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Overpriced Shares, Ill-Advised Acquisitions, and Goodwill Impairment

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ABSTRACT: We establish that the root cause of many goodwill write-offs is the buyers' overpriced shares at acquisition. Overpriced shares provide managers with strong incentives to exploit the overpricing by acquiring businesses, often paying more than the acquisition's synergies, setting the stage for subsequent goodwill write-offs. In particular, we document the following patterns: (1) Share overpricing is strongly and positively associated with the intensity of corporate acquisitions and the growth of accounting goodwill. (2) Share overpricing predicts goodwill write-offs and their magnitude. (3) Acquisitions by overpriced companies—a strategy often recommended by investment bankers and some academics—are often ill-advised (overpaid for and/or strategic misfit), exacerbating the post-acquisition negative returns of buyers beyond the reversal of the overpricing. Thus, managers' arguments notwithstanding, goodwill write-off is an important event highlighting a dysfunctional investment strategy.

Keywords: *goodwill write-off; overpriced shares; acquisitions.*

Data Availability: *Data are available from sources identified in the paper.*

I. INTRODUCTION

Pictures speak louder than words: Figure 1 presents eBay's cumulative stock return against the S&P 500 index from 2003. In mid-September 2005 (see left arrow), eBay acquired the Internet phone company Skype for \$2.6 billion, paid in part by stock. At the time of acquisition, eBay's stock advanced over twice the S&P 500, and with the benefit of

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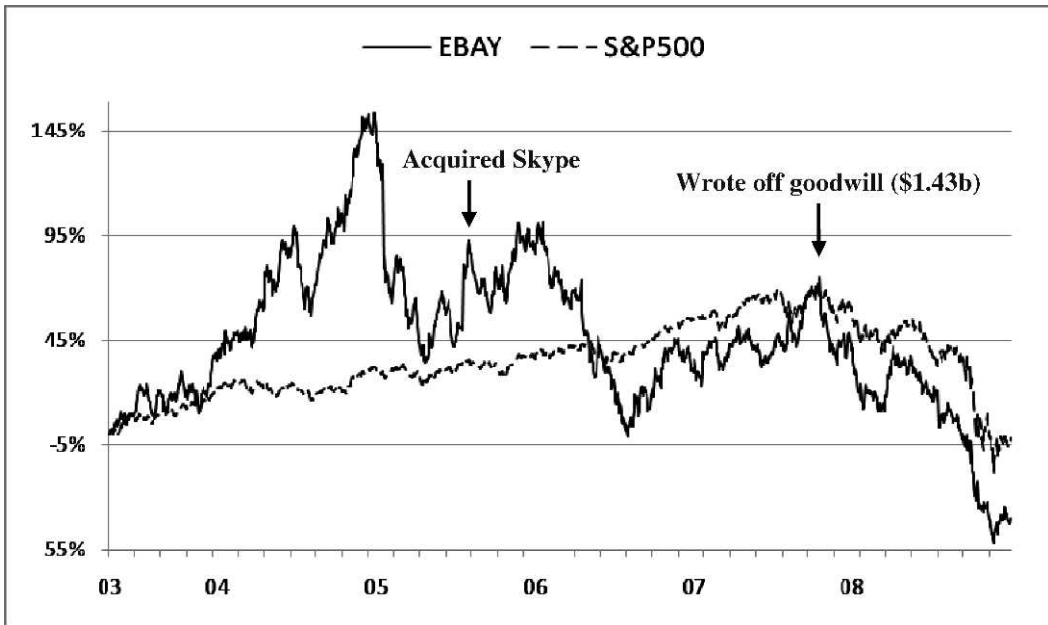
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FIGURE 1
eBay versus S&P 500: The Skype Acquisition
Cumulative Stock Returns



hindsight—eBay’s steep stock price decline in 2006 and its stagnation thereafter—its shares seem to have been substantially *overpriced* at the time of the Skype acquisition. Things soon turned ugly for the online auctioneer, and on October 1, 2007 (right arrow), it announced a massive goodwill write-off of \$1.43 billion (55 percent of the acquisition price) related to the Skype acquisition. Meg Whitman, eBay’s highly respected CEO, retired soon thereafter, in January 2008, and commentators attributed this in part to the Skype debacle.¹

In this study, we argue and corroborate empirically that eBay’s chain of events—from overpriced shares through stock-financed acquisitions and, ultimately, to substantial goodwill write-offs—is, in fact, a general phenomenon. Using a sample of acquisitions during 1990–2006, we first document a strong and monotonically positive relation between the share overpricing of the bidding (acquiring) companies and the amount of goodwill from these acquisitions. We then show a monotonically positive association between the bidders’ overpricing and goodwill write-offs (impairment) following the acquisitions. Cementing the relation between share overpricing and goodwill write-offs, we find that the frequency of shareholder lawsuits alleging fraud and misleading information about acquisitions, which are often filed promptly after a goodwill write-off announcement, is strongly related to the bidders’ overpricing. We measure share overpricing by three indicators of overvaluation: the industry-adjusted price-to-earnings ratio, discretionary

¹ In September 2009, eBay sold 65 percent of Skype to private investors.

accruals, and prior equity issuance, and combine these indicators into an aggregate index of share overvaluation. This study thereby traces the antecedents of goodwill impairment—an important and increasing phenomenon—to acquisitions with overpriced shares.²

We note that our findings are not automatic outcomes of acquisitions with overpriced shares. While overpriced bidders may acquire overvalued targets, which often leads to certain goodwill, the amount and prevalence of such goodwill are constrained by various important factors. First and foremost, as [Shleifer and Vishny \(2003\)](#) argue, the acquisition price (and consequent goodwill) must be lower than the merger synergies. The perceived synergies, therefore, are an upper bound on the goodwill of the acquisition. Second, other factors, such as the bidder's relative bargaining power and incentives-to-sell given to target managers (elaborated below), also reduce the purchase price and the consequent goodwill. Thus, while bidder overpricing may lead to certain goodwill, its extent and prevalence can be determined only by empirical analysis. This is even more pronounced regarding our second link: acquisition with overpriced shares and goodwill write-offs. Indeed, if acquiring managers behave rationally, according to the [Shleifer and Vishny \(2003\)](#) model, and constrain the acquisition price by the acquisition synergies, there will be no goodwill write-offs. That is, the future cash flows or cost savings from the merger would exceed the acquisition price, thereby obviating goodwill impairment. Accordingly, our empirical findings are not mechanical outcomes of acquisitions with overpriced shares.

Providing further insight into the link between overpriced bidder shares and goodwill write-offs, we document that weak corporate governance enhances the association between share overpricing on one hand, and acquisition intensity and the consequent goodwill write-offs on the other. Apparently, effective directors check managers' urge to use overpriced shares to acquire companies in order to justify and prolong the overpricing. Many such acquisitions are overvalued and strategically incompatible with the bidders.

We then turn to an important, yet unresearched, issue concerning the economic implications of goodwill write-offs. Academics and practitioners often argue that when a firm's shares are overpriced, it is beneficial to current shareholders to acquire businesses, and even overpay for them, as long as such overpayment is lower than the bidder's share overpricing. It is argued that such acquisitions are beneficial in the long term, moderating the negative bidder returns due to the correction of the overpricing (see next section for elaboration). Following this logic, a subsequent goodwill write-off does not reflect negatively on the acquisition decision; rather, it is an expected consequence of an overpayment for the target with even more overpriced shares. A goodwill write-off is accordingly a non-event—just an accounting routine. We show that this is not the case. Corporate acquisitions with overpriced shares—many leading to goodwill write-offs—exacerbate the post-acquisition negative returns beyond the overpricing correction. Goodwill write-offs are, accordingly, an important business event signaling a flawed investment strategy.

Our main contribution to the accounting literature is to trace goodwill write-offs, a frequent and growing phenomenon, all the way back to their root cause: the incentives of managers of overvalued firms to acquire businesses, whether to exploit the overpricing for shareholders' benefit or to justify and prolong the overpricing by maintaining the façade of growth. In contrast, most extant studies on goodwill impairment focus on events surrounding the write-off, such as investors' reaction to the write-off announcement (it is generally negative [[Li et al. 2005](#)]), whether goodwill write-offs are timely or delayed by managers (they are delayed [[Hayn and Hughes 2006](#); [Francis et al. 1996](#)]), whether write-offs improve financial information (they do; write-offs predict future cash

² The number of firms reporting goodwill write-offs between 2004 and 2008 are 447, 480, 475, 533, and 1,283, respectively. The median ratios of goodwill write-off to equity over those years are 5.5 percent, 6.8 percent, 4.7 percent, 6.9 percent, and 15.2 percent, respectively.

flows and earnings [[Anantharaman 2007](#)]), and the managerial incentives affecting the write-offs (goodwill impairment is related to characteristics of debt contracts, managerial bonuses, and exchange delisting regulations [[Beatty and Weber 2006](#)]).³ While these findings are informative, the root causes of goodwill impairment—the circumstances under which ill-advised acquisitions are being made—have not been comprehensively investigated in the literature.

We further contribute to the accounting literature by investigating the economic implications of a goodwill write-off. Is it a benign event, merely reflecting the target's overvaluation—a frequent occurrence when overpriced shares are used as payment—or is goodwill write-off an important indication of a flawed investment strategy? We corroborate the latter, consistent with investors' negative reaction to write-off announcements and the frequent shareholder lawsuits following goodwill write-offs.

At a practical level, our findings are relevant to auditors and regulatory agencies concerned with the timely recognition of goodwill impairment.⁴ Goodwill must be annually tested for impairment, but such tests are notoriously difficult. Unless the target's shares continue to be publicly traded—a minority of acquisitions—there is no objective evidence of impairment. We document below that bidders' overpriced shares at the time of acquisition predict goodwill write-offs (along with other variables, such as the percentage acquisition price paid in shares and the target being a foreign enterprise), thus providing auditors and regulators with an early-warning signal for a high likelihood of goodwill impairment.

Section II elaborates on mispriced shares, especially those that are overpriced, and outlines our research questions. Section III presents the data, summary statistics, and our research methodology. Section IV presents our empirical findings. Section V establishes that share overpricing predicts goodwill write-offs, and Section VI presents various robustness checks. Section VII concludes the paper.

II. RESEARCH QUESTIONS

In forming our research questions, we begin with the well-known [Shleifer and Vishny \(2003\)](#) (hereafter, SV) model of corporate acquisitions based on investors' misvaluations of the merger partners. SV's underlying assumption is that:

financial markets are inefficient, so some firms are valued incorrectly. In contrast, managers are completely rational, understand stock market inefficiencies, and take advantage of them, in part through merger decisions. Mergers in this model are a form of arbitrage by rational managers operating in inefficient markets. (SV, 296)

Managers in SV's model are endowed with considerable information. They are aware of the mispricing of both bidder (buyer) and target (seller) firms. They also know the synergies from combining the merger partners and the long-run valuation of the combined entity. A major implication (prescription) of SV's model is that bidder managers use their overpriced shares to acquire target companies, and that bidder shareholders gain as long as the price paid for the acquired entity is lower than the perceived synergies (savings) from the merger. When bidders acquire firms for less than the perceived synergies from acquisition, even if the target is overvalued

³ Note that these managerial incentives relate to the write-off decision, unlike ours, which focus on the acquisition decision. Several studies focus on the target overpayment at acquisition. [Li et al. \(2005\)](#) document that write-offs are more likely in overpayment of target cases (different from the overvaluation of bidders, which we investigate) and when the post-acquisition returns of buyers are negative. [Hayn and Hughes \(2006\)](#) predict write-offs from the acquisition premium and other variables.

⁴ Recall the evidence that managers often delay the recognition of goodwill impairment.

(but less overvalued than the bidder), then bidders' shareholders benefit in the long term, since the post-acquisition negative returns from the correction of the overvaluation will be smaller than they would have been without the acquisition:

[S]tock acquisitions are used specifically by overvalued bidders who expect to see negative long-run returns on their shares [the correction of the overvaluation], but are attempting to make these returns less negative.⁵ (SV, 306)

Why would bidder managers use overpriced shares primarily for acquisitions rather than issue the overvalued equity for other purposes, perhaps for organic growth or cash hoarding? To be sure, not all managers of overpriced companies engage in acquisitions. Some use the overpriced shares to finance organic (internal) growth, as shown by [Polk and Sapienza \(2009\)](#), while some may just do nothing with the overpriced shares. But the incentive to acquire companies with overpriced shares is strong:

The advantage of making acquisitions, aside from positive perceived synergies, is that they contribute to the growth in earnings of the firm, and thereby help justify the high valuations. As the policies of Cisco and other technology firms illustrate, acquisitions become part of a growth strategy justifying high market multiples in a way that cash accumulation cannot. For this reason as well, it might be better to use overvalued equity *to buy other overvalued firms* than to invest in cash. (SV, 303; emphasis added)

Thus, the advantage of a merger over organic growth or investing in cash (and over doing nothing) is that it immediately boosts both the top and bottom lines—revenues and earnings—thereby justifying the continuation of bidder overvaluation, whereas internal growth (capital expenditures) takes time to bear fruit and cash investments yield, at most, a modest interest. Acquisitions with overpriced shares also have the advantage of reducing the negative impact of a new equity issuance on bidder share price because, as shown by [Baker et al. \(2007\)](#), in a stock acquisition, most of the target shareholders become new shareholders of the bidder as they follow the “path of least resistance” to passively accept and hold the acquirer's shares, even when they would not have bought the same shares from a seasoned equity offer. Shareholders' decision to follow the “path of least resistance” can also be motivated by tax considerations.

Certain aspects of the SV model are supported by a comprehensive study on acquisitions ([Dong et al. 2006](#)), documenting the following patterns. First, high valuation (presumably overpriced) bidders are much more likely to use stock rather than cash for acquisitions. Second, bidders have significantly higher market valuations than targets. Third, high target valuations (presumably overpriced) are associated with stock rather than cash offers. Fourth, “[t]argets with higher valuations are less likely to be hostile to the bid, and are more likely to be acquired and to receive merger bids [stock] rather than tender offers [cash]” ([Dong et al. 2006](#), 729). [Dong et al.'s \(2006\)](#) estimates confirm that acquisition targets are, on average, overvalued.

⁵ This poses an intriguing question. Why would the target's shareholders accept the bidder's overpriced shares? SV offer two answers. First, target shareholders receive a premium over their shares' (sometimes inflated) value, and gain as long as they sell the bidder's shares before the overpricing is completely corrected. Second, the bidder pays (bribes) the target managers, whose consent is generally crucial to the acquisition, by keeping these managers in top positions in the merged company, or giving them generous severance pay, or accelerating the exercise of their stock options (particularly lucrative if the target is overvalued). A striking confirmation of the last point comes from a recent study showing that numerous companies have awarded stock options to their top executives while engaged in negotiations to be acquired. The average CEO received an extra \$5.7 million from such grants. When the deal closed, the executives cashed out these options ([Fich et al. 2010](#)).

This leaves open the main postulate of the SV model that the price paid for the target is expected to be lower than the perceived synergy. Stated differently, bidder managers act in the long-term interests of shareholders.⁶ Indeed, several well-known corporate acquisition models depart from this assumption. Stein (1996), for example, advances a model in which managers cater to the *short-term* interests of shareholders. To boost short-term share prices, or at least keep them from falling, managers will invest in acquisitions, some of which are ill-advised—negative net-present-value projects—in order to boost reported revenues and earnings, while detracting from the long-term growth of the firm. Polk and Sapienza (2009) provide empirical support for this scenario.⁷ Earnings management, particularly by “real means”—such as cutting R&D, postponing advertising, or delaying IT systems updates, on which there is extensive evidence—is similarly aimed at such short-term justification of overpriced shares (Jensen 2005).

SV’s assumption of managers’ information omniscience—they know the mispricing of the merger partners, as well as the merger synergies—is also questionable. Estimating mispricing and, particularly, assessing *ex ante* merger synergies is highly uncertain and prone to serious mistakes. In fact, Roll (1986) bases his theory of mergers on the assumption that managers err in assessing the value of the target and the merger synergies (leading to “hubris,” where the bidder with the largest overvaluation of the target gets the deal and incurs the “winner’s curse”). Lehn and Zhao (2006) provide intriguing evidence consistent with many managers substantially overestimating the target (hubris). They document that “[o]f the 714 CEOs who affected the sample acquisitions, 407, or 57 percent of the sample, were replaced following the acquisitions in what we classify as ‘disciplinary CEO turnover’” (Lehn and Zhao 2006, 1761).

Various models supported by evidence thus depart from SV’s rational managerial acquisition behavior. To the extent that bidders with overpriced shares overestimate the benefits from acquisitions in their zeal to soften the inevitable correction of the overpricing, or to cater to short-term investors (Stein 1996), the acquisition’s goodwill will have to be subsequently written-off, and the long-term returns to bidder shareholders will be worse than without the acquisitions.⁸ Thus, the SV acquisition model and related models based on different assumptions raise intriguing questions regarding the consequences of acquisitions with overpriced shares and, particularly, its effect on goodwill write-offs. In particular:

Acquisition with Overpriced Shares and Goodwill

The SV model predicts that some acquisition targets will be overvalued, as long as such overvaluation is not larger than the bidder’s overvaluation. Target overvaluation implies the recording of accounting goodwill with the acquisition. Recall, however, that the main acquisition condition of the SV model is that for acquisitions paid in stock, the acquisition price (P)—a major determinant of goodwill—is lower than the perceived acquisition synergies (S).⁹ There is, therefore,

⁶ “Using overvalued shares as a means of payment enhances the claim on capital of the bidding shareholders, and thereby cushions the collapse of the shares in the long run” (SV, 301).

⁷ “Our main interpretation of the results is consistent with Stein’s (1996) hypothesis that short-horizon managers temporarily distort the firm’s investment decision and therefore misallocate resources” (Polk and Sapienza 2009, 27).

⁸ Other studies on the relation between valuation and merger include Rhodes-Kropf and Viswanathan (2004), who develop a model to explain how merger waves occur under different conditions of valuation, and Rhodes-Kropf et al. (2005), who empirically test the model’s prediction that misvaluation drives merger. While Rhodes-Kropf et al. (2005) find that bidders have higher market-to-book than targets (similar to Dong et al. 2006), they show that the difference is only true for the short-term mispricing. The long-run mispricing follows the opposite pattern: bidders have lower long-run market-to-book ratio than targets.

⁹ The SV model allows cases where $P > S$, yet such acquisitions are not expected if acquirers want to maximize shareholder value.

a strict upper bound in the SV model on goodwill: $P < S$. Managers will not pay exorbitant prices for targets, since the price is constrained by the synergies, restricting, in turn, the values of goodwill. In fact, the SV model implies that regardless of the extent of share overpricing, rational bidders will *minimize* acquisition price in order to maximize the gains from acquisition (SV, 301). This incentive further restricts the value of goodwill.

In addition to the acquisition price being bounded by the perceived synergies, there are, according to SV, various other factors affecting the price: (1) The bidder's bargaining power relative to the target (a large pharmaceutical company relative to a small biotech firm)—the larger the bidder's relative bargaining power, the lower will be the price; (2) "incentives" given to target managers (continuing employment by the merged unit, accelerating their stock options) motivating them to agree to a lower purchase price; (3) target managers' incentives to sell the company (managers nearing retirement will be particularly eager to "cash out" by an acquisition, given the large premia paid, rather than wait for uncertain growth)—the larger the incentive to sell, the lower the acquisition price. There are, thus, various factors, in addition to the merger synergies, that will lower the acquisition price and the consequent goodwill.¹⁰

Accordingly, while share overpricing leads to some acquisitions of overvalued targets, which in turn, generates goodwill, the extent of such goodwill and its prevalence are open questions, given the multiple factors that restrict the acquisition price and the consequent goodwill. The extent of the relation between bidders' overpricing and goodwill is, thus, our first research question.

Acquisition with Overpriced Shares and Goodwill Write-Offs

While a certain amount of goodwill can be expected from acquisition of overpriced targets, goodwill *write-offs* cannot be automatically expected. The reason is that if the acquisition price is lower than the perceived merger synergies—future cash flows, or cost savings from the merger—goodwill will not be impaired and there will be no goodwill write-off. Thus, if managers maximize long-term shareholder value by paying less than the synergies, as SV assume, the acquisition's cash flows (synergies) will exceed the acquisition price, and there will be *no* goodwill write-off. Only in cases of gross overestimation of the synergies, or overpayment relative to synergies, will there be a write-off.

This reasoning is corroborated by a recent KPMG report stating: "Regarding goodwill, misjudgment with respect to estimated synergies and projected growth rates may lead to significant impairment risk . . . Acquirers that expect a high going-concern valuation and synergies at the time of acquisition may pay a higher control premium" (KPMG 2010, 11). And a recent *Wall Street Journal* (2010) online article quotes Sigma Pharmaceuticals, which wrote off goodwill to the tune of \$375 million, as conceding that "the synergies expected from the merger between Arrow and Sigma back in 2005 had not been achieved." Thus, goodwill write-off is not an automatic by-product of large goodwill, but rather results from a misvaluation of expected synergies or unexpected decline in synergies. Indeed, a large number of well-run firms, such as IBM, General Electric, and General Dynamics, have billions of dollars of goodwill without any write-offs (at least during 1995–2008).¹¹

Goodwill write-offs will also occur when managers depart from the SV assumptions. Models like Stein's (1996) and Roll's (1986), as mentioned above, depart from the long-term maximization assumption of SV, and admit to cases where the present value of the acquisition's long-term cash flows are lower than the price paid, either because of a short-term focus (Stein 1996) or

¹⁰ In untabulated analysis, we confirm that these factors are indeed negatively related to goodwill.

¹¹ General Dynamics, for example, during 1995–2008, had more than 50 acquisitions, increasing its goodwill to 40 percent of total assets in 2008, yet did not have any goodwill write-offs.

overestimating the synergies (Roll 1986). In such cases, there will obviously be a goodwill write-off.

Hence, the relation between acquisition with overpriced shares and goodwill write-offs depends on whether managers can reliably estimate the acquisition synergies and pay less than the synergies (SV), or whether managers pursue short-term targets (Stein 1996) or systematically misvalue the synergies (Roll 1986). This relation is obviously an important empirical question, which we address below.

The Economic Implications of Goodwill Write-Offs

The overpriced shares used in acquisition will, sooner or later, revert to intrinsic value, leading to negative post-acquisition returns for bidders. The extent of such price reversal, however, is also an empirical question, as it depends on whether the bidder manager acts in the long-term interests of shareholders (SV) or pursues other objectives (Stein 1996). If bidders follow the long-term maximization assumption of SV by paying less than the expected synergies, the post-acquisition negative returns from the correction of the initial share overvaluation will be smaller than they would have been without the acquisition (SV, 306). However, in cases of overestimating synergies and/or overpayment for synergies, the negative subsequent returns will be worse (larger) than without acquisition, indicating the ill-advised nature of the acquisition. Thus, there is a sharp difference of opinion about acquisition consequences.

Examining the extent of the post-acquisition price reversal is particularly relevant for understanding the economic implications of goodwill write-offs. Managers tend to portray these write-offs as just a byproduct of the expected price reversal when overpriced shares are used to acquire overvalued targets. They often argue that such goodwill impairments have no economic implications, since they just reflect the lower valuations of the previously overvalued shares used to acquire overvalued targets. Thus, argue the managers, goodwill write-offs simply reflect the reversal of the overvaluation, not the substance of the acquisition. In the words of the CFO of JDS Uniphase, after writing off \$44.8 billion of goodwill: "Had these [acquisition] transactions been done at different times when valuations were lower . . . the goodwill amounts will have been considerably smaller [and so would be the write-off]" (Pender 2001). Managers also often highlight the non-cash nature of the goodwill write-off to further imply that the write-off is just a benign accounting ritual with no real economic substance.

So, is goodwill write-off a prominent accounting procedure, increasing in frequency, a non-event, or does it signify an ill-advised acquisition strategy? This question can be answered by examining whether the post-acquisition stock returns of overvalued bidders were improved by the acquisition, or worsened, in the presence of goodwill write-off? This is an empirical and obviously important question to accountants and investors, which we address below.

We would like to note that none of the above research questions—the relation between acquisitions with overpriced shares and goodwill, that between acquisitions and write-offs, and the economic implications of write-offs—were examined before. Nor are the answers to these questions mechanically derived from previous research that essentially shows that overvalued bidders tend to acquire overvalued targets. In particular, as SV postulate, the fact that a target is overvalued does not imply that goodwill will be written off, as long as the price paid is lower than the perceived acquisition synergies.

III. DATA, METHODOLOGY, AND SUMMARY STATISTICS

We obtained our sample from the SDC database on mergers and acquisitions. The initial sample consists of all U.S. publicly traded firms that undertook mergers and acquisitions between 1990 and 2006. We include acquisitions of both U.S. and foreign enterprises, as well as acquisitions

of public and private targets. We exclude all observations for which (1) the value of the transaction is not disclosed, (2) the percentage of shares acquired in the transaction is less than 90 percent, (3) the value of the transaction is more than 100 percent or less than 1 percent of the acquiring firm's market value, or (4) the pooling method was used. We also require that sample firms have accounting data in Compustat and stock price and return data in CRSP. The total sample includes 54,218 yearly observations, and the bidder subsample is comprised of 7,055 observations.

Measuring Share Overpricing

We use the following three indicators to identify overpriced shares: the industry-adjusted price-to-earnings (P/E) ratio, the amount of discretionary accruals, and prior equity issuance. As there, obviously, is no unique *ex ante* perfect measure of share mispricing, we use three proxies to indicate this phenomenon, and blend them into an index reflecting the incremental information conveyed by the individual proxies. Prior studies (Baker and Wurgler 2006; Polk and Sapienza 2009) similarly use mispricing proxies, or construct indices from such proxies, to indicate mispricing.

Our motivations for using the specific proxies are as follows: (1) *The industry-adjusted price-to-earnings (P/E) ratio* is by far the most widespread mispricing proxy used by investors.¹² The industry-adjusted P/E ratio we use is the difference between the firm's P/E and the corresponding four-digit SIC industry median P/E. To ensure that the industry median P/E ratio is representative, we exclude from it firms with negative P/Es and those with P/E ratios greater than 100. (2) *Discretionary accruals* were found by Sloan (1996) to indicate mispricing because returns on shares of high accruals companies reverse during the two to three years subsequent to the high accruals. Following Chan et al. (2006) and Polk and Sapienza (2009), we define discretionary accruals as the difference between the firm's total accruals and "normal accruals," deflated by average total assets. Total accruals are measured as the difference between earnings before extraordinary items and cash from operations. Normal accruals are the product of the firm's current sales times the ratio of the sum of total accruals, divided by the sum of sales over the prior five years (year $t-5$ to year $t-1$). (3) *Net equity issues* proxy for overpricing because evidence indicates that equity issues predict subsequent low stock returns (Daniel and Titman 2006); that is, the firm's shares are overvalued around the time of issue. Following Daniel and Titman (2006), equity issuance is measured as the difference between the log of the ratio of the firm's market value at year t to its market value at year $t-5$, and the log of the firm's stock return from year $t-5$ to year t .

Because no single mispricing proxy fully captures the phenomenon, we construct mispricing indicators that blend the three individual proxies and reflect the incremental information in them. To construct these composite indicators, we perform a principal component analysis using—for maximum representativeness—all available firms, not just corporate buyers, with the required accounting and stock return data. To enhance our estimation of share overpricing, we use the first two principal components which, combined, account for 68.9 percent of the sample variance of the underlying overpricing proxies. In our following tests and regression analyses, we use these two principal components as the firm-specific indicators of share mispricing (termed *OVE1* and *OVE2*, respectively).

Some of our tests below are based on a 5×5 classification of the sample firms into quintiles of the first (*OVE1*) and the second (*OVE2*) principal components of the overpricing proxies. In these tests, we focus on the main diagonal of the 5×5 table, namely, the intersection of firms with the lowest quintile of the *OVE1* and *OVE2* indicators (least overvalued firms), followed by the intersection of firms with the second-lowest quintile *OVE1* and *OVE2*, . . . , ending with the fifth group—the intersection of the firms with the highest quintile of *OVE1* and *OVE2* indicators (most

¹² In their study of share overpricing and corporate acquisitions, Dong et al. (2006) use a highly correlated, but somewhat less frequently used, measure: the price-to-book ratio.

overpriced firms). We perform this main diagonal classification of firms for every sample year from 1990 to 2006.

To demonstrate the efficacy of our mispricing proxies and composite indicators, we compute abnormal returns for the three years following the mispricing computation (that is, three years following each sample year, 1990–2006). If our proxies indeed capture share mispricing, then the subsequent returns should reverse as investors realize the mispricing, with positive subsequent returns for underpriced shares and negative returns for overpriced shares. The subsequent abnormal returns are computed following Hirshleifer et al.'s (2004) computation of hedge portfolio abnormal returns (both equally weighted and value-weighted).¹³ Table 1 reports these abnormal returns during the three years following the mispricing classification. The columns of Table 1 document the subsequent returns along the main diagonal of the 5×5 firm classification, from the least overpriced firms (Lowest-Lowest portfolio) to the most overpriced (Highest-Highest portfolio).

It is evident that the subsequent returns are monotonically decreasing. For year $t+1$ (equally weighted), for example, the returns are 0.0018, -0.0029 , -0.0031 , -0.0043 , and -0.0100 , respectively. The same return pattern is evident for years $t+2$ and $t+3$, and for the value-weighted returns. Notably, most of the portfolio returns are statistically significant. The systematic pattern of the returns in Table 1—positive for underpriced (Lowest-Lowest portfolio) and increasingly negative for overpriced shares—demonstrates the ability of our three proxies (combined in the indicators *OVE1* and *OVE2*) to capture share mispricing. The monthly hedge portfolio returns, reported in the last four lines of Table 1, are positive and substantial, reflecting the gains of a strategy of going long on the underpriced shares and shorting the overpriced shares. As also reported in the bottom of Table 1, we see similar results when measuring trading gains by CAPM, the Fama-French three-factor model, and the Carhart (1997) four-factor model.¹⁴

Measuring Acquisition Intensity

From identifying share overpricing, we move to the measurement of acquisition intensity. We measure the intensity of corporate acquisitions for each firm-year by the total *number* of transactions undertaken by the firm in the year subsequent to the overpricing measurement (*NUM*), as well as by the aggregate *value* of all transactions in the subsequent year, deflated by the bidder's market value at the beginning of the year (*VALUE*). For firm-years with no acquisition activities on the SDC database, the value of these two variables is set to 0. We compute the two acquisition intensity measures, *NUM* and *VALUE*, for all bidders, as well as for the subsamples of transactions that are financed fully by stock or by cash. For each firm-year, we also compute, for all acquisitions, the average percentage of the transaction value paid for by stock (*STOCK%*).

¹³ The hedge portfolio abnormal returns are those obtained from a trading strategy that invests long in the first diagonal portfolio (Lowest-Lowest), comprised of the quintile with the least overpriced shares, and shorts the fifth diagonal portfolio (Highest-Highest), consisting of the quintile with the most overpriced shares. For each portfolio, we compute monthly equally weighted and value-weighted abnormal returns subsequent to the measurement of mispricing (with a minimum four-month lag between fiscal year-end and the first month of the return period). Abnormal returns for each individual firm in the portfolio are calculated by subtracting from its raw return the equally weighted or value-weighted returns of a benchmark portfolio matched by size, book-to-market, and momentum (prior year return).

¹⁴ We also ran a multivariate analysis: Fama-MacBeth regressions of monthly stock returns subsequent to the overpricing measurement run on: (1) firm size ($\ln(MV)$) and the book-to-market ($\ln(B/M)$) ratio, the common determinants of returns; (2) the returns of the previous periods ($Ret_{t-1}, \dots, Ret_{t-3}$), serving as controls; (3) the individual overpricing proxies—*P/E* (relative P/E), *DACC* (discretionary accruals), and *NEQ* (equity issues); and (4) the two composite overpricing indicators (*OVE1* and *OVE2*). These regressions are run with the overpricing indicators lagged one, two, and three years to the returns. The estimates of this regression indicate that the overpricing indicators, individually and in combination, are all negatively and significantly associated with subsequent stock returns, confirming in a multivariate context the validity of our overpricing indicators.

TABLE 1
Overpricing Indicators and Future Abnormal Stock Returns

Portfolio	Equally Weighted			Value-Weighted		
	adj_ew t+1	adj_ew t+2	adj_ew t+3	adj_vw t+1	adj_vw t+2	adj_vw t+3
Lowest-Lowest (LL)	0.0018 1.59	0.0003 0.36	-0.0012 -0.36	0.0026 2.53	0.0020 2.03	0.0011 0.28
Low-Medium	-0.0029 -4.62	-0.0022 -4.16	-0.0016 -3.15	-0.0004 -1.11	0.0003 0.44	-0.0009 -1.56
Medium-Medium	-0.0031 -4.67	-0.0025 -4.22	-0.0017 -3.26	-0.0009 -1.54	0.0004 0.85	-0.0006 -1.09
Medium-High	-0.0043 -6.83	-0.0028 -4.07	-0.0029 -4.36	-0.0017 -2.64	-0.0002 -0.41	-0.0006 -1.40
Highest-Highest (HH)	-0.0100 -10.47	-0.0106 -9.21	-0.0097 -5.59	-0.0039 -4.14	-0.0031 -3.87	-0.0029 -3.77
Hedge (LL - HH)	0.0118 9.17	0.0109 7.14	0.0085 4.68	0.0065 3.69	0.0051 3.31	0.0040 3.16
CAPM α	0.0122 9.26	0.0113 7.78	0.0096 5.77	0.0066 3.78	0.0057 3.65	0.0044 3.33
Three-factor α	0.0129 9.65	0.0115 7.84	0.0098 5.63	0.0069 4.02	0.0064 3.88	0.0053 4.05
Four-factor α	0.0116 9.37	0.0102 7.03	0.0083 4.81	0.0061 3.52	0.0046 3.14	0.0042 3.43

Sample period is 1990–2006. Variable definitions are as follows: Indicator #1 of overpricing (*OVE1*) and indicator #2 of overpricing (*OVE2*) are, respectively, the first and second principal component of the firm's relative P/E, discretionary accruals, and equity issuance. Relative P/E (*P/E*) is the difference between the firm's P/E ratio (Compustat data #199/#58) at fiscal year-end and the four-digit SIC industry median P/E ratio for all firms in the sample firm's four-digit SIC industry. In the computation of four-digit industry median P/E ratio, we exclude firms with negative P/E ratios and firms with P/E ratios greater than 100. Firms with negative P/E ratios are excluded in the sample. Discretionary accruals (*DACC*) are the difference between the firm's total accruals and "normal accruals," deflated by average total assets (Compustat data #6). Total accruals are measured as the difference between earnings before extraordinary items (Compustat data #123) and cash from operation (Compustat data #308). Normal accruals are a constant proportion of the firm's current-year sales (Compustat data #12), based on the ratio of the sum of total accruals to the sum of sales over the prior five years (year $t-5$ to year $t-1$) (Chan et al. 2006). Equity issuance (*NEQ*) is the difference between $\log(MV_t/MV_{t-5})$ and $r(t-5, t)$, where $MV_t(MV_{t-5})$ is the firm's market capitalization (Compustat data #199 \times #25) at the end of fiscal year $t(t-5)$ and $r(t-5, t)$ is the log stock return from year $t-5$ to year t . The eigenvalues of the principal component analysis are 1.067, 1.000, and 0.933. The eigenvectors for the first (second) principal component are 0.48, 0.52, and 0.71 (0.74, -0.68, and -0.004). From January 1990 to December 2006, portfolios are formed monthly by assigning firms into quintiles based on the values of *OVE1* and *OVE2*, respectively, in the most recent fiscal year, and then retaining firms in the intersection of the two portfolios. For example, the portfolio labeled "Highest-Highest" ("Lowest-Lowest") consists of firms that are in the top (bottom) quintiles ranked by both *OVE1* and *OVE2*. A minimum four-month lag is required between the fiscal year-end, for which *OVE1* and *OVE2* are measured, and the first month of the return period. The monthly abnormal return for a firm is computed by subtracting the equally weighted or value-weighted monthly return of a benchmark portfolio matched by size, book-to-market, and momentum (return of the most recent 12 months) from the firm's raw monthly return. Monthly abnormal returns of each portfolio are the average of abnormal returns across all firms in the portfolio. The hedge portfolio is formed by taking a long position in the portfolio with the lowest quintiles of *OVE1* and *OVE2*, and a short position in the portfolio with the highest quintiles of *OVE1* and *OVE2*. The CAPM α is the intercept from the regression of the raw returns or characteristics-adjusted returns of the hedge portfolio on the excess return of the market portfolio. The three-factor α is the intercept from the regression of the returns of the hedge portfolio on the three Fama-French factors, including market risk-free return, the size effect (*SMB*), and the book-to-market effect (*HML*). The four-factor α is the intercept from the regression of the returns of the hedge portfolio on the three Fama-French factors and a momentum factor.

Summary Statistics

Table 2 provides summary statistics. Panel A refers to all firms with available data, whereas Panel B focuses on the bidders. The data indicate that bidders are larger (see *MV*) than non-bidders at the median (\$399 million versus \$249 million), and are also larger at the mean. Bidders also have a substantially higher industry-adjusted P/E ratio than non-bidders—our first indication that overpricing is related to acquisitions. The same pattern emerges for the other components of the overpricing index: bidders have larger discretionary accruals and more equity issued prior to acquisition than non-bidders, and the two composite mispricing indicators (*OVE1* and *OVE2*) are substantially larger for bidders than non-bidders. Thus, shares of bidding firms, as a group, are more overpriced than those of non-acquiring firms. In untabulated tests, we find that the overpricing indicators are significantly correlated with acquisition intensity and with the change in goodwill.

IV. RESULTS

We employ two methodologies to examine our three research questions. The first is a simultaneous classification of the observations by the main diagonal of the 5×5 classification of firms by quintiles of the two overpricing indicators (principal components), *OVE1* and *OVE2*. The five main diagonal groups span from the Lowest-Lowest overpricing to Highest-Highest overpricing, as described and tested in the previous section. The second methodology is a multivariate regression or logit analyses of the focus variables (e.g., goodwill write-offs), run on share overpricing and control variables.

Question 1: Share Overpricing, Acquisition Intensity, and Goodwill

Table 3 reports the association between share overpricing and firms' acquisition intensity and the consequent goodwill change in the year following the overpricing.¹⁵ It presents the mean acquisition value and frequency (in parentheses) for the main diagonal of the sample firms classified by quintiles of the two overpricing composite indicators (*OVE1* and *OVE2*). Thus, the left cell (Lowest-Lowest) includes all firms that are classified by both indicators as falling within the least overpriced (presumably underpriced) quintile, whereas the right cell (Highest-Highest) includes all firms falling into the most overpriced category by both *OVE1* and *OVE2*. Moving along the mispricing spectrum from left to right across each row, the data in Table 3 portray a strong and monotonic increase in both mean acquisition value (divided by market value) and in the mean number of acquisitions per firm (in parentheses) in the year following the mispricing. Thus, for all sample firms (the first row of Table 3), as one moves from the least to the most overpriced firms, acquisition value (frequency) increases from 0.026 (0.105) to 0.115 (0.369), a three- to four-fold increase. A monotonic increase in acquisition intensity holds also for the subsample of bidder firms, corroborating earlier findings by [Dong et al. \(2006\)](#).¹⁶

Moving to a main theme of this study, Table 3 reports, for "all firms" and for "bidders," the mean percentage change in accounting goodwill in the year subsequent to the overpricing. It is evident for both groups of firms that the change in goodwill increases monotonically with share

¹⁵ Our inferences regarding this association are unchanged when we extend the post-overpricing horizon of measuring acquisition intensity and goodwill growth from one year to three years.

¹⁶ We confirm the association between our overpricing indicators and next year's acquisition intensity with an untabulated logistic regression of acquisition intensity (1 for acquisition, 0 for no acquisition) run on the composite overpricing indicators, the individual overpricing proxies, the lagged values of the overpricing indicators, and the following control variables: $\text{Log}(MV)$, cash flows from operations, the change in the S&P 500 index, and industry indicators. All coefficients of the overpricing indicators are positive and statistically significant in this analysis.

TABLE 2
Descriptive Statistics of the Sample Firms

Panel A: All Available Firms

	n	Mean	Standard Deviation	25%	Median	75%
Market value (<i>MV</i>) (\$ million)	54218	2430.69	10796	55.61	249.02	1048.96
Relative P/E (<i>P/E</i>)	54218	18.060	123.54	-3.344	0.110	7.946
Discretionary accruals (<i>DACC</i>)	54218	0.015	0.392	-0.032	0.002	0.042
Equity issuance (<i>NEQ</i>)	54218	0.119	0.464	-0.084	0.023	0.217
Indicator #1 of overpricing (<i>OVE1</i>)	54218	0.039	0.997	-0.383	-0.169	0.206
Indicator #2 of overpricing (<i>OVE2</i>)	54218	0.011	0.888	-0.138	-0.075	0.006
Cash flows from operation (<i>CFO</i>)	54218	0.110	0.307	0.052	0.099	0.161

Panel B: Firms with Acquisition Activities (Bidders)

	n	Mean	Standard Deviation	25%	Median	75%
Market value (<i>MV</i>) (\$ million)	7055	2371.02	9568	110.78	399.38	1329.13
Relative P/E (<i>P/E</i>)	7055	20.821	153.43	-2.769	0.724	8.863
Discretionary accruals (<i>DACC</i>)	7055	0.018	0.149	-0.031	0.003	0.040
Equity issuance (<i>NEQ</i>)	7055	0.222	0.506	-0.030	0.091	0.348
Indicator #1 of overpricing (<i>OVE1</i>)	7055	0.214	0.944	-0.306	-0.026	0.459
Indicator #2 of overpricing (<i>OVE2</i>)	7055	0.034	0.289	-0.131	-0.073	0.008
Cash flows from operation (<i>CFO</i>)	7055	0.120	0.108	0.062	0.109	0.170
Number of acquisitions (<i>NUM</i>)	7055	1.345	0.929	1.000	1.000	1.000
Value of acquisitions (<i>VALUE</i>)	7055	0.278	0.645	0.047	0.120	0.316
Change of goodwill (Δ <i>GDWL</i>)	7055	0.079	0.245	0.000	0.000	0.072
Δ <i>GDWL</i> (bidders with goodwill)	3764	0.103	0.258	0.0001	0.033	0.117

Sample period is 1990–2006. Variable definitions are as follows. Market value (*MV*) is the firm's inflation-adjusted capital market valuation of common equity at the fiscal year-end, in \$ millions. Relative P/E (*P/E*) is the difference between the firm's P/E ratio (Compustat data #199/#58) at fiscal year-end and the four-digit SIC industry median P/E ratio for all firms in the sample firm's four-digit SIC industry. In the computation of the four-digit industry median P/E ratio, we exclude firms with negative P/E ratios and firms with P/E ratios greater than 100. Firms with negative P/E ratios are excluded in the sample. Discretionary accruals (*DACC*) are the difference between the firm's total accruals and "normal accruals," deflated by average total assets (Compustat data #6). Total accruals are measured as the difference between earnings before extraordinary items (Compustat data #123) and cash from operation (Compustat data #308). Normal accruals are a constant proportion of the firm's current-year sales (Compustat data #12), based on the ratio of the sum of total accruals to the sum of sales over the prior five years (year $t-5$ to year $t-1$) (Chan et al. 2006). Equity issuance (*NEQ*) is the difference between $\text{Log}(MV_t/MV_{t-5})$ and $r(t-5, t)$, where $MV_t(MV_{t-5})$ is the firm's market capitalization at the end of fiscal year $t(t-5)$ and $r(t-5, t)$ is the log stock return from year $t-5$ to year t . Indicator #1 of overpricing (*OVE1*) and indicator #2 of overpricing (*OVE2*) are, respectively, the first and second principal component of the firm's relative P/E, discretionary accruals, and equity issuance. Cash flows from operation (*CFO*) are the amount of net cash flows from the firm's operating activities (Compustat data #308), deflated by lagged total assets (Compustat data #6 for year $t-1$). Panel B includes firm-years with acquisition activity in the subsequent year between 1990 and 2006. The number of acquisitions (*NUM*) is the total number of acquisition transactions undertaken by the firm in the subsequent year. The value of acquisitions (*VALUE*) is the combined value of all acquisition transactions in the subsequent year, deflated by the acquiring firm's market value at the beginning of the year. The change of goodwill (Δ *GDWL*) is the change in the amount of goodwill (Compustat data #204) deflated by the firm's total assets (Compustat data #6).

TABLE 3
Mean Value (Frequency) of Acquisitions and Changes in Goodwill ($\Delta GDWL$) over
Subsequent Year for Portfolios of Firms Classified by Share Overpricing

		Main Diagonal of Sample Firms Classified by Quintiles of <i>OVE1</i> and <i>OVE2</i>				
Sample	Form of Payment	Lowest-Lowest	Low-Medium	Medium-Medium	Medium-High	Highest-Highest
All firms	All	0.026 (0.105)	0.031 (0.148)	0.038 (0.223)	0.052 (0.309)	0.115 (0.369)
	% change of goodwill	0.005	0.009	0.012	0.016	0.031
Bidders	All	0.298 (1.212)	0.324 (1.262)	0.348 (1.342)	0.387 (1.502)	0.499 (1.708)
	% change of goodwill	0.034	0.045	0.047	0.060	0.121
Bidders	Stock	0.301 (1.052)	0.319 (1.142)	0.359 (1.300)	0.373 (1.421)	0.489 (1.502)
	% change of goodwill	0.039	0.065	0.074	0.115	0.171
Bidders	Cash	0.221 (1.069)	0.203 (1.103)	0.147 (1.123)	0.128 (1.194)	0.216 (1.184)
	% change of goodwill	0.088	0.052	0.069	0.066	0.072

Sample period for acquisition is 1990–2006. The main diagonal of sample firms classified by quintiles of *OVE1* and *OVE2* is formed by assigning firms in each year into quintile portfolios ranked by the values of *OVE1* and *OVE2*, respectively, and then retaining firms in the intersection of the two portfolios. For example, the portfolio labeled “Highest-Highest” (“Lowest-Lowest”) consists of firms that are in the top (bottom) quintiles ranked by both *OVE1* and *OVE2*. “All firms” includes all firms with data on *OVE1* and *OVE2*, and “Bidders” includes only those with acquisition activities in the subsequent year between 1990 and 2006. “Stock” includes firms with acquisitions that are completely paid with the shares of the acquiring firm, and “Cash” includes firms with acquisitions that are fully paid with cash.

overpricing. Thus, for “all firms” (“bidders”), the annual goodwill growth is 0.5 percent (3.4 percent) for the least overpriced firms, and 3.1 percent (12.1 percent) for the most overpriced firms.¹⁷ The lower part of Table 3 presents the overpricing diagonal data for stock-only and cash-only acquisitions, from the least (left) to the most (right) overpriced firms. It is apparent that the increasing pattern of acquisition intensity and goodwill growth with share overpricing exists only for acquisitions by stock. For cash-financed acquisitions, both acquisition intensity and goodwill growth are roughly unchanged across the share overpricing spectrum, confirming the Shleifer and Vishny (2003) prediction that overpriced companies will primarily use shares for corporate acquisitions.

We also run regressions of the growth in goodwill during the year subsequent to the overpricing measurement (dependent variable) on the share overpricing composite indicators, the lagged indicators, and control variables, including firm size, cash flows from operation, the percentage of transaction value acquired with stock over the previous year, and the return on the S&P 500 index during the prior year. For all regressions (untabulated), the overpricing coefficients are positive and statistically significant, indicating in a multivariate context that goodwill from an acquisition is positively related to share overpricing prior to acquisition. We also introduce to the examination three potentially intervening variables: the effectiveness of corporate governance,

¹⁷ In untabulated analysis, we confirm that the association between share overpricing and acquisition/goodwill also holds for various subperiods of our 1990–2006 sample period.

managerial share ownership in the firm, and whether the acquisition target is a domestic or foreign enterprise. If overvalued firms make some ill-advised acquisitions, as hypothesized by [Stein \(1996\)](#), then effective governance should restrain managers, avoiding some of these acquisitions and preventing overpayment for targets. This restraint will be reflected in lower goodwill. Substantial managerial share ownership might provide additional incentive to managers of overvalued firms to engage in acquisitions and even to overpay for the target to “buy themselves out” of the overpricing predicament. As for foreign targets, when growth in the domestic market slows down, managers search for growth by acquisitions abroad and, accordingly, the intensity of acquisitions is likely to be higher for foreign targets.¹⁸

We measure governance effectiveness by the [Gompers et al. \(2003\)](#) indicators, which primarily reflect shareholder rights. The governance indicator, which increases as governance becomes weaker, and its interaction with overpricing indicators are indeed positive and statistically significant for both acquisition intensity and the change in goodwill. Thus, lax corporate governance and its interaction with overpricing enhance further acquisition activity and overpayment for targets, leading to higher goodwill. The effect of managerial ownership and its interaction with overpricing on acquisitions and goodwill is significantly positive (untabulated). This effect, however, is concave: managers with small ownership stakes are primarily concerned with justifying the overpricing by acquisitions, whereas managers with larger ownership shares restrain acquisitions because they are increasingly concerned with the negative long-term effect of acquisitions on their considerable shareholdings. As to foreign acquisitions, the coefficients of bidder share overpricing, for both intensity of acquisitions and goodwill growth, are larger for foreign targets than for domestic targets, providing evidence of an extra incentive to engage in foreign acquisitions to rejuvenate growth. The coefficients of the control variables and the overpricing indicators are all as expected.

Recall from Section II that our first question relates to the effect of acquisition with overpriced shares on goodwill. On the one hand, the evidence (e.g., [Dong et al. 2006](#)) shows that overvalued bidders tend to acquire overvalued targets, thereby increasing the likelihood of recognizing goodwill. On the other hand, SV’s model postulates that the acquisition price will not be higher than the expected synergies. Such a price cap lowers the expected goodwill. Our analysis, reported in this section, indicates the predominance of the former factor: bidders’ share overpricing is positively associated with the goodwill from acquisitions. Weak corporate governance and managerial share ownership (up to a point) further enhance goodwill through higher premiums paid for targets.

Question 2: Overpriced Shares and Goodwill Write-Offs

The effect of overpricing on goodwill *write-off* is the central issue of this study. Recall from Section II that if bidder managers follow the [Shleifer and Vishny \(2003\)](#) prescription of acquiring firms only when the acquisition price is lower than the synergies (future cash flows from acquisition), there will be no goodwill write-off. Stated differently, the existence of goodwill, even if large, does not necessarily imply subsequent write-off. Conversely, if managers follow a short-term oriented policy of overpaying for the synergies ([Stein 1996](#)) and/or grossly overestimating the synergies ([Roll 1986](#)), goodwill write-offs are likely. In this section, we examine the relation between share overpricing and goodwill write-offs.

Table 4 presents the relationship between bidders’ share overpricing and goodwill write-off by quintiles (main diagonal) of overpricing. We measure share overpricing as the average of the

¹⁸ [Zenner et al. \(2008\)](#) argue that shareholders of foreign companies are reluctant to sell their companies for stock due to “home bias” in investments. Accordingly, it will take large premiums to convince foreign shareholders to sell.

TABLE 4
The Relation between Share Overpricing and Subsequent Goodwill Write-Offs and Acquisition-Related Lawsuits

Sample Description	Main Diagonal of Sample Firms Classified by Quintiles of <i>OVE1</i> and <i>OVE2</i>				
	Lowest- Lowest	Low- Medium	Medium- Medium	Medium- High	Highest- Highest
1. Mean amount of goodwill write-offs for all firms with data on share overpricing	0.0038	0.0064	0.0168	0.0207	0.0507
2. Mean amount of goodwill write-offs for firms with acquisitions activities over 1990–2000	0.0069	0.0198	0.0306	0.0593	0.1056
3. Mean amount of goodwill write-offs for all firms with impairment over 2001–2006	0.0263	0.0546	0.0879	0.0901	0.2183
4. Mean amount of goodwill write-offs for firms with acquisitions activities over 1990–2000 and impairment over 2001–2006	0.0167	0.0595	0.0931	0.1026	0.2154
5. Percentage of firms sued for using inflated stock as a currency in acquisitions over 1996–2006.	0.00%	4.46%	7.97%	11.11%	13.86%
6. Percentage of acquiring firms sued for using inflated stock as a currency in acquisitions, and reporting goodwill write-offs in 2001–2006.	0.00%	6.87%	17.72%	34.29%	39.86%

Information on goodwill write-offs is based on the total amount of goodwill write-offs between 2001 and 2006 (deflated by total assets). Sample period for acquisition activities is 1990–2000. Overpricing indicators and components (*P/E*, *DACC*, *NEQ*, *OVE1*, and *OVE2*) are the average value of overpricing for the year prior to the acquisition year.

overpricing indicators over the acquisition period ending in 2000.¹⁹ The total amount of goodwill write-offs (scaled by bidders' total assets) relates to the period 2001–2006. The top row reports findings for all sample firms, both with and without acquisitions or write-offs. The data show that the average goodwill write-off increases monotonically with share overpricing, from 0.0038 (0.38 percent of total assets) for the quintile of firms with the lowest overvaluation to 0.0507 (5.07 percent of total assets) for the quintile of firms with the highest share overpricing. The second row refers to firms that made acquisitions between 1990 and 2000, and shows an increase in write-offs from 0.7 percent of total assets to 10.6 percent. The third row, referring to firms with write-offs between 2001 and 2006, shows a similar pattern, but with substantially larger write-offs. The total amount of write-off increases from 2.6 percent (lowest overpricing) to 21.8 percent (highest overpricing). For the subsample of firms with acquisitions between 1991 and 2000 and goodwill write-offs between 2001 and 2006 (fourth row), the write-offs increase from 1.7 percent to 21.5 percent. Thus, the goodwill write-offs made by the quintile of the most overpriced bidders amount to over one-fifth of their total assets—a staggering loss of value from acquisitions. Share overpricing is, thus, strongly associated with goodwill write-offs.

¹⁹ Share overpricing is measured in the year preceding the acquisitions made between 1990 and 2000. For firms with multiple acquisitions between 1990 and 2000, share overpricing is the average of the overpricing in the year prior to each acquisition.

To solidify the causation from bidders' share overpricing to goodwill write-offs, Lines 5 and 6 of Table 4 present data on the frequency of lawsuits alleging share price manipulation by bidders (that is, acquisition with inflated stock).²⁰ Such lawsuits are often filed soon after the write-off announcement. Line 5 reports the percentage of lawsuits filed against all acquiring firms, categorized by overpricing quintiles. It is evident that the lawsuit frequency rises steeply, from zero for the least overpriced bidders to 13.9 percent of the firms in the highest overpricing quintile. Line 6 restricts the sample to firms with goodwill write-offs in the period 2001–2006, and shows that the frequency of lawsuits increases with overpricing from zero to 40 percent. Thus, according to plaintiffs, their losses from goodwill write-offs primarily originate with the overpriced shares used as payment for the acquisition, an overpricing allegedly brought about by managers' manipulation and hype.

We also perform multivariate logistic and Tobit analyses (not tabulated here), regressing the incidence of write-off (logit) and the amount of goodwill write-off scaled by total assets (Tobit) on the two overpricing indicators, *OVE1* and *OVE2*, and their individual components (*P/E*, *DACC*, and *NEQ*). We also include a host of control variables affecting goodwill write-offs: the percent of the acquisition price paid in shares, the percentage of acquisition involving foreign targets, the number of acquisitions, the total value of acquisitions deflated by the bidder's beginning market value, the amount of goodwill, weak governance, the bidder's size, and industry indicators.²¹ All the independent variables are measured by their average value during the years of acquisition (1990–2000). The estimates indicate that in all the logistic regressions, the two overpricing composite indicators, as well as their individual components, are positive and highly significant. Acquisition of foreign targets adds significantly to the likelihood of write-off, probably due to managers' belief that growth in certain foreign markets exceeds domestic growth (Bodnar and Weintrop 1997), providing managers with strong incentives to pay high premiums for foreign acquisitions, which results in a large goodwill write-off. The coefficient on weak governance is significantly positive, as is its interaction with overpricing (*OVE1*), indicating an incremental contribution of ineffective, subservient directors during the acquisition period to subsequent goodwill write-offs. Bidders' size is also positively associated with goodwill write-off. The Tobit analysis focuses on the total value of write-offs and confirms the findings of the logistic analysis of an association between bidders' overpriced shares and the incidence, as well as the amount, of goodwill write-off. Weak corporate governance and acquisition of foreign targets further enhance the relationship between overpricing and write-offs.

It is clear from the strong and consistent association between share overpricing and subsequent goodwill write-offs that many managers of overvalued firms do not follow the long-term maximization strategy, prescribed by Shleifer and Vishny (2003), of paying less than the acquisition's perceived synergies (in which case, there will be no write-off). Either managers follow a short-term stock price enhancement strategy (Stein 1996) and pay for the acquisition more than the long-term expected synergies,²² or, in their optimism and overconfidence (e.g., Ben-David et al. 2007), they overstate the synergies. Furthermore, because bidder managers may obtain personal wealth gains from acquisitions, they also choose to pursue acquisitions even though the deals do not necessarily increase shareholder value (Harford and Li 2007).

Question 3: The Economic Implications of Goodwill Write-Offs

We showed in the preceding section that the overpricing of bidders' shares is positively associated with the subsequent goodwill write-off, suggesting an adverse consequence of

²⁰ We thank Mary Brooke Billings for suggesting this test and providing the lawsuit data.

²¹ The dependent variable in the logistic regression is 1 for write-off, and 0 for no write-off. In the Tobit analysis, the dependent variable is the total amount of write-offs between 2001 and 2006.

²² An acquisition often boosts short-term stock prices because it increases sales and EPS, portraying enhanced growth so coveted by investors.

acquisition with overpriced shares. SV, though, argue that such acquisitions benefit shareholders in the long run, causing share prices to fall less than without the acquisitions (the fall is due to the correction of the overpricing). So, are these write-offs just a benign accounting ritual, or an important business event? Do goodwill write-offs signal imprudent acquisition strategy, calling for a serious examination of past investment decisions, or perhaps goodwill impairment is just a byproduct of successful acquisitions motivated by market timing?

We address these questions by asking: Did the acquisitions *moderate* the post-acquisition negative returns of bidders from the reversal of the share overpricing, as Shleifer and Vishny (2003) argue, in which case the goodwill write-off is indeed a non-event? Or did the acquisitions *worsen* the negative returns, in which case the goodwill write-off has important negative implications for the firm's investment strategy? Table 5 uses Fama-MacBeth monthly regressions to relate firms' returns during the three years following the overpricing measurement to the following factors: (1) firm size ($\ln(MV)$) and book-to-market ($\ln(B/M)$), the conventional determinants of subsequent returns; (2) three-year lagged returns, as controls for future returns; (3) the two overpricing composite indicators; (4) the amount of goodwill; and (5) the focus of this analysis—whether the firm acquired other companies during the year following the overpricing measurement (ACQ). This examination, run on firms with and without acquisitions, thus holds constant the degree of overpricing and the consequent reversal of stock prices due to the overpricing, thereby focusing on the effect of acquisitions on the subsequent returns. We also include in the regression the interactions between overpricing and acquisition ($OVE1 \times ACQ$ and $OVE2 \times ACQ$) for further insight.

The estimates in the left three columns of Table 5 show, as expected, that the overpricing indicators ($OVE1$ and $OVE2$) are negatively associated with subsequent returns, reflecting the negative effect of the overpricing reversal on returns. The coefficient on the indicator for acquisitions, ACQ , is negative and statistically significant in each of the three post-overpricing years, indicating that acquisitions *worsen*, on average, the post-acquisition returns of the firm. Thus, for example, in year $t+1$, the bidders suffer an *extra* negative abnormal monthly return of -0.37 percent (-4.5 percent on an annual basis) relative to similarly overpriced non-acquirers. The interaction variables $OVE1 \times ACQ$ and $OVE2 \times ACQ$ are also negative and statistically significant, indicating that acquisition with overpriced shares adversely affects subsequent stock returns beyond the reversal of the overpricing.

We have so far evaluated the economic meaning of goodwill write-offs in terms of post-acquisition stock returns. An alternative approach focuses on the industry-adjusted accounting return-on-assets (ROA) in the year following acquisition. We, therefore, regress (reported in the right column of Table 5) the firm's industry-adjusted ROA on the overpricing indicators ($OVE1$ and $OVE2$), the amount of goodwill, lagged industry-adjusted ROA , and the focus of this analysis—whether the firm made acquisitions (ACQ , and its interaction with overpricing). The coefficient of ACQ and those of the two interactions are, once again, negative and significant, corroborating the stock returns analysis.²³ Acquisitions by overvalued firms negatively impact their performance, as measured by either market or accounting variables.²⁴

Our final procedure for assessing the economic relevance of goodwill write-offs is to trace the fortunes of goodwill-impaired firms from the acquisition through the write-off. We do this in Table

²³ The dependent variable of this regression is industry-adjusted ROA of year $t+1$. Because the mean value of the industry-adjusted ROA of year $t+1$ is 0.009, this estimate indicates that acquisition reduces the profitability of year $t+1$ by one-third (33 percent) of the mean value of the industry-adjusted ROA .

²⁴ In the tests of Table 5 and this untabulated analysis, we assess whether the negative coefficients on ACQ reflect the effect of the really high valuation of the acquirers by including in the regression an indicator variable, $TOPOVE$, for firms in the top quintile of both $OVE1$ and $OVE2$, and its interaction with $OVE1$ and $OVE2$. In this untabulated sensitivity test, ACQ and its interaction with overpricing continue to be significantly negative.

TABLE 5
Acquisition with Overpriced Shares and Future Performance

Variable	Future Stock Returns			Future ROA <i>t</i> +1
	<i>t</i> +1	<i>t</i> +2	<i>t</i> +3	
<i>Ln</i> (<i>MV</i>)	-0.0010 -2.17	-0.0010 -2.18	-0.0010 -2.16	—
<i>Ln</i> (<i>B/M</i>)	0.0020 2.85	0.0021 2.88	0.0021 2.90	—
<i>Ret</i> ₁	-0.0383 -8.50	-0.0381 -7.97	-0.0381 -7.94	—
<i>Ret</i> ₂	0.0066 4.48	0.0066 4.44	0.0068 4.49	—
<i>Ret</i> ₃	-0.0025 -2.32	-0.0025 -2.39	-0.0025 -2.83	—
<i>OVE1</i>	-0.0026 -4.52	-0.0020 -3.71	-0.0010 -2.15	-0.008 -5.02
<i>OVE2</i>	-0.0020 -4.11	-0.0017 -3.43	-0.0009 -1.76	-0.004 -4.09
<i>ACQ</i>	-0.0037 -5.62	-0.0033 -4.33	-0.0015 -3.15	-0.003 -4.18
<i>OVE1</i> × <i>ACQ</i>	-0.0031 -5.23	-0.0029 -4.66	-0.0023 -2.41	-0.006 -4.36
<i>OVE2</i> × <i>ACQ</i>	-0.0025 -2.94	-0.0023 -2.65	-0.0024 -2.54	-0.006 -2.75
<i>GOODWILL</i>	-0.0091 -3.49	-0.0058 -2.81	-0.0053 -1.98	-0.009 -4.17
<i>ROA</i>	—	—	—	0.650 13.63

Italic numbers indicate statistical significance at less than the 5 percent level (two-tailed test).

For the return regressions, every month between January 1990 and December 2006 the cross-section of firms' monthly stock returns is regressed on firm size (*Ln*(*MV*)), defined as the log of the firm's inflation-adjusted market capitalization, the log of the firm's book-to-market ratio (*Ln*(*B/M*)), the firm's previous monthly return (*Ret*₁), the previous year's return from month *t*-12 to *t*-2 (*Ret*₂), the return from month *t*-36 to *t*-13 (*Ret*₃), *OVE1* and *OVE2* lagged either one, two, or three years to returns, an indicator variable, *ACQ*, that equals 1 if the firm acquired other companies during the year following the overpricing measurement, and 0 otherwise, the interactions between overpricing and acquisition (*OVE1* × *ACQ* and *OVE2* × *ACQ*), and the amount of goodwill (Compustat data #204) deflated by lagged total assets (*GOODWILL*). Reported statistics are the mean coefficient estimates and *t*-statistics from cross-sectional regressions. The dependent variable of the regressions for future accounting profitability, *ROA*_{*t*+1}, is the firm's industry-adjusted return on assets before the effect of goodwill impairment write-offs in year *t*+1. The firm's return on assets is the ratio of earnings before extraordinary items (Compustat data #18) without the effect of goodwill write-off (Compustat data #368) to average total assets (Compustat data #6). *ACQ* equals 1 if there is acquisition activity during the previous one-year period, and 0 otherwise. *OVE1* and *OVE2* are for the prior fiscal year. Following Petersen (2009) and Gow et al. (2010), we run the regressions for *ROA* with year indicators included, and report the significance level of the coefficient estimate obtained from firm-level clustering. The period of acquisition activity included in the tests is 1990–2005.

6, focusing on two firm performance measures: abnormal stock returns and the industry-adjusted accounting return-on-assets before the write-offs. For both performance measures, we control for the effect of overpricing before acquisition by matching acquirers with non-acquirers on the basis of firm size (same size decile) and overpricing (the same quintile of *OVE2* and the closest values of

OVEI) in the year before acquisition. The abnormal stock returns and industry-adjusted return-on-assets of the acquirers in Table 6 are, thus, the stock returns and industry-adjusted return-on-assets of the acquirers minus the stock returns and industry-adjusted return-on-assets of the matched non-acquirers, respectively.²⁵

Table 6 provides data for both the year-by-year performance around acquisition and write-off, and for the entire trip from acquisition through the write-off (right column). Acquisitions without subsequent write-offs, reported in Panel A, provide the benchmark for this analysis. From the year before acquisition ($t-1$) through the sixth year after it, the cumulative mean and median abnormal stock returns for these firms are -8.27 percent and -2.31 percent, respectively (right column), indicating the inferior performance of acquirers compared to non-acquirers. Things are very different for firms with goodwill write-offs, as reported in Panel B. Of the 504 firms for which we have complete data on acquisitions and goodwill write-offs, 100 firms (20 percent) do not survive three years after write-off—i.e., they went bankrupt or were acquired. As shown in Panel B, the data for the 404 firms that made it through the third year after write-off indicate that both the mean and median returns during the period from acquisition through write-off are decidedly negative: -54.28 percent and -47.12 percent, respectively. The returns for the write-off year (year 0) and subsequent years are particularly large and negative. The large and negative accounting return-on-assets numbers in Panel B relative to those of Panel A are consistent with the negative stock returns of the write-off firms. In an untabulated test, we use the Fama-MacBeth monthly regressions to relate the event of goodwill write-off (*WRITEOFF*) to post-write-off stock returns while controlling for firm size, book-to-market, recent returns, overpricing, goodwill, and acquisition. Results indicate a significantly negative coefficient on the write-off event, confirming the lower future abnormal returns for firms with a goodwill write-off. The evidence, thus, confirms that goodwill write-off is not an expected outcome of a rational investment decision; rather, it reflects an excessive payment for targets acquired with inflated shares.

The negative effect of acquisitions on the subsequent returns of overvalued firms indicates that many acquisitions are indeed ill-advised, because of either overpayment or strategic misfits. It also clarifies that the documented underperformance of acquiring companies (Loughran and Vijh 1997) is partially due to the inevitable price reversal of overvalued firms, but also due to the ill-advised acquisitions made by many overvalued firms. Since acquisition with overvalued shares is closely related to goodwill write-off, the estimates of Table 5 indicate that goodwill write-off is often the result of ill-advised acquisitions exacerbating the long-term negative returns of overvalued bidders, and not, as Shleifer and Vishny (2003) have argued, the byproduct of a prudent investment decision moderating the overpricing reversal. A goodwill write-off is, thus, an important business event that calls for a reassessment of the firm's investment strategy.

Our findings of the negative effect of acquisitions on the subsequent returns of overvalued firms differ from those of Savor and Lu (2009), who report that overvaluation-driven acquisitions increase acquirers' long-run returns. The difference is probably attributable to the characteristics of the sample firms and the specifics of research methodology. While Savor and Lu (2009) study a sample of mergers during 1978–2003 and use the returns of bidders of attempted, but unsuccessful, mergers as a proxy for the long-term performance of non-acquiring bidders, we use a more recent sample of takeovers during 1990–2006, and control for the level of bidder overvaluation (rather than using a control group of unsuccessful mergers) when examining bidder long-run stock performance.

²⁵ In the computation of matched returns, we follow the approach of Loughran and Vijh (1997) for acquirers that are delisted before the end of the intended return horizon and have truncated returns.

TABLE 6
Mean and Median Firm Performance around Acquisition and Goodwill Write-Off

Panel A: Benchmark: Acquiring Firms with No Goodwill Impairment (1,953 Firms)

Variable	Years Relative to Acquisition (Year 0)							Total Return Since Acquisition
	-1	0	+1	+2	+3	+4	+5	
Abnormal stock return	0.0565	-0.0881	-0.0095	-0.0021	0.0146	-0.0195	-0.0473	-0.0331
Return on assets	0.0357	-0.0284	-0.0013	-0.0015	0.0030	-0.0024	-0.0021	-0.0134
	0.0038	-0.0107	-0.0157	-0.0122	-0.0132	-0.0148	-0.0125	-0.0107
	0.0015	-0.0031	-0.0048	-0.0039	-0.0052	-0.0063	-0.0041	-0.0042

Panel B: Firms that Survived Up to Three Years after Impairment (404 Firms)

Variable	Years Relative to Impairment (0)							Total Return Since Acquisition
	-1	0	+1	+1	0	+1	+2	
Abnormal stock return	0.0924	-0.0039	-0.1405	-0.1925	-0.2833	-0.0547	-0.0395	-0.0428
Return on assets	0.0361	-0.0519	-0.0495	-0.1893	-0.2619	-0.0591	-0.0431	-0.0895
	0.0045	-0.0052	-0.0182	-0.0389	-0.0652	-0.0555	-0.0219	-0.0312
	0.0046	-0.0023	-0.0055	-0.0277	-0.0308	-0.0181	-0.0164	-0.0077

In each panel, the first (second) row for each variable reports the mean (median) value of that variable. The sample in Panel A consists of 1,953 acquirers that have required Computat data for up to six years after acquisition and report no goodwill impairment during 2001–2006. The sample in Panel B consists of 404 firms that report goodwill impairment over 2001–2003 and have the required Computat data available for up to three years after the impairment. Abnormal stock returns are the acquirer's stock returns minus the return of a matched non-acquirer over the same period. Return on assets is before the effect of goodwill impairment and is adjusted for the firm's four-digit SIC industry average return on assets. Return on assets of an acquirer is the acquirer's industry-adjusted return on assets minus the industry-adjusted return on assets of a matched non-acquirer. The matching between an acquirer and non-acquirer is based on firm size (same size decile) and overpricing (same quintile of *OVE1* and the closest values of *OVE1* in the same quintile). For delisted firms, the computation of truncated returns for the acquirer and matched non-acquirer follows the approach of [Loughran and Vjth \(1997\)](#).

V. SHARE OVERPRICING PREDICTS GOODWILL WRITE-OFFS

The annual assessment of goodwill impairment required by GAAP is notoriously difficult to conduct. Most bidders fully absorb their acquisition targets so that there are no observable share prices to indicate goodwill impairment. Accordingly, early warning signs of impending goodwill impairment are of considerable importance to auditors and regulators like the Securities and Exchange Commission (SEC). We report in this section on the ability of our overpricing indicators to *predict* both the occurrence and magnitude of goodwill write-offs.²⁶ Because it is impossible to relate a goodwill write-off to a specific acquisition from Compustat data, we restrict our first prediction test to firms with a single acquisition during the sample period and a subsequent goodwill write-off, thereby attributing the reported write-off to its causal acquisition.

We run both a logit and a Tobit analysis: the former with the dependent variable of goodwill write-off (1) and no write-off (0), and the latter with the size of the write-off relative to total assets as the dependent variable. The independent variables are the lagged values of our two overpricing indicators (*OVE1* and *OVE2*), along with a variable distinguishing between domestic and foreign targets (*FOREIGN%*). Foreign acquisitions differ from domestic acquisitions along institutional, economic, and accounting dimensions that could affect the write-off prediction. The remaining independent variables—amount of goodwill, bidder's size, acquisition value, percentage of acquisition price paid in stock, and industry indicators—serve as control variables.

Table 7 reports the logit and Tobit prediction estimates. Panel A predicts the incidence of a write-off by logit and the size of the write-off by Tobit. Panel B predicts the lawsuits following the write-off. In both panels, the two overpricing indicators, *OVE1* and *OVE2*, are positive and significant. The right columns of the logit and Tobit tables in Panel A indicate that the marginal predictive contribution of the overpricing indicators is highest among the independent variables (except, of course, for the size of goodwill). We conclude, therefore, that bidders' share overpricing has a significant predictive ability with respect to subsequent goodwill impairment, along with the size of goodwill (an indicator of overpayment). These variables can, thus, serve as early (starting from the acquisition date) warning signs of impending write-offs, alerting auditors and regulators.²⁷ Panel B of Table 7 indicates that bidders' overpricing also predicts shareholder lawsuits that generally follow a write-off announcement.

VI. TIME-SERIES TEST

Our examination of the relation between share overpricing on the one hand, and acquisition intensity, goodwill growth, and write-off on the other, is based on *cross-sectional* analysis. As a robustness check, we also perform a *time-series* test for the relation between changes in share valuation regimes and subsequent changes in acquisition activity and write-offs.²⁸ Table 8 summarizes the results of this test, where we designate each sample firm in each year as

²⁶ Hayn and Hughes (2006) investigate the prediction of goodwill write-offs. They examined several predictors: the purchase price premium over the target's market value, goodwill as a percentage of purchase price, number of bidders, market reaction to acquisition announcement, and the number of recent acquisitions by the bidder. They document that the purchase price premium, among other variables, predicts the write-off. Their study differs from our goodwill write-off prediction, reported in this section, in two important respects. First, the focus of our analysis—and main predictor—is the bidder's overpriced shares, which, according to our hypothesis, leads to acquisition and often overpayment. Second, Hayn and Hughes' (2006) sample is mostly from the period preceding SFAS 142 (1988–1998), although in a sensitivity test they add 56 cases under SFAS 142. Our goodwill write-offs are all from the current accounting regime (post-SFAS 142).

²⁷ Such an early warning sign is important given the evidence that managers tend to delay the recognition of goodwill impairment (Francis et al. 1996).

²⁸ We thank a reviewer for proposing this test.

TABLE 7

Overpricing Predicts Goodwill Write-Off and Acquisition-Related Lawsuits

Panel A: Logistic and Tobit Regressions Predicting Impairment versus No-Impairment for Firms with a Single Acquisition

Independent Variable	Logistic Regression		Tobit Regression	
	Coefficient	Effect on Probability	Coefficient	Effect on Probability
Intercept	0.262	—	-0.012	—
[p-value]	[0.647]		[0.776]	
<i>OVE1</i>	1.133	38.19%	0.043	11.09%
	[<0.001]		[<0.001]	
<i>OVE2</i>	0.728	18.15%	0.031	7.84%
	[0.042]		[0.029]	
<i>STOCK%</i>	0.039	0.86%	0.023	5.87%
	[0.463]		[0.231]	
<i>VALUE</i>	0.057	1.31%	0.022	5.63%
	[0.444]		[0.252]	
<i>FOREIGN</i>	0.438	11.02%	0.034	8.61%
	[0.178]		[0.178]	
<i>GOODWILL</i>	5.083	50.67%	0.041	10.37%
	[0.001]		[0.364]	
<i>Log(MV)</i>	0.118	2.99%	0.003	0.70%
	[0.080]		[0.335]	
Industry Indicators	Included		Included	
n	243		243	
Model χ^2	60.64		28.60	
(Model p-value)	(<0.001)		(<0.001)	
Pseudo R ²	18.02%		29.04%	
% correctly classified	69.14%			
% non-impairment in sample	51.44%			
Actual impairment predicted to be true	62.71%			
Actual non-impairment predicted to be true	75.20%			
Type I error	24.80%			
Type II error	37.29%			

Panel B: Logistic Regression of Future Incidences of Acquisition-Related Lawsuit on Indicators of Overpricing and Control Variables

Variable	Model 1	Model 2	Model 3	Model 4	Model 5
Intercept	-3.233	-3.235	-3.474	-3.469	-3.568
[p-value]	[<0.001]	[<0.001]	[<0.001]	[<0.001]	[<0.001]
<i>P/E</i>	0.002	—	—	—	—
	[0.017]				
<i>DACC</i>	—	0.847	—	—	—
		[0.001]			
<i>NEQ</i>	—	—	1.068	—	—
			[<0.001]		

(continued on next page)

TABLE 7 (continued)

Variable	Model 1	Model 2	Model 3	Model 4	Model 5
<i>OVE1</i>	—	—	—	0.475 [<0.001]	0.245 [0.014]
<i>OVE2</i>	—	—	—	0.318 [0.002]	0.112 [0.003]
<i>WEAK_GOV</i>	—	—	—	—	0.121 [0.015]
<i>WEAK_GOV</i> × <i>OVE1</i>	—	—	—	—	0.130 [0.152]
<i>WEAK_GOV</i> × <i>OVE2</i>	—	—	—	—	0.831 [0.007]
<i>STOCK%</i>	0.718 [0.016]	0.712 [0.017]	0.687 [0.022]	0.727 [0.015]	0.657 [0.152]
<i>Log(MV)</i>	0.158 [<0.001]	0.165 [<0.001]	0.178 [<0.001]	0.149 [<0.001]	0.100 [0.133]
<i>HIGH_TECH</i>	0.331 [<0.001]	0.350 [<0.001]	0.342 [<0.001]	0.371 [<0.001]	0.182 [0.254]
Year Indicators	Included	Included	Included	Included	Included
Model χ^2	86.10	82.10	95.86	112.28	36.39
[p-value]	[<0.001]	[<0.001]	[<0.001]	[<0.001]	[<0.001]
Pseudo R ²	7.54%	7.21%	8.97%	10.33%	11.99%
n	3231	3231	3231	3231	571

Panel A includes firms that made only one acquisition during the period 1990–2004. Information on goodwill write-offs is based on the total amount of goodwill write-offs after the acquisition. In Panel A, the dependent variable in the logistic regressions is an indicator variable that equals 1 for firms reporting goodwill write-offs (Compustat data #368) after the acquisition, and 0 otherwise. The dependent variable in the Tobit regression is the total amount of goodwill write-offs after the acquisition (deflated by lagged total assets). *OVE1* and *OVE2* are the value of overpricing indicators for the year prior to the acquisition. *STOCK%* is the percentage of the acquisition value paid for by stock. *VALUE* is the value of acquisition (deflated by the acquiring firm's market value at the beginning of the acquisition year). *FOREIGN* is an indicator variable that takes the value of 1 for acquisition of foreign targets, and 0 otherwise. *GOODWILL* is the amount of goodwill attributable to acquisitions. *Log(MV)* is the log of the year-end inflation-adjusted market value of acquiring firms during the year of acquisition. In the logistic regression, "Effect on Probability" for a given independent variable indicates the marginal effect of a one-unit increase in that independent variable on the probability of firms reporting subsequent goodwill impairment as implied by the coefficient of that independent variable while holding all other variables constant. In the Tobit regression, "Effect on Probability" for each independent variable indicates the marginal effect of a one-unit increase in that independent variable on the probability that the amount of goodwill impairment conditional on the independent variable would be greater than zero.

In Panel B, information on acquisition-related lawsuits is obtained from Stanford University's securities litigation database from 1995 to 2006. The dependent variable is an indicator that equals 1 for firm acquisitions involved in acquisition-related litigation, and 0 otherwise. *P/E* is the average value of the firm's relative P/E across fiscal year that immediately precedes the year of acquisition during the period 1990–2000. For example, if a firm makes acquisitions in 1993, 1996, and 1998, *P/E* is the average value of the firm's relative P/E for 1992, 1995, and 1997. *DACC* (average discretionary accruals), *NEQ* (average equity issuance), *OVE1* (average value of the first overpricing indicator), and *OVE2* (average value of the second overpricing indicator) are defined and measured analogously. *WEAK_GOV* is the corporate governance quality index developed by Gompers et al. (2003). Sample years with the index available include 1993, 1998, 2000, 2002, and 2004. The interaction variable *WEAK_GOV* × *OVE1* (*WEAK_GOV* × *OVE2*) equals *WEAK_GOV* times *OVE1* (*OVE2*). *STOCK%* is the percentage of the acquisition value paid for by stock. *Log(MV)* is the log of the average inflation-adjusted year-end market value of acquiring firms during the years of acquisition. *HIGH_TECH* is an indicator variable that takes the value of 1 for firms from biotech, computer, electronics, instruments, telecom, and software industries, and 0 otherwise.

TABLE 8
Temporal Shifts in Share Mispricing, Subsequent Acquisition Activity, and Goodwill Impairment

Valuation Regime Change Year $t-1 \rightarrow$ Year t	Shift	Acquisition Activity in the Subsequent Year (Year $t+1$)				Subsequent Goodwill Write-Off	
		% Higher \$ Acq.	% More # Acq.	% With Acq.	% No Acq. \rightarrow Acq.	% Impairment	% Impairment
UNDER \rightarrow OVER	UP	11%	10%	23%	9%	11%	11%
CORRECT \rightarrow OVER	UP	13%	13%	33%	10%	10%	10%
CORRECT \rightarrow UNDER	DOWN	6%	6%	9%	5%	2%	2%
OVER \rightarrow UNDER	DOWN	7%	6%	11%	5%	5%	5%

Firms are classified into three valuation regimes for year $t-1$ and year t , respectively: undervalued (UNDER), correctly valued (CORRECT), and overvalued (OVER). Firms are defined as being overvalued (undervalued) if both principal components of overvaluation (OVE1 and OVE2) are in the top (bottom) two quintiles. Correctly valued firms are those with both principal components in the middle quintile. "Valuation Regime Change" designates the shift in valuation over time from year $t-1$ ("Year $t-1$ ") to year t ("Year t "). "Shift" includes increases in valuation (UP) and decreases in valuation (DOWN), respectively, from year $t-1$ to year t . Acquisition activities are measured for year $t+1$ and include the following statistics: "% Higher \$ Acq." is the percentage of firms with greater dollar amount of acquisition in year $t+1$ than in year t ; "% More # Acq." is the percentage of firms with greater number of acquisition in year $t+1$ than in year t ; "% With Acq." is the percentage of firms with acquisition in year $t+1$; "% No Acq. \rightarrow Acq." is the percentage of firms with acquisition in year $t+1$, but no acquisition in year t ; and "% Impairment" is the percentage of firms with goodwill impairment in subsequent years.



undervalued (*UNDER*), correctly valued (*CORRECT*), or overvalued (*OVER*). Firms are classified as undervalued (overvalued) if they fall into the first two quintiles (the last two quintiles) of the main diagonal of the 5×5 classification of firms by quintiles of the two overvaluation composite indicators, *OVE1* and *OVE2* (see Section III for details). Correctly valued firms are those in the middle quintile of the main diagonal. We identify a shift in the valuation regime by comparing the firm's valuation classification in year t with that of year $t-1$. Shifts in valuation regimes from year $t-1$ to year t can take multiple paths. We are particularly interested in the four paths reported in Table 8. These are the two upward (*UP*) shifts from undervaluation and correct valuation to overvaluation (denoted *UNDER* \rightarrow *OVER* and *CORRECT* \rightarrow *OVER*), and the two downward (*DOWN*) shifts from correct and overvaluation to undervaluation (*CORRECT* \rightarrow *UNDER* and *OVER* \rightarrow *UNDER*). For the shifting firms, we compute the following statistics on acquisition activity during year $t+1$ (the year following the shift) and for subsequent goodwill write-off: (1) the percentage of firms with a larger dollar amount of acquisitions in year $t+1$ than in year t (% Higher \$ Acq.), (2) the percentage of firms with a larger number of acquisitions in year $t+1$ than in year t (% More # Acq.), (3) the percentage of firms with acquisition activity in year $t+1$ (% With Acq.), (4) the percentage of firms with acquisition activity in year $t+1$, but no acquisition activity in year t (% No Acq. \rightarrow Acq.), and (5) the percentage of firms with goodwill write-off (% Impairment).

Table 8 reveals that upward shifts in share valuation (*UP*) are associated with larger increases in acquisition activity than are downward shifts (*DOWN*). For example, of the firms going through the upward path *CORRECT* \rightarrow *OVER* from year $t-1$ to year t (second row), 13 percent experience increases in acquisition intensity, both in dollar value and number of acquisitions (% Higher \$ Acq. and % More # Acq.) relative to the previous year, whereas only 6 percent of the downward-shifting firms experience increases in acquisition activity. Of the upward-moving firms, 33 percent engage in acquisition activity in the following year, and 10 percent are new to the acquisition arena (No Acq. \rightarrow Acq.), compared with 9 percent and 5 percent, respectively, for the down-movers. The same relative patterns characterize the *UNDER* \rightarrow *OVER* versus *OVER* \rightarrow *UNDER* shifts.

Table 8 reports in the right column the association between temporal shifts in share overpricing and subsequent goodwill write-offs. The write-off frequencies associated with the upward shifts in overpricing, 11 percent and 10 percent, are substantially (and statistically significantly) larger than the write-off frequencies associated with downward moves in overpricing, 2 percent and 5 percent.

We perform Chi-square (χ^2) tests to examine whether firms with share valuation increases (*UP*) are more likely to have increases in acquisitions and write-offs than are firms with decreases in share valuation (*DOWN*). In these tests, we use indicator variables (1/0) to distinguish between: (1) firms with increases in acquisition in year $t+1$ from firms with no increase in acquisitions, (2) firms undertaking acquisition in year $t+1$ from firms without acquisitions in $t+1$, and (3) firms with subsequent write-offs and those without write-offs. In all tests, the χ^2 statistics are statistically significant at the 0.001 level. These time-series tests, thus, corroborate the cross-sectional findings reported in Tables 3 and 4 about the strong relation between share overpricing on the one hand and acquisition intensity and goodwill write-offs on the other.²⁹

²⁹ Our second time-series test follows Polk and Sapienza (2009). Specifically, we regress the change in the amount of goodwill from year t to year $t+1$ on three independent variables: (1) the change in our first overpricing indicator (*OVE1*) from year $t-1$ to year t , (2) the change in our second overpricing indicator (*OVE2*), and (3) the "abnormal" amount of goodwill in the previous year, t , as control. Similar to Polk and Sapienza (2009), we define the firm's abnormal goodwill in year t as the difference between the firm's amount of goodwill and the median goodwill of the firm's four-digit SIC industry in year t . Our main interest is in the first two independent variables, the overpricing indicators. We, indeed, find positive and statistically significant coefficients (untabulated) for both overpricing indicators, confirming our evidence concerning Question 1 (e.g., Table 3) in a time-series context.

VII. CONCLUDING COMMENTS

This study establishes that a major cause of goodwill write-offs—a fast-increasing phenomenon—is the overpriced shares of buyers at acquisition. Share overpricing provides managers with strong incentives to exploit mispricing by using inflated shares for acquisitions, sometimes overpaying for the target. Such overpayment is the harbinger of subsequent write-offs.

We document a strong positive association between share overpricing on the one hand and subsequent acquisition intensity and goodwill growth on the other. Effective corporate governance tempers these managerial incentives. We then show that bidders' overpricing is strongly associated with goodwill write-offs and, moreover, that overpricing predicts both the occurrence of goodwill write-offs and their magnitude, a finding of importance to auditors in the context of testing for goodwill impairment. Further, despite frequent claims by managers that a goodwill write-off is just a byproduct of a rational use of overpriced shares to acquire sometimes overvalued targets, we show that such write-offs are a very consequential event, calling for a reassessment of the firm's investment strategy.

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