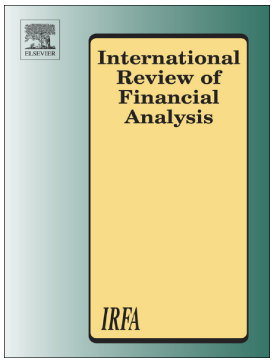

The impact of different goodwill accounting methods on stock prices: A comparison of amortization and impairment-only methodologies

Emanuel Bagna, Enrico Cotta Ramusino, Matteo Ogliari

PII: S1057-5219(22)00382-9

DOI: https://doi.org/10.1016/j.irfa.2022.102432

Reference: FINANA 102432

To appear in: *International Review of Financial Analysis*

Received date: 10 June 2022

Revised date: 30 September 2022

Accepted date: 14 November 2022

Please cite this article as: E. Bagna, E.C. Ramusino and M. Ogliari, The impact of different goodwill accounting methods on stock prices: A comparison of amortization and impairment-only methodologies, *International Review of Financial Analysis* (2022), https://doi.org/10.1016/j.irfa.2022.102432

The impact of different Goodwill accounting methods on stock prices: a comparison of amortization and impairment-only methodologies

Emanuel Bagna[1]*, Enrico Cotta Ramusino[1], Matteo Ogliari[2]

[1] Pavia University, Department of Economics and Management, Via San Felice 7 - 27100 Pavia, Italy;

Transformative Innovation Research Center (TIRC), Pavia University

[2] Partner Deloitte, Milan, Italy, Adjunct Professor Pavia University

* Corresponding author: emanuel.bagna@unipv.it

The impact of different Goodwill accounting methods on stock prices: a comparison of amortization and impairment-only methodologies

Abstract

In March 2020, the IASB issued a discussion paper – 'Business Combinations – Disclosures, Goodwill and Impairment'[1] – which discussed, inter alia, whether to introduce a sort of *counterreformation* of IAS 36 that might lead to the reintroduction of goodwill amortization. Among other things, the IASB, leveraging key findings from academic research, questioned a) the disclosure provided by entities applying IFRS 3 requirements and b) the timing of impairment write-downs and their overall magnitude.

The main goal of this study, focusing on a large sample of European listed companies since the adoption of IAS in 2005, is to test the value relevance of goodwill under the current accounting framework and the alternative hypothesis of an amortization regime.

Our findings show that the information provided by listed companies to market investors under the current accounting regime (verification at least annually of the recoverability of the value of the goodwill carrying amount through the impairment test) – the level of goodwill before and post impairment, as well as goodwill write downs – is value relevant and contributes to explain the level of the market to tangible book value multiple. On the contrary, simulating the alternative accounting scenario of goodwill amortization, we found that the information conveyed to market investor would not be value relevant, with the amortization itself added back to the multiple. The results support the current accounting framework and indicate that the best way to improve goodwill accounting is by enforcing present rules.

This study aims to provide a multidimensional contribution to the current debate within the IASB, leveraging the largest database in Europe.

Keywords: goodwill, impairment, amortization, IASB, accounting, value relevance

[1] Https://www.ifrs.org/projects/work-plan/goodwill-and-impairment/#published-documents.

Introduction

Accounting for goodwill is an interesting research topic for academics and a relevant issue for preparers, investors, professionals, regulators, and standard setters. Goodwill represents a significant and growing portion of investments at listed firms because of mergers and acquisitions (M&As), which give acquiring firms the possibility, in business combinations, to recognize goodwill and record it under their assets.[2] The monitoring and adjustment of the goodwill carrying amount over time is at present disciplined, at the international level, by the impairment-only approach introduced by the International Accounting Standards Board (IASB) in 2004[3] (and adopted in 2005), after a similar decision by the U.S. Financial Accounting Standards Board (FASB) in 2001. In the new framework, the amortization of goodwill was abolished, based on the presupposition that, through impairment, firms could provide market participants with more appropriate and useful pricing information.

However, some weaknesses of the impairment-only approach introduced in 2004 have been identified by academics, standard setters, and professionals, triggering discussion about possible remedies, including the potential reintroduction of amortization. During and after the Post-Implementation Review[4] (PIR) by the IASB (IASB 2015) of IFRS 3 'Business Combinations', respondents – investors, preparers, auditors, and regulators – gave mixed feedback about the effectiveness of the impairment-only approach, jointly considering the information content of impairment, the complexity and costs of the process, and the room for discretionary management of the test.[5] Additionally, some respondents criticized the timing of the impairment write-downs and their overall magnitude. Other respondents said that disclosures provided by entities applying the IFRS 3 requirements do not provide sufficient information for users to properly understand the effects of the business combination on the reporting entity. In other reviews collecting similar opinions from stakeholders, broad support was found for a return to the amortization approach (KPMG 2014).

Following the decisions taken at the July 2018 meeting (IFRS 2018),[6] in March 2020, the IASB issued the discussion paper 'Business Combinations – Disclosures, Goodwill and Impairment'[7] in order to explore whether companies

[2] At the end of 2017, the total amount of goodwill recorded by European listed companies that have goodwill among their assets (€ 3,418,394,666) was equal to 31.06% of their equity book value (€ 11,006,668,668).

3 IAS 36.96: "IAS 36.96: "the annual impairment test for a cash-generating unit to which goodwill has been allocated may be performed at any time during an annual period, provided the test is performed at the same time every year […]".

[4] The scope of PIR covered the whole Business Combinations project, which resulted in IFRS 3 (2004), IFRS 3 (2008) 'Business Combinations' and any resulting consequential amendments to IAS 27 'Consolidated and Separate Financial Statements', IAS 36 'Impairment of Assets', and IAS 38 'Intangible Assets'.

[5] Investors, a category of stakeholders expected to particularly benefit from the new approach, gave mixed answers. On the one hand, some stated they shared the rationale of the new approach, mainly because of the confirmatory value of the impairment test, which helps them verify whether an acquisition is working as expected. Other respondents pointed out the impairment process is complex, time consuming, expensive, and involves significant subjective estimations of goodwill fair value.

[6] In that meeting, acting in response to the findings of the PIR, the IASB took some key decisions concerning goodwill accounting. On the one hand, the Board decided to pursue the objective of exploring whether disclosures could be improved to enable investors to better assess company impairment processes and results. On the other hand, the Board decided to pursue the objective of simplifying goodwill accounting by exploring whether to reintroduce amortization and/or provide relief from the mandatory annual quantitative impairment testing of goodwill.

[7] IFRS Standards – Discussion Paper DP/2020/1 - https://www.ifrs.org/projects/work-plan/goodwill-and-impairment/#published-documents

can provide investors with more useful information about their acquisitions.[8] One of the most important topics addressed in the discussion paper is whether to reintroduce the amortization of goodwill. The IASB recognizes that the reintroduction of amortization could eliminate the costs of performing the impairment test, but it could also reduce information provided to investors. The reintroduction of the amortization of goodwill would require the definition of an amortization period; among the possible approaches, only the definition of a default period would eliminate complexity, costs, and any kind of managerial discretion.[9] Amortization could be a simple way for a company to reduce the carrying amount of goodwill and take some pressure off the impairment test. The consequence of such a decision would be to impose a common rule and mitigate the related regular costs for all firms, regardless of specific conditions and perspectives. However, a small majority of the IAS Board (eight out of 14 members) reached a preliminary view that the Board should retain the impairment-only model. The Board then met on July 20, 2021, to redefine its preliminary opinions on the accounting of goodwill, and in particular on the advisability of reintroducing the amortization of goodwill. As part of its restatement on whether to reintroduce goodwill amortization, the Board discussed the disclosure of business combinations and the improvement of the impairment test in IAS 36 'Impairment of Assets'. However, the Council was not called to make decisions in this regard.

In September 2021, the IASB decided to give priority to the following issues:

- making tentative decisions on the package of disclosure requirements about business combinations described in the 2020 Discussion Paper "Business Combinations – Disclosures, Goodwill and Impairment";
- analysing specific aspects of the feedback on the subsequent accounting for goodwill.

On 27 May 2022, the IASB discussed additional research on whether it is feasible to estimate the useful life of goodwill[10] and the potential consequences of transitioning to an amortisation-based model[11]. The IASB was not asked to make any decisions.

In addition to the issues raised by the IASB, scholars have long debated a range of issues related to goodwill, including its nature, opportunistic behaviour by management in its accounting, and its value relevance for investors. This study provides further evidence for these ongoing discussions related mainly to the latter two research strands, i.e. opportunistic behaviour of management and value relevance for investors.

An amortization regime should significantly lower the common equity of all companies that have never recorded an impairment loss. Considering the 1,498 European listed companies that recorded goodwill at the end of 2017,[12] we found

[8] Better information would help investors assess the performance of companies that have made acquisitions. This project considers the following topics in the PIR of IFRS 3: a) disclosing information about the acquisitions; b) testing goodwill for impairment – effectiveness and cost; c) whether to reintroduce the amortization of goodwill; and d) recognizing intangible assets separately from goodwill

[9] Alternatives to a default period imply the estimation (and updating) of the useful life of goodwill; again, this makes it necessary to operate (complex) estimates, bear costs and give managers some discretion.

10 IASB Staff paper 18A, May 2022, paper topic: "estimating the useful life of goodwill", web site https://www.ifrs.org/content/dam/ifrs/meetings/2022/may/iasb/

11 IASB Staff paper 18B, May 2022, paper topic: "potential consequences of transitioning to an amortization-based model, web site https://www.ifrs.org/content/dam/ifrs/meetings/2022/may/iasb/

[12] The sample considered here includes all European listed companies with goodwill as of December 31, 2017, according to the DataStream TOTMKEU Index. The number of companies examined in this period (2006–2017), varied from 1,470 (2014) to 1,629 (2011), with an average of 1,508, the majority of which belong to the industrial sector (71.4% of the total, on average, in terms of number), followed by other financials (11.9%), utilities (6.3%), banks (5.3%), insurance (2.9%), and transportation (2.4%). Sectors are defined according to Datastream macro-sectors (General Industry Classification: industrial, utilities, banks, insurance, other financials, and transportation.) At the end of 2017, 879 firms did not record goodwill as an asset.

that 1,041 (69.5%) had not recorded impairment losses since the adoption of IAS in 2005. Impairment losses were recorded by 843 companies,[13] and many of them recorded losses in more than one of the years considered. Among firms that recorded impairment losses, these losses were, on average, 7.17% of initial goodwill (with peaks of 15.15% in 2008 and 12.16% in 2011; for more information, see Table A1 in Appendix 1). An average of 222 firms recorded impairment losses per year, i.e. less than 15% of the whole sample; the average impairment rate among these firms was slightly above 2%. On average, 93 firms per year recorded losses greater than 5% (slightly more than 6% of the whole sample), while 67 firms per year, on average, recorded losses greater than 10% (slightly more than 4% of the whole sample). To understand the consequences of the reintroduction of amortization, this evidence should be compared to a hypothetical goodwill amortization rate of 5% or 10% (assuming amortization over a default period of 20 or 10 years, respectively).[14]

Based on these premises, in our study, we test the value relevance of goodwill (and goodwill impairment losses) under the current accounting framework and in the alternative hypothesis of an amortization regime. Moreover, we explore whether the value relevance of impairment losses increases in subsequent write-downs. Value relevance is defined as the ability of financial statement information (in this case, goodwill carrying amount and impairment losses) to influence firm value and is measured as the statistical association between financial statement information and stock market values or returns.[15]

Our study contributes to the existing literature in several ways. The first is the analysis of goodwill carrying amount and goodwill impairment losses for a large sample of European firms over a significantly longer period than in prior studies. This allowed us to analyse the subsequent write-downs and understand whether the impairment test requires enforcement actions to avoid opportunistic behaviour by management. The second is the comparison of the value relevance of the current accounting rules for goodwill (i.e. impairment tests) with goodwill amortization, which enabled us to understand whether the reintroduction of amortization would provide relevant information for investors. The third is the focus on European companies, since most other studies predominantly consider firms from English-speaking countries. Finally, the study answers the research questions posed by the IASB on the accounting treatment of goodwill.

The results of our analysis demonstrate that information provided by listed companies to market investors according to the present accounting regime – the level of goodwill before and post impairment and goodwill write downs - are value relevant and contribute to explain the level of the market to tangible book value multiple. The coefficient we found through regression analysis have the sign that we expected from an ex ante qualitative perspective, positive for goodwill and negative for write downs (when considered together with goodwill). On the contrary, simulating the alternative accounting scenario – a linear amortization for goodwill – we found that the information conveyed to market investor would not be value relevant, with the amortization itself added back to the multiple.

[13] The total number of 1,498 is not the sum of the two aforementioned numbers because a portion of the 843 firms which recorded impairment losses between 2006 and 2017 were no longer listed at the end of 2017, having been merged or delisted.

[14] IFRS for SMEs 19.23: '[…] if the useful life of goodwill cannot be established reliably, the life shall be determined based on management's best estimate but shall not exceed ten years […]'. In accordance with the indication of the IASB in the IFRS for SMEs, we assume a useful life of goodwill of 10 or 20 years.

[15] A key commonality in the definition of value relevance is that an accounting amount is deemed value relevant if it has a significant association with equity market value.

The remainder of this paper is organized as follows: we first review the relevant literature on goodwill accounting and develop our research hypotheses; then we present our empirical analysis and main results before providing the study's conclusions.

Literature review and international debate on goodwill accounting

Accounting for purchased goodwill remains controversial. Early literature concentrated on the nature of goodwill, particularly on whether it could be considered an asset (Gynther 1969, Barth and Clinch 1996, Godfrey and Koh 2001) and, if so, how its value should be adjusted over time, with one suggested alternative being amortization. This academic debate took place at a time when the regulatory framework differed significantly from country to country (Boennen and Glaum 2014), with goodwill capitalized in some cases and written off in others. Most authors found that investors priced goodwill as an asset (Chauvin and Hirschey 1994, Godfrey and Koh 2009, Barth and Clinch 1996), and that they attributed importance to its components (Henning, Lewis and Shaw 2000) and age, with new (recent) goodwill considered more relevant (Bugeja and Gallery 2006, Li, Amel-Zadeh and Meeks 2012). Some authors indicated that amortization could inaccurately represent the way goodwill declines in value, which varies significantly from firm to firm (Jennings et al. 1996). Accordingly, other authors argued that impairment adjustment could provide far more useful information for market participants (Churyk 2005).

Goodwill accounting rules changed significantly at the beginning of the past decade when the FASB and IASB introduced the impairment test and eliminated the amortization of goodwill. The resultant academic analysis followed two main directions.

The first and more general field of research has been the value relevance of goodwill numbers, that is, the amount of goodwill recorded in the financial position statement on the one hand and losses from goodwill impairment on the other. The research results have been inconsistent. Bens et al. (2011) found that the information content of goodwill write offs has decreased in the new approach as the impairment test can be manipulated and Hamberg and Beisland (2014) concluded that impairment losses are no longer value relevant. Some authors (Li et al. 2011) found evidence of the value relevance of impairment losses, but also found that this relevance seemed to be lower in the post-SFAS-142 approach. The absence of value relevance could be due to inconsistencies in the implementation of IAS 36, such as a correct definition of a Cash Generating Unit (Petersen and Plenborg 2010). This includes both how firms define a CGU and how they estimate the recoverable amount.

Other studies have indirectly demonstrated the value relevance of goodwill, highlighting a positive relationship between Tobin's Q ratio (i.e. market price–shareholder equity ratio) and the amount of goodwill existing within each company (Ni, Cheng and Huang 2021).

However, most authors concluded that the two accounting items (goodwill carrying amount and losses from goodwill impairment) are value relevant, and that their value relevance has increased with the adoption of the new IFRS

framework (d'Arcy and Tarca 2018). In some cases, an association was found between recognized goodwill and the post-acquisition performance of the acquiring firm (Boennen and Glaum 2014, Lee 2011, Su and Wells 2015, Lys, Vincent and Yehuda 2012). Considering the importance of this research strand, we aimed to verify the value relevance of goodwill numbers for European listed companies (i.e. goodwill carrying amount and goodwill impairment losses). Accordingly, we posited and verified the following hypothesis:

H1: The goodwill carrying amount (goodwill carrying amount before impairment test + goodwill impairment loss) is value relevant.

Given that some authors have found goodwill impairment is not value relevant, we decided to analyse goodwill impairment losses individually in greater detail (i.e. separately from the level of the goodwill carrying amount), testing the following hypotheses:

H2a: The goodwill carrying amount split into its two components (goodwill carrying amount before impairment test + goodwill impairment loss) is value relevant.

H2b: The goodwill impairment loss alone is not value relevant

H2c: The gross carrying amount of goodwill, i.e. without the impairment loss, is not value relevant.

The second and most important sphere for recent goodwill accounting research has addressed the issue of opportunistic behaviour by management. Many scholars argued that, in the new regulatory framework, management remuneration schemes could lead to practices that resulted in earnings management in the interests of management itself. This issue was investigated on three main fronts. The first concerned the amount allocated to goodwill in purchase price allocation (PPA) after a business combination (Paugam, Astolfi and Ramond 2015). Various authors highlighted how allocation was associated more with the incentive structure of the acquiring firm's top management than with the economic characteristics of the acquired firm (Bugeja and Loo Yung 2015, Shalev, Zhang and Zhang 2013, Zhang and Zhang 2017). In the impairment-only approach, the portion of the consideration allocated to goodwill does not affect, at least in the short term, the economic results of the entity resulting from the combination. This, in turn, could help top managers achieve the economic results on which bonus schemes depend. The second front related to the discretion used by management in the impairment procedure, which is largely unverifiable for investors (Ramanna and Watts 2012, Beatty and Weber 2006, Carlin and Finch 2009), given the information firms normally provide is not based on the mandatory disclosure accounting principle (Devalle and Rizzato 2012, Sapkauskiene and Leitoniene 2014, Glaum et al. 2013, Authority 2013, ESMA 2013). The third and related front in which problems were identified is that the timing and amount of write offs was based on managerial discretion. Hence, management's incentive structure may lead to a misuse of the impairment approach, with the impairment delayed in time and reduced in amount. Considering these critical issues, some authors have concluded that the new approach has not adequately achieved its goals (Li and Sloan 2017), showing for example that for a sample of German listed firms for the period 2006 to 2013, goodwill impairments are not recognized in a timely manner and delayed by at least one to two years (Albersmann and Quick 2020). Other scholars found that managerial manipulation may lead to no

impairment being reported (Chen et al., 2015); in other words, the absence of reported impairment can cause uncertainty, leading to strong or weak market reactions.

Considering the relevance of the research strand on opportunistic behaviour by management and the interesting results from previous studies, we decided to adopt a new approach to analyse this topic. Using the value relevance technique and considering that our analysis covers a long period of time during which some companies recorded more than one (sometimes numerous) impairment losses, we decided to test the following hypothesis:

H3: The goodwill carrying amount becomes more value relevant in subsequent write-downs.

In another research strand, various authors have compared the old and new accounting approaches and found that, in the new one, the value relevance of goodwill has increased (Aharony, Barniv and Falk 2010, Chalmers, Clinch and Godfrey 2008, Chalmers, Godfrey and Webster 2011, Oliveira, Rodrigues and Craig 2010). With regards to goodwill impairment, many authors found a negative correlation between these types of losses and the market value of the firm (Li et al. 2010, Lapointe-Antunes, Cormier and Magnan 2009, Xu, Anandarajan and Curatola 2011) as these losses provide the market with more useful information than the amortization approach.

Considering the importance of the comparison between the goodwill impairment test and the reintroduction of the amortization regime, as well as its relevance to the ongoing debate between standard setters, we decided to compare the value relevance of the impairment test and goodwill amortization. Accordingly, we posited and verified the following hypothesis:

H4: Assuming linear amortization of goodwill over 20 years (i.e. a 5% depreciation rate), the goodwill carrying amount would not be value relevant.

Having thus defined the hypotheses based on the literature review, the following section describes the testing process and results.

Empirical analysis and key results

The methodology section is organized as follows: the first section includes a description of the sample used in our analyses. The second part depicts the models used to test hypotheses. The third, beginning with descriptive statistics, reports the regression results and findings.

Description of the sample

The sample (table 1) consists of the 2,377 listed companies registered in the Datastream database as of December 31.12.2017 within the Totmkteu index. The period under consideration is 13 years, beginning with the adoption of the IAS (31.12.2005), for a possible sample size of 30,901 (= 13 x 2,377).

Table 1: Sample

	N° of Companies	**% of Companies**
A) Firms (Observations per Year)	2377	100%

Sector Composition		
Sector 1 - Industrial Companies	*1492*	*63%*
Sector 2 - Utilities	*130*	*5%*
Sector 3 - Transportation	*56*	*2%*
Sector 4 - Bank	*124*	*5%*
Sector 5 - Insurance	*58*	*2%*
Sector 6 - Other Financials	*426*	*18%*
Country Composition		
Belgium	*89*	*4%*
France	*251*	*11%*
Germany	*250*	*11%*
Great Britain	*538*	*23%*
Greece	*50*	*2%*
Italy	*157*	*7%*
Netherlands	*115*	*5%*
Other Countries	*737*	*31%*
Spain	*120*	*5%*
Sweden	*70*	*3%*

B) Number of Years	13
C) Total Observations = A x B	30901
D) Available Observations with Price to Tangible Book Value	20529
E) Available Observations with Earnings Forecast (Consensus IBES)	14289
F) Observations with Earnings Forecast and Negative Tangible Book Value	3977
G) Available Observations with Earnings Forecast (Consensus IBES) and Positive Tangible Book Value = E - F	10312
H) Missing data due to variable intersection	1287
I) Final Sample for Regression = G – H	9025

This sample contains both companies with goodwill (as indicated in the table in the appendix and in notes 7 and 8 for values ranging from 1403 to 1629 depending on the year, representing the majority of the sample) and companies without goodwill. The majority (62.8%) of the sample consists of 1,492 firms from the industrial sector, followed by 426 firms from the Other Financials sector (primarily holding companies), 130 firms from the utilities sector (5.5%), and 124 firms from the banking sector (5.2%). The sample is completed by 58 companies in the insurance sector and 56 companies in the transportation sector.

In terms of geography, the majority of the sample (538 companies, or 22.6% of the sample) refers to companies listed in the United Kingdom, followed by France (251 companies, or 10.6% of the sample), Germany (250 companies), Italy (157 companies), and the Netherlands (115 companies).

In terms of location, most of the sample refers to companies listed in Great Britain (538 companies, or 22.6%), followed by France (251 companies, or 10.6%), Germany (250 companies), Italy (157 companies), and the Netherlands (115 companies). Due to the fact that many companies went public after the date of 31.12.2005, the sample size has been reduced to 20,529 observations. There are also 14,289 observations related to equity analysts' forecasts of net earnings per share and 23,943 observations related to the last reported Return on Tangible Equity. Because our models use tangible book value, we eliminate all observations with negative tangible book value. After removing all observations with negative tangible book

values, a potential sample of 10312 observations with earnings forecasts remains. The intersection of the different data used for the analyses, yields a final sample size of 9,025 observations.

Testable hypothesis

To test H1, we ran the following regression (Model 1):

$$\frac{Mkt\ Cap_{i,t}}{TBV_{i,t}} = \propto + \beta_{Goodwill\ Post\ Impairment} \times \frac{(Goodwill\ Post\ Impairment_{i,t})}{TBV_{i,t}} + \beta_{ROTE} \times ROTE_{i,t+1} + \beta_{Growth}$$

$$\times \frac{(Net\ Income_{i,t+3} - Net\ Income_{i,t+1})}{TBV_{i,t}} + \sum_{k=1}^{K} \beta_{Control,k} \times Control_{k,i,t} + \varepsilon_{i,t}$$

In Appendix 2, we describe how our regression model was derived. The dependent variable is the *market-to-tangible book value multiple* computed at the end of each accounting year. The independent variables are as follows: goodwill carrying amount at the end of year t (scaled by the tangible book value [TBV] of equity), return on tangible equity (ROTE), measured as expected net income expected at end of year 1 scaled over TBV (tangible equity = common equity – intangible assets); and net income growth, i.e. the difference between net income expected at the end of year 3 (t+3) and expected net income at year 1 (t+1) scaled over $TBV_{i,t.}$ The expected income at the end of year t+1 and t+3 is obtained from the IBES consensus. As explained in the appendix 2, in order to evaluate the effects of growth the expected growth in consensus earnings from IBES were taken into consideration. The IBES consensus estimates include profit forecasts from the current year (at the date of extraction) to the fifth year. As the time horizon lengthens, the number of forecasts decreases significantly.There are no consensus forecasts for many companies for years 4 and 5 (these is also due to the absence of industrial plans announced by the companies that cover a period of 5 years). To account for the effects of medium/long-term growth while maintaining a large statistical sample, it was decided to consider expected earnings growth up to the third year. So we considered the difference between t+3 and t+1 because on this time span forecast are available, while there are less information for longer time periods.

If the goodwill carrying amount post-impairment is value relevant, we expect $\beta_{Goodwill\ Post\ impairment}$ to be statistically significant. Theoretically, in terms of coefficient interpretation, if investors wholly believe in accounting measures, $\beta_{Goodwill\ Post\ Impairment}$ should equal one (see Appendix 2). We then expect the parameters β_{ROTE} and β_{Growth} to be positive. The constant $\propto$, when statistically significant, represents the price to TBV multiple in the case that every other variable is not statistically different from zero. Drawing on the literature (Bagna, Di Martino and Rossi 2015, Francis, Olsson and Oswald 2000), the value of $\propto$ is expected to be close to one; a higher (lower) value implies that the market appreciates some hidden assets (liabilities) not recorded in the balance sheet.

Finally, a set of control variables was used to control for year-, sector-, size-, and country-specific effects. Size is measured using the natural logarithm of turnover (expressed in euros). Using a fundamental approach, since the equity value of a company (and hence implied goodwill) equals the sum of discounted cash flows at the right cost of capital (recoverable

amount of goodwill estimated by performing an impairment test equals the difference between value in use and book value), and the cost of capital is a function of sector, size, and country, our analysis includes these control variables.

To test H2a, i.e. the value relevance of the goodwill carrying amount split into its components (goodwill carrying amount before impairment test + goodwill impairment loss), we ran the following regression (Model 2A):

$$\frac{Mkt\ Cap_{i,t}}{TBV_{i,t}} = \propto + \beta_{ROTE} \times ROTE_{i,t+1} + \beta_{Growth} \times \frac{(Net\ Income_{i,t+3} - Net\ Income_{i,t+1})}{TBV_{i,t}} + \beta_{Goodwill\ Before\ Impairment} \times \frac{(Goodwill\ Before\ Impairment_{i,t})}{TBV_{i,t}} + \beta_{Goodwill\ Impairment\ Test} \times \frac{(Goodwill\ Write\ Down_{i,t})}{TBV_{i,t}} + \sum_{k=1}^{K} \beta_{Control,k} \times Control_{k,i,t} + \varepsilon_{i,t}$$

In this, we split the goodwill post-impairment variable into two: the goodwill carrying amount before impairment, which is the amount of goodwill at the end of year t plus write-downs recorded in year t (scaled by TBV of equity) and goodwill write-downs, i.e. the write-downs recorded in year *t* (scaled by TBV of equity). As stated, the sum of the goodwill carrying amount before impairment and write-downs recorded in year t equals the goodwill carrying amount post-impairment.

If the goodwill carrying amount and goodwill impairment losses are value relevant, we expect both $\beta_{Goodwill\ Before\ Impairment}$ and $\beta_{Goodwill\ Impairment}$ to be statistically significant. Since impaired goodwill (a cost in a financial statement) is a positive number in our database, we expect a negative sign for the parameter $\beta_{Goodwill\ Impairment}$ while we expect a positive sign for $\beta_{Goodwill}$. The parameters for 'goodwill before impairment' and 'goodwill write-downs' over TBV should provide evidence of the relative value relevance the market assigns to the accounting value of each figure examined. Theoretically, in terms of coefficient interpretation, if investors wholly believe in accounting measures, $\beta_{Goodwill}$ and $\beta_{Goodwill\ Impairment}$ should equal one.

Given that some authors have found goodwill impairment is not value relevant, we decided to analyse each component of the current accounting treatment of goodwill individually and in detail, testing H2b and H2c through the following regressions, respectively:

Model 2B:

$$\frac{Mkt\ Cap_{i,t}}{TBV_{i,t}} = \propto + \beta_{Goodwill\ Impairment\ Test} \times \frac{(Goodwill\ Write\ Down_{i,t})}{TBV_{i,t}} + \beta_{ROTE} \times ROTE_{i,t+1} + \beta_{Growth} \times \frac{(Net\ Income_{i,t+3} - Net\ Income_{i,t+1})}{TBV_{i,t}} + \sum_{k=1}^{K} \beta_{Control,k} \times Control_{k,i,t} + \varepsilon_{i,t}$$

Model 2C:

$$\frac{Mkt\ Cap_{i,t}}{TBV_{i,t}} = \propto + \beta_{GoodwillBefore\ Impairment} \times \frac{(Goodwill\ Before\ Impairment_{i,t})}{TBV_{i,t}} + \beta_{ROTE} \times ROTE_{i,t+1} + \beta_{Growth}$$

$$\times \frac{(Net\ Income_{i,t+3} - Net\ Income_{i,t+1})}{TBV_{i,t}} + \sum_{k=1}^{K} \beta_{Control,k} \times Control_{k,i,t} + \varepsilon_{i,t}$$

Since a significant number of companies in our sample recorded more than one impairment loss, we decided to investigate how investors value companies with multiple impairments over time (H3). For each of the companies included in our sample, we considered all the impairments recorded in the period, with the results shown in Table 1. We found that 33.43% of the companies analysed recorded a goodwill write-down only once, while 21.57% recorded impairments twice. Seven companies recorded impairment losses in each of the 13 years from 2005–2017, while 94.13% recorded impairment losses in seven or fewer years. The last column of Table 2 shows the average value of the impairment recorded as a percentage of TBV. The first goodwill write-down is the most relevant (0.763% of TBV, on average), while subsequent write-downs tend to decrease quite consistently.

Table 2: Frequency of goodwill write-downs

Goodwill Impairments / No. of firms		**% of Firms**	**Cumulated %**	**Average Goodwill Write-Down / Tangible Book Value**
1	843	33.43%	33.43%	0.763%
2	544	21.57%	55.00%	0.667%
3	370	14.67%	69.67%	0.643%
4	249	9.87%	79.54%	0.730%
5	171	6.78%	86.32%	0.587%
6	117	4.64%	90.96%	0.491%
7	80	3.17%	94.13%	0.518%
8	53	2.10%	96.23%	0.414%
9	38	1.51%	97.74%	0.400%
10	32	1.27%	99.01%	0.330%
11	18	0.71%	99.72%	0.226%
12	7	0.28%	100.00%	0.085%
Total	**2522**	**100.0%**		

Given this, we decided to analyse the $\beta_{Goodwill\ Impairment}$ coefficient considering the ranking of the impairment for each company in more detail (Model 3), as we wanted to understand whether investors behave differently in the face of the first impairment or in subsequent impairments. We conducted a regression analysis (Model 3), where the dummy variable

(named dummy impairment *j*) identifies whether the j^{th} impairment is the first, the second, ..., or eighth impairment (in the final category, we considered the eighth, ninth, tenth, eleventh, and twelfth impairments together[16]):

$$\frac{Mkt\ Cap_{i,t}}{TBV_{i,t}} = \propto + \beta_{ROTE} \times ROTE_{i,t+1} + \beta_{Growth} \times \frac{(Net\ Income_{i,t+3} - Net\ Income_{i,t+1})}{TBV_{i,t}} + \beta_{GoodwillBefore\ Impairment} \times \frac{(Godwill\ Before\ Impairment_{i,t})}{TBV_{i,t}} + \beta_{Goodwill\ Impairment} \times \frac{(Godwill\ Write\ Down_{i,t})}{TBV_{i,t}} + \sum_{k=1}^{K} \beta_{Control,k} \times Control_{k,i,t} + \sum_{j=1}^{7} \beta_{Dummy\ Impairment,j} \times \frac{(Godwill\ Write\ Down_{i,t})}{TBV_{i,t}} + \varepsilon_{i,t}$$

For companies without impairment, the product between the variable 'Dummy impairment' and the variable 'Goodwill write-down' assumes a value of zero (since the variable 'Goodwill write-down' assumes a value of zero).

Finally, we focused on the possibility that goodwill amortization could be reintroduced (H4). Goodwill amortization can be seen as a simple mechanism for reducing the risk of overstating goodwill and reducing the overall book value of equity. In this framework, goodwill is treated similarly to other wasting assets with a finite useful life and should be amortized and tested for impairment each time there is evidence that an impairment loss occurred (i.e. trigger event). As stated by the IAS Board, reintroducing amortization would not eliminate the need for impairment testing. To test the value relevance of goodwill under the amortization regime, we proceeded with the regression identified in Model 2A, adding a new variable representing the decremental shareholder equity that would emerge from goodwill amortization (Model 4):

$$\frac{Mkt\ Cap_{i,t}}{TBV_{i,t}} = \propto + \beta_{ROTE} \times ROTE_{i,t+1} + \beta_{Growth} \times \frac{(Net\ Income_{i,t+3} - Net\ Income_{i,t+1})}{TBV_{i,t}} + \beta_{Goodwill\ Before\ Impairment} \times \frac{(Goodwill\ Before\ Impairment_{i,t})}{TBV_{i,t}} + \beta_{Goodwill\ Impairment\ Test} \times \frac{(Goodwill\ Write\ Down_{i,t})}{TBV_{i,t}} + \beta_{Goodwill\ Under\ Amortization\ Regime} \times \frac{(Book\ Value_{\ Under\ Goodwill\ Amortization\ Regimei,,t} - Book\ Value_{i,t})}{TBV_{i,t}} + \sum_{k=1}^{K} \beta_{Control,k} \times Control_{k,i,t} + \varepsilon_{i,t}$$

where the variable $Book\ Value_{\ Under\ Goodwill\ Amortization\ Regime,i,t} - Book\ Value_{i,t}$ expresses the decreased shareholder equity that would emerge from goodwill amortization (we assume a default period of 20 years and an amortization rate of 5%). For companies that have not made any write-downs, this variable corresponds to the difference between the goodwill recorded in the financial statements in the current accounting framework and that in the amortization regime. For companies

[16] Since the write-downs by the same company made more than seven times are always less than 3% of the sample (of the sample of companies that made write-downs; 3% = 53 / 2522, see Table 1), we decided to build a single variable representative of all write-downs greater than the eighth.

that have recorded write-downs, the goodwill at the end of each year t under the amortization hypothesis corresponds to the lesser goodwill that emerges after the impairment test and goodwill post-amortization.

If investors and financial markets have confidence in the current accounting framework, we expect a negative and statistically significant sign on the decremental book value that should emerge under the amortization regime, meaning that investors would reverse the amortization recorded to assess the carrying amount of goodwill without amortization.

Descriptive statistics

The descriptive statistics for the variables used in the regression analysis are shown in Table 3. On average, the price to TBV equals 3.66, with a (winsorized at 5% level) maximum of 25.66 and a minimum of 0.26. The goodwill carrying amount before impairment is, on average, 46.47% of TBV, while goodwill write-down is, on average, 0.068% of TBV. As noted before, when a firm does not record a goodwill write-down in its financial statements, this variable assumes a value of 0%. The expected ROTE is 12.48%, with high volatility (minimum = -61.55%; maximum = 81.48%). The hypothetical goodwill amortization regime should lower the TBV by 10.05% on average.

Table 3: Descriptive statistics

	Valid N	Mean	Median	Minimum
Market to TBV	20529	3,66	1,77	0,26
Decremental Book Value Under Amortization Regime / TBV	18800	-10,05%	-1,15%	-162,98%
Goodwill Post-Impairment / TBV	18800	46,39%	12,32%	0,00%
Goodwill Pre-Impairment / TBV	18800	46,47%	12,47%	0,00%
Goodwill Write-Down / TBV	24553	0,068%	0,00%	0,00%
Return on Tangible Equity	23943	12,48%	9,18%	-61,55%
(Expected Net Income Y=3 / Expected Net Income Y=1) / TBV	14289	70,55%	4,60%	-407,22%
Size (Revenues in million Euro)	25765	13,00	13,16	-4,605

	Maximum	Lower Quartile	Upper Quartile	Std.Dev.
Market to TBV	25,66	0,95	4,07	4,70
Decremental Book Value Under Amortization Regime / TBV	0,00%	-10,84%	0,00%	19,58%
Goodwill Post-Impairment / TBV	404,26%	0,22%	56,21%	75,30%
Goodwill Pre-Impairment / TBV	404,26%	0,24%	56,35%	75,35%
Goodwill Write-Down / TBV	2,717%	0,000%	0,00%	0,29%
Return on Tangible Equity	81,48%	1,03%	18,67%	15,80%
(Expected Net Income Y=3 / Expected Net Income Y=1) / TBV	693,00%	0,98%	17,86%	171,27%
Size (Revenues in million Euro)	19,71	11,45	14,63	2,475

Note: TBV = tangible book value

Table 4 shows that: a) large amounts of goodwill are found in companies with high profitability and growth prospects, as expected.; and b) the variable linked to goodwill write-downs does not show significant correlations with the other variables, except for the variable linked to the goodwill carrying amount (a low correlation coefficient of 0.12). Higher goodwill implies a greater likelihood of a goodwill write-down.

Table 4: Correlation matrix

	Market to TBV	Decremental Book Value Under Amortization Regime / TBV	Goodwill Post-Impairment / TBV	Goodwill Pre-Impairment / TBV	Goodwill Write-Down / TBV	Return on Tangible Equity	(Expected Net Income Y=3 / Expected Net Income Y=1) / TBV	Size (Revenues in million Euro)
Market to TBV	1,00	-0,28	0,35	0,35	-0,04	0,41	0,18	-0,01
Decremental Book Value Under Amortization Regime / TBV	-0,28	1,00	-0,59	-0,59	-0,03	-0,27	-0,12	-0,16
Goodwill Post-Impairment / TBV	0,35	-0,59	1,00	1,00	0,14	0,46	0,17	0,15
Goodwill Pre-Impairment / TBV	0,35	-0,59	1,00	1,00	0,12	0,50	0,10	0,06
Goodwill Write-Down / TBV	-0,04	-0,03	0,14	0,12	1,00	0,00	-0,02	0,08
Return on Tangible Equity	0,41	-0,27	0,46	0,50	0,00	1,00	0,22	0,00
(Expected Net Income Y=3 / Expected Net Income Y=1) / TBV	0,18	-0,12	0,17	0,10	-0,02	0,22	1,00	-0,08
Size (Revenues in million Euro)	-0,01	-0,16	0,15	0,06	0,08	0,00	-0,08	1,00

Note: TBV = tangible book value

Findings

Table 5 summarizes the regressions results.

The regression coefficient shown in Model 1 highlights value relevance of the goodwill carrying amount under the current accounting framework, thereby confirming H1. The goodwill coefficient ($\beta_{Goodwill}$) is positive and slightly greater than one. Therefore, we can conclude that concerns among users of financial statements that carrying amounts of goodwill may be overstated are unjustified, since the regression coefficient of the goodwill carrying amount is greater than one. A coefficient greater than one means that financial markets attribute a value to goodwill greater than that indicated in the balance sheet; it is consistent with the fact that under the current accounting framework (IFRS 3), goodwill is the difference between the price

paid and the book value of a company and does not include any net present value of the investment from the acquisition of the company. The difference between the coefficient and the value of one should be equal to the net present value of the investment. A coefficient greater than one supports the fact that investors appreciate the value of the unrecognized headroom in a cash-generating unit.

Table 5: Regression results

	Model 1		Model 2A		Model 2B		Model 2C		Model 3		Model 4	
	Param.	Sign.	Param.	Sign.	Param.	Sign.	Param.	Sign.	Param.	Sign.	Param.	Sign.
Intercept	0,889	7,65%*	0,905	7,12%*	0,081	86,04%	0,888	7,68%*	0,866	8,48%*	0,975	5,09%*
Return on Tangible Equity	9,388	0,00%***	9,35	0,00%***	12,277	0,00%***	9,392	0,00%***	9,322	0,00%***	9,327	0,00%***
(Expected Net Income Y = 3 / Expected Net Income Y = 1) / Tangible Equity	0,267	0,00%***	0,26	0,00%***	0,346	0,00%***	0,267	0,00%***	0,265	0,00%***	0,279	0,00%***
Size (ln - euro mln Revenues)	-0,076	0,79%***	-0,071	1,31%**	-0,007	80,31%	[illegible]	0,78%***	-0,066	2,19%**	-0,073	1,05%**
Goodwill Carrying Amount (Post Impairment) / Tangible Book Value	1,179	0,00%***										
Goodwill Before Impairment / Tangible Book Value			1,203	0,00%***			1,177	0,00%***	1,208	0,00%***	0,779	0,00%***
Goodwill Write Down / Tangible Book Value			-36,28	0,83%**	-0,960	94,50%			-247,4	0,71%***	-29,316	3,25%**
(De)cremental Goodwill Under goodwill Amortization Regime / Tangible Book Value											-2,771	0,00%***
Dummy 1st Impairment x (Goodwill Write Down / Tangible Book Value)									225,86	1,65%**		
Dummy 2nd Impairment x (Goodwill Write Down / Tangible Book Value)									210,39	2,85%**		
Dummy 3rd Impairment x (Goodwill Write Down / Tangible Book Value)									234,71	1,56%**		
Dummy 4th Impairment x (Goodwill Write Down / Tangible Book Value)									184,84	6,04%*		
Dummy 5th Impairment x (Goodwill Write Down / Tangible Book Value)									179,81	8,61%*		
Dummy 6th Impairment x (Goodwill Write Down / Tangible Book Value)									229,45	4,11%**		
Dummy 7th Impairment x (Goodwill Write Down / Tangible Book Value)									154,98	22,00%		
Sector Control Variables	YES											

Year Control Variables	YES					
Country Controlo Variables	YES					
Adjusted R^2	25,80 %	25,90 %	24,10 %	25,80 %	25,90 %	26,50 %
Observations	9025					

Hp 1: the goodwill-carrying amount (goodwill carrying amount before impairment test + goodwill impairment loss = goodwill post impairment) is value relevant
Hp 2A: the goodwill- carrying amount splitted into its two components (goodwill carrying amount before impairment test + goodwill impairment loss), is value relevant
Hp 2B: the goodwill impairment loss alone is not value relevant
Hp 2C: the gross carrying amount of goodwill, i.e. without the impairment loss, is not value relevant
Hp 3: the goodwill-carrying amount becomes more value relevant in subsequent write-downs.
H 4: assuming a linear amortization of goodwill over 20 years (i.e. depreciation rate of 5%), the goodwill carrying amount would not be value relevant.
* Significance @ 10% level; ** Significance @ 5% level; *** Significance @ 1% level

The regression coefficient shown in Model 2A highlights that the goodwill carrying amount split into its components (goodwill before impairment and impaired goodwill) is statistically significant and, as a consequence, value relevant, thus supporting H2a. The regression constant shows a value close to one (0.9054), as expected. The goodwill coefficient ($\beta_{Goodwill}$) is positive and slightly greater than one, while the impairment coefficient ($\beta_{Goodwill\ Impairment}$) is negative, as expected.

From the significance of the regression coefficient identified in Model 2B, we can infer that impairment losses on a stand-alone basis are not statistically significant, thus confirming H2b. In our opinion, this may be due to the fact that the information provided by goodwill impairment write-downs becomes value relevant (as in the previous case) only when it is combined with other information (in this case, information about the goodwill carrying amount of the companies issuing this information). In other words, it seems that impairment losses are only relevant to investors when recorded by companies that hold a significant amount of goodwill (compared to tangible book value). Model 2C highlights that the goodwill carrying amount before the impairment test is value relevant on a stand-alone basis thus H2c is not supported.

The coefficients identified in Model 3 are clear. With the exception of the third impairment, whose coefficient is the smallest of the series, and of the sixth, which is lower than the fifth and the fourth, the general picture shows an increase in coefficients as firms record additional impairments after the first. In other words, market investors react increasingly negatively to the impairment decisions of firms that are compelled to impair goodwill repeatedly, thus confirming H3. In Table 6, the coefficients from Model 3 reported in Table 5 are multiplied by the average goodwill write-downs reported in

Table 2, to find the implied market write-downs as a percentage of the TBVs of impairing firms. In the second column of Table 6, we compute the implied $\beta_{Goodwill\ Impairment}$ coefficient calculated through our regression analysis considering whether the impairment is the first, second, ..., or twelfth.

Table 6: Market valuation of goodwill write-downs

	A) Average Goodwill Write-Down / TBV	B) Implied β (Goodwill Write-Down / TBV)	C) Implied Market Write Off / TBV = A x B
1st Impairment	0.763%	-17.8	-0.14x
2nd Impairment	0.667%	-30.2	-0.20x
3rd Impairment	0.643%	-12.9	-0.08x
4th Impairment	0.730%	-76.5	-0.56x
5th Impairment	0.587%	-85.3	-0.50x
6th Impairment	0.491%	-35.9	-0.18x
7th Impairment	0.518%	-111.7	-0.58x
8th Impairment	0.414%	-247.4	-1.03x
9th Impairment	0.400%	-247.4	-0.99x
10th Impairment	0.330%	-247.4	-0.82x
11th Impairment	0.226%	-247.4	-0.56x
12th Impairment	0.085%	-247.4	-0.21x

Note: TBV = tangible book value

The first, second, and third impairments imply a reduction in TBV between 8% and 20%. Subsequent impairments, between the fourth and seventh (with the exception of the sixth), imply devaluation of TBV equal to or greater than 50%. The final write-downs lead to increasingly large market investor devaluations. The reaction of market investors explains why managers are often cautious in impairing goodwill, not only in the case of the first write-down but also – and especially – in the case of subsequent write-downs.

Finally, we can infer from the coefficients found in Model 4 that the information provided under the hypothetical amortization regime would not be value relevant, thus confirming H4.. The coefficient on the decremental book value that should emerge under the amortization regime is negative and statistically significant, meaning that investors would reverse the amortization recorded to assess the goodwill carrying amount without amortization. In addition, the coefficient of the goodwill write-down remains negative and statistically significant. Moreover, the negative (and statistically significant) sign on the decremental book value that should emerge under the amortization regime implies that investors implicitly use the information contained in goodwill amortization to reconstruct the originally acquired goodwill and make their own assessments. This is consistent with the request of the standard setter for greater disclosure of acquired goodwill.

The statistical analyses performed here cover all listed companies in the sample, including those without goodwill. These companies have not engaged in any Merger and Acquisition activity, unless the price recognized in the acquisition was greater than the acquired company's net book value. Even after excluding firms without goodwill, i.e., companies that have not participated in M&A transactions, the results of the statistical analysis are confirmed.

Our results support the definition of goodwill as a non-wasting asset with an indefinite life. Introducing a 5% yearly amortization rate for goodwill implies that goodwill is considered a wasting asset. This is in contrast with the definition of goodwill and its components given by the IASB within the scope of IFRS 3 ('Business Combinations'; Basis for conclusions, § BC313–BC318). Illustrating IFRS 3, the IAS Board affirms that goodwill value stems from two components: first, the so-called 'going concern' component, which relates to the acquiree and reflects the excess assembled value of the acquiree's net assets. Second, the fair value of the expected synergies and other benefits coming from the combination of the acquirer's and acquiree's net assets and businesses.

Therefore, considering goodwill as a wasting asset contradicts the definition of goodwill, since: a) the going concern element has an indefinite life, by definition, being the difference between the acquiree's cash flows projected in perpetuity (with an indefinite life) and all the acquirees' other (wasting) assets; and b) cost synergies, the most relevant part of synergies, have indefinite lives.

Conclusions

The impairment test regime introduced by the International Accounting Standards in 2005 to regulate goodwill accounting is now under discussion and standard setters – based either on the mixed feedback from stakeholders and on the results of academic research – are considering, among possible solutions, the reintroduction of amortization. Our analysis, focused on a large sample of European listed firms, examined over a long period of time, reveals, first, that one size does not fit all, as impairment loss of goodwill emerges as firm specific and, in particular periods, industry-specific. Only a minority of European listed companies have recorded impairment losses and even fewer have recorded *significant* impairment losses (qualified as those greater than 5% or 10% of initial goodwill). This evidence indicates that imposing *erga omnes* an equal amortization rate would have determined in the examined period, a significant change in the information provided by firms to market investors, and a non-negligible reduction in the assets and equity book value of non-impairing companies.

This finding is a relevant premise for our analysis, where we tested the value relevance of the information provided by companies to investors under the present goodwill accounting treatment. We used, to that purpose, the Market Capitalization to Tangible Book Value multiple as dependent variable, a relevant indicator for equity investors.

Firstly, we found that the level of goodwill post impairment represents a relevant information for investors. The coefficient is statistically significant and greater than one, showing that, on average, investors assign to goodwill a value greater than the carrying amount and this result demonstrates that the latter cannot be considered, on average, overstated.

Secondly, we splitted the goodwill carrying amount into its two fundamental components – goodwill before impairment and goodwill write downs and examined them both jointly and separated. Putting the two variables in the regression equation, we found that both information are relevant for investors. The first component has a positive sign and a value greater than one (slightly greater than in the first model, confirming what previously found), while the second has a

negative sign, showing that investors consider write downs as a relevant and negative information, as expected. Examining impairment losses separately from goodwill we found, by the contrary, that they do not represent a relevant information for investor, and we believe this is due to the fact that investors only see impairment losses as relevant when recorded by companies that hold a significant amount of goodwill (compared to TBV). For what concerns the gross carrying amount of goodwill before impairment, we found that it is a relevant information for market investors, even if examined separately from impairment losses. Like in other regressions, the coefficient is greater than one, confirming what we found in the proceeding analysis.

We concluded our analysis of goodwill numbers by examining market reactions to goodwill write-downs following the first write-down. We discovered that this reaction increases significantly, indicating that investor become increasingly concerned about the sustainability of goodwill.

The aforementioned results confirm that the information provided by companies to market investors under the current present goodwill accounting treatment are relevant and contribute to explain the level of the multiple we assumed as dependent variable in our models. These results seem to us significant, notwithstanding the critical issues raised by academic literature and the complaints coming from preparers, auditors and users of financial statements. The evidence that in each model goodwill coefficients, are always statistically significant, positive and greater than one implies that worries about the book value of goodwill at listed companies are, on average, not supported.

These achievements led us to conclude our analysis, testing the value relevance of goodwill under the alternative hypothetical scenario of an amortization regime. The result we found testing this hypothesis is quite interesting: the variable introduced in the regression (difference between common equity under current accounting framework and common equity under the alternative framework) to simulate goodwill amortization accounting framework is negative in the 99% of cases and its coefficient is negative as well, with the consequence that the contribution of this variable to the multiple is positive. This result seems to confirm that market investors do not regard goodwill amortization as a relevant information for valuation purposes. In conclusion, the reintroduction of amortization would not generate relevant information.

Our analysis supports the current accounting framework. We believe that additional work should be done in order to make the principle more effective, particularly requesting companies more disclosure about impairment procedures and results.

On the contrary, reintroducing goodwill amortization – which appears to be an easy way to manage subsequent accounting for goodwill - would not generate value relevant information for market investors and would significantly reduce assets and equity book value of companies that would not record impairment losses in the present regime. .

We think that future research should first and foremost extend our analysis to companies listed in non European markets, given that the level of reported goodwill varies significantly across geographical areas and may have an impact on the level of the multiple we used in our analysis. Another extension of our analysis could target clusters of firms quite similar in terms of industry and products or clusters of firms comparable in terms of amount of reported goodwill as percentage of TBV. Develop analyzes that, in addition to considering value relevance and random inference, consider

behavioral theories more broadly, also carrying out analyzes through surveys or analyzes of small samples with the aim of analyzing the reasons for accounting behavior

Finally, companies that recorded goodwill as a result of mergers involving stock-based payments should be examined separately from those that recorded goodwill as a result of cash-based acquisitions.

Appendix 1

Table A1: Goodwill carrying amount and goodwill impairment losses at European listed companies

	(1)	(2)	(3)			(6)	(7)
Year	**Goodwill Carrying Amount Beginning of the Year - Whole Sample - at Year Beginning**	**Goodwill Impairment Loss - Whole Sample**	**Goodwill Carrying Amount Beginning of the Year - Companies with Impairment Losses**	**(4) = (2) / (1)**	**(5) = (2) / (3)**	**Average Goodwill Impairment Rate**	**No. of Observations**
2005	1,682,174,283	10,010,546	453,307,071	0.60%	2.21%	1.75%	1403
2006	1,972,846,475	39,373,809	567,960,196	2.00%	6.93%	1.77%	1433
2007	2,421,719,273	21,915,007	600,848,227	0.90%	3.65%	1.30%	1464
2008	2,738,457,034	176,277,238	1,163,763,600	6.44%	15.15%	3.11%	1501
2009	2,663,515,984	42,945,482	1,031,862,940	1.61%	4.16%	2.59%	1526
2010	2,797,701,107	38,195,161	921,211,294	1.37%	4.15%	1.47%	1563
2011	2,932,723,837	195,220,158	1,605,390,169	6.66%	12.16%	2.61%	1629
2012	2,832,215,037	55,251,606	800,726,659	1.95%	6.90%	2.76%	1620
2013	2,744,464,854	41,310,774	454,661,097	1.51%	9.09%	1.66%	1519
2014	2,937,609,878	31,765,894	456,393,854	1.08%	6.96%	1.89%	1470
2015	3,023,161,391	35,045,509	431,664,314	1.16%	8.12%	2.03%	1480
2016	3,339,813,519	30,253,476	568,667,367	0.91%	5.34%	2.01%	1492
2017	3,418,394,666	58,195,148	691,067,117	1.70%	8.42%	1.28%	1498
Average	2,731,138,257	59,673,831	832,104,066	2.14%	7.17%	2.02%	1508

Table A2: Goodwill impairment losses at European listed companies

Year	(1) Firms with Goodwill	(2) Firms with Impairment Losses	(3) Firms with >5% Impairment Losses	(4) Firms with >10% Impairment Losses	(5)= (2) / (1)	(6) = (3) / (1)	(7) = (4) / (1)
2005	1,403	211	78	50	15.0%	5.6%	3.6%
2006	1,433	215	69	47	15.0%	4.8%	3.3%
2007	1,464	189	53	34	12.9%	3.6%	2.3%
2008	1,501	289	138	107	19.3%	9.2%	7.1%
2009	1,526	280	137	96	18.3%	9.0%	6.3%
2010	1,563	229	79	50	14.7%	5.1%	3.2%
2011	1,629	285	128	98	17.5%	7.9%	6.0%
2012	1,620	248	113	92	15.3%	7.0%	5.7%
2013	1,519	189	81	54	12.4%	5.3%	3.6%
2014	1,470	187	84	62	12.7%	5.7%	4.2%
2015	1,480	202	96	72	13.6%	6.5%	4.9%
2016	1,492	193	87	69	12.9%	5.8%	4.6%
2017	1,498	171	66	43	11.4%	4.4%	2.9%
Average	1508	222	93	67	14.7%	6.1%	4.4%

Appendix 2: Derivation of the regression equation used in the analysis

Assuming full fair value accounting,[17] a firm's equity value (S) is equal to the book value of common equity (BV):

$$\mathbf{S = FVA - FVL = BV_{FF}} \quad \textbf{(1)}$$

Where:
S = Equity value
FVA = Asset fair value
FVL = Liabilities fair value
BV_{FF} = Book value$_{\text{Full fair value}}$

Based on this assumption, if markets are efficient and have confidence in balance sheet fair value measures, the price to book value multiple, for any firm, should equal one. In practice, markets express prices that are widely different from book values, because not all assets (and liabilities) are recorded in the balance sheet and not all those recorded are recorded at fair value.[18] Equation (1) can be written as follows to separately identify the contribution of intangible assets to firm value:

$$\mathbf{S = BV_{IFRS} + \Delta INT +/- CG} \quad \textbf{(2),}$$

where:
BV_{IFRS} = Book value IFRS
ΔINT = Unrecognized intangible assets[19]
CG = Unrealized capital gains/losses on tangible assets

This is equivalent to:

$$\mathbf{S = TBV + INT +/- CG} \quad \textbf{(3),}$$

where:
TBV = Tangible book value
INT = Intangible assets (both recognized and unrecognized).
Intangible assets include both goodwill[20] and separately identifiable intangible assets[21]:

$$\mathbf{INT = GBI - GI + SIIA} \quad \textbf{(4),}$$

where:

GBI = Goodwill before impairment

GI = Goodwill impairment

SIIA = Separately identifiable intangible assets (recorded and not recorded in the balance sheet).

Given equation (4), we can write (3) as follows:

$$\mathbf{S = TBV + GBI - GI + SIIA +/- CG} \quad \textbf{(5)}$$

Breaking down written goodwill in the sum of *1)* goodwill before impairment and *2)* goodwill write-down after the impairment test allowed us to test the value relevance of both accounting items.

To define our model, we scaled each variable to tangible book values,[22] allowing a meaningful interpretation of the regression coefficients.

[17] In a full fair value environment, all intangible assets at a given date are booked in the balance sheet, so that current income can be obtained as the product of the measured intangible fair value and the specific required return on the intangible asset.

[18] This is due, for example, to tangible asset recognition under IAS 16 held to maturity under IFRS 9 (for financial companies), or simply because internally generated intangible assets cannot be identified and recorded in the balance sheet. Regarding the latter issue, it is notable that some companies will have higher book values because they have conducted many M&As, while other companies will have lower book values as a consequence of not having acquired any other firms.

[19] This includes both internally generated intangible assets and differences in the fair value of externally acquired intangible assets between the date of acquisition and the current date.

[20] This includes both internally generated goodwill, goodwill emerging from an acquisition (externally acquired goodwill), and differences in the fair value of externally acquired goodwill between the date of acquisition and the current date.

[21] Such as customer relationship intangible assets (customer base or customer list), brand, technology-related intangibles, know how, etc.

$$\frac{S}{TBV} = 1 + \frac{(Goodwill\ Before\ Impairment\ \ )}{TBV} + \frac{(Goodwill\ Write\ Down\ \ )}{TBV} + \frac{(Unrealized\ Capital\ Gains - \ Losses\ \ )}{TBV} + \frac{(Separately\ Identifiable\ Intangible\ Assets\ \ )}{TBV} \quad (\mathbf{6})$$

Given equation (6), to test our hypothesis, we run the following regression:

$$\frac{Mkt\ Cap_{i,t}}{TBV_{i,t}} = \propto + \beta_{Goodwill\ Before\ impairment} \times \frac{(Goodwill\ Before\ Impairment_{i,t})}{TBV_{i,t}} + \beta_{Goodwill\ Impairment\ test} \times \frac{(Goodwill\ Write\ Down_{i,t})}{TBV_{i,t}} + \beta_{ROTE} \times ROTE_{i,t+1} + \beta_{Growth} \times \frac{(Net\ Income_{i,t+3} - Net\ Income_{i,t+1})}{TBV_{i,t}} + \sum_{k=1}^{K} \beta_{Control,k} \times Control_{k,i,t} + \varepsilon_{i,t}$$

(7)

Compared to equation (6), the regression equation used in our analysis does not include separately identifiable intangible assets (SIIA), both recorded and not recorded in the balance sheet, and unrealized capital gains/losses (CG), as these values are unobservable. Nevertheless, the value of both variables may be considered a function of current profitability (ROTE) and expected growth in profitability, i.e., the difference between net income expected at the end of year 3 (t+3) and expected net income at year 1 (t+1).

[22] This is to take into account the fact that absolute value measures suffer from heteroscedasticity, in particular in a sample that covers not only big but also small firms. Value relevance research has stressed the need to scale accounting and market measures in order to avoid heteroscedasticity of residuals while performing regression analysis. Therefore, accounting figures are scaled by tangible book value. As we illustrate hereafter, it is important to note that results are not biased by the choice of the scalar: scaling by TBV allows interpretation of a dependent variable as a multiple and, most importantly, reduces the tangible book value variable as part of the intercept in regression analysis. The choice of tangible book value is also due to the fact that this measure is not influenced by the amount of goodwill itself.

References

Aharony, J., R. Barniv and H. Falk (2010), 'The Impact of Mandatory IFRS Adoption on Equity Valuation of Accounting Numbers for Security Investors in the EU', *European Accounting Review*, Vol. 19, pp. 535–78.

Alcaide, M.Á., Guadalajara, M.N., De La Poza, E. (2021), "Modelling it brand values supplied by consultancy service companies: Empirical evidence for differences", Technological and Economic Development of Economy Vol. 27(1), pp. 120-148

Bagna, E., G. Di Martino and D. Rossi (2015), 'No More Discount Under Enhanced Fair Value Hierarchy', *Applied Economics*, Vol. 47, pp. 5559–82.

Bagna, E., Bini, M., Bird, R., Momentè, F., Reggiani, F. (2010), "Accounting for Employee Stock Options: What Can We Learn from the Market's Perceptions?", *Journal of International Financial Management and Accounting, Vol. 21(2), pp. 161–186.*

Bagna, E., Ramusino, E.C., Denicolai, S. (2021), Innovation through patents and intangible assets: Effects on growth and profitability of european companies, *Journal of Open Innovation: Technology, Market, and Complexity, Vol. 7(4), pp. 220*

Barth, M. E. and G. Clinch (1996), 'International Accounting Differences and their Relation to Share Prices: Evidence from UK, Australian, and Canadian Firms', *Contemporary Accounting Research*, Vol. 13, pp. 135–70.

Beatty, A. and J. Weber (2006), 'Accounting Discretion in Fair Value Estimates: An Examination of SFAS 142 Goodwill Impairments', *Journal of Accounting Research*, Vol. 44, pp. 257–88.

Bens, D. A., W. Heltzer and B. Segal (2011), 'The Information Content of Goodwill Impairments and SFAS 142', *Journal of Accounting, Auditing and Finance*, Vol. 26, pp. 527–55.

Boennen, S. and M. Glaum (2014), 'Goodwill Accounting: A Review of the Literature', *Available at SSRN 2462516*. https://dx.doi.org/10.2139/ssrn.2462516

Bugeja, M. and N. Gallery (2006), 'Is Older Goodwill Value Relevant?', *Accounting & Finance*, Vol. 46, pp. 519–35.

Bugeja, M. and A. Loyeung (2010), 'What Drives the Allocation of the Purchase Price to Goodwill?', *Journal of Contemporary Accounting & Economics*, Vol. 11, pp. 245–61.

Carlin, T. M. and N. Finch (2009), 'Discount Rates in Disarray: Evidence on Flawed Goodwill Impairment Testing', *Australian Accounting Review*, Vol. 19, pp. 326–36.

Chalmers, K., G. Clinch and J. M. Godfrey (2008), 'Adoption of International Financial Reporting Standards: Impact on the Value Relevance of Intangible Assets', *Australian Accounting Review*, Vol. 18, pp. 237–47.

Chalmers, K. G., J. M. Godfrey and J. C. Webster (2011), 'Does a Goodwill Impairment Regime Better Reflect the Underlying Economic Attributes Of Goodwill?', *Accounting and Finance*, Vol. 51, pp. 634–60.

Chauvin, K. W. and M. Hirschey (1994), 'Goodwill, Profitability, and the Market Value of the Firm', *Journal of Accounting and Public Policy*, Vol. 13, pp. 159–80.

Churyk, N. T. (2005), 'Reporting Goodwill: Are the New Accounting Standards Consistent With Market Valuations?', *Journal of Business Research*, Vol. 58, pp. 1353–61.

d'Arcy, A. and A. Tarca (2018), 'Reviewing IFRS Goodwill Accounting Research: Implementation Effects and Cross-Country Differences', *International Journal of Accounting*, Vol. 53, pp. 203–26.

Devalle, A. and F. Rizzato (2012), 'The Quality of Mandatory Disclosure: The Impairment of Goodwill. An Empirical Analysis of European Listed Companies', *2nd Annual International Conference on Accounting and Finance (Af 2012) and Qualitative and Quantitative Economics Research (Qqe 2012)*, Vol. 2, pp. 101–108.

ESMA (2013), *European Enforcers Review of Impairment of Goodwill and Other Intangible Assets in the IFRS Financial Statements*. European Securities and Markets Authority Paris.

Francis, J., P. Olsson and D. R. Oswald (2000), 'Comparing the Accuracy and Explainability of Dividend, Free Cash Flow, and Abnormal Earnings Equity Value Estimates', *Journal of Accounting Research*, Vol. 38, pp. 45–70.

Glaum, M., P. Schmidt, D. L. Street and S. Vogel (2013), 'Compliance with IFRS 3 and IAS 36-Required Disclosures Across 17 European Countries: Company- and Country-Level Determinants', *Accounting and Business Research*, Vol. 43, pp. 163–204.

Godfrey, J. and P.-S. Koh (2001), 'The Relevance to Firm Valuation of Capitalising Intangible Assets in Total and by Category', *Australian Accounting Review*, Vol. 11, pp. 39–48.

Godfrey, J. M. and P.-S. Koh (2009), 'Goodwill Impairment as a Reflection of Investment Opportunities', *Accounting & Finance*, Vol. 49, pp. 117–40.

Gynther, R. S. (1969), 'Some "Conceptualizing" on Goodwill', *The Accounting Review*, Vol. 44, pp. 247–55.

Hamberg, M. and L.-A. Beisland (2014), 'Changes in the Value Relevance of Goodwill Accounting Following the Adoption of IFRS 3', *Journal of International Accounting, Auditing and Taxation*, Vol. 23, pp. 59–73.

Henning, S. L., B. L. Lewis and W. H. Shaw (2000), 'Valuation of the Components of Purchased Goodwill', *Journal of Accounting Research*, Vol. 38, pp. 375–86.

IASB (2015), *Post-Implementation Review of IFRS 3 Business Combinations*. https://www.ifrs.org/projects/completed-projects/2015/pir-of-ifrs-3-business-combinations/

IFRS (2018), *Staff Paper. Goodwill and Impairment Research Project. 11.*

Jennings, R., J. Robinson, R. B. Thompson and L. Duvall (1996), 'The Relation Between Accounting Goodwill Numbers and Equity Values', *Journal of Business Finance & Accounting*, Vol. 23, pp. 513–33.

KPMG (2014), *Who Cares About Goodwill Impairment?* https://assets.kpmg/content/dam/kpmg/pdf/2014/04/impairment-qa.pdf

Lapointe-Antunes, P., D. Cormier and M. Magnan (2009), 'Value Relevance and Timeliness of Transitional Goodwill-Impairment Losses: Evidence from Canada', *The International Journal of Accounting*, Vol. 44, pp. 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*, Vol. 30, pp. 236–55.

Li, K., A. Amel-Zadeh and G. Meeks (2010), 'The Impairment of Purchased Goodwill: Effects on Market Value', *Available at SSRN 930979*. https://dx.doi.org/10.2139/ssrn.930979

Li, K. K. and R. G. Sloan (2017), 'Has Goodwill Accounting Gone Bad?', *Review of Accounting Studies*, Vol. 22, pp. 964–1003.

Li, Z., P. K. Shroff, R. Venkataraman and I. X. Zhang (2011), 'Causes and Consequences of Goodwill Impairment Losses', *Review of Accounting Studies*, Vol. 16, pp. 745–78.

Lys, T. Z., L. Vincent and N. Yehuda (2012), 'The Nature and Implications of Acquisition Goodwill', *Available at SSRN 1802612*. http://dx.doi.org/10.2139/ssrn.1802612

Ni, Y., Y.-R. Cheng and P. Huang (2021), 'Do Intellectual Capitals Matter to Firm Value Enhancement? Evidence from Taiwan', *Journal of Intellectual Capital*, Vol. 22, pp. 725–43.

Oliveira, L., L. L. Rodrigues and R. Craig (2010), 'Intangible Assets and Value Relevance: Evidence from the Portuguese Stock Exchange', *The British Accounting Review*, Vol. 42, pp. 241–52.

Paugam, L., P. Astolfi and O. Ramond (2015), 'Accounting for Business Combinations: Do Purchase Price Allocations Matter?', *Journal of Accounting and Public Policy*, Vol. 34, pp. 362–91.

Ramanna, K. and R. L. Watts (2012), 'Evidence on the Use of Unverifiable Estimates in Required Goodwill Impairment', *Review of Accounting Studies*, Vol. 17, pp. 749–78.

Sapkauskiene, A. and S. Leitoniene (2014), 'The Analysis of Factors Influencing the Write-Off of Goodwill', *19th International Scientific Conference Economics and Management 2014 (Icem-2014)*, Vol. 156, pp. 643–47.

Shalev, R., I. X. Zhang and Y. Zhang (2013), 'CEO Compensation and Fair Value Accounting: Evidence from Purchase Price Allocation', *Journal of Accounting Research*, Vol. 51, pp. 819–54.

Su, W. H. and P. Wells (2015), 'The Association of Identifiable Intangible Assets Acquired and Recognised in Business Acquisitions with Postacquisition Firm Performance', *Accounting & Finance*, Vol. 55, pp. 1171–99.

Xu, W., A. Anandarajan and A. Curatola (2011), 'The Value Relevance of Goodwill Impairment', *Research in Accounting Regulation*, Vol. 23, pp. 145–48.

Zhang, I. X. and Y. Zhang (2017), 'Accounting Discretion and Purchase Price Allocation After Acquisitions', *Journal of Accounting, Auditing & Finance*, Vol. 32, pp. 241–70.

The impact of different Goodwill accounting methods on stock prices: a comparison of amortization and impairment-only methodologies

Author Statement

Emanuel Bagna: Conceptualization, Methodology, Formal analysis, Writing - Review & Editing
Enrico Cotta Ramusino: Data curation, Writing- Original draft preparation, **Matteo Ogliari**: Visualization, Investigation, Supervision, Resources, Writing- Original draft preparation

Highlights

We examine the value relevance of goodwill under the current accounting framework and the alternative hypothesis of an amortization regime by analyzing a large sample of European publicly traded companies since the adoption of IAS (2005)

Results support the existing accounting system (no amortization of goodwill)

In the case of multiple goodwill write-downs, market response to goodwill impairment becomes increasingly severe