CEO compensation and fair value accounting:
Evidence from purchase price allocation[*]

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April 2010

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Abstract

This study investigates the impact of CEO compensation structure on the purchase price allocation, a unique event where managers estimate and disclose fair values of various acquired non-financial assets and liabilities. We find that CEO compensation structure is an important determinant of managers' fair value measurement. In particular, the proportion of purchase price recorded as goodwill, which affects subsequent reported earnings and therefore managers' bonuses, is positively associated with the relative importance of bonuses in the compensation package. We also find that, when acquirers include cash-flow-based parameters in the measures to evaluate CEO performance, the association between allocation to goodwill and the importance of bonuses diminishes.

1. Introduction

Accounting-based bonus plans constitute an important portion of CEO compensation. While the existing literature examines the impact of bonus plan pay-performance structure on accounting choices fairly extensively (e.g., Healy, 1985; Holthausen et al., 1995), little evidence is available on how (1) the relative weight of bonus in the compensation package and (2) the performance measures, specifically the inclusion of cash-flow based performance measure, in bonus plans affect accounting decisions. These two aspects of compensation packages are key features of compensation contracts (Murphy, 1999), and anecdotal evidence suggests that both have increased in importance in recent years. For example, Cohen et al. (2007) document a steady increase in the relative importance of bonuses, and Leone (2004) points out that cash-flow-based performance measures have become increasingly popular for bonus plans. In this study we investigate the effect of the above aspects of compensation on managerial accounting choices. In particular, we examine the role they play in fair value measurement of acquired non-financial assets and liabilities, an issue that also attracted much interest in recent years.

Extending the scope of fair value accounting beyond trading securities and derivatives has been a major emphasis on the agenda of standard setters worldwide. For example, in a recent discussion paper prepared by the Australian Accounting Standards Board (AASB), *Initial Accounting for Internally Generated Intangible Assets*, it was proposed that firms recognize internally generated intangible assets at their estimated fair values. One of the main arguments against the move to fair value accounting is that fair values of non-financial assets and liabilities are largely unverifiable and can be affected by managerial incentives such as those derived from bonus plans. While this issue has become the center of debate among practitioners and academics, related empirical evidence is scarce. An important reason for the lack of evidence is

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that under the current accounting regime most assets other than marketable securities are reported following the historical cost principle. We identify a unique event where managers are required to estimate and disclose fair values of various assets other than marketable securities, and provide evidence on the role CEO compensation incentives in fair value measurement.

Upon the completion of an acquisition, the acquirer is required to allocate the cost of acquiring the target to its tangible and identifiable intangible assets and liabilities based on their estimated fair values. The remainder (the difference between the purchase price and the value of net identifiable assets) is recorded as goodwill. The recognition of goodwill has different implications for subsequent earnings than that of other assets recognized in the purchase price allocation. While tangible and identifiable intangible assets with finite lives, such as developed technologies, are depreciated or amortized,[1] goodwill is unamortized and subject to a periodic mandatory fair-value-based impairment test. When the likelihood of goodwill impairment is remote, *ceteris paribus*, a firm will report higher post-acquisition earnings if it recognizes more goodwill.

We argue that CEO compensation plans can motivate CEOs to overstate goodwill. Specifically, bonus plans provide stronger incentives for overstating goodwill (understating other net assets) than other forms of compensation for several reasons. First, bonus plans typically specify annual earnings as the performance measure, whereas other forms of compensation do not (Gaver and Gaver, 1998, Murphy, 1999). Thus, bonus is more likely than equity-based compensation to increase with the overstatement of goodwill and earnings due to explicit contracting. Prior studies show that CEO bonuses are often tied to earnings and that CEOs

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[1] An exception is in-process research and development (IPRD). IPRD is written off as expense at the time of acquisition during our sample period. The reporting issues related to IPRD are discussed later.

manipulate earnings to maximize their bonuses (Healy, 1985; Holthausen et al., 1995). In addition, rewriting the bonus contract to adjust for the misstatement of goodwill can be costly or unattainable due to the CEO's influence. In contrast, equity-based compensation is linked to stock price that can implicitly adjust for the overstatement of goodwill and earnings without costly re-contracting, providing weaker motivation for earnings management.[2] Consistent with this argument, Larcker et al. (2007) find that abnormal accruals are higher when the compensation mix is weighted towards accounting-based plans. Second, overstating goodwill increases the likelihood of impairment write-offs in the future and equity-based compensation is likely more affected by such write-offs than bonuses. Dechow et al. (1994) and Gaver and Gaver (1998) suggest that CEO cash compensation is shielded from non-recurring losses, whereas Li et al. (2009) and Bens et al. (2007) show that goodwill impairment write-offs trigger significant negative market reactions. Such market adjustments likely result in a reduction in CEO equity-based compensation. Consequently, we expect the incentive to overstate goodwill to become stronger as the relative importance of CEO bonus in her compensation package increases.

Accounting-based performance measures other than earnings are also used in bonus plans (Murphy, 1999). Anecdotal evidence suggests that firms in recent years adopt cash-flow-based performance measures in bonus plans to mitigate opportunistic incentives created by earnings-based performance measures (e.g., Leone, 2004). If CEO bonuses are also tied to cash-flow-based parameters, the effect of amortization on CEO bonuses is likely mitigated and bonus contracts would provide weaker incentives for CEOs to distort the allocation of purchase price between goodwill and other assets. Therefore, we predict that the positive association between

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[2] In making the argument, we assume that both the board and the market can see through the misstatement of goodwill. If they cannot see through it, since the market valuation of stocks relies on multiple information sources and does not contract on earnings, we still expect equity-based compensation to be less affected by the misstatement.

the importance of bonus in CEO compensation and the allocation to goodwill becomes weaker when cash flow is included as a CEO performance measure.

We collect the fair value allocation data for a sample of acquisitions completed between July 2001 and April 2007. We test the above predictions by examining how the relative importance of bonus and the use of cash-flow-based performance measure affect the proportion of acquisition price recorded as goodwill, after controlling for other determinants of the allocation. [3]

Consistent with our predictions, we find that after controlling for the economic determinants of the valuation, the proportion of acquisition price recorded as goodwill increases with the relative importance of bonus in a CEO's compensation package. The findings are consistent with CEOs exploiting their discretion in unverifiable fair value measurement to increase their bonuses. Interestingly, this association diminishes when cash-flow-based measures are also adopted in CEO bonus plans, suggesting that different parameters in bonus plans create different reporting incentives for the CEO. While earnings-based performance measures motivate CEOs to overstate goodwill, cash-flow-based performance measures mitigate such incentives. [4] These inferences are robust to controls for the potential endogeneity of CEO compensation structure and the allocation of the purchase price to goodwill.

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[3] Note that instead of examining the fair value measurement for individual assets, we focus on a summary measure of the allocation: the proportion of the acquisition price allocated to goodwill.

[4] This finding does not necessarily suggest cash-flow-based performance measures are preferable to earnings in CEO performance evaluation. Using the realized bonus payout to infer performance measures used in bonus plans, Natarajan (1996) finds that the weights on earnings and cash flow measures in CEO bonus compensation vary with firm characteristics. While we document the costs of adopting earnings-based performance measure in bonus plans in one dimension, the total benefits of using earnings-based measures could outweigh the costs for some firms.

Economic determinants such as target's book-to-market ratio and R&D expenditures that capture target's economic rents and unrecognized intangibles, such as developed technologies, are significantly correlated with the proportion of acquisition price recorded as goodwill. These economic factors along with the target industry fixed effects are in fact the most significant determinants of the allocation, explaining about 32 percent of the total variation of the dependent variable. We also consider the cost of overstating goodwill and find evidence that the balance sheet flexibility of acquirers to avoid future goodwill impairment also plays a role in the allocation to goodwill.

In addition, we examine the impact of CEO compensation structure on the recording of in-process research and development (IPRD). As IPRD is written off as an expense at the time of acquisition, allocation to IPRD depresses earnings in the period immediately after the acquisition but increases earnings in subsequent periods. If, as Dechow et al. (1994) and Gaver and Gaver (1998) suggest, CEO cash compensation is shielded from non-recurring losses, CEOs can increase their bonuses by over-expensing IPRD. We find that the impact of the compensation features we examine on the recording of IPRD is similar to that on the allocation to goodwill, providing corroborating evidence for our earlier results.

This paper makes several contributions to the literature. First, it extends the literature on compensation contracts and managers' accounting choices. While existing research focuses on the impact of bonus plan pay-performance structure on accounting choices (e.g. Healy 1985), there is scant evidence on how compensation mix and the inclusion of cash-based performance measures in bonus plans affect management behavior. Our paper fills this void by providing direct evidence that both compensation mix, in particular the relative importance of cash bonus, and the type of performance measures have important implications for accounting choices.

Recently, Cohen et al. (2007) show a trend of firms relying less on options and more on bonus in CEO compensation, possibly in reaction to the blame of managers' equity incentives. Our results suggest that, bonus plans may provide even stronger incentives for manipulation under certain conditions.

Second, this study furthers our understanding of fair value measurement when it is applied to a wide range of assets and liabilities, contributing to the debate on fair value accounting for non-financial assets and liabilities. Given that procedures similar to the purchase price allocation were proposed for measuring fair values of internally developed intangibles (AASB, 2008), our findings are particularly relevant to the regulatory debate on fair value accounting for intangible assets.[5]

Third, our findings contribute to the regulatory debate on the accounting for IPRD. The SEC has been concerned with the over-expensing of IPRD since the mid-1990s. Recently the FASB issued SFAS 141R, requiring IPRD be capitalized rather than expensed and tested for impairment periodically, similar to goodwill. While our finding of a significant association between CEO's compensation structure and the recording of IPRD supports the SEC's suspicion of over-expensing of IPRD, our results on goodwill also suggest that the inherent subjectivity in IPRD measurement can make it a likely subject of manipulation under the new rules as well.

Finally, unveiling an approach of earnings management that is largely missing in the literature, our findings highlight the notion that earnings management is a dynamic process. The extant earnings management literature focuses on manipulation of concurrent accruals (e.g.,

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[5] Note that this study does not explore the net benefits or costs of fair value accounting relative to alternative accounting methods and therefore cannot generate direct implications for standard setting. However, our findings are useful both for users of financial information and as inputs in both designing and evaluating fair-value-based accounting procedures.

Jones, 1991) or real activities (e.g., Roychowdhury, 2006). We study an accounting procedure that has a long lasting effect on earnings and differs from the typical accrual or real activity choices. Our results indicate that earnings management can result from past opportunistic actions and be hard to detect using the existing models.

The rest of the paper is organized as follows. Section 2 discusses related research on fair value accounting. Development of the hypotheses is explained in Section 3. Section 4 discusses sample selection procedures and empirical results. Section 5 concludes.

2. Related studies

Our study relates to two streams of research, that on the association between management's compensation contracts and their accounting choices and that on fair value accounting.

CEO compensation typically consists of four components: base salary – the fixed component of compensation, stock options, long-term incentive plans and annual bonus plans (Murphy, 1999). Larker et al. (2007) show a positive association between abnormal accruals and the weight of accounting-based pay in the compensation package, suggesting that accounting-based pay provides stronger incentives for earnings manipulation than equity-based compensation. Regarding bonus plans specifically, Murphy (1999) points out that these plans consist of three basic components: performance measures, performance standards, and the structure of the pay-performance relation. Prior research largely focuses on how the structure of pay-performance relation provides incentives for earnings management (Healy, 1985; Holthausen et al. 1995; Gaver et al. 1995). While these studies assume that earnings are the performance measure used in bonus plans, Murphy (1999) indicates that cash flow may also be

used as a performance measure. Perry and Zenner (2001) report that in 1995 around 15 percent of firms employed cash-flow based performance measures. Recent anecdotal evidence suggests that cash-flow-based performance measures are increasing in popularity, allegedly due to concerns over management manipulation of earnings (Leone, 2004). In a sample of 165 firms in year 2005 Huang, Marquardt, and Zhang (2010) report that around 20% percent of the firms use cash flow based performance measure in their bonus plans.

The second stream of research our paper relates to examines issues around the hotly debated fair value accounting. Early research focuses on the valuation of financial assets and liabilities by financial institutions and produces mixed evidence. Beatty et al. (1996) find that bank share prices were negatively affected by events leading to SFAS 115 and attribute the decrease to problems with the fair value approach promulgated by the standard. Several other studies examine the value relevance of fair value disclosures by banks following SFAS 107 and find mixed evidence for different categories of assets (Eccher et al., 1996; Nelson, 1996; Barth et al., 1996).[6] Recently several studies examine the fair-value-based goodwill impairment tests of SFAS 142, *Goodwill and Other Intangible Assets*, to draw inferences on fair value accounting. Investigating the determinants of firms' initial impairment tests under SFAS 142, Beatty and Weber (2006) find that equity market concerns and contracting incentives affect firms' decision to accelerate or delay the impairment recognition. Ramanna and Watts (2009) find that the likelihood of goodwill impairment is decreasing in firm characteristics associated with greater accounting discretion in the impairment tests.

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[6] Several other studies examine fair value accounting for specific line items other than financial assets and liabilities. For example, Hann et al. (2007) investigate the value and credit relevance of fair value pension accounting and conclude that there is no material benefit with applying fair value accounting to pensions. Dietrich et al. (2001) examine the fair value estimates for investment properties in the U.K. and report that the fair value estimates are less biased and more accurate measures of selling price than historical costs.

The post-acquisition purchase price allocation offers a unique setting to connect the two strands of literature and to investigate the effect of one of the strongest managerial sources of incentives –compensation contracts – on fair value measurement.[7] It allows us to examine fair value measurement for a wide range of assets rather than just financial assets and liabilities for which active markets are more likely to exist. Compared to the impairment setting, it is less confounded by extreme firm performance as impairment firms typically experience financial difficulties that could affect managers' accounting choices.

3. Hypothesis development

SFAS 141, *Business Combinations*, requires that an acquiring entity allocate the cost of an acquired entity to the assets acquired and liabilities assumed based on their estimated fair values at the date of acquisition. This is effectively a process of measuring fair values of individual assets and liabilities of a firm with the constraint that the fair values add up to the price paid to acquire the firm. Following SFAS 141, the acquirer should first estimate the fair values of acquired tangible and identifiable intangible assets and liabilities. The excess of the cost of the acquired entity over the net of the amounts assigned to assets acquired and liabilities assumed shall be recognized as goodwill. While there are probably observable prices for marketable securities, other assets and liabilities are unlikely to have quoted prices and the fair value estimation therefore involves substantial judgment.

The accounting treatment for goodwill post acquisitions differs from that for other assets. Current assets are expensed as they are used up in operations, presumably affecting only

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[7] A contemporary study, Kimbrough (2007), also examines the purchase price allocation. He investigates investors' response to the first disclosure of the initial valuation and finds that investors use the information.

earnings of the next fiscal year. Tangible long-lived assets and identifiable intangible assets, with the exception of IPRD and those considered to have indefinite lives (typically marketing related such as brand names and trademarks), are depreciated or amortized over their remaining useful lives. In contrast, since the passage of SFAS 142, goodwill is unamortized but subject to periodic fair-value-based impairment tests. Thus, while the recognition of most tangible and identifiable intangible assets depresses post-acquisition reported earnings on a regular basis, recording goodwill does not, unless a goodwill impairment write-off has to be recorded.

Prior research shows that CEO bonuses are usually tied to reported earnings. Healy (1985) and Holthausen et al. (1995) find that CEOs manipulate accounting earnings in order to maximize their bonuses. In our setting, the initial valuation of goodwill and other assets post-acquisition can affect subsequent reported earnings and consequently CEO bonuses.[8] Thus, CEOs may be motivated to increase the amount of recorded goodwill in order to reduce subsequent depreciation and amortization expenses, thereby increasing earnings and bonuses.

We predict a positive association between the relative importance of CEO bonus in her compensation package and her incentive to overstate goodwill for the following reasons. First, since bonus plans typically specify annual earnings as the performance measure, whereas other forms of compensation do not (Gaver and Gaver, 1998, Murphy, 1999) bonus is more likely to increase with the overstatement of goodwill and earnings due to explicit contracting. Rewriting the contracts to adjust for earnings management is likely costly or possibly unattainable, among

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[8] Following Healy (1985) and Holthausen et al. (1995), our argument is based on the fixed-target assumption, i.e., the parameters of the bonus plans are fixed. Under this assumption, overstatement of goodwill will lead to higher earnings and bonuses over the entire amortization period. If bonus contracts exhibit a ratcheting target, overstatement of goodwill probably only results in higher bonus in one period and thus the impact will likely be immaterial, which goes against our prediction. Holthausen et al.'s (1995) tests provide no support for the presence of a ratcheting target in CEO bonus plans.

others, due to the CEO's influence. Murphy (1999) shows that earnings-based performance measures are the most popular performance measures and very few firms use adjusted performance measures other than cash-flow-based measures, suggesting specific adjustments are costly and rare. As to CEOs' influence on compensation contracting, Sridharan (1996) finds a positive correlation between measures of CEO influence over the board and CEO compensation, whereas Vafeas (2003) finds that insider participation in the compensation committee is related to CEO pay. These findings suggest that CEOs can influence the compensation committee and therefore the compensation contract for their own benefits. In contrast, although equity-based compensation such as options and restricted stocks is affected by firm performance, it does not directly contract on earnings. Investors can adjust for overstatements of earnings when they price the firm's stock without costly re-contracting. Thus, equity-based compensation is likely less affected by the misstatement of goodwill than bonuses and thus less likely to motivate the misstatement of goodwill.[9] Consistent with this argument, Larcker et al. (2007) find that abnormal accruals are higher when the compensation mix is weighted towards accounting-based plans.

Second, equity-based compensation is likely more sensitive to the cost of overstating goodwill – increasing the likelihood of impairment write-offs in the future. Dechow et al. (1994) and Gaver and Gaver (1998) suggest that CEO cash compensation is shielded from non-recurring losses, whereas Li et al. (2009) and Bens et al. (2007) show that goodwill impairment write-offs

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[9] Although many blame equity-based compensation for motivating management to make opportunistic accounting choices following the revelation of a number of high profile accounting scandals recently, empirical evidence in this regard has been mixed. Efendi et al. (2007) show a positive correlation between the sensitivity of CEOs' stock portfolio to stock price and the frequency of accounting restatements. In contrast, Erickson et al. (2006) find no consistent evidence supporting the connection between CEO equity incentives and accounting frauds.

trigger significant negative market reactions. Such market adjustments can lead to a reduction in CEO's equity-based compensation.

Collectively the above discussion suggests that CEOs who likely benefit more from the overstatement of goodwill are those whose bonuses constitute a larger portion of their annual compensation. Thus, our first testable hypothesis is:

H1: *Ceteris paribus*, the proportion of purchase price recorded as goodwill after an acquisition increases with the proportion of bonus in a CEO's compensation package.

Murphy (1999) indicates that some firms use cash-flow-based performance measures in CEO bonus plans. Leone (2004) suggests that companies in recent years are relying more and more on cash flows as performance measures in bonus compensation. If cash-flow-based parameters are also used to measure performance, CEO bonuses will be less affected by depreciation and amortization expenses than in the case cash flow is not used as a performance measure. Consequently, using cash-flow-based performance measures can mitigate managers' incentives to overstate goodwill during the purchase price allocation. As a result, we predict that the adoption of cash-flow-based parameters to measure performance mitigates CEO's incentive to overstate goodwill. Therefore, our second testable hypothesis is:

H2: *Ceteris paribus*, compensation contracts incentive to overstate goodwill post acquisitions is attenuated in firms that include cash-flow-based performance measures in the bonus plan.

4. Sample Selection and Empirical Analysis

4.1. Sample selection and distribution

Companies have been required to disclose the allocation of purchase price since SFAS 142 became effective in July 2001. We begin our sample selection with all the acquisitions completed between July 2001 and April 2007 with deal value above $10 million as reported by the SDC. We further require that both the acquirer and the target be publicly traded before the acquisition. We require targets to be public in order to obtain financial and stock price data for measuring economic determinants of purchase price allocation. The SDC reports 699 deals meeting these requirements.

For each deal, we collect the information about purchase price allocation from the acquirer's 10-K filing to the SEC. Information about purchase price allocation is available for 538 deals. Requiring the acquirers' and the targets' financial information from COMPUSTAT, including compensation data for the acquirers, reduces the sample size to 276 deals. We also obtain other acquisition deal characteristics from the SDC and CEO compensation data from Execucomp. Information on the use of cash-flow-based measures is collected by a keyword search of acquirers' proxy statements.[10] In addition, we obtain stock price information from CRSP. Table 1 summarizes the sample filter procedures.

Table 2 reports the distribution of our sample across 2-digit SIC industries and over time. Both acquiring and acquired firms are distributed across a fairly wide range of industries. Among the acquired entities, Business Services industry (2-digit SIC code 73) is the most heavily represented industry. About 33% of the acquired firms come from this industry. Measuring,

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[10] The use of cash-flow-based measures is identified based on a keyword search of proxy statements through 10-k wizard. Firms that mention "cash flows" no further than 50 words from "performance goals" are classified as firms that include cash-flow-based measure in their list of performance measures. We also manually checked our coding for a sample of 20 observations. Our coding method was found to identify correctly for 90% of the cases.

Analyzing, and Controlling Instruments (2-digit SIC code 38) ranks the second with 10.1% of the acquired entities from this industry. For acquirers, Chemicals and Allied Products (2-digit SIC code 28), Measuring, Analyzing, and Controlling Instruments, and Business Services industry each account for more than 10% of the sample. As asset structure likely exhibits systematic variation across industries, we control for the industry clustering of acquired entities by including industry fixed effects in our regression tests. Our sample period (July 2001 to April 2007) spans over six different calendar years. The sample does not show any obvious clustering in time.

4.2. CEO bonus and depreciation/amortization

Before testing our main hypotheses, we examine the relation between depreciation and amortization expenses and CEO bonuses to validate our maintained assumption that changes in depreciation/amortization affect cash bonuses. We estimate the following regression:

$$CHANGE\_BONUS_t = a_0 + a_1 RET_t + a_2 \Delta ROA_t + a_3 \Delta DEP/AMORT_t + e \qquad (1)$$

Following Sloan (1993) and Cheng (2007), the dependent variable is defined as the change in the logarithm of bonus in two adjacent years of the same CEO. Years that report two CEO names (transition years) are dropped from the analysis. Stock returns (*RET*) and changes in return on assets are included as performance measures. Industry and year fixed effects are also included in the regression.

We decompose change in the accounting-based performance measure into two parts: one for change in depreciation and amortization expenses ($\Delta DEP/AMORT_t$, change in depreciation and amortization scaled by beginning total assets) and one for change in ROA before depreciation and amortization (ΔROA_t, net income before extraordinary items and depreciation

and amortization scaled by beginning total assets). If a decrease in depreciation/amortization increases bonuses, we expect the coefficient on $\Delta DEP/AMORT_t$ to be negative.

We estimate regression (1) for all firms with Execucomp data and report the results in Table 3 column (1). Consistent with prior studies, the coefficients on ΔROA_t and RET_t are both positive and significant. The coefficient on $\Delta DEP/AMORT_t$ is negative and significant, confirming our assumption that a decrease in depreciation and amortization expenses leads to an increase in CEO bonuses.

We also estimate regression (1) separately for the two subsamples with and without cash-flow-based performance measures to check the validity of our classification of the two groups. We expect the coefficient on $\Delta DEP/AMORT_t$ to be smaller in magnitude for firms that also use cash-flow-based measures to evaluate CEO performance. Table 3 column (2) reports the estimation results for firms with no cash-flow-based performance measures while column (3) reports the results for the rest of the sample. The coefficient on $\Delta DEP/AMORT_t$ is smaller in magnitude and not statistically significant for firms with cash-flow-based performance measures, consistent with our expectation. Since we identify firms adopting cash-flow-based measures using a keyword search of proxy statements, there is likely noise in our coding. For example, some firms may report cash based measure as one of possible performance measures but not actually use it in a specific year. However, we do not expect the noise to bias our results.

4.3. CEO bonus plan and purchase price allocation

4.3.1. Research design and variable measurement

We construct the following regression model to test H1 and H2. Industry fixed effects are included and industries are identified using 2-digit SIC codes.

$GOODWILL = a_0 + a_1\ BONUS + a_2\ CASH\_MEASURE + a_3\ BONUS*CASH\_MEASURE + a_4$

$TRG\_RD + a_5\ TRG\_ADV + a_6\ TRG\_BTM + a_7\ INDSAME + a_8\ SYNERGY + a_9\ RELATIVE + a_{10}$

$LACK\_SLACK + a_{11}\ PCT\_STOCK + e$ (2)

The dependent variable *GOODWILL* is defined as goodwill plus other intangible assets with indefinite-lives over total acquisition costs.[11] Goodwill and other intangible assets with indefinite lives are grouped together as they are treated similarly in accounting; they are not amortized but subject to a mandatory fair-value-based impairment test.[12] *BONUS* measures the importance of cash compensation in a CEO's compensation package; it is computed as the three year average of the ratio of cash bonus to total annual compensation starting two fiscal years before the year the acquisition was announced.[13] H1 predicts that the coefficient on *BONUS* is positive.

CASH_MEASURE is a dummy variable that takes the value of one if acquirer's proxy statement shows cash-flow-based measures as one of the performance measures for evaluating executives' performance. [14] While we do not have a prediction for the coefficient on *CASH_MEASURE* in regression (2), H2 predicts that the interaction of *BONUS* and *CASH_MEASURE* should load negatively in the regression.

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[11] Alternatively, we also use total acquisition costs minus IPRD as the deflator for *GOODWILL*. All the inferences remain intact.

[12] While our main arguments suggest that overstating goodwill and understating other long-lived assets lead to higher post-acquisition earnings and bonuses, firms could also misstate other balance sheet items that affect post-acquisition earnings, leading to an overstatement of goodwill. Consequently, we use total acquisition costs as the deflator in our main analyses.

[13] Our inferences are intact if we measure *BONUS* using data from the acquisition announcement year only or average of three years ending in the year prior to the acquisition year.

[14] Since firms are not always consistent with the level of detail in the proxy statement and since performance measures are likely to be sticky, *Cash_Measure* is coded as one for all the years following the first time cash-flow-based measures appear in the proxy statement.

We include a number of control variables to capture other determinants of the valuation of goodwill versus other assets. First, we include target industry, *TRG_RD, TRG_ADV, TRG_BTM*, *SYNERGY*, and *INDSAME* as economic determinants of the allocation to goodwill. Target industry classification is included as different industries may have different levels of unrecognized assets on the balance sheet that are not directly captured by the other economic variables that we use to control for the economic allocation. *TRG_RD* is the target's three year average ratio of research and development expense to sales starting three years before the acquisition announcement. R&D expenditures of the target are likely positively associated with recognized identifiable intangible assets such as developed technologies or in-process R&D. As a result, we expect *TRG_RD* to have a negative association with *GOODWILL. TRG_ADV* is target's three year average ratio of advertising expense to sales starting three years before the acquisition announcement. Advertising expense of the target normally translates to the recognition of either brand names or trademarks in the allocation which in most cases are intangible assets with indefinite lives. Consequently, we expect *TRG_ADV* to have a positive association with *GOODWILL. TRG_BTM*, the book-to-market ratio of the target, captures unrecognized assets of the target before the acquisition that are not related to R&D and advertising, i.e., the value of the going concern of the target. The FASB indicates in SFAS 141 that goodwill should measure, among others, the value of the going concern of the target. Since we measure the inverse of the market to book ratio, we expect target book-to-market ratio to be negatively associated with *GOODWILL*.

SYNERGY and *INDSAME* are proxies for the amount of synergy created by the combination. *SYNERGY* is measured as the combined dollar amount of return for the target and acquirer divided by total acquisition costs. Since the FASB indicated in SFAS 141 that goodwill

should measure, among others, the value of synergies created in the combination, we expect a positive association between *SYNERGY* and the amount allocated to goodwill. *INDSAME* is set to one if acquirer's and target's primary two digit SIC industry are the same. On the one hand, merging two firms from the same line of business is likely to generate more synergies (e.g. cost saving), and therefore more economic goodwill, predicting a positive correlation between *INDSAME* and *GOODWILL*. On the other hand, Morck et al. (1990) suggest that acquirers taking over a target from a different line of business may overpay. Since goodwill mechanically subsumes any overpayment that may have transpired, *INDSAME* can be negatively correlated with *GOODWILL*. Therefore, we have no directional prediction for this variable.

Next, we control for the cost of overstating goodwill by including *RELATIVE* and *LACK_SLACK*. *Ceteris paribus*, overstating goodwill increases the likelihood of goodwill impairment in the future. Goodwill write-offs are considered manifestation of past acquisition mistakes that can result in CEO turnover, as in the AOL Time Warner case. Li et al. (2009) document a downward revision of analysts' earnings forecasts following the announcement of goodwill impairment. Both Bens et al. (2007) and Li et al. (2009) find significant negative stock returns when goodwill impairment is announced, suggesting that impairments are costly events. Since acquisitions of large targets relative to the size of the acquirer are more significant corporate decisions than acquisitions of smaller targets, we conjecture that CEOs are less likely to overstate goodwill after large acquisitions in order to avoid future impairment. *RELATIVE* is measured as the total acquisition cost over acquirer's pre-acquisition total assets. We use acquirer's total assets as the deflator because the smaller the acquirer's book value relative to the total acquisition price, the more is the acquirer's accounting performance affected by the

acquisition. Using acquirer's pre-acquisition market value of equity as the deflator does not change our inferences.

We also include *LACK_SLACK* as a measure of the amount of flexibility a firm has to avoid future impairment. As promulgated by SFAS 142, the first step of an impairment test is to compare the fair value of a reporting unit to its carrying book value. When the carrying book value is greater than the fair value of the reporting unit, the firm needs to measure the amount for impairment it needs to recognize. Because we do not have a good measure for acquirers reporting units fair value we use the market value of the firm and compare it to the book value of the firm. The smaller the difference between market and book value, the higher is the likelihood that sometime in the future the fair value will fall below the carrying book value and the acquirer will need to recognize impairment of goodwill. The variable *LACK_SLACK* is set to one if an acquirer has less discretion, i.e., the total acquisition price exceeds the difference between acquirer market value and book value and zero otherwise. We predict a negative correlation between *LACK_SLACK* and *GOODWILL*.

Finally, we control for the mode of payment to capture the likelihood of overvaluation of the consideration. Myers and Majluf (1984) find that a bidding firm will offer to issue stock to finance an investment when it has private information that its stock price is overvalued. Since goodwill mechanically subsumes any overvaluation of the consideration paid, we expect acquirers paying with stock to record more goodwill. *PCT_STOCK* is computed as the ratio of stock consideration to the total acquisition cost.

4.3.2. Descriptive statistics

Panel A of Table 4 reports the descriptive statistics of the acquirer. The average market value of the acquirer is about $21,500 million and the median is about $4,140 million. The

average bonus as a proportion of total compensation is 19%, indicating that bonus is a material component of CEO compensation. About 44% of the firms in our sample adopt cash-flow-based performance measures.[15] *LACK_SLACK* takes the value of one for about 8% of the acquirers.

Panel B reports the statistics of the acquired target. The average book-to-market ratio of the target is about 0.47 with the median being 0.42. In the year prior to being acquired, an average target company spends only 2% of its sales revenue on advertising but spends 85% of its sales revenue on R&D activities.[16]

Panel C reports the deal characteristics. The average purchase price is about $2,222 million, while the median is $624 million. *RELATIVE* is 0.32 on average, suggesting that on average an acquirer is three times as large as the acquired target. As a result, accounting choice for these acquisitions likely has a significant impact on the acquirers' future reported financial performance. The acquirer and the target operate in the same 2-digit SIC industry for 70% of the deals. The average percentage of stock payment is 33% while the median is zero.

On average, intangible assets account for 80% of the deal value. Goodwill is the most significant component of intangible assets. On average it accounts for about 58% of the deal value. There is a fair amount of variation in the portion of deal value classified as goodwill, with the 25 percentile and the 75 percentile at 40% and 75%, respectively. About 38% of the acquirers in the sample engage an external appraiser to help them with the initial fair value allocation post acquisitions.

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[15] We also did the keyword search for the Compustat population to identify the adoption of cash-flow-based performance measures. About 20% of the population is coded as having cash-flow-based performance measures, consistent with the anecdotal evidence in Leone (2004).

[16] The average R&D expenditure over sales is high due to a few young firms in which R&D is greater than sales. The 75 percentile of the ratio of R&D to sales is 20%. We also measure *TRG_RD* using a rank variable of R&D over sales. All the inferences do not change.

Finally, Panel D reports the fair value allocation information collected from acquirers' 10-K filings. There are roughly six categories of identifiable intangible assets in our sample: trademark, developed technology, customer base and customer loyalty, patents, non-compete agreements and contracts, and other agreements and contracts. Among them, developed technology and customer base and customer loyalty are reported most often and account for most of the dollar value. About 50% of the acquisitions recognize developed technology and customer base and/or customer loyalty as intangible assets. They each account for more than 10% of the purchase price when they are recognized. The life of these intangibles, upon which calculation of amortization expenses will be based, varies greatly across different intangible categories and also has a wide range in each individual category (untabulated). This is consistent with the arguments about the inherent difficulty in assessing the value of intangible assets.

IPRD is recorded in 38.7% of the acquisitions, accounting for 11.7% of the purchase price on average when it recorded. While IPRD is not as important as some other intangibles in the purchase price allocation, it is also a likely object of manipulation given that it is written off at the time of the acquisition and does not depress post-acquisition earnings. We examine this item separately in additional analysis.

4.3.3. Correlations

Table 5 reports the pair-wise correlations among different variables in our sample. *GOODWILL* is significantly correlated with economic determinants of the allocation. *TRG_BTM* and *GOODWILL* are negatively correlated, consistent with *TRG_BTM* capturing the going concern of the target which is reflected in recognized goodwill. *TRG_RD* is also negatively correlated with *GOODWILL*. Companies that spend more on R&D are more likely to have developed mature technologies and therefore recognize more identifiable intangible assets.

TRG_ADV is positively correlated with *GOODWILL*, suggesting that advertising expenditures give rise to intangible assets with indefinite lives such as trademarks. Neither *SYNERGY* nor *INDSAME* is significantly correlated with *GOODWILL*.

BONUS is positively correlated with *GOODWILL*, marginally insignificant with a two-tailed p-value of 18%. When we partition the sample to two subsamples, one that includes only acquirers without cash-flow based performance measures in the proxy statement and the other with cash-based measures in the proxy statement, the correlation between *BONUS* and *GOODWILL* is significant at 5% (two-tailed test) for the first subsample (no cash-flow-based measure in the proxy statement) and insignificant for the other subsample. As expected, *LACK_SLACK* is significantly negatively correlated with *GOODWILL*. *RELATIVE* and *PCT_STOCK*, on the other hand, do not exhibit significant correlation with *GOODWILL*.

4.3.4. Main findings

Table 6 reports the estimation results of regression (2). When only the economic determinants are included as the independent variables, the adjusted R-squared is 32%. *TRG_BTM* and *TRG_RD* significantly explain the variation in *GOODWILL* with the predicted signs, indicating that the valuation of goodwill and other assets is partly determined by the underlying economics. The adjusted R-squared amounts to 32% if only these two variables and target industry fixed effects are included in the regression. All other economic variables are not significant at conventional levels.

We add the variable *BONUS* in the regression in column (2). Consistent with the prediction of H1, the coefficient on *BONUS* is positive and significant at the 1% level, suggesting that cash bonuses provide stronger incentives than other forms of compensation for CEOs to overstate goodwill in the purchase price allocation. We then partition the sample based

on *CASH_MEASURE* in columns (3) and (4) and estimate the model separately for the two subsamples. While the coefficient on *BONUS* is positive and significant in the regression for firms not using cash-flow-based performance measures, it ceases to be significant in the regression for firms adopting cash-flow-based measures.

Finally, we add *CASH_MEASURE* and its interaction with *BONUS* in column (5) of Table 6 and estimate the regression for the entire sample. The interaction of *BONUS* and *CASH_MEASURE* loads negative and significant (-0.469, t-stat=-2.23), consistent with the prediction of H2. *BONUS* still loads positive and significant in the regression in column (5) (0.515, t-stat=3.69). A one-standard-deviation increase in *BONUS* translates into an increase of 7.65% of the purchase price being allocated to goodwill, suggesting that CEOs' compensation structure has an economically significant impact on the allocation. However, when cash-flow based performance evaluation measure is included in CEO compensation 90 percent of the effect disappears. F-test shows that the sum of the coefficients on *BONUS* and *BONUS*CASH_MEASURE* is insignificant. The results suggest that the choice of performance measures in the bonus plan has different implications for managers' accounting choices. While earnings-based performance measures motivate CEOs to overstate goodwill, such incentives are mitigated when cash-flow-based measures are adopted. The results also suggest that impairment concerns affect acquirer purchase price allocation. The coefficient on *LACK_SLACK* is negative and significant (-0.135, t-stat=-2.06), indicating that when firms have small difference between their market value and their book value they will tend to allocate less of the purchase price to goodwill.

4.3.5. Alternative specifications

Bryan et al. (2000) show that the relative importance of different forms of compensation is endogenously determined by firm characteristics. In particular, growth firms likely rely more on equity-based compensation. Meanwhile, growth firms are also likely to acquire similar firms with high growth and mechanically record more goodwill. To mitigate this concern of endogeneity, we construct a model for *BONUS*. We expect the size of the firm as measured by the logarithm of total assets, growth opportunities as captured by the book to market ratio, and analysts' long-term growth forecast to affect the compensation mix. We then take the residual of the model as a measure of the relative importance of bonus after controlling for the economic determinants of the compensation mix (*BONUS*).

The results of estimating regression (2) using this alternative measure are reported in Table 7. Requiring the data to estimate the model for *BONUS* reduces the sample size to 232 firms. Untabulated results show that all inferences are unchanged if we estimated regression (2) with the original *BONUS* variable using this smaller sample, except that the coefficient on *INDSAME* ceases to be significant. In columns (1) and (2) Table 7, we estimate the regression separately for firms with *CASH_MEASURE* equaling one and zero. The results are very similar to those reported in Table 6 in terms of statistical significance. There is a significant correlation between *GOODWILL* and *BONUS'* only when no cash measure is adopted. In column (3), we estimate the regression for the entire sample with the interaction of *BONUS* and *CASH_MEASURE*. The coefficient on *BONUS*, the residual from the first stage model for BONUS, is still positive and significant at conventional levels. The coefficient on the interaction of *BONUS'* and *CASH_MEASURE* is negative and significant. Our other inferences are very similar to those from Table 6.

Since Columns 3 and 4 in Table 6 include either firms that use cash-flow based performance measure or do use cash flow based performance measure, each of the regression may suffer from selection bias if the choice to use cash-flow based measure and the allocation to goodwill are jointly affected by a latent omitted variable. To address this concern issue of endogeneity we use a two-stage Heckman approach. We model the usage of cash-flow-based performance measures using a probit model. Natarajan (1996) suggests that the weight on different performance measures is determined by firm characteristics, such as growth and size. Therefore, we include the size of the firm as measured by the logarithm of total assets, growth opportunities as captured by the book to market ratio, and analysts' long-term growth forecast as explanatory variables. Untabulated results suggest that the use of cash measure is strongly positively associated with firm size but not with firm's growth options. We then calculate the inverse Mills ratio and add it to the regressions in column 3 and 4. The results are very similar to those reported in Table 6 and therefore are not tabulated.

4.4. Additional analysis

4.4.1. CEO bonus plans and IPRD

The SEC has been concerned with the over-expensing of IPRD since the mid-1990s (Turner, 1998). Dowdell and Press (2004) suggest that acquirers are motivated to inflate IPRD write-offs in order to report higher earnings post-acquisition and improve accounting performance measures such as return on assets by reducing the asset base. The value assigned to IPRD in the purchase price allocation is expensed at acquisition, depressing earnings in the immediate period following the acquisition but increasing earnings in the subsequent periods (similar effect to the big bath). The cost of immediate expensing of large amounts is lower income in the quarter following the acquisition completion and potentially lower CEO bonuses.

However, if, as suggested in Dechow et al. (1994) and Gaver and Gaver (1998), CEO cash compensation is largely shielded from non-recurring losses, the one-time IPRD write-off will have little impact on concurrent bonuses and CEOs can obtain higher bonuses post-acquisition by over-expensing IPRD.

We expect management's incentive to overstate IPRD to become stronger when their compensation is weighted towards accounting-based bonus plans and when cash-flow-based performance measures are not adopted. To test these predictions, we estimate the following model,

$IPRD = a_0 + a_1\ BONUS + a_2\ CASH\_MEASURE + a_3\ BONUS*\ CASH\_MEASURE + a_4$
$TRG\_RD + a_5\ TRG\_BTM + e$ (3)

The dependent variable, *IPRD*, is set equal to IPRD expense over purchase price minus goodwill. The deflator does not include goodwill because overstating goodwill also leads to higher post-acquisition earnings in general. Managers are thus more likely to manipulate the allocation between IPRD and other assets and liabilities rather than that between IPRD and goodwill. Not all firms in our sample have significant R&D expenditures. To increase the power of our tests, we restrict the sample to the top three industries with significant R&D activities. The top three R&D intensive industries are identified by ranking the industry average R&D over sales ratio for the Compustat population.

The results of regression (3) are reported in Table 8. Consistent with our expectation, the coefficient on *BONUS* is positive and significant for the subsample without cash-flow-based performance measures, showing that *IPRD* increases with the relative importance of bonus in the compensation package. The result is not as strong as our findings on goodwill allocation in terms of the magnitude of the coefficient and statistical significance, probably because the SEC has

watched the recording of IPRD closely in our sample period. The coefficient on *BONUS* is insignificant for the subsample with cash-flow-based performance measures, suggesting that the use of cash-flow-based performance measures mitigates the incentives to over-expense IPRD. Overall, our findings support the SEC's position that managers likely exercise their discretion in expensing IPRD. The FASB has recently changed the accounting treatment for IPRD. Following the new SFAS 141R, IPRD is capitalized and subject to periodic impairment tests, similar to goodwill. Given our earlier findings on the overstatement of goodwill, IPRD may still be a likely object of manipulation under the new standards.

4.4.2. Impact of independent appraisers

Dietrich et al. (2001) and Muller and Riedl (2002) argue that external appraisers may serve as monitors in fair value measurements and enhance the credibility of fair value estimates. They find that valuation of investment properties conducted by external independent appraisers is more accurate and associated with less information asymmetry than internal valuation. Since the valuation of investment properties can be more verifiable than many other assets such as intangible assets that rarely have an active market, it is unclear whether their conclusion would apply in our setting. We test the impact of external appraisers by estimating regression (2) separately for firms with and without external appraisers. If external appraisers constrain managers' manipulation of the initial valuation of goodwill and other assets, we expect the correlation between *CASH_MEASURE* and *GOODWILL* to decrease and that between the economic determinants and *GOODWILL* to increase with the presence of an external appraiser. Note, however, that acquirers that engage external appraisals typically do so with respect to specific target assets, typically separable intangible asset, but not all target assets. Tangible assets and liabilities are typically valued internally by the acquirer. Since goodwill is measured as the

difference between the purchase price and the fair value of the net assets, a plug-in number, the amount allocated to goodwill is affected by the valuation of each of targets' assets and liabilities. Thus, the fact that the external appraisers almost never value all targets' assets and liabilities may reduce their effect on the allocation to goodwill.

Untabulated results show that economic determinants of the allocation are weakly more significant for the sub-sample with external appraisers. *LACK_SLACK*, capturing the expected discretion in future impairment tests, ceases to be significant in the presence of external appraisers and target book to market ratio is not significant in the no-external-appraiser subsample. However, for both samples, *BONUS* is significantly correlated with *GOODWILL*, suggesting that external appraisers cannot prevent all managerial manipulation in the purchase price allocation.

4.4.3. Does the board of directors adjust for manipulation of allocation?

Our results so far show that as reducing depreciation and amortization increases CEO bonus, CEOs tend to overstate goodwill in the fair value allocation after acquisitions to overstate subsequent reported income through reducing depreciation and amortization. The remaining question now is whether the boards of directors adjust CEO bonus plans subsequent to acquisitions for the overstatement of goodwill, and thus undo all or part of the overstatement of earnings. As computing the overstatement and the "what if" reported earnings is complicated, and requires that the board present an alternative "correct" allocation of the purchase price, the board may not adjust for the overstatement.

Again, we follow the specification of Cheng (2007) and explore the question using the following regression,

$$CHANGE\_BONUS_t = a_0 + a_1 \Delta DEP/AMORT_{t,-1} + a_2 \Delta ROA_{t,-1} + a_3 Abnormal\_GW +$$

$$a_4 RET_t + e \qquad\qquad\qquad\qquad (4)$$

The dependent variable is the logarithm of annual CEO bonus one to three years post an acquisition minus that one year prior to the acquisition. $\Delta DEP/AMORT_{t,-1}$ and $\Delta ROA_{t,-1}$ are defined accordingly as depreciation and amortization expenses over total assets or ROA (before depreciation and amortization) within three years post the acquisition minus that one year prior to the acquisition. *Abnormal_GW* is the residual from a regression of *GOODWILL* on the economic determinants of the allocation. The higher *Abnormal_GW*, the more is goodwill overstated and depreciation/amortization post-acquisition understated. If the board of directors adjusts for the overstatement of goodwill when setting the bonus plan parameters, we expect *Abnormal_GW* to be negatively correlated with the dependent variable. The intuition is that, by allowing *Abnormal_GW* to negatively affect the compensation, the board is effectively offsetting the bonus-inflating effect of the over-allocation to goodwill (and therefore understatement of depreciation and/or amortization).

Untabulated results show that, while the coefficients on $\Delta DEP/AMORT$, ΔROA, and *AnnRet* have the predicted signs and are significant, that on *Abnormal_GW* is insignificant. The findings provide no support for the hypothesis that the board adjusts bonus plans for manipulation in the purchase price allocation process.

5. Conclusions

In this study we examine the relation between compensation structure and managerial accounting choices in fair value measurement. Specifically, we analyze how (1) the relative importance of annual bonus plans in CEO compensation and (2) the use of cash-flow-based

performance measures affect the proportion of acquisition price recorded as goodwill post acquisitions.

While we find that economic determinants of the valuation - targets' industry, book-to-market ratio and R&D expenditures, are significantly correlated with the proportion of acquisition price recorded as goodwill, we also find that the proportion of acquisition price recorded as goodwill increases with the relative importance of cash bonus in CEO compensation. This association diminishes when cash-flow-based measures are adopted in CEO bonus plans. This study also provides evidence that allocation to in process R&D is consistent with the pattern of the allocation to goodwill and that acquirer flexibility to avoid future impairment also affect the allocation to goodwill. Overall, our results are consistent with the arguments in Murphy (1999) that, not only pay-performance structure, but also performance measures in bonus contracts affect CEOs' reporting incentives. These reporting incentives have a statistically significant impact on fair value measurement when observable market prices are not available. Our results suggest that compensation mix plays a role in managers' motivation to overstate accounting earnings while the inclusion of cash flow-based performance measures in their bonus plan may mitigate such motivation, and that managerial compensation incentives could play a distorting role in unverifiable fair value measurements.

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Appendix: Variable definitions

Variable	Definition
AMORT	Amortization expense over total assets
BONUS	Three year average ratio of CEO bonus over her total compensation, starting two years before the acquisition announcement year
CASH_MEASURE	Indicator variable equaling one if CEO's bonus plan includes cash-flow-based performance measures, zero otherwise
CHANGE_BONUS	Change in the logarithm of CEO bonus
DEP	Depreciation expense over total assets
GOODWILL	Goodwill plus other intangible assets with indefinite-lives over total acquisition costs
INDSAME	Indicator variable equaling one if the acquirer and the target are from the same 2-digit SIC industry, zero otherwise
RELATIVE	Deal value over acquirer's pre-acquisition total assets
PCT_STOCK	Percentage of consideration paid with stock
RET	Annual raw stock returns
ROA	Return on assets before amortization and depreciation, net income before amortization and depreciation over assets
LACK_SLACK	Indicator variable equaling one if the deal value exceeds the difference between acquirer's market and book value prior to the acquisition, zero otherwise
SYNERGY	Cumulative dollar amount change in the value of the acquirer and the target at the announcement of the acquisition deflated by the deal value
TRG_ADV	Target advertising expense over sales, averaged over the deal announcement year and the prior year
TRG_BTM	Target book-to-market ratio prior to the acquisition
TRG_RD	Target R&D expense over sales, averaged over the deal announcement year and the prior year

Table 1: Sample selection procedures

This table describes the sample selection procedures for the acquisition sample.

	Number of Acquisitions
Acquisitions on SDC between July 2001 and April 2007, where the acquired companies are publicly traded before being acquired	699
Less Missing purchase price allocation information	161
Acquisitions remaining	538
Less Missing acquiring companies' financial information from Compustat, including compensation data	206
Acquisitions remaining	332
Less Missing acquired companies' financial information from Compustat	56
Acquisitions remaining	276

Table 2: Sample distribution across industries and over time

This table reports the sample distribution across 2-digit SIC industries (Panel A) and over time (Panel B).

Panel A: Industry distribution

Industry acronym	Two-digit SIC Codes	Number of acquired firms	Percentage of Sample	Number of acquirers	Percentage of Sample
Agricultural Production	01	1	0.4	1	0.4
Mental Mining	10			1	0.4
Oil and Gas Extraction	13	12	4.4	14	5.1
Heavy Construction	16	1	0.4		
Special Trade Contractors	17			1	0.4
Food and Kindred Products	20	4	1.5	4	1.5
Textile Mill Products	22			1	0.4
Apparel and Other Textile Products	23	1	0.4	2	0.7
Furniture and Fixtures	25	1	0.4	1	0.4
Paper and Allied Products	26	1	0.4	3	1.1
Printing and Furnishing	27	3	1.1	4	1.5
Chemicals and Allied Products	28	21	7.6	29	10.5
Petroleum and Coal Products	29			1	0.4
Rubber and Misc. Plastics Products	30	2	0.7		
Leather and Leather Products	31	2	0.7	1	0.4
Stone, Clay, and Glass Products	32	1	0.4		
Primary Metal Industries	33	4	1.5	3	1.1
Fabricated Metal Products	34	1	0.4		
Industrial Machinery and Equipment	35	21	7.6	26	9.4
Electrical and Electric Equipment	36	21	7.6	21	7.6
Transportation Equipment	37	2	0.7	3	1.1
Instruments and Related Products	38	28	10.1	32	11.6
Miscellaneous Manufacturing Industries	39	4	1.5	6	2.2
Motor Freight Transportation and Warehousing	42	1	0.4	1	0.4
Water Transportation	44	2	0.7	2	0.7
Communications	48	10	3.6	12	4.4
Electric, Gas, and Sanitary Services	49	4	1.5	3	1.1
Wholesale Trade – Durable Goods	50	4	1.5	2	0.7
Wholesale Trade – Nondurable Goods	51	4	1.5	3	1.1
Building Materials, Hardware, Garden Supply & Mobile	53	1	0.4	2	0.7
General Merchandise Stores	54	1	0.4	1	0.4
Apparel and Accessory Stores	56	1	0.4	2	0.7
Eating and Drinking Places	58	1	0.4	1	0.4
Miscellaneous Retail	59	5	1.8	3	1.1
Insurance Agents, Brokers and Service	64			1	0.4
Personal Services	72	1	0.4	1	0.4
Business Services	73	91	33.0	79	28.6
Motion Pictures	78	2	0.7		
Amusement and Recreational Services	79	3	1.1	2	0.7
Health Services	80	3	1.1	4	1.5
Educational Services	82	2	0.7	2	0.7
Engineering and Management Services	87	9	3.3	1	0.4
Total		276	100	276	100

Panel B: Sample distribution over time

YEAR	Number of Observations	Percentage of Sample
2001	34	12.3
2002	37	13.4
2003	38	13.8
2004	45	16.3
2005	51	18.5
2006	51	18.5
2007	20	7.2
Total	276	100

Table 3 : CEO bonus and depreciation/amortization

This table reports the estimation results of the following regression,

$CHANGE\_BONUS_t = a_0 + a_1 RET_t + a_2 \Delta ROA_t + a_3 \Delta DEP/AMORT_t + e$ (1)

The regression is first estimated for the entire Execucomp population and then for the two groups with or without cash-flow-based performance measures separately. Variables are defined in the appendix. Industry and year fixed effects are included. T-statistics are reported in parentheses.

	Predicted Sign	Execucomp Population	NO Cash Measure	With Cash Measure
RET	+	0.455***	0.330**	0.536***
		(4.63)	(2.24)	(3.99)
ΔROA	+	9.250***	9.494***	9.237***
		(10.09)	(7.34)	(6.96)
Δ (DEP + AMORT)	-	-13.920***	-17.818**	-9.012
		(-2.90)	(-2.44)	(-1.39)
Intercept		0.269	0.028	-0.743
		(0.79)	(0.01)	(-0.2856)
Number of observations		4163	1923	2236
Adj R^2		23%	20%	25%

Table 4: Descriptive statistics

This table reports the descriptive statistics of acquirers (Panel A), targets (Panel B), deals (Panel C), and purchase price allocation (Panel D). Variables are defined in the appendix.

Panel A — Acquirer characteristics

Variable	Mean	Std	25th %	50th %	75th %
MARKET VALUE	21500	41300	1553	4140	16500
LACK_SLACK	0.08	0.27	0	0	0
CASH_MEASURE	0.44	0.50	0	0	1
BONUS	0.19	0.15	0.08	0.15	0.27

Panel B – Target characteristics

Variable	Mean	Std	25th %	50th %	75th %
TRG_BTM	0.47	0.54	0.24	0.42	0.64
TRG_ADV	0.02	0.06	0	0	0.01
TRG_RD	0.85	4.71	0	0.08	0.20

Panel C – Deal characteristics

Variable	Mean	Std	25th %	50th %	75th %
DEAL VALUE	2222	6119	199	624	1727
DEAL VALUE/ACQUIRER MARKET VALUE	0.30	0.41	0.04	0.13	0.40
RELATIVE	0.32	0.42	0.06	0.16	0.39
SYNERGY	0.33	0.86	-0.10	0.14	0.46
PCT_STOCK	0.33	0.41	0	0	0.71
INDSAME	0.70	0.46	0	1	1
TOTAL INTANGIBLES	1681	4566	136	443	1357
TOTAL INTANGIBLES/DEAL VALUE	0.80	0.35	0.63	0.82	0.98
GOODWILL	1133	2761	93	320	988
GOODWILL/DEAL VALUE	0.58	0.29	0.40	0.58	0.75
INDEPENDENT APPRAISAL	0.38	0.49	0	0	1

Panel D: Descriptive statistics of purchase price allocation

Name of Intangible Assets	Number of Acquisitions	Percentage of Acquisitions	Mean Percentage of Purchase Price	Mean Percentage of Total Intangible Assets Recognized
Trademark	119	43.1%	7.1%	8.2%
Developed Technology & Patents	139	50%	13.1%	15.4%
Customer Base & Customer Royalty	139	50%	11.0%	11.5%
Non-competing Agreements & contracts	28	10%	0.3%	0.4%
Other Agreements & Contracts	46	16.7%	8.9%	9.0%
In Process R&D	107	38.7%	11.7%	14.4%
Goodwill	275	99.3%	58.0%	74.7%

Table 5: Correlations

This table reports the Pearson pair wise correlations for the acquisition sample. For each variable-pair, the first row indicates correlation coefficient and the second row reports p-value in parentheses. Correlations that are significant at conventional levels are in bold.

	GOODWILL	RELATIVE	RELATIVE	SYNERGY	TRG_ADV	TRG_RD	PCT_STOCK	LACK_SLACK	INDSAME	CASH_MEASURE	BONUS
GOODWILL	1										
TRG_BTM	**-0.23** **(0.00)**	1									
RELATIVE	-0.02 (0.73)	**-0.10** **(0.10)**	1								
SYNERGY	-0.06 (0.33)	**0.18** **(0.00)**	**-0.20** **(0.00)**	1							
TRG_ADV	**0.12** **(0.04)**	**-0.11** **(0.08)**	-0.05 (0.37)	-0.01 (0.90)	1						
TRG_RD	**-0.27** **(0.02)**	**0.10** **(0.09)**	-0.02 (0.78)	**0.24** **(0.00)**	-0.04 (0.54)	1					
PCT_STOCK	0.03 (0.62)	**0.10** **(0.09)**	**0.34** **(0.00)**	**-0.21** **(0.00)**	-0.02 (0.76)	-0.02 (0.68)	1				
LACK_SLACK	**-0.11** **(0.07)**	0.00 (0.95)	**0.52** **(0.00)**	-0.08 (0.17)	-0.07 (0.28)	-0.05 (0.42)	**0.21** **(0.00)**	1			
INDSAME	-0.08 (0.19)	-0.01 (0.80)	**0.11** **(0.07)**	-0.08 (0.17)	0.09 (0.15)	0.08 (0.18)	0.09 (0.13)	0.04 (0.52)	1		
CASH_MEASURE	0.07 (0.23)	**-0.13** **(0.03)**	-0.03 (0.60)	0.01 (0.81)	0.01 (0.86)	-0.08 (0.21)	-0.01 (0.82)	0.07 (0.22)	**-0.23** **(0.00)**	1	
BONUS	0.08 (0.18)	0.03 (0.52)	**-0.10** **(0.09)**	0.02 (0.78)	**-0.12** **(0.05)**	-0.05 (0.43)	-0.02 (0.78)	0.01 (0.82)	-0.03 (0.61)	**0.11** **(0.06)**	1

Table 6: CEO compensation structure and goodwill

This table reports the estimation results of the following regression:

$GOODWILL = a_0 + a_1\ BONUS + a_2\ CASH\_MEASURE + a_3\ BONUS*\ CASH\_MEASURE + a_4\ TRG\_RD + a_5\ TRG\_ADV + a_6\ TRG\_BTM + a_7\ INDSAME + a_8\ SYNERGY + a_9\ RELATIVE + a_{10}\ LACK\_SLACK + a_{11}\ PCT\_STOCK + e$ (2)

The regression is first estimated including economic determinants of the dependent variable only (column 1). In column (2), *BONUS* and other control variables are added as explanatory variables. Column (2) regression is estimated for the subsample using cash-flow-based performance measures in column (3). It is estimated for the rest of the sample without cash-flow-based measures in column (4). Column (5) estimates the regression with the interaction of *BONUS* and *CASH_MEASURE* for the entire sample. All variables are defined in the appendix. Key variables for hypothesis testing are presented in bold. T-statistics are reported below the coefficient estimates in parentheses. ***,**,* indicates the coefficient is significantly different from zero at 1%, 5% or 10% level, two-tailed test.

Variable	Predicted	(1) All	(2) All	(3) With Cash Measure	(4) No Cash Measure	(5) All
BONUS	+		**0.302*****	**-0.001**	**0.512*****	**0.515*****
			(2.95)	**(-0.01)**	**(3.00)**	**(3.69)**
CASH_MEASURE						0.096
						(1.91)
BONUS*CASH_MEASURE	-					**-0.469****
						(-2.23)
TRG_RD	-	-0.014***	-0.014***	-0.031**	-0.012***	-0.013***
		(-3.66)	(-3.63)	(-2.34)	(-2.74)	(-3.64)
TRG_ADV	+	0.040	0.104	-0.329	0.524	0.113
		(0.15)	(0.41)	(-1.01)	(1.4)	(0.45)
TRG_BTM	-	-0.153***	-0.159***	-0.190***	-0.164***	-0.158***
		(-4.80)	(-5.10)	(-3.2)	(-3.96)	(-4.98)
INDSAME	?	-0.036	-0.030	-0.086**	0.081	-0.034
		(-0.97)	(-0.82)	(-1.94)	(1.26)	(-0.91)
SYNERGY	+	-0.001	0.001	-0.001	0.001	-0.001
		(-0.26)	(0.04)	(-0.51)	(0.1)	(-0.35)
RELATIVE	+		0.009	0.012	0.000	0.008
			(0.21)	(0.27)	(0.00)	(0.25)
LACK_SLACK	-		-0.123**	-0.199***	-0.078	-0.135**
			(-1.86)	(-2.7)	(-0.63)	(-2.06)
PCT_STOCK	+	0.000	0.001	0.001***	0.000	0.001
		(1.11)	(0.43)	(2.6)	(-0.34)	(1.63)
Number of observations		276	276	122	154	276
Adj R^2		32%	34%	48%	33%	36%

Table 7: Controlling for the endogeneity of compensation mix

This table reports the estimation results of the following regression:

$$GOODWILL = a_0 + a_1 \, BONUS' + a_2 \, CASH\_MEASURE + a_3 \, BONUS'* CASH\_MEASURE + a_4$$
$$TRG\_RD + a_5 \, TRG\_ADV + a_6 \, TRG\_BTM + a_7 \, INDSAME + a_8 \, SYNERGY + a_9 \, RELATIVE + a_{10}$$
$$LACK\_SLACK + a_{11} \, PCT\_STOCK + e \qquad\qquad (2')$$

BONUS' is the residual from the regression of *BONUS* on the logarithm of acquirer's total assets, acquirer's book to market ratio, and analysts' long-term growth forecast for the acquirer. The regression is first estimated for the two subsamples with *CASH_MEASURE* equaling one and zero separately in columns (1) and (2). It is then estimated for the sample with data to compute *BONUS'* in column (3). Other variables are defined in the appendix. Key variables for hypothesis testing are presented in bold. T-statistics are reported below the coefficient estimates in parentheses. ***,**,* indicates the coefficient is significantly different from zero at 1%, 5% or 10% level, two-tailed test.

Variable	Predicted	(1) With Cash Measure	(2) No Cash Measure	(3) All
BONUS'	+	**-0.186**	**0.458****	**0.623*****
		(-1.31)	**(2.66)**	**(3.99)**
CASH_MEASURE				0.025
				(0.76)
BONUS'*CASH_MEASURE	-			**-0.736*****
				(-3.30)
TRG_RD	-	-0.026**	-0.010**	-0.012***
		(-2.00)	(-2.42)	(-3.34)
TRG_ADV	+	-0.492	0.344	0.024
		(-1.48)	(1.01)	(0.09)
TRG_BTM	-	-0.241***	-0.253***	-0.219***
		(-3.95)	(-6.05)	(-6.49)
INDSAME	?	-0.122**	0.183***	-0.009
		(-2.57)	(2.99)	(-0.23)
SYNERGY	+	-0.001	0.003	0.001
		(-0.33)	(0.22)	(0.2)
RELATIVE	+	0.014	-0.007	0.023
		(0.33)	(-0.12)	(0.69)
LACK_SLACK	-	-0.256***	-0.088	-0.191**
		(-2.87)	(-0.70)	(-2.53)
PCT_STOCK	+	0.001**	-0.001	0.000
		(2.29)	(-0.97)	(1.04)
Number of observations		101	131	232
Adj R^2		55%	45%	42%

Table 8: CEO compensation structure and IPRD

This table reports the estimation results of the following regression,

$IPRD = a_0 + a_1 BONUS + a_2 CASH\_MEASURE + a_3 BONUS* CASH\_MEASURE + a_4 TRG\_RD + a_5 TRG\_BTM + a_6 TECH\_PATENT + e$ (3)

The analysis is conducted for firms from R&D intensive industries. The regression is first estimated for the two subsamples with *CASH_MEASURE* equaling one and zero separately in columns (1) and (2). It is then estimated for all firms from R&D intensive industries in column (3). All variables are defined in the appendix. Key variables for hypothesis testing are presented in bold. T-statistics are reported below the coefficient estimates in parentheses. ***,**,* indicates the coefficient is significantly different from zero at 1%, 5% or 10% level, two-tailed test.

Variable	Predicted	Cash Measure	No Cash Measure	R&D Intensive
BONUS	+	**-0.109**	**0.320****	**0.343****
		(-0.56)	**(1.96)**	**(1.79)**
CASH_MEASURE				0.088
				(1.47)
BONUS*CASH_MEASURE	-			**-0.412**
				(-1.50)
TRG_BTM	-	-0.15	-0.056**	-0.073**
		(-1.40)	(-2.00)	(-2.36)
TRG_RD	-	0.064	0.006***	0.010***
		(5.34)	(0.256)	(3.47)
Number of observations		33	71	104
Adj R^2		72%	56%	54%