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公允價值衡量資訊揭露的有用性：來自商譽減損的證據

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摘要

本研究以實證方式探討商譽公允價值衡量揭露的資訊有用性。研究結果顯示，公司揭露商譽公允價值衡量的多寡與公司未來一年認列商譽減損損失的可能性呈負相關。其次，研究發現投資人對於商譽減損損失有負面的市場反應，商譽減損金額越高，市場負面反應也越高，但若公司提供較多的公允價值衡量揭露，則市場的負面反應程度會降低。研究進一步發現，當公司的研發經費較多或報導部門數目較多時，公允價值衡量揭露對商譽減損損失及市場反應兩者間的影響會更加的顯著。綜合來說，公允價值衡量揭露加強商譽衡量的可靠性及可驗證性，降低投資人對管理當局利用公允價值衡量操弄商譽減損決定的疑慮。

關鍵詞：商譽減損、公允價值衡量、揭露、透明度

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On the Usefulness of Supplemental Disclosure about Fair Value Measurement: Evidence for Goodwill Impairment

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Abstract

This study examines the usefulness of firms' supplemental disclosure about fair value measurement used in determining goodwill impairment. We find that the level of supplemental disclosure about the specifics of goodwill impairment test in the current year is negatively associated with the recurrence of goodwill write-off in the subsequent year. We also find that investors' valuation of goodwill impairment loss is less negative for firms making more extensive disclosure about goodwill impairment test. This effect is found to be stronger for firms with more complex and subjective decision of goodwill impairment. Taken together, our results suggest that supplemental disclosure about fair value measurement enhances the verifiability of fair value-based accounting information and mitigates investors' concern about the subjectivity and opacity of firms' fair value accounting decision.

Keywords: *Goodwill impairment, Fair value measurement, Supplemental disclosure, Transparency.*

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1. INTRODUCTION

Goodwill impairment is the accounting recognition for the loss of expected synergy value due to underperforming acquisitions. This recognition is economically important for investment and valuation analysis as it reflects negatively on the impairment firm's acquisition strategy and its implementation.[1] While goodwill impairment loss is clearly indicated in firms' financial reports, the process followed by firms in measuring impairment is not transparent to investors because goodwill impairment decisions are based on complex and subjective fair value measurement that is unobservable to investors. As a result, investors seeking to verify the decision of goodwill impairment and assess its implications can be hampered by the lack of information if they are not fully informed of fair value measurement process underlying impairment decision. However, because management plays a direct and critical role in performing goodwill impairment test and determining impairment loss, supplemental disclosure by management about the elements of impairment test may aid investors' assessment of firms' impairment decision. This study examines whether management disclosure about the specifics of goodwill impairment test increases the verifiability of goodwill impairment decision and facilitates investors' assessment of the implications of goodwill impairment.

Following the essence of goodwill impairment test prescribed by SFAS 142, we focus on disclosure about three elements of firms' impairment decision: (1) information on past mergers and acquisitions that have led to goodwill write-off, (2) fair value measurement methodologies used in goodwill impairment test, and (3) inputs of fair value measurement underlying goodwill impairment test.[2] While these elements are obviously the key of firms' internal measurement employed in determining goodwill impairment, the usefulness of disclosure about each element is not straightforward and has not been examined by prior research. Absent a complete revelation about the entire spectrum of information considered by management in making impairment decision, it is not clear whether knowledge about certain specifics of goodwill impairment test may help investors penetrate firms' complex decision of goodwill impairment. Disclosure that does not specify events and factors responsible for impairment may not provide a meaningful basis for investors to infer the

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[1] The prevalence of goodwill impairment has increased over time. Since the enactment of SFAS 142, the number of firms with goodwill impairment has risen from 466 in 2003 (10.04% of all firms with goodwill in 2003) to 562 in 2012 (14.81% of all firms with goodwill in 2012), with the average amount of impairment relative to goodwill growing from 11.2% to 14.6% (an increase of 30%). The large increase has led to intense investor scrutiny of firms reporting goodwill impairment (Byrnes 2009; Healy 2009). The negative implications of goodwill impairment are confirmed by studies documenting negative market reaction to goodwill impairment news (Bens, Heltzer, and Segal 2011; Li, Shroff, Venkataraman, and Zhang 2011) and stock sales by insiders before the news (Muller, Neamtiu, and Riedl 2009).

[2] In summarizing the key features of SFAS 142, FASB states that the requirements of tracing goodwill from acquisition to firms' operating units and using fair value measurements that incorporate management inputs to assess goodwill impairment are the key elements of SFAS 142 and its major departure from prior standards (e.g., APB 17 and SFAS 121).

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implications of goodwill impairment, whereas disclosure without details on the implementation of impairment test may not be useful to investors for verifying the propriety of impairment decision. The effect of management disclosure about firms' goodwill impairment decision also depends on whether information from other sources is more informative and/or timelier than management disclosure. Thus, the usefulness of management disclosure about goodwill impairment test is an empirical issue.

We argue that the level of supplemental disclosure about goodwill impairment decision is associated with the extent of management understating the existing amount of impairment loss, a form of manipulation that may lead to repeated goodwill write-offs in the subsequent year. Managers manipulating impairment decision to understate impairment loss likely have incentives to disclose fewer details of goodwill impairment test because disclosure of more details may enhance investors' ability to detect the manipulation. Less disclosure about the specifics of impairment test benefits management by hindering investors' ability to fully assess the propriety of firms' impairment decision and "see through" the manipulation. Hence, we predict a negative association between the level of impairment-related disclosure in the current year and the likelihood of recurring goodwill write-off in the subsequent year. Consistent with the role of disclosure level as a signal for the truthfulness of firms' impairment decision, we also hypothesize that investors would condition their assessment of the valuation implications of goodwill impairment on the available amount of disclosure about the details of firms' impairment test.

Consistent with our hypotheses, we find that firms reporting impairment but disclosing fewer (more) details about goodwill impairment test in the current year are more (less) likely to incur impairment loss again in the following year. This evidence suggests that the amount of management disclosure credibly signals the verifiability and truthfulness of firms' goodwill impairment decision. We also find that investor valuation of goodwill impairment loss is less negative for firms that make more extensive disclosure about impairment test. This evidence is consistent with management disclosure enhancing the transparency of firms' impairment decision and mitigating investors' concerns about management understating the current amount of impairment loss. We find that the usefulness of impairment-related disclosure is greater for firms with more complex and subjective decision of goodwill impairment, such as firms operating in more segments that need to be separately tested for impairment and firms with more intangible investments that need to be fair valued when assessing goodwill impairment. Thus, the usefulness of management disclosure increases with the complexity and opacity of firms' accounting process for determining goodwill impairment.

Our study makes the following contributions. First, it contributes to research on the reporting of goodwill impairment. Existing studies examine management discretion in the adoption of SFAS 142 (Beatty and Weber 2006), the political economy of goodwill

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accounting (Ramanna 2008), the information content of goodwill impairment (Bens et al. 2011; Li et al. 2011), the cause of goodwill write-off (Gu and Lev 2011), and delays in write-off decision (Ramanna and Watts 2012; Li and Sloan 2017). There is no research on the role of disclosure about the measurement process underlying the decision of goodwill impairment. Our study fills this gap by providing evidence on the usefulness of disclosure about the inputs and methods used in making goodwill impairment decision. We find that when valuing goodwill impairment investors view the extent of impairment-related disclosure as a signal for the truthfulness of firms' impairment decision. Our study adds to existing research on the implications of unverifiable and subjective fair value-based goodwill accounting by documenting that supplemental disclosure enhances the verifiability and truthfulness of goodwill accounting.

Second, the results of our study are relevant for ongoing regulatory debate about the usefulness of disclosure in fair value-based reporting of goodwill. While users indicate that enhanced disclosure can facilitate the processing of information on goodwill impairment (Ernst & Young 2010), it is contested that information about the methods and assumptions employed in impairment decision would be of little benefit to users if users do not have access to management projection of firms' future performance (FASB 2001a). Recently, FASB simplified the reporting of goodwill impairment by allowing firms to replace quantitative impairment tests with a qualitative assessment of impairment risk that conveys no information on the inputs and methods of fair value measurement (FASB 2011). In response, the SEC stressed the importance for firms to continuingly inform investors of critical accounting methods and assumptions used in goodwill impairment decision (SEC 2011). Our study provides evidence confirming the usefulness of disclosure in investors' processing of goodwill impairment information.

Third, our study also contributes to research examining the effect of voluntary disclosure on accounting transparency. Existing studies have focused on aggregate disclosure (e.g., the AIMR disclosure rankings) that abstracts from firms' accounting measurement process and management decision involved in generating the externally disclosed information. There is little research on disclosure that informs investors of firms' underlying accounting process (Beyer, Cohen, Lys, and Walther 2010) and indicates how managers internally transform disaggregated data into aggregate accounting output (Berger 2011).[3] These two aspects are important to investors because they provide the necessary

[3] Beyer et al. (2010, 309) suggest that research on how disclosure varies with the informativeness of firms' accounting measurement process is particularly useful for improving the understanding about the benefits of management disclosure ("We believe that a promising topic to investigate is how disclosures vary with the ability of the accounting process to convey useful and relevant information"). Berger (2011) specifically suggests that "To really understand the decisions that lead to this aggregated output, we need to learn more about how managers use their discretion in going from the disaggregated data they observe internally to arrive at the highly aggregated items that get reported externally" (p. 216).

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background for understanding accounting reports. Our study specifically fills this gap by examining the disclosure of goodwill impairment that reveals management discretion in choosing the disaggregated data (e.g., the specific inputs of fair value measurement) used in making the complex accounting decision of goodwill impairment. Given the unique role of management in the production of accounting information, such disclosure can shed light on managers' private information and beliefs about firm performance. In the context of subjective fair value-based goodwill impairment reporting, the disclosure is particularly useful for users' assessment of the uncertainties involved in fair value-based measurement, which in turn can improve users' understanding about the potential variability in the prospects for future cash flows related to the underlying assets (FASB 2012). Our study also shows that the usefulness of disclosure varies with the complexity and opacity of firms' accounting decision-making process for goodwill impairment. This relationship between disclosure usefulness and the attribute of firms' accounting measurement process has not been documented by prior research.

The remainder of our study proceeds as follows. We motivate our research hypotheses in section 2. Section 3 describes our sample and data, and section 4 reports the details of our empirical tests and results. Section 5 summarizes our study and concludes.

2. RESEARCH HYPOTHESIS

Impairment of goodwill is an important event for valuation and investment analysis as it signifies firms' failure in achieving the anticipated synergetic value of prior acquisitions. Investors' task of assessing the full implications of the event, however, is not straightforward, due to the concern that subjective and unverifiable fair value-based reporting is susceptible to manipulation by management (Watts 2003; Hilton and O'Brien 2009; Dichev, Graham, Harvey, and Rajgopal 2014). Self-interested managers can exploit this susceptibility to understate impairment loss by delaying write-offs of impaired goodwill while hoping that improved performance in future would void further impairment charge (Ramanna 2008; Ramanna and Watts 2012; Li and Sloan 2017). Because the revelation of goodwill impairment directly links management to a failed investment strategy, understating impairment can potentially save the manager by decreasing the magnitude of negative market reaction to the news of impairment (Li et al. 2011), reducing the likelihood of shareholder lawsuits alleging bad acquisition decisions (Gu and Lev 2011), and even avoiding management turnover. Thus, managers attempting to soften the blow of goodwill impairment will likely try to delay recognizing a portion of currently existing impairment loss, resulting in repeated impairment in the subsequent year when firms' future performance falls short of managers' overly optimistic expectations for

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improvement.[4]

We argue that managers attempting to delay and understate impairment loss have incentives to disclose fewer details about goodwill impairment test because more details would enhance investors' ability to assess the truthfulness of firms' impairment decision, such as the propriety of key assumptions and estimates underlying the amount and timing of impairment loss recognized in the current period, and hence "see through" intentional delay and understatement of impairment loss by management. This incentive is consistent with prior research on firms' opaque reporting choices when management withholds bad news and delays its recognition (e.g., Kothari, Shu, and Wysocki 2009). Less disclosure about the specifics of impairment test benefits management by making it more difficult for investors to question the validity and prudence of firms' impairment decision. Therefore, we predict that for firms with goodwill impairment in the current year there is a negative association between the level of firms' impairment-related disclosure in the current year and the likelihood of repeated occurrence of goodwill impairment in the subsequent year.[5]

H1: The current level of disclosure about the specifics of goodwill impairment decision is negatively associated with the likelihood of repeated impairment loss in the subsequent year.

The role of disclosure in verifying the propriety and truthfulness of firms' impairment decision also predicts variations in investors' valuation of goodwill impairment in relation to the amount of disclosure available to investors. We consider two relevant scenarios of the variation.

First, if disclosure is provided *contemporaneously* with the news of goodwill impairment (e.g., at the time of firms' earnings reports), there would be a less negative valuation for firms providing more disclosure about their impairment decision-making process. Second, disclosure is made *subsequent to* the initial news of impairment (e.g., in 10-K report filed weeks after earnings announcement). This sequential information release leads to a two-stage valuation for the impact of goodwill impairment, where investors perform the first-stage valuation in the absence of disclosure about the specifics of goodwill impairment test and place a more negative valuation than if the disclosure is

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[4] Prior research finds that on average firms recognizing goodwill impairment in the current year continue experiencing performance declines (e.g., below-industry-average stock returns and accounting profitability) during subsequent years (Gu and Lev 2011).

[5] Prior research also suggests that managers may have incentives to overstate the amount of asset impairment loss by "taking a big bath" to pre-load future impairment charges into the current period and hence protect management against future impairment loss (e.g., Francis, Hanna, and Vincent 1996; Riedl 2004). It is conceivable that management engaged in overstating goodwill impairment may also have incentives to provide less supplemental disclosure about the specifics of goodwill impairment test in order to avoid investor detection of the manipulation. This scenario, however, would lead to a *positive* association between current disclosure level and the likelihood of repeated impairment in the subsequent year because firms overstating the amount of impairment loss in the current year are less likely to report impairment loss again in the subsequent year. This positive association is *opposite* to the prediction of H1.

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available. The second-stage valuation, however, is different and reflects the effect of subsequent disclosure on mitigating investors' concerns about management manipulation, such as delayed recognition and understatement of impairment loss. Informative disclosure at the second stage increases the verifiability of reported impairment loss and prompts investors to revise the first-stage valuation accordingly. Because rational investors may initially assume the worst possible valuation for all firms (i.e., the most negative valuation for impairment loss due to the possibility of delayed reporting of more impairment losses), a more positive revision is expected for firms that provide greater disclosure about the specifics of impairment measurement process.[6]

We focus on the second scenario because in practice firms reveal the initial news of goodwill impairment in earnings announcements without much detail (see Section 3) and subsequently disclose some details of the impairment decision in a footnote in annual reports or 10-K. Our interest is in the second-stage valuation where some firms provide greater disclosure than others. We examine whether greater disclosure mitigates investors' concerns about the propriety and truthfulness of their impairment decision. Because the level of disclosure credibly separates firms with more truthful impairment decisions from others, we expect disclosure to have a positive effect on investors' subsequent valuation adjustment relative to the initial negative valuation of goodwill impairment arrived at an earlier date when no disclosure is available to investors (i.e., in earnings reports first showing the amount of the impairment). Stated differently, greater disclosure about firms' impairment decision-making is expected to trigger a more positive revision in investors' valuation of goodwill impairment. Thus, our second hypothesis is (in alternate form):

H2: The level of supplemental disclosure about the specifics of firms' goodwill impairment decision is positively associated with the revision of investors' valuation of goodwill impairment.

Our predictions in H1 and H2 are consistent with the implications from the model of Hughes and Pae (2004). Hughes and Pae examine the relation between estimates of asset value and voluntary supplemental disclosure of precision information (i.e., information used by management in deriving the estimate of asset value that is revealed to investors). They find that voluntary disclosure of information with high precision (i.e., more detailed

[6] As a result of this worst-case-scenario assumption by investors, management may decide to subsequently disclose more information in 10-K when they believe investors may have over-reacted in the first-stage valuation (i.e., management believes that their firm is in fact better than the worst-case scenario assumed by investors). Our research interest is in the usefulness of subsequent disclosure about goodwill impairment in 10-K in the second- stage valuation while we take firms' decision to disclosure more or less information in 10-K as given. As explained in Section 4.1, we focus on the abnormal level of subsequent disclosure in 10-K after taking into account the information materiality concerning goodwill impairment loss and goodwill, litigation risk, and factors pertaining to firms' information environment. To the extent that investors' first-stage valuation decision is based on the magnitude of reported goodwill impairment loss (in absolute value and in relation to the size of firms' goodwill), the level of abnormal disclosure may likely reflect additional management response to investors' over-reaction in the first-stage valuation of goodwill impairment loss.

information useful for verifying the estimate of asset value) is given by management when the estimate of asset value is higher than previously believed. This relation implies that disclosure of high precision, supplemental information useful for verifying the estimate of asset value conveys good news concerning asset value and triggers positive investor reaction.[7] In our setting of management reporting of goodwill impairment, we predict that greater supplemental disclosure about the specifics of goodwill impairment decision is associated with a lower likelihood of repeated impairment loss in the subsequent year (H1) and also leads to a more positive revision of investors' valuation (H2).

To further substantiate the usefulness of impairment disclosure in mitigating investors' concerns about the subjective and unverifiable nature of managers' impairment decision, we consider cases where the high subjectivity and low verifiability of impairment decision are of greater concerns to investors. We predict that in such cases the usefulness of impairment disclosure would be greater. Empirically, the benefit of disclosure may likely vary with the inherent complexity and opacity of firms' impairment decision-making process. These characteristics contribute significantly to the lack of transparency and verifiability in firms' impairment decisions. *Ceteris paribus*, impairment decisions are more complex and more opaque for firms with greater internal investments in intangible assets, such as R&D. Although R&D expenditures are fully expensed for other purposes of financial reporting (e.g., determination of earnings), SFAS 142 requires firms to include unrecognized intangible assets, such as R&D, in the estimation of the fair value of a reporting unit for the purpose of assessing possible goodwill impairment.[8] Given the inherent difficulty of determining the value of internally developed intangibles such as R&D (e.g., lack of market for trade and high uncertainty in value), impairment decisions are inherently more subjective and complex at firms with greater investment in R&D.[9]

The effect of disclosure is also likely stronger for firms operating in multiple business segments. The initial recording of goodwill and subsequent impairment tests are both

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[7] Supporting this implication, Hutton, Miller, and Skinner (2003) find that management earnings forecasts with good news that are accompanied by supplemental disclosures are associated with more positive market reactions than those that are not.

[8] This requirement applies to the first step in the determination of goodwill impairment, which is the process of estimating the fair value of a reporting unit to which goodwill is assigned. Specifically, SFAS 142 requires that "The implied fair value of goodwill shall be determined in the same manner as the amount of goodwill recognized in a business combination is determined. That is, an entity shall allocate the fair value of a reporting unit to all of the assets and liabilities of that unit (including any unrecognized intangible assets) as if the reporting unit had been acquired in a business combination and the fair value of the reporting unit was the price paid to acquire the reporting unit." (SFAS 142,` Paragraph 21).

[9] The economic value of unrecognized intangible assets directly affects firms' impairment decision. For example, firms with more valuable in-process R&D (e.g., new products and technologies under development) and other unrecognized intangibles are less likely to record a goodwill impairment charge because they are less likely to have an indicator for goodwill impairment under the first step of the impairment test prescribed by SFAS 142. Thus, the timing and amount of impairment recognition can be affected by management discretion in estimating the value of internally developed intangible assets and, more fundamentally, management decision of R&D allocation among business units.

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performed at the reporting unit level (e.g., segment). Because more segments allow greater flexibility and management manipulation in accounting decisions (e.g., accounting allocations across segments), investors are likely more concerned about the transparency of impairment decision at multi- segment firms.

The arguments above lead to our prediction that the transparency-enhancing effect of impairment disclosure is positively associated with the amount of R&D investment and positively associated with the number of segments of the impairment firm. Thus, our third hypothesis is (in alternate form):

H3: The usefulness of disclosure about firms' goodwill impairment decision is greater and more positive for (1) firms with larger amounts of investment in R&D and (2) firms with more business segments.

3. SAMPLE AND DATA

Because SFAS 142 requires all firms with goodwill to perform impairment test on an annual basis, any firm with goodwill may choose to disclose some information about goodwill impairment test. In this study, we focus on disclosure about goodwill impairment test provided by firms that report impairment loss rather than the disclosure from firms with goodwill but no impairment loss. This focus allows us to control for the effect of event and information materiality on firms' disclosure decision. Prior research finds that failure to control for this effect leads to incorrect inferences regarding the incentives of disclosure (Heitzman, Wasley, and Zimmerman 2010).[10] To identify firms reporting goodwill impairment under SFAS 142, we use the 2006 COMPUSTAT merged annual files. Our initial sample consists of 892 firm-years that report goodwill impairment for the period 2003-2005 and have all required variables available from COMPUSTAT. Our sample period begins in 2003 because this is the first mandatory adoption year of SFAS 142 for all firms.[11] We sequentially exclude 106 firm-years that have no available filing date for 10-K and 218 firm-years that are not covered in CRSP. The final sample includes

[10] As explained in Section 4.1, we further implement the control for information materiality by removing the effect of firms' goodwill impairment loss (as a percentage of total assets) and the amount of goodwill relative to total assets when we measure the level of firms' discretionary disclosure about goodwill impairment test.

[11] Mandatory adoption of SFAS 142 was required for all firms with fiscal years beginning after December 15, 2001, with early adoption allowed for firms with fiscal years beginning after March 15, 2001. As a result, all firms (some firms) in 2001 (2002) had the option of early adoption. We begin our sample period in 2003 to ensure uniform and mandatory applicability of SFAS 142 to all firms across all years of our sample period.

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568 firm-years.[12] Table 1 provides the details of our sample selection process.

Table 1 Sample Selection Procedure

Sample of firms reporting goodwill write-off between 2003 and 2005 with complete COMPUSTAT information	892
(1) Minus: firms with no filing date for 10-K	(106)
(2) Minus: firms with no CRSP data	(218)
Final sample	568

Notes: The sample of firms reporting goodwill write-off is identified from the 2006 COMPUSTAT merged annual files.

Table 2 reports the industry composition of our sample firms. While a total of 57 two-digit SIC industries are represented in the sample, the number of firms in each industry varies considerably, with 23 (34) industries including at least (less than) 6 firms, or 1% of the sample. Approximately 41% of the sample firms are from four industries that are intensive in new technologies and innovations, including chemical and pharmaceutical, computer and machinery, electrical and electronics, and computer software and data services. The concentration of goodwill impairment among these industries is likely due to the joint effects of (1) the high level of acquisition activities and the prevalence of goodwill in these industries and (2) the highly volatile and uncertain operating environment in these industries that increase the risk of acquiring firms not fully realizing the anticipated benefits from acquisition.

[12] We chose 2003-2005 as our sample period in order to capture informative disclosure about firms' goodwill impairment decision-making and avoid the stickiness of disclosure behavior that may likely occur in subsequent period (i.e., firms repeat the same disclosure language used for earlier years even when economic factors underlying the initial disclosure decision have changed). It is also important to insulate our sample from the substantial confounding effect associated with the global financial crisis of 2007-2009, during which sharp declines in stock prices prompted an unusually large number of firms to record goodwill impairment, a decision that may not be fully consistent with sound accounting and economic considerations. The rush to record goodwill impairment under highly unusual market conditions may have also given some firms the opportunity to unload goodwill from their balance sheet in order to minimize or even eliminate the risk of future impairment, creating yet another confounding effect for examining goodwill impairment decisions of the post-crisis period. Relative to the years immediately before and after the financial crisis period, our sample period is associated with more normal market and economic conditions underlying firms' goodwill impairment decision. Except for private firms, the requirements of goodwill impairment testing under SFAS 142 have not changed since the promulgation of the standard in 2001.

Table 2 Industry Composition of Sample Firms

Two-digit SIC	Industry	Number of firms	Percentage
13	(1) Oil and gas extraction	6	1.06%
17	(2) Construction-special trade	8	1.41%
20	(3) Food and kindred products	11	1.94%
28	(4) Chemical and pharmaceutical products	37	6.53%
30	(5) Rubber and miscellaneous plastics	7	1.23%
33	(6) Primary metal industries	12	2.12%
35	(7) Computer and machinery	37	6.53%
36	(8) Electrical and electronics	72	12.68%
37	(9) Transportation equipment	9	1.59%
38	(10) Medical and scientific instruments	22	3.88%
39	(11) Miscellaneous manufacturing industries	6	1.06%
48	(12) Communications	28	4.94%
49	(13) Utilities	29	5.11%
51	(14) Nondurable goods-wholesale	14	2.47%
54	(15) Food stores	8	1.41%
58	(16) Eating and drinking places	12	2.12%
59	(17) Miscellaneous retail	16	2.82%
61	(18) Nondepository credit institution	6	1.06%
62	(19) Security and commodity brokers	6	1.06%
63	(20) Insurance carriers	6	1.06%
73	(21) Computer software and data services	90	15.87%
80	(22) Health services	14	2.47%
87	(23) Engineering and other professionals services	14	2.47%
Other	Other industries (34 industries)	98	17.25%
Total		568	100%

We report the descriptive statistics of our sample firms in Table 3. It shows that the mean and median firm sizes measured by total assets are $5,367 million and $553 million, respectively. The mean (median) market-to-book ratio is 2.799 (1.8014). The mean (median) amount of goodwill relative to total assets is 14.39% (10.01%). These percentages are relatively large and attest to the economic importance of goodwill for the sample firms. Table 3 also shows that the effect of goodwill impairment is economically significant: on average goodwill impairment accounts for 5.87% of firms' total assets. The mean and median return on assets (ROA) of the sample firms are both negative, -0.1289 and -0.0295, respectively, possibly attributable to the effect of goodwill impairment losses. Sample firms are also diversified: on average sample firms have three different business segments. The indicators for firms' litigation risk, which is based on the firm's membership in highly litigious industries (i.e., industries with 4-digit SIC of 2833-2836, 3570-3577, 3600-3674, and 5200-5961), and for business complexity based on R&D and

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the number of segments all exhibit considerable cross-sectional variations.[13]

Table 3 Descriptive Statistics of Sample Firms

Variable	*N*	Mean	Standard deviation	25th	Median	75th
Firm size ($ million)	568	5367	15919	105	553	2601
SIZE	568	6.3473	2.2659	4.5516	6.3158	7.8635
M/B	568	2.7987	3.9602	1.1480	1.8014	3.0519
GOODWILL	568	0.1439	0.1489	0.0079	0.1001	0.2389
IMPAIRMENT	568	0.0587	0.1207	0.0030	0.0137	0.0580
D_IMPAIRMENT	568	0.3873	0.4876	0.0000	0.0000	1.0000
ROA	568	-0.1289	0.2858	-0.1803	-0.0295	0.0271
SEGNUM	568	3.0141	1.8566	1.0000	3.0000	4.0000
RD	568	0.0308	0.0599	0.0000	0.0000	0.0311
LITIGATION	568	0.2267	0.4191	0.0000	0.0000	0.0000
CAR	568	-0.0024	0.0594	-0.0195	-0.0009	0.0178
DISCLOSURE	568	0.2124	0.1231	0.1429	0.2143	0.2857
AB_DISC	568	0.0000	0.1150	-0.0723	-0.0038	0.0770
RETURN	568	0.1873	0.5980	-0.1277	0.1255	0.4601
FLLW	568	0.8930	1.0695	0.0000	0.0000	1.7918
10KNEWS	568	0.1144	0.3186	0.0000	0.0000	0.0000
INSTITUTION	568	0.3986	0.3446	0.0026	0.3858	0.7055
MFORECAST	568	0.4763	0.4999	0.0000	0.0000	1.0000

Notes: Variable definitions are as follows. *Firm size* is the value of total assets in millions of dollar. *SIZE* is the logarithm of firm size. *M/B* is the ratio of the firm's market value to book value. *GOODWILL* is the amount of firms' goodwill deflated by total assets. *IMPAIRMENT* is the absolute amount of goodwill impairment deflated by total assets. *ROA* is the firm's return on assets, computed as the ratio of net income before extraordinary items, adjusted for goodwill impairment, to the firm's average total assets. *SEGNUM* is the number of the firm's segments. *RD* is the firm's R&D expenditure deflated by total assets. *LITIGATION* is a dummy variable that takes the value of 1 for firms with four-digit SIC in the range of 2833-2836, 3570-3577, 3600-3674, and 5200-5961 and 0 otherwise. *CAR* is the three-day size- adjusted cumulative abnormal returns starting from the release date of the firm's 10-K. *DISCLOSURE* is the composite disclosure score reflecting firms' disclosure about acquisitions responsible for goodwill write-off, the fair value measurement methodologies used in goodwill impairment test, and the inputs of the fair value measurement. *AB_DISC* is the residual from the regression of equation (1) and serves as our measure for abnormal disclosure about goodwill impairment test. *RETURN* is the firm's annual stock return for the fiscal year. *FLLW* is the logarithm of one plus the number of analysts issuing earnings forecast for the firm. *10KNEWS* as a dummy variable that takes the value of 1 for firms with insider purchase transactions during the 30-day window leading up to 5 days before the firm's 10-K filing date (i.e., days -35 to -5 relative to the filing date) and zero otherwise. *INSTITUTION* is the percentage of shares outstanding that are held by institutions. *MFORECAST* is an indicator variable that takes the value of 1 for firms with management earnings forecast during the fiscal year and 0 otherwise.

[13] While our sample firms are on average small (e.g., median total assets of $553 million), the majority of them are multi-segment firms with an average of 3 segments per firm. This attribute is likely due to the active acquisition history of these firms, as indicated by their relatively large amount of goodwill (e.g., more than 10% of total assets). Acquisitions, particularly those aimed at diversifying the acquirer's business portfolio, increase the likelihood for acquiring firms to expand beyond their existing industry boundaries by buying firms operating in other industries.

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Our measure for firms' disclosure about goodwill impairment decision is a composite disclosure score, *DISCLOSURE*, designed to capture the amount of information essential for understanding firms' decision-making for goodwill impairment. This composite score is based on the extent and quality of firms' disclosure in 10-K about three key aspects of impairment decision-making, including (1) disclosure about merger and acquisition activities giving rise to goodwill and subsequent goodwill impairment (*M&A*), (2) disclosure about fair value measurement methodology used in determining goodwill impairment (*METHOD*), and (3) disclosure about the specific information inputs used in implementing the fair value measurement methodology (*INPUT*). Together, these disclosures cover the full spectrum of key information, considerations, and choices underlying firms' impairment decision, thereby capturing the essence of firms' impairment decision-making process. Prior research finds that the occurrence of goodwill impairment is directly linked to firms' decisions in earlier M&A deals (e.g., selection of acquisition target and amount of payment for target) (Hayn and Hughes 2006; Gu and Lev 2011). Hence, it is logical that information on merger and acquisition activities is useful for evaluating subsequent decision-making for goodwill impairment and its implications. Given the complex and subjective nature of fair value methods underlying goodwill impairment decisions, specifics on fair value methods used by the firm (e.g., choice of the method and inputs of the method) are expected to be useful to investors.

We obtain the information used for determining the disclosure score from sample firms' 10-K reports. We select 10-K reports as the primary source of information about firms' goodwill impairment decision after performing a detailed comparison of the availability and timing of impairment-related information across potential disclosure venues used by firms. For example, we examine firms' quarterly earnings announcements that contain the initial news of goodwill impairment loss. In un-tabulated tests, we find that the majority (approximately 70%) of sample firms' earnings reports provide no information about goodwill impairment other than the amount of impairment loss (as a component of earnings), whereas others mostly contain non-essential information (e.g., the non-cash nature of impairment loss).[14] Thus, it is not a common practice for firms to disclose the details of goodwill impairment decision in earnings announcements. Most

[14] For our sample firms, we also examine whether questions from institutional investors and financial analysts and management response to these questions during quarterly earnings conference calls are related to firms' decision- making of goodwill impairment. As expected, we find some evidence of management attributing poor performance to goodwill impairment (e.g., citing goodwill impairment as a factor in their explanations about overall accounting losses or earnings decreases). We, however, find no evidence of investors and analysts inquiring about the specifics of firms' goodwill impairment decision (e.g., methods and assumptions used in making goodwill impairment decisions). The paucity of analyst questions on accounting-related issues, such as goodwill impairment, during earnings calls is consistent with the findings in Lev and Gu (2016) that the vast majority of investor and analyst questions during earnings conference calls and investor meetings are non-accounting related. Prior research also indicates analysts tend to ignore nonrecurring items (e.g., Philbrick and Ricks 1991; Gu and Chen 2004).

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firms tend to refrain from elaborating on the key information of goodwill impairment decision when the news of impairment first appears in earnings reports. In contrast, we find greater and more varied disclosures in 10-Ks about the details of goodwill impairment decision.[15] In constructing our disclosure score, we focus on sample firms' 10-K reports pertaining to the specific year of impairment. This ensures that our disclosure score captures information pertinent to the details of goodwill impairment test performed by firms that incur goodwill impairment, rather than general and recurring statements assuring firms' compliance with the impairment testing requirements of SFAS 142. As a result, our disclosure score reflects disclosure intensity unique to goodwill-impaired firms in the year of the impairment.[16]

To determine the disclosure score for each of the three components (*M&A*, *METHOD*, and *INPUT*), we manually code key information about sample firms' goodwill impairment decision-making and then assign points to each component based on the amount of relevant information given by the firm for that component. Our procedure to obtain the disclosure score is as follows.

The disclosure score for *M&A* is based on whether firms identify the specific acquisition responsible for the impairment (i.e., segment or unit/division/operation involved in the acquisition and the business acquired), the year of the acquisition (i.e., more recent acquisition that is more related to the firm's current strategy vs. earlier acquisition that is less related to current strategy),[17] the synergy initially expected from the acquisition (e.g., expected revenue growth and/or cost savings as a result of the acquisition) that has implications for the expected contribution of the acquired business to the acquiring firm's future performance,[18] and the scope of acquired business that underperforms and triggers and justifies the decision of goodwill impairment (i.e., specific products, customers, and operations that have lost value in the post- acquisition period).

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[15] Because firms are required to perform goodwill impairment test at least on an annual basis, the majority of firms with impaired goodwill report goodwill impairment losses at the end of firms' fourth fiscal quarter and at the time of the required annual impairment test (e.g., 70% for our sample). As a result, 10-K filings are also the most logic place for firms to provide supplemental information about their goodwill impairment decision and the test underlying that decision.

[16] In un-tabulated tests, we confirm that these three categories of disclosure about the details of goodwill impairment decision are much less likely to be given by firm-years that have goodwill but incur no impairment.

[17] Disclosure about the year of acquisition responsible for impairment is useful when the firm was active in acquisition such that (1) multiple acquisitions were made by the same or different segments or units in the same year and/or (2) multiple acquisitions were made by the same segment or unit over years. In conjunction with disclosure identifying the specific segment or unit involved in the acquisition, this disclosure about the year of the acquisition completes the background information about the acquisition. The disclosure is particularly useful to investors when the acquisition was made before the firm became a public company required to disclose the acquisition.

[18] Information on expected synergy at the time of acquisition vs. realized performance in the post-acquisition period can also help users evaluate the propriety of firms' goodwill impairment decision (i.e., whether the impairment loss is overstated or understated).

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We allocate a total maximum of 4 points to the disclosure score for *M&A*.

Focusing on the specifics of prior merger and acquisition activities leading to subsequent goodwill impairment reflects the spirit of disclosure guidance under SFAS 142, which requires disclosure of information on "the facts and circumstances leading to the impairment" (FASB 2001b, paragraph 47). SFAS 142 also requires firms with goodwill impairment loss to disclose the name of segment in which impairment loss is recognized. The usefulness of the information items included in the disclosure score for *M&A* is also suggested by prior research. For example, recent research (Li and Sloan 2017) indicates that investors do not fully incorporate all publicly available information (e.g., transactions and events responsible for goodwill impairment) when processing goodwill impairment decision, suggesting the usefulness of disclosing the specifics of prior merger and acquisition activities leading to the impairment. Prior research (e.g., Shalev 2009) also finds that the amount of goodwill-related disclosure (e.g., transaction background, segment absorbing goodwill, and economic factors associated with expected synergy and goodwill allocation) is associated with the acquiring firms' future performance but investors do not fully incorporate the information content of the disclosure. This suggests the usefulness of disclosing the specifics of merger and acquisition activities for evaluating the propriety and implications of goodwill impairment.

The score for *METHOD* reflects information on specific methods and approaches followed by management in implementing impairment decision and is based on the amount of details about (1) management explanations for specific events rather than macroeconomic or industry-wide trends believed to lead to the impairment decision (e.g., the loss of a key market or customer, adverse actions taken by competitors, obsolescence of acquired technologies, and unfavorable outcome from litigations), (2) the use of external and independent valuation specialists versus the firm's own internal resources in impairment testing, (3) the fair value measurement approach used by the firm (i.e., discounted cash flows method, revenue or earnings multiple, market/industry comparables, etc.), (4) sensitivity tests informing how changes in key assumptions and estimates of fair value measurement may affect the outcome of the impairment decision, (5) sensitivity tests for the effect of changes in the choice of fair value measurement method on the outcome of the impairment decision, and (6) management outlook for the risk of future impairment. A total maximum of 6 points are allocated to the disclosure score for *METHOD*.

The score for *INPUT* is based on the amount of details about the inputs used by firms in implementing specific fair value analysis and focuses on information of fair value estimates and assumptions employed by the firm in implementing a particular valuation technique. For example, for firms using discounted cash flows method, the disclosure score for *INPUT* captures the amount of information on discount rate, growth rate, forecast

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horizon, and forecast parameters.[19] We assign a total maximum of 4 points to the score for *INPUT*.

Our choices of information items to be included in the disclosure scores for *METHOD* and *INPUT* are motivated by the requirement of SFAS 142 and industry practices in business valuation and its application for goodwill impairment. Specifically, SFAS 142 requires firms with goodwill impairment to disclose information on valuation method (FASB 2001b, paragraph 47). Anecdotal evidence based on industry surveys supports the usefulness of disclosing the details of fair value assessment (e.g., fair value approach, inputs, and sensitivity tests). For example, Ernst & Young (2014, 2017) find that different valuation methods and inputs are needed for different purposes (i.e., no single valuation method and inputs can cover all applications), suggesting the usefulness for investors to be informed of the specific details of fair value assessment underlying goodwill impairment decisions. These surveys conducted by Ernst & Young also find that valuation involving intangible assets is more challenging and uncertain, heightening the benefits for investors to receive detailed disclosure about how fair value is assessed. The results of the survey further show that cross check using multiple valuation approaches (i.e., sensitivity analysis) is important for ensuring reliable and meaningful fair value-based decisions.

Taken together, the details captured in the disclosure score reveal the specificity and amount of information about the key steps untaken by firms in tracking post-acquisition performance vs. the expected synergy from acquisition and determining the amount of goodwill impairment loss. We compute the firm's final composite disclosure score (*DISCLOSURE*) by summing the three component disclosure scores and scaling the total score by dividing the actual total score given to a firm by the maximum possible points of 14 (4+6+4=14). For example, if a firm receives 2 points for *M&A*, 3 points for *METHOD*, and 2 points for *INPUT*, the sum of the disclosure score would be 7 (2+3+2=7), and the scaled total score, *DISCLOSURE*, would be 0.5 (7÷14=0.5).

In the appendix, we provide two specific examples to illustrate our data coding and scoring procedure underlying the measurement of the disclosure score. These examples contain sample firms' 10-K disclosures of information likely useful for measuring the extent of impairment-related disclosure. In each example, we highlight the key information items deemed relevant for constructing our disclosure score, indicate the score that we assign to the firm for each disclosure component, and explain how we compute each sample firm's composite disclosure score (*DISCLOSURE*). In our main test, we focus on firms' composite disclosure score that measures the total amount of useful information

[19] For firms using the approach of valuation multiples, the score for *INPUT* is based on the amount of details on the variable to be multiplied (e.g., earnings, sales, cash flows, or others), the time horizon of the variable (i.e., current value or expected value), the specific value of the multiple (e.g., 3 or 4 times), and the specific source of the multiple (e.g., derived from industry average or from the firm's own conditions).

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available to investors. Given the complex and multi-faceted nature of goodwill impairment decision, greater disclosure across the board would enhance investors' ability to "see through" firms' impairment decision-making process to determine the propriety of the decision and understand its implications.

Our disclosure score covers a much broader range of more detailed information than the required disclosure under SFAS 142. Although SFAS 142 requires firms with goodwill impairment to provide information on "the facts and circumstances leading to the impairment," it does not stipulate what constitutes useful information for this disclosure, thereby allowing management discretion in determining the type and amount of details in the disclosure. Our disclosure score for management information on the cause of goodwill impairment focuses on managers' explanations about specific events and factors directly responsible for goodwill impairment, rather than general statements attributing goodwill impairment to adverse business conditions faced by the firm (e.g., downturn in the firm's industry and/or economic recession prompt a write-off of goodwill). SFAS 142 further requires impairment firms to disclose the method used in determining the fair value of the reporting unit associated with the impairment.[20] There are, however, no requirements for firms to disclose the details about the inputs of fair value measurement. By construction, our disclosure score also captures a considerable amount of important details concerning firms' impairment decision that are beyond the scope of the required disclosure under SFAS 142.[21] Because our disclosure score focuses on information not specifically required under SFAS 142 (with the exception of disclosure about impairment testing method, which is not complied by many firms), the cross-sectional variation of the disclosure score reflects differences in the extent of firms' voluntary disclosure about the decision-making of goodwill impairment.

Table 3 reports the summary statistics for the composite disclosure score (*DISCLOSURE*), our primary measure for the level of firms' disclosure about important details of goodwill impairment decision. The mean and median values of the disclosure

[20] We find that, despite this requirement, many firms in our sample did not disclose the specific fair value-based method used for determining goodwill impairment ("Example two" in the appendix illustrates such a case). The lack of full compliance with this requirement suggests that investors' access to information about this key aspect of firms' goodwill impairment decision is also subject to management discretion.

[21] In addition to management attribution of goodwill impairment and the method of impairment testing, SFAS 142 also requires firms to disclose (1) the reasons for un-finalized impairment loss that is subject to future adjustment and (2) the nature and amount of the adjustment when it is made in subsequent periods. No firm in our sample report un-finalized impairment loss likely because the issue of un-finalized impairment and related adjustment is not applicable to most impairment firms.

score are 0.2124 and 0.2143, respectively, and the standard deviation is 0.1231.[22] Thus, there are considerable cross-sectional variations in the disclosure score, indicating that the amount of disclosure is not uniform across sample firms even though all sample firms incur goodwill impairment loss. In un-tabulated tests, we find that the components of the disclosure score also vary considerably across sample firms, indicating again the non-uniform attribute of firms' impairment disclosure decision.

We measure market reaction to the information in firms' 10-K with the firm's size-adjusted three-day cumulative abnormal returns (*CAR*) starting from the 10-K release date (i.e., days 0, +1, and +2 relative to the release date). Table 3 indicates that on average there are negative market reactions to the release of the sample firms' 10-K: the mean and median size-adjusted three-day cumulative abnormal returns are significantly negative (-0.24% and -0.09%, respectively).[23]

4. EMPIRICAL RESULTS

4.1 Measurement of Management Disclosure about Goodwill Impairment Test

In our examination of the usefulness of firms' disclosure about goodwill impairment test, we focus on the extent of disclosure that is abnormal given the accounting and economic materiality of the event concerning goodwill impairment. While total disclosure level is clearly affected by accounting and economic materiality, the extent of abnormal disclosure is likely more indicative of management discretion in disclosure choice (e.g., management propensity to inform investors of specifics of goodwill impairment test and its verifiability). To measure the extent of firms' abnormal disclosure about goodwill impairment, we follow prior research to identify factors that reflect the extent of expected investor demand for information on goodwill impairment decision and management incentives to provide the information. We classify these factors into three determinants for the expected level of disclosure about goodwill impairment test, including (1) the materiality of goodwill impairment loss, (2) the size of goodwill, (3) the litigation risk associated with acquisition and impairment, and (4) certain firm characteristics discussed below. The arguments for each determinant are as follows.

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[22] The relatively low average disclosure score indicates that some information items are only infrequently disclosed by sample firms. This low disclosure frequency may create a noise element in the disclosure score. Noise and non-information element of the disclosure score (e.g., information items with zero disclosure frequency), however, is expected to work against finding a significant and meaningful association between disclosure level and (1) the incidence of repeated goodwill impairment in the subsequent year (H1) and (2) revision in investors' valuation of goodwill impairment loss (H2). In un-tabulated tests, we use a modified disclosure score that excludes information items with zero disclosure frequency and find substantively similar results.

[23] Consistently, we find in un-tabulated tests that sample firms' mean and median analyst forecast revisions following the release of 10-K are also negative, confirming the significance and nature of the information contained in the sample firms' 10-K reports.

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First, the materiality of goodwill impairment is likely associated with expected disclosure level because larger impairment may trigger more investor scrutiny and more demand for the transparency of impairment decision, due to greater need for investors to understand the nature of impairment decision and its economic implications. Large impairment also increases management incentives to disclose more information because market penalty is more severe for firms reporting bad news (e.g., impairment loss) but providing little transparency, due to investors' concern that the lack of transparency allows firms to hide even more bad news.[24]

Second, we expect the amount of goodwill to be positively associated with disclosure level. Prior research finds that for some firms goodwill includes overpayment for acquisition and predicts future impairment losses, suggesting a negative relation between acquisition quality and the amount of goodwill (Henning, Lewis, and Shaw 2000; Hayn and Hughes 2006; Gu and Lev 2011). Hence, there is greater investor demand for information on the valuation of goodwill for firms with larger amount of goodwill, particularly when the firm has incurred impairment losses. Management has incentives to meet this demand because of market penalty for opacity at firms that report bad news, such as impairment, but provide little transparency.

Third, expected disclosure level is also higher for firms facing greater risk of shareholder litigation. Prior research finds that managers of acquiring firms are frequently targeted in class action lawsuits by shareholders suspicious of management impropriety before or during the merger period that causes losses of firm value (e.g., DuCharme, Malatesta, and Sefcik 2004; Gong, Louis, and Sun 2008). Because goodwill impairment is a direct management admission of failed acquisition, impairment may likely prompt even more investor scrutiny of management roles in acquisition decision-making and hence increase the risk of lawsuits.[25] Prior research finds that greater disclosure is a useful strategy for firms facing increased litigation risk (e.g., Skinner 1994, 1997). Thus,

[24] Investors are more likely to attend to firms reporting bad news because bad news is inherently more credible than good news (e.g., Skinner 1994; Hutton et al. 2003). Prior research also documents significant market penalty for the lack of transparency at firms reporting bad news. For example, Houston, Lev, and Tucker (2010) show that firms with declining performance suffer significant market backlash, such as decreases in analyst following and increases in analyst forecast error and dispersion, when these firms stop guiding investors with management earnings forecasts. Investors likely have concerns about the lack of transparency allowing bad news firms to hide even more bad news because management has incentives to withhold bad news and delay reporting bad news (Kothari et al. 2009). In the context of goodwill impairment reporting, these concerns are justifiable given the high percentage of recurring incidences of goodwill impairment and the fact that many impairment firms suffer very negative stock returns even after the year of impairment.

[25] For example, after Lipman Electronic Engineering Inc. announced the decision of goodwill write-off related to the acquisition completed less than one year ago, shareholders of Lipman filed a lawsuit against the executives of Lipman and alleged that the defendants committed misjudgment in assessing the potential benefits from the acquisition (Law Office of Jacob Sabo 2005). Remec, Inc., a manufacturer of high-tech communication equipment, was also sued by investors when the company announced the decision to write-off 95% of the goodwill related to a prior acquisition (Business Wire 2004).

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impairment firms operating in more litigious environment likely have incentives to provide more disclosure about impairment test.

We regress the composite disclosure score on these factors and use the residual from the regression as our measure for firms' abnormal disclosure level. Specifically, we estimate the following regression:

$$DISCLOSURE_{i,t}=\alpha_0+\alpha_1 IMPAIRMENT_{i,t}+\alpha_2 GOODWILL_{i,t}+\alpha_3 LITIGATION_{i,t} +\alpha_4 M/B_{i,t}+\alpha_5 SIZE_{i,t}+\alpha_6 ROA_{i,t}+\alpha_7 RETURN_{i,t} +\alpha_8 INSTITUTION_{i,t}+\alpha_9 FLLW_{i,t}+e_{i,t}. \quad (1)$$

where *i* and *t* are firm and year subscripts, respectively. The regression variables are defined as follows. *DISCLOSURE* is the composite disclosure score computed by following the procedure described in section 3 and illustrated in the appendix. *IMPAIRMENT* is the amount of goodwill impairment deflated by total assets. *GOODWILL* is the amount of firms' goodwill deflated by total assets. *LITIGATION* is the proxy for litigation risk, defined as an indicator variable that takes the value of one if the firm is from industries with 4-digit SIC of 2833-2836, 3570-3577, 3600-3674, and 5200-5961 and zero otherwise. The control variables include *M/B*, *SIZE*, *ROA*, *RET*, *INST*, and *FLLW*. *M/B* is the firm's market-to-book ratio measured at fiscal year-end. *SIZE* is the logarithm of the firm's total assets. *ROA* is the firm's return on assets, measured as the sum of net income before extraordinary items and goodwill impairment (absolute amount), divided by average total assets. *RETURN* is the firm's annual stock return during the fiscal year. *INSTITUTION* is the percentage of shares held by institutional investors. *FLLW* is analyst following measured as the logarithm of one plus the number of analysts issuing earnings forecast for the firm. Prior research on disclosure finds that these firm characteristics are associated with the cross-sectional variation in disclosure propensity (e.g., Lang and Lundholm 1993).

We report the correlation coefficients among the variables of equation (1) in Table 4. Consistent with our expectations, the disclosure score is positively correlated with the amount of goodwill impairment loss and the size of goodwill relative to total assets. Consistent with prior evidence, disclosure score is associated with the extent of analyst following. The disclosure score, however, is not associated with the level of firms' institutional ownership, suggesting that management disclosure decision is not related to the consideration of investor sophistication possibly because institutional investors and individual investors are similar with respect to the information set needed for performing the task of assessing firms' complex and subjective decisions of goodwill impairment.

Table 4 Pearson (Upper Diagonal) and Spearman (Lower Diagonal) Correlation Coefficients among Key Variables (*p*-values are in parentheses)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) *DISCLOSURE*	-	0.939	0.152	0.122	0.064	0.003	0.007	-0.113	0.085	-0.001	0.090
		(0.0001)	(0.0003)	(0.0036)	(0.1251)	(0.9372)	(0.8706)	(0.0072)	(0.0427)	(0.9885)	(0.0324)
(2) *AB_DISC*	0.932		-0.014	-0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(0.0001)		(0.7455)	(0.9864)	(1.000)	(1.000)	(1.000)	(1.000)	(1.000)	(1.000)	(1.000)
(3) *IMPAIRMENT*	0.290	0.203		0.104	0.018	0.028	-0.403	-0.746	-0.083	-0.188	-0.181
	(0.0001)	(0.0001)		(0.0129)	(0.6722)	(0.5003)	(0.0001)	(0.0001)	(0.0486)	(0.0001)	(0.0001)
(4) *GOODWILL*	0.159	0.044	0.158		-0.124	0.059	-0.022	-0.049	-0.076	0.067	-0.015
	(0.0001)	(0.2946)	(0.0002)		(0.0031)	(0.1586)	(0.6048)	(0.2393)	(0.0718)	(0.1115)	(0.7158)
(5) *LITIGATION*	0.059	-0.001	0.077	-0.106		-0.012	-0.015	-0.062	-0.034	-0.091	0.129
	(0.1626)	(0.9731)	(0.0650)	(0.0113)		(0.7819)	(0.7222)	(0.1421)	(0.4176)	(0.0306)	(0.0021)
(6) *M/B*	-0.050	-0.075	-0.188	0.069	0.053		-0.074	-0.220	0.105	0.026	0.034
	(0.2342)	(0.0755)	(0.0001)	(0.1008)	(0.2095)		(0.0766)	(0.0001)	(0.0120)	(0.5437)	(0.4209)
(7) *SIZE*	0.003	-0.013	-0.588	0.059	-0.003	0.127		0.543	-0.035	0.448	0.494
	(0.9513)	(0.7629)	(0.0001)	(0.1603)	(0.9379)	(0.0024)		(0.0001)	(0.4068)	(0.0001)	(0.0001)
(8) *ROA*	-0.190	-0.106	-0.727	0.012	-0.073	0.188	0.577		0.044	0.279	0.270
	(0.0001)	(0.0112)	(0.0001)	(0.7666)	(0.0826)	(0.0001)	(0.0001)		(0.2941)	(0.0001)	(0.0001)
(9) *RETURN*	0.057	-0.006	-0.139	-0.092	-0.029	0.185	0.059	0.119		-0.034	-0.014
	(0.1719)	(0.8901)	(0.0009)	(0.0285)	(0.4876)	(0.0001)	(0.1608)	(0.0045)		(0.4214)	(0.7415)
(10) *INSTITUTION*	0.002	-0.007	-0.268	0.138	-0.083	0.147	0.424	0.284	0.028		0.435
	(0.9587)	(0.8762)	(0.0001)	(0.0010)	(0.0490)	(0.0004)	(0.0001)	(0.0001)	(0.4991)		(0.0001)
(11) *FLLW*	0.106	0.015	-0.257	0.032	0.112	0.159	0.484	0.311	0.036	0.423	-
	(0.0117)	(0.7276)	(0.0001)	(0.4438)	(0.0077)	(0.0001)	(0.0001)	(0.0001)	(0.9312)	(0.0001)	

Notes: Variable definitions are as follows. *DISCLOSURE* is the composite disclosure score reflecting firms' disclosure about acquisitions responsible for goodwill write-off, the fair value measurement methodologies used in goodwill impairment test, and the inputs of the fair value measurement. *IMPAIRMENT* is the absolute amount of goodwill impairment deflated by total assets. *GOODWILL* is the amount of firms' goodwill deflated by total assets. *LITIGATION* is a dummy variable that takes the value of 1 for firms with four-digit SIC in the range of 2833-2836, 3570-3577, 3600-3674, and 5200-5961 and 0 otherwise. *M/B* is the ratio of the firm's market value to book value. *SIZE* is the logarithm of firm size where firm size is the value of the firm's total assets in millions of dollar. *ROA* is the firm's return on assets, computed as the ratio of net income before extraordinary items, adjusted for goodwill impairment, to the firm's average total assets. *RETURN* is the firm's annual stock return for the fiscal year. *INSTITUTION* is the percentage of shares outstanding that are held by institutions. *FLLW* is the logarithm of one plus the number of analysts issuing earnings forecast for the firm.

Table 5 reports the regression estimates of equation (1). Consistent with the results of univariate correlation, the coefficients on goodwill write-off (*IMPAIRMENT*) and goodwill (*GOODWILL*) are positive, 0.1009 and 0.0866, respectively, and statistically significant at the 0.01 level or higher. Consistent with the predicted effect of litigation risk on disclosure decision, we find a positive and marginally significant coefficient on the proxy for litigation risk (0.0145, *p*-value = 0.1168). As expected, we find that disclosure level is positively associated with firm size, stock returns, and analyst coverage.[26] The significant results for the determinants of disclosure confirm that our disclosure score indeed reflects the accounting and economic significance of the event of goodwill impairment. In

Table 5 Regression of Composite Impairment Disclosure Score on Impairment Size, Goodwill, Litigation Risk, and Control Variables

Variable	Exp. sign	Coefficient	(*p*-value)
Intercept	+/-	0.2141	(0.0001)
IMPAIRMENT	+	0.1009	(0.0311)
GOODWILL	+	0.0866	(0.0057)
LITIGATION	+	0.0145	(0.1168)
M/B	+	-0.0038	(0.1470)
SIZE	+	0.0127	(0.0048)
ROA	-	-0.0234	(0.0001)
RETURN	+	0.0247	(0.0035)
INSTITUTION	+	-0.0062	(0.7158)
FLLW	+	0.0148	(0.0045)
Year and industry dummies		Yes	
N		568	
Adj. R^2		11.27%	

Notes: Variable definitions are as follows. *DISCLOSURE* is the composite disclosure score reflecting firms' disclosure about acquisitions responsible for goodwill write-off, the fair value measurement methodologies used in goodwill impairment test, and the inputs of the fair value measurement. *IMPAIRMENT* is the absolute amount of goodwill impairment deflated by total assets. *GOODWILL* is the amount of firms' goodwill deflated by total assets. *LITIGATION* is a dummy variable that takes the value of 1 for firms with four-digit SIC in the range of 2833-2836, 3570-3577, 3600-3674, and 5200-5961 and 0 otherwise. *M/B* is the ratio of the firm's market value to book value. *SIZE* is the logarithm of firm size where firm size is the value of the firm's total assets in millions of dollar. *ROA* is the firm's return on assets, computed as the ratio of net income before extraordinary items, adjusted for goodwill impairment, to the firm's average total assets. *RETURN* is the firm's annual stock return for the fiscal year. *INSTITUTION* is the percentage of shares outstanding that are held by institutions. *FLLW* is the logarithm of one plus the number of analysts issuing earnings forecast for the firm. *p*-value in parentheses is one-tailed when predicted sign is either "+" or "-" and two-tailed otherwise.

[26] In un-tabulated tests, we also estimate the regression of equation (1) for each component of the disclosure score and find generally consistent results for the predicted relation between the amount of disclosure and the three disclosure determinants (impairment, goodwill, and litigation risk). As expected, litigation risk is more significantly associated with disclosure about the inputs of goodwill impairment tests, whereas the number of firms' business segments is more significantly associated with disclosure about prior acquisitions responsible for impairment. These results further support the validity of our disclosure score.

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subsequent tests, we use the residual from the regression of equation (1), *AB_DISC*, as our measure for firms' abnormal disclosure about goodwill impairment test. By construction, this measure controls for factors affecting the expected level of disclosure and hence reflects the extent of discretionary disclosure about goodwill impairment test.[27] Positive (negative) abnormal disclosure indicates firms' decision to disclose more (less) information about goodwill impairment test than expected given the materiality of the firm's impairment loss, the economic significance of goodwill, and litigation risk. In subsequent tests, we examine the usefulness of abnormal disclosure about goodwill impairment (*AB_DISC*). Using the abnormal disclosure level in the test ensures that our results reflect the propensity of disclosure driven by management discretion rather than common factors underlying expected disclosure practices.

4.2 Impairment Disclosure and Repeated Goodwill Write-Off

In H1, we predict a negative association between the level of disclosure about goodwill impairment test and the occurrence of repeated goodwill write-offs in the subsequent year. To examine this prediction, we estimate the following logit regression model:

$$D\_IMPAIRMENT_{i,t+1}=\chi_0+\chi_1 AB\_DISC_{i,t}+\chi_2 GOODWILL_{i,t}+\chi_3 IMPAIRMENT_{i,t}+\chi_4 M/B_{i,t}+\chi_5 SIZE_{i,t}+\chi_6 ROA_{i,t}+\chi_7 RETURN_{i,t}+\varepsilon_{i,t}. \quad (2)$$

where *i* and *t* are firm and year subscripts, respectively. We define the regression variables as follows. $D\_IMPAIRMENT_{i,t+1}$ is an indicator variable that takes the value of one if firms report goodwill write-off in year *t*+1 and zero otherwise. *AB_DISC*, *GOODWILL*, *IMPAIRMENT*, *M/B*, *SIZE*, *ROA*, and *RETURN* have the same definitions as in equation (1).

The main variable of interest in equation (2) is *AB_DISC*, for which we predict a negative coefficient if firms increase disclosure about goodwill impairment test when current reporting of goodwill impairment is more truthful (i.e., more free of delay by management) and thus repeated impairment in future is less likely. We include *GOODWILL*, *M/B*, *ROA*, and *RETURN* as control variables because prior research suggests that the amount of goodwill and firms' current performance are associated with future impairment (e.g., Hayn and Hughes 2006; Gu and Lev 2011). Consistent with available research, we expect a positive coefficient on *GOODWILL*. We also include current impairment (*IMPAIRMENT*) to control for the serial correlation of impairment.

[27] Consistent with the construction of *AB_DISC*, the mean value of *AB_DISC* is 0, and its median value is -0.0038, with a standard deviation of 0.115.

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Table 6 Logit Regression of Goodwill Impairment in the Subsequent Year on Impairment Disclosure Score and Control Variables

Variable	Expected sign	Coefficient (*p*-value)	Marginal effect on probability
Intercept	+/-	-1.2868 (0.0027)	-
AB_DISC	-	-2.0880 (0.0063)	-49.30%
GOODWILL	+	2.6894 (0.0001)	63.50%
IMPAIRMENT	-	-1.8812 (0.0776)	-44.42%
M/B	-	-0.1155 (0.0029)	-2.73%
SIZE	+	0.0813 (0.0545)	1.92%
ROA	-	-0.4806 (0.2150)	-11.35%
RETURN	-	0.0268 (0.4385)	0.63%
Year and industry dummies		Yes	
N		568	
Pseudo R^2		6.41%	

Notes: Variable definitions are as follows. $D\_IMPAIRMENT_{i,t+1}$ is a dummy variable that takes the value of 1 for firms reporting goodwill write-off in the subsequent year. *AB_DISC* is the residual from the regression of equation (1) for *DISCLOSURE*, which is the composite disclosure score reflecting firms' disclosure about acquisitions responsible for goodwill write-off, the fair value measurement methodologies used in goodwill impairment test, and the inputs of the fair value measurement. *GOODWILL* is the amount of firms' goodwill deflated by total assets. *IMPAIRMENT* is the absolute amount of goodwill impairment deflated by total assets. *M/B* is the ratio of the firm's market value to book value. *SIZE* is the logarithm of firm size where firm size is the value firms' total assets in millions of dollar. *ROA* is the firm's return on assets, computed as the ratio of net income before extraordinary items, adjusted for goodwill impairment, to the firm's average total assets. *RETURN* is the firm's annual stock return for the fiscal year. *p*-value in parentheses is one-tailed when predicted sign is either "+" or "-" and two-tailed otherwise.

We report the logit regression estimates of equation (2) in Table 6. As expected, the coefficient on goodwill is significantly positive (2.6894, *p*-value = 0.0001). In contrast, the coefficient on the disclosure score (*AB_DISC*) is significantly negative (–2.0880, *p*-value = 0.0063), indicating a negative relation between current year's disclosure about goodwill impairment test and the likelihood of repeated impairment in the subsequent year. Thus, firms with more extensive and transparent disclosure about current impairment decision are indeed less likely to report impairment loss again in the subsequent year after controlling for factors influencing the occurrence of future goodwill impairment. The magnitude of this relation is meaningful: the marginal effect of *AB_DISC* on the probability of goodwill impairment in the subsequent year is 49.30%. This evidence is consistent with the view that disclosure about goodwill impairment test in the current year indicates more truthful and complete management reporting of the extent of goodwill

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impairment and signals lower likelihood of future impairment as a result of management intentionally understating and delaying existing impairment in the current year. Firms providing more extensive disclosure in the current year are less likely to report impairment again in the following year. Thus, our evidence on the negative relation between current disclosure and future impairment is consistent with the role of disclosure serving as a positive signal for the quality and truthfulness of goodwill impairment decision by management.

4.3 Investor Reaction to Disclosure about Goodwill Impairment Test

In H2, we predict less negative valuation of impairment loss for firms with greater disclosure about impairment test. To examine this prediction, we estimate the following regression:

$$\begin{aligned} CAR_{i,t} = {} & \beta_0 + \beta_1 AB\_DISC_{i,t} + \beta_2 UNEXIMP_{i,t} + \beta_3 AB\_DISC \times UNEXIMP_{i,t} \\ & + \beta_4 10KNEWS_{i,t} + \beta_5 FLLW_{i,t} + \beta_6 INSTITUTION_{i,t} + \beta_7 M/B_{i,t} + \beta_8 SIZE_{i,t} \\ & + \beta_9 ROA_{i,t} + \beta_{10} MFORECAST_{i,t} + \emptyset_{i,t}. \end{aligned} \quad (3)$$

where *i* and *t* are firm and year subscripts, respectively. We define the regression variables as follows. *CAR* is the firm's size-adjusted cumulative abnormal returns over a three-day window starting from the release date of the firm's 10-K that contains the disclosure about goodwill impairment test (i.e., days 0, +1, and +2 relative to the release date of the firm's 10-K).[28] *AB_DISC* is the residual from the regression of equation (1). *UNEXIMP* is the amount of unexpected goodwill impairment loss and is measured using the approaches of Li et al. (2011). First, under the assumption that investors expect zero impairment loss, *UNEXIMP* is simply the amount of reported goodwill impairment loss (deflated by total assets). Second, we follow Li et al. (2011) to relate *UNEXIMP* to the excess of the firm's tangible net worth over market value of equity. *FLLW*, *INSTITUTION*, *M/B*, *SIZE*, and *ROA* follow the same definitions as in equation (1). *AB_DISC*×*UNEXIMP* is the interaction term between *AB_DISC* and *UNEXIMP*.

We control for two factors affecting market reaction to the release of 10-K, including (i) the new information contained in 10-K and (ii) the firm's overall information environment. While there are numerous news items in a given 10-K filing, market reaction to the filing obviously reflects the *aggregate net effect* of all relevant news items contained in the filing. To circumvent the challenge of specifically identifying and measuring each specific news item in a firm's 10-K, we employ a proxy based on the extent of the firm's insider trading leading up to the release of 10-K. This proxy is based on prior research

[28] We use a three-day window because prior research finds that most market reaction to 10-K reports occurs during the three-day period starting on the day of filing (e.g., Griffin 2003). We also re-run the regression using a two-day window and five-day window, respectively, and find substantively similar results.

showing that insiders are privy to new information to be revealed in forthcoming 10-K filings and actively trade on the information before the filing date (Huddart, Ke, and Shi 2007). Thus, insider trading prior to the release of 10-K reflects the aggregate effect of relevant information contained in firms' subsequent 10-K filings (*10KNEWS*). We focus on insider purchases because earlier research shows that insider purchase transactions are informative but insider sale transactions are generally not (e.g., Lakonishok and Lee 2001). We define *10KNEWS* as a dummy variable that takes the value of 1 for firms with insider purchase transactions during the 30-day window leading up to 5 days before the firm's 10-K filing date (i.e., days -35 to -5 relative to the filing date) and zero otherwise.[29]

We control for firms' information environment because firms with richer overall information environment likely experience smaller and more attenuated market reaction to the information contained in 10-K. Our controls for firms' information environment include analyst coverage (*FLLW*), institutional holding (*INSTITUTION*), firm size (*SIZE*), market-to-book (*M/B*), profitability (*ROA*), and the availability of management earnings forecasts (*MFORECAST*). Analyst coverage, institutional holding, firm size, and market-to-book are fundamental firm characteristics likely associated with cross-sectional variations in the richness of firms' information environment. We control for profitability because prior evidence suggests that firms with poorer performance (e.g., loss firms) tend to have greater information asymmetry, or less information available to investors (e.g., Collins, Pincus, and Xie 1999). Considerable research shows that management earnings forecasts are a useful source of information for investors (e.g., Hutton et al., 2003). Therefore, we control for the availability of management earnings forecast during the year (*MFORECAST*), defined as an indicator variable that takes the value of one for firms providing management earnings forecast and zero otherwise.[30]

Consistent with the economic implications of goodwill impairment (i.e., loss of acquisition value), we expect a negative coefficient on the amount of unexpected goodwill impairment (*UNEXIMP*).[31] The interaction term, *AB_DISC*×*UNEXIMP*, informs of the usefulness of impairment-related disclosure for investors' assessment of the valuation implications of unexpected goodwill impairment loss. The verifiability-enhancing effect of

[29] The descriptive statistics for *10KNEWS* in Table 3 show that the frequency of insider purchase prior to the release of 10-K is relatively low (e.g., mean of 11.44%). This is consistent with the generally low frequency of insider purchase activities as documented by prior research on insider trading. The low frequency is likely due to insiders acquiring shares by means other than purchases, such as stock-based compensation plans. It is also consistent with the uneven distribution of insider trading prior to firms' 10-K filing date reported in Huddart et al. (2007) (i.e., a small number of firms account for most of the observed insider trading activities).

[30] The formulation of our model in equation (2) is similar to that of models used in prior research examining stock price reaction to the release of 10-K filings (e.g., Shalev 2009; Franco, Wong, and Zhou 2011). We, however, include more control variables in our model.

[31] On average, the coefficient on *UNEXIMP*, however, may not be large and significant because in most cases the amount of goodwill impairment has been reported in the firm's earlier earnings announcement.

goodwill impairment disclosure implies that disclosure mitigates investors' concerns aboutmanagement manipulation in reporting goodwill impairment (e.g., holding more bad news by delaying the recognition of goodwill write-off that has already occurred). Hence, consistent with the prediction of H2, we expect a positive coefficient on the interaction term *AB_DISC×UNEXIMP* (i.e., $\beta_3 > 0$).[32]

We report the regression estimates of equation (3) in Table 7. Our focus is on the interaction between abnormal disclosure and the amount of impairment loss (*AB_DISC×UNEXIMP*). Model 1 is based on our first measure of unexpected impairment loss, which is simply the reported amount of impairment loss under the assumption that investors expect zero impairment loss. We find that consistent with the verifiability-enhancing effect of disclosure predicted in H2, the coefficient on the interaction term *AB_DISC×UNEXIMP* is positive (0.5919) and statistically significant (*p*-value = 0.0003). To put into perspective the economic implications of this coefficient estimate, consider the difference in market reaction associated with the following differences in disclosure. The coefficient on *AB_DISC×UNEXIMP* implies that holding the amount of goodwill impairment constant, a decrease in *AB_DISC* from the mean value of 0 to -0.02 is associated with a more negative three-day market reaction by -1.18% (-0.02×0.5919 = -0.0118). Thus, when compared to the negative coefficient on *UNEXIMP* (-0.0370, *p*-value = 0.0862), the results for the interaction term show that market valuation of impairment loss for firms with below average disclosure about impairment test is significantly more negative. This incremental effect associated with lower disclosure level apparently reflects market penalty for the lack of transparency in firms' reporting of goodwill impairment. This penalty is likely due to investors' concerns about the lack of transparency and verifiability allowing goodwill-impaired firms to hide more bad news, such as delaying the recognition of impairment loss already incurred, or to overstate impairment loss in the current period. Conversely, our results show that there is market reward for firms with extensive impairment-related disclosure that increase the transparency and verifiability of firms' goodwill impairment decision.

[32] We estimate our regressions using standard OLS with industry and year dummies because as a result of our sample selection criterion, our sample data does not consist of the same set of firms in each sample year. In all of our regressions, the statistical significance level and associated inferences of our coefficient estimates, however, are unchanged when the standard deviation of coefficient is obtained from firm level clustering by following the procedure suggested by Petersen (2009).

Table 7 Regression of Stock Price Reaction to 10-K Release on Impairment Disclosure Score, Goodwill Impairment, and Control Variables

Variable	Expected sign	Model 1	Model 2
Intercept (*p*-value)	+/-	-0.0174 (0.0622)	-0.0120 (0.1151)
AB_DISC	+	0.0595 (0.0008)	0.0691 (0.0003)
UNEXIMP	-	-0.0370 (0.0774)	-0.0021 (0.2200)
AB_DISC×UNEXIMP	+	0.5919 (0.0003)	0.4162 (0.0180)
10KNEWS	+	0.0148 (0.0142)	0.0168 (0.0130)
FLLW	-	-0.0009 (0.3245)	0.0002 (0.4541)
INSTITUTION	+/-	0.0156 (0.0219)	0.0122 (0.0645)
M/B	-	-0.0014 (0.2478)	-0.0025 (0.1088)
SIZE	-	0.0023 (0.1310)	0.0019 (0.3324)
ROA	-	-0.0029 (0.1131)	-0.0022 (0.1535)
MFORECAST	+/-	0.0030 (0.2822)	0.0017 (0.3751)
Year and industry dummies		Yes	Yes
N		568	568
Adj. R^2		6.11%	5.81%

Notes: Variable definitions are as follows. *CAR* is the three-day size-adjusted cumulative abnormal returns starting from the release date of the firm's 10-K. *AB_DISC* is the residual from the regression of equation (1) for *DISCLOSURE*, which is the composite disclosure score reflecting firms' disclosure about acquisitions responsible for goodwill write-off, the fair value measurement methodologies used in goodwill impairment test, and the inputs of the fair value measurement. *UNEXIMP* is the amount of reported goodwill impairment deflated by total assets (Model 1) and unexpected goodwill impairment (Model 2) based on Li et al. (2011). *AB_DISC×UNEXIMP* is *AB_DISC* times *UNEXIMP*. *10KNEWS* as a dummy variable that takes the value of 1 for firms with insider purchase transactions during the 30-day window leading up to 5 days before the firm's 10-K filing date (i.e., days -35 to -5 relative to the filing date) and zero otherwise. *FLLW* is the logarithm of one plus the number of analysts issuing earnings forecast for the firm. *INSTITUTION* is the percentage of shares outstanding that are held by institutions. *M/B* is the ratio of the firm's market value to book value. *SIZE* is the logarithm of firm size where firm size is measured as the value of firms' total assets in millions of dollar. *ROA* is the firm's return on assets, computed as the ratio of net income before extraordinary items, adjusted for goodwill impairment, to the firm's average total assets. *MFORECAST* is an indicator variable that takes the value of one for firms with management earnings forecast and zero otherwise. *p*-value in parentheses is one-tailed when predicted sign is either "+" or "-" and two-tailed otherwise.

The results for Model 2 are based on our second measure of unexpected impairment loss, which follows the approach of Li et al. (2011). The coefficient on *AB_DISC×UNEXIMP* is also significantly positive (0.4162), consistent with market reward for more transparency of firms' impairment decision-making. In the regression of Table 7, the coefficient on *10KNEWS*, our proxy for news contained in the firm's 10-K filing based

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on the pattern of insider trading prior to the filing date, is significantly positive. This is consistent with earlier evidence that insiders are privy to the news in forthcoming 10-K filing and trade on the news (i.e., insiders choose to buy shares before the release of 10-K that contains good news).[33]

4.4 Complexity of Impairment Decision and Usefulness of Impairment Disclosure

Taken together, the evidence in Table 7 is consistent with the prediction of H2 and indicates that enhanced disclosure increases the transparency of goodwill impairment reporting and mitigates investors' concerns about the low verifiability of goodwill impairment decision and its vulnerability to manipulation by management. To provide more corroborating evidence on the transparency-enhancing effect of impairment disclosure, we further examine the prediction that the usefulness of disclosure about goodwill impairment test is greater for firms with larger R&D expenditures and firms operating in more segments (H3). From the viewpoint of investors, the more complex the firm's business structure and the greater the firm's intangible investment such as R&D, the more investors are likely concerned about the transparency and verifiability of goodwill impairment decision, and the more informative management disclosure about impairment tests is with respect to the transparency and verifiability of impairment decision.

To test the predictions of H3, we expand the regression of equation (3) and examine whether the coefficient on *AB_DISC*×*UNEXIMP*, which indicates the usefulness of disclosure for investors' valuation of goodwill impairment, is significantly greater for firms with larger R&D expenditure relative to total assets (*RD*) and firms operating in more business segments (*SEGNUM*). Specifically, our regression for this examination is as follows:

$$\begin{aligned} CAR_{i,t} = {} & \beta_0 + \beta_1 AB\_DISC_{i,t} + \beta_2 UNEXIMP_{i,t} + \beta_3 RD_{i,t} + \beta_4 SEGNUM_{i,t} \\ & + \beta_5 AB\_DISC \times UNEXIMP_{i,t} + \beta_6 AB\_DISC \times UNEXIMP \times RD_{i,t} \\ & + \beta_7 AB\_DISC \times UNEXIMP \times SEGNUM_{i,t} + \beta_8 10KNEWS_{i,t} + \beta_9 FLLW_{i,t} \\ & + \beta_{10} INSTITUTION_{i,t} + \beta_{11} M/B_{i,t} + \beta_{12} SIZE_{i,t} + \beta_{13} ROA_{i,t} \\ & + \beta_{14} MFORECAST_{i,t} + \emptyset_{i,t}. \end{aligned} \quad (4)$$

where *RD* is the firm's R&D expenditures deflated by total assets, and *SEGNUM* is the number of business segments of the firm. *AB_DISC*×*UNEXIMP*×*RD* is the interaction term among the level of abnormal disclosure about impairment test (*AB_DISC*), the amount of the firm's unexpected goodwill impairment, and the firm's R&D expenditure

[33] The positive coefficient on the abnormal disclosure score, *AB_DISC*, is consistent with market reward for firms' transparent reporting choices as documented by prior research (e.g., Bhattacharya, Daouk, and Welker 2003; Chen, Matsumoto, and Rajgopal 2011).

deflated by total assets. The interaction variable of *AB_DISC*×*UNEXIMP*×*SEGNUM* is defined analogously. All other variables have the same definition as in equation (3). H3 predicts positive a coefficient on the interaction variables *AB_DISC*×*UNEXIMP*×*RD* and *AB_DISC*×*UNEXIMP*×*SEGNUM*, respectively. Goodwill impairment decisions are inherently more complex and more opaque for firms with greater internal investments in intangible assets, such as R&D, and for firms with more business segments. For these firms, we expect disclosure to have a greater effect on improving the transparency and verifiability of firms' goodwill impairment decision.

We report the regression estimates of equation (4) in Table 8. Model 1 is based on our first measure of unexpected impairment loss, which is simply the reported amount of goodwill impairment loss (investors are assumed to expect zero impairment loss). The results show a positive and statistically significant coefficient on *AB_DISC*×*UNEXIMP*×*RD* *AB_DISC*×*UNEXIMP*×*SEGNUM*, respectively. Thus, consistent with the predictions of H3, the transparency-enhancing effect of disclosure about goodwill impairment test is indeed stronger for firms with greater un-capitalized R&D expenditures and for firms operating in more business segments. Our results indicate that disclosure about goodwill impairment test is more useful to investors when investors are more concerned about the lack of transparency and verifiability in the impairment decisions of multi-segment firms and firms with more R&D-related intangibles. Because investors likely have greater concerns about the transparency and verifiability of goodwill impairment decision by these firms, our evidence corroborates the transparency- enhancing effect of disclosure about goodwill impairment test as predicted by H3. The results for Model 2 are based on the second measure of unexpected impairment loss and are consistent with those for Model 1.

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Table 8 Regression of Stock Price Reaction to 10-K Release on Impairment Disclosure Score, Complexity of Goodwill Impairment Decision, and Control Variables

Variable	Expected sign	Model 1	Model 2
Intercept (*p*-value)	+/-	-0.0199 (0.0532)	-0.0230 (0.0088)
AB_DISC	+	0.0553 (0.0021)	0.0778 (0.0001)
UNEXIMP	-	-0.0346 (0.0813)	-0.0102 (0.2438)
RD	+/-	0.0586 (0.1443)	0.0711 (0.1250)
SEGNUM	+/-	0.0003 (0.4021)	0.0003 (0.4214)
AB_DISC×UNEXIMP	+	-0.9538 (0.2735)	-0.8001 (0.1112)
AB_DISC×UNEXIMP×RD	+	5.3249 (0.0171)	5.0041 (0.0316)
AB_DISC×UNEXIMP×SEGNUM	+	0.5468 (0.0399)	0.7140 (0.0095)
10KNEWS	+	0.0140 (0.0176)	0.0135 (0.0208)
FLLW	-	-0.0008 (0.3740)	-0.0016 (0.2102)
INSTITUTION	+/-	0.0160 (0.0243)	0.0164 (0.0203)
M/B	-	-0.0010 (0.3098)	-0.0020 (0.1529)
SIZE	-	0.0017 (0.2414)	0.0026 (0.1243)
ROA	-	-0.0019 (0.2271)	-0.0012 (0.3047)
MFORECAST	+/-	0.0043 (0.2084)	0.0037 (0.2430)
Year and industry dummies		Yes	Yes
N		568	568
Adj. R^2		6.28%	5.89%

Notes: Variable definitions are as follows. *CAR* is the three-day size-adjusted cumulative abnormal returns starting from the release date of the firm's 10-K. *AB_DISC* is the residual from the regression of equation (1) for *DISCLOSURE*, which is the composite disclosure score reflecting firms' disclosure about acquisitions responsible for goodwill write-off, the fair value measurement methodologies used in goodwill impairment test, and the inputs of the fair value measurement. *UNEXIMP* is the amount of reported goodwill impairment deflated by total assets (Model 1) and unexpected goodwill impairment (Model 2) based on Li et al. (2011). *RD* is the firm's R&D expenditures deflated by total assets. *SEGNUM* is the number of business segments of the firm. *AB_DISC×UNEXIMP* is *AB_DISC* times *UNEXIMP*. *AB_DISC×UNEXIMP×RD* is *AB_DISC* times the product of *UNEXIMP* and *RD*. *AB_DISC×UNEXIMP×SEGNUM* is *AB_DISC* times the product of *UNEXIMP* and *SEGNUM*. *10KNEWS* as a dummy variable that takes the value of 1 for firms with insider purchase transactions during the 30-day window leading up to 5 days before the firm's 10-K filing date (i.e., days -35 to -5 relative to the filing date) and zero otherwise. *FLLW* is the logarithm of one plus the number of analysts issuing earnings forecast for the firm. *INSTITUTION* is the percentage of shares outstanding that are held by institutions. *M/B* is the ratio of the firm's market value to book value. *SIZE* is the logarithm of firm size where firm size is measured as the value of firms' total assets in millions of dollar. *ROA* is the firm's return on assets, computed as the ratio of net income before extraordinary items, adjusted for goodwill impairment, to the firm's average total assets. *MFORECAST* is an indicator variable that takes the value of one for firms with management earnings forecast and zero otherwise. *p*-value in parentheses is one- tailed when predicted sign is either "+" or "-" and two-tailed otherwise.

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5. SUMMARY AND CONCLUSION

This study examines firms' disclosure about goodwill impairment test, including information on mergers and acquisitions responsible for subsequent impairment and the specifics of fair value measurement used in the measurement of goodwill impairment. We focus on the extent of disclosure that is abnormal given the economic materiality of goodwill and goodwill impairment loss and the risk of shareholder litigation again management. Our evidence indicates that the level of abnormal disclosure is predictive of the incidence of repeated impairment in future. We also find that the level of abnormal disclosure about goodwill impairment test is associated with market consequences concerning the transparency of goodwill impairment decision.

Our study provides the first set of evidence regarding the usefulness of firms' disclosure about goodwill impairment test. The evidence is consistent with the view that supplemental disclosure about fair value accounting is useful to investors. Given the increasing use of fair value measurement in financial reporting, it is important to gain more understanding about supplemental disclosure about fair value information. To broaden the evidence on the usefulness of supplemental disclosure about fair value accounting, future research may examine supplemental disclosure about other types of fair value measurements, such as biological assets and gains and losses associated with changes in the value of financial assets and liabilities.

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Appendix

Illustration for the Construction of Composite Disclosure Score (*DISCLOSURE*)

To illustrate how our composite disclosure score is constructed, we use the examples of Nanogen Inc. (2005) and Atlantic Tele Network Inc. (2004) and provide the details of our coding and scoring procedure. In each example, we highlight in italic the information items used in determining the score for the three components (*M&A*, *METHOD*, and *INPUT*) of the composite disclosure score.

Example One: Nanogen Inc., 10-K report for 2005

In accordance with SFAS No. 142, "Goodwill and Other Intangible Assets," we do not amortize goodwill and intangible assets with indefinite useful lives. In 2004, using the purchase method of accounting we recorded goodwill with our acquisitions of SynX and Epoch that represented the difference between the purchase price and the fair value of the identifiable tangible and intangible net assets. This goodwill was subject to our quarterly reviews for indicators of impairment.

During our first three quarterly reviews in 2005 there were no material events or changes in circumstances to indicate that the carrying amount of our goodwill might not be recoverable. Therefore, we performed our required annual goodwill impairment testing during the fourth quarter of our fiscal year. We allocated our goodwill assets to our Epoch and SynX reporting units and performed our goodwill testing to determine if the reporting units carrying amount including goodwill was greater than its fair value. To determine the estimated fair value of the reporting units we used a third party to perform a valuation analysis of our reporting units, while we reviewed their assumptions, calculations and conclusions for reasonableness and accuracy. We determined that the carrying amount of the reporting unit that included Epoch was in excess of its fair value. The fair value was based on a combination of the income approach, which estimates the fair value based on the future discounted cash flows, and the market approach, which estimates the fair value based on comparable market prices. Under the income approach, we assumed a cash flow period through 2010 with terminal values thereafter, long- term annual revenue growth rates of 5% to 43%, a discount rate of 20% and terminal value growth rates of 5%. We determined that the fair value of the reporting unit related to Epoch was approximately $26.6 million. Therefore, we incurred a non-cash impairment charge to our goodwill of $59.0 million, which did not affect our liquidity.

We believe we have taken an appropriate valuation approach to determine the fair value of this goodwill asset; however, because there is no exact method to derive the value of a goodwill asset we had to make significant assumptions as to the ratio of market approach verses a income approach. Had we changed the following assumptions our

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goodwill asset and related impairment charge would have changed by the following amounts:

Assumption	Market Approach	Income Approach	Goodwill Valuation	Resulting Goodwill Impairment Charge
Our valuation approach	33%	67%	$ 26,620,000	$ 59,000,000
Pure income approach	0%	100%	$ 15,884,000	$ 69,776,000
Pure market approach	100%	0%	$ 49,600,000	$ 36,000,000

Scoring procedure:

Because the company disclosed the specific reporting unit with goodwill and goodwill impairment (the company's Epoch reporting unit), we assign 1 point to the component of *M&A* (there are no other disclosures for this component). For the component of *METHOD*, we give (1) 1 point to the company's disclosure about the use of external valuation specialist in impairment testing (the company uses a third party to perform valuation analysis of the company's reporting units), (2) 1 point to the disclosure about impairment testing methodology (the company uses a combination of the income approach based discounted future cash flows and the market approach based on comparable market prices), (3) 1 point to the company's disclosure about the sensitivity test concerning the effect of using alternative fair value measurement approaches (discounted future cash flows vs. market prices) on goodwill valuation and goodwill impairment charge, and (4) 1 point to the company's disclosure informing how changes in the assumptions and estimates of fair value measurement (varying the mix of income component vs. market component in fair value measurement) affect the valuation of goodwill and the amount of impairment charge. Summing the disclosure score across these three items gives a disclosure score of 4 points for the component of *METHOD* (1+1+2=4). For the component of *INPUT*, we assign 4 points to the company's very detailed disclosure about the assumptions and estimates used in fair value measurement, including the revenue growth rate (5% to 43%), the horizon of cash flow projection (through 2010), discount rate (20%), terminal value growth rate (5%), and the estimate of total fair value of the reporting unit ($26.6 million).

The sum of scores for the three disclosure components is 9 points (1+4+4=9), out of a maximum of 14 points in our disclosure score. Accordingly, the scaled disclosure score (*DISCLOSURE*) for Nanogen Inc. in 2005 is 0.6429 (9÷14=0.6429).

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Example Two: Atlantic Tele Network Inc., 10-K report for 2004

GOODWILL AND OTHER INTANGIBLE ASSETS

In accordance with the requirements of SFAS 142, the Company has performed its annual impairment test of goodwill and determined that goodwill was impaired at December 31, 2004 as the carrying value of the goodwill recorded on its books exceeded its fair value at December 31, 2004. Accordingly, the Company adjusted the carrying value of these assets and recorded a $1.6 million impairment charge for goodwill at its Choice subsidiary.

Scoring procedure:

The company's only relevant disclosure is for the component of *M&A*, and this disclosure reveals the subsidiary with goodwill and goodwill impairment (its Choice subsidiary). We give 1 point to this disclosure. The company provides no disclosure about the components of *METHOD* and *INPUT*. Thus, the sum of the company's disclosure is 1 point, out of a maximum of 14 points, and the company's scaled disclosure score (*DISCLOSURE*) for 2004 is 0.0714 (1÷14=0.0714).

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