represents on average 0.8% of total assets in sample B (only firms with goodwill in the balance sheet) and 5.7% if we consider only observations with impairment (sample C). The observations with goodwill impairment range from 0.01% (1st decile) to 24% (10th decile) of total assets.

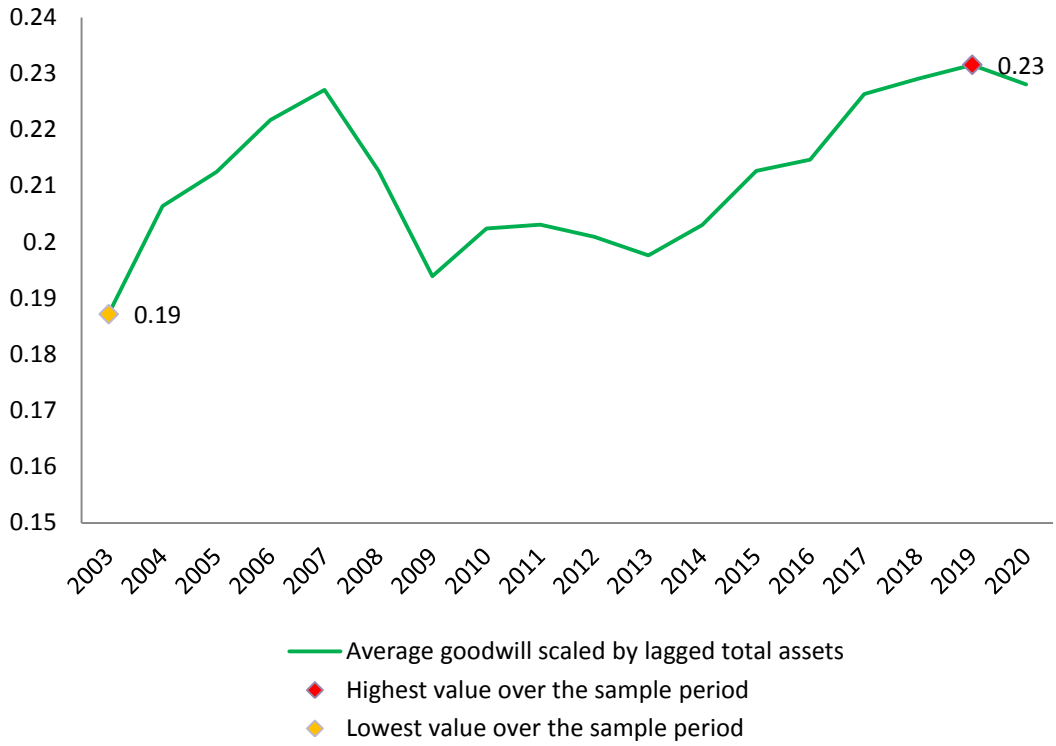
Figure 15: Deciles' distribution of goodwill impairment



3.3 Goodwill and goodwill impairment evolution during the sample period

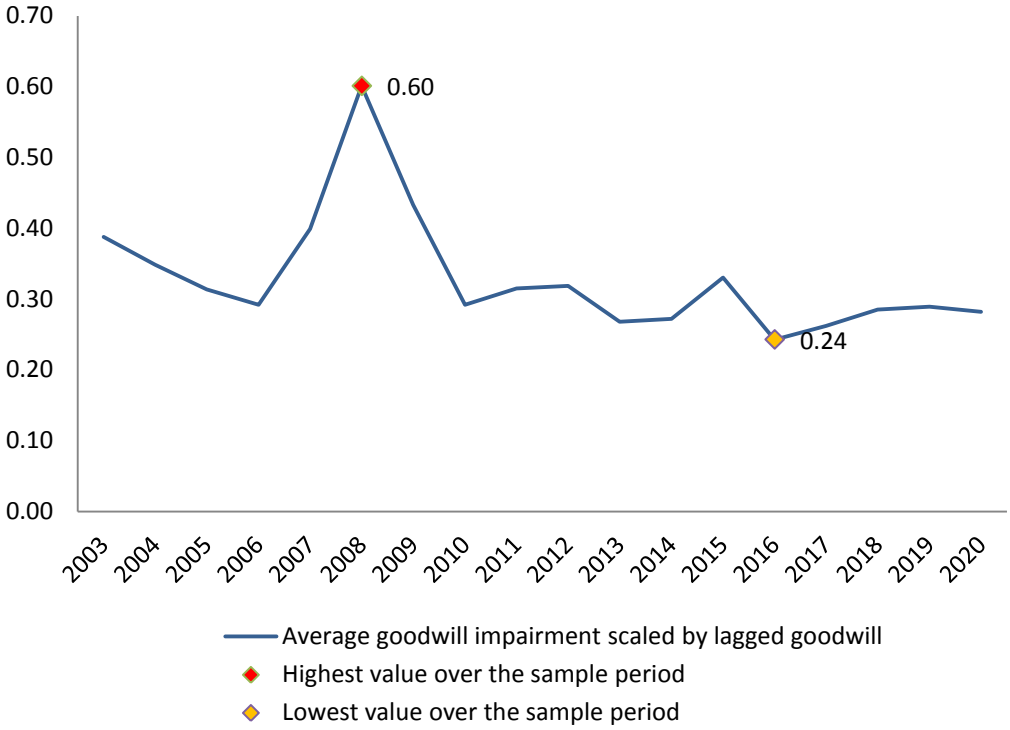
The important amounts of goodwill were not always as significant and have varied over time. In figure 16 below, we observe an overall upward tendency with goodwill representing on average 19% of total assets in 2003 and an average of 22% in 2020. However, the rise of goodwill amounts over times has experienced important spikes and drops. In 2004, goodwill experienced a major rise of 10%. This rise continued up to 2008 where it started to fall down. In 2009, goodwill suffered its most important decline (9% reduction). After the financial crisis period, average goodwill generally increased (with some slight decreases in 2012 and 2013) until 2019 where it reached its highest value (23%). In 2020, goodwill suffered another decrease of 2%, probably due to the Coronavirus pandemic.

Figure 16: Average goodwill evolution from 2003 to 2020



Unlike goodwill, goodwill impairment evolution from 2003 to 2020 did not experience the same general rise, as it can be seen on figure 17 below. Goodwill impairment amounts experienced strong volatility over the years with no specific tendency. On average goodwill impairment represented 39% of goodwill in 2003 and decreased slightly over the three following years. As a consequence of the financial crisis, goodwill impairment experienced a tremendous rise of +51% in 2008, reaching its highest value of 60% of goodwill (equivalent to 10.7% of total assets). For the remaining years, goodwill impairment values continued to be volatile with rises and drops. The lowest value of goodwill impairment in our sample is 24% which occurred in 2016.

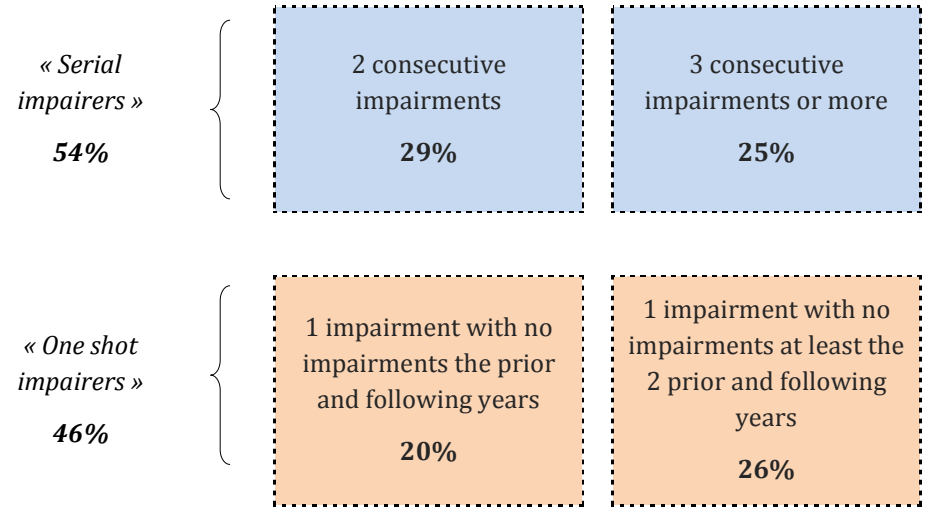
Figure 17: Average goodwill impairment evolution from 2003 to 2020



3.4 Goodwill impairment patterns

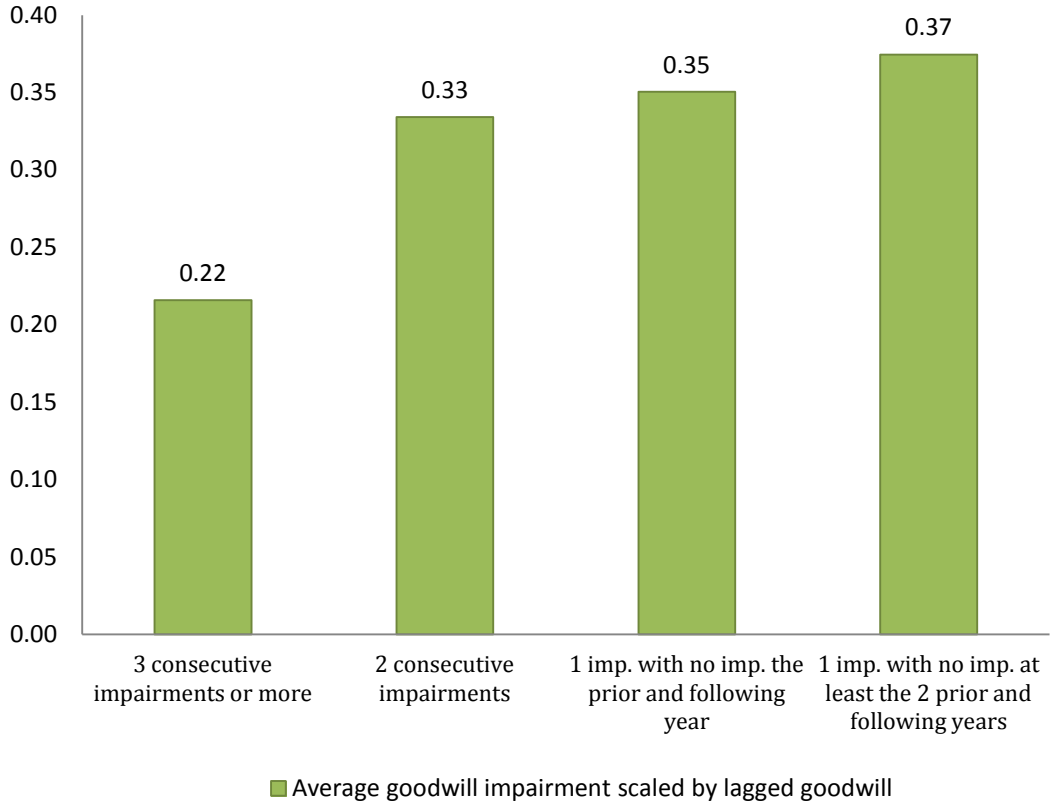
After examining goodwill and goodwill impairment evolutions over the years, we noticed in the dataset two distinct patterns of goodwill impairment. Some firms report frequent impairments while others only impair goodwill rarely. Within these two categories of "serial impairers" and "one shot impairers", we identified 2 sub groups as shown below in figure 18. Within the "serial impairers", we identified firms who perform 2 consecutive impairments which represent 29% of the impairments and firms who report 3 consecutive impairments or more and this group represents 25% of the impairments. Taken together the consecutive impairments represent approximately half of the impairments which is 54%. For the "one shot impairers", we identified firms who report 1 impairment with no impairments the prior and following years (20% of impairments in the sample are conducted this way) and firms who report 1 impairment with no impairments at least the 2 prior and following years (26% of impairments in the sample). Taken together, the one shot impairments represent 46% of the sample impairments. The four identified patterns represent more or less equal parts with the "2 conservative impairments" pattern being the most frequent.

Figure 18: Goodwill impairment patterns



The different patterns of impairment have a direct impact on the amounts of goodwill that firms impair. Firms who perform frequent impairments report smaller impairment amounts than firms who impair rarely. Figure 19 below displays the average impairment for each pattern. Not surprisingly, firms who report the smaller amounts are firms who perform 3 consecutive impairments (these firms impair on average 21.6% of their goodwill) and firms who report the highest amounts of goodwill impairment are firms who report 1 impairment with no impairments at least the 2 prior and following years (37.5% of goodwill). These results indicate that firms choose an impairment strategy of either smoothing the impairment charge or taking it all at once (big bath).

Figure 19: Mean of goodwill impairment for each impairment pattern



4. Opportunism in goodwill impairment

4.1. Earnings smoothing and big bath accounting

By observing reported earnings surrounding the period in which asset write-downs were announced, Zucca and Campbell (1992) identified two possible patterns of earnings management: income smoothing and big baths. They describe income smoothing as an earnings pattern in which management aspires to maintain a steady and predictable rate of earnings growth. Thus, in the case of write downs, a firm with an impaired asset may attempt to record the loss in a period of higher than normal earnings. The second form of earnings management identified by the authors has been referred to as the "big bath." Under this scenario, the firm appears to "save up" discretionary losses or accruals and then record several losses in the same period or in a period in which the firm has already experienced below normal earnings. In the case of discretionary asset write downs, this reasoning is particularly appropriate since a write down results in decreased depredation expense in the future. Using a sample of U.K

listed firms, AbuGhazaleh et al (2011) reveal that goodwill impairment is likely to be associated with income smoothing and big bath reporting behaviors.

We test for our sample the existence of a link between goodwill impairment and earnings smoothing or big bath reporting behaviors. To measure earnings smoothing and big bath reporting, we follow the methodology of Riedl (2004). First, we compute the change in firms' pre-impairment earnings from T-1 to T deflated by lagged total assets. "Smooth", a dichotomous variable, takes 1 if this change is above the median of non-zero positive values, and 0 otherwise. "Bath", a dichotomous variable, takes 1 if this change is below the median of non-zero negative values, and 0 otherwise. We use a mean comparison test to examine if there is a difference in the amounts of goodwill impaired for observations with indication of earnings smoothing and observations with indication of big bath accounting. The results in figure 20 below show that firms with indications of earnings smoothing report smaller amounts of goodwill impairment (3.6% of goodwill) than firms with no indications of earnings smoothing. Similarly, firms with indications of big bath accounting report higher impairment (10% of goodwill) than firms with no indications of big bath. The detailed results of the mean comparison test in table 8 show that the difference of goodwill impairment mean between smooth and no smooth observations is significant with a t-statistic of 7.22. The difference of goodwill impairment mean between bath and no bath observations is also significant with a t-statistic of -18.31.

Figure 20: Goodwill impairment mean difference between (smooth/no smooth) and (bath/no bath)

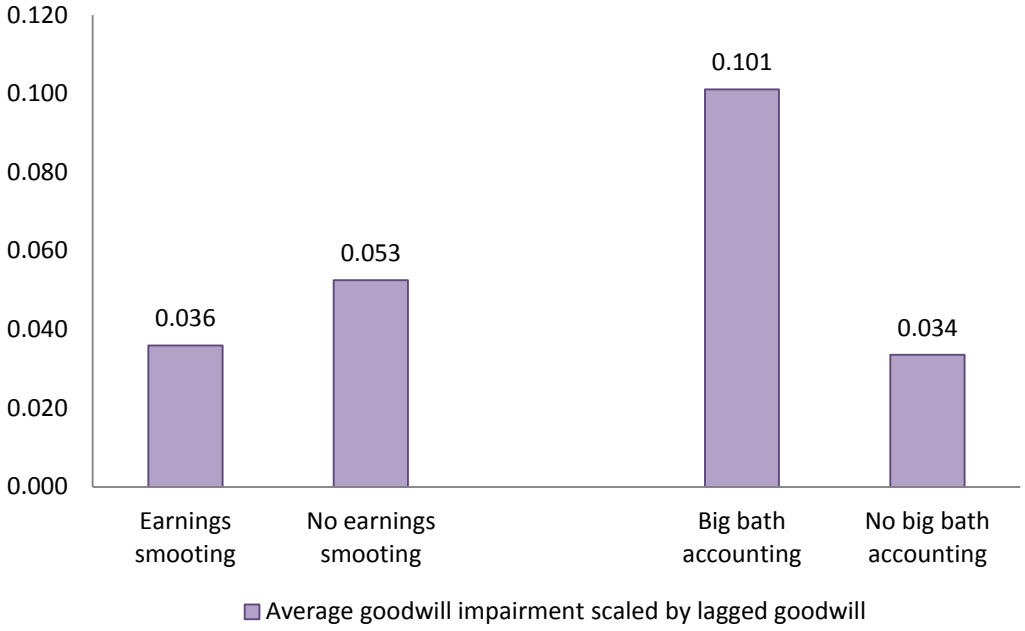


Table 8:Goodwill impairment mean comparaison test results (smooth/no smooth) and (bath/no bath)

	Impairment mean	Number of observations	t-stat
Smooth	0.036	7450	7.22***
No smooth	0.053	18304	
Bath	0.101	20344	-18.31***
No bath	0.034	5410	

*, ** and *** denote significance at pvalue≤10%, ≤5% and ≤1% respectively

4.2. CEO change and CEO compensation

Other factors impacting the reported amounts of goodwill impairment according to previous literature are related to senior management. Ramanna and Watts (2012) find an association between goodwill non-impairment and CEO compensation. CEOs whose compensation is based on high proportions of bonus might try to minimize the impairment loss. In contrast, new CEOs might report higher impairments, blaming the low performance and failure of the acquisition on the old management, while creating an opportunity to inflate future earnings (Masters-Stout et al (2008), Zang (2008)). We conduct a mean comparison test of the amounts of reported goodwill impairment in the cases where there is a new CEO or not and in the cases the CEO receives bonus compensation or not. We create the dichotomous variable "New_CEO" which takes 1 if

the CEO of year T is different from the CEO in year T-1, and 0 otherwise. Similarly, we create the dichotomous variable "Bonus" which takes 1 if the CEO receives a bonus and stock-based compensation, and 0 otherwise. The results in figure 21 show that average goodwill impairment is higher for firms with a new CEOs (5.5% of goodwill) compared to when there is no change in CEO. Average goodwill impairment is however lower for firms who grant bonus compensations to their CEOs (2.8% of goodwill) compared to firms who do not grant these types of compensations. The detailed results of the mean comparison test in table 9 show that the difference of goodwill impairment mean between new and old CEOs observations is significant with a t-statistic of -3.95. The difference of goodwill impairment mean between bonus compensation observations and no bonus observations is also significant with a t-statistic of 5.11.

Figure 21: Goodwill impairment mean difference between (CEO change / no change) and (bonus / no bonus)

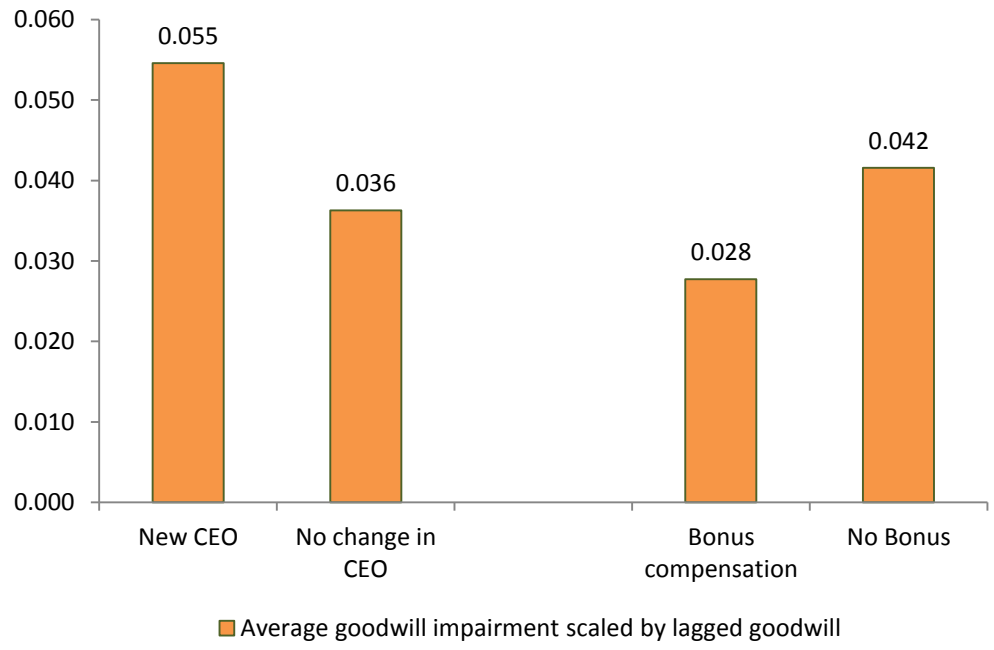


Table 9: Goodwill impairment mean comparison test results (CEO change/no change) and (bonus/no bonus)

	Impairment mean	Number of observations	t-stat
New CEO	0.055	1627	-3.95***
No CEO change	0.036	13327	
Bonus	0.028	11336	5.11***
No bonus	0.042	3547	

*, ** and *** denote significance at pvalue≤10%, ≤5% and ≤1% respectively

4.3. Debt covenant violation concerns

Literature on goodwill impairment also claims firms can delay or abstain from impairments to avoid debt covenant violations. The debt covenant hypothesis is based on the assumption that managers of highly leveraged firms have incentives to engage in income-increasing earnings management to avoid costly debt covenant violations (Watts and Zimmermann (1986)). The discretion offered by the ASC 350 can allow highly leveraged firms the opportunity to avoid or delay an impairment charge to respect the debt covenant. Zang (2008) examines whether managers use discretion in determining the goodwill impairment loss in a strategic manner. The results show that more highly leveraged firms have a lower goodwill impairment charge. We investigate whether firms with important leverages report smaller goodwill impairment compared to other firms. We measure important leverage with a dichotomous variable taking 1 if a firm's leverage is higher than its industry-year median. We conduct a mean comparison test for firms with leverages above and below their industry-year median. The mean comparison test results in figure 22 show that firms with leverages above the industry median report lower impairments (4.5% of goodwill) than other firms (5.1% of goodwill). The detailed results of the mean comparison test in table 10 show that the difference of goodwill impairment mean between firms with high/low leverage is significant with a t-statistic of 2.71.

Figure 22: Goodwill impairment mean difference between (high leverage/low leverage)

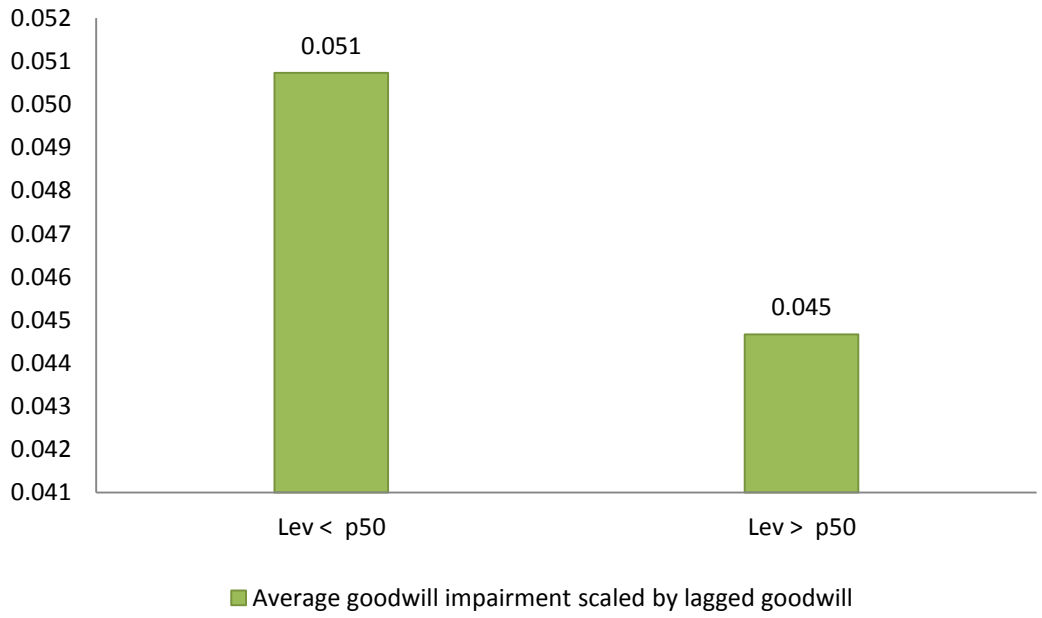


Table 10: Goodwill impairment mean comparison test results (High leverage/low leverage)

	Impairment mean	Number of observations	t-stat
Lev < industry p50	0.051	13091	2.71***
Lev > industry p50	0.045	12663	

*, ** and *** denote significance at pvalue≤10%, ≤5% and ≤1% respectively

5. Performance attributes around goodwill impairment

All of the evidence presented above confirms the conclusions of prior studies on the opportunistic use of goodwill impairment (Ramanna and Watts, 2012, Zang, 2008, Li, 2017, Beatty and Weber, 2006, Filip et al., 2015). Nevertheless, the literature also presents counterarguments. Jarva (2009) examines a sample of non-impairment firms in which there are indications that goodwill is impaired and fails to find convincing evidence that these firms are opportunistically avoiding impairments. Similarly, Jordan et al. (2015) find evidence suggesting that goodwill impairments are not being recorded opportunistically to take big baths but instead are being recognized only after multiple years of substandard earnings have occurred, thus indicating managers are recording these impairments to provide relevant information to financial statement users. Several other studies conclude that goodwill impairment is value relevant, is perceived by investors to reliably measure a decline in the value of goodwill, and is a rightful reflection of a firm's investment opportunities (Godfrey and Koh, 2009, Lapointe-Antunes et al., 2009). According to Lee (2011), Lee and Yoon, (2012) and Bostwick et al., (2016), goodwill's ability to predict future cash flows has also improved since the FASB adopted SFAS 142.

In the present section, we test if goodwill impairment is related to performance attributes of the firms. Firms with higher economic performances are expected to have a reduced likelihood of impairment, whereas a reduced profitability might indicate a higher likelihood of impairment. We select three measures of firm performance: pre-impairment return on assets, operating cash flows and sales, both scaled by average total assets. We observe the change of these indicators over the three years prior and following an impairment. Figures 23, 24 and 25 below present the evolution over the years for average pre-impairment ROA, average operating cash flows and average sales,

respectively. A similar tendency is observed on the three figures. The highest value of the three indicators happens in year -3, followed by a decrease in year -2 and -1, and reaching the lowest value on year 0, the year of goodwill impairment. This result indicates that goodwill impairment occurs after multiple years of performance decrease. It also shows that firms operate the impairment in the year with the lowest performance. Another observation from the three graphs is that performance starts to increase in year +1. This increase could signify that goodwill impairment signals a change or restructuring of the firm which may be associated with future performance improvements.

Figure 23: Average ROA evolution 3 years before and after goodwill impairment

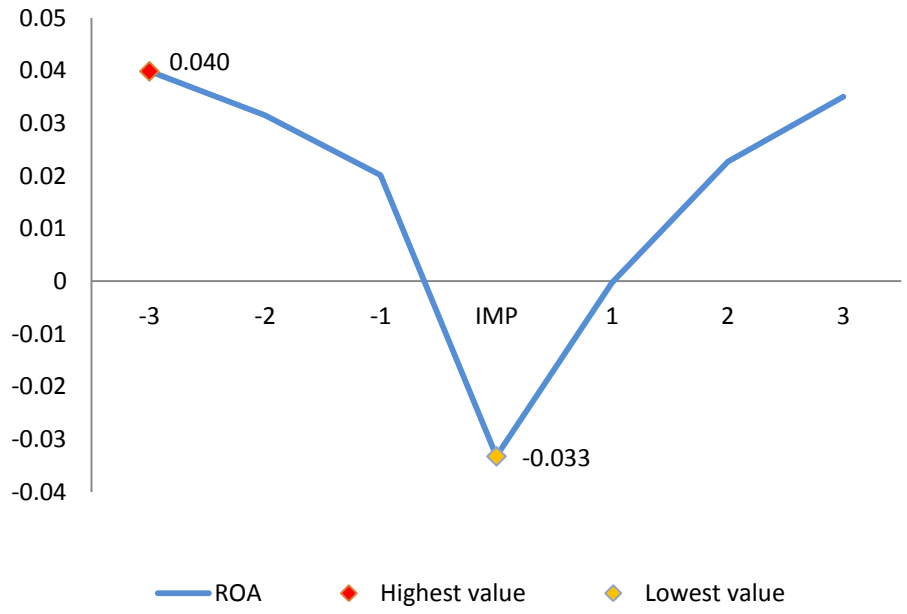


Figure 24: Average operating cash flows evolution 3 years before and after goodwill impairment

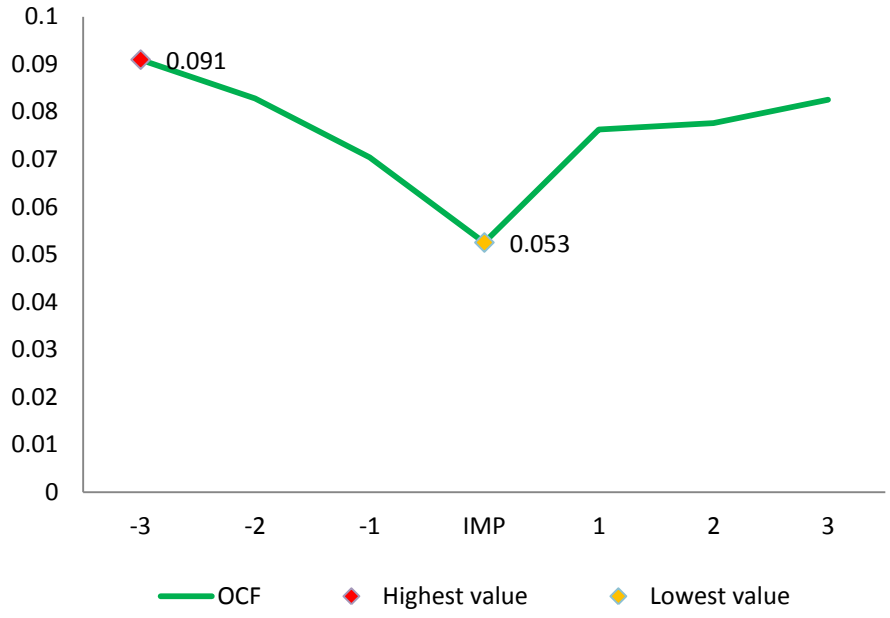
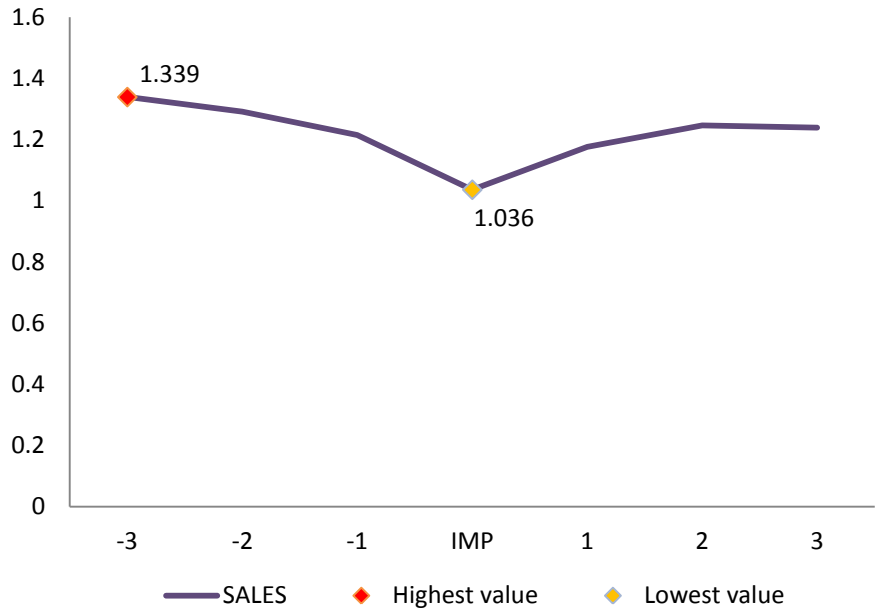


Figure 25: Average sales evolution 3 years before and after goodwill impairment



6. Regression analysis

Finally, to take into account simultaneously the effect of all the elements tested separately above; we run a regression model testing the impact of each variable on goodwill impairment.

$$IMP_{iT} = \beta_0 + \beta_1 GW_{i(T-1)} + \beta_2 \Delta OCF_{iT} + \beta_3 ROA_{i(T-1)} + \beta_4 SMOOTH_{iT} + \beta_5 BATH_{iT} + \beta_6 NEW\_CEO_{iT} + \beta_7 BONUS_{iT} + \beta_8 LEV_{iT} + \beta_9 BTM_{i(T-1)} + \in_{iT}$$

We first run this regression as a probit model testing the decision to impair goodwill. In this case, IMP is a dichotomous variable taking 1 if a firm performs an impairment and 0 otherwise. We run the regression a second time with IMP being a continuous variable measuring the magnitude of goodwill impairment. Specifically, IMP is computed as goodwill impairment scaled by lagged total assets and multiplied by -1 so that a higher value indicates a larger impairment. We run the regression with industry[27] and year fixed effects and cluster standard errors at firm level. Both regressions are conducted on sample B (only observations with goodwill).

The choice of the explanatory variables is based on prior literature and on the different indicators presented above. First, we include the variable *GW*. Firms with higher goodwill may incur more goodwill impairment. We include two performance measures. ΔOCF is the change in operating cash flows from T-1 to T, it captures cash-related performance attributes (Riedl, 2004). *ROA* is measured as net income scaled by total assets, it captures the firms general performance. It is expected that the poorer the firm's performance, the greater the magnitude of reported goodwill impairment. We also include indicators for earnings smoothing and big bath accounting. We measure earnings smoothing and big bath accounting with Riedl's (2004) method explained previously (see section 5.1). We include a variable related to the CEO's position: NEW_CEO, a dichotomous variable taking 1 if a firm has a new CEO, and 0 otherwise. Zang (2008) finds evidence suggesting that firms which have undergone recent management change report greater goodwill impairment. We include a variable related to performance-based compensation: CEO_BONUS. It is the proportion of bonus compensation and stock-based compensation on total compensation received by the CEO. CEO's whose compensation depends largely on the firm's results have incentives to prevent goodwill impairment to avoid a decrease in earnings. The variable LEV (leverage) controls for capital structure and tests the debt covenant violation theory. Finally, the variable *BTM* is computed as book value on market value. Firms with a higher book-to-market ratio are expected to impair more goodwill to adjust their book

[27] We use 2 digit sic codes for our industry classification

value to the reality of the market. Table 11 below summarizes the variables of the model, the sources and the expected signs.

Table 11 : Regression variables definitions and sources

Variable	Definition	Source (reference)	Predicted sign
IMP_{iT}	IMP = Magnitude of goodwill impairment scaled by lagged total assets *or* IMP1 = Dichotomous variable taking one if firms report goodwill impairment and 0 otherwise (for the probit model)	-Goodwill impairment: Compustat (gdwlip) -Total assets: Compustat (at)	
$GW_{i(T-1)}$	Goodwill (T-1) scaled by lagged total assets (T-2)	-Goodwill: Compustat (gdwl)	+
ΔOCF_{iT}	Change in operating cash flows from year T-1 to T scaled by lagged total assets	-Operating cash flows: Compustat (oancf)	-
$ROA_{i(T-1)}$	Net income (T-1) scaled by total assets	-Net income: Compustat (ni)	-
$SMOOTH_{iT}$	Dichotomous variable, takes 1 if the change in firms' pre-impairment earnings from T-1 to T is above the median of non-zero positive values, and 0 otherwise	-Net income: Compustat (ni)	-
$BATH_{iT}$	Dichotomous variable, takes 1 if the change in firms' pre-impairment earnings from T-1 to T is below the median of non-zero negative values, and 0 otherwise.	-Net income: Compustat (ni)	+
NEW_CEO_{iT}	Dichotomous variable taking 1 if a firm has a new CEO, and 0 otherwise	-Executive full name: Execucomp (EXEC_FNAME) -Date became CEO: Execucomp (BECAMECEO) -Date left as CEO: Execucomp (LEFTOFC)	+
$BONUS_{iT}$	Bonus compensation and stock-based compensation on total compensation received by the CEO	-Bonus: Execucomp (BONUS ($)) -Total current compensation: Execucomp (TOTAL_CURR)	-
LEV_{iT}	Long term debt plus debt in current liabilities scaled by lagged total assets	-Long term debt: Compustat (dltt) -Debt in current liabilities: Compustat (dlc)	-
$BTM_{i(T-1)}$	Book value on market value at T-1	-Market value: Compustat (mkvalt) -Book value per share: Compustat (bkvlps) -Number of shares outstanding: Compustat (csho)	+

The results of the regressions are presented in table 12. Column 1 of the table presents the results of the probit regression. The magnitude of goodwill impacts positively and significantly the decision to impair. As expected, both performance proxies, ROA and ΔOCF have negative and significant coefficients, confirming that poor performance leads to a higher probability of goodwill impairment. SMOOTH is negative and significant and BATH is positive and significant as expected for both variables. These results indicate that goodwill impairment might be used for big bath reporting incentives but also for earnings smoothing purposes. Regarding the CEO variables, our results indicate that a new CEO is more likely to impair goodwill, while the CEO's bonus compensation does not impact the decision to impair. Both leverage and book to market ratio have significant coefficients. The book to market coefficient has a positive sign as expected, indicating that higher book values result in a higher probability of goodwill impairment. The leverage variable has a positive sign, against the prediction of the debt covenant violation theory. Column 2 of the table presents the results of the fixed effect regression with goodwill impairment magnitude as a dependant variable. The results are similar to the ones of the probit regression for the variables capturing the performance attributes of the firm. The results for the proxies on the opportunism in goodwill impairment are slightly different from the results of the probit regression: earnings smoothing proxy is positive for the magnitude of goodwill impairment and negative for the decision to impair goodwill. The bonus compensation of the CEO does not impact the decision to impair goodwill but has a significant and negative impact on the magnitude of goodwill impaired. The leverage variable exhibits a non significant coefficient.

Taken together, our results indicate that goodwill impairment is related to performance attributes of the firm. This is the case for the probit regression testing the decision to impair goodwill and for the fixed effect regression on the magnitude of goodwill impairment. This result is an indication that firms are rightfully applying the recommendation of ASC 350. For the opportunism concerns, our results are more mitigated. The results indicate that some specific situations can lead to opportunistic impairments or avoidance of impairment: the presence of a new CEO and big bath reporting incentives. These two findings hold for both the decision to impair goodwill and its magnitude. However, we do not have evidence on any association between

goodwill impairment and the debt covenant violation concerns. The results for earnings smoothing and bonus compensation are mitigated.

Table 12: Regression results

		(1)		*(2)*	
		Dependant variable: IMP1		*Dependant variable: IMP*	
	Expected sign	Coefficient	T-statistic	Coefficient	T-statistic
$GW_{i(T-1)}$	+	0.291	2.98***	0.019	8.890***
ΔOCF_{iT}	-	-0.984	-4.34***	-0.017	-4.070***
$ROA_{i(T-1)}$	-	-1.230	-5.67***	-0.022	-6.130***
$SMOOTH_{iT}$	-	-0.094	-2.36**	0.001	1.980**
$BATH_{iT}$	+	0.342	9.31***	0.009	9.690***
NEW_CEO_{iT}	+	0.165	4.02***	0.003	2.830***
$BONUS_{iT}$	-	-0.102	-0.55	-0.005	-2.340**
LEV_{iT}	-	0.312	3.71***	0.001	0.480
$BTM_{i(T-1)}$	+	0.603	6.76***	0.010	8.660***
Constant		-1.808	-17.95***	-0.003	-3.270***
Industry FE		No		Yes	
Year FE		No		Yes	
Cluster by firm		Yes		Yes	
Pseudo R2		8.95%			
Adjusted R2				9.96%	

*, ** and *** denote significance at pvalue≤10%, ≤5% and ≤1% respectively. Column 1 presents the results for the probit regression testing the decision to impair goodwill with a dichotomous dependant variable taking 1 if firms report goodwill impairment and 0 otherwise. Column 2 presents the results of the fixed effect regression with goodwill impairment magnitude as a dependant variable. We run the regression with industry and year fixed effects and cluster standard errors at firm level. Both regressions are conducted on sample B (only observations with goodwill = 29740 observations).

7. Conclusion

In this prelude we conduct a descriptive analysis of goodwill and goodwill impairment data used throughout the different chapters. We start by analyzing goodwill and goodwill impairment magnitudes, patterns and evolutions during the years of the sample. We conduct descriptive statistics on indicators defined by prior literature as key elements impacting goodwill impairment. We do not develop any new hypothesis for testing but we discuss previously established arguments defined by prior literature. We also conduct a regression model for goodwill impairment.

The results of the descriptive analysis confirm all the arguments made by prior literature while the result of our regression model presents more nuanced conclusions. Overall the findings indicate that goodwill impairment is related to performance attributes of the firm. This result is an indication that firms are rightfully applying the recommendation of ASC 350. For the opportunism concerns, our results indicate that some specific situations can lead to opportunistic impairments or avoidance of impairments.

8. References

AbuGhazaleh, N., Al-Hares, O., and Roberts, C., (2011), Accounting Discretion in Goodwill Impairments: UK Evidence. *Journal of International Financial Management & Accounting*, 22(3), 165-204.

Beatty, A., Weber, J., (2006). Accounting Discretion in Fair Value Estimates: An Examination of SFAS 142 Goodwill Impairments. *Journal of Accounting Research*, 44 (2), 257-288.

Bostwick, E., D., Krieger, K., Lambert, S., L., (2016). Relevance of Goodwill Impairments to Cash Flow Prediction and Forecasting. *Journal of Accounting, Auditing & Finance*, 31(3), 339–364.

Filip, A., Jeanjean, T., and Paugam, L., (2015), Using Real Activities to Avoid Goodwill Impairment Losses: Evidence and Effect on Future Performance, *Journal of Business Finance and Accounting*, 42(3-4), 515 – 554.

Godfrey, J., M., Koh, P-S., (2009). Goodwill impairment as a reflection of investment opportunities. *Accounting and Finance*, 49, 117–140.

Jarva, H., (2009). Do Firms Manage Fair Value Estimates? An Examination of SFAS 142 Goodwill Impairments. *Journal of Business Finance & Accounting*, 36(9-10), 1059–1086.

Jordan, C., E., Clark, S., J., (2015), Do Canadian Companies Employ Big Bath Accounting When Recording Goodwill Impairment? *International Journal of Economics and Finance,* 7 (9), 159-168.

Lapointe-Antunes, P., Cormier, D., Magnan, M., (2009). Value relevance and timeliness of transitional goodwill-impairment losses: Evidence from Canada. *The International Journal of Accounting,* 44, 56–78.

Lee, C. (2011). The effect of SFAS 142 on the ability of goodwill to predict future cash flows. *Journal of Accounting and Public Policy*, 30, 236-255.

Lee, C., Yoon, S., W., (2012). The Effects of Goodwill Accounting on Informativeness of Earnings: Evidence from Earnings Persistence and Earnings' Ability to Predict Future Cash Flows. *Journal of Accounting and Finance*, 12(3), 124-147.

Li, K., K., Sloan, R., G., (2017). Has goodwill accounting gone bad? *Review of Accounting Studies*, 22, 964–1003.

Masters-Stout, B. Costigan, M. L. and Lovata, L. M. (2008), Goodwill Impairments and Chief Executive Officer Tenure. *Critical Perspectives on Accounting*, 19, 1370-1383.

Ramanna, K. Watts, R. L. (2012), Evidence on the Use of Unverifiable Estimates in Required Goodwill Impairment. *Review of Accounting Studies*, 17 (4), 749-780.

Riedl, E., J., (2004), An Examination of Long-Lived Asset Impairments. *The Accounting Review*, 79(3), 823-852.

Watts, R. L. Zimmermann, J. L. (1986), Positive Accounting Theory, *New Jersey: Pearson*.

Zang, Y. (2008). Discretionary behavior with respect to the adoption of SFAS no, 142 and the behavior of security prices, *Review of Accounting and Finance*, 7 (1), 38-68.

Zucca, L., J., Campbell, D., R., (1992), A Closer Look at Discretionary Write Downs of Impaired Assets. *Accounting Horizons*, 6, 30-41.

Chapter 1: The effect of goodwill and its impairment on cash flow prediction

The effect of goodwill and its impairment on cash flow prediction

Abstract

In this study, we examine the impact of goodwill and its impairment on earnings' ability to predict future cash flows. The prediction of future cash flows is a fundamental topic in accounting research as well as a primary objective of financial reporting. Using a sample of U.S. listed companies; we provide empirical evidence that goodwill decreases the predictability of cash flows while goodwill impairment increases it. Our results indicate that goodwill impairment, in addition to increasing predictability, results in higher future cash flows.

Key words:

Goodwill, goodwill impairment, cash flow prediction, predictive ability of earnings.

1. Introduction

The Financial Accounting Standards Board (FASB) indicates that a primary objective of financial reporting is to provide information to help investors, creditors, and other stakeholders assess the amount and timing of prospective cash flows. While researchers differ in their conclusions in which one of earnings or cash flows better predict future cash flows, they all recognize that cash flow prediction is one of the fundamental uses of financial information.

In this chapter, we first investigate the role of intangible assets in firm valuation. Specifically, we test the impact of one of the largest intangible asset in company's books, goodwill, on the prediction of future cash flows. Over the years, goodwill values for U.S. firms have been constantly increasing, reaching the value of 23% of total assets in 2020. We argue that goodwill can lower cash flow predictability due to its opacity and information asymmetry. Goodwill is also subject to important discretion in its accounting.

Second, we investigate the role of fair value standards on the matter of cash flow predictability. Fair value standards offer managers a certain latitude to exercise accounting judgment to convey their private information credibly to stakeholders through financial statements, thereby improving their ability to assess future profitability and cash flows. Specifically, we investigate the impact of goodwill impairment, an important fair value standard of the FASB, on cash flow prediction. One of the main purposes of the introduction of the impairment approach is to provide managers the opportunity to convey their private information credibly to stakeholders through financial statements. The enhanced disclosures are supposed to provide users with a better understanding of the expectations and changes over time, thereby improving their ability to assess future profitability and cash flows. Therefore, we argue that goodwill impairment can increase cash flow predictability. Prior literature presents mixed conclusions on the topic. While some studies argue that goodwill impairment is value relevant and a good indicator for cash flow prediction (Godfrey and Koh, 2009, Lapointe-Antunes et al., 2009, Lee, 2011, Lee and Yoon, 2012, Bostwick et al., 2016), other studies argue that the discretion in impairment testing is used opportunistically

by managers (Ramanna and Watts, 2012, Zang, 2008, Li, 2017, Beatty and Weber, 2006, Filip et al., 2015).

Using a sample of 40046 observations from U.S. listed companies; we provide empirical evidence that goodwill decreases the predictability of cash flows while goodwill impairment increases it. This result is however balanced by the findings in our additional analysis. We demonstrate that only higher values of goodwill decrease predictability. We also show that impairments only increase predictability when firm's goodwill is important. In the cases of smaller goodwill values, goodwill impairment has no impact on predictability. Moreover, our findings indicate that goodwill impairment, in addition to increasing predictability, results in higher future cash flows. Our results show that goodwill impairment occurs after several years of profitability decrease, instead of being recognized to indicate a future decline in profitability. We also notice that 58% of firms in our sample who report goodwill impairment also report restructuring charges. We conclude that the enhanced profitability following goodwill impairment is due to change and restructuring of the firm which is associated with future performance improvements.

Our study relates to several streams of literature. First, our findings contribute to the ongoing and fundamental issue of accounting which is cash flow prediction. We also contribute to the literature on intangible assets generally and goodwill specifically by providing evidence goodwill decreases cash flow prediction while goodwill impairment increases it. Therefore, this study also contributes to the literature on the relevance of fair value accounting standards.

The rest of this paper is structured as follow: section 1 discusses related literature on the topic and develops the hypotheses; section 2 presents the data and the empirical methodology and section 3 presents the results of the study.

2. Literature review and hypotheses development

The Financial Accounting Standards Board (FASB) asserts in its conceptual framework that a primary objective of financial reporting is to help existing and potential investors, lenders, and other stakeholders assess the amount, timing, and uncertainty of future expected cash flows. Several prior studies test the relative abilities of aggregate earnings and/or cash flows to predict future cash flows. While the conceptual framework of FASB states that earnings provide a better basis than current cash flows for assessing a firm's future expected cash flows, the extensive literature of this fundamental issue provides mixed evidence. Several research studies (Brooks, 1982; Dechow et al., 1998; Kim and Kross, 2005; Nam et al., 2012) document that earnings are better than current cash flows in predicting future cash flows, while other studies (Burgstahler et al., 1998; Subramanyam and Venkatachalam, 2007; Lorek and Willinger, 2009; Chen et al., 2019) state the opposite. According to Nallareddy et al., (2020), the apparent contradiction is likely due to differences in measurement approaches, variable definitions, and sample selection. According to FASB's conceptual framework and previous academic literature on the topic, earnings' superior ability as a summary measure to predict future cash flows is attributable to the timing role of accrual accounting and the ability of accruals to smooth temporary timing differences in cash flows. In this context, prior research examined the incremental predictive ability of accruals. Specifically, Barth et al. (2001) decompose accruals into six major components and document the incremental predictive ability of these components over current cash flows to predict future cash flows. While accruals contain incremental information, they miss important economic transactions, particularly mergers, acquisitions or divestiture activities that have implications for future cash flows (Larson et al., 2018). In this chapter, we explore the predictive ability of earnings in the presence of goodwill and goodwill impairment. In recent decades, the growth of intangible assets and goodwill has attracted increasing attention from academia. In 2003, goodwill represented 19% of total assets for US companies while it represented 23% of total assets in 2020. The important rise of goodwill values can be attributed to bigger and more frequent mergers and acquisitions. In this chapter, we argue that firms with important amounts of goodwill are associated with lower cash flow predictability. Goodwill is associated with high information asymmetry mainly attributed to bad news hoarding by managers who conceal negative

information until its final release to the public, leading to investors' negative sentiments (Wu and Lai, 2020). Dahmash and Watson (2009) state that accounting information related to intangible assets in general can be unreliable. Moreover, goodwill is subject to important discretion in its accounting: goodwill impairment can be delayed by managers (bad news hoarding), and it can be used for opportunistic motives. We argue that these different aspects of goodwill can lead to lower cash flow predictability. Therefore, we develop our first hypothesis:

H1*: The presence of goodwill reduces cash flow predictability*

In 2001, the Financial Accounting Standards Board introduced significant change for the accounting of goodwill by issuing ASC 350, formerly SFAS 142: Goodwill and Other Intangible Assets. Previous standards presumed that goodwill and all other intangible assets were wasting assets (that is, finite lived), and thus the amounts assigned to them should be amortized; it also mandated an arbitrary ceiling of 40 years for that amortization. With ASC 350, goodwill and intangible assets that have indefinite useful lives will not be amortized but rather tested at least annually for impairment. Goodwill is now impaired based on a comparison of a fair-value estimate of goodwill with its book value. According to the FASB, the changes included in the statement will improve financial reporting because the financial statements of entities that acquire goodwill and other intangible assets will better reflect the underlying economics of those assets. The enhanced disclosures about goodwill and intangible assets will provide users with a better understanding of the expectations and changes in those assets over time, thereby improving their ability to assess future profitability and cash flows. In light of this framework, several studies investigate the predictive role of earnings since the introduction of the impairment approach. Lee (2011) and Lee and Yoon (2012) examine the relationship between goodwill impairments and future cash flows in the pre and post SFAS 142 periods. Lee (2011) finds that goodwill's ability to predict future cash flows has improved since the FASB adopted SFAS 142 while Lee and Yoon (2012) demonstrate that the ability of earnings to predict future operating cash flows and earnings persistence has improved after the enactment of SFAS No. 142. Bostwick et al. (2016) examine the contribution of goodwill impairment information to the prediction and forecasting of future operating cash flows and find that explicitly including goodwill impairments incrementally improves 1-year-ahead cash flow prediction and forecasting.

Goodwill impairment provides management considerable latitude to exercise accounting judgment to convey their private information credibly to stakeholders through financial statements. According to the results of Lee (2011), Lee and Yoon (2012) and Bostwick et al. (2016), the expanded managerial discretion with the adoption of SFAS 142 is not used opportunistically. On the other hand, several studies have shown that firms tend to delay goodwill impairment and perform untimely impairments (Ramanna and Watts (2012), Zang (2008), Li (2017), Beatty and Weber (2006), Filip et al (2015)), resulting in high information asymmetry between managers and investors. In light of the mixed evidence on the use of discretion of goodwill impairment, we test a second hypothesis arguing the impact of goodwill impairment on cash flow predictability. Our second hypothesis is the following:

H2*: Goodwill impairment increases cash flow predictability*

The next section discusses in detail the research methodology used to test the developed hypotheses.

3. Data and research methodology

3.1 Sample selection

We obtain annual financial statement information for all publicly traded firms incorporated in the U.S. from Compustat. We initially downloaded a sample of all North-American companies from 2002 to 2020. The initial number of firm-years is 211215, to which we subtracted observations with missing data and observations of firms operating in the financial sector, in utilities and in mining. We excluded companies operating outside of the United States[28]. We also deleted all observations prior to 2003.[29] The final sample consists of 40 046 firm-years from 4 811 firms. The table below summarizes the selection criteria.

Table 13: Sample selection process

Sample selection criteria	Firm-Years
All North American listed companies from Compustat database from 2002 to 2020	211 215
- Firm-years with missing data	-52 735
- Firms operating outside of the United States	-87 522
- Financial sector, utilities and mining	-29 324
- Observations prior to 2003	-1 588
Final sample	40 046

3.2 Empirical model

We first examine the ability of earnings to predict future cash flows in the presence and in the absence of goodwill in the balance sheet. To investigate the predictive ability of

[28] We deleted observations of Canadian firms and firms based in the United States but incorporated or listed elsewhere.

[29] ASC 350 was introduced in 2001 but was required to be applied starting with fiscal years beginning after December 15, 2001. We therefore excluded observation of 2001 and of the initial adoption year (2002). Data of 2002 was however used to compute changes in variables.

earnings for future cash flows, we estimate the following model based on prior literature:

$$CF_{iT} = \beta_0 + \beta_1 EARN_{i(T-1)} + \in_{iT} \quad (1)$$

We use pooled estimation on 2 sub sample: one containing goodwill and the other without goodwill. We then compare the predictive ability of earnings using the adjusted R squared. Following prior literature (Barth et al., 2001; Nallareddy et al., 2020), we define earnings (EARN) as income before extraordinary items and discontinued operations. Cash flows (CF) are measured as cash flows from operations adjusted for extraordinary items and discontinued operations. We scale the variables by average of beginning and end of the year total assets and winsorize the variables at the 1% and 99% levels to mitigate the effect of outliers.

Second, to test hypothesis 2, we examine the ability of earnings to predict future cash flows in the presence of goodwill and in the two scenarios where firms report or not goodwill impairment. We use the same method as previously and we compare the adjusted R squared of the two regressions below:

$$CF_{iT} = \beta_0 + \beta_1 EARN_{i(T-1)} + \in_{iT} \quad (1)$$

$$CF_{iT} = \beta_0 + \beta_1 EARN_{i(T-1)} + \beta_2 EARN_{i(T-1)} \times IMP1_{i(T-1)} + \beta_3 IMP1_{i(T-1)} + \in_{iT} \quad (2)$$

The first equation is the same one used previously and the second equation adds an interaction term (IMP1) to capture goodwill impairment. IMP1 is a dichotomous variable taking 1 if firms report goodwill impairment and 0 otherwise. Table 14 below provides descriptions and measurement details for all variables.

Table 14: Variables' descriptions and measurement details

Variable	Definition	Source (reference)
CF_{iT}	Net cash flow from operating activities less cash flow from extraordinary items and discontinued operations, scaled by average total assets (Dependant variable)	-Operating cash flows: Compustat (oancf) - Cash flow from extraordinary items: Compustat (xidoc) -Total assets: Compustat (at)
$EARN_{i(T-1)}$	Income before extraordinary items and discontinued operations, scaled by average total assets	- Income before extraordinary items: Compustat (ib)
$GW_{i(T-1)}$	Pre impairment goodwill scaled by average total assets	-Goodwill: Compustat (gdwl)
$IMP_{i(T-1)}$	Goodwill impairment scaled by average total assets	-Goodwill impairment: Compustat (gdwlip)
$IMP1_{i(T-1)}$	Dichotomous variable taking 1 if firms report goodwill impairment, and 0 otherwise	-Goodwill impairment: Compustat (gdwlip)

4. Results

4.1. Summary statistics

We provide summary statistics in table 15. The mean value of cash-flows is positive while the mean value of earnings is negative. The standard deviation of earnings is however higher. Goodwill represents on average 14.6% of total assets in the entire sample and 19.6% of total assets for the sub-sample of observations with goodwill in the balance sheet (74% of the sample, see variable *POS_GW*). Similarly, goodwill impairment represents on average 0.6% of total assets for the entire sample and 5.7% of total assets for the sub sample of observations reporting impairments.

Table 15: Summary statistics

Variable	Mean	Std. Dev.	p25	Median	p75
CF	0.029	0.231	0.014	0.079	0.133
EARN	-0.047	0.306	-0.041	0.034	0.08
GW	0.146	0.167	0.000	0.086	0.24
POS_GW	0.196	0.166	0.059	0.153	0.296
IMP	0.006	0.028	0.000	0.000	0.000
POS_IMP	0.057	0.071	0.004	0.023	0.086

The descriptive statistics are based on a sample of US companies drawn from Compustat. The sample covers the period from 2003 to 2020 and includes 40,046 firm-year observations.

Table 16 reports Pearson correlations among the key variables. As expected, cash flows are significantly positively correlated with earnings. While goodwill is positively and significantly correlated to both earnings and cash-flows, goodwill impairment is negatively correlated to both variables. Goodwill and goodwill impairment are logically positively correlated to one another. Overall, correlations among variables in our sample are as expected and in line with prior research.

Table 16: Pearson correlation matrix

Variables	*(1)*	*(2)*	*(3)*	*(4)*
$(1)CF_{iT}$	1			
$(2)EARN_{i(T-1)}$	0.798***	1		
$(3)IMP_{i(T-1)}$	-0.012**	-0.164***	1	
$(4)GW_{i(T-1)}$	0.168***	0.120***	0.226***	1

The Table above shows the Pearson correlation coefficients.
*, ** and *** denote significance at pvalue≤10%, ≤5% and ≤1% respectively

4.2. Regression results for hypothesis 1

We present the estimation results of equation 1 in Table 17. Column 1 of the table presents the results of the regression on observations without goodwill. Column 2 of the table presents the results of the regression on observations with goodwill. The results indicate that the predictive ability of earnings in the presence of goodwill is significantly lower (Adj. R^2 = 0.453) than the predictive ability on the absence of goodwill (Adj. R^2 = 0.657). The coefficient of earnings (β_{EARN}) is also lower in the presence of goodwill. This result confirms our first hypothesis that goodwill lowers cash flow predictability due to its opacity, information asymmetry and discretion in its accounting.

Table 17: Regressions of current operating cash flows on lagged earnings in the absence and presence of goodwill

	(1) *Absence of goodwill*		*(2)* *Presence of goodwill*	
	Coefficient	T-statistic	Coefficient	T-statistic
β_{EARN}	0.581	127.4***	0.505	145.45***
Constant	0.048	6.46***	0.073	34.45***
Adjusted R2	0.657		0.453	

Column 1 presents the results for the regression of current operating cash flows on lagged earnings on a sample of observations with no goodwill (10091 observations). Column 2 presents the results for the regression of current operating cash flows on lagged earnings on a sample of observations with goodwill (27412 observations). Pooled OLS estimation is used.

4.3. Regression results for hypothesis 2

We present the estimation results of equation 1 and 2 in Table 18. Column 1 of the table presents the results of the regression specified in equation 1. Column 2 of the table presents the results of the regression specified in equation 2 (which includes the interaction term with goodwill impairment). The results indicate that the predictive ability of earnings in the presence of goodwill impairment is higher (Adj. R^2 = 0.484) than the predictive ability in the absence of goodwill impairment (Adj. R^2 = 0.453). Adding a separate term to include the information content of goodwill impairment improves cash flow prediction. This result is consistent with our second hypothesis that goodwill impairment increases cash flow predictability. Regarding the coefficient of earnings, we notice a smaller coefficient in the presence of goodwill impairment. We believe this is related to the fact that goodwill impairment is less persistent than other earnings' components. The non-recurring nature of goodwill impairment results in less persistent earnings, which explains the lower coefficient of earnings in the presence of goodwill impairment. However, the identification of the impairment still improves the predictive ability of earnings, which is shown in the adjusted R^2.

To test whether equation 2 (extended model) is indeed significantly statistically superior to equations 1 (restricted model) in terms of explaining associations with future cash flows, we conduct a Chow test. The results of the test indicate a significant improvement in the association with future cash flows (F = 664.41, p-value=0.000) when the separate term for goodwill impairment is included.

Table 18: Regressions of current operating cash flows on lagged earnings in the absence and presence of goodwill impairment

	(1)		*(2)*	
	Coefficient	T-statistic	Coefficient	T-statistic
$EARN_{i(T-1)}$	0.505	145.45***	0.571	151.62***
$EARN_{i(T-1)} \times IMP1_{i(T-1)}$			-0.328	-36.11***
$IMP1_{i(T-1)}$			0.012	7.13***
$Constant$	0.073	34.45***	0.069	33.17***
Adjusted R2	0.453		0.484	

Column 1 presents the results for the regression of current operating cash flows on lagged earnings as specified in equation 1 : $CF_{iT} = \beta_0 + \beta_1 EARN_{i(T-1)} + \in_{iT}$. Column 2 presents the results for the regression of current operating cash flows on lagged earnings and includes an interaction term for goodwill impairment as specified in equation 2 : $CF_{iT} = \beta_0 + \beta_1 EARN_{i(T-1)} + \beta_2 EARN_{i(T-1)} \times IMP1_{i(T-1)} + \beta_3 IMP1_{i(T-1)} + \in_{iT}$. Both regressions are conducted on a sample of observations with goodwill (27412 observations). Pooled OLS estimation is used.

Second, we test our impairment hypothesis using a different methodology based on Barth et al. (2001) and used by Jarva (2009) and Bostwick et al. (2016). Barth et al. (2001) demonstrate that parsing annual accrual earnings information into specific components improves the prediction of cash flows compared to approaches using lagged, single-item cash flows and/or earnings values to predict future cash flows. First, we replicate Barth et al.'s (2001) model:

$$CF_{iT} = \beta_0 + \beta_1 CF_{i(T-1)} + \beta_2 \Delta AR_{i(T-1)} + \beta_3 \Delta INV_{i(T-1)} + \beta_4 \Delta AP_{i(T-1)} + \beta_5 DEP_{i(T-1)} + \beta_6 OTHER1_{i(T-1)} + \in_{iT} \quad (3)$$

Where CF is cash flows from operations adjusted for extraordinary items and discontinued operations as defined above. ΔAR is the change in account receivables. ΔINV is the change in inventory and ΔAP is the change in account payables. DEP is depreciation, depletion, and amortization expenses. Finally, OTHER1 is defined as follows:

$$OTHER1 = EARN - (CF + \Delta AR + \Delta INV - \Delta AP - DEP)$$

All variables are scaled by average of beginning and end of the year total assets and winsorized at 1% and 99%.

Second, following Jarva (2009) and Bostwick et al. (2016), we add an additional parsing to Barth et al.'s (2001) model to include a separate term for goodwill impairment:

$$CF_{iT} = \beta_0 + \beta_1 CF_{i(T-1)} + \beta_2 IMP_{i(T-1)} + \beta_3 \Delta AR_{i(T-1)} + \beta_4 \Delta INV_{i(T-1)} + \beta_5 \Delta AP_{i(T-1)} + \beta_6 DEP_{i(T-1)} + \beta_7 OTHER2_{i(T-1)} + \in_{iT} \quad (4)$$

Where IMP is goodwill impairment scaled by average total assets and multiplied by -1 so that a higher value indicates a larger impairment. Adding a separate term for goodwill impairment aims to capture the accounting information of the write off. OTHER2 in this case is defined as follows:

$$OTHER2 = EARN - (CF + \Delta AR + \Delta INV - \Delta AP - DEP - IMP)$$

We run equation 3 and 4 and then we compare the adjusted R squared to test whether the inclusion of a separate term for goodwill impairment improves the ability to predict future cash flows. The variables used equation 3 and 4 are presented in the table below:

Table 19: Variables' descriptions and measurement details

Variable	Definition	Source (reference)
$\Delta AR_{i(T-1)}$	Change in account receivables from T-1 to T scaled by average total assets	-Account receivables: Compustat (rect)
$\Delta INV_{i(T-1)}$	Change in inventory from T-1 to T scaled by average total assets	-Inventory: Compustat (invt)
$\Delta AP_{i(T-1)}$	Change in account payables from T-1 to T scaled by average total assets	-Account payables: Compustat (ap)
$DEP_{i(T-1)}$	Depreciation and amortization scaled by average total assets	- Depreciation and amortization: Compustat (dp)

We present the estimation results of equation 3 and 4 in Table 20. Column 1 of the table presents the results for the initial Barth et al.'s (2001) model. Column 2 of the table presents the results of Barth et al.'s (2001) model with the additional separate term for goodwill impairment. The adjusted R squared in column 2 (0.613) is higher than the adjusted R squared in column 1 (0.608) suggesting that the inclusion of a separate term for goodwill impairments improves the ability to predict future cash flows. This finding confirms our hypothesis that goodwill impairment increases cash flow predictability.

To test whether the extended model is indeed significantly statistically superior to Barth et al.'s (2001) original model in terms of explaining associations with future cash flows, we conduct a Chow test. The results of the test indicate a significant improvement in the

association with future cash flows (F = 207.38, p-value=0.000) when the separate term for goodwill impairment is included.

Table 20 : Regression results based on Barth's et al. (2001) model

	(1)		*(2)*	
	Coefficient	T-statistic	Coefficient	T-statistic
$CF_{i(T-1)}$	0.753	187.37***	0.759	189.05***
$IMP_{i(T-1)}$			0.092	5.20***
$\Delta AR_{i(T-1)}$	0.522	37.85***	0.553	39.91***
$\Delta INV_{i(T-1)}$	0.461	26.85***	0.487	28.36***
$\Delta AP_{i(T-1)}$	-0.468	-31.40***	-0.503	-33.59***
$DEP_{i(T-1)}$	0.170	8.310***	0.170	8.32***
$OTHER1_{i(T-1)}$	0.180	35.87***		
$OTHER2_{i(T-1)}$			0.219	39.45***
Constant	0.016	7.88***	0.015	7.51***
Adjusted R2	0.608		0.613	

Column 1 presents the results for Barth et al.'s (2001) model as specified in equation 3: $CF_{iT} = \beta_0 + \beta_1 CF_{i(T-1)} + \beta_2 \Delta AR_{i(T-1)} + \beta_3 \Delta INV_{i(T-1)} + \beta_4 \Delta AP_{i(T-1)} + \beta_5 DEP_{i(T-1)} + \beta_6 OTHER1_{i(T-1)} + \in_{iT}$. Column 2 of the table presents the results of Barth et al.'s (2001) model with the separate term for goodwill impairment as specified on equation 4: $CF_{iT} = \beta_0 + \beta_1 CF_{i(T-1)} + \beta_2 IMP_{i(T-1)} + \beta_3 \Delta AR_{i(T-1)} + \beta_4 \Delta INV_{i(T-1)} + \beta_5 \Delta AP_{i(T-1)} + \beta_6 DEP_{i(T-1)} + \beta_7 OTHER2_{i(T-1)} + \in_{iT}$. Both regressions are conducted on a sample of observations with goodwill (27412 observations). Pooled OLS estimation is used.

4.4. Goodwill impairment's impact on future cash flow value

The previous results establish a clear relationship between goodwill impairment and an increase in cash flow predictability. We draw this conclusion based on the higher R squared from the regressions which includes the impairment term. This result holds under both the regression models tested:

$$CF_{iT} = \beta_0 + \beta_1 EARN_{i(T-1)} + \beta_2 EARN_{i(T-1)} \times IMP1_{i(T-1)} + \beta_3 IMP1_{i(T-1)} + \in_{iT} \quad (2)$$

and

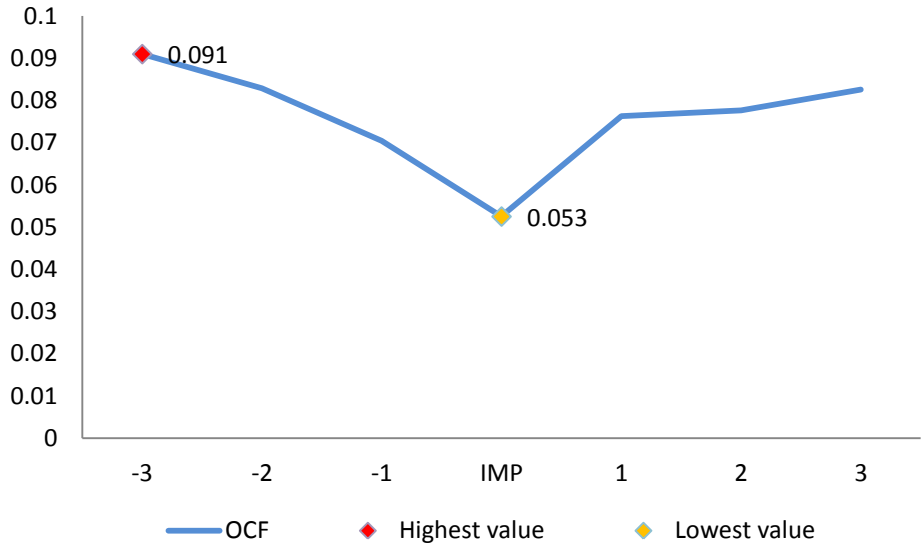
$$CF_{iT} = \beta_0 + \beta_1 CF_{i(T-1)} + \beta_2 IMP_{i(T-1)} + \beta_3 \Delta AR_{i(T-1)} + \beta_4 \Delta INV_{i(T-1)} + \beta_5 \Delta AP_{i(T-1)} + \beta_6 DEP_{i(T-1)} + \beta_7 OTHER2_{i(T-1)} + \in_{iT} \quad (4)$$

We notice in the regression results that the impairment term exhibits a positive and significant coefficient in both equation 2 and equation 4 (see table 18 column 2 and table 20 column 2). The positive coefficients indicate that actual goodwill impairment leads to higher future cash flows. However, our initial expectation is that goodwill impairment

might be associated with lower future cash flows. Goodwill impairment would imply lower future cash flows that necessitate the recognition of the goodwill impairment charge. Nevertheless, our results indicate the opposite. The positive and significant coefficient indicates that the recognition of goodwill impairment results in higher future cash flows. A possible explanation is that goodwill impairment occurs after a decline in firm performance and would therefore signals a change or restructuring of the firm which may be associated with future performance improvements. Looking at average operating cash flows in our sample (see figure 26 below), we notice that goodwill impairment occurs after multiple years of cash flow decrease. After the recognition of the impairment charge, cash flows start to increase. This result could signify that instead of goodwill impairment being recognized by firm to indicate a future decline in profitability, goodwill impairment is recognised after several years of profitability decrease. The impairment would therefore signals a change or restructuring of the firm which may be associated with future performance improvements. Darrough et al. (2014) suggest that goodwill impairment is related to contemporaneous firm events such as long-term asset write-downs, restructuring charges, and other special items. As a matter of fact, we notice that 58% of firms in our sample who report goodwill impairment also report restructuring charges[30].

[30] Our measure of restructuring charges is Compustat's "rcp" item which includes: severances, closing cost, exit costs, reductions in workforce, rationalizations, realignment, relocation charges, repositioning and early retirement

Figure 26: Average cash flow evolution 3 years prior and after the recognition of goodwill impairment



Next, we conduct a mean difference test for goodwill impairment for firms reporting or not restructuring charges. The results in table 21 show that firms with restructuring charges report goodwill impairment amounts that are two times larger than the impairments of firms without restructuring charges. Firms with restructuring charges have an average goodwill impairment of 0.8% of total assets while firms without restructuring charges have an average impairment of 0.4% of total assets.

Table 21: Mean difference test of goodwill impairment for firms with and without restructuring charges

	Restructuring charges (12 083 observations)		No restructuring charges (17 096 observations)		Difference in means (No R.C.- R.C.)
	Mean	*Std, Dev,*	*Mean*	*Std, Dev,*	
IMP	0.008	0.032	0.004	0.023	-0.004***

From the different descriptive statistics above, we argue that goodwill impairment generally occurs during a restructuring phase of the firm and after a period of low economic performance. After the impairment charge and the restructuring phase, firm's performance increases, which explains the significant positive coefficients of goodwill impairment in our regressions.

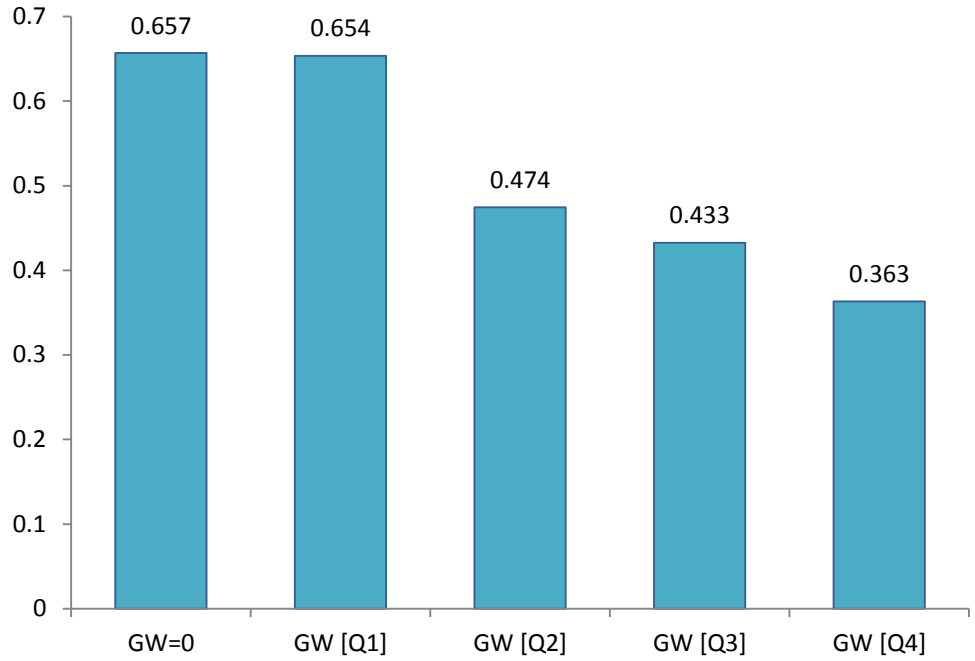
5. Additional analysis

5.1. Additional analysis regarding goodwill

The decrease in the predictive ability of earnings in the presence of goodwill is clearly established by the previous results. In an additional test, we investigate whether this is the case for all goodwill sizes. Previous summary statistics show that goodwill values can range from 5.9% of total assets (p25) to 29.6% (p75). We suspect the difference in sizes to have an effect on the predictive ability of earnings. To capture this effect, we classify each goodwill observation according to its size: in the first, second, third or fourth quartile of its industry[31]-year. We run equation 1 in each of these sub-samples and we compare the adjusted R^2 in figure 27 below. The results indicate that not all values of goodwill decrease predictability. Smaller values of goodwill (the first quartile) do not have any impact on the predictability of cash flows. The adjusted R^2 (0.654) is equal to the adjusted R^2 when there is no goodwill (0.657). However, as goodwill size grows the predictive ability of earnings decreases. This additional finding balances the previous results and demonstrates that goodwill does not necessarily have a negative impact on cash flow predictability. The decrease in predictability is linked to the size of goodwill.

[31] We use 2-digit SIC codes for our industry classification

Figure 27: R^2 comparaison according to goodwill size



Each bar of the chart represents the value of the adjusted R^2 from the regression of operating cash-flows on lagged earnings, ($CF_{iT} = \beta_0 + \beta_1 EARN_{i(T-1)} + \in_{iT}$) but on different samples. Bar 1 of the chart represents the R^2 from the regression on a sample of observations with no goodwill. Bar 2, 3, 4 and 5 represent the R^2 from the regressions on samples of observations with goodwill in the first, second, third and fourth quartiles, respectively. The quartiles are defined for each industry year.

5.2. *Additional analysis regarding goodwill and goodwill impairment*

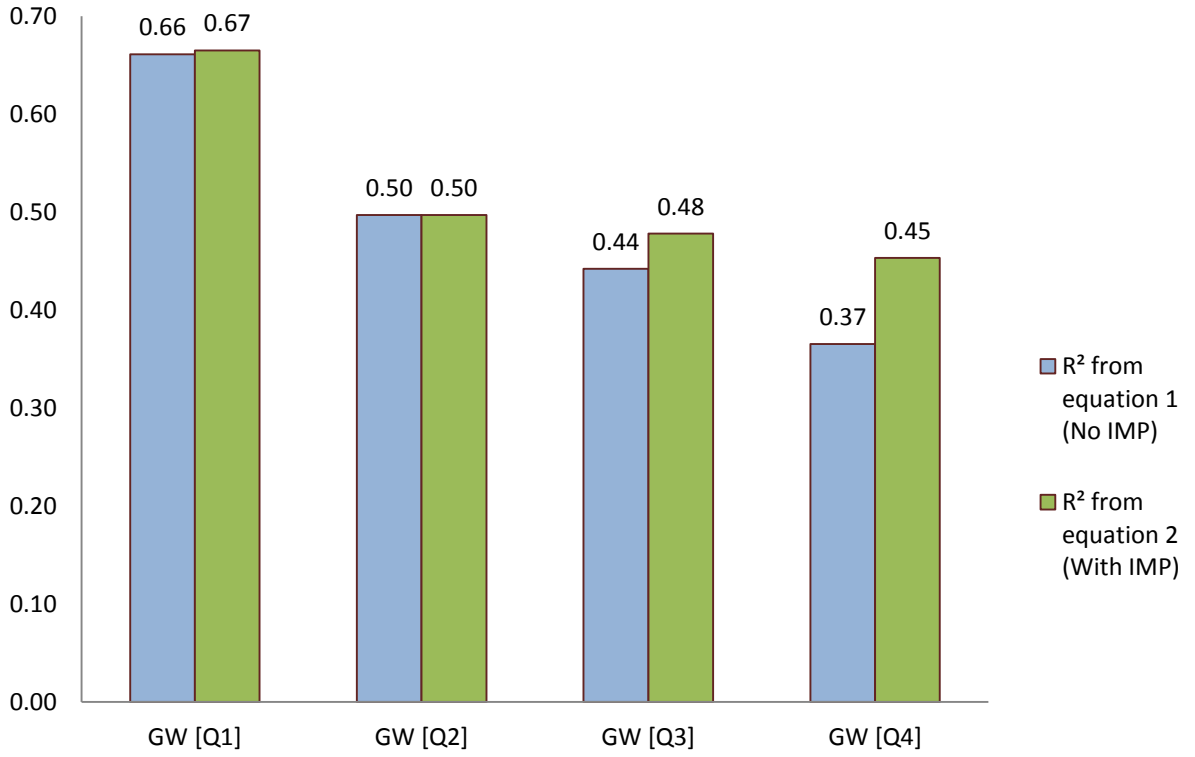
Our initial results indicate that the presence of goodwill in the balance sheet decreases cash flow predictability while goodwill impairment increases the predictability. However, in our additional analysis, we demonstrate that smaller values of goodwill do not decrease cash flow predictability while higher values significantly decrease the predictability. Since the decrease in the predictive ability of earnings in the presence of goodwill is related to the size of the goodwill, we suspect that goodwill impairment' impact on earnings predictability to also differ depending on the size of goodwill. We suspect that a goodwill write-off by a firm with a small goodwill figure in the balance sheet to have a different impact on cash flow predictability than a write-off by a firm with large goodwill in the balance sheet. To investigate this matter, we regress cash flows on earnings twice as specified in equation 1 and 2:

$$CF_{iT} = \beta_0 + \beta_1 EARN_{i(T-1)} + \in_{iT} \quad (1)$$

$$CF_{iT} = \beta_0 + \beta_1 EARN_{i(T-1)} + \beta_2 EARN_{i(T-1)} \times IMP1_{i(T-1)} + \in_{iT} \quad (2)$$

We run the two regressions 4 times each on the 4 quartiles of goodwill size and compare the adjusted R^2 in the graph below. The results in figure 28 indicate that goodwill impairment increases cash flow predictability only when the firm's goodwill is of a higher value (3rd and 4th quartiles). For smaller values of goodwill, goodwill impairment does not change cash flow predictability. This result is coherent with our previous findings. Smaller values of goodwill do not seem to decrease predictability. Therefore goodwill impairment in these cases does not have any impact on predictability. However, our results showed that higher values of goodwill significantly decrease predictability. In the specific case of higher goodwill values, goodwill impairment increases predictability.

Figure 28: R^2 comparaison according to goodwill size and goodwill impairment



The bars of the chart represent the values of the adjusted R² from different regressions. The blue bars represent the values of the adjusted R² from equation 1: $CF_{iT} = \beta_0 + \beta_1 EARN_{i(T-1)} + \epsilon_{iT}$. The green bars represent the values of the adjusted R² from equation 2: $CF_{iT} = \beta_0 + \beta_1 EARN_{i(T-1)} + \beta_2 EARN_{i(T-1)} \times IMP1_{i(T-1)} + \epsilon_{iT}$. Each equation is run four times on four different sub samples depending on the size of goodwill : first, second, third and fourth quartiles of goodwill size. The quartiles are defined for each industry-year.

6. Conclusion

The prediction of future cash flows is a fundamental topic in accounting research as well as a primary objective of financial reporting. This study falls into this line of research by

investigating the impact of intangible assets, specifically goodwill, on the prediction of future cash flows. We argue that the presence of goodwill in companies' books can lower cash flow predictability because of its opacity, information asymmetry and discretion in its accounting. Second, we investigate whether companies who report goodwill impairment increase their cash flow predictability. One of the main purposes of the introduction of the impairment approach is to provide managers the opportunity to convey their private information credibly to stakeholders through financial statements. The enhanced disclosures are supposed to provide users with a better understanding of the expectations and changes over time, thereby improving their ability to assess future profitability and cash flows.

Using a sample of 40046 observations from U.S. listed companies, we provide empirical evidence that goodwill decreases the predictability of cash flows while goodwill impairment increases it. This result is however balanced by the findings in our additional analysis. We demonstrate that only higher values of goodwill decrease predictability. We also show that impairments only increase predictability when firm's goodwill is important. In the cases of smaller goodwill values, there is no impact on predictability. Finally, our results indicate that goodwill impairment, in addition to increasing predictability, results in higher future cash flows.

Our study relates to several streams of literature. First, our findings contribute to the ongoing and fundamental issue of accounting which is cash flow prediction. We also contribute to the literature on intangible assets generally and goodwill specifically by providing evidence goodwill decreases cash flow prediction while goodwill impairment increases it. Therefore, this study also contributes to the literature on the relevance of fair value accounting standards.

7. References

Barth, M. E., Cram, D. P., Nelson, K. K. (2001). Accruals and the prediction of future cash flows, *Accounting Review*, 76, 27-58.

Beatty, A., Weber, J., (2006). Accounting Discretion in Fair Value Estimates: An Examination of SFAS 142 Goodwill Impairments. *Journal of Accounting Research*, 44 (2), 257-288.

Bostwick, E., D., Krieger, K., Lambert, S., L., (2016). Relevance of Goodwill Impairments to Cash Flow Prediction and Forecasting. *Journal of Accounting, Auditing & Finance*, 31(3), 339–364.

Brooks, J., E., (1982). An Empirical Investigation of the Usefulness of Earnings in Predicting Future Enterprise Cash Flows. Dissertation, *Michigan State University*.

Burgstahler, D., Jiambalvo, J., Pyo, Y., (1998). The Informativeness of Cash Flows for Future Cash Flows. *Working Paper*. *University of Washington*.

Chen, C., W., Melessa, S., Mergenthaler, R., Ohn, H., (2019). Surrogate Measures of Cash Flows: Problems and Solutions. *Working Paper.*

Dahmash, F., N., Durand, R., B., Watson, J., (2009). The value relevance and reliability of reported goodwill and identifiable intangible assets. *The British Accounting* Review, 41, 120–137.

Darrough, M., Guler, L., Wang, P. (2014). Goodwill impairment losses and CEO compensation. *Journal of Accounting, Auditing and Finance*, 29(4), 435–463.

Dechow, P., M., Kothari, S., P., Watts, R., L., (1998). The relation between earnings and cash flows. *Journal of Accounting and Economics*, 25 (2), 133-168.

Filip, A., Jeanjean, T., and Paugam, L., (2015), Using Real Activities to Avoid Goodwill Impairment Losses: Evidence and Effect on Future Performance, *Journal of Business Finance and Accounting*, 42(3-4), 515 – 554.

Godfrey, J., M., Koh, P-S., (2009). Goodwill impairment as a reflection of investment opportunities. *Accounting and Finance*, 49, 117–140.

Jarva, H., (2009). Do Firms Manage Fair Value Estimates? An Examination of SFAS 142 Goodwill Impairments. *Journal of Business Finance & Accounting*, 36(9-10), 1059–1086.

Kim, M., Kross, W., (2005). The ability of earnings to predict future operating cash flows has been increasing not decreasing. *Journal of Accounting Research*, 43 (5), 753-780.

Lapointe-Antunes, P., Cormier, D., Magnan, M., (2009). Value relevance and timeliness of transitional goodwill-impairment losses: Evidence from Canada. *The International Journal of Accounting,* 44, 56–78.

Larson, C., R., Sloan, R., G., Zha Giedt, J., (2018). Defining, measuring and modeling accruals: a guide for researchers. *Review of Accounting Studies*, 23 (3), 827-871.

Lee, C. (2011). The effect of SFAS 142 on the ability of goodwill to predict future cash flows. *Journal of Accounting and Public Policy*, 30, 236-255.

Lee, C., Yoon, S., W., (2012). The Effects of Goodwill Accounting on Informativeness of Earnings: Evidence from Earnings Persistence and Earnings' Ability to Predict Future Cash Flows. *Journal of Accounting and Finance*, 12(3), 124-147.

Li, K., K., Sloan, R., G., (2017). Has goodwill accounting gone bad? *Review of Accounting Studies*, 22, 964–1003.

Lorek, K., S., Willinger, G., L., (2009). New evidence pertaining to the prediction of operating cash flows. *Review of Quantitative Finance and Accounting*, 32 (1), 1-15.

Nallareddy, S., Sethuraman M., Venkatachalam, M., (2020). Changes in accrual properties and operating environment: Implications for cash flow predictability. *Journal of Accounting and Economics*, 69.

Nam, S., Brochet, F., Ronen, J., (2012). The predictive value of accruals and consequences for market anomalies. *Journal of Accounting Audit and Finance*, 27 (2), 151-176.

Ramanna, K. Watts, R. L. (2012), Evidence on the Use of Unverifiable Estimates in Required Goodwill Impairment. *Review of Accounting Studies*, 17 (4), 749-780.

Subramanyam, K., R., Venkatachalam, M., (2007). Earnings, cash flows, and ex post intrinsic value of equity. *The Accounting Review*, 82 (2), 457-481.

Wu, K., Lai, S., (2020). Intangible intensity and stock price crash risk. *Journal of Corporate Finance.* 64.

Zang, Y. (2008). Discretionary behavior with respect to the adoption of SFAS no, 142 and the behavior of security prices, *Review of Accounting and Finance*, 7 (1), 38-68.

Chapter 2: Goodwill and stock price crash risk

Goodwill and stock price crash risk

Abstract

In this study, we examine the impact of goodwill and its impairment on stock price crash risk. Using a sample of U.S. listed firms from 2003 to 2020, we find strong evidence suggesting that the magnitude of goodwill in the balance sheet increases stock price crash risk. We measure firm-specific crash risk by the negative skewness of firm-specific weekly returns. Our results also demonstrate that firms who report frequent goodwill impairments reduce their stock price crash risk.

Key words:

Goodwill, goodwill impairment, stock price crash risk, volatility, negative skewness, down to up volatility.

1. Introduction

Crash risk, defined as the frequency of extreme negative stock returns, has always been a significant concern for investors. Since the 2008 financial crisis, stock price crash risk has increasingly attracted considerable attention from academic and professional communities, policy makers, and popular press. Prior studies on crash risk often attribute stock price crashes to managers' intentional information management. At the center of this information theory are managers' incentives and ability to hide bad news. When hidden bad news accumulate to a certain threshold, it will come out all at once, resulting in an abrupt, large-scale decline in stock price, namely, a stock price crash (Kim et al. 2016). In this paper, we argue that goodwill can be positively associated with stock price crash risk. Goodwill is subject to important discretion in its accounting, which creates important information asymmetry between managers and investors. Goodwill impairment was also proven by prior literature to be delayed and used for earnings management motives. These different aspects of goodwill accounting (discretion, information asymmetry, delaying of impairment charges and earnings management) are defined by literature as driving elements of stock price crash risk.

Another stream of literature on stock price crash risk suggests that the financial reporting environment is an important determinant of crash risk. DeFond et al. (2015) and Kim and Zhang (2016) show that International Financial Reporting Standards and accounting conservatism increase transparency and reduce crash risk. Jin and Myers (2006) find that stocks in more opaque countries are more likely to crash, that is, to deliver large negative returns, than stocks in relatively transparent countries. Similarly, Hutton et al. (2009) find that opaque firms are more prone to stock price crashes, using earnings management as a measure of opacity. In this study, we also examine how fair-value-oriented standards affect crash risk. Specifically, we test whether firms who do not refrain from goodwill impairment and perform frequent impairments reduce their stock price crash risk.

Following Chen el al. (2001) and Hutton et al. (2009), we measure firm-specific crash risk using the negative skewness of firm-specific weekly returns. Using a sample of 40046 observations from U.S listed companies, we provide empirical evidence that the magnitude of goodwill increases firms' stock price crash risk. This result is close to the

findings of Wu and Lai (2020) who document that intangible-intensive firms are associated with high stock price crash risk with goodwill being the driving force. Our results also show that it is the magnitude of goodwill that influences stock price crash risk, not its presence in the balance sheet. We also document that firms who report frequent goodwill impairments decrease their stock price crash risk. This additional finding is coherent with recent literature linking stock price crash risk to financial reporting transparency. In additional analyses, we demonstrate that higher values of goodwill (goodwill higher than the industry-year fourth quartile) are the ones impacting stock price crash risk. Otherwise, the presence of a smaller goodwill figure does not impact firms' crash risk. Our additional analyses also demonstrate that not all intangible assets drive stock price crash risk upwards. As a robustness test, we run all our analyses a second time using an alternative measure of stock price crash risk. Specifically, we use the down-to-up volatility (DUVOL) measure of crash risk (Chen et al. 2001; Kim et al. 2011b) and we get similar results.

Our study relates to several streams of literature. First, our findings contribute to the studies on the determinants of stock price crash risk by establishing a positive impact of goodwill on stock price crash risk. We also contribute to the literature that links crash risk to financial reporting transparency by providing evidence that firms who do not refrain from goodwill impairment reduce their stock price crash risk. Therefore, this study also contributes to the literature on the relation between accounting properties and stock price crashes. This paper is related to Wu and Lai's (2020) study, which links intangible assets and goodwill to stock price crash risk. Our study presents similar conclusions and provides additional findings suggesting that frequent goodwill impairments reduce firms' stock price crash risk. This additional finding relates our study to previous research on the links between crash risk and the financial reporting environment (Kim et al. (2016), Kim and Zhang (2016), DeFond et al. (2015), Jin and Myers (2006)).

The rest of this paper is structured as follow: section 1 discusses related literature on the topic and develops the hypotheses; section 2 presents the data and the empirical methodology and section 3 presents the results of the study.

2. Literature review and hypotheses development

In 2001, the Financial Accounting Standards Board introduced significant change for the accounting of goodwill by issuing ASC 350, formerly SFAS 142: Goodwill and Other Intangible Assets. Previous standards presumed that goodwill and all other intangible assets were wasting assets (that is, finite lived), and thus the amounts assigned to them should be amortized; it also mandated an arbitrary ceiling of 40 years for that amortization. With ASC 350, goodwill and intangible assets that have indefinite useful lives will not be amortized but rather tested at least annually for impairment. Goodwill is now impaired based on a comparison of a fair-value estimate of goodwill with its book value. According to the FASB, the changes included in the Statement will improve financial reporting because the financial statements of entities that acquire goodwill and other intangible assets will better reflect the underlying economics of those assets. The enhanced disclosures about goodwill and intangible assets will provide users with a better understanding of the expectations and changes in those assets over time, thereby improving their ability to assess future profitability and cash flows. However, the granted flexibility in impairment testing raised some concerns about the accuracy of impairments. Managerial discretion is prominent in impairment testing and fair value estimates (Ramanna and Watts 2012). Several studies have shown that firms tend to delay goodwill impairment and perform untimely impairments (Ramanna and Watts (2012), Zang (2008), Li (2017), Beatty and Weber (2006), Filip et al (2015)), resulting in high information asymmetry between managers and investors.

The other topic we address in this paper is stock price crash risk. Prior studies on crash risk often attribute stock price crashes to managers' intentional information management. Jin and Myers (2006) argue that the existence of information asymmetries between corporate insiders and external stakeholders could contribute to crash risk. Managers have incentives to overstate financial performance by strategically withholding bad news and accelerating the release of good news, hoping that poor current performance will be camouflaged by strong future performance. If managers withhold and accumulate bad news for an extended period, negative information is likely to be stockpiled within a firm. Once the amount of accumulated bad news reaches a certain threshold, it will be released all at once, leading to stock price crashes (Hutton et al., 2009; Kim et al., 2011a, 2011b; Kim and Zhang, 2016).

Since information asymmetry and bad news hoarding are defining elements of stock price crash risk, we suspect goodwill, which is subject to important discretion in its accounting, to be positively associated with stock price crash risk. Wu and Lai (2020) find that intangible-intensive firms are associated with high stock price crash risk. The decomposition of intangible intensity identifies goodwill as the driving force.

Goodwill and its impairment were also proven to be used for earnings management purposes (Filip et al (2015), AbuGhazaleh et al (2011), Zang (2008), Li (2017), Beatty and Weber (2006)). Hutton et al. (2009) find that opaque firms are more prone to stock price crashes, using earnings management as a measure of opacity. Khurana et al. (2018) find real earnings smoothing to be positively associated with firm-specific stock price crash risk. This finding is consistent with the view that real earnings smoothing helps managers withhold bad news, keep poor-performing projects, conceal resource diversion, and engage in ineffective risk management, which increases crash risk. Overall, the study suggests that real earnings smoothing destroys shareholder value in that it increases stock price crash risk.

Goodwill accounting is subject to discretion (information asymmetry). Goodwill impairment can be delayed by managers (bad news hoarding), and it can be used for earnings management purposes. These three elements are directly associated with stock price crash risk. Therefore, we develop our first hypothesis for this study:

H1: *Goodwill is positively associated with stock price crash risk.*

Another stream of literature on stock price crash risk specifies the elements that can decrease stock price crash risk. Kim et al. (2016) argue that the benefits of comparability reduce managers' incentives and ability to withhold bad news. This is because, by having access to and being able to understand information from comparable firms, investors can not only gain a better understanding of a firm's performance but also obtain some of the bad news about it through inferences based on the performance and/or disclosures of its comparable peers, even in the absence of its disclosure. The authors find that expected crash risk decreases with financial statement comparability, and this negative relation is more pronounced in an environment where managers are more prone to withhold bad news. The results suggest that financial statement comparability disinclines managers from bad news hoarding, which reduces investors' perceptions of a

firm's future crash risk. Kim and Zhang's (2016) study investigates the relation between conditional conservatism in financial reporting and future stock price crash risk. They find that the degree of conditional conservatism (timelier recognition of bad news as losses than of good news as gains) is significantly and negatively associated with future crash risk. The results are consistent with the notion that accounting conservatism is associated with less withholding of bad news or the more timely release of bad news to outside investors, thereby reducing stock price crash risk. DeFond et al. (2015) find a decrease in crash risk among nonfinancial firms after IFRS adoption, and that the effect is more pronounced among firms in poor information environments and in countries with large and credible changes to local GAAP. The results suggest that IFRS increases transparency, thereby broadly reducing crash risk among nonfinancial firms.

The studies mentioned above indicate that comparability, accounting conservatism and fair value oriented standards lower firms' stock price crash risk. In this study, we also aim to test whether firms who do not refrain from goodwill impairment and perform frequent impairments reduce their stock price crash risk. Jin and Myers (2006) find that crash risk is associated with several country-level measures of financial reporting transparency. Therefore, our second hypothesis for this study is the following:

H2: *Frequent goodwill impairments lower stock price crash risk.*

To measure stock price crash risk, we employ two measures of crash risk, which are constructed following previous studies in the crash risk literature. Our main crash risk measure is based on skewness, defined as the third moment scaled by the second moment. This measure was initially proposed by Chen et al. (2001) to capture the asymmetry of the return distribution and has been frequently used in the literature. Negative values for the skewness indicate data that are skewed to the left. When a stock return distribution is left-skewed, the left tail is more pronounced and longer than the right tail, and the firm has a disproportionate likelihood of experiencing extreme negative stock returns. As a robustness test, we use an alternative measure of crash likelihood which is the down to up volatility measure. The next section discusses in more detail the research methodology.

3. Data and research methodology

3.1. Sample selection

We obtain annual financial statement information for all publicly traded firms incorporated in the U.S. from Compustat. We initially downloaded a sample of all North-American companies from 2002 to 2020. The initial number of firm-years is 211215, to which we subtracted observations with missing data and observations of firms operating in the financial sector, in utilities and in mining. We excluded companies operating outside of the United States[32]. We also deleted all observations prior to 2003.[33] The final sample consists of 40 046 firm-years from 4811 firms. The table below summarizes the selection criteria.

Table 22: Sample selection process

Sample selection criteria	Firm-Years
All North American listed companies from Compustat database from 2002 to 2020	211 215
- Firm-years with missing data	-52 735
- Firms operating outside of the United States	-87 522
- Financial sector, utilities and mining	-29 324
- Observations prior to 2003	-1 588
Final sample	40 046

3.2. Measuring firm specific crash-risk

In order to measure crash risk, we follow the methodology developed by Chen et al. (2001) and Kim et al. (2011a, b). This measure of crash risk is computed as the negative conditional skewness of firm-specific weekly returns (NCSKEW). We start by computing

[32] We deleted observations of Canadian firms and firms based in the United States but incorporated or listed elsewhere.

[33] ASC 350 was introduced in 2001 but was required to be applied starting with fiscal years beginning after December 15, 2001. We therefore excluded observation of 2001 and of the initial adoption year (2002). Data of 2002 was however used to compute changes in variables.

firm-specific residual weekly returns by regressing the return of firm *i* in week *t* on actual and two periods lagged and lead values of CRSP value-weighted market return in week *t*. Specifically, we estimate the following model:

$$r_{it} = \propto_i + \beta_1 r_{m(t-2)} + \beta_2 r_{m(t-1)} + \beta_3 r_{mt} + \beta_4 r_{m(t+1)} + \beta_5 r_{m(t+2)} + \in_{it} \quad (1)$$

Where r_{it} is the return on stock *i* in week *t*, and r_{mt} is the return on the CRSP value-weighted market index in week *t*. The firm-specific weekly return, denoted W, is defined as the natural logarithm of one plus the residual return from the regression of equation 1, that is $W_{it} = \ln(1 + \in_{it})$.

Our measure of crash risk, NCSKEW, is the skewness of residual returns. We calculate NCSKEW for a given firm in a fiscal year by taking the negative of the third moment of firm-specific weekly returns during the same fiscal year, and dividing it by the standard deviation of firm-specific weekly returns raised to the third power. Specifically, for each firm *i* in year *T*, we calculate:

$$NCSKEW_{iT} = -\left[n(n-1)^{\frac{3}{2}} \sum W_{it}^3\right] / \left[(n-1)(n-2)(\sum W_{it}^2)^{\frac{3}{2}}\right] \quad (2)$$

Where n is the number of observations of firm-specific weekly returns during the fiscal year *T*. A negative sign is put in front of the third moment such that a higher value of NCSKEW indicates higher crash risk.

3.3. Empirical model

To determine whether the presence of goodwill in the balance sheet increases crash risk, we employ the following model, consistent with prior studies (Chen et al. 2001, Kim et al. 2011a, 2011b, Kim et al. 2016, Kim and Zhang, 2016).

$$\begin{aligned} NCSKEW_{iT} = {} & \beta_0 + \beta_1 GW_{i(T-1)} + \beta_2 NCSKEW_{i(T-1)} + \beta_3 DTURN_{i(T-1)} + \beta_4 Sigma_{i(T-1)} \\ & + \beta_5 RET100_{i(T-1)} + \beta_6 Size_{i(T-1)} + \beta_7 LEV_{i(T-1)} + \beta_8 ABDACC_{i(T-1)} \\ & + \beta_9 MTB_{i(T-1)} + \beta_{10} ROA1_{i(T-1)} + \in_{iT} \end{aligned} \quad (3)$$

Our dependant variable NCSKEW captures firm's crash risk. The first explanatory variable "GW" is our interest variable. It is computed as goodwill on lagged total assets. Following prior studies such as Chen et al. (2001), Hutton et al. (2009), and Kim et al.

(2011a, 2011b); we include several control variables known to influence crash likelihood. We first control for the lag value of NCSKEW since firms with a high return skewness are likely to have a high crash risk in the following year. Chen et al. (2001) show that trading volume, a proxy for the intensity of differences of opinion among investors, is a predictor of stock price crash risk. We thus control for change in trading volume (DTURN), computed as the average monthly share turnover in year *T-1* minus the average monthly share turnover in *T – 2*. Since more volatile stocks are more likely to experience stock price crashes, we include the variable SIGMA, which is the standard deviation of firm specific weekly returns over the last year. Chen et al. (2001) provide evidence that past returns have predictive power over future crash risk. In particular, they find that stocks with high past returns are more likely to crash. We therefore control for the average of firm-specific weekly returns over the last year, RET100, computed as the mean of firm-specific weekly returns over the fiscal-year period x100. We control for the size effect by including SIZE, the log of market value of equity. We also include market to book ratio, leverage, return on assets and absolute value of discretionary accruals[34] as controls in the regression. We include an accrual measure as firms engaging in earnings management are more prone to stock price crashes. We winsorize all the continuous variables at the top and bottom 1 percentiles to reduce the effects of extreme values on our results. We control for common industry factors by including industry fixed effects[35] and we cluster standard errors at firm and year levels. Table 23 summarizes the variables of the model, their sources and the expected signs.

[34] We use the Jones (1991) model to estimate accruals: $\mathrm{ACC} = \beta_0 + \beta_1 \frac{1}{\mathrm{TA}} + \beta_2 \frac{\Delta \mathrm{REV}}{\mathrm{TA}} + \beta_3 \frac{\mathrm{PPE}}{\mathrm{TA}} + \epsilon$. Where ACC are the total accruals computed as the change in working capital minus depreciation and amortization. ΔREV is the change in revenues from the previous year and PPE is the gross value of property, plant and equipment. All variables are scaled by lagged total assets. We estimate the above regression cross-sectionally for industry-years with at least 10 observations. The estimated residual of the equation is our measure of discretionary accruals.

[35] We use 2-digit SIC codes for our industry classification

Table 23: Regression variables

Variable	Definition	Source (reference)	Predicted sign
$NCSKEW_{iT}$	Negative skewness of firm-specific weekly returns over the fiscal year (Dependant variable)	-Holding period return (daily)[36]: CRSP (ret) - Value-weighted market return (daily): CRSP (vwretd)	
$GW_{i(T-1)}$	Lagged pre impairment goodwill (T-1) scaled by lagged total assets (T-2)	-Goodwill: Compustat (gdwl) -Total assets: Compustat (at)	+
$NCSKEW_{i(T-1)}$	Negative skewness of firm-specific weekly returns over the fiscal year (T-1)	-Holding period return (daily)[37]: CRSP (ret) - Value-weighted market return (daily): CRSP (vwretd)	+
$DTURN_{i(T-1)}$	Change of average monthly share turnover from year *T-2* to *T-1*, where monthly share turnover is calculated as the monthly trading volume divided by the total number of shares outstanding during the month	-Share volume: Compustat (vol) -Shares outstading: Compustat (shrout)	+
$Sigma_{i(T-1)}$	Standard deviation of firm-specific weekly returns over the fiscal year (T-1)	-Holding period return (daily): CRSP (ret)	+
$RET100_{i(T-1)}$	Mean of firm-specific weekly returns over the fiscal year (T-1), times 100.	-Holding period return (daily): CRSP (ret)	+
$Size_{i(T-1)}$	Log of market value of equity on T-1	-Market value: Compustat (mkvalt)	+
$LEV_{i(T-1)}$	Lagged long term debt plus lagged debt in current liabilities (T-1) scaled by lagged total assets (T-2)	-Long term debt: Compustat (dltt) -Debt in current liabilities: Compustat (dlc)	+
$ABDACC_{i(T-1)}$	Absolute value of discretionary accruals (T-1), where discretionary accruals are estimated from the Jones model.	-Account receivables: Compustat (rect) -Inventory: Compustat (invt) -Account payables: Compustat (ap) - Depreciation and amortization: Compustat (dp) -Revenues: Compustat (revt) -Plant property and equipment: Compustat (ppegt)	+
$MTB_{i(T-1)}$	Market to Book ratio on T-1	-Market value: Compustat (mkvalt) -Book value per share: Compustat (bkvlps) -Number of shares outstanding: Compustat (csho)	+
$ROA1_{i(T-1)}$	Net income scaled by total assets on T-1	-Net income: Compustat (ni)	-

To test the second hypothesis regarding the effect of goodwill impairment on stock price crash risk, we run the following regression models:

[36] Stock returns are available on CRSP on a daily and monthly format. We downloaded daily stock returns and then transformed them into weekly stock returns.

$$NCSKEW_{iT} = \beta_0 + \beta_1 IMP_{i(T-1)} + \beta_2 GW_{i(T-1)} + \beta_3 NCSKEW_{i(T-1)} + \beta_4 DTURN_{i(T-1)} + \beta_5 Sigma_{i(T-1)} + \beta_6 RET100_{i(T-1)} + \beta_7 Size_{i(T-1)} + \beta_8 LEV_{i(T-1)} + \beta_9 ABDACC_{i(T-1)} + \beta_{10} MTB_{i(T-1)} + \beta_{11} ROA1_{i(T-1)} + \in_{iT} \quad (4)$$

Where IMP is a dichotomous variable taking 1 if a firm reports goodwill impairment, and 0 otherwise. The objective here is to examine whether firms who report goodwill impairment lower their stock price crash risk. We also wish to test whether frequent impairments influence stock price crash risk through the regression model below:

$$NCSKEW_{iT} = \beta_0 + \beta_1 PREVIOUS_{i(T-1)} + \beta_2 GW_{i(T-1)} + \beta_3 NCSKEW_{i(T-1)} + \beta_4 DTURN_{i(T-1)} + \beta_5 Sigma_{i(T-1)} + \beta_6 RET100_{i(T-1)} + \beta_7 Size_{i(T-1)} + \beta_8 LEV_{i(T-1)} + \beta_9 ABDACC_{i(T-1)} + \beta_{10} MTB_{i(T-1)} + \beta_{11} ROA1_{i(T-1)} + \in_{iT} \quad (5)$$

The variable "PREVIOUS" captures past impairments of a firm and takes 1 if a firm has reported at least 2 impairments in the last 3 years. For both equations 4 and 5, we use the same dependant variable (Negative skewness of firm-specific weekly returns) and the same control variables as in the first model (equation 3). Table 24 summarizes the goodwill impairment variables, their sources and the expected signs.

Table 24: Goodwill impairment variables

Variable	Definition	Source (reference)	Predicted sign
$IMP_{i(T-1)}$	Dichotomous variable taking 1 if a firm reports goodwill impairment in the last year, and 0 otherwise.	-Goodwill impairment: Compustat (gdwlip)	-
$PREVIOUS_{i(T-1)}$	Dichotomous variable taking 1 if a firm has reported at least 2 impairments in the last 3 years.	-Goodwill impairment: Compustat (gdwlip)	-

4. Results

4.1. Summary statistics

We provide summary statistics in table 25. The mean value of our crash risk measure, NCSKEW, is 0.05. This mean is similar to the estimates in Kim et al. (2011b) and Kim et al. (2016), but is much higher than the mean reported in Chen et al. (2001), possibly due to the different sample period and/or the fact that these authors use daily returns to construct their variables while we use weekly returns. Goodwill represents on average 16% of total assets in our sample. The average change in monthly trading volume is 0.07. The average firm in our sample has a firm-specific weekly return of 0.36% and a

weekly return volatility of 0.064. The other control variable (SIZE, LEV, ABDACC, MTB and ROA) are coherent with previous literature.

Table 25:Summary statistics

Variable	Mean	Std. Dev.	p25	Median	p75
$NKSKEW$	0.05	1.174	-0.68	0.002	0.711
GW	0.161	0.188	0.003	0.095	0.254
$DTURN$	0.072	1.137	-0.307	0.007	0.356
$SIGMA$	0.064	0.035	0.04	0.056	0.079
$RET100$	0.365	1.016	-0.148	0.321	0.825
$SIZE$	6.296	2.119	4.819	6.324	7.719
LEV	0.239	0.275	0.009	0.172	0.353
$ABDACC$	0.046	0.058	0.012	0.027	0.055
MTB	3.292	6.497	1.315	2.267	4.03
ROA	-0.005	0.333	-0.041	0.033	0.077

The descriptive statistics are based on a sample of US companies drawn from Compustat. The sample covers the period from 2003 to 2020 and includes 40,046 firm-year observations.

We conduct a mean difference test of our crash risk measure (NCSKEW) for observation with and without goodwill in the balance sheet. Table 26 summarizes the results. Observations with goodwill have a crash risk of 0.081 on average while observations with no goodwill exhibit a crash risk of -0.037. This first result provides initial support for our first hypothesis.

Table 26: Mean difference test

	Goodwill (28 468 observations)		No Goodwill (11 578 observations)		Difference in means (No GW-GW)
	Mean	*Std, Dev,*	*Mean*	*Std, Dev,*	
$NCSKEW$	0.081	1.158	-0.037	1.210	-0.118***

*, ** and *** denote significance at pvalue≤10%, ≤5% and ≤1% respectively

Table 27 reports Pearson correlations among the regression variables. The correlation between NCSKEW and goodwill is positively significant, which supports our first hypothesis. The correlations between goodwill impairment and other variables are generally similar to those in prior studies. The lagged annual mean of weekly returns ($RET100_{i(T-1)}$) and lagged negative skewness of firm-specific weekly returns

($NCSKEW_{i(T-1)}$) are correlated, which is expected since both variables are constructed using weekly returns. Otherwise, there is no evidence of severe multicollinearity among the explanatory variables.

4.2. Regression results for hypothesis 1

We present the estimation results of equation 3 in Table 28. Column 3 of table 28 shows that the coefficient of GW is significantly positive (0.142 with t-statistic = 3.04) suggesting that goodwill increases stock price crash risk, confirming therefore our first hypothesis. The lag value of NCSKEW exhibits a positive and significant coefficient, confirming the prediction that firms with a high return skewness are likely to have a high crash risk in the following year. The variable DTURN captures the trading volume of stocks. Its coefficient is positive as expected but its significance is low. For the variable SIGMA, we got a negative coefficient which is contrary to our prediction. We got a positive and significant coefficient for our variable RET100, confirming the prediction that stocks with high past returns are more likely to crash. Column 4 of table 28 shows the result of a similar regression to equation 3 but the goodwill variable is replaced by a dichotomous variable (GW1) taking 1 if a firm exhibits goodwill in its balance sheet, and 0 otherwise. The coefficient of GW1 is not significant suggesting that the presence of goodwill in the balance sheet doesn't influence stock price crash risk but its magnitude in regards to total assets is what increases stock price crash risk.

Table 27: Pearson correlation matrix

Variables	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*	*(11)*
(1) $NCSKEW_{iT}$	1										
(2) $GW_{i(T-1)}$	0.042***	1									
(3) $NCSKEW_{i(T-1)}$	-0.009*	0.035***	1								
(4) $DTURN_{i(T-1)}$	0.024***	0.021***	-0.017***	1							
(5) $Sigma_{i(T-1)}$	-0.059***	-0.147***	-0.087***	0.230***	1						
(6) $RET100_{i(T-1)}$	0.056***	-0.033***	-0.564***	0.089***	0.129***	1					
(7) $Size_{i(T-1)}$	0.096***	0.242***	-0.012**	-0.016***	-0.421***	0.102***	1				
(8) $LEV_{i(T-1)}$	0.004	0.242***	-0.001	0.049***	-0.058***	-0.004	0.115***	1			
(9) $ABDACC_{i(T-1)}$	0.002	-0.088***	-0.020***	0.063***	0.137***	0.035***	-0.241***	0.087***	1		
(10) $MTB_{i(T-1)}$	-0.003	0.002	-0.004	0.011*	-0.002	0.007	0.005	-0.008	-0.003	1	
(11) $ROA1_{i(T-1)}$	0.004	0.037***	-0.010*	-0.026***	-0.042***	0.024***	0.055***	-0.106***	-0.115***	0.006	1

The Table above shows the Pearson correlation coefficients.
*, ** and *** denote significance at pvalue≤10%, ≤5% and ≤1% respectively.

Table 28: Regression results for hypothesis 1

	(1)		*(2)*		*(3)*		*(4)*	
	Coefficient	T-statistic	Coefficient	T-statistic	Coefficient	T-statistic	Coefficient	T-statistic
$GW_{i(T-1)}$	0.261	7.360***	0.156	3.77***	0.142	3.04***		
$GW1_{i(T-1)}$							0.001	0.03
$NCSKEW_{i(T-1)}$			0.030	3.95***	0.045	5.39***	0.045	5.36***
$DTURN_{i(T-1)}$			0.031	4.35***	0.011	1.47	0.013	1.75*
$Sigma_{i(T-1)}$			-1.905	-6.59***	-1.178	-3.39***	-1.296	-3.75***
$RET100_{i(T-1)}$			0.096	9.82***	0.144	11.81***	0.143	11.79***
$Size_{i(T-1)}$			0.038	8.65***	0.042	9.26***	0.044	9.62***
$LEV_{i(T-1)}$			-0.080	-2.6***	-0.076	-2.17**	-0.043	-1.28
$ABDACC_{i(T-1)}$			0.477	3.32***	0.444	2.93***	0.413	2.73***
$MTB_{i(T-1)}$			-0.000	-1.3	-0.000	-5.81***	-0.000	-5.8***
$ROA1_{i(T-1)}$			-0.082	-3.08***	-0.085	-2.2**	-0.088	-2.27**
Constant	0.023	2.630***	-0.120	3.77***	-0.198	-4.66***	-0.188	-4.36***
Industry FE	No		No		Yes		Yes	
Year FE	No		No		Yes		Yes	
Cluster by firm	No		No		Yes		Yes	
Cluster by year	No		No		Yes		Yes	
Adjusted R2	0.17%		1.49%		2.5%		2.48%	

*, ** and *** denote significance at pvalue≤10%, ≤5% and ≤1% respectively.

Column 1 presents the results for the regression of crash risk (proxied by negative skewness of firm-specific weekly returns over the fiscal year: NCSKEW) on goodwill. Column 2 presents results for the regression of crash risk on goodwill and other dependant variables. Column 3 presents the same regression but includes industry fixed effects and standard errors are clustered at the firm and year levels. Column 4 presents a similar regression but the goodwill variable is replaced by a dichotomous variable taking 1 if a firm exhibits goodwill in its balance sheet, and 0 otherwise.

4.3. Regression results for hypothesis 2

We present the estimation results of equation 4 and 5 in Table 29. With these equations, we examine whether firms who report goodwill impairment and/or frequent impairments lower their stock price crash risk. Column 1 of table 29 shows the result of equation 4 with the variable IMP as our main explanatory variable. IMP captures whether a firms has reported goodwill impairment in the previous year or not. The coefficient on IMP (-0.037 with t-statistic = -1.48) is not significant suggesting that even when reporting goodwill impairment, a firm does not reduce its crash risk. Column 2 of table 29 shows the result of equation 5 with the variable PREVIOUS as our main explanatory variable. PREVIOUS captures past impairments of a firm and takes 1 if a firm has reported at least 2 impairments in the last 3 years. The coefficient of PREVIOUS (-0.088 with t-statistic = -2.73) is negative and significant suggesting that frequent impairments can reduce firms' stock price crash risk.

Table 29: Regression results for hypothesis 2

	(1)		*(2)*	
	Coefficient	T-statistic	Coefficient	T-statistic
$GW_{i(T-1)}$	0.15	3.18***	0.124	2.46**
$IMP_{i(T-1)}$	-0.037	-1.48		
$PREVIOUS_{i(T-1)}$			-0.088	-2.73***
$NCSKEW_{i(T-1)}$	0.045	5.41***	0.051	5.75***
$DTURN_{i(T-1)}$	0.011	1.45	0.014	1.63
$Sigma_{i(T-1)}$	-1.14	-3.28***	-1.666	-4.42***
$RET100_{i(T-1)}$	0.142	11.63***	0.153	11.75***
$Size_{i(T-1)}$	0.042	9.3***	0.038	7.97***
$LEV_{i(T-1)}$	-0.077	-2.18**	-0.072	-1.91*
$ABDACC_{i(T-1)}$	0.439	2.9***	0.462	2.64***
$MTB_{i(T-1)}$	-0.000	-5.82***	-0.000	-5.87***
$ROA1_{i(T-1)}$	-0.088	-2.25**	-0.08	-1.9*
Constant	-0.199	-4.68***	-0.151	-3.33***
Industry FE	Yes		Yes	
Year FE	Yes		Yes	
Cluster by firm	Yes		Yes	
Cluster by year	Yes		Yes	
Adjusted R2	2.51%		2.62%	

*, ** and *** denote significance at pvalue≤10%, ≤5% and ≤1% respectively. Column 1 presents the results for the regression of crash risk (proxied by negative skewness of firm-specific weekly returns over the fiscal year: NCSKEW) on goodwill and goodwill impairment (IMP). The variable IMP is a dichotomous variable taking 1 if a firm has performed an impairment, and 0 otherwise. Column 2 presents the results for the regression of crash risk on goodwill and on "PREVIOUS". The variable "PREVIOUS" captures a firm's frequency of impairments. Specifically, it is a dichotomous variable that takes 1 if a firm has performed at least 2

impairments in the last three years, and 0 otherwise. Both regressions include industry and year fixed effects and standard errors are clustered at the firm and years levels.

5. Additional analyses

5.1. Impact of intangible assets

We next extend our main analysis to all intangible assets. We want to test whether all intangible assets influence stock price crash risk or is it mainly goodwill. In our main regression (equation 3), we replace goodwill with variables capturing intangible assets. We run our regression a first time replacing goodwill with the variable (INT1) which is total intangibles assets on lagged total assets, and a second time with the variable (INT2) which is intangible assets minus goodwill on lagged total assets. Table 30 below presents the results of the two regressions. Column 1 presents the result of the regression of stock price crash risk (proxied by NCSKEW) on all intangible assets. The coefficient of INT1 (0.104 with t-statistic = 3.05) is positive and significant suggesting that intangible assets increase stock price crash risk for firms. However, in column 2 of the table, the coefficient for INT2, which captures intangible assets excluding goodwill, is not highly significant (0.125 with t-statistic = 1.73). Taken together, these results indicate that all intangible assets do not necessarily influence stock price crash risk, whereas goodwill has a direct positive impact on stock price crash risk.

Table 30: Regression results for the impact of intangible assets on stock price crash risk

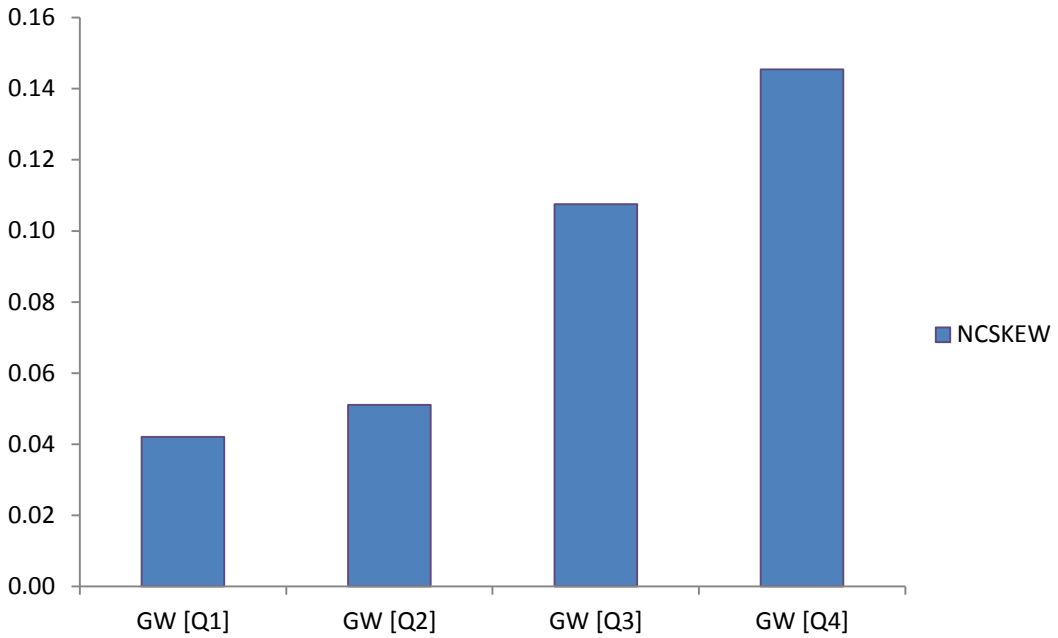
	(1)		*(2)*	
	Coefficient	T-statistic	Coefficient	T-statistic
$INT1_{i(T-1)}$	0.104	3.05***		
$INT2_{i(T-1)}$			0.125	1.73*
$NCSKEW_{i(T-1)}$	0.045	5.32***	0.045	5.39***
$DTURN_{i(T-1)}$	0.013	1.71*	0.013	1.7*
$Sigma_{i(T-1)}$	-1.266	-3.63***	-1.276	-3.66***
$RET100_{i(T-1)}$	0.143	11.73***	0.143	11.66***
$Size_{i(T-1)}$	0.042	9.26***	0.044	9.74***
$LEV_{i(T-1)}$	-0.081	-2.26**	-0.061	-1.73*
$ABDACC_{i(T-1)}$	0.419	2.77***	0.412	2.71***
$MTB_{i(T-1)}$	-0.000	-5.8***	-0.000	-5.79***
$ROA1_{i(T-1)}$	-0.092	-2.36**	-0.092	-2.35**
Constant	-0.192	-4.49***	-0.191	-4.47***
Industry FE	Yes		Yes	
Year FE	Yes		Yes	
Cluster by firm	Yes		Yes	
Cluster by year	Yes		Yes	
Adjusted R2	2.53%		2.50%	

*, ** and *** denote significance at pvalue≤10%, ≤5% and ≤1% respectively. Column 1 presents the results for the regression of crash risk (proxied by negative skewness of firm-specific weekly returns over the fiscal year: NCSKEW) on intangible assets (INT1). Column 2 presents the results for the regression of crash risk on intangible assets excluding goodwill (INT2). Both regressions include industry and year fixed effects and standard errors are clustered at the firm and years levels.

5.2. *Impact of goodwill size*

We previously tested whether it is the presence of goodwill in the balance sheet or its magnitude that influences stock price crash risk. Our results indicated that the presence of goodwill does not impact stock price crash risk, however, its magnitude does. This result indicates that smaller values of goodwill do not impact stock price crash risk. It also indicates the existence of a certain threshold at which goodwill starts to influence stock price crash risk. In an additional test, we attempt to determine the threshold at which goodwill starts to impact stock price crash risk. First, we conduct descriptive statistics on average stock price crash risk depending on the level of goodwill in its industry-year. We classify each goodwill observation according to its size: in the first, second, third or fourth quartile of its industry-year. The results in figure 29 below indicate that the value of NCSKEW is relatively small for goodwill in the first and second quartiles compared to goodwill in the third and fourth quartiles.

Figure 29: Average stock price crash risk depending on goodwill size



Each bar of the chart represents the average value of stock price crash risk proxied by NCSKEW but on different samples. Bar 1, 2, 3 and 4 of the chart represents the average NCKSEW on samples of observations with goodwill in the first, second, third and fourth quartiles, respectively. The quartiles are defined for each industry-year.

Next, we run our regression specified in equation 3 twice: a first time replacing goodwill with the variable (GW50) which is a dichotomous variable taking 1 if goodwill is above the industry-year median and 0 otherwise; and a second time replacing goodwill with the variable (GW75) which is a dichotomous variable taking 1 if goodwill is above the fourth quartile of its industry-year, and 0 otherwise. We choose to test the thresholds of the third and fourth quartiles as they appear in figure 29 to be highly related to stock price crash risk. Table 31 below presents the results of the two regressions. Column 1 presents the results of the regression of stock price crash risk (proxied by NCSKEW) on the dichotomous variable "GW50". The coefficient of GW50 (0.015 with t-statistic = 0.94) appears to be not significant suggesting that the presence of goodwill which is higher than the industry median does not impact stock price crash risk. Column 2 presents the results of the regression of stock price crash risk on the dichotomous variable "GW75". The coefficient of GW75 (0.043 with t-statistic = 2.45) is positive and significant indicating that the presence of goodwill that is higher than the industry's fourth quartile increases stock price crash risk.

Table 31: Regression results for the impact of goodwill on stock price crash risk depending on goodwill size

	(1) *GW > P50*		*(2)* *GW > P75*	
	Coefficient	T-statistic	Coefficient	T-statistic
$GW50_{i(T-1)}$	0.015	0.94		
$GW75_{i(T-1)}$			0.043	2.45**
$NCSKEW_{i(T-1)}$	0.045	5.39***	0.045	5.39***
$DTURN_{i(T-1)}$	0.012	1.58	0.012	1.54
$Sigma_{i(T-1)}$	-1.232	-3.55***	-1.207	-3.48***
$RET100_{i(T-1)}$	0.143	11.75***	0.144	11.78***
$Size_{i(T-1)}$	0.043	9.56***	0.043	9.48***
$LEV_{i(T-1)}$	-0.049	-1.45	-0.061	-1.79
$ABDACC_{i(T-1)}$	0.436	2.87***	0.444	2.93***
$MTB_{i(T-1)}$	-0.000	-5.83***	0.000	-5.78***
$ROA1_{i(T-1)}$	-0.087	-2.24**	-0.085	-2.2**
Constant	-0.194	-4.57***	-0.192	-4.54***
Industry FE	Yes		Yes	
Year FE	Yes		Yes	
Cluster by firm	Yes		Yes	
Cluster by year	Yes		Yes	
Adjusted R2	2.47%		2.49%	

*, ** and *** denote significance at pvalue≤10%, ≤5% and ≤1% respectively. Column 1 presents the results for the regression of crash risk (proxied by negative skewness of firm-specific weekly returns over the fiscal year: NCSKEW) on a dichotomous variable (GW50) which takes 1 if goodwill is higher than the industry-year median. Column 2 presents the results for the regression of crash risk on a dichotomous variable (GW75) which takes 1 if goodwill is higher than the industry-year fourth quartile. Both regressions include industry and year fixed effects and standard errors are clustered at the firm and years levels.

6. Robustness test

We repeat our analyses in Table 32 using the down-to-up volatility (DUVOL) measure of crash risk (Chen et al. 2001; Kim et al. 2011b). For each firm *i* over year *T*, we separate all the weeks with firm-specific weekly returns below the annual mean (down weeks) from those with firm-specific weekly returns above the annual mean (up weeks) and calculate the standard deviation for each of these subsamples separately. The variable "DUVOL" is the log of the ratio of the standard deviation of the down weeks to the standard deviation of the up weeks:

$$DUVOL_{iT} = \log\{(n_u - 1)\sum_{Down} W_{it}^2 \Big/ (n_d - 1)\sum_{Up} W_{it}^2\}$$

Where n_u and n_d are respectively the number of up weeks and the number of down weeks during year *T* and W_{it} is firm-specific weekly return.

We use DUVOL to retest the two hypotheses of this research. Specifically, we test whether the presence of goodwill in the balance sheet and/or its magnitude influences stock price crash risk and we test whether goodwill impairment reduces it. Table 32 below presents the results of the analyses using "DUVOL" as the dependant variable. Column 1 of the table presents the results of the regression of DUVOL on goodwill scaled by lagged total assets (GW) and column 2 presents the results of the regression of DUVOL on a dichotomous variable taking 1 if a firm exhibits goodwill in its balance sheet (GW1). The coefficient of GW (0.088 with t-statistic = 2.59) is positive and significant while the coefficient of GW1 (-0.012 with t-statistic = -0.85) is not significant. These findings indicate that the presence of goodwill in the balance sheet does not influence stock price crash risk but its magnitude does. Column 3 and 4 of the table present the results of the regression of "DUVOL" on goodwill and goodwill impairment. In column 3, the variable IMP is a dichotomous variable taking 1 if a firm has performed an impairment, and 0 otherwise. In column 4, the variable "PREVIOUS" captures the frequency of impairments. Specifically, it is a dichotomous variable taking 1 if a firm has performed at least 2 impairments in the last three years, and 0 otherwise. The coefficient of IMP in column 3 (-0.03 with t-statistic = -1.68) is not strongly significant while the coefficient of PREVIOUS in column 4 (-0.067 with t-statistic = -2.88) is negative and significant. Taken together, these results indicate that a single impairment does not influence stock price crash risk. However, firms who perform frequent goodwill impairments decrease their stock price crash risk. The results with DUVOL confirm the previous findings which were based on the negative skewness of firm-specific weekly returns as a measure of stock price crash risk.

Table 32: Regression results with an alternative measure of stock price crash risk : DUVOL

	(1)		*(2)*		*(3)*		*(4)*	
	Coefficient	T-statistic	Coefficient	T-statistic	Coefficient	T-statistic	Coefficient	T-statistic
$GW_{i(T-1)}$	0.088	2.59***			0.094	2.760***	0.072	1.98**
$GW1_{i(T-1)}$			-0.012	-0.85				
$IMP_{i(T-1)}$					-0.03	-1.68*		
$PREVIOUS_{i(T-1)}$							-0.067	-2.88***
$DUVOL_{i(T-1)}$	0.037	3.99***	0.037	3.97***	0.037	4.01***	0.041	4.21***
$DTURN_{i(T-1)}$	0.012	2.27**	0.014	2.51**	0.012	2.25**	0.014	2.41**
$Sigma_{i(T-1)}$	-1.125	-4.42***	-1.219	-4.83***	-1.095	-4.3***	-1.483	-5.39***
$RET100_{i(T-1)}$	0.109	10.87***	0.109	10.88***	0.108	10.72***	0.116	10.83***
$Size_{i(T-1)}$	0.027	8.07***	0.029	8.56***	0.027	8.12***	0.025	7.02***
$LEV_{i(T-1)}$	-0.061	-2.45**	-0.038	-1.61	-0.061	-2.46**	-0.063	-2.37**
$ABDACC_{i(T-1)}$	0.409	3.66***	0.382	3.43***	0.406	3.63***	0.419	3.24***
$MTB_{i(T-1)}$	-0.000	-3.47***	-0.000	-3.48***	-0.000	-3.47***	-0.000	-3.57***
$ROA1_{i(T-1)}$	-0.066	-2.23**	-0.066	-2.25**	-0.068	-2.28**	-0.064	-1.97**
Constant	-0.124	-3.97***	-0.111	-3.49***	-0.125	-4.00***	-0.092	-2.75***
Industry FE	Yes		Yes		Yes		Yes	
Year FE	Yes		Yes		Yes		Yes	
Cluster by firm	Yes		Yes		Yes		Yes	
Cluster by year	Yes		Yes		Yes		Yes	
Adjusted R2	2.89%		2.88%		2.89%		3.05%	

*, ** and *** denote significance at pvalue≤10%, ≤5% and ≤1% respectively. Column 1 presents the results for the regression of crash risk (proxied by the down-to-up volatility: DUVOL) on goodwill. Column 2 presents results for the regression of crash risk on "GW1", a dichotomous variable taking 1 if a firm exhibits goodwill in its balance sheet, and 0 otherwise. Column 3 presents the results for the regression of crash risk on goodwill and goodwill impairment (IMP). The variable IMP is a dichotomous variable taking 1 if a firm has performed an impairment, and 0 otherwise. Column 4 presents the results for the regression of crash risk on goodwill and on PREVIOUS. The variable PREVIOUS captures a firm's frequency of impairments. Specifically, it is a dichotomous variable taking 1 if a firm has performed at least 2 impairments in the last three years, and 0 otherwise. All regressions include industry and year fixed effects and standard errors are clustered at the firm and years levels.

7. Conclusion

In contrast to financial market theories focusing on the investor side, recent corporate finance and accounting theories have begun to explore the firm side of the story for stock price crashes. This study falls into this line of research by investigating the determinants of stock price crash risk from the firms' side. Specifically, we investigate the impact goodwill can have on stock price crash risk. Goodwill is subject to important discretion in its accounting, which creates important information asymmetry between managers and investors. Goodwill impairment was also proven by prior literature to be delayed and used for earnings management motives. These different aspects of goodwill are defined by literature as driving elements of stock price crash risk.

Using a sample of U.S. listed firms from 2003 to 2020, we document that the magnitude of goodwill increases stock price crash risk. We use the negative skewness of firm-specific weekly returns developed by Chen et al. (2001) as our main measure of crash risk. We also document that firms who report frequent goodwill impairments decrease their stock price crash risk. This additional finding is coherent with recent literature linking stock price crash risk to financial reporting transparency. Moreover, our results show that, aside from goodwill, other intangible assets do not necessarily impact stock price crash risk. Goodwill has also no impact on stock price crash risk for firms with smaller goodwill figures: we demonstrate that higher values of goodwill (goodwill higher than the industry-year fourth quartile) are the ones impacting stock price crash risk. Our results hold when using a different measure of crash risk, namely the down to up volatility measure.

We contribute to the literature by examining the effect of goodwill on crash risk. Our findings complement prior studies that examine the determinants of stock price crash risk. We also contribute to the literature regarding the impact of the financial reporting environment on crash risk by demonstrating that goodwill impairment, a fair value oriented accounting standard, reduces firms' stock price crash risk.

.

8. References

AbuGhazaleh, N., Al-Hares, O., and Roberts, C., (2011), Accounting Discretion in Goodwill Impairments: UK Evidence. *Journal of International Financial Management & Accounting*, 22(3), 165-204.

Beatty, A., Weber, J., (2006). Accounting Discretion in Fair Value Estimates: An Examination of SFAS 142 Goodwill Impairments. *Journal of Accounting Research*, 44 (2), 257-288.

Chen, J., Hong, H., Stein, J.,C., (2001). Forecasting crashes: trading volume, past returns, and conditional skewness in stock prices. *Journal of Financial Economics*, 61 (3), 345–381.

DeFond, M., Hung, M. ,Li, S., Li, Y.,(2013). Does mandatory IFRS adoption affect crash risk? The Accouting Review, 90(1), 265–299.

Filip, A., Jeanjean, T., and Paugam, L., (2015), Using Real Activities to Avoid Goodwill Impairment Losses: Evidence and Effect on Future Performance, *Journal of Business Finance and Accounting*, 42(3-4), 515 – 554.

Hutton, A.P., Marcus, A.J., Tehranian, H., (2009). Opaque financial reports, R2, and crash risk. *Journal of Financial Economics*, 94(1), 67-86.

Jin, L., Myers, S.C., (2006). R2 around the world: new theory and new tests. *Journal of Financial Economics*, 79(2), 257-292.

Khurana, K., I., Pereira, R., Zhang, E., X., (2018). Is Real Earnings Smoothing Harmful? Evidence from Firm-Specific Stock Price Crash Risk. *Contemporary Accounting Research*, 35 (1), 558–587.

Kim, J., B., Li, L., Lu, L., Y., Yu, Y., (2016). Financial statement comparability and expected crash risk. *Journal of Accounting and Economics*. 61, 294–312.

Kim, J.B., Li, Y., Zhang, L., (2011a). Corporate tax avoidance and stock price crash risk: firm level analysis. *Journal of Financial Economics*, 100(3), 639-662.

Kim, J.B., Li, Y., Zhang, L., (2011b). CFO vs. CEO: equity incentives and crashes. *Journal of Financial Economics,* 101(3), 713-730.

Kim, J.B., Wang, Z., Zhang, L., (2016). CEO overconfidence and stock price crash risk. *Contemporary Accounting research*, 33(4), 1720-1749.

Kim, J.B., Zhang, L., (2016). Accounting Conservatism and Stock Price Crash Risk: Firm-level Evidence. *Contemporary Accounting Research*, 33 (1), 412–441.

Kim, Y., Li, H., Li, S., (2014). Corporate social responsibility and stock price crash risk. *Journal of Banking & Finance*, 43, 1–13.

Li, K., K., Sloan, R., G., (2017). Has goodwill accounting gone bad? *Review of Accounting Studies*, 22, 964–1003.

Ramanna, K. Watts, R. L. (2012), Evidence on the Use of Unverifiable Estimates in Required Goodwill Impairment. *Review of Accounting Studies*, 17 (4), 749-780.

Statement of financial accounting standards NO. 142: GOODWILL AND OTHER INTANGIBLE ASSETS (2001), Financial Accounting Standards board

Wu, K., Lai, S., (2020). Intangible intensity and stock price crash risk. *Journal of Corporate Finance*. 64.

Zang, Y. (2008). Discretionary behavior with respect to the adoption of SFAS no, 142 and the behavior of security prices, *Review of Accounting and Finance*, 7 (1), 38-68.

Chapter 3: Economic policy uncertainty and goodwill impairment

Economic policy uncertainty and goodwill impairment

Abstract

In this study, we examine the implications of economic policy uncertainty on reported goodwill impairments. Using a sample of U.S. listed firms from 2003 to 2020, we find strong evidence suggesting that firms report more goodwill impairment when facing high uncertainty. We use Baker et al.'s (2016) index of economic policy uncertainty as our proxy for uncertainty. Our results demonstrate that firms report more goodwill impairment when facing uncertainty, but this effect is mitigated by the presence of overconfident CEOs.

Key words:

Goodwill, goodwill impairment, uncertainty, economic and policy uncertainty, CEO, overconfidence.

1. Introduction

For the last two decades, the U.S. economy has experienced significant levels of economic and policy uncertainty as a result of the 9/11 attacks, the financial crisis of 2008 and the failure of Lehman Brothers, the debt ceiling crisis of 2011 and the corona virus pandemic of 2020. High economic and policy uncertainty has a negative effect on the U.S. economy but has also serious adverse consequences on firms. Prior research finds that the uncertainty surrounding government policies and regulatory frameworks may heighten the uncertainty of operating environments for firms (Dhole et al. 2021). Baker et al. (2016) conduct a study at firm level and observe that economic policy uncertainty is associated with greater stock price volatility, a fall in industrial production and reduced investment and employment.

EPU (Economic Policy Uncertainty) has also consequences for the quality of financial reporting. Jin et al. (2019) find that high levels of EPU lead to greater earnings opacity while Dhole et al. (2021) show that high EPU reduces earnings comparability. The first motivation of our study is to provide evidence on how managers are implementing financial reporting standards requiring the recognition of declines in asset values. We focus on goodwill for two mains reasons. First, it is an important item of the balance sheet representing on average 20% of total assets. Second, the impairment testing process is quite complex and requires significant judgment and discretion in fair value estimation. We argue that EPU is likely to influence goodwill impairment in the following two ways. First, EPU increases the uncertainty of future cash flows, which makes the impairment testing harder since it depends on managers' prediction of future cash flows. Second, EPU increases uncertainty of discount rates which are also a key element in the impairment process. In this study, we investigate the relationship between EPU and goodwill impairment. Specifically we test if firms report more goodwill impairment in periods of high uncertainty, and then we examine whether the same pattern is observable for firms with overconfident CEOs. Prior research on the topic suggests that overconfident CEOs tend to be overoptimistic about uncertain outcomes and believe they have greater control over uncertain events. We suspect that this aspect of overconfidence will likely impact the impairment process during periods of uncertainty.

Our measure of EPU is the news based index developed by Baker, Bloom, and Davis (2016). We first examine if firms report more goodwill impairment when facing high uncertainty. Our results show that there is more goodwill impairment in periods of high uncertainty. Second, we examine if firms with overconfident CEOs also exhibit higher impairments in periods of high uncertainty. We measure CEO overconfidence using the option-exercise behavior method developed by Malmendier and Tate (2005). We find that in periods of high uncertainty, firms with overconfident CEOs report smaller goodwill impairments compared to other firms, even when the firm's economic performance is low. Our results are robust to alternate mean computations of EPU: the main EPU measure used in this study is constructed by converting the monthly EPU index into an annual measure using the mean of the twelve months before fiscal year end. We test three different mean computations and we get similar results. We find that our results do not change when we use a different measure of uncertainty, namely the VIX index.

Our findings contribute to the growing literature of the impact of uncertainty and macroeconomic factors on financial reporting and corporate decision making. Johnston et al. (2018) find that high levels of uncertainty, measured as the change in sales, leads to more goodwill impairment. We corroborate this finding using a different measure of uncertainty. The news based index is widely considered in the literature as a reliable measure of uncertainty. Second, our study relates to the emerging literature of behavioral corporate finance that examines the impact of managerial psychological traits, such as overconfidence, on various corporate policies and outcomes. Our study extends this line of research by examining the impact of CEO overconfidence on goodwill impairment under uncertainty. We document that the effect of uncertainty on goodwill impairment is mitigated when the CEO is classified as overconfident. Therefore, this study also contributes to the literature that examines how CEO overconfidence impacts financial reporting.

The rest of this paper is structured as follow: section 1 discusses related literature on the topic and develops the hypotheses; section 2 presents the data and the empirical methodology and section 3 presents the results of the study.

2. Literature review and hypotheses development

In 2001, the Financial Accounting Standards Board introduced significant change for the accounting of goodwill by issuing ASC 350, formerly SFAS 142: Goodwill and Other Intangible Assets. Previous standards presumed that goodwill and all other intangible assets were wasting assets (that is, finite lived), and thus the amounts assigned to them should be amortized; it also mandated an arbitrary ceiling of 40 years for that amortization. With ASC 350, goodwill and intangible assets that have indefinite useful lives will not be amortized but rather tested at least annually for impairment. Goodwill is now impaired based on a comparison of a fair-value estimate of goodwill with its book value. According to the FASB, the changes included in the Statement will improve financial reporting because the financial statements of entities that acquire goodwill and other intangible assets will better reflect the underlying economics of those assets. The enhanced disclosures about goodwill and intangible assets will provide users with a better understanding of the expectations and changes in those assets over time, thereby improving their ability to assess future profitability and cash flows. However, the granted flexibility in impairment testing raised some concerns about the accuracy of impairment. Managerial discretion is prominent in impairment testing and fair value estimates (Ramanna and Watts, 2012). Moreover, goodwill impairment decision largely depends on managers' prediction of future cash flows (Johnston et al. 2018). Goodman et al. (2014) argue that environmental uncertainty causes firms to make inaccurate predictions of future cash flows and earnings. In other words, forecast errors are greater when there is a higher level of uncertainty. Dhole et al. (2021) suggest that as firms face a significant amount of uncertainty of future cash flows in higher economic uncertainty periods, they are more risk-averse and implement more conservative policies, which could adversely impact firm value. Dai and Ngo (2020) find that accounting conservatism, proxied by asymmetric timeliness of earnings, increases in periods of high political uncertainty, establishing therefore a causal relationship between uncertainty and accounting conservatism. Since conservatism is an efficient contracting mechanism that restricts managers' tendency to overstate accounting information (Watts, 2003a), we suspect that firms could report more goodwill impairment when facing high uncertainty. Johnston et al. (2018) find that there is a significant and positive relationship between environmental uncertainty (measured as the change in sales) and

goodwill impairment, suggesting that firms faced with more volatile environments are more likely to incur goodwill impairment and a larger magnitude of such impairment. Overall the results from previous studies show that economic and policy uncertainty can lead to inaccurate predictions of future cash flows, increased accounting conservatism and higher levels of goodwill impairment. Nevertheless, previous literature also presents counterarguments. Jin et al. (2019) find that high levels of uncertainty lead to greater bank earnings opacity. When economic policy is relatively uncertain, it is easier for bank managers to distort financial information, as unpredictable economic policy changes make assessing the existence and impact of hidden adverse new more difficult for investors and creditors. They conclude that uncertainty in economic policy is positively related to earnings opacity and negatively related to the level of accounting conservatism. Dhole et al. (2021) argue that increased economic policy uncertainty reduces the quality of earnings and its comparability. They also suggest that uncertainty is an increased opportunity for earnings management. Yung and Root (2019) also argue that policy uncertainty is associated with earnings management. They find evidence suggesting that firms increase earnings management when policy uncertainty is high. All these counterarguments suggest that the impact of uncertainty on goodwill impairment is debatable and deserving of empirical investigation. Therefore, we test in this paper the following hypothesis:

H1*: While facing high Economic Policy Uncertainty, firms report more goodwill impairment.*

The second research topic we address in this paper is the effect of executives on the impairment decision amid uncertainty. We focus on the role of the CEO and we investigate whether CEO overconfidence mitigates or heightens the relationship between economic policy uncertainty and goodwill impairment. CEO overconfidence is defined as the systematically upward biased beliefs of CEOs about the future returns to their investment projects or as the overestimation of the accuracy of their beliefs and underestimation of risks they are actually facing (Malmendier and Tate, 2005). Investigating the effects of overconfidence on corporate and accounting policies is important since overconfidence can induce value destroying decisions. For example, Roll (1986) argues that managerial hubris explains why firms engage in value destroying mergers or acquisition. There are several reasons to believe that CEO's overconfidence

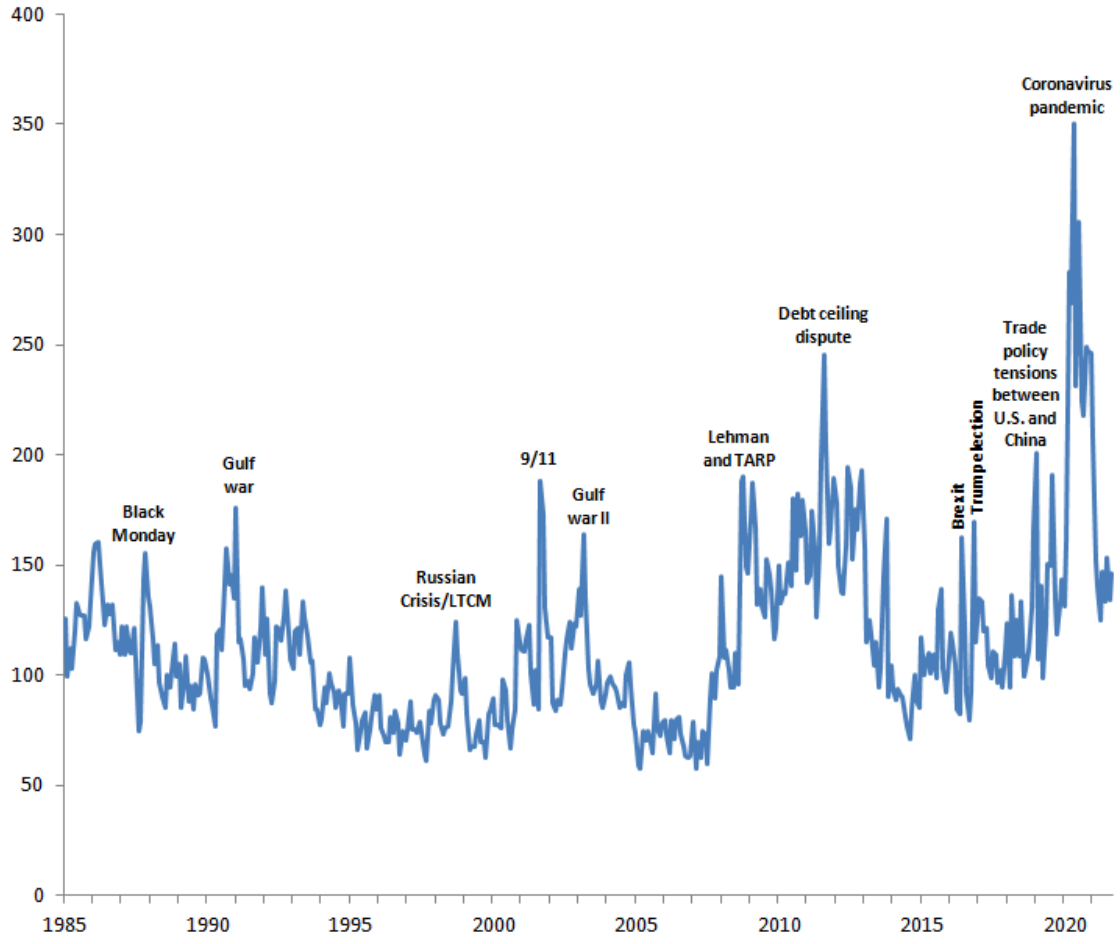
plays a role in the impairment process, especially during periods of uncertainty. Ahmed and Duellman (2013) find that overconfident CEOs tend to report less conservatively. Since overconfident managers overestimate future returns from their firms' projects, they are likely to delay recognition of losses and use less conditionally conservative accounting. Chung and Hribar (2021) argue that CEO overconfidence leads to an overestimation of future performance and illusion of control, such that the CEOs are less likely to believe an impairment is necessary and delay the impairment. They demonstrate that overconfident CEO's tend to affect the timeliness of goodwill impairment and that uncertainty strengthens this effect. In periods of high uncertainty, overconfident CEOs can make optimistic cash flow predictions which will reduce the likelihood of impairment. Moreover, when a company revises downward its goodwill figure following an impairment test, it affects downward its reported earnings. Beyond the income effect, there are potential reputational and career concerns. In cases where the CEO was at the helm for the acquisition, the board and/or investors can view the impairment as evidence of a poor M&A decision (Chung and Hribar (2021)). All these arguments suggest that CEO overconfidence can mitigate the relationship between economic policy uncertainty and goodwill impairment. Therefore, we develop a second hypothesis for this paper:

H2*: While facing high Economic Policy Uncertainty, overconfident CEOs are less likely to impair goodwill*

One of the main challenges in this line of research is finding an appropriate measure of uncertainty. The overall uncertainty faced by firms has been measured using a variety of variables, such as the dispersion in analyst forecasts or volatility of stock returns, input and output prices, total factor productivity, or firm fundamentals (Gulen H., Ion M., (2016)). Baker, Bloom, and Davis (2016) fill this gap in the literature by constructing an index of aggregate economic policy uncertainty as a weighted average of four different components. The first component is an index of search results from 10 largest U.S newspapers. To construct the index, the authors perform monthly searches of each paper for terms related to economic and policy uncertainty. This first component captures newspaper coverage frequency. The second component measures the level of uncertainty related to future changes in tax policy. This is done through an estimation of revenue effects of all tax provisions set to expire in the near future, using data from the

Congressional Budget Office. The third and fourth components of the index are the dispersion of economic forecasts directly influenced by government policy: consumer price index forecast (3rd component) and the forecast of purchases of goods and services by state, local governments, and the federal government (4th component). The overall EPU index is constructed using a weight of one-half for the news-based component and one-sixth on each of the other three measures (the tax expiration index, the consumer price index forecast disagreement measure, and the federal/state/local purchases forecast disagreement measure). The result is an economic policy uncertainty index that tends to show large spikes around significant events as shown in the figure below.

Figure 30 : Economic Policy Uncertainty evolution from 1985 to 2021



This index has found widespread acceptance in the finance literature and has been used in different studies investigating the impact of economic policy uncertainty on investment (Gulen and Ion 2015), financial statement comparability (Dhole et al. 2021), earnings management (Yung and Root 2019) and mergers and acquisitions (Nguyen and Phan 2019).

3. Data

3.1. Sample selection

We obtain annual financial statement information for all publicly traded firms incorporated in the U.S. from Compustat. We initially downloaded a sample of all North-American companies from 2002 to 2020. The initial number of firm-years is 211215, to which we subtracted observations with missing data, observations with no goodwill, and observations of firms operating in the financial sector, in utilities and in mining. We excluded companies operating outside of the United States[38]. We also deleted all observations prior to 2003.[39] The final sample consists of 29 740 firm-years from 3 513 firms. The table below summarizes the selection criteria.

Table 33: Sample selection process

Sample selection criteria	Firm-Years
All North American listed companies from Compustat database from 2002 to 2020	211 215
- Firm-years with missing data	-49 185
- Firm-years with missing goodwill data or zero goodwill	-30 966
- Firms operating outside of the United States	-57 151
- Financial sector, utilities and mining	-43 034
- Observations prior to 2003	-1 139
Final sample	29 740

[38] We deleted observations of Canadian firms and firms based in the United States but incorporated or listed elsewhere.

[39] ASC 350 was introduced in 2001 but was required to be applied starting with fiscal years beginning after December 15, 2001. We therefore excluded observation of 2001 and of the initial adoption year (2002). Data of 2002 was however used to compute changes in variables.

3.2. Empirical methodology

To observe firms' impairment behavior in uncertain environments, we run the following regression model:

$$IMP_{iT} = \beta_0 + \beta_1 EPU_{iT} + \beta_2 GW_{i(T-1)} + \beta_3 \Delta OCF_{iT} + \beta_4 ROA_{i(T-1)} + \beta_5 RET_{i(T-1)} + \beta_6 BTM_{i(T-1)} + \beta_7 LEV_{iT} + \beta_8 RGDP_T + \beta_9 SDSALES_{iT} + \in_{iT} \quad (1)$$

Our dependant variable IMP is the goodwill impairment of year T scaled by lagged total assets and multiplied by -1 so that a higher value indicates a larger impairment. For our uncertainty measure (EPU), we use the monthly EPU index developed by Baker, Bloom, and Davis (2016). Since our data is annual, we transform the EPU index following Gulen and Ion (2015) and Dhole et al. (2021). Specifically, we compute the natural logarithm of the mean of the EPU index of the twelve months before fiscal year end. We include a set of variables to proxy for the characteristics leading to goodwill impairment. The first variable GW is measured as goodwill scaled by lagged total assets. Firms with a higher goodwill figure in their balance sheet may incur more goodwill impairment, because the relative amount of goodwill that is exposed to the impairment test will be greater (Zang, 2008). We also include three performance measures. ΔOCF is measured as the change in operating cash flows from T-1 to T, scaled by lagged total assets; it captures cash-related performance attributes (Riedl, 2004). ROA is measured as net income scaled by total assets, it captures the firms general performance. It is expected that the poorer the firm's performance, the greater the magnitude of reported goodwill impairment (AbuGhazaleh et al. 2011). Following Francis el al. (1996), we control for firms' stock price performance. We include a stock performance proxy (RET), which is a dummy variable taking one if the annual stock return of a firm is negative. More negative returns should increase the size of impairment. The variable BTM is computed as book value on market value. Firms with a higher book-to-market ratio are expected to impair more goodwill to adjust their book value to the reality of the market. Finally, the variable LEV controls for capital structure. It is measured as total debt scaled by lagged total assets.

To mitigate the concern that EPU might capture general macroeconomic conditions, we control for GDP[40] growth. Since GDP growth is highly correlated with EPU, we use the residual component (RGDP) by regressing GDP growth on EPU. Finally, we control for

[40] GDP = Gross Domestic Product

firm-level uncertainty using the volatility of sales. Specifically, we compute the variable SDSALES as the standard deviation of quarterly sales over the preceding 8 quarters. We control for common industry factors by including industry fixed effects[41]. Given the same Economic Policy Uncertainty has an effect on all firms at the same time, we cluster standard errors at firm and year levels. We winsorize all the continuous variables at the top and bottom 1 percentiles to reduce the effects of extreme values on our results. Table 34 summarizes the variables of the model, their sources and the expected signs.

Table 34: Regression variables definitions and sources

Variable	Definition	Source (reference)	Predicted sign
IMP_{iT}	Magnitude of goodwill impairment scaled by lagged total assets (Dependant variable)	-Goodwill impairment: Compustat (gdwlip) -Total assets: Compustat (at)	
EPU_T	BBD monthly index converted into an annual variable	www.policyuncertainty.com	+
$GW_{i(T-1)}$	Goodwill (T-1) scaled by lagged total assets (T-2)	-Goodwill: Compustat (gdwl)	+
ΔOCF_{iT}	Change in operating cash flows from year T-1 to T scaled by lagged total assets	-Operating cash flows: Compustat (oancf)	-
$ROA_{i(T-1)}$	Net income scaled by total assets (T-1)	-Net income: Compustat (ni)	-
$RET_{i(T-1)}$	Dummy variable taking one if the annual stock return of a firm is negative and 0 otherwise	-Monthly stock return with dividend and stock-split-adjusted: CRSP (ret)	+
$BTM_{i(T-1)}$	Book value on market value (T-1)	-Market value: Compustat (mkvalt) -Book value per share: Compustat (bkvlps) -Number of shares outstanding: Compustat (csho)	+
LEV_{iT}	Long term debt plus debt in current liabilities scaled by lagged total assets	-Long term debt: Compustat (dltt) -Debt in current liabilities: Compustat (dlc)	?
$RGDP_T$	Residual value from the regression of GDP growth on EPU	www.worldbank.org	-
$SDSALES_{iT}$	Standard deviation of quarterly sales scaled by lagged total assets over the preceding 8 quarters	Quarterly sales: Compustat (saleq)	+

To test the second hypothesis regarding the effect of CEO overconfidence, we run the following regression model:

[41] We use 4-digit SIC codes for our industry classification

$$IMP_{iT} = \beta_0 + \beta_1 EPU_T + \beta_2 GW_{i(T-1)} + \beta_3 H67_{iT} + \beta_4 EPU_T \times H67_{iT} + \beta_5 \Delta OCF_{iT} + \beta_6 ROA_{i(T-1)} + \beta_7 RET_{i(T-1)} + \beta_8 BTM_{i(T-1)} + \beta_9 LEV_{iT} + \beta_{10} RGDP_T + \beta_{11} SDSALES_{iT} + \in_{iT} \quad (2)$$

We use the same dependant and independent variables of the first model and we incorporate a measure of CEO overconfidence (H67) as well as an interaction term between the uncertainty measure and the overconfidence measure.

Our measure of CEO overconfidence is the option holdings-based overconfidence measure developed by Malmendier and Tate (2005). A CEO is classified as overconfident if he keeps his options too long to be considered rational. Overconfident CEOs are more likely to believe that their companies will continue to perform better and therefore postpone option exercise. Specifically, the dummy variable Holder67 (H67) takes the value of 1 if a CEO postpones the exercise of his options that are 67% or more in the money at least twice over the sample period, and zero otherwise[42]. Once a CEO is identified as overconfident, we assume that he remains overconfident for the rest of sample period. Since we do not have access to Malmendier and Tate (2005) detailed data on CEOs' option holdings and exercise prices, we follow the methodology employed by Campbell et al. (2011) to compute the average moneyness of the CEO's option portfolio for each year by using the data available in the ExecuComp database. To calculate the average moneyness, we first compute the average realizable value for the option by dividing the total realizable value of the exercisable options (ExecuComp variable: OPT_UNEX_EXER_EST_VAL) by the number of exercisable options held by the CEO (ExecuComp variable: OPT_UNEX_EXER_NUM) for each year. Next, we subtract the per-option average realizable value from the stock price at the fiscal year end (ExecuComp variable: PRCCF) to obtain an estimate of the average exercise price of the options (estimated strike price). Lastly, the average percent moneyness of the options equals the stock price at the fiscal year end (PRCCF) divided by the estimated strike price minus 1. To capture the effect of CEO overconfidence on the impairment process during periods of uncertainty, we add an interaction term ($EPU \times H67$) between the uncertainty and the overconfidence proxies (see equation 2 above).

[42] Following Chung and Hribar (2021), we also test an alternative measure of CEO Overconfidence. We compute *LongHolder*, a dummy which takes 1 if a CEO hasn't exercised his options that are 40% in the money and will expire in less than a year. We get similar results.

To fully understand the extent of the effect of CEO overconfidence on impairment of goodwill during periods of uncertainty, we run another regression model (equation 3 below) which introduces another interaction term related to performance (BAD_PERF). We aim to test whether overconfident CEOs tend to impair less goodwill during periods of uncertainty even when firms have just experienced poor economic performance. Underperformance is considered an indicator for required goodwill impairment.

$$\begin{aligned} IMP_{iT} = {} & \beta_0 + \beta_1 EPU_T + \beta_2 GW_{i(T-1)} + \beta_3 H67_{iT} + \beta_4 EPU_T \times H67_{iT} \times BAD\_PERF_{i(T-1)} \\ & + \beta_5 \Delta OCF_{iT} + \beta_6 BAD\_PERF_{i(T-1)} + \beta_7 RET_{i(T-1)} + \beta_8 BTM_{i(T-1)} \\ & + \beta_9 LEV_{iT} + \beta_{10} RGDP_T + \beta_{11} SDSALES_{iT} + \in_{iT} \end{aligned} \quad (3)$$

We measure BAD_PERF in three different ways. First we measure a firm's performance with the dummy variable (Low_ROA) which takes the value of 1 if a firm has a lower ROA than its industry-year median. Second, we compute a dummy variable (Low_SALES) which takes the value of 1 if a firm has lower sales compared to its industry-year median. We also test the regression with a stock performance measure. Specifically, we compute (RET), a dummy which takes the value of 1 if a firm exhibits a negative stock return.

4. Results

4.1. Summary statistics

We provide summary statistics in table 35. The mean of goodwill impairment losses in our sample is 0.8% of total assets. Since only a small portion of the sample exhibits impairment losses (3665 firm-years report goodwill impairment while 26 075 do not), we present summary statistics for non null impairment values (*POS_IMP*). For this subsample, goodwill impairment represents on average 5.7% of total assets. Goodwill represents on average 21.2% of total assets in our sample. The mean and median of EPU is 4.7. These statistics are generally consistent with prior research.

Table 35: Summary statistics

Variable	Mean	Std. Dev.	p25	Median	p75
IMP	0.008	0.034	0	0	0
POS_IMP	0.057	0.076	0.004	0.023	0.079
EPU	4.752	0.306	4.533	4.714	4.969
GW	0.212	0.190	0.064	0.162	0.309
ΔOCF	0.010	0.079	-0.023	0.008	0.042
ROA	0.015	0.159	-0.001	0.043	0.081
RET	0.324	0.468	0	0	1
BTM	0.490	0.555	0.229	0.405	0.663
LEV	0.253	0.253	0.041	0.207	0.37
RGDP	0	1.448	-0.778	0.314	1.152
SDSALES	0.042	0.042	0.015	0.028	0.052

The descriptive statistics are based on a sample of US companies drawn from Compustat. The sample covers the period from 2003 to 2020 and includes 29,740 firm-year observations.

The mean and median of EPU are both equal to 4.7. We conduct a mean difference test of the magnitude of goodwill impairment for observation below and above an EPU of 4.7. Table 36 summarizes the results. Observations with high levels of uncertainty report an impairment of goodwill of 1.02% on average while observations with low levels of uncertainty report a smaller impairment loss: 0.62%. This first result provides initial support for our first hypothesis.

Table 36: Mean difference test

	High Uncertainty EPU>=4.7		Low Uncertainty EPU<4.7		Difference in means (Low-High)
	Mean	*Std, Dev,*	*Mean*	*Std, Dev,*	
IMP	0,010	0,045	0,006	0,072	-0,004***

*, ** and *** denote significance at pvalue≤10%, ≤5% and ≤1% respectively

Table 37 reports Pearson correlations among the regression variables. The correlation between impairment and EPU is positively significant, which supports our first hypothesis. The correlations between goodwill impairment and other variables are generally similar to those in prior studies. Goodwill and book to market ratio are positively correlated with impairment, while the change in operating cash flows and return on assets are negatively correlated. The correlation matrix reveals that the

variables used in the regression are not highly correlated with one another suggesting that multicollinearity does not appear to be a problem in this study.

4.2. Regression results for hypothesis 1

We present the estimation results of equation 1 in Table 38. Column 3 of table 38 shows that the coefficient of EPU is significantly positive (0.005 with t-statistic = 7.38) suggesting that goodwill impairment increases as uncertainty increases, confirming therefore our first hypothesis. Goodwill is significant and positive as expected (0.030 with t-statistic = 14.49). Both performance proxies, the change in operating cash flows (-0.023 with t-statistic = -6.70) and the return on assets (-0.019 with t-statistic = -7.66), are negative and significant while the dichotomous stock performance variable is positive and significant (0.005 with t-statistic = 8.97). These results are in accordance with our predictions. A higher book to market ratio (0.009 with t-statistic = 11.42) leads to more goodwill impairment but leverage does not impact goodwill impairment (-0.001 with t-statistic = -0.42). The coefficient for GDP growth is negative and significant (-0.001 with t-statistic = -9.14) while the coefficient for firm-level uncertainty using the volatility of sales is positive (0.035 with t-statistic = 4.30). The control variables are generally significant and of the expected signs. Column 4 of the table shows the result for a probit estimation of the model. For this column, the dependant variable is a dummy variable taking 1 when firms impair goodwill, and 0 otherwise. The positive coefficient of EPU (0.330 with t-statistic = 9.76) suggests that uncertainty also impacts the decision to impair goodwill.

Table 37: Pearson correlation matrix

Variables	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*
(1) IMP_{iT}	1.000									
(2) EPU_T	0.055***	1.000								
(3) $GW_{i(T-1)}$	0.129***	-0.001	1.000							
(4) ΔOCF_{iT}	-0.044***	-0.015**	0.016**	1.000						
(5) $ROA_{i(T-1)}$	-0.104***	-0.025***	0.036***	-0.038***	1.000					
(6) $RET_{i(T-1)}$	0.103***	0.091***	-0.045***	0.008	-0.105***	1.000				
(7) $BTM_{i(T-1)}$	0.141***	0.067***	-0.019***	-0.036***	-0.007	0.178***	1.000			
(8) LEV_{iT}	-0.016***	0.071***	0.110***	-0.012**	-0.019***	-0.024***	-0.238***	1.000		
(9) $RGDP_T$	-0.086***	0.000	-0.017**	-0.038***	0.023***	-0.137***	-0.045***	0.004	1.000	
(10) $SDSALES_{iT}$	0.039***	-0.016*	-0.105***	0.032***	-0.104***	-0.003	-0.007	0.052***	-0.035***	1.000

The Table above shows the Pearson correlation coefficients.
*, ** and *** denote significance at pvalue≤10%, ≤5% and ≤1% respectively

Table 38: Regression results for hypothesis 1

	(1)		*(2)*		*(3)*		*(4) : probit*	
	Coefficient	T-statistic	Coefficient	T-statistic	Coefficient	T-statistic	Coefficient	T-statistic
EPU_T	0.0061	9.12***	0.004	5.98***	0.005	7.38***	0.330	9.76***
$GW_{i(T-1)}$			0.026	21.75***	0.030	14.49***	0.436	6.39***
ΔOCF_{iT}			-0.023	-7.97***	-0.023	-6.70***	-1.208	-8.84***
$ROA_{i(T-1)}$			-0.020	-13.43***	-0.019	-7.66***	-0.505	-6.01***
$RET_{i(T-1)}$			0.005	10.51***	0.005	8.97***	0.232	9.54***
$BTM_{i(T-1)}$			0.009	18.95***	0.009	11.42***	0.487	11.47***
LEV_{iT}			-0.001	-0.73	-0.001	-0.42	0.359	6.25***
$RGDP_T$			-0.001	-10.28***	-0.001	-9.14***	-.0055	-8.43***
$SDSALES_{iT}$			0.038	6.20***	0.035	4.30***	0.869	2.46**
Constant	-0.022	-6.69***	-0.025	-7.30***	-0.026	-8.87***	-3.214	-19.75***
Industry FE	No		No		Yes		No	
Cluster by firm	No		No		Yes		Yes	
Cluster by year	No		No		Yes		No	
Adjusted R2	0.3%		6.62%		7.17%			
Pseudo R2							6.46%	

*, ** and *** denote significance at pvalue≤10%, ≤5% and ≤1% respectively.
Column 1 presents the results for the regression of goodwill impairment on EPU. Columns 2 present results for the regression of goodwill impairment on EPU and other dependant variables. Column 3 presents the same regression but includes industry fixed effects and standard errors are clustered at the firm and year levels. Column 4 presents a probit estimation of the model. For this column, the dependant variable is a dummy variable taking 1 when firms impair goodwill, and 0 otherwise.

Baker et al (2016) use the news component of EPU (EPU_NEWS) as their primary measure of economic policy uncertainty. Therefore, we estimate equation 1 with EPU_NEWS as the measure of uncertainty instead of the aggregate EPU. Baker et al. (2016) also develop a range of sub-indexes based solely on news data. Each sub-index requires the economic, uncertainty, and policy terms as well as a set of categorical policy terms. Since the impairment test requires the use of discount rates, we suspect monetary policy uncertainty, specifically uncertainty related to interest rates, to impact discount rates and therefore impact reported goodwill impairment. To obtain a measure of monetary policy uncertainty, the additional criteria involve the presence of one or more of these category-relevant terms: ‘‘the Fed,’’ ‘‘central bank,’’ ‘‘interest rate,’’ ‘‘inflation,’’. Table 39 presents the result of equation 1 with the news based index (EPU_NEWS) in column 1 and monetary policy uncertainty (MPU) in column 2 as our proxies for uncertainty. In column 1, the coefficient for the news based index is positive and significant (0.004 with t-statistic = 7.44). In column 2, we also get a significant positive coefficient for the monetary uncertainty measure (0.007 with t-statistic = 10.80). Taken together, our results indicate that higher levels of EPU are associated with more goodwill impairment.

Table 39: Regression results using the news based uncertainty measure and the monetary uncertainty measure

	News based index as a measure of uncertainty (1)		*Monetary policy uncertainty as a measure of uncertainty (2)*	
	Coefficient	T-statistic	Coefficient	T-statistic
EPU_NEWS_T	0.004	7.44***		
MPU_T			0.007	10.80***
$GW_{i(T-1)}$	0.030	14.40***	0.030	14.46***
ΔOCF_{iT}	-0.023	-6.66***	-0.023	-6.65***
$ROA_{i(T-1)}$	-0.019	-7.62***	-0.019	-7.95***
$RET_{i(T-1)}$	0.005	8.90***	0.005	8.70***
$BTM_{i(T-1)}$	0.010	11.53***	0.009	11.47***
LEV_{iT}	-0.001	-1.18	-0.001	-0.65
$RGDP_T$	-0.002	-9.23***	-0.001	-6.95***
$SDSALES_{iT}$	0.036	4.43***	0.032	3.95***
Constant	-0.024	-9.07***	-0.036	-12.03***
Industry FE	Yes		Yes	
Cluster by firm	Yes		Yes	
Cluster by year	Yes		Yes	
Adjusted R2	7.18%		7.52%	

*, ** and *** denote significance at pvalue≤10%, ≤5% and ≤1% respectively. Column 1 presents the results for the regression of goodwill impairment on the news based index of EPU. Column 2 presents results for the regression of goodwill impairment on monetary policy uncertainty. Both regressions include industry fixed effects and standard errors are clustered at the firm and years levels.

4.3. Regression results for hypothesis 2

We present the estimation results of equation 2 in Table 41 below. With this second equation we examine whether the presence of an overconfident CEO changes the relation between EPU and goodwill impairment. Considerable evidence in social psychology literature suggests that people have overly positive self-evaluations (the better-than-average effect), exaggerated perception of control, and unrealistic optimism about the future. The social psychology literature also suggests that overconfident people suffer from the so-called interpretational bias: negative feedback is more likely to be perceived as inaccurate or uninformative than positive feedback. As a result, negative feedback is often explained away or ignored. Previous literature demonstrates that overconfident executives report less conservatively and make overly optimistic predictions. In periods of high uncertainty, overconfident CEOs can make optimistic cash flow predictions which will reduce the likelihood of impairment. Since executive and stock option data is not available for our entire sample, we run the regression on a subsample of 14 304 firms-years for which we could obtain the necessary data. Column 1 of table 41 below presents the results of our second regression model which includes

the overconfidence measure and the interaction term between uncertainty and overconfidence. The coefficient for H67 is significant and positive (0.015 with t-statistic = 2.17) while the coefficient for the interaction term between H67 and EPU is negative and significant (-0.004 with t-statistic = -2.67). To fully comprehend the impact of CEO overconfidence on goodwill impairment in the presence of uncertainty, we compute the different values of goodwill impairment depending on the value of EPU, the value of H67 and the value of the interaction term. H67 can only take the values of 1 or 0. EPU ranges from 4.25 (p1) to 5.49 (p99) as seen in the distribution below:

Table 40: EPU distribution

Variable	p1	p5	p10	p25	p50	p75	p90	p95	p99
EPU	4.2556	4.2673	4.2793	4.5331	4.7136	4.9694	5.1343	5.1735	5.493

According to our regression results, the value of goodwill impairment can be determined with the equation below:

$$IMP = 0.006 \times EPU + 0.015 \times H67 - 0.004 \times EPU \times H67$$

Table 42 below presents the different values of goodwill impairment depending on the level of EPU and on the overconfidence of the CEO. The results indicate that goodwill impairment is always smaller for firms with overconfidence CEOs. The results indicate that CEO's overconfidence mitigates the effect of uncertainty on goodwill impairment. Firms with overconfident CEOs tend to impair less goodwill than their counterparts while facing uncertainty. Column 2, 3 and 4 of table 41 also test the effect CEO overconfidence has on the relationship between goodwill impairment and uncertainty but this time including a performance measure[43]. The result in column 1 table 41 show that overconfident CEOs report less goodwill impairment than other CEOs in times of uncertainty. We test whether this mitigating effect persists even when a firm is facing high uncertainty and exhibiting low performance. The negative and significant coefficient of the three interaction term between EPU, overconfidence and low return on asset in column 2 (-0.001 with t-statistic = -3.42) shows that CEO overconfidence mitigates the effect of uncertainty on goodwill impairment even when firm's

[43] The performance measures used are respectively: a dichotomous variable taking 1 if a firm exhibits lower ROA than its industry-year median (Low_ROA), a dichotomous variable taking 1 if a firm exhibits lower sales than its industry-year median (Low_SALES), and negative stock returns.

performance (in this case a lower ROA than its industry-year median) is low. This result is robust to different measures of low performance: lower sales than the industry-year median in column 3 and negative stock returns in column 4.

Table 41: Regression results for the overconfidence aspect (hypothesis 2)

	(1)		*Measure of bad performance= ROA (2)*		*Measure of bad performance = SALES (3)*		*Measure of bad performance = Stock returns (4)*	
	Coefficient	T-statistic	Coefficient	T-statistic	Coefficient	T-statistic	Coefficient	T-statistic
EPU_T	0.006	5.04***	0.004	6.16***	0.004	6.04***	0.004	5.82***
$GW_{i(T-1)}$	0.020	8.55***	0.020	8.49***	0.020	8.45***	0.020	8.54***
$H67_{iT}$	0.015	2.17**	-0.002	-2.84***	-0.002	-2.99***	-0.003	-4.40***
$EPU_T \times H67_{iT}$	-0.004	-2.67***						
$EPU_T \times H67_{iT} \times BAD\_PERF_{i(T-1)}$			-0.001	-3.42***	-0.001	-2.54**	-0.001	-1.91*
$BAD\_PERF_{i(T-1)}(Low\_ROA)$			0.006	5.36***				
$BAD\_PERF_{i(T-1)}(Low\_SALES)$					0.003	3.55***		
$BAD\_PERF_{i(T-1)}(RET)$							0.005	4.69***
ΔOCF_{iT}	-0.028	-6.40***	-0.028	-6.39***	-0.029	-6.39***	-0.029	-6.40***
$ROA_{i(T-1)}$	-0.011	-3.26***			-0.009	-2.88***	-0.010	-3.18***
$RET_{i(T-1)}$	0.004	5.74***	0.004	5.75***	0.004	5.77***		
$BTM_{i(T-1)}$	0.010	9.28***	0.009	9.12***	0.009	9.25***	0.010	9.30***
LEV_{iT}	-0.000	-0.070	-0.000	-0.270	-0.000	-0.26	-0.000	-0.11
$RGDP_T$	-0.001	-6.66***	-0.001	-6.87***	-0.001	-6.69***	-0.001	-6.81***
$SDSALES_{iT}$	0.043	3.90***	0.043	3.88***	0.051	4.47***	0.044	3.92***
Constant	-0.031	-5.37***	-0.025	-7.32***	-0.024	-6.97***	-0.022	-6.44***
Industry FE	Yes		Yes		Yes		Yes	
Cluster by firm	Yes		Yes		Yes		Yes	
Cluster by year	Yes		Yes		Yes		Yes	
Adjusted R2	6.64%		6.87%		6.73%		6.65%	

*, ** and *** denote significance at pvalue≤10%, ≤5% and ≤1% respectively.

Column 1 presents the results for the regression of goodwill impairment on EPU and a measure of CEO overconfidence (H67) and an interaction term between the uncertainty and overconfidence measures. Column 2 presents a similar regression but includes a three way interaction term between uncertainty, overconfidence and an indicator of bad performance. In column 2 the indicator of bad performance is a dummy variable indicating the firms exhibiting low ROA in comparison to its industry. Column 3 and 4 present the same regressions as column 2 but use low sales and low stock returns respectively as measures of bad performance. All regressions include industry fixed effects and standard errors are clustered at the firm and year levels.

Table 42: Value of goodwill impairment depending on the values of EPU and H67

	EPU	H67	EPUxH67	Impairment value	IMP (when H67=1) minus IMP (when H67=0)
For P99 values of EPU	5.493	1	5.493	0.0260	-0.0070
		0	0	0.0330	
For P95 values of EPU	5.735	1	5.735	0.0265	-0.0079
		0	0	0.0344	
For P90 values of EPU	5.134	1	5.134	0.0253	-0.0055
		0	0	0.0308	
For P75 values of EPU	4.969	1	4.969	0.0249	-0.0049
		0	0	0.0298	
For P50 values of EPU	4.714	1	4.714	0.0244	-0.0039
		0	0	0.0283	
For P25 values of EPU	4.533	1	4.533	0.0241	-0.0031
		0	0	0.0272	
For P10 values of EPU	4.2793	1	4.2793	0.0236	-0.0021
		0	0	0.0257	
For P5 values of EPU	4.2673	1	4.2673	0.0235	-0.0021
		0	0	0.0256	
For P1 values of EPU	4.2556	1	4.2556	0.0235	-0.0020
		0	0	0.0255	

5. Robustness tests

5.1. Different mean computations of EPU

The EPU index is originally a monthly variable that we transformed into an annual measure by using the natural logarithm of the average of twelve months. We suspect that this procedure might have smoothed out any important changes in uncertainty that occurred in specific months but were not reflected in the annual mean. We also suspect that the uncertainty occurring at the beginning of the fiscal year might not impact goodwill impairment since the testing process generally occurs at fiscal year end. Therefore, we test three other different transformations of the monthly EPU Index. First, we compute a new variable *EPU_Month* which is the natural logarithm of the EPU Index of the specific month in which the firm closes its fiscal year. Second, we compute *EPU_Quarter* which is the natural logarithm of the mean of the last quarter before fiscal year end. Finally, we compute *EPU_Window* which is the natural logarithm of the mean of 7 months: [fiscal year end month + 3 months prior + 3 months later]. We chose to expand the window three months after the fiscal year end since it is possible for some

firm to operate the impairment testing process after the fiscal year end. Tables 43 44 and 45 report the results of the regressions with the alternative measures. The coefficients for EPU_Month, EPU_Quarter and EPU_Window are respectively are all positive and significant coefficients at 1%. The three different computations of EPU all exhibit results similar to the annual mean used earlier in the chapter. We also test the different mean computations of EPU with the overconfidence aspect and our results remain unchanged.

Table 43: Regression results with EPU_Month

	(1)		*(2)*		*(3)*	
	Coefficient	T-statistic	Coefficient	T-statistic	Coefficient	T-statistic
EPU_Month_T	0.006	10.29***	0.008	6.87***	0.006	8.22***
$GW_{i(T-1)}$	0.030	14.43***	0.020	8.47***	0.020	8.36***
$H67_{iT}$			0.019	2.97***	-0.002	-2.89***
$EPU\_Month_T \times H67_{iT}$			-0.005	-3.44***		
$EPU\_Month_T \times H67_{iT} \times BAD\_PERF_{i(T-1)}$					-0.001	-2.53**
$BAD\_PERF_{i(T-1)}$					0.004	3.58***
ΔOCF_{iT}	-0.023	-6.71***	-0.029	-6.42***	-0.029	-6.42***
$ROA_{i(T-1)}$	-0.019	-7.68***	-0.011	-3.32***	-0.009	-2.90***
$RET_{i(T-1)}$	0.005	9.04***	0.004	5.81***	0.004	5.83***
$BTM_{i(T-1)}$	0.009	11.41***	0.009	9.26***	0.009	9.24***
LEV_{iT}	-0.001	-1.02	-0.000	-0.21	-0.001	-0.40
$RGDP_T$	-0.002	-9.54***	-0.001	-7.00***	-0.001	-7.05***
$SDSALES_{iT}$	0.035	4.26***	0.043	3.89***	0.050	4.46***
Constant	-0.034	-11.69***	-0.041	-7.16***	-0.031	-8.79***
Industry FE	Yes		Yes		Yes	
Cluster by firm	Yes		Yes		Yes	
Cluster by year	Yes		Yes		Yes	
Adjusted R2	7.37%		6.91%		6.97%	

*, ** and *** denote significance at pvalue≤10%, ≤5% and ≤1% respectively.
Column 1 presents the results for the regression of goodwill impairment on EPU_Month, which is the natural logarithm of the EPU Index of the specific month in which the firm closes its fiscal year. Column 2 presents the results for the regression of goodwill impairment on EPU_Month and includes (H67), the CEO overconfidence measure as well as the interaction term between the EPU_Month and H67. Column 3 presents a similar regression but includes a three way interaction term between EPU_Month, H67 and an indicator of bad performance: low sales. All regressions include industry fixed effects and standard errors are clustered at the firm and year levels.

Table 44: Regression results with EPU_Quarter

	(1)		*(2)*		*(3)*	
	Coefficient	T-statistic	Coefficient	T-statistic	Coefficient	T-statistic
$EPU\_Quarter_t$	0.007	10.78***	0.009	7.09***	0.006	8.45***
$GW_{i(T-1)}$	0.030	14.46***	0.020	8.48***	0.020	8.39***
$H67_{iT}$			0.023	3.24***	-0.002	-2.95***
$EPU\_Quarter_T \times H67_{iT}$			-0.005	-3.64***		
$EPU\_Quarter_T \times H67_{iT} \times BAD\_PERF_{i(T-1)}$					-0.001	-2.53**
$BAD\_PERF_{i(T-1)}$					0.004	3.55***
ΔOCF_{iT}	-0.023	-6.64***	-0.028	-6.34***	-0.028	-6.33***
$ROA_{i(T-1)}$	-0.019	-7.67***	-0.011	-3.32***	-0.010	-2.91***
$RET_{i(T-1)}$	0.005	9.06***	0.004	5.83***	0.004	5.84***
$BTM_{i(T-1)}$	0.009	11.33***	0.009	9.19***	0.009	9.18***
LEV_{iT}	-0.001	-1.09	0.001	-0.25	-0.001	-0.42
$RGDP_T$	-0.002	-9.18***	0.000	-6.76***	-0.001	-6.83***
$SDSALES_{iT}$	0.035	4.26***	0.042	3.83***	0.050	4.41***
Constant	-0.037	-12.08***	-0.045	-7.40***	-0.034	-9.06***
Industry FE	Yes		Yes		Yes	
Cluster by firm	Yes		Yes		Yes	
Cluster by year	Yes		Yes		Yes	
Adjusted R2	7.43%		7.00%		7.04%	

*, ** and *** denote significance at pvalue≤10%, ≤5% and ≤1% respectively.
Column 1 presents the results for the regression of goodwill impairment on EPU_Quarter, which is the natural logarithm of the mean of the last quarter before fiscal year end. Column 2 presents the results for the regression of goodwill impairment on EPU_Quarter and includes (H67), the CEO overconfidence measure as well as the interaction term between the EPU_Quarter and H67. Column 3 presents a similar regression but includes a three way interaction term between EPU_Quarter, H67 and an indicator of bad performance: low sales. All regressions include industry fixed effects and standard errors are clustered at the firm and year levels.

Table 45: Regression results with EPU_Window

	(1)		*(2)*		*(3)*	
	Coefficient	T-statistic	Coefficient	T-statistic	Coefficient	T-statistic
EPU_Window_T	0.008	11.63***	0.010	7.15***	0.007	8.61***
$GW_{i(T-1)}$	0.030	14.45***	0.020	8.48***	0.020	8.38***
$H67_{iT}$			0.025	3.13***	-0.002	-2.93***
$EPU\_Window_T \times H67_{iT}$			-0.006	-3.49***		
$EPU\_Window_T \times H67_{iT} \times BAD\_PERF_{i(T-1)}$					-0.001	-2.52**
$BAD\_PERF_{i(T-1)}$					0.003	3.54***
ΔOCF_{iT}	-0.023	-6.62***	-0.028	-6.34***	-0.028	-6.31***
$ROA_{i(T-1)}$	-0.019	-7.67***	-0.011	-3.32***	-0.010	-2.92***
$RET_{i(T-1)}$	0.005	8.82***	0.004	5.66***	0.004	5.67***
$BTM_{i(T-1)}$	0.009	11.28***	0.009	9.18***	0.009	9.17***
LEV_{iT}	-0.001	-1.32	-0.000	-0.38	-0.001	-0.56
$RGDP_T$	-0.002	-9.22***	-0.001	-6.76***	-0.001	-6.80***
$SDSALES_{iT}$	0.035	4.25***	0.042	3.83***	0.050	4.39***
Constant	-0.044	-12.81***	-0.051	-7.44***	-0.038	-9.11***
Industry FE	Yes		Yes		Yes	
Cluster by firm	Yes		Yes		Yes	
Cluster by year	Yes		Yes		Yes	
Adjusted R2	7.53%		7.06%		7.09%	

*, ** and *** denote significance at pvalue≤10%, ≤5% and ≤1% respectively.
Column 1 presents the results for the regression of goodwill impairment on EPU_Window, which is the natural logarithm of a 7 months mean EPU (EPU_Window): [fiscal year end month + 3 months prior + 3 months later].. Column 2 presents the results for the regression of goodwill impairment on EPU_Window and includes (H67), the CEO overconfidence measure as well as the interaction term between the EPU_Window and H67. Column 3 presents a similar regression but includes a three way interaction term between EPU_Window, H67 and an indicator of bad performance: low sales. All regressions include industry fixed effects and standard errors are clustered at the firm and year levels.

5.2. Using the VIX index as a measure of uncertainty

Our second robustness test consists of using a different measure of uncertainty. Following Dhole (2021), we extend our analyses to other forms of macroeconomic uncertainty used in prior research. In order to provide further evidence on the impact of uncertainty on goodwill impairment, we replace EPU with a stock market uncertainty measure. Specifically, we use the Chicago Board Options Exchange (CBOE) Volatility Index (VIX), which is an index of 30-day option-implied volatility in the S&P 500 Index. We download monthly VIX indexes from Yahoo! Finance[44] and compute the natural logarithm of the mean of the VIX index of the twelve months before fiscal year end. Table 46 reports the results of our regression models using the VIX index instead of EPU as our measure of uncertainty. All the other variables used in the regressions are similar to our prior analysis expect for the GDP index where we replace RGDP (residual value of the regression of GDP growth on EPU) by RVGDP (residual value of the regression of GDP growth on the VIX). In column 1 of the table, we observe that the coefficient for VIX is positive and significant (0.001 with t-statistic = 14.43) suggesting that uncertainty leads to more goodwill impairment. This first result is coherent with our previous findings using the EPU measure and provides additional support for hypothesis 1. Column 2 and 3 provide additional support to our second hypothesis. The coefficient for the interaction term between VIX and overconfidence in column 2 (-0.001 with t-statistic = -4.23), confirms that CEO overconfidence mitigates the effect of uncertainty on reported goodwill impairment. The coefficient for the interaction term between VIX, overconfidence and our indicator of bad performance (low sales) in column 3 (-0.0002 with t-statistic = -2.05) suggests that CEO overconfidence mitigates the effect of uncertainty on goodwill impairment even when firm's performance is low. Taken together, these results based on VIX index corroborate our previous findings using EPU.

[44] https://fr.finance.yahoo.com/quote/%5EVIX/history?p=^VIX

Table 46: Regression results using the VIX index as a proxy for uncertainty

	(1)		*(2)*		*(3)*	
	Coefficient	T-statistic	Coefficient	T-statistic	Coefficient	T-statistic
VIX_T	0.001	14.43***	0.001	8.33***	0.001	10.24***
$GW_{i(T-1)}$	0.030	14.76***	0.021	8.78***	0.021	8.68***
$H67_{iT}$			0.006	2.96***	-0.002	-3.67***
$VIX_T \times H67_{iT}$			-0.001	-4.23***		
$VIX_T \times H67_{iT} \times BAD\_PERF_{i(T-1)}$					-0.0002	-2.05**
$BAD\_PERF_{i(T-1)}$					0.003	3.32***
ΔOCF_{iT}	-0.022	-6.35***	-0.026	-5.93***	-0.026	-5.91***
$ROA_{i(T-1)}$	-0.019	-7.95***	-0.010	-3.18***	-0.009	-2.87***
$RET_{i(T-1)}$	0.005	9.30***	0.004	6.14***	0.004	5.98***
$BTM_{i(T-1)}$	0.009	11.11***	0.009	8.95***	0.009	9.00***
LEV_{iT}	0.001	0.63	0.001	1.01	0.001	0.96
$RGDP_T$	0.001	6.34***	0.001	5.35***	0.001	5.16***
$SDSALES_{iT}$	0.030	3.71***	0.037	3.37***	0.043	3.87***
Constant	-0.017	-15.30***	-0.018	-8.71***	-0.015	-9.58***
Industry FE	Yes		Yes		Yes	
Cluster by firm	Yes		Yes		Yes	
Cluster by year	Yes		Yes		Yes	
Adjusted R2	8.41%		8.31%		8.08%	

*, ** and *** denote significance at pvalue≤10%, ≤5% and ≤1% respectively.
Column 1 presents the results for the regression of goodwill impairment on the VIX index, an alternative measure of uncertainty. Column 2 presents the results of the regression of goodwill impairment on the VIX index and includes (H67), the CEO overconfidence measure as well as the interaction term between the VIX and H67. Column 3 presents a similar regression but includes a three way interaction term between VIX, H67 and an indicator of bad performance: low sales. All regressions include industry fixed effects and standard errors are clustered at the firm and year levels.

6. Conclusion

In this study, we investigate the relationship between economic policy uncertainty and goodwill impairment. Specifically, we test if firms report more goodwill impairment when facing high uncertainty and we test if the same pattern is observable for firms with overconfident CEOs. Our sample consists of 29 740 firm-years of U.S. listed firms from 2003 to 2020 and our measure of uncertainty is the economic policy uncertainty index developed by Baker et al. (2016).

Our results confirm our hypothesis that firms facing high levels of uncertainty report more goodwill impairment, but they also demonstrate that this effect is mitigated when the CEO of the firm is classified as overconfident. This mitigating effect persists even when firms are exhibiting low economic performance. These results are consistent with prior literature suggesting that in general, uncertainty increases accounting conservatism, while overconfidence leads to less conservative reporting, even in periods of high uncertainty. Our results are robust to a battery of tests. First, we test a different method of transforming the monthly EPU index to an annual measure and we get similar results. Second, we use a different measure of uncertainty, namely the VIX index, and our results remain unchanged.

This paper contributes to the ongoing research on the financial implications of EPU for companies and establishes a robust association between economic policy uncertainty and goodwill impairment. It has implications for regulators as it demonstrates that financial reporting standards are directly impacted by economic policy uncertainty. It can also interest investors and shareholders given that accounting numbers convey important information about companies' overall health and future expectations.

7. References

Alfaro, I., Bloom, N., Lin, X., (2018). The Finance Uncertainty Multiplier. *National Bureau of Economic Research.*

AbuGhazaleh, N., Al-Hares, O., and Roberts, C., (2011), Accounting Discretion in Goodwill Impairments: UK Evidence. *Journal of International Financial Management & Accounting,* 22(3), 165-204.

Ahmed, A. S., Duellman, S., (2013). Managerial overconfidence and accounting conservatism. *Journal of Accounting Research,* 51 (1), 1–30.

Baker S. R., Bloom N. and Davis j. S., (2016), Measuring Economic Policy Uncertainty. *The Quarterly Journal of Economics*, 131 (4), 1593–1636.

Campbell, T., M. Gallmeyer, S. Johnson, J. Rutherford, and B. Stanley. (2011), CEO optimism and forced turnover. *Journal of Financial Economics,* 101 (3), 695–712.

Chung, B., H., Hribar, P., (2021). CEO overconfidence and the timeliness of goodwill impairments. *The Accounting Review*, 96 (3), 221-259.

Dai, L., Ngo, P., (2020). Political uncertainty and accounting conservatism. *European Accounting Review*, 30(2), 1–32.

Dhole S., Liu L., Lobo J. G. , Mishra S., (2021). Economic policy uncertainty and financial statement comparability. *Journal of accounting and public policy*, 40(1), 1-21.

Francis, J. Hanna, J. and Vincent L. (1996), Causes and Effects of Discretionary Asset Write-Offs, *Journal of Accounting Research*, 34 (SUPP), 117–134.

Goodman, T. H., M. Neamtiu, N. Shroff, and H. D. White. (2014). Management forecast quality and capital investment decisions. The Accounting Review, 89 (1), 331–365.

Gulen H., Ion M., (2016). Policy Uncertainty and Corporate Investment. The Review of Financial Studie, 29 (3), 523-564.

Jin J. Y., Kanagaretnam K., Liu Y., Lobo G. J., (2019) Economic policy uncertainty and bank earnings opacity. *Journal of accounting and public policy*, 38, 199-218.

Johnston J. A., Sun L., Zhang J. H., (2018), Environmental Uncertainty, Managerial Ability, Goodwill Impairment, and Earnings Management. *Journal of Forensic & Investigative Accounting*, 10 (3), 392-421.

Kim, J.B., Wang, Z., Zhang, L., (2016). CEO overconfidence and stock price crash risk. *Contemporary Accounting research*, 33(4), 1720-1749.

Malmendier, U., Tate, G., (2005). CEO overconfidence and corporate investment. *Journal of Finance*, 60 (6), 2661-2700.

Nguyen, N.H., Phan, H.V., (2017). Policy uncertainty and mergers and acquisitions. *Journal of Financial and Quantitative Analysis*, 52 (2), 613–644.

Ramanna, K. Watts, R. L. (2012), Evidence on the Use of Unverifiable Estimates in Required Goodwill Impairment. *Review of Accounting Studies*, 17 (4), 749-780.

Riedl, E.J., (2004). An Examination of Long-Lived Asset Impairments. *The Accounting Review*. Vol. 79 (3), 823–852.

Roll, R., (1986). The Hubris Hypothesis of Corporate Takeovers. *The Journal of Business,* 59 (2), 197-216.

STATEMENT of financial accounting standards NO. 142: GOODWILL AND OTHER INTANGIBLE ASSETS (2001), Financial Accounting Standards board

Stein L. C.D., Wang C. C.Y., (2016). Economic uncertainty and earnings management. Working paper, Harvard Business school.

Vanza S., Wells P., Wright A., (2018). Do asset impairments and the associated disclosures resolve uncertainty about future returns and reduce information asymmetry? *Journal of Contemporary Accounting & Economics*, 14 (1), 22–40.

Yung K., Root A., (2019). Policy uncertainty and earnings management: International evidence. *Journal of Business Research*, 100, 255–267.

Watts, R. L. (2003a), Conservatism in accounting part I: Explanations and implications, *Accounting Horizons*, 17 (3), 207-221.

Zang, Y. (2008). Discretionary behavior with respect to the adoption of SFAS no, 142 and the behavior of security prices, *Review of Accounting and Finance*, 7 (1), 38-68.

General conclusion

This dissertation addresses the complexities introduced by the accounting treatment of goodwill. We focus specifically on the impairment testing process, which is associated to important discretion. In 2001, the Financial Accounting Standards Board introduced significant change for the accounting of goodwill by issuing ASC 350, formerly SFAS 142: Goodwill and Other Intangible Assets. Previous standards presumed that goodwill and all other intangible assets were wasting assets (that is, finite lived), and thus the amounts assigned to them should be amortized. The amortization technique is undoubtedly very simple, but it is a poor reflection of the economic reality. With ASC 350, goodwill is now impaired based on a comparison of a fair-value estimate of goodwill with its book value. According to the FASB, the changes included in the statement will improve financial reporting because the financial statements of entities that acquire goodwill and other intangible assets will better reflect the underlying economics of those assets. Nevertheless, the difficulty to estimate goodwill through impairment tests raises concerns about the efficiency of the new method.

This thesis contains three essays on three different questions regarding the accounting of goodwill and goodwill impairment. The introduction of the dissertation contains a review of literature concerning the empirical research on goodwill accounting. This helps the reader to categorize the subsequently presented research papers, to evaluate the research papers' contributions, and to gain an overview of the various research streams. Before presenting the three research papers, a prelude is provided. It is primarily a descriptive analysis of goodwill and goodwill impairment data used throughout the different chapters. The three research papers are presented after the descriptive chapter.

The first essay (chapter 1) explores the matter of future cash flow prediction. Specifically, we investigate the impacts of goodwill and its impairment on cash flow prediction. Since goodwill is associated with high information asymmetry and opacity, we first argue that firms with important amounts of goodwill are associated with lower cash flow predictability. Second, we argue that goodwill impairment can increase cash flow predictability. The discretion in goodwill impairment is an opportunity for managers to exercise accounting judgment and convey their private information therefore improving future cash flow prediction. Our results indicate that goodwill decreases the predictability of cash flows while goodwill impairment increases it. Our

results indicate that goodwill impairment, in addition to increasing predictability, results in higher future cash flows.

In the second essay (chapter 2), we argue that goodwill can be positively associated with stock price crash risk. Goodwill is subject to important discretion in its accounting, which creates important information asymmetry between managers and investors and can lead to stock price crash risk. Our results also show that it is the magnitude of goodwill that influences stock price crash risk, not its presence in the balance sheet. We also document that firms who report frequent goodwill impairments decrease their stock price crash risk. This additional finding is coherent with recent literature linking stock price crash risk to financial reporting transparency. In additional analyses, we demonstrate that the positive relation between goodwill magnitude and stock price crash risk only holds for firms with higher goodwill values (goodwill higher than the industry-year fourth quartile). Finally, we demonstrate that other intangible assets do not necessarily drive stock price crash risk upwards.

In the third essay (chapter 3), we test if firms report more goodwill impairment in periods of high uncertainty, and then we examine whether the same pattern is observable for firms with overconfident CEOs. Prior research on the topic suggests that overconfident CEOs tend to be overoptimistic about uncertain outcomes and believe they have greater control over uncertain events. Our results show that there is more goodwill impairment in periods of high uncertainty. Second, we examine if firms with overconfident CEOs also exhibit higher impairments in periods of high uncertainty. We find that in periods of high uncertainty, firms with overconfident CEOs report smaller goodwill impairments compared to other firms, even when the firm's economic performance is low.

The dissertation is thought of as a global analysis on goodwill and its impairment on different scales. The first chapter focuses on the firm's side (micro scale). The second chapter investigates the relation to the stock market (mezzo scale) and the third chapter examines the association with the general environment of the firm (macro scale). Taken together, the results of our research present several contributions. Goodwill impairment can be an effective mechanism. In most of our analyses we find strong associations between performance attributes of the firm and goodwill impairment. However, due to

the discretion in the testing process, goodwill impairment can be easily affected by many factors, whether internal or external to the firm. The impact of these different factors does not automatically lead to opportunistic impairments. We found strong evidence suggesting firms report higher impairment when facing uncertainty. This is a rightful application of ASC 350 recommendations. Environmental uncertainty generally leads to uncertain outcomes for firms and thus presents a strong motive for goodwill impairment. Managers are recording these impairments when facing uncertainty to provide relevant information to financial statement users. Our results also indicate that the discretion in impairment testing allows managers to convey their private information credibly to stakeholders as the prediction of future cash flows is improved with goodwill impairment. The only difference between the precepts of ASC 350 and the reality of firms is that goodwill impairment seems to occur after several years of profitability decrease, instead of being recognized to indicate a future decline in profitability. Nevertheless, there are factors that can lead to opportunistic behaviors regarding goodwill impairment. While we found that most firms report higher amounts of goodwill impairment when facing uncertainty, firms with overconfident CEOs do not follow the same pattern. In periods of uncertainty, overconfident CEOs report smaller impairments compared to their counterparts even if the firm is underperforming economically. However, the stock market balances out the opportunistic behavior around goodwill impairment. Our results indicate that firms with high magnitudes of goodwill in the balance sheet face greater stock price crash risk, but if these firms report frequent goodwill impairments, their crash risk reduces.

This dissertation contributes to the academic literature in a number of ways. Broadly, the thesis contributes to the literature investigating the efficiency of a specific fair value oriented standard: goodwill impairment. Moreover, it adds to other different streams of literature. Our findings contribute to the ongoing and fundamental issue of accounting which is cash flow prediction. It also presents new arguments for the literature on the impact of companies' environment on financial reporting and corporate decision making. It relates to the literature of behavioral corporate finance that examines the impact of managerial psychological traits, such as overconfidence, on various corporate policies and outcomes. Finally, it contributes to the literature on stock price crash risk and its association to financial reporting transparency.

This thesis is not without limitations. First, the timing of goodwill impairment is assumed to be at the end of the reporting period. This simplification is unlikely to be universally valid. Second, our environmental uncertainty measure is a general measure for all firms. We tackle this issue econometrically by including industry fixed effects and clustering at firm and year levels. However, some type of uncertainty can be beneficial to some firms while being detrimental to others. Uncertainty emerging from wars can be detrimental to many firms but can benefit defense firms and weapon manufacturers. Third, when we investigate the effect of executives' overconfidence on goodwill impairment, we focus only on the CEO. It could be interesting to look at other managers participating in these decisions. Finally, we study performance attributes and general characteristics of the firms to assess its need to impair goodwill. However, goodwill is assigned to specific cash generating units, which data we do not have access to. A CGU can be underperforming while the firm is outperforming. The proxies therefore used to assess goodwill impairment are macro proxies of the firm. The dissertation also presents some methodological limitations such as endogeneity problems. Additional analyses could be conducted to assess to which extent these issues impact the different results. Finally, the dissertation is solely based on quantitative analyses which leave out several qualitative aspects of the impairment process.

There are many potential avenues for further research relating to the theme of this thesis. First, an in-depth research on goodwill impairment can be conducted where a specific impairment is linked to its acquisitions to investigate the impairment behavior of successful and unsuccessful acquisitions. Another avenue is to consider the role of auditors. More precisely, to shed light on how they analyze companies' estimation of impairment losses. A different methodology can be mobilized and a qualitative case study on specific cash generating units can be conducted. Finally, a more theoretical research can be conducted on the recognition of internally generated goodwill.

List of abbreviations

ASC	:	Accounting Standards Codification
ASU	:	Accounting Standards Update
CEO	:	Chief Executive Officer
CGU	:	Cash Generating Unit
CRSP	:	Center of Research in Security Prices
EPU	:	Economic Policy Uncertainty
FASB	:	Financial Accounting Standards Board
GDP	:	Gross Domestic Product
IAS	:	International Accounting Standards
IASB	:	International Accounting Standards Board
IBES	:	Institutional Brokers' Estimate System
IFRS	:	International Financial Reporting Standards
M&A	:	Mergers and Acquisitions
SFAS	:	Statement of Financial Accounting Standards
U.S.	:	United States
US GAAP	:	United States Generally Accepted Accounting Principles
USD	:	United States Dollar

List of Tables

General introduction

Prelude: descriptive analysis

Chapter 1: The effect of goodwill and its impairment on cash flow prediction

List of Figures

General introduction

Prelude: descriptive analysis

Conferences

The different analyses constituting the chapters of this thesis were presented at the following conferences:

AFC 2019: 40th congress of the French accounting association doctoral colloquium, May 2019, Paris, France.

AFFI 2019: 36th edition of the international conference of the French finance association, June 2019, Québec city, Canada.

EUFIN 2019: 15th workshop « European Financial reporting », August 2019, Vienna, Austria.

EAA 2021: European Accounting Association Doctoral Colloquium, May 2021, Virtual colloquium.

AFC 2022: 43th congress of the French accounting association, May 2022, Bordeaux, France.

Comptabilisation des actifs incorporels : cas du goodwill

L'objet de cette thèse est d'évaluer l'impact des complexités introduites par le traitement comptable du goodwill. Plus spécifiquement, nous nous concentrons sur les tests de dépréciation qui sont associés à une discrétion importante. De nombreuses questions peuvent à cet égard être posées. Nous en retenons trois qui constituent les axes de réflexion de notre travail doctoral, et de fait, les matrices de nos trois essais. La thèse est pensée comme une analyse du goodwill et de sa dépréciation à différentes échelles. Le premier essai/chapitre place le curseur du côté de l'entreprise; il explore la question de la prévision des cash-flows futurs. Étant donné l'opacité et l'asymétrie d'information liées au goodwill, nous testons l'hypothèse que les entreprises ayant un goodwill important sont associées à une faible prédictibilité des cash-flows futurs. Nos résultats indiquent que le goodwill diminue la prédictibilité des cash-flows futurs tandis que la dépréciation du goodwill l'augmente. La discrétion en matière de dépréciation du goodwill est une opportunité pour les dirigeants d'exercer leur jugement comptable et de transmettre leurs informations privées, améliorant ainsi la prédictibilité des cash-flows futurs. Le deuxième chapitre se place du coté du marché financier; nous testons l'hypothèse que le goodwill peut être positivement associé au risque de chute du cours des actions. Nos résultats montrent que c'est l'ampleur du goodwill qui influence le risque de krach boursier, et non sa présence dans le bilan. Nous documentons également que les entreprises qui signalent des dépréciations fréquentes du goodwill réduisent leur risque de chute du cours des actions. Le troisième chapitre examine l'association avec l'environnement général de l'entreprise et teste si les entreprises déclarent plus de dépréciation du goodwill lorsqu'elles évoluent en environnement incertain. Nos résultats montrent qu'il y a plus de dépréciation du goodwill en période de forte incertitude mais ce résultat est atténué en présence d'un dirigeant qualifié de sur-confiant.

Mots clefs français : actifs incorporels, comptabilisation, goodwill, dépréciation

---

Accounting of intangible assets: case of goodwill

This dissertation addresses the complexities introduced by the accounting treatment of goodwill. We focus specifically on the impairment testing process, which is associated to important discretion. Many questions can be asked in this regard. We retain three that constitute the lines of reflection of our doctoral work, and the matrices of the three essays of the thesis. The dissertation is thought of as a global analysis on goodwill and its impairment on different scales. The first essay/chapter focuses on the firm's side; it explores the matter of future cash flow prediction. Specifically, we investigate the impacts of goodwill and its impairment on cash flow prediction. Since goodwill is associated with high information asymmetry and opacity, we first argue that firms with important amounts of goodwill are associated with lower cash flow predictability. Second, we argue that goodwill impairment can increase cash flow predictability. The discretion in goodwill impairment is an opportunity for managers to exercise accounting judgment and convey their private information therefore improving future cash flow prediction. Our results indicate that goodwill decreases the predictability of cash flows while goodwill impairment increases it. The second chapter investigates the relation to the stock market; we argue that goodwill can be positively associated with stock price crash risk. Our results also show that it is the magnitude of goodwill that influences stock price crash risk, not its presence in the balance sheet. We also document that firms who report frequent goodwill impairments decrease their stock price crash risk. The third chapter examines the association with the general environment of the firm and tests whether firms report more goodwill impairment in periods of high uncertainty. Our results show that there is more goodwill impairment in periods of high uncertainty but this result is mitigated in the presence of an overconfident CEO.

Keywords: intangible assets, accounting, goodwill, impairment

Unité de recherche/Research unit : *LUMEN, 02 rue de Mulhouse – 59024 Lille.*
Ecole doctorale/Doctoral school : *Ecole doctorale des sciences juridiques, politiques et de gestion, n° 74, 1 place Déliot, 59000 Lille, ecodoc.univ-lille2.fr,* http://edoctorale74.univ-lille2.fr
Université/University : *Université Lille, 42 rue Paul Duez, 59000 Lille,* http://www.univ-lille.fr