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Consequences of booking market-driven goodwill Impairments

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Consequences of booking market-driven goodwill impairments

Abstract

Under the fair-value-based goodwill impairment test of SFAS 142, a firm's market value is often used as an important reference point for determining the existence of impairment. In fact, a below-one market-to-book ratio is considered by many, including external auditors and security lawyers, to be an indicator of goodwill impairment. As a result, firms can be pressured into recording goodwill impairment upon a temporary market value decline which is unsubstantiated by economic fundamentals. From a sample of goodwill impairments recorded during the period 2002-2009, we identify about a sixth of the sample firms which report impairment charges that are most likely market-driven and not backed by fundamentals. Validating our identification of market-driven impairments, we find that the impairment loss of these firms is associated with a return reversal in the subsequent year. It appears from our results that the market does not understand the difference between market-driven and other impairments and reacts equally negatively upon the initial announcement of the loss, resulting in a further price decline for firms with market-driven impairment. In addition, we find that, until the return reversal occurs, firms with market-driven impairment experience an increase in information asymmetry associated with the impairment loss. Finally, our results suggest that the managers of these firms exploit the delay in the market's reversal of the temporary undervaluation related to the impairment by engaging in share repurchases to a greater extent than normal. Overall, our findings shed light on the potential negative consequences of the imperfect implementation of fair value accounting.

1. Introduction

The Statement of Financial Accounting Standards (SFAS) No. 142, *Goodwill and Other Intangible Assets*, issued by the Financial Accounting Standards Board (FASB), effective July 2001, requires companies to review goodwill for impairment at annual intervals and when triggering events occur, and to recognize a loss if goodwill is impaired. As an immediate consequence of this standard, there was a spate of goodwill write-offs running into millions of dollars announced by a number of high-profile companies, such as AOL Time Warner. A second wave of goodwill write-offs occurred during the recent recession and market collapse with impairment charges amounting to roughly two-thirds of the goodwill balance on companies' opening balance sheets (Comiskey and Mulford 2010). SFAS 142 requires companies to determine the goodwill impairment loss using a fair value approach. Specifically, the fair value of goodwill is determined as the residual fair value of a reporting unit after subtracting the fair value of its recognized net assets other than goodwill. To determine fair values, SFAS 142 suggests that quoted market prices provide the best evidence of fair values. Consistently, a subsequent standard, SFAS 157 (updated), *Fair Value Measurements*, specifies the fair value hierarchy and emphasizes that "level 1" fair value measurement reflects values from orderly transactions.

Given SFAS 142's prescription on fair value measurement and emphasis on impairment triggers, it is quite likely that goodwill impairment losses taken by firms are based on a current decline in firms' market values.[1] While a firm's market value provides an objective measure of the combined fair values of reporting units, it can temporarily deviate from the firm's fundamental value for various reasons, including volatile markets, illiquidity, price pressure, exogenous shocks and

[1] Although SFAS 142 does not specifically refer to a decline in market prices as an example of a triggering event, International Accounting Standard (IAS) 36, *Impairment of Assets*, lists market value decline as an external indicator of impairment. Also, major public accounting firms in the U.S. consider a significant stock price decline to be a potential impairment trigger (Dharan 2009). Based on a sample of firms that took a goodwill write-off in 2008, Comiskey and Mulford (2010) find that 68% of the firms viewed a decline in equity prices as a goodwill impairment triggering event.

other market frictions. Due to pressure from external auditors and/or litigation concerns, firms experiencing a temporary decline in their market value may be forced to recognize a goodwill impairment loss even in the absence of any evidence of economic impairment in fundamentals. As a consequence, market prices can be further distorted if investors fail to understand the nature of the impairment loss. In this paper, we identify cases of goodwill impairment that are likely driven by the market-based impairment signal but not backed by economic fundamentals. We first examine whether these firms experience a price reversal associated with the impairment in the subsequent year. We then test whether the market is misled by these impairments, how the impairment recognition affects the information environment, and whether managers exploit the impairment-related undervaluation by taking actions such as repurchasing shares.

We categorize a firm in the impairment sample as recording a "market-driven non-fundamental" impairment if its market performance signals impairment but the firm's fundamentals do not indicate an economic impairment.[2] We consider the market signal of impairment to be strong if the ratio of a firm's market value of equity to book value of equity (M/B) declines during the year and is less than one at the end of the year.[3] To determine whether a firm's fundamentals signal goodwill impairment, we construct a composite measure of firm fundamentals by conducting a factor analysis of various current and expected future performance indicators for the Compustat population during our sample period. We then categorize firms that fall in the bottom tercile of the distribution based on the sum of the first two factors as exhibiting weak fundamentals suggestive of economic

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[2] In the interest of brevity, we also refer to market-driven non-fundamental goodwill impairments simply as market-driven impairments in subsequent discussions.

[3] Several prior studies have used M/B less than 1 as an indicator of potential goodwill impairment (e.g., Beatty and Weber 2006, and Ramanna and Watts 2012). As discussed in the next section, a below-one market-to-book ratio is also considered by regulators, public accounting firms, and security lawyers as a signal of goodwill impairment.

impairment.[4] To (ex post) validate that the goodwill impairment of these firms is related to a *temporary* price decline, we begin by examining whether the market later reverses its effect. Specifically, we test whether the magnitude of the impairment is positively correlated with the subsequent year's returns.

We estimate a regression of the subsequent year's market-adjusted returns on the magnitude of the impairment interacted with indicator variables for the market-driven impairment sample and benchmark impairment samples (along with other determinants of returns). We use several benchmark samples to establish our results. First, we use all impairment firms other than firms with market-driven non-fundamental impairment as a benchmark sample. Our second benchmark sample includes only impairment firms that have "confirmatory" signals, that is, both the market and fundamental impairment signals are consistently negative, thus indicating a higher likelihood of an economic impairment. We believe that these impairments are less likely to be "forced" by a temporary market decline since the firm's fundamentals also corroborate an economic impairment. Our results indicate a significant return reversal for the market-driven impairment sample, but none for the benchmark impairment samples, confirming that the impairment of the market-driven sample is related to a temporary price decline.

The positive association between subsequent returns and the impairment magnitude of the market-driven sample does not necessarily imply that the market is misled by the recognition of the impairment charge. This is because the positive association could capture either the reversal of the market's negative reaction to the impairment announcement or prior negative returns that led to the impairment or both. We therefore test whether the market was initially misled into reacting negatively to the announcement of the impairment. Our results show a significant negative reaction

[4] For the factor analysis, we use the level of return on assets (ROA), operating cash flows, and gross margin as indicators of current performance, and changes in ROA, operating cash flows, gross margin, sales, capital expenditure, and the number of employees as indicators of expected future performance. The first factor captures the levels variables which we interpret as current performance, and the second factor captures changes in variables which we interpret as indicators of trends in future performance.

to market-driven impairment announcements which is not distinguishable from that of the benchmark impairment samples. Thus, the market does not appear to understand that these impairments are not backed by fundamentals leading to further undervaluation upon their announcement.

The market is likely to understand the nature of these impairments when later realizations provide confirmatory information. To determine the point in time during the subsequent year when the price reversal occurs, we analyze (cumulative) quarterly patterns in the relation between the magnitude of impairment and returns in the subsequent year. We find an insignificant relation between impairment and subsequent returns up to the end of three quarters, and a significant positive relation only in the fourth quarter. Thus, our evidence suggests that the market learns about the undervaluation (at least partially) only when the next year's performance results are released.

Since the market recognizes the nature of market-driven impairments with a delay, we expect to observe several consequences associated with this delay. First, we hypothesize that the recognition of impairment in the presence of conflicting signals (i.e., market versus fundamental) will lead to greater uncertainty about the stated value of goodwill and its future cash flow implications. Hence, we expect to observe more diverse interpretations of this information by market participants as captured by an increase in the bid-ask spread and analysts' forecast dispersion in the interim period. Second, we expect managers to have private information about the "true" value of goodwill and therefore hypothesize that they will take actions in the interim period to take advantage of the market's undervaluation of goodwill and its implications for future cash flows. Thus, based on the timing of the market's correction, we test whether the managers of these firms repurchase more shares in the interim period relative to benchmark firms.

In analyzing the consequences of the lag in the market's recognition of the nature of these impairments, we examine the relation between the magnitude of impairment and commonly used measures of information asymmetry in the subsequent year for the market-driven impairment sample relative to the benchmark impairment samples. We find an incremental positive relation between impairment magnitude and the change in bid-ask spreads and analysts' forecast dispersion for the market-driven impairment sample, suggesting an increase in information asymmetry for these firms associated with the previously recorded goodwill impairment. We also compare the market-driven impairment sample with a matched control sample of non-impairment firms. For each impairment firm, we identify one non-impairment control firm that belongs to the same industry and has similar levels of market and fundamental indicators as the impairment firm. Market-driven impairment firms exhibit a greater increase in information asymmetry associated with the impairment relative to control firms, suggesting that the recognition of impairment exacerbates information asymmetry.

We also find evidence suggesting that managers take advantage of the temporary under-pricing of their firm's shares due to market-driven goodwill impairments. In the subsequent year, we find that, relative to the benchmark impairment samples, there is a significantly higher correlation between the magnitude of impairment and the firm's propensity to repurchase for the market-driven impairment sample; also, the correlation between impairment magnitude and the dollar amount repurchased is significantly higher for these firms relative to the benchmark firms. Further, compared to matched control firms with similar levels of market and fundamental indicators, market-driven impairment firms exhibit an incremental tendency to repurchase that is positively correlated with the magnitude of impairment. Thus, it appears that insiders are aware that these impairments are induced mainly by a temporary market decline in their stock, and moreover realize that the market is not aware of the nature of these impairments at least for a while. As a consequence, they buy back their own shares at a price lower than that indicated by fundamentals and at the same time signal their firm's undervaluation to the market.

From our results, goodwill impairment charges taken by a sixth of our sample companies are likely driven by the decline in their market prices, unsubstantiated by fundamentals. We find that the frequency of such market-driven impairments more than doubles during the financial crisis when a significant number of firms experience temporary slumps in the price of their stock. Investors at least temporarily are unable to distinguish these impairments from those that reflect impaired economic fundamentals. The accounting recognition of market-driven impairments results in a further price decline, suggesting that the fair-value-based accounting for goodwill exacerbates the severity of mispricing particularly in times of crisis. Although it appears that managers are aware of the nature of these impairments, the rules prohibit them from reversing a previously recorded impairment loss under any circumstances. As a consequence of this prohibition, the price distortion may persist until subsequent news confirms that the impairment charge was inconsistent with economic fundamentals.

Our paper contributes to the literature investigating the effect of goodwill impairment losses based on fair value measurement. The use of unverifiable fair values in estimating goodwill impairment has been questioned by Ramanna and Watts (2012). These authors provide evidence suggesting that a number of firms with potentially impaired goodwill (on the basis of M/B) did not take an impairment charge, probably justified by subjective fair values of reporting units. Different from Ramanna and Watts (2012), we focus on firms that may have been "forced" to take an impairment charge because of a so-called objective fair-value criterion. We provide evidence suggesting that firms who *did* take an impairment charge on the basis of a *temporary* decline in equity prices may have misled the market. Our results focus on the flawed implementation of fair value accounting in booking impairments rather than fair values facilitating impairment avoidance and thus complement the findings of Ramanna and Watts (2012). On the one hand, the use of unverifiable fair values may encourage managers to behave opportunistically; on the other hand, blind adherence to fair value prescriptions while disregarding the underlying economics of the situation can swing the pendulum to the other extreme and also result in misleading investors.

Our paper also sheds light on the role of fair value accounting in the recent financial crisis. During the financial crisis, arguments were made that fair value accounting forced banks to write down temporarily-depressed investments that they had no intention of selling, leading them to make sub-optimal pro-cyclical actions that further amplified the crisis. While admittedly the impact of fair value accounting was orders of magnitude greater in the financial sector, we provide evidence that fair value accounting of the goodwill asset also had similar spiral effects on firms in the real economy. Perhaps the FASB's revised guidance on fair value measurement addressing the use of quoted prices in inactive markets will check the flawed implementation of fair value accounting in future.

The rest of the paper is organized as follows. Section 2 describes the hypotheses. Section 3 discusses the data and variables. Research design and empirical results are reported in Section 4, followed by concluding remarks in Section 5.

2. Hypotheses development

SFAS 142 requires that firms test goodwill for impairment annually and between annual tests if an event occurs or circumstances change that would more likely than not reduce the fair value of a reporting unit below its carrying amount (FASB, 2001). The impairment test is a two-step procedure based on fair values. Step one involves comparing the fair value of a company's reporting unit with its carrying amount, including goodwill. If the carrying amount of a reporting unit exceeds its fair value, the second step of the goodwill impairment test must be carried out to measure the amount of the impairment loss, which equals the difference between the carrying amount of goodwill and its estimated fair value.

The fair values used for goodwill impairment testing are generally not readily available and have to be estimated. Yet, the market value of a firm provides an objective measure of the combined fair values of reporting units and becomes an important factor to consider in the testing process. In fact, it is widely viewed as a key indication of impairment if a firm's market value falls below its book value. Several academic studies identify firms with goodwill impairment using the market-to-book ratio (e.g., Beatty and Weber 2006; Ramanna and Watts 2012). A below-one market-to-book ratio is also considered by regulators and accounting firms as a signal of goodwill impairment. While regulators emphasize that it is not the only factor to consider in assessing goodwill for impairment, they point out that it is "prudent to reconcile the combined fair values of your reporting units to your market capitalization."[5] In his presentation to the American Institute of Certified Public Accountants (AICPA) in December 2008, Steven C. Jacobs, Associate Chief Accountant of the Division of Corporation Finance at the Securities and Exchange Commission (SEC), specifically listed "decline in market capitalization below book value" as an event that may trigger an interim goodwill impairment test.[6] McGladrey, the fifth largest accounting firm in the U.S. in terms of revenue, states in their publication that while they do not believe a reduction of market capitalization below book value is an "automatic indicator," a significant decline in the market capitalization below the carrying amount may be an event or circumstance that triggers the requirement for impairment testing.[7]

While regulators and auditors are cautious and avoid using the market-to-book ratio as the sole determinant of goodwill impairment, security lawyers place substantial emphasis on it in evaluating if impairment has occurred. For example, Latham & Watkins, one of the largest law firms in the world, recommends to its clients that in case their market capitalization is less than book value, they should prepare for the possibility of goodwill impairment and ensure that appropriate

[5] http://www.sec.gov/news/speech/2008/spch120808rgf.htm.

[6] http://www.sec.gov/news/speech/2008/spch120908wc-slides.pdf

[7] http://mcgladrey.com/pdf/goodwill_impairment_testing_today_economy.pdf

disclosures are made.[8] This suggests that a below-one market-to-book ratio is associated with the general perception that goodwill impairment exists. If a firm does not record a goodwill impairment charge in the presence of a below-one market-to-book ratio, it can be targeted by security lawyers for a class action lawsuit on account of its failure to record and disclose the loss.

Benchmarking against the market value of the firm likely constrains the subjectivity in the goodwill impairment testing process. However, the relevance of the approach critically hinges on market value conforming to economic fundamentals. If stock prices deviate from the underlying economics for a variety of reasons, market value could be a misleading indicator of impairment. Yet, SFAS 157 assigns quoted prices in active markets the highest priority (level 1) in estimating fair values, with quoted prices in inactive markets and "unobservable inputs" assigned level 2 and level 3 priority, respectively. The strict enforcement of SFAS 157 by auditors is apparent from the 2007 white paper issued by the Center for Audit Quality (mainly representing the Big-4 accounting firms), which emphasized that prices from inactive markets took precedence over internal cash flow projections and pricing models. The legitimacy of fair-value accounting in the presence of less active or inactive markets was questioned by many during the recent financial crisis in the context of other assets and liabilities (e.g., investments and derivatives) of financial institutions in particular. It appears that SFAS 157 and its interpretation may have helped auditors to force their clients to anchor fair values on depressed prices from inactive markets even if those prices were not determinative of fair value.[9, 10]

[8] http://www.lw.com/upload/pubContent/_pdf/pub2484_1.pdf

[9] In response to outside pressure during the crisis to amend fair value accounting, a subsequent FASB staff position (No. 157-4) allowed companies to depart from observable market values and use more optimistic fair value estimates.

[10] In addition to auditors, the SEC has also pursued firms that did not write down investments based on a decline in their market values. While it is hard to imagine firms not complying with the SEC's directive, in a notable case of Berkshire Hathaway, the company's CFO communicated to the SEC that the company did not plan to write off losses on two of its investments because the prices did not reflect the worth of the shares (see Holm 2011).

Particular to goodwill impairment, if auditors consider M/B<1 to be a strong signal of impairment, even though economic fundamentals indicate otherwise, firms can be forced to take an impairment charge in the auditing process. In order to reduce litigation risk, firms may even voluntarily record a goodwill impairment charge if their M/B ratio declines during the year and is less than one at the end of the year. In this case, a goodwill impairment charge reflects a temporary market value decline rather than declining economic fundamentals, i.e., an economic impairment. We refer to these impairment charges taken in the presence of the market indicator (M/B<1 and ΔM/B<0) but not backed by economic fundamentals as "market-driven non-fundamental" impairments (or market-driven impairments, for the sake of brevity).

We first ex post validate that market-driven impairments in fact reflect a market decline that is temporary in nature. If the impairment is associated with temporary mispricing, we expect the market to correct the mispricing subsequently as economic news is revealed. Thus, if our identification of market-driven impairments is correct, we expect to observe a positive correlation between subsequent returns and the impairment amount for this sample.

Prior research shows that announcements of goodwill impairment, on average, convey bad news and cause investors to adjust their expectations about future cash flows downward (see Li et al. 2011, Bens et al. 2011). A consequence of booking goodwill impairment on the basis of a temporary market decline is that the accounting recognition of the impairment may mislead the market into reacting negatively and further undervaluing the stock. During the financial crisis, many blamed fair value accounting for forcing banks to write down temporarily-depressed investments that they had no intention of selling, leading them to make sub-optimal pro-cyclical actions resulting in a downward spiral.[11] While by no means comparable to its effect on the financial sector, we examine whether fair

[11] Badertscher, Burks and Easton (2012) show that fair value accounting losses had minimal effect on commercial banks' regulatory capital during the crisis and that the (pro-cyclical) investment sales made by banks in response to these losses were economically insignificant. On the other hand, Bhatt, Frankel and Martin (2012) report results

value accounting had similar spiral effects on the real economy via its effect on the goodwill asset. If investors do not immediately recognize that market-driven goodwill impairments reflect a temporary decline in market values, the accounting recognition of the impairment could exacerbate the undervaluation by leading to a further decline in the stock price. Thus, we test whether investors react negatively upon the announcement of market-driven impairments and whether the reaction is similar to that of other impairments.[12] Our first hypothesis is the following:

H1: The market reacts negatively to the announcement of market-driven goodwill impairments and the reaction is not significantly different from that of other goodwill impairments.

It is an empirical question as to how long it takes for the market to discover and correct the temporary mispricing associated with market-driven goodwill impairment. As restoration of a previous impairment charge is not allowed under the current reporting regime, managers cannot effectively communicate their private information about the nature of the impairment to the market. Instead, the mispricing is likely corrected over time with the revelation of economic news that provides more information about the firm's future cash flows. Theoretical models with imperfect information predict that stock prices adjust to poor quality information gradually, not instantaneously (e.g., Verrecchia 1980, Callen, Govindaraj, and Xu 2000, and Callen, Khan, and Lu 2012). When accounting information is imprecise, for example in the case of market-driven goodwill impairments, investors' understanding of the implications of this information for future cash flows would evolve over time, so that prices would reflect fundamentals with a delay. Thus, before sufficient economic news is released to resolve the mispricing, we expect that firms with market-driven goodwill impairment experience an increase in information asymmetry that is correlated with the magnitude of

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suggesting that feedback between bank holdings of mortgage-backed securities and their market prices was aggravated by mark-to-market accounting and had a measurable effect on shareholder value.

[12] Note that a positive association between subsequent returns and the impairment amount cannot be construed as evidence that investors were misled by the recognition of market-driven impairments. This is because the positive association could be due to the reversal of the price impact of the impairment announcement and/or the effect of prior (temporary) negative returns that led to the market-driven impairment.

impairment. We use bid-ask spreads as a proxy for information asymmetry among investors. This is consistent with previous studies that argue that poor accounting and disclosure quality is associated with wider spreads because it results in differentially informed investors and thus increases the adverse selection risk of liquidity providers (Bhattacharya, Desai, and Venkataraman 2012, and Heflin, Shaw, and Wild 2005). We also use dispersion in analysts' forecasts as an additional proxy for information asymmetry among market participants. Our second prediction is thus the following:

H2: Relative to benchmark firms, firms reporting market-driven impairments experience an incremental increase in subsequent bid-ask spreads and analysts' forecast dispersion that is associated with the impairment.

There are several theoretical studies in behavioral corporate finance which model imperfect capital markets in which investors are irrational but managers are able to identify price dislocations (see Baker, Ruback, and Wurgler 2007 for a review). Consistent with theory, Brockman and Chung (2001) find that managers use their private information about the firm's undervaluation to time equity repurchases in the open market. Since managerial wealth is tied to the value of the firm, it is likely that managers will use their superior knowledge about their firm's fundamentals to their own advantage and that of existing shareholders. In the case of market-driven goodwill impairment, we expect that managers would understand the temporary underpricing due to the market-driven impairment charge and act to take advantage of the mispricing and/or to signal in order to correct the mispricing. Specifically, we predict that, relative to benchmark firms, the impairment charge of these firms will be associated with more share repurchases during the "window of opportunity," i.e., in the period beginning with the impairment announcement until the market correction occurs. Thus, our third prediction is the following:

H3: Relative to benchmark firms, firms reporting market-driven impairments exhibit an incremental increase in stock repurchases that is associated with the impairment.

We use the sample of (i) non market-driven impairment firms, and (ii) "confirmatory" impairment firms as benchmark samples to test these hypotheses. The confirmatory sample includes impairments taken when both the market and the fundamental signals are present. Our purpose in using the confirmatory impairment sample is to compare the effects of "forced" market-driven impairments with economic impairments. Since both these groups have a declining and below-one M/B, comparing the two groups controls for the impact of the market indicator on subsequent stock returns and information asymmetry. In addition, we also use a sample of non-impairment control firms as a relative benchmark in our tests of hypotheses 2 and 3. In the next section, we describe our sample selection and descriptive statistics for the final sample.

3. Data and sample selection

3.1 Sample selection

We begin by selecting firms that report a goodwill impairment charge during the period 2002-09 as recorded in Compustat. Our sample period begins in 2002, the year in which most firms adopted SFAS 142. We obtain financial information from Compustat and price and return data from CRSP. We exclude financial institutions (SIC 6000-6999) and utility firms (SIC 4900-4999), and require sample firms to have (1) financial and stock price data for calculating the market and the fundamentals indicators, and (2) financial and return data of the year subsequent to the impairment. To mitigate the effect of outliers, we further exclude observations with market-adjusted returns greater than 200%, penny stocks, and firms with negative market-to-book ratios from our sample. After imposing these data requirements, we obtain a sample of goodwill impairments that includes 1,543 firm-year observations.

As discussed earlier, our hypotheses focus on "market-driven non-fundamental" goodwill impairments, namely, impairment charges taken in the presence of the market indicator but not the fundamentals indicator. To identify these impairments, we construct indicators of the market signal and the fundamentals signal of goodwill impairment. Reflecting the popular belief that declining market values and M/B<1 are strong signals of goodwill impairment, we base the market indicator on the M/B ratio. Specifically, we consider the market indicator of goodwill impairment to be present when a firm's market value of equity relative to its book value of equity (after adding back the after-tax impairment charge) declines during the year and falls below one at the end of the impairment year (i.e., $M/B<1$ and $\Delta M/B<0$).

We rely on accounting performance measures to capture the fundamentals indicator of goodwill impairment. While accounting performance measures can be noisy or untimely in reflecting economic fundamentals, they are less affected by temporary market shocks than stock prices. We conduct a factor analysis using several variables that reflect firms' current and expected future performance. Specifically, we use the level of ROA, operating cash flows to total assets, and gross margin as indicators of current performance. We include operating cash flows in addition to ROA to ensure that the firm's earnings performance is backed by cash generation from operations and is therefore less likely to be simply a result of accruals manipulation. We further include change in ROA, change in operating cash flows to total assets, change in gross margin, sales growth, capital expenditure (scaled by total assets), change in capital expenditure, and change in the number of employees as indicators of expected future performance. Changes in various performance variables are expected to provide information about the trend in the firm's future prospects. In addition, the level and growth in capital expenditure and growth in employees capture the firm's current and future investment opportunities and are therefore considered to be indicators of the firm's expected future performance.

The factor analysis is performed using all Compustat firms that belong to the same industry (two-digit SIC) as firms in the impairment sample with available data during the sample period. We select the first two factors from the factor analysis -- the first factor captures the effect of three levels variables (ROA, operating cash flows, and gross margin) which we interpret as a measure of current performance, and the second factor captures the effect of changes in these three variables which we interpret as a measure of the future trend in performance.[13] For each firm-year observation, we calculate the factor scores of the first two factors and measure the composite score as the sum of the two factor scores. A firm is considered to have a fundamental signal of impairment if its composite factor score falls in the bottom tercile of the distribution for all Compustat firms.[14]

Based on the indicators of impairment defined above, we identify 16% of sample firms as experiencing market-driven non-fundamental impairment (with the market indicator but not the fundamentals indicator of impairment), and 19% as experiencing confirmatory impairments (with both the market and the fundamentals indicator of impairment).

As described above, we construct the market and fundamental indicators at the firm level, whereas the actual impairment test is conducted at the reporting unit level. Although reporting unit level indicators would be our ideal choice, data limitations compel us to rely on firm-level indicators. First, in relation to the market indicator of impairment, note that reporting units generally are not traded subsidiaries and hence the market value of a unit is not available. Second, as regards the fundamentals indicator, we could potentially make use of segment-level disclosures to construct the fundamentals indicator at the reporting unit level. However, our reading of 10-K reports for about 10% of our sample reveals the following: the segment to which a reporting unit belongs is not always disclosed, the allocation of impairment amounts to different segments is not always clear, and the segment profitability measure that is disclosed is not consistently defined across firms. As a result, it is difficult to make use of

[13]The Appendix provides detailed results of the factor analysis.

[14] We believe that classifying firms with fundamental scores in the bottom tercile as having poor fundamentals is justified since less than 10% of the Compustat population in our sample period reports goodwill impairment. The tenor of our results is unchanged if we instead classify firms with a below-median fundamental score as having low fundamentals suggestive of economic impairment.

segment-level data to construct the fundamentals indicator. We acknowledge that our use of firm-level indicators may introduce noise in our identification of market-driven non-fundamental impairments; however, the concern may not be as serious due to the following: (i) To the extent the performance of reporting units is correlated and legal counsel/auditors advise managers to use the *firm's* M/B ratio as an indicator of impairment (as anecdotal evidence suggests), measurement error should be less of a concern. (ii) Misclassification of market-driven non-fundamental impairment firms will bias against finding differences between the samples. (iii) In sensitivity analysis, we test our hypotheses using only single-segment firms for which firm-level measures are the appropriate indicators of impairment and find substantially similar results. (iv) In additional sensitivity analysis, we eliminate, from the market-driven impairment sample, firms with negative EPS in one or more segments and obtain substantially similar results.

3.2 Matched control firms

One possible concern in testing for differences between market-driven and benchmark impairment samples is that our results may be driven by the firm characteristics used to identify these impairment subgroups. To mitigate this concern, we obtain a matched control sample of non-impairment firms with reported goodwill at the beginning of the impairment year. We require the matched control observation to be from the same year and the same industry (two-digit SIC) as the impairment firm and to have the same market indicator of impairment (i.e., M/B<1 and ΔM/B<0 for market-driven and confirmatory impairment firms and M/B>1 or ΔM/B>0 for the remaining impairment firms).[15] Then, from non-impairment firms satisfying these requirements, we choose a control firm from the same fundamentals-indicator category (i.e., bottom tercile or top two terciles) with the closest fundamentals indicator (composite factor score) as the impairment firm.

[15] For 12% of our sample firms, we obtain a matched control firm at the one-digit SIC code level, since the additional data requirements result in no match at the two-digit level.

3.3 Descriptive statistics of the impairment sample

Table 1 reports the distribution of the entire impairment sample by year and presents the descriptive statistics of the impairment sample and its matched control sample. Panel A shows that 31% of goodwill write-offs (473 firms) occur in 2008, right in the middle of the recent financial crisis, consistent with significant economic impairment occurring during the accompanying recession.

To mitigate the undue impact of outliers, all continuous variables are winsorized at the top and bottom 1% of their distribution. Panel B presents the mean and median characteristics of the total impairment sample and the matched control sample of firms. The mean (after-tax) impairment charge amounts to 5% of the market capitalization of the impairment sample. Compared to control firms, the impairment firms are on average larger in size and have significantly lower ΔROA, stock returns, and M/B ratio. Although the composite fundamental factor score of the impairment sample is lower than that of the control sample, the difference is insignificant. To compensate for the less than perfect control-firm matching on impairment indicators, we also include these indicators as control variables in our regressions.

3.4 Descriptive statistics of market-driven and other impairment firms

Table 2 reports the distribution of the market-driven, confirmatory, and other impairment firms by year and presents the descriptive statistics of the impairment sub-samples. Overall, 16% of goodwill impairments are classified as market-driven impairments based on our criteria. Interestingly, the annual percentage of market-driven impairments is the highest at 31% for impairments reported in 2008, the year with the largest number of impairments, consistent with negative market shocks during the financial crisis leading to market-driven goodwill write-offs. To explore the extent to which our results are driven by impairments reported during the financial crisis period, we later conduct sensitivity analyses examining the financial crisis period and the rest of the sample separately. We obtain similar inferences for the two sub-periods. About 19% of the sample includes confirmatory impairments firms, i.e., firms with both market and fundamental signals of impairment.

Panel B reports the mean and median characteristics of the market-driven impairment sample and the two benchmark samples (i) impairment firms other than market-driven, and (ii) confirmatory impairment firms. The asterisks shown in the columns for other impairment firms and confirmatory impairment firms relate to tests of differences in means and medians of the market-driven impairment sample versus the respective benchmark sample. The mean impairment charge taken by market-driven impairment firms is 8% of their market capitalization, which is significantly higher than that for other impairment firms (5%) but lower than that of confirmatory impairment firms (10%). Market-driven impairment firms are on average smaller in size (market value) than other impairment firms but larger than firms in the confirmatory impairment sample. By construction, the mean M/B ratios of the market-driven and confirmatory samples are below one and significantly lower than that of other impairment firms. Also by construction, the mean composite fundamental factor score is positive for the market-driven sample and negative for the sample of other impairment firms and confirmatory impairment firms. While all three samples have negative stock returns, they are significantly more negative for the market-driven and confirmatory impairment samples relative to other impairment firms. The market-driven and confirmatory impairment firms have a higher bid-ask spread relative to other impairment firms.

4. Research design and empirical results

4.1 Return reversal

4.1.1 Research design

We first ex post validate that our identification of market-driven goodwill impairments captures impairments associated with a temporary market value decline. If that is the case, we expect these impairments to be followed by subsequent returns that are positively correlated with the magnitude of impairment. To test this prediction, we estimate the following regression using the market-driven (*MD*) and the benchmark (*BMark*) impairment samples (firm subscripts are suppressed),

$$RET_{t+1} = a_0 + a_1 MD_t + a_2 ImpairAmt_t * MD_t + a_3 ImpairAmt_t * BMark_t + \sum a_{4i} Controls_i + e_{t+1} \quad (1)$$

Year t refers to the goodwill impairment year. The dependent variable, RET_{t+1}, is the market-adjusted buy-and-hold return over a period of twelve months following the month of the earnings announcement of the impairment year.[16] $ImpairAmt_t$ is the after-tax amount of goodwill impairment in year t scaled by the market value of equity at the beginning of the impairment year. Upon the initial adoption of SFAS 142 in 2002, firms were required to test all previously recognized goodwill for impairment using the newly prescribed methodology. The resulting goodwill impairment, i.e., the transitional impairment, is reported as the cumulative effect of an accounting change (after tax). As a result, for the year 2002, we calculate the amount of goodwill impairment as the sum of the cumulative effect of accounting change (*ACCHG*) and the after-tax goodwill impairment for the year (*GDWLIA*). The variable MD_t is an indicator variable that equals one if the impairment is classified as market-driven non-fundamental and zero otherwise. The variable $BMark_t$ is an indicator variable that equals one if the impairment firm belongs to the benchmark sample (i.e., impairments other than market-driven, and confirmatory impairments) and zero otherwise. The coefficient on the interaction of $ImpairAmt_t$ and MD_t ($BMark_t$) captures the association between RET_{t+1} and $ImpairAmt_t$ for firms in the market-driven (benchmark) impairment sample. We expect a positive coefficient on a_2, if there is a return reversal associated with the impairment for the market-driven sample of firms. We do not expect to observe a return reversal for the benchmark impairment samples.

[16] We use equally-weighted market returns to compute market-adjusted returns in the main analyses. Our inferences are unchanged if we use value-weighted market returns.

We control for a number of other factors that may affect returns of year t+1. First, we include the M/B ratio at the end of year t (M/B_t), change in the M/B ratio in year t ($\Delta M/B_t$), and the composite fundamental factor score at the end of year t ($Fundamental_t$) to control for differences in returns associated with firm characteristics used to partition the impairment sample. Second, we include firm size ($Size_t$) as measured by the logarithm of total assets at the end of year t and return volatility of year t ($Volatility_t$) to control for their potential impact on returns. Following Mukherji (2011) and Collins and Kim (2013), we also control for long-run mean reversion of returns using buy-and-hold returns over a holding period of three years ending in year t ($RET_{t-2,t}$). Third, we control for the impact of concurrent earnings and impairment news on stock returns by including change in earnings per share before goodwill impairment in year t+1 deflated by the beginning-of-the-year stock price (ΔEPS_{t+1}) and goodwill impairment in year t+1 deflated by the market value at the beginning of year t+1 ($ImpairAmt_{t+1}$). Finally, we control for self-selection bias by including the inverse Mills ratio (IMR) from a first-stage probit regression estimating the likelihood of reporting a goodwill impairment using firm characteristics suggested by Beatty and Weber (2006) and Li et al. (2011).[17]

4.1.2 Return reversal results

Table 3 reports the estimation results of regression (1). Columns (1-2) report basic results using the market-driven impairment group alone (and thus do not include the interaction variables). The coefficient estimate on $ImpairAmt_t$ is positive and significant, suggesting that firms with market-driven impairment experience a return reversal that is positively correlated with the magnitude of the impairment previously recorded. Among the control variables, earnings surprise and goodwill

[17] We include variables that capture managerial reporting incentives and prior economic indicators of impairment as explanatory variables in the first-stage regression. Specifically, we use firm size (market value), leverage, stringency of the exchange's delisting requirements, change in ROA, stock returns, return volatility, an indicator variable for Big4 auditors, and an indicator variable which equals one if the firm belongs to an industry with high litigation risk. Results of the first-stage regression are available from the authors upon request.

impairment of year t+1 are significantly correlated with returns of year t+1 with the predicted signs. The significant negative coefficient on the inverse Mills ratio indicates that firms that are more likely to take an impairment charge have lower returns in the subsequent year. Results of regression (1) comparing the market-driven sample with the sample of other impairment firms are reported in columns (3-4) and with the confirmatory sample in columns (5-6). The coefficient estimate on $ImpairAmt_t{*}MD_t$ is positive and significant suggesting a return reversal for the market-driven group that is positively correlated with impairment magnitude. In contrast, the coefficient estimate on $ImpairAmt_t{*}BMark_t$ is insignificant for the benchmark samples, providing no evidence of a return reversal relating to the previously recorded impairment.[18] In both regressions, the *F*-test rejects the null that the coefficient on $ImpairAmt_t{*}MD_t$ is equal to that on $ImpairAmt_t{*}BMark_t$.

Overall, the results in Table 3 show that market-driven impairment firms experience a unique return reversal in the year following the impairment that is correlated with the magnitude of impairment. Firms with impairments that are not market-driven, including firms with a similar market indicator but different fundamental indicator (i.e., confirmatory impairments), do not exhibit a similar reversal. Thus, these results provide an ex post validation of our identification of the market-driven impairment sample.

4.1.3 Sensitivity tests

The analyses in Table 3 Panel A require that impairment firms have return and financial data for the year subsequent to the impairment. This requirement potentially introduces a survivorship bias that may affect our inferences. We find that about 15% of firms with market-driven impairment are delisted during the year subsequent to the impairment, whereas 27% of other impairment firms are delisted during the same time period. To assess the extent to which our findings are affected by the

[18] Note that the coefficient estimates on $ImpairAmt_t{*}MD_t$ and $ImpairAmt_t{*}BMark_t$ capture the impact of impairment on subsequent returns for the respective sample; i.e., we do not report differential coefficients. The *F*-test in the last row of the table reports the significance of the difference in coefficients.

survivorship bias, we include the delisted firms in the sample and rerun the return reversal test. We find that about 70% of the delisted firms have delisting codes on CRSP. For these firms, we use the CRSP delisting return and assume that the proceeds of the delisted firm are invested in the market portfolio for the remainder of the year following the impairment. When the CRSP delisting return is not available, we assume a delisting return of -30% for firms that are delisted due to poor performance and zero return for other firms, as recommended by Shumway (1997). The estimation results with delisting firms are reported in Table 3, Panel B. Consistent with the results in Panel A, the coefficient estimate on $ImpairAmt_t$ is positive and significant when the regression is estimated for market-driven firms only in columns (1-2). From columns (3-4) and (5-6), we find a significant return reversal for the market-driven impairment firms but not for the benchmark impairment firms. These results are consistent with those reported in Panel A suggesting that our inferences are not driven by a survivorship bias.

As discussed earlier in Section 3.1, our firm-level fundamental indicators are likely to capture economic impairment of goodwill with noise because the actual goodwill impairment tests are conducted at the reporting unit level. Some of our market-driven impairment firms may have strong fundamentals overall at the firm level but economic impairment at one or more reporting units. These firms are misclassified as market-driven under our primary classification scheme. To address this issue, we eliminate, from the market-driven impairment sample, firms with indicators of economic impairment in one or more segments.[19] Specifically, due to the lack of comprehensive financial data at the segment level, we consider a negative segment EPS to be a summary indicator of fundamental impairment. Although the size of the market-driven impairment sample is reduced by about 32% after we exclude firms with possible impairment at the segment level, we obtain substantially similar results as reported in Table 3. In addition, we test the return reversal effect

[19] A reporting unit is an operating segment or one level below an operating segment.

using only single-segment firms for which firm-level measures are likely appropriate indicators of impairment and find substantially similar results.

4.2 Market reaction to impairment announcement

4.2.1 Research design

To test whether the market is misled into reacting negatively to the announcement of market-driven impairments and that the reaction is similar to that for other impairments (H1), we estimate the following regression using the market-driven (*MD*) and the benchmark (*BMark*) impairment samples,

$$3\text{-}DRET_t = a_0 + a_1\, MD_t + a_2 ImpairAmt_t{*}MD_t + a_3\, ImpairAmt_t{*}BMark_t + a_4 \Delta EPS_t + a_5 IMR + e_t \quad (2)$$

The dependent variable, $3\text{-}DRET_t$, is the 3-day (-1, 0, +1) market-adjusted return surrounding the date of the earnings announcement of the impairment quarter. Following the regression specification in Li et al. (2011), along with the magnitude of the impairment, we also include the earnings surprise of the impairment quarter (measured as the seasonal earnings change) as an explanatory variable for returns. Both explanatory variables are scaled by the price at the beginning of the quarter. In addition, we include the inverse Mills ratio to control for self-selection bias in reporting goodwill impairment.

4.2.2 Results of the market reaction test

Table 4 reports the results of regression (2). The results of the regression estimated for the market-driven impairment sample alone are reported in columns (1-2). The coefficient estimate on $ImpairAmt_t$ is negative and significant (-0.0532, p-value = 0.0048), suggesting that investors consider the impairment to be bad news and adjust their valuation of the firm downward upon its announcement. The magnitude of the coefficient is comparable to the market response to goodwill impairment reported in Li et al. (2011).

In columns (3-4), we report results of regression (2) estimated using market-driven impairment firms together with all other impairment firms as the benchmark. The coefficient estimates on $ImpairAmt_t$*MD_t and $ImpairAmt_t$*$BMark_t$ are both significantly negative (-0.0486 and -0.0650, respectively). The *F*-test fails to reject the null that the two coefficients are equal at conventional levels. Finally, columns (5-6) report results of regression (2) estimated using market-driven and confirmatory impairment firms. Similar to the results in columns (3-4), the coefficient estimate on $ImpairAmt_t$*MD_t is significantly negative and insignificantly different from that on $ImpairAmt_t$*$BMark_t$. Thus, it appears that the market fails to understand the nature of market-driven impairments and is misled into further undervaluing these firms upon the impairment announcement.

To mitigate the concern about a survivorship bias, we also run the test including firms that are delisted in the year after the impairment. The results are reported in Table 4, Panel B. Consistent with the results in Panel A, we find that the coefficient estimates on $ImpairAmt_t$*MD_t and $ImpairAmt_t$*$BMark_t$ are always significantly negative, indicating that survivorship bias is not a concern in interpreting our results.

4.3 Timing of return reversal

Having established a return reversal following market-driven impairments, we next investigate *when* the reversal occurs by examining the association between impairment and returns over the subsequent one, two, three, and four quarters. If the return reversal occurs immediately after the announcement of impairment, i.e., the temporary mispricing is corrected right away, the recognition of market-driven impairment will probably have a minimal impact on information asymmetry and on managers' actions motivated by the temporary mispricing. Our predictions in H2 and H3 regarding information asymmetry and stock repurchases are more likely to hold if the market correction takes a while to complete.

To examine the timing of the return reversal, we estimate sub-period regressions in which the dependent variable is buy-and-hold market-adjusted returns over four sub-periods of the subsequent year, that is, from the month following the earnings announcement of the impairment year *t* up to the end of the earnings announcement month of the k^{th} quarter of year *t*+1 (*k*=1,...4). The regression of sub-period returns on impairment amount is estimated for each of the three impairment groups, i.e., market-driven impairment firms, other impairment firms, and confirmatory impairment firms. We use the same control variables as in regression (1) except that, in this regression, we compute ΔEPS_{t+1} ($ImpairAmt_{t+1}$) as cumulative earnings (goodwill impairment) from the month following the earnings announcement of impairment year *t* up to the end of the earnings announcement month of the k^{th} quarter of year *t*+1. For each impairment sub-group, since this test involves four regressions for periods ending with the first, second, third and fourth quarter of the subsequent year respectively, for the sake of brevity, we only report the key coefficient estimate, i.e., on $ImpairAmt_t$, in Table 5.

Table 5 column (1) shows the results for the market-driven impairment sample. For periods ending with the first, second, and third quarter of the subsequent year, the coefficient estimate on $ImpairAmt_t$ is positive but insignificant at conventional levels, providing no evidence of a market correction related to market-driven impairments. The last two rows of Table 5 report results based on returns over the entire subsequent year (four quarters) and is the same as that reported in Table 3. We observe that the coefficient estimate on $ImpairAmt_t$ is positive and significant only when the dependent variable is the return over all four quarters of the subsequent year. Hence, the price reversal becomes apparent only towards the end of the year following the impairment, suggesting that the market learns about the nature of these impairments only when the next year's performance results are released and reverses the effect of the impairment at that time (at least partially). For the benchmark impairment samples reported in columns (2) and (3), we do not observe a significant reversal pattern for any of the cumulative sub-periods of the subsequent year.

4.4 Information asymmetry

4.4.1 Bid-ask spread and goodwill impairment

We next test H2 that, relative to benchmark firms, firms with market-driven impairment experience a greater increase in information asymmetry that is due to the impairment. To assess the impact of the recognition of market-driven impairment on information asymmetry, rather than the effect of the temporary undervaluation experienced by market-driven impairment firms, we contrast the market-driven sample with a matched control sample of non-impairment firms that exhibit similar market and fundamental indicators.

We first use the bid-ask spread to capture information asymmetry among investors. Specifically, we examine whether the association between the change in bid-ask spread and the magnitude of impairment is greater for the market-driven impairment firms relative to matched control firms and the other impairment firms. We estimate variations of the following regression:

$$\Delta Spread_{t+1} = a_0 + a_1 MD_t + a_2 Control_t + a_3\, Control_t{*}MD_t + a_4 ImpairAmt_t + a_5\, ImpairAmt_t{*}MD_t + \sum a_{6i}\, Control\ Variable_i + e_{t+1} \quad (3)$$

The dependent variable, $\Delta Spread_{t+1}$, is the average daily bid-ask spread of the year subsequent to the impairment (year t+1) minus that of the year before impairment (year $t-1$). We do not use the change in bid-ask spread from year t, the impairment year, to year t+1 because the information asymmetry in the year of impairment is likely contaminated by the recognition of impairment. As a result, we compare the post-impairment bid-ask spread to that prior to the impairment. The daily bid-ask spread is calculated as follows using the bid and the ask price at closing:

$$Bid\ Ask\ Spread = \frac{2 \times |Ask\ Price - Bid\ Price|}{Ask\ Price + Bid\ Price}$$

The daily bid-ask spread is then averaged over the period beginning with the date of the earnings announcement of year t and ending the day before the date of the earnings announcement of year

t+1. We do not have a prediction as to whether goodwill impairment in general increases information asymmetry in the subsequent year. We expect market-driven impairment firms to experience an incremental increase in information asymmetry due to the impairment. If so, the coefficient on $ImpairAmt_t*MD_t$, a_3, will be positive.

We include a number of control variables that may affect bid-ask spreads in model (3). We use M/B_{t+1} and $Size_{t+1}$ to control for the effect of fundamental firm characteristics on information asymmetry. Prior studies document a positive correlation between stock prices and bid-ask spreads (e.g., Demsetz, 1968; Tinic, 1972). Thus, following Coller and Yohn (1997), we include in the regression the logarithm of stock price at the end of the fiscal year ($Logprice_{t+1}$). Coller and Yohn (1997) also find a negative correlation between bid-ask spread and depth. We therefore include $Depth_{t+1}$ captured by the logarithm of the number of common shares outstanding at the end of year t+1. To control for the inventory cost component of bid-ask spread that increases with return volatility (e.g., Stoll, 1978), we include return volatility ($Volatility_t$ and $Volatility_{t+1}$), computed as the standard deviation of daily returns over the 250-day period before the earnings announcement of years t and t+1. Finally, we control for goodwill impairment in year t+1 ($ImpairAmt_{t+1}$) that likely increases contemporaneous information asymmetry.

Table 6, Panel A, reports the estimation results of model (3). In columns (1-2), the regression is estimated using the market-driven impairment firms and their matched control firms. The coefficient estimate on $ImpairAmt_t$ is significantly positive (0.0107, p-value = 0.0085), consistent with H2 that, relative to non-impairment firms with similar market and fundamental indicators, market-driven impairment firms experience an incremental increase in information asymmetry that is correlated with the amount of impairment. The coefficient on the indicator for control firms, *Control*, is insignificant, indicating that market-driven and control firms are similar in $\Delta Spread_{t+1}$ other than the incremental impact of impairment on $\Delta Spread_{t+1}$. Including control firms that are matched with impairment firms on the market and fundamental indicators allows us to attribute the incremental increase in information asymmetry experienced by market-driven impairment firms to the reporting of impairment. In columns (3-4), the regression is estimated using the entire sample of impairment firms and their matched control firms. While the coefficient estimate on $ImpairAmt_t$ is insignificant (0.0017, *p*-value = 0.4345), that on the interaction term, $ImpairAmt_t*MD_t$, is significantly positive (0.0104, *p*-value = 0.0113), suggesting that the increase in information asymmetry associated with the impairment is unique to market-driven impairment firms. In columns (5-6), we focus on market-driven and confirmatory impairment firms and their control firms. The coefficient estimate on $ImpairAmt_t*MD_t$ remains significantly positive (0.0128, *p*-value = 0.0051), confirming the inferences from columns (1-2). Overall, the unique incremental increase in information asymmetry experienced by market-driven impairment firms suggests that the recognition of impairment exacerbates the information asymmetry of these firms.

4.4.2 Analyst forecast dispersion and goodwill impairment

In addition to bid-ask spread, we also examine analyst earnings forecast dispersion as an alternative measure of information asymmetry (Lang and Lundholm 1996; Barron and Stuerke 1998). High forecast dispersion implies low consensus among analysts and is therefore a sign of high information asymmetry.

We employ the following model to test the relationship between the change in analyst forecast dispersion around goodwill impairment and the magnitude of the impairment.

$$\Delta Dispersion_{t+1} = a_0 + a_1 MD_t + a_2 Control_t + a_3 Control_t*MD_t + a_4 ImpairAmt_t + a_5 ImpairAmt_t*MD_t + \sum a_{6i} Control\ Variable_i + e_{t+1} \quad (4)$$

Similar to our measurement of the change in bid-ask spread, the change in analyst forecast dispersion is computed as analyst forecast dispersion of the year subsequent to the impairment (year *t*+1) minus that of the year before the impairment (year *t*-1). Analyst forecast dispersion is calculated as the average standard-deviation of one-quarter-ahead earnings forecasts issued by analysts, scaled by the beginning-of-the-year stock price.

We include a number of control variables that may affect analyst forecast dispersion. Prior research shows that loss firms are associated with higher information uncertainty and thus higher forecast dispersion (e.g., Brown, 2001). We therefore include a dummy variable *Loss* that takes the value of one if earnings of year *t*+1 are negative and zero otherwise. Information asymmetry is likely to change with firm size, as disclosure policies (Lang and Lundholm, 1993) as well as information acquisition as captured by the number of analysts following a firm (Brennan and Hughes, 1991) vary with firm size. We control for firm size using the logarithm of market value of equity at the beginning of year *t*+1 (*LogMV*). We also control for earnings volatility (*Std_ROE*) computed as the standard deviation of annual earnings over the past five years. Analyst forecast dispersion likely increases with earnings volatility since volatile earnings are less predictable. The previous literature also suggests that information uncertainty decreases with analyst coverage (Alford and Berger, 1999). We control for analyst coverage by the logarithm of the number of one-quarter-ahead forecasts in year *t*+1 (*NForecast*). Finally, we control for year *t*+1 goodwill impairment which could lead to higher contemporaneous information asymmetry.

The estimation results of model (4) are reported in Table 6, Panel B. In columns (1-2), the regression is estimated using the market-driven impairment sample and its matched control sample. The coefficient estimate on $ImpairAmt_t$ is significantly positive (0.0153, *p*-value = 0.0906), indicating that firms with market-driven impairment experience an incremental increase in analyst forecast dispersion that is correlated with the amount of the impairment previously recorded. Similar to the results in Panel A, the coefficient estimate on *Control* is insignificant at conventional levels, suggesting that market-driven and control firms are insignificantly different in terms of changes in information asymmetry other than through the impact of impairment. In columns (3-4), the regression is estimated using the entire impairment sample and control firms. While the coefficient estimate on $ImpairAmt_t$ is insignificant, providing no evidence of a general increase in analyst forecast dispersion correlated with the amount of impairment previously recorded, the coefficient estimate on $ImpairAmt_t{*}MD_t$ is significantly positive (0.0333, *p*-value = 0.0006). Columns (5-6) present the results of the same regression estimated using the market-driven and confirmatory impairment firms. The coefficient estimate on $ImpairAmt_t{*}MD_t$ remains positive and significant with a *p*-value of 0.0161. The results in Panel B confirm the inference from Panel A that market-driven firms experience a unique incremental increase in information asymmetry likely resulting from the recognition of impairment.

4.5 Stock repurchases

Last, we test H3 by examining stock repurchases in the year subsequent to goodwill impairment. We use two variables to capture repurchasing activity: a dummy variable reflecting whether a firm repurchases its stock in year *t*+1 and a continuous variable of the dollar amount of repurchases. The following model is estimated with either of the two variables as the dependent variable. We estimate a logistic regression when the dependent variable is binary (whether or not a firm repurchases) and a Tobit regression when it is continuous (the dollar amount of repurchases).

$$Repurchase_{t+1} = a_0 + a_1 MD_t + a_2 Control_t + a_3 Control_t{*}MD_t + a_4 ImpairAmt_t + a_5 ImpairAmt_t{*}MD_t + \sum a_{6i} Control\ Variable_i + e_{t+1} \quad (5)$$

H3 predicts the coefficient on $ImpairAmt_t{*}MD_t$ to be positive.

We control for a number of other factors that have been documented by prior studies to affect stock repurchases. The excess capital hypothesis predicts that firms with more cash on hand are more likely to engage in stock repurchases and to repurchase more stock. Following Dittmar (2000), we control for the impact of excess cash on stock repurchases by including cash balance at the beginning of year t+1 scaled by total assets ($Cash_t$).

The optimal leverage ratio hypothesis argues that firms may use stock repurchases to increase leverage to an optimal level (Bagwell and Shoven, 1988; Hovakimian et al., 2001). We thus control for the deviation of a firm's current leverage from the target ratio to capture stock repurchases that are carried out for the purpose of adjusting leverage. Similar to Dittmar (2000), we use the industry average leverage ratio as the target leverage. *Leverage* is then computed as a firm's leverage ratio (total debt divided by the sum of total debt and market value of equity) minus the target leverage ratio at the beginning of year t+1. The lower a firm's leverage relative to the target, the higher the likelihood that it repurchases stock the following year and repurchases more.

Dittmar (2000) argues that firms may use stock repurchases as a substitute for paying dividends. This argument suggests that, the lower the dividend payout ratio, the more likely the firm repurchases stock in the following year. We thus control for dividend payout ratio in year t+1 (*Payout*), computed as dividend announced in year t+1 scaled by net income of year t.

Dittmar (2000) also argues that stock options encourage managers to substitute repurchases for dividends since repurchases do not dilute the per-share value of the firm. Managers' tendency to repurchase shares increases with their stock option-holdings also because the shares provided to managers upon the exercise of options are often issued from treasury stock. Thus, we control for the number of options exercised and exercisable scaled by the number of common shares outstanding at the beginning of year t+1. The data on options are obtained from Execucomp.

Finally, to control for stock repurchases motivated by other mispricing unrelated to goodwill impairment, we include the contemporaneous market-adjusted returns in the regression. We also include the lagged value of the dependent variable to control for omitted firm characteristics that affect the decision to repurchase persistently.

Table 7 reports the test results of H3 using model (5). In Panel A, logistic regressions are estimated to model the likelihood of repurchase. In columns (1-2), the regression is estimated for the market-driven impairment firms and their matched control firms. The coefficient estimate on $ImpairAmt_t$ is significantly positive (1.9403, p-value = 0.0302), indicating that, relative to non-impairment firms with similar market and fundamental indicators, market-driven impairment firms experience an incremental increase in the tendency to repurchase that is correlated with the amount of the impairment. The coefficient on the indicator for control firms, *Control*, is positive but insignificant (0.2623, p-value = 0.5115), suggesting that market-driven and control firms are similar in the likelihood of repurchase other than the recognition of impairment leading to an incremental increase in the tendency to repurchase. In columns (3-4), the regression is estimated using the entire impairment sample and the matched control sample. The coefficient estimate on the interaction term, $ImpairAmt_t*MD_t$ is significantly positive, suggesting that firms with market-driven impairment experience an incremental increase in the likelihood of repurchases relative to other impairment firms. In columns (5-6), the regression is estimated using the market-driven and confirmatory impairment samples and their matched control samples. We continue to obtain the same inferences.

Panel B reports the results of a Tobit regression with the dollar amount of repurchases as the dependent variable. Columns (1-2) show that the coefficient estimate on $ImpairAmt_t$ is significantly positive (0.0256, p-value = 0.0660), suggesting that the market-driven impairment firms repurchase a greater dollar amount of shares relative to matched control firms. In columns (3-4) and (5-6), when other impairment or confirmatory impairment firms are included as additional benchmarks, the coefficient estimate on $ImpairAmt_t*MD_t$ remains significantly positive, consistent with the results in Panel A. Overall, the evidence in Table 7 suggests that managers of market-driven impairment firms are aware of the incremental undervaluation caused by the recognition of impairment and exploit the opportunity for stock repurchases.

4.5 Market-driven impairment and the financial crisis

About 38% of our sample is clustered in the last two quarters of 2007 and the year 2008, the financial crisis period when stock prices drastically declined. More than half the number of impairments classified as market-driven were recorded during this period. While this pattern is consistent with the argument that firms are forced to take impairment charges when there is a temporary market decline, one might be concerned with the extent to which our results are driven by impairments taken during this period alone.

To examine this issue, we conduct tests of H1-H3 separately for the sample of impairments during the crisis period and the rest of the sample period. The results are reported in Table 8. For brevity, we report only the coefficient of interest in each test when the benchmark impairment sample is all impairments other than market-driven impairment firms. We obtain substantially similar results using other specifications.

Column (1) presents the estimated coefficient on $ImpairAmt_t*MD_t$ in regression (1). The coefficient on $ImpairAmt_t*MD_t$ is significantly positive for both periods, suggesting that the return reversal associated with market-driven impairment in Table 3 is not driven entirely by impairments taken during the crisis period. Column (2) reports the market reaction test for the two sub-periods separately. We find that the market's reaction to the announcement of impairment is significantly negative in both periods. Column (3) reports the test of H2 using bid-ask spread as the measure of information asymmetry. The association between the market-driven impairment and the change in bid-ask spread from the year prior to the impairment to the year after is significantly positive for both the financial crisis and the non-financial crisis periods. Finally in column (4), we estimate the logistic regression to model the likelihood of repurchase for the two sub-periods separately. For both sub-periods, market-driven impairment firms exhibit a higher likelihood of repurchases that is correlated with the impairment, consistent with H3. In summary, we find evidence consistent with our predictions, H1-H3, for both the financial crisis and the non-financial crisis periods.

5. Conclusion

Under the fair-value-based goodwill impairment test prescribed by SFAS 142, a firm's market value is used as an important reference point for determining the existence of goodwill impairment. In fact, a below-one market-to-book ratio is considered by many, including auditors and security lawyers, to be an important indicator of goodwill impairment. As a result of this perception, firms can be pressured into recording goodwill impairment losses upon a temporary market value decline that is not supported by economic fundamentals. Investors can be misled by such impairments into undervaluing the stock of these firms, since goodwill impairment is in general considered bad news and triggers a negative market reaction. Subsequently, as economic news unfolds, investors are likely to learn about the nature of these impairments leading to a price reversal associated with the impairment. Consistent with this, we find that, for the sample of market-driven non-fundamental impairments that we identify, the magnitude of current-period impairment losses is positively correlated with the subsequent year's returns. A similar reversal pattern is not observed for other impairment firms. We also find that the market reacts negatively to the announcement of market-driven impairments, suggesting that investors do not understand the nature of these impairments which leads to further firm undervaluation.

Our analysis of the timing of the return reversal shows that it occurs with a lag. During the interim period, compared to other impairment firms, market-driven impairment firms experience an incremental increase in information asymmetry that is positively correlated with the magnitude of their impairment losses. Finally, we find that the managers of these firms exploit the delay in the market's reversal and the consequent undervaluation by engaging in more share repurchases than other impairment firms or non-impairment control firms matched on market and fundamental performance.

Our paper adds to the literature investigating the effect of goodwill impairment losses based on fair value measurement. We focus on firms that may have been "forced" to take an impairment charge because of a temporary decline in equity prices not backed by economic fundamentals and provide evidence that such impairments may have misled the market. Complementary to the message from prior research that the use of unverifiable fair values may encourage managers to behave opportunistically (Ramanna and Watts, 2012), our evidence suggests that adherence to market values when such values deviate from the underlying economics can swing the pendulum to the other extreme and also mislead investors.

Our paper also sheds light on the effects of fair value accounting on the real economy during the recent financial crisis. Many critics blamed fair value accounting for inducing banks to take write offs of temporarily-depressed assets followed by sub-optimal pro-cyclical actions that led to the downward price spiral. Our paper focuses on write-offs of the goodwill asset triggered by a temporary market value decline and provides evidence on how the accounting recognition of these write-offs led to an additional market penalty and exacerbated firm undervaluation during the crisis. While not as (allegedly) calamitous as its effect on the financial sector, our analysis of firms in the real economy also reveals the potential negative consequences of the flawed implementation of fair value accounting.

References

Alford, A., and P., Berger, 1999. A Simultaneous Equations Analysis of Forecast Accuracy, Analyst Following, and Trading Volume. *Journal of Accounting*, *Auditing*, *and Finance* 14, 219-240.

Badertscher, B., J. Burks, and P. Easton, 2012. A convenient scapegoat: Fair value accounting by commercial banks during the financial crisis. *The Accounting Review* 87 (1): 59-90.

Bagwell, L.S., and J. Shoven, 1988. Share repurchases and acquisitions: An analysis of which firms participate. In Alan J. Auerbach (ed.), Corporate Takeovers: Causes and Consequences. Chicago: University of Chicago Press.

Baker, M., R. Ruback, and J. Wurgler, 2007. Behavioral Corporate Finance: A Survey. In The Handbook of Corporate Finance: Empirical Corporate Finance, edited by Espen Eckbo. New York: Elsevier/North Holland, 2007.

Barron, O. E., and P. S. Stuerke, 1998. Dispersion in Analysts' Earnings Forecasts as a Measure of Uncertainty. *Journal of Accounting, Auditing, and Finance*, Vol. 13 (3), 245-270.

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

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

Bhat, G., R. Frankel, and X. Martin, 2012. Panacea, Pandora's box, or placebo: Feedback in bank mortgage-backed security holdings and fair value accounting. *Journal of Accounting and Economics* 52 (2-3): 153-173.

Bhattacharya, N., H. Desai, and K. Venkataraman, 2012. Does earnings quality affect information asymmetry? Evidence from trading costs. *Contemporary Accounting Research*, forthcoming.

Brennan, M.J., and P. J. Hughes, 1991. Stock Prices and the Supply of Information. *Journal of Finance* Vol. 46, No. 5, 1665-1691.

Brockman, P., and D.Y. Chung, 2001. Managerial Timing and Corporate Liquidity: Evidence from Actual Share Repurchases. *Journal of Financial Economics* 61, 417-448.

Brown, L. 2001. A temporal analysis of earnings surprises: Profits vs. losses. *Journal of Accounting Research* 39 (September): 221-241.

Callen, J.L., S. Govindaraj, and L. Xu, 2000. Large Time and Small Noise Asymptotic Results for Mean Reverting Diffusion Processes with Applications. Economic Theory 2000, 401-419.

Callen, J.L., M. Khan, and H. Lu, 2012. Accounting Quality, Stock Price Delay and Future Stock Returns. *Contemporary Accounting Research*, forthcoming.

Coller, M., and T. Yohn, 1997. Management forecasts and information asymmetry: An examination of bid-ask spreads. *Journal of Accounting Research* 35, 181-191.

Collins, D., and J. Kim, 2013. Illusion of Growth: Merger-Related Transitory Growth and Its Implications for Growth and Accrual Mispricing. Working paper, University of Iowa.

Comiskey, E., and C.W. Mulford, 2010. Goodwill, triggering events, and impairment accounting. *Managerial Finance*, Vol. 36 Issue 9, 746 – 767.

Demsetz, H., 1968. The cost of transacting. *Quarterly Journal of Economics* (February 1968): 33-53.

Dharan, B., 2009. Preparing for Goodwill Impairments. *Law360*, February 5, 2009.

Dittmar, A., 2000. Why do firms repurchase stocks? *Journal of Business* 73, 331-355.

Fama, E.F., and K.R. French, 1988. Permanent and temporary components of stock prices. *Journal of Political Economy* 96, 246–273.

Hatcher, L., 1994. A step by step approach to using the SAS system for factor analysis and structural equation modeling. SAS publishing.

Heflin, F., K. Shaw, and J. Wild, 2005. Disclosure policies and market liquidity: Impact of depth quotes and order sizes. *Contemporary Accounting Research* 22 (4): 829–65.

Holm, E. 2011. Query spurs Berkshire write-downs. *Wall Street Journal* (March 29).

Hovakimian, A., T. Opler, and S. Titman, 2001. The debt-equity choice. *Journal of Financial and Qualitative Analysis* 36, 1-24.

Lang, M., and R. Lundholm, 1993. Cross-Sectional Determinants of Analyst Ratings of Corporate Disclosure. *Journal of Accounting Research* 31, 246-271.

Lang, M., and R. Lundholm, 1996. Corporate Disclosure Policy and Analyst Behavior. *The Accounting Review* 71, 476-492.

Li, Z., P. Shroff, R. Venkataraman, and I.X. Zhang, 2011. Causes and Consequences of Goodwill Impairment Loss. *Review of Accounting Studies* 16, 745-778.

McDonald, R., 1985. Factor analysis and related methods. Psychology Press.

Mukherji, S., 2011. Are stock returns still mean-reverting? *Review of Financial Economics* 20, 22-27.

Ramanna, K., and R. Watts, 2012. Evidence on the Effects of Unverifiable Fair-Value Accounting. Forthcoming, *Review of Accounting Studies*.

Stoll, H., 1978. The pricing of security dealer services: An empirical study of NASDAQ stocks. *Journal of Finance* (September 1978): 1153-72.

Tinic, S., 1972. The economics of liquidity services. *Quarterly Journal of Economics* (February 1972): 79-93.

Verrecchia, 1980. Consensus Beliefs, Information Acquisition, and Market Information Efficiency. *The American Economic Review* 70(5): 874-884.

Appendix: Factor analysis to estimate the fundamental indicator

The factor analysis is performed using all Compustat firms that belong to the same industry (two-digit SIC) as firms in the impairment sample with available data during the sample period. We examine indicators of current performance, including return on assets (*ROA*), operating cash flows (*CFO*), and gross margin, as well as indicators of expected future performance, including change in *ROA*, change in *CFO*, change in gross margin, capital expenditure (*Capex*), change in *Capex*, sales growth, and percentage change in the number of employees.

Table A1 summarizes the results of the factor analysis. Panel A reports the eigenvalues of the correlation matrix. There are four factors with eigenvalues greater than one that are loaded by more than one variable.[20] Panel B reports the standardized scoring coefficients of each variable. Factor 1 is loaded by *ROA*, *CFO*, and gross margin. Factor 2 is loaded by change in *ROA*, change in *CFO*, and change in gross margin. Factor 3 and Factor 4 are each loaded by two variables. McDonald (1985) and Hatcher (1994), among others, point out that if a factor is loaded by only one or two variables, the factor loadings on this factor may be poorly estimated even using a large sample. They suggest dropping such 'singlet' or 'doublet' factors. Thus, following common practice, we only retain Factor 1 and Factor 2 in our analyses.[21] Factor 1 captures the effect of three levels variables (ROA, operating cash flows, and gross margin) which we interpret as a measure of current performance, and Factor 2 captures the effect of changes in these three variables which we interpret as a measure of the future trend in performance. For each firm-year observation, we calculate the factor scores of the first two factors and construct the composite score as the sum of the two factor scores. A firm is considered to have a fundamental signal of impairment if its composite factor score falls in the bottom tercile of the distribution for the Compustat firms.

[20]The fifth factor is dropped since it is loaded only by one variable.

[21]Our inferences are robust to using a composite score based on the first four factors.

Table A1: Factor analysis results

Panel A: Eigenvalues of the Correlation Matrix

	Eigenvalue	*Difference*	*Variance explained*	*Cumulative variance*
Factor1	2.600	1.108	0.260	0.260
Factor2	1.492	0.151	0.149	0.409
Factor3	1.341	0.087	0.134	0.543
Factor4	1.254	0.236	0.125	0.669
Factor5	1.018	0.339	0.102	0.771
Factor6	0.679	0.106	0.068	0.839
Factor7	0.573	0.028	0.057	0.896
Factor8	0.545	0.137	0.055	0.950
Factor9	0.408	0.319	0.041	0.991
Factor10	0.089		0.009	1

Panel B: Standardized Scoring Coefficients

	Factor1	*Factor2*	*Factor3*	*Factor4*
ROA	0.414	-0.091	0.051	-0.020
CFO	0.420	-0.055	-0.038	0.020
Gross margin	0.327	-0.051	-0.078	0.005
ROA change	-0.044	0.529	0.038	-0.019
CFO change	0.013	0.488	-0.083	0.007
Gross margin change	-0.101	0.333	-0.054	0.016
Capex	-0.007	-0.017	0.007	0.612
Capex change	0.009	0.027	-0.033	0.612
Sales growth	-0.030	0.078	0.548	-0.026
Employee change	-0.038	-0.154	0.617	0.005

Table 1: Descriptive statistics of the sample of goodwill impairments

Panel A: Distribution of impairment sample by year

Year	All goodwill impairments	Percentage
2002	215	13.93%
2003	159	10.30%
2004	139	9.01%
2005	160	10.37%
2006	161	10.43%
2007	149	9.66%
2008	473	30.65%
2009	87	5.64%
Total	1543	100%

Panel B: Firm characteristics of impairment and control firms

This panel reports statistics of the entire impairment sample and its matched control sample. *Total Assets* represents total assets (in millions) at the beginning of the impairment year. *MV* is the market value of equity (in millions) at the beginning of the impairment year. *ImpairAmt* is equal to the after-tax amount of goodwill impairment scaled by beginning-of-the-year market value of equity. *ΔROA* is change in operating income before goodwill impairment scaled by beginning-of-the-year total assets. *M/B* is computed as market value of equity at the end of the impairment year over book value of equity before goodwill impairment at the end of the year. *Fundamental* is the sum of the first two factor scores extracted from a factor analysis of various indicators capturing current and expected future performance, including ROA, change in ROA, operating cash flows to total assets, change in operating cash flows to total assets, gross margin, change in gross margin, sales growth, capital expenditure scaled by total assets, change in capital expenditure, and change in the number of employees. *RET* is the buy-and-hold market-adjusted returns of the impairment year. *Spread* is the average daily bid-ask spread in the impairment year. *Forecast Dispersion* is calculated as the annual average of the quarterly standard-deviation of one-quarter-ahead forecasts issued by analysts for the impairment year, scaled by beginning-of-the-year stock price. *T*-tests (Wilcoxon tests) are conducted to test the difference in means (distributions) of the impairment and the control samples. *, **, *** indicate the significance of differences at the 10%, 5%, and 1% levels, respectively.

	Impairment		Control	
Variable	Mean	Median	Mean	Median
Total Assets	8478.61	959.52	5762.56**	323.41***
MV	6069.91	607.38	4906.67	326.36***
ImpairAmt	0.05	0.02	-	-
ΔROA	-0.03	-0.01	-0.01***	-0.01***
M/B	1.87	1.25	2.53***	1.54***
Fundamental	-0.14	0.09	-0.12	0.10
RET	-0.11	-0.16	-0.02***	-0.09***
Spread	0.05	0.05	0.05	0.05
Forecast Dispersion	0.01	0.00	0.00***	0.00***

Table 2: Descriptive statistics of market-driven and other impairment firms

Panel A: Distribution by year

Market-driven impairments are goodwill write-offs recorded in the presence of the market indicator (a below-one market-to-book ratio and a decline in market-to-book ratio in the impairment year) but not the fundamental impairment indicator. *Confirmatory* impairments are goodwill write-offs recorded in the presence of both the market and the fundamental indicators. The percentage of market-driven or confirmatory impairments in each year is reported in parentheses.

Year	All goodwill impairments	Market indicator present No fundamental indicator (*Market-driven*)	Market and fundamental indicators both present (*Confirmatory*)
2002	215	36	61
		(17%)	(28%)
2003	159	3	4
		(2%)	(3%)
2004	139	4	7
		(3%)	(5%)
2005	160	9	18
		(6%)	(11%)
2006	161	8	14
		(5%)	(9%)
2007	149	22	22
		(15%)	(15%)
2008	473	146	154
		(31%)	(33%)
2009	87	21	12
		(24%)	(14%)
Total	1543	249	292
		(16%)	(19%)

Panel B: Market-driven impairments vs. other impairments

This panel presents statistics of market-driven impairments, all other impairments, and confirmatory impairments separately. All variables are defined in Table 1, Panel B. *T*-tests (Wilcoxon tests) are conducted to test the difference in means (distributions) of the market-driven impairments and all other impairments or confirmatory impairments. *, **, *** indicate the significance of differences at the 10%, 5%, and 1% levels, respectively.

	Market-driven		All others		Confirmatory	
Variable	Mean	Median	Mean	Median	Mean	Median
Total Assets	8733.34	790.60	8429.40	972.91	3497.59***	425.13***
MV	3314.35	265.54	6602.28***	733.98***	1033.55**	149.36***
ImpairAmt	0.08	0.06	0.05***	0.01***	0.10*	0.07**
ΔROA	0.01	-0.01	-0.03***	-0.01***	-0.11***	-0.07***
M/B	0.65	0.65	2.11***	1.49***	0.62	0.61
Fundamental	0.43	0.32	-0.25***	-0.03***	-1.08***	-0.75***
RET	-0.21	-0.23	-0.09***	-0.15***	-0.36***	-0.33***
Spread	0.06	0.06	0.05***	0.04***	0.07**	0.07**
Forecast Dispersion	0.01	0.01	0.01**	0.00***	0.01	0.00

Table 3: Return reversal

This table reports results of variations of the following regression:

$$RET_{t+1} = a_0 + a_1 MD_t + a_2 ImpairAmt_t * MD_t + a_3 ImpairAmt_t * BMark_t + \sum a_{4i} Controls_i + e_{t+1} \quad (1)$$

Year t refers to impairment year. The dependent variable RET_{t+1} is the buy-and-hold market-adjusted return over the 12-month period following the month of the annual earnings announcement of the impairment year. MD_t is an indicator variable that equals one for market-driven impairment firms and zero otherwise. $BMark_t$ is an indicator variable that equals one for benchmark impairment firms (all other impairment or confirmatory impairment firms) and zero for market-driven impairment firms. $ImpairAmt_t$ is computed as the after-tax amount of goodwill impairment scaled by beginning-of-the-year market value of equity. Control variables include: M/B_t, market-to-book ratio at the end of year t; $\Delta M/B_t$, change in market-to-book ratio in year t; $Fundamental_t$, the sum of the first two factor scores extracted from a factor analysis of various indicators capturing current and expected future performance, including ROA, change in ROA, operating cash flows to total assets, change in operating cash flows to total assets, gross margin, change in gross margin, sales growth, capital expenditure scaled by total assets, change in capital expenditure, and change in the number of employees; $Size_t$, logarithm of total assets at the end of year t; $Volatility_t$, the standard deviation of daily stock returns in year t; $RET_{t-2,t}$, buy-and-hold market-adjusted returns over the (t-2, t) window; ΔEPS_{t+1}, change in earnings per share before goodwill impairment in year t+1 deflated by the beginning-of-the-year stock price; $ImpairAmt_{t+1}$, goodwill impairment in year t+1 scaled by beginning-of-the-year market value; IMR, the inverse Mills ratio from a first-stage probit regression estimating the likelihood of reporting a goodwill impairment. Year fixed effects are included in each regression and the p-values are based on robust standard errors.

Panel A: Primary sample

This panel reports estimation results of model (1) for the primary sample described in Table 1. The regression is estimated for the market-driven impairment firms only in columns (1-2), market-driven and all other goodwill impairments in columns (3-4), and market-driven and confirmatory impairments in columns (5-6).

	Market-driven only		Market-driven vs. All others		Market-driven vs. Confirmatory	
	Estimate (1)	P-value (2)	Estimate (3)	P-value (4)	Estimate (5)	P-value (6)
MD_t			-0.0214	0.7331	-0.0503	0.6575
$ImpairAmt_t$	**0.4030**	**0.0028**				
$ImpairAmt_t * MD_t$			**0.3970**	**0.0083**	**0.3568**	**0.0033**
$ImpairAmt_t * BMark_t$			**0.0555**	**0.7177**	**0.0383**	**0.7408**
M/B_t	-0.2154	0.0032	-0.0229	0.0570	-0.1751	0.0191
$\Delta M/B_t$	-0.0032	0.7755	0.0173	0.1090	0.0430	0.0550
$Fundamental_t$	-0.0179	0.6920	0.0233	0.2548	0.0242	0.5567
$Size_t$	-0.0128	0.3635	-0.0156	0.3447	-0.0228	0.3631
$Volatility_t$	0.2117	0.0670	0.1089	0.4142	0.1710	0.0181
$RET_{t-2,t}$	-0.2969	0.0793	-0.0205	0.5917	-0.3858	0.1100
ΔEPS_{t+1}	0.7284	0.0007	0.4969	0.0011	0.6448	<.0001
$ImpairAmt_{t+1}$	-0.3344	0.0520	-0.5259	0.0018	-0.4287	<.0001
IMR	-0.5051	0.0236	-0.4304	0.0511	-0.5241	0.0254
Adj R^2		0.1658		0.0597		0.1442
N		249		1543		541
F-test p-values:						
$ImpairAmt_t * MD_t = ImpairAmt_t * BMark_t$				0.0878		0.0052

Panel B: Sample including delisted firms

This panel reports the estimation results of model (1) for the primary sample plus impairment firms delisted in the year subsequent to the impairment. The regression is estimated for the market-driven impairment firms only in columns (1-2), market-driven and all other goodwill impairments in columns (3-4), and market-driven and confirmatory impairments in columns (5-6).

	Market-driven only		Market-driven vs. All others		Market-driven vs. Confirmatory	
	Estimate (1)	P-value (2)	Estimate (3)	P-value (4)	Estimate (5)	P-value (6)
MD_t			-0.0560	0.2555	-0.0866	0.2889
$ImpairAmt_t$	**0.3817**	**0.0467**				
$ImpairAmt_t{*}MD_t$			**0.3844**	**0.0304**	**0.4262**	**0.0380**
$ImpairAmt_t{*}BMark_t$			**-0.0677**	**0.5196**	**0.0433**	**0.8286**
M/B_t	-0.1335	0.3403	-0.0122	0.0362	-0.1030	0.1070
$\Delta M/B_t$	0.0038	0.9533	0.0126	0.2175	0.0443	0.3319
$Fundamental_t$	-0.0050	0.9580	0.0173	0.2746	0.0250	0.5034
$Size_t$	-0.0078	0.7946	-0.0097	0.3308	-0.0277	0.2473
$Volatility_t$	0.0507	0.7435	0.0965	0.0112	0.0576	0.6055
$RET_{t-2,t}$	-0.2700	0.0321	-0.0065	0.6729	-0.2773	0.0020
ΔEPS_{t+1}	0.6550	0.0123	0.5176	0.0002	0.5717	0.0008
IMR	-0.4451	0.2111	-0.2057	0.0759	-0.4247	0.0922
Adj R^2		0.1196		0.0323		0.1099
N		270		1910		593
F-test p-values:						
$ImpairAmt_t{*}MD_t = ImpairAmt_t{*}BMark_t$				0.0292		0.1549

Table 4: Market reaction to impairment announcement

This table reports the results of the following regression:

$$3\text{-}DRET_t = a_0 + a_1\, MD_t + a_2 ImpairAmt_t{*}MD_t + a_3\, ImpairAmt_t{*}BMark_t + a_4 \Delta EPS_t + a_5 IMR + e_t \quad (2)$$

The dependent variable, *3-DRET*$_t$, is computed as the 3-day market-adjusted returns around the earnings announcement of the impairment quarter. *ImpairAmt*$_t$ is the amount of goodwill impairment in quarter *t* scaled by beginning-of-the-quarter market value. ΔEPS_t is the seasonally-adjusted change in earnings per share (before goodwill impairment) of quarter *t* scaled by beginning-of-the-quarter stock price. Year fixed effects are included in each regression and the *p*-values are computed based on robust standard errors.

Panel A: Primary sample

This panel reports the estimation results of model (2) for the primary sample described in Table 1. The regression is estimated for the market-driven impairment firms only in columns (1-2), market-driven and all other goodwill impairments in columns (3-4), and market-driven and confirmatory impairments in columns (5-6).

	Market-driven only		Market-driven vs. All others		Market-driven vs. Confirmatory	
	Estimate (1)	P-value (2)	Estimate (3)	P-value (4)	Estimate (5)	P-value (6)
MD_t			0.0196	0.0798	0.0373	0.0003
$ImpairAmt_t$	**-0.0532**	**0.0048**				
$ImpairAmt_t{*}MD_t$			**-0.0486**	**0.0034**	**-0.0503**	**0.0048**
$ImpairAmt_t{*}BMark_t$			**-0.0650**	**0.0017**	**-0.0382**	**0.0652**
ΔEPS_t	0.0002	0.7158	0.0004	0.0670	0.0002	0.5004
IMR	0.0213	0.3214	0.0035	0.7957	0.0437	0.0248
Adj R^2		0.0194		0.0186		0.0357
N		266		1653		571
F-test p-values: $ImpairAmt_t{*}MD_t = ImpairAmt_t{*}BMark_t$				0.1498		0.5280

Panel B: Sample including delisted firms

This panel reports the estimation results of model (2) for the primary sample plus impairment firms delisted in the year subsequent to the impairment. The regression is estimated for the market-driven impairment firms only in columns (1-2), market-driven and all other goodwill impairments in columns (3-4), and market-driven and confirmatory impairments in columns (5-6).

	Market-driven only		Market-driven vs. All others		Market-driven vs. Confirmatory	
	Estimate (1)	P-value (2)	Estimate (3)	P-value (4)	Estimate (5)	P-value (6)
MD_t			0.0181	0.1260	0.0304	0.0093
$ImpairAmt_t$	**-0.0529**	**0.0196**				
$ImpairAmt_t*MD_t$			**-0.0481**	**0.0086**	**-0.0488**	**0.0145**
$ImpairAmt_t*BMark_t$			**-0.0476**	**0.0170**	**-0.0556**	**0.0038**
ΔEPS_t	0.0002	0.6672	0.0005	0.0321	0.0004	0.2862
IMR	0.0274	0.2862	0.0089	0.5654	0.0395	0.0273
Adj R^2		0.0267		0.0139		0.0367
N		288		2035		624
F-test p-values: $ImpairAmt_t*MD_t$ = $ImpairAmt_t*BMark_t$				0.9866		0.6872

Table 5: Timing of return reversal

This table reports the results on the timing of return reversal. The following regression is estimated:

$$BHRET_{t+1,k} = a_0 + a_1\, ImpairAmt_t + \sum a_{2i}\, Controls_i + e_{t+1}$$

The dependent variable, $BHRET_{t+1,k}$, is computed as buy-and-hold market-adjusted returns from the month following the earnings announcement of impairment year t up to the end of the earnings announcement month of the k^{th} quarter of year t+1. Control variables are the same as in Table 3 except that, in this regression, ΔEPS_{t+1} and $ImpairAmt_{t+1}$ are computed as cumulative earnings and impairment from the month following the earnings announcement of impairment year t up to the end of the earnings announcement month of the k^{th} quarter. The regression is estimated for market-driven, all other, and confirmatory impairment firms separately in columns (1-2), (3-4), and (5-6), respectively. Year fixed effects are included in each regression and the p-values are based on robust standard errors. For brevity, only the coefficient estimates and p-values (in parentheses) on $ImpairAmt_t$ (a_1) are reported.

Dependent Variable	Market-driven (1)	All others (2)	Confirmatory (3)
$BHRET_{t+1,1}$	-0.0375	-0.0729	-0.0171
	(0.7288)	(0.4463)	(0.8640)
$BHRET_{t+1,2}$	-0.0833	-0.1347	-0.4375
	(0.7898)	(0.3343)	(0.0875)
$BHRET_{t+1,3}$	0.3971	0.0686	-0.3664
	(0.3069)	(0.7146)	(0.4184)
$BHRET_{t+1,4}$	0.4030	0.0824	-0.0279
	(0.0028)	(0.5665)	(0.9111)

Table 6: Information asymmetry

This table reports the test results of H2 on changes in information asymmetry.

Panel A: Bid-ask spread as a measure of information asymmetry

This table reports the estimation results of variations of the following regression:

$$\Delta Spread_{t+1} = a_0 + a_1 MD_t + a_2 Control_t + a_4\, Control_t{*}MD_t + a_3 ImpairAmt_t + a_5\, ImpairAmt_t{*}MD_t + \sum a_{6i}\, Control\ Variable_i + e_{t+1} \quad (3)$$

Year *t* refers to the impairment year. The dependent variable $\Delta Spread_{t+1}$ is the difference in the bid-ask spread between the year subsequent to the impairment (year *t*+1) and the year before the impairment (year *t*-1). *Control* is an indicator variable equal to one for matched control non-impairment firms and zero for impairment firms. Among control variables, $Price_{t+1}$, equals the logarithm of stock price at the end of year *t+1*. $Depth_{t+1}$ is computed as the logarithm of the number of outstanding common shares at the end of year *t+1*. $Volatility_t$ ($Volatility_{t+1}$) is the standard deviation of daily returns over the 250-day period before the earnings announcement of year *t* (year *t*+1). All other variables are defined in Table 3. The regression is estimated for market-driven and matched control firms in columns (1-2), the entire goodwill impairment sample and matched control firms in columns (3-4), and market-driven and confirmatory impairment firms and their matched control firms in columns (5-6). Year fixed effects are included in each regression and the *p*-values are based on robust standard errors.

	Market-driven only		Market-driven vs. All others		Market-driven vs. Confirmatory	
	Estimate (1)	P-value (2)	Estimate (3)	P-value (4)	Estimate (5)	P-value (6)
MD_t			0.0005	0.2061	0.0017	0.1130
$Control_t$	0.0000	0.9748	-0.0004	0.6545	0.0003	0.8512
$Control{*}MD_t$			-0.0006	0.5940	-0.0020	0.1797
$ImpairAmt_t$	**0.0107**	**0.0085**	0.0017	0.4345	-0.0033	0.2565
$ImpairAmt_t{*}MD_t$			**0.0104**	**0.0113**	**0.0128**	**0.0051**
M/B_t	0.0008	0.6735	-0.0002	0.0211	0.0018	0.2276
$\Delta M/B_t$	-0.0016	0.0253	0.0000	0.9439	-0.0004	0.4474
$Fundamental_t$	-0.0026	0.0259	0.0001	0.6883	-0.0002	0.6363
$Size_t$	0.0003	0.6185	0.0001	0.5999	0.0009	0.0862
$Price_{t+1}$	-0.0010	0.1929	-0.0016	<.0001	-0.0026	<.0001
$Depth_{t+1}$	-0.0008	0.0509	-0.0008	<.0001	-0.0009	0.0010
$Volatility_t$	0.0356	<.0001	0.0323	<.0001	0.0369	<.0001
$Volatility_{t+1}$	-0.0312	<.0001	-0.0347	<.0001	-0.0334	<.0001
$ImpairAmt_{t+1}$	-0.0001	0.9775	0.0064	0.0399	-0.0001	0.9879
IMR	-0.0075	0.0899	-0.0052	0.0053	-0.0059	0.0882
Adj R^2		0.8890		0.8485		0.8842
N		496		3086		1082

Panel B: Analyst forecast dispersion as a measure of information asymmetry

This table reports the estimation results of variations of the following regression:

$$\Delta Dispersion_{t+1} = a_0 + a_1 MD_t + a_2 Control_t + a_3\ Control_t*MD_t + a_4 ImpairAmt_t + a_5\ ImpairAmt_t\ *MD_t + \sum a_{6i}\ Control\ Variable_i + e_{t+1} \quad (4)$$

Year *t* refers to the impairment year. The dependent variable $\Delta Dispersion_{t+1}$ is equal to the analyst forecast dispersion of the year subsequent to the impairment year (year *t*+1) minus that of the year before the impairment (year *t*-1). Analyst forecast dispersion is computed as the annual average standard deviation of one-quarter-ahead forecasts issued by analysts, scaled by beginning-of-the-year stock price. Among control variables, $Loss_{t+1}$, is equal to one if earnings of year *t*+1 is negative and zero otherwise. $Std\_ROE_{t-5,t}$ is computed as the standard deviation of annual earnings over the past five years (year *t*-5 to year *t*). $LogMV_t$ is the logarithm of market value of equity at the end of year *t*. *NForecast* is the logarithm of the number of one-quarter-ahead forecasts in year *t*+1. All other variables are defined in Table 3. The regression is estimated for the market-driven impairment firms and their control firms in columns (1-2), the market-driven and all other goodwill impairment firms and their matched control firms in column (3-4), and the market-driven and confirmatory impairment firms and their matched control firms in column (5-6). Year fixed effects are included in each regression and the *p*-values are based on robust standard errors.

	Market-driven only		Market-driven vs. All others		Market-driven vs. Confirmatory	
	Estimate (1)	P-value (2)	Estimate (3)	P-value (4)	Estimate (5)	P-value (6)
MD_t			0.0009	0.1361	0.0070	0.1027
$Control_t$	-0.0005	0.8055	-0.0010	0.5745	-0.0011	0.7668
$Control_t*MD_t$			-0.0023	0.2703	-0.0091	0.0873
$ImpairAmt_t$	**0.0153**	**0.0906**	-0.0194	0.0274	-0.0530	0.0339
$ImpairAmt_t*MD_t$			**0.0333**	**0.0006**	**0.0529**	**0.0161**
M/B_t	0.0054	0.0842	0.0000	0.4566	0.0059	0.1420
$\Delta M/B_t$	0.0000	0.9788	0.0000	0.6735	-0.0006	0.2403
$Fundamental_t$	-0.0058	0.0069	0.0004	0.4050	0.0031	0.1908
$Loss_{t+1}$	0.0010	0.6423	0.0011	0.3114	-0.0005	0.8566
$Std\_ROE_{t-5,t}$	-0.0006	0.6895	0.0007	0.3145	0.0025	0.2580
$LogMV_t$	0.0000	0.9976	0.0002	0.5343	0.0000	0.9813
$NForecast_{t+1}$	-0.0003	0.8054	0.0001	0.8631	-0.0002	0.8213
$ImpairAmt_{t+1}$	0.0047	0.7131	0.0158	0.0183	0.0008	0.9509
IMR	0.0063	0.4351	0.0017	0.6403	-0.0040	0.6229
Adj R^2		0.2186		0.0796		0.1613
N		172		1196		334

Table 7: Stock repurchases

This table reports the test results of H3 on share repurchases.

Panel A: Regression analysis – decision to repurchase

This table reports the estimation results of the following logistic regression:

$$Repurchase_{t+1} = a_0 + a_1 MD_t + a_2 Control_t + a_3\, Control_t{*}MD_t + a_4 ImpairAmt_t + a_5\, ImpairAmt_t{*}MD_t + \sum a_{6i}\, Control\ Variable_i + e_{t+1} \quad (5)$$

Year t refers to the impairment year. The dependent variable $Repurchase_{t+1}$ is a dummy variable equal to one if a firm repurchases its stock in year t+1 and zero otherwise. *Control* is an indicator variable equal to one for matched control non-impairment firms and zero for impairment firms. Among control variables, $Cash_t$ is the cash balance scaled by market value of equity at the end of year t. $Payout_{t+1}$ is computed as dividend over net income of year $t+1$. $Leverage_t$ is industry-average-adjusted leverage ratio, where the leverage ratio is defined as total debt over the sum of market value of equity and total debt. *OptionExercisable* (*OptionExercised*) is the number of exercisable (exercised) options in year t+1 scaled by the number of common shares outstanding at the beginning of the year. All other variables are defined in Table 3. Year fixed effects are included in the regressions and the p-values are based on robust standard errors.

	Market-driven only		Market-driven vs. All others		Market-driven vs. Confirmatory	
	Estimate (1)	P-value (2)	Estimate (3)	P-value (4)	Estimate (5)	P-value (6)
MD			0.4192	<.0001	0.2997	0.0393
Control	0.2623	0.5115	0.2985	0.4298	0.4312	<.0001
*Control*MD*			-0.6883	0.1603	-0.5372	0.2215
$ImpairAmt_t$	**1.9403**	**0.0302**	-0.6617	0.3013	-0.2273	0.7008
$ImpairAmt_t{*}MD_t$			**1.8272**	**0.0014**	**1.9556**	**0.0030**
M/B_t	0.0010	0.7180	-0.0005	0.1456	0.0022	0.9797
$\Delta M/B_t$	-0.2426	0.1422	-0.0014	0.5102	-0.0412	0.7501
$Fundamental_t$	-0.7273	0.0788	0.2948	<.0001	0.0658	0.6491
$Cash_t$	-1.0681	0.2836	0.3027	0.0982	-0.1713	0.6731
$Payout_{t+1}$	-0.0098	0.8656	-0.0166	<.0001	-0.0165	<.0001
$Leverage_t$	-4.1629	0.0004	-2.1282	0.0001	-3.2244	0.0001
RET_{t+1}	-0.4346	<.0001	-0.2322	0.0004	-0.2961	<.0001
$OptionExercisable_{t+1}$	1.9446	0.6650	2.3380	0.0767	-0.6079	0.8115
$OptionExercised_{t+1}$	6.7403	0.6171	19.8163	<.0001	54.1798	<.0001
LagRepurchase	2.3626	<.0001	2.3840	<.0001	1.9881	<.0001
IMR	-1.2989	0.2859	-1.9517	<.0001	-1.7055	<.0001
Chi-Square stat		268.66		1394.77		520.10
N		498		3086		1082

Panel B: Regression analysis – dollar amount of repurchase

This table reports the estimation results of the following Tobit regression:

$$Repurchase_{t+1} = a_0 + a_1 MD_t + a_2 Control_t + a_3 Control_t{*}MD_t + a_4 ImpairAmt_t + a_5\, ImpairAmt_t{*}MD_t + \sum a_{5i}\, Control\ Variable_i + e_{t+1} \quad (5)$$

The dependent variable $Repurchase_{t+1}$ is equal to the dollar amount of stock repurchases during year t+1. All other variables are defined in Panel A and Table 3. Year fixed effects are included in the regressions and the *p*-values are based on robust standard errors.

	Market-driven only		Market-driven vs. All others		Market-driven vs. Confirmatory	
	Estimate (1)	P-value (2)	Estimate (3)	P-value (4)	Estimate (5)	P-value (6)
MD			0.0089	0.0000	0.0080	0.1680
Control	0.0067	0.1730	0.0031	0.5360	-0.0002	0.9810
*Control*MD*			-0.0183	0.0020	-0.0175	0.0220
$ImpairAmt_t$	**0.0253**	**0.0680**	-0.0195	0.0660	-0.0123	0.4080
$ImpairAmt_t{*}MD_t$			**0.0418**	**0.0440**	**0.0447**	**0.0510**
M/B_t	0.0000	0.0080	0.0000	0.2240	-0.0005	0.8580
$\Delta M/B_t$	-0.0043	0.0420	0.0000	0.1700	-0.0021	0.2000
$Fundamental_t$	0.0003	0.9370	0.0041	0.0040	0.0066	0.0130
$Cash_t$	-0.0298	0.0340	0.0069	0.3020	0.0118	0.3650
$Payout_{t+1}$	-0.0012	0.0130	-0.0001	0.3210	-0.0001	0.4210
$Leverage_t$	-0.0564	0.0000	-0.0430	0.0000	-0.0516	0.0000
RET_{t+1}	-0.0014	0.1830	-0.0010	0.5590	-0.0021	0.3260
$OptionExercisable_{t+1}$	0.1391	0.0590	0.0881	0.0010	0.0590	0.1450
$OptionExercised_{t+1}$	0.3080	0.2770	0.3027	0.0000	0.6861	0.0040
LagRepurchase	-0.0126	0.8210	0.1647	0.0000	0.0252	0.5760
IMR	-0.0353	0.2000	-0.0395	0.0000	-0.0440	0.0010
Chi-Square stat		218.34		1196.67		345.32
N		490		3080		1076

Table 8: Impairments during the financial crisis

This table reports the estimated coefficient of interest in the following regressions. In all regressions, the benchmark impairment sample is all impairment firms other than market-driven impairment firms. Year fixed effects are included in each regression and the *p*-values are based on robust standard errors. In columns (1-4), the following regressions are estimated for all impairments during the financial crisis period and the rest of the impairment sample separately, respectively:

$$RET_{t+1} = a_0 + a_1 MD_t + a_2 ImpairAmt_t{*}MD_t + a_3\, ImpairAmt_t{*}BMark_t + \sum a_{4i}\, Controls_i + e_{t+1} \quad (1)$$

$$3\text{-}DRET_t = a_0 + a_1\, MD_t + a_2 ImpairAmt_t{*}MD_t + a_3\, ImpairAmt_t{*}BMark_t + a_4 \Delta EPS_t + a_5 IMR + e_t \quad (2)$$

$$\Delta Spread_{t+1} = a_0 + a_1\, MD_t + a_2 Control_t + a_4\, Control_t{*}MD_{\ t} + a_3 ImpairAmt_t + a_5\, ImpairAmt_t{*}MD_t + \sum a_{6i}\, Control\ Variable_i + e_{t+1} \quad (3)$$

$$Repurchase_{t+1} = a_0 + a_1\, MD_t + a_2 Control_t + a_3\, Control_t{*}MD_t + a_4\, ImpairAmt_t + a_5\, ImpairAmt_t\, {*}MD_t + \sum a_{6i}\, Control\ Variable_i + e_{t+1} \quad (5)$$

The coefficient on $ImpairAmt_t{*}MD_t$ is reported in each column with the p-value in parentheses. All other variables are defined in Tables 3-7.

	Return reversal (1)	H1: Market reaction (2)	H2: Change in bid-ask spread (3)	H3: Stock repurchase (4)
Financial crisis period	0.6681	-0.0437	0.0096	2.1875
	(0.0322)	(0.0818)	(0.0496)	(0.0487)
Non-financial crisis period	0.6327	-0.0665	0.0177	2.5620
	(0.0906)	(0.0697)	(0.0004)	(0.0707)