

Identifying the Nature and Value of Expected Merger Synergies

Abstract

Using a large sample of post-2001 mergers, we show that three components of targets' intellectual property account for 25% to 33% of merger value creation. In particular, we show that R&D, Technology, and Trademarks generate greater synergies than acquired net tangible assets and goodwill. We also find that acquiring targets' customer bases is associated with lower synergies and that acquirers overpay for goodwill. Our findings are robust to using conventional and novel wealth effect estimates. They suggest that information about the economic value of acquired assets drawn from price allocation disclosures enables researchers to simultaneously study multiple sources of synergy.

JEL classification: G32; G34; M40.

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1. Introduction

This paper examines the role of target firms' intellectual property and contractual relationships on value creation in mergers. Our investigation extends prior work on the nature of merger synergies as intellectual property encompasses not only patents and on-going R&D activities, but also unpatented technologies, trade secrets, internally developed software/IT processes, and trademarks. This is important because these various sources of intellectual property are economically significant relative to patents.¹ In addition, target firms' customer relationships and contractual rights (e.g., lease or service agreements) have, to our knowledge, not been studied in the context of merger wealth effects. Using a large sample of post-2001 mergers for which we extract merger-specific information about the nature and value of acquired assets from SEC filings disclosing merger price allocations, we find that the components of the target's intellectual property account for 25% to 33% of total merger value creation.²

Our evidence relating merger price allocation disclosures to merger wealth effects is of interest to M&A researchers for four reasons. First, exploiting merger-specific economic data in large samples arguably overcomes one of the main reasons for why evidence on the source of merger synergies is scarce (e.g., Andrade, Mitchell, and Stafford 2001; Betton, Eckbo, and Thorburn 2008). Second, our data enable us to simultaneously study the relative importance of multiple sources of synergy. This contrasts with prior work which, with the exception of Devos et al.'s (2009)

¹ Cohen et al. (2000) show that patents tend to be less emphasized than other forms of intellectual property in manufacturing industries. Rowe (2009) estimates the value of the trade secrets of U.S. public firms at \$5 trillion, while by comparison, we estimate the economic value of patents issued from 1992 to 2008 in the Kogan et al. (2017) database at \$12.5 trillion (in 2008 dollars). Further, Potepa and Welch (2017) argue that many innovative firms such as Airbnb, Netflix, and Uber derive most of their value from unpatented technology, software, and trademarks.

² Since 2001, publicly traded firms have been required to provide finer disclosures about their acquisitive activities. That is, in addition to disclosing the target's tangible net assets and goodwill firms are also required to disclose the economic value of all other identifiable intangibles acquired, including the target's previously unreported intangible assets (e.g., R&D, Technology, Trademarks, Contractual Rights, and Customer Relationships). The valuations that underlie the allocation of the merger price are reliable to the extent that they are determined by an independent appraiser and audited by an independent auditor.

analysis of a sample of merged Value Line firms, has focused on studying a single source of synergy at a time (e.g., reduction in expected expropriation costs in Beneish et al. (2008), product market synergy in Hoberg and Philips (2010), and innovation synergy in Bena and Li (2014)). Third, the economic values we use are likely to capture merger-specific synergies more precisely and more completely than commonly available surrogates. For example, we find that targets have no prior patents in 30% of the deals in which acquirers buy technology-related intangibles. This highlights the importance of unpatented technology, proprietary computer software, and trade secrets in the acquisition of technology-related assets. Further, we find that acquirers do not recognize innovation-related intangibles in 45% of the targets that have investments in R&D, suggesting that not all R&D activities of the target have value for the combined firm.³

Finally, we relate purchase price allocations to conventional and alternative measurements of merger wealth effects. Specifically, we introduce a new measure that builds on prior work and adjusts the conventional three-day acquirer price reaction for partially anticipated merger announcements and signals about an acquirer's incentives to engage in acquisitions (e.g., overvaluation, limited organic growth opportunities) that are often revealed at the announcement of a deal. In addition, a second alternative measure is our implementation of Wang's (2018) suggestion to adjust the acquirer price reaction for estimated synergy losses in exogenously withdrawn deals.

We argue that purchase price allocation disclosures (PPA) enable *researchers* to ex post identify sources of synergy expected by investors at the time of the merger announcement. This is

³ The market values of four major types of intangible assets as disclosed in the purchase price allocation are related to previously used proxies for innovation and marketing synergies, but while positive, the correlations are generally modest in magnitude. For example, we find correlation coefficients of .17 between patents and allocations to R&D and of .16 between patents and allocations to technology. Similarly, we find a correlation of .29 between pre-merger advertising expenditures and the proportion of the purchase price allocated to trademarks.

plausible if either (1) investors have rational expectations about the value of the target's identifiable assets across states of nature (i.e., standalone vs. acquired), or (2) deal announcements *update* investors' expectations about the probabilities of different states of nature and the value of the target's identifiable assets in the state in which the proposed merger occurs (based on, for example, information revealed at deal announcement in press releases, investor and analyst presentations, or conference calls). To further evaluate our argument, we examine the market reaction to the subsequent SEC filing that discloses the allocation, which occurs approximately three (seven) months after deal completion (announcement). We find no significant market reaction around the SEC filing date. We further find that the SEC filing date returns are not related to either the merger announcement returns or the values of allocated merger prices.⁴ We interpret these findings as evidence that subsequent SEC filings of PPA do not alter investors' estimates of the economic value of acquired assets.

Our sample consists of 447 mergers involving publicly traded bidders and targets from 2001 to 2015, based on the intersection of SDC, CRSP, COMPUSTAT, and the Pratt's Stats database from which we collect the purchase price allocation as disclosed in the SEC filings. We focus on acquisitions of public targets because the availability of stock prices and returns allows us to evaluate synergies and their distribution among acquirer and target shareholders. As we later detail, our sample of 447 deals is representative of the 1,746 deals involving public acquirers and targets based on the broader intersection of SDC, CRSP, and COMPUSTAT over the same period.

Our results include the following. First, the merger wealth effects we document are generally consistent with prior research. During the three days surrounding the merger announcement, we find

⁴ Our finding of no market reaction is consistent with Shalev (2009), but in conflict with Paugam et al. (2015) and Liang and Yeung (2017). We show that the market reaction to the 10-Q/10-K filing that contains the PPA disclosure is driven by a small subset of firms that concurrently release their earnings. In effect, there is no detectable market reaction associated with PPA disclosures that are not contaminated by concurrent earnings releases.

that, on average, acquirers lose (targets gain) -1.1% (26.5%) of their market value and that synergy gains average 2.9% of the combined merger value, with targets gaining on average 4.6 cents more than acquirers for each dollar of combined pre-merger market values. In contrast, when we re-measure acquirer wealth effects and adjust for anticipation, industry shocks, and signals unrelated to the deal but informative about the acquirer's standalone value, we find that, on average, acquirers gain 0.6% of their market value, synergy gains average 4.3 % of the combined merger value, and target gains decline to an average of 3.3 cents more than acquirers for each dollar of combined pre-merger market values.

Second, we find that synergies are higher in deals in which a greater portion of the purchase price is allocated to the intellectual property of the target. Specifically, we find a positive relation between various measures of deal synergies and the portion of the purchase price allocated to (1) R&D, (2) patented and unpatented technology, trade secrets and software (i.e., acquired technology), and (3) trademarks. Our evidence on innovation is consistent with Bena and Li's (2014) conclusion that combining innovation is a source of merger synergy. However, whereas Bena and Li suggest that, conditional on overlapping innovation, the likelihood of business combination is lower for firms operating in the same output markets, our results are driven by related rather than by diversifying acquisitions. Indeed, we find that synergies arising from the intellectual property of the target are economically significant in the subset of related deals: evaluated at the mean, allocations to R&D, acquired technology, and trademarks, account for 0.28%, 0.48%, and 0.27% of the combined merger value, respectively, which in total represents one-third of the average synergy gain of 3.1% in the subsample of related acquisitions. Based on our re-measured synergy gains, we find that the allocations to these asset classes represent approximately 25% of total merger value creation. On the other hand, we find that synergies are smaller if a greater portion of

the purchase price is allocated to client relationships (e.g., contracts with existing customers). This is consistent with arguments that revenue synergies are more difficult to achieve and that integrating sales forces and preventing client cannibalization is often challenging (e.g., Houston, et al. 2001; Cullinan, et al. 2004, Devos, et al. 2009; E&Y 2013, Chartier, et al. 2017).

Third, we investigate how the synergy gains are shared between acquirer and target shareholders. We find a positive relation between acquired R&D/technology and the premium paid to target shareholders, but no evidence of a relation with acquirer announcement returns. This suggests that most of the synergies arising from the target's intellectual property flow to target shareholders. In contrast, we find that synergies from acquiring trademarks mainly flow to the acquirer. That is, we find that the premium paid is no different in deals with a greater allocation to trademarks and that acquirers gain from buying trademarks. Finally, we find that goodwill is not associated with higher synergies, but that acquirers pay a higher premium and experience more adverse shareholder wealth effects in deals in which a greater portion of the purchase price is allocated to goodwill. These findings suggest that acquirers overpay for deals with a substantial amount of goodwill.

Overall, our evidence validates the use of purchase price allocation disclosures to study merger wealth effects. Our findings on the synergistic value of targets' intellectual property underscore the importance of using more precise and complete proxies for potentially synergistic activities. In addition, the measure we propose to estimate acquirer (and thus combined) wealth effects builds on and adds to prior work as its adjustments for merger anticipation, acquirer signaling, and industry effects are easily implementable.

2. Empirical Framework

2.1 Related Literature

There is extensive evidence of positive estimates of aggregate value creation from mergers. Yet, whereas theoretical justifications for synergy gains are abundant, without access to detailed merger-specific data researchers have historically found it difficult to identify the sources of such gains, even in smaller samples and clinical studies (e.g., Jensen and Ruback, 1983; Kaplan, 2000; Andrade et al. 2001).⁵ Our work is related to three types of studies that have recently attempted to document the motivations underlying mergers.

First, there are studies that focus on smaller samples with detailed economic information about individual acquisitions. Beneish et al. (2008) draw on data that became publicly available as a result of the tobacco litigation settlement to study acquisitions by a small group of homogenous firms in the tobacco industry. They show that geographic diversification enables tobacco firms to influence politicians in a greater number of political districts and transforms excess financial assets into physical and intangible assets of non-tobacco operations, thereby reducing expected expropriation costs. Devos et al. (2009) study a sample of 264 mergers involving firms followed by Value Line from 1980-2004. By exploiting Value Line forecasts of earnings, revenues, cash flows, and investments of acquirers, targets, and the combined firm, Devos et al. show that value creation stems from operating synergies in related mergers and from tax savings in diversifying mergers.

Second, several studies have examined a particular source of synergy in larger samples. Hoberg and Phillips (2010) focus on product market synergies described as the ability of merging

⁵ Synergistic gains have been suggested to arise from (1) exploiting economies of scale, (2) obtaining operating synergies from vertical integration, (3) obtaining tax benefits, (4) replacing inefficient management, (5) increasing debt capacity, and (6) creating an improved internal capital market (e.g., Teece, 1980; Ravenscraft and Scherer, 1987; Healy et al., 1992; Shleifer and Vishny, 1992).

firms to create new and unique products that complement an acquirer's existing range of products and enable the merged firm to better differentiate itself from its rivals. They find that firms with more similar product market language are more likely to engage in a merger, experience higher announcement returns during an 11-day window [-10, 0], and generate higher profitability and greater growth in sales and product descriptions in the long run. Related to innovation, Sevilir and Tian (2012) suggest that merger wealth effects are greater when the target has filed for at least one patent during the three years prior to the merger and conclude that acquiring innovation creates value. Bena and Li (2014) use both textual analysis and patent data and find greater patent output post-merger, suggesting that synergies arise when acquisitions involve complementary R&D activities. Our study differs because we examine detailed information about several sources of synergy simultaneously and because our analysis of announcement returns enables us to estimate the expected value of synergies.

Finally, our work is also related to research that examines post-merger long-run performance and changes in firm behavior.⁶ However, in contrast to these studies, we focus on studying value creation at merger announcements, to avoid concerns that post-merger improvements could be related to either unobservable common shocks (Andrade et al. 2001) or changes in the business strategy that are unrelated to the merger (Philips and Zdanov 2013), instead of anticipated merger synergies.

⁶ Healy et al. (1992) and Andrade et al. (2001) show that merged firms' accounting profitability improves relative to their industry peers during the two to five years following a merger. Using manufacturers' plant-level data, Maksimovic and Phillips (2001) and Schoar (2002) present improvements in Total Factor Productivity during two years after mergers. Specifically, acquirers reduce target's wage rates, material inputs, and investments, but the corresponding outputs do not decline proportionally (Li, 2013), and acquirers sell productivity-declining plants and retain productivity-enhancing plants after mergers (Maksimovic et al. 2011). More recent studies focus on different aspects of synergistic gains for non-manufacturing firms. In the consumer goods industry, Sheen (2014) documents an increase in product quality and a decrease in selling prices up to five years after mergers. On the other hand, Seru (2014) focuses on innovative industries and finds that successfully merged firms produce more and higher quality patents than firms failed to be acquired due to reasons other than R&D activities.

Our approach is based on detailed economic information about the target. Specifically, since 2001 publicly traded firms are required to disclose the economic value of all identifiable assets acquired. Thus, in addition to the target's tangible net assets and goodwill, acquirers disclose the value of all other identifiable intangibles acquired, including the target's previously unreported intangible assets. These assets include R&D, technology, trademarks, contractual rights, and customer relationships, which we describe in more detail in Appendix A. Importantly, we believe that these expanded disclosures and the valuations disclosed in the purchase price allocation can overcome many of the limitations in prior literature. First, as purchase price allocation disclosures are mandated by the SEC, we are able to examine a large sample of mergers. Second, because the asset valuations are deal-specific and typically independently generated and audited, they are more precise and complete than commonly used proxies.⁷ Third, having detailed target-specific economic information about the nature of *all* acquired assets enables us to simultaneously investigate various sources of synergies at the time of merger announcements.

2.2 Relating Merger Wealth Effects to Purchase Price Allocations

We define ΔMVE_ACQ as the change in acquirer's market value of equity from day -2 to the day after the merger announcement and define $ACAR$ as the acquirer's cumulative market adjusted abnormal return from day -1 to day +1. We similarly define the wealth effect on target shareholders in dollars (ΔMVE_TGT) and in percentages ($TCAR$). In addition to this conventional estimate, we consider two alternative measures of acquirer wealth effects. The alternative measures begin with the conventional three-day market-adjusted (or market *and* industry-adjusted) price

⁷ Values are typically determined by independent appraisers based on the "highest and best use" value in the most advantageous market and audited by the firm's independent auditors. Appraisers tend to view the concept of highest and best use as "the single most important issue to appraising" (Munizzo and Virruso-Musial 2009, p. 100). In the accounting standard governing acquisitions, highest and best use is defined as "the use of a nonfinancial asset by market participants that would maximize the value of the asset...within which the asset would be used" (Accounting Standard Codification 820-10-35-10A).

reaction to deal announcements. We then make adjustments to disentangle the signaling effects of the merger announcement and to rescale the price reaction for the extent to which an acquisition by a given firm is anticipated. Appendix B details our proposed alternative estimation of acquirer wealth effects as well as our implementation of Wang’s (2018) suggestion to adjust the three-day price reaction for estimated synergy losses in exogenously withdrawn deals.

We estimate synergy gains by combining acquirer and target shareholder wealth effects ($\text{SYNERGY} = \Delta\text{MVE_TGT} + \Delta\text{MVE_ACQ}$), following Bradley et al. (1988) and measure the distribution of those gains ($\text{DISTRIBUTION} = \Delta\text{MVE_TGT} - \Delta\text{MVE_ACQ}$), following Ahern (2012). Based on prior studies, we posit that the acquirer wealth effect ($\Delta\text{MVE_ACQ}$) is the sum of two components: (1) investors’ assessment of the net present value of the proposed merger as an investment (NPV) and (2) a signaling component about the firm’s management, the value of its equity, or its future growth prospects (SIGNAL).⁸ We view the target wealth effect ($\Delta\text{MVE_TGT}$) as the takeover premium, computed as the difference between the purchase price (PURCHASE PRICE) and the target’s market value of equity prior to merger announcement (TMVE_PRIOR). The target wealth effect can be construed as the difference between the ‘synergistic’ value of the target as perceived by acquirer’s management and the standalone value of the target. This enables us to rewrite synergy as follows:

$$\text{SYNERGY} = \text{PURCHASE PRICE} - \text{TMVE_PRIOR} + \text{NPV} + \text{SIGNAL} \quad (1)$$

⁸ Prior research has investigated several explanations for acquirer wealth losses including (1) that diversification occurs for the benefit of managers (i.e., as a means of managers to protect their equity-contingent wealth and human capital and reap private rewards (the agency cost hypothesis; Jensen 1986)), (2) that acquiring firms’ managers overestimate their ability to manage the target company and overpay for acquisitions (the hubris hypothesis; Roll 1986), (3) that acquisitions paid for with equity signal that the equity of the acquirer is overvalued (the overvaluation hypothesis; Travlos 1987; Fuller et al. 2002; Moeller et al. 2004), (4) that acquisitions signal reduced internal growth opportunities (the growth opportunity hypothesis; McCardle and Viswanathan 1994), and (5) that the negative returns are induced by price pressure resulting from the actions of arbitrageurs (Mitchell et al. 2004).

The purchase price allocation consists of the sum of the fair values of the target's identifiable assets under the combined firm and goodwill as a remainder from the price negotiated by acquirer's management. It is thus the sum of the fair values of target's tangible net assets ($FVTNA_{MERGER}$), goodwill (GWL_{MERGER}), and identifiable intangible assets ($INTG_{MERGER}$), most of which were previously unreported. Although, we view the value of a firm as reflecting an expectation of value across states of nature, including some with low probabilities where the firm is either acquired or fails, we posit for simplicity that $TMVE_PRIOR$ is the sum of three unobservable components: the fair value of tangible net assets ($FVTNA_{ALONE}$), the fair value of recorded and unrecorded intangibles ($INTG_{ALONE}$), and the value of recorded and unrecorded goodwill (GWL_{ALONE}), all as perceived by investors assuming the target continues as currently organized and managed (i.e., as a standalone entity). Substituting, we can rewrite (1) as suggesting that purchase price allocations help assess the source of merger synergies by identifying differences in the standalone vs. merged value of the target's identifiable assets.

$$\begin{aligned}
 SYNERGY = & (FVTNA_{MERGER} + INTG_{MERGER} + GWL_{MERGER}) \\
 & - (FVTNA_{ALONE} + INTG_{ALONE} + GWL_{ALONE}) + NPV + SIGNAL \quad (2)
 \end{aligned}$$

Our empirical specification of equation (2) is as follows. First, we distinguish seven categories of intangibles from the purchase price allocation: R&D, technology, trademarks, client relationships, contractual rights, other intangibles, and goodwill. The fraction of the deal value represented by each of these categories represents our test variables, with the allocation to the target's tangible net assets serving as a reference category. Second, the fair values of the target's intangible assets *prior* to the merger (e.g., stand-alone values) are not observable by researchers regardless of whether they are reported in financial statements or not. Consequently, we include proxies to capture market participants' estimations of the values of these intangible assets prior to

merger announcements. That is, we include the book values of pre-merger existing intangibles that are reported on the target's balance sheet prior to the merger. In addition, prior studies show that investors also value *unreported* intangible assets derived from R&D and advertising activities (e.g., Joos and Plesko 2005). Therefore, we include the estimated pre-merger market valuation of unrecorded R&D assets and trademarks following the procedures in Lev and Sougiannis (1996) and Penman and Zhang (2002).

The last two components of equation (2) relate to the change in acquirer shareholder wealth, which measures the extent to which the merger is a positive or negative NPV investment and may reflect a SIGNAL component that is unrelated to the value-creation of the deal. If there is no signaling component, a positive (negative) acquirer return indicates investors' belief that the acquirer has underpaid (overpaid) for the target. However, as some form of signaling is likely and given that the NPV and SIGNAL components are not separately observable, our analyses attempt to control for the agency costs, equity overvaluation, and growth opportunities inherent in SIGNAL. In addition, we control for the possibility that acquisition activity is anticipated as one can expect a muted market reaction to (partially) anticipated deals.

Given evidence on the value of diversification in prior work, we also conduct our analysis on a sample partitioned based on whether the deal is related or diversifying.⁹ The underlying idea is that the likelihood of synergies is lower and that of overpayment higher when acquisitions are diversifying. To the extent that synergies are less likely, we expect the information from purchase price allocations to be less useful for diversifying mergers.

⁹ Prior research consistently reports negative or zero abnormal returns for firms announcing diversifying acquisitions and a number of studies have provided evidence consistent with either Jensen's free-cash-flow hypothesis--in which the negative returns represent agency costs, or Rolls' hubris hypothesis--in which the negative returns represent managers miscalculations that result in overpayments (e.g., see Jensen 1986; Roll 1986; Shleifer and Vishny 1989; Harford 1999; Bruner 2002; Moeller et al. 2004). In large-sample studies of diversifying acquisitions, the costs from hubris and agency concerns apparently outweigh any benefits from improved financial or operating efficiency.

3. Method

3.1 Sample Selection

The principal analyses in this paper are based on a sample of completed deals announced between 2001-2015, involving public acquirers and targets at the intersection of SDC, CRSP, COMPUSTAT, and the Pratt's Stats database from which we collect purchase price allocations as reported in SEC filings. As described in Table 1, Panel A, from the 2,755 SDC completed deals involving public acquirers and targets for which we have data in both CRSP and Compustat, we drop 138 deals with deal values less than \$5 million, 395 deals in which the deal value is less than 1 percent of the acquirer's market capitalization, 83 deals in which the acquirer previously owned a controlling interest (i.e., 50% or more of the target), and 393 deals with missing Compustat data. Out of the remaining 1,746 deals, we identify 447 deals (approximately 26%) for which the Pratt's Stats database contains a textual summary of the purchase price allocation extracted from the audited SEC filing. We further verify the accuracy of the Pratt's textual data by manually checking the information in Pratt's with the original SEC filing.

In Table 1, Panel B, we compare our final sample (N=447) to the SDC/Compustat sample from which it is drawn (N=1,746) to assess whether there is a selection issue associated with the use of the Pratt's database. The two samples are similar with respect to acquirer and combined wealth effects (ACAR & PCAR), but target shareholders gain more in our sample (TCAR; mean [median] 0.265 [0.230]) than in the SDC sample (mean [median] 0.239 [0.193]). In terms of deal characteristics, our sample contains fewer stock only acquisitions than the SDC sample (19.5% vs. 23.6%), but more tender offers (20.4% vs. 16.3%). Whereas these differences together suggest higher anticipated synergies in our sample, the average synergy gain is numerically, but not statistically higher in our sample (0.029 vs. 0.025).

With respect to merging firms' characteristics, our sample firms share a similar size with the average SDC firm, but our targets have marginally lower book-to-market ratios (0.578 vs. 0.677). In addition, both our acquirers and targets have greater analyst following and are on average two years older than the firms in the SDC sample. Overall, these results reveal (economically) minor differences between the two samples, suggesting that our sample is representative of the deals in the SDC universe. Nevertheless, our analyses systematically control for these differences and other firm and transaction characteristics that are documented by prior research to affect deal outcomes.

3.2 Empirical Model

We conduct our empirical tests on the relation between merger wealth effects (DEPVAR) and purchase price allocations using the following model specification:

$$\begin{aligned} \text{DEPVAR} = & \beta_1 + \beta_2\text{REL_GW} + \beta_3\text{REL_RD} + \beta_4\text{REL_TECH} + \beta_5\text{REL_CLIENT} + \\ & \beta_6\text{REL_RIGHTS} + \beta_7\text{REL_TM} + \beta_8\text{REL_INTAN} + \beta_9\text{CAPRD_ACQ} + \\ & \beta_{10}\text{CAPADV_ACQ} + \beta_{11}\text{INTAN_ACQ} + \beta_{12}\text{CAPRD_TAR} + \beta_{13}\text{CAPADV_TAR} + \\ & \beta_{14}\text{INTAN_TAR} + \beta_{15}\text{SIZE_ACQ} + \beta_{16}\text{LDVALUE} + \beta_{17}\text{STOCKONLY} + \beta_{18}\text{MERGER} + \\ & \beta_{19}\text{TENDER} + \beta_{20}\text{BIDCOMP} + \beta_{21}\text{DIVERSIFY} + \beta_{22}\text{BTM_ACQ} + \beta_{23}\text{BTM_TAR} + \\ & \beta_{24}\text{ROA_ACQ} + \beta_{25}\text{ROA_TAR} + \beta_{26}\text{FIRMAGE_ACQ} + \beta_{27}\text{FIRMAGE_TAR} + \\ & \beta_{28}\text{RUNUP_ACQ} + \beta_{29}\text{RUNUP_TAR} + \beta_{30}\text{ANALYST_ACQ} + \beta_{31}\text{ANALYST_TAR} + \\ & \beta_{31}\text{PROBACQ} + \text{Year FE} + \text{Industry FE} + \varepsilon \end{aligned} \quad (3)$$

Where DEPVAR captures different merger wealth effects related to (1) synergies [the combined firms' announcement return (PCAR), a combined announcement return that is adjusted for anticipation, industry shocks, and signals of the acquirer's standalone valuation (ADJ_PCAR), a combined announcement return adjusted via a withdrawn deal sample (WDADJ_PCAR), or the amount of dollar synergies relative to the deal value (REL_PCAR)], (2) acquirer value creation [the acquirer's announcement return (ACAR), an acquirer announcement return that is adjusted for anticipation, industry shocks, and signals of the acquirer's standalone valuation (ADJ_ACAR), an acquirer announcement return adjusted via a withdrawn deal sample (WDADJ_ACAR), or the amount of the acquirer's dollar synergies relative to the deal value (REL_ACAR)], and (3) four

measures capturing wealth transferred from acquirer to target shareholders [an estimate of the premium paid (PREMIUM), an estimate of the distribution of gains to targets relative to acquirers (TGAIN), an alternative distribution measure adjusted for anticipation, industry shocks, and signals of the acquirer's standalone valuation (ADJ_TGAIN), or a distribution measure adjusted via a withdrawn deal sample (WDADJ_TGAIN)]. The explanatory variables are defined in more detail in Appendix C. Industry fixed effects are based on the Fama-French 12 industry classification and we use robust standard errors that are clustered at the acquirer level in our tests.

3.3 Descriptive Statistics

Table 2 reports descriptive statistics for variables used in the analyses based on all 447 mergers in the full sample and for subsamples that contain either 304 related or 143 diversifying mergers. We discuss results for the full sample and refer to the subsamples when tests reveal noteworthy differences between related and diversifying deals.

Table 2, Panel A reports several measures of merger wealth effects. In the full sample, the mean (median) acquirer wealth effect—ACAR—is negative -1.1% (-0.9%). This is in line with prior research findings, in terms of both direction and magnitude. Moeller et al. (2004) and Ahern (2012) report negative acquirer returns for public acquisitions of -1.02% and -1.27%, respectively. A lower acquirer return of -2.14% within a five-day window is documented in Cai and Sevilir (2012, p. 334).

The target wealth effect (TCAR) and estimated synergy gains (PCAR) are both positive, representing 26.5% (median: 23.0%) of the target's market value and 2.9% (median: 1.8%) of the combined merger value. The target wealth effect is in line with the 19.8% reported by Ahern (2012, p. 537) and the 21.2% reported by Cai and Sevilir (2012, p. 334). However, our estimated synergy gains are an order of magnitude greater than the 1.35% and 1.12% reported by Moeller et al. (2004, p. 224) and Cai and Sevilir (2012, p. 534), respectively. The premium paid for the target, calculated

relative to the target's market value two months prior to deal announcement, averages approximately 40%. TGAIN is the relative gain to the target firm and is calculated as the dollar gain of the target minus the dollar gain of the acquirer, divided by the sum of the acquirer's and target's market capitalization two months prior to deal announcement, following Ahern (2012). The average of 0.046 indicates that for each dollar of combined pre-merger values, targets gain 4.6 cents more than acquirers do. Furthermore, the average target gain in related acquisitions is greater than in diversifying acquisitions (5.0 cents vs. 3.8 cents).

In addition to the conventional measures of wealth effects, we find that acquirer shareholders gain 0.6% (and value creation averages 4.3%) when we disentangle acquirer's revelation and adjust announcement returns for the likelihood that an acquisition is anticipated. Further, when adjusting announcement returns using a sample of exogenously withdrawn deals we find, similar to Wang (2018), that acquirers gain 3.7% and that synergy estimates average 6.7%. The final measure we consider is our adjusted wealth effect measure deflated by deal value. This is a way of assessing the expected yield to or ROI on the acquirer's investment (REL_ACAR, 11.6%) and the value creation as a function of the size of the deal (REL_PCAR, 26.8%).

Table 2, Panel B reports how the purchase price is allocated to goodwill, various types of previously unrecorded intangibles, and tangible net assets. The allocation to goodwill (REL_GW) is the largest, representing on average 43.9% of the purchase price, followed by that to tangible net assets as a group (REL_TANG; 28.0%). Intangible assets represent R&D (REL_RD; 3.3%), trademarks (REL_TM; 2.7%), customer relationships (REL_CLIENT; 6.0%), rights (REL_RIGHTS; 1.6%), technology (REL_TECH; 4.7%), and a group of unspecified intangibles that are typically disclosed as 'other' (REL_INTAN; 9.9%). When comparing related mergers with diversifying mergers, acquirers in related deals purchase more R&D (4.0% vs. 1.9%), rights (2.1%

vs. 0.5%), and tangible assets (31.0% vs. 21.6%) than acquirers in diversifying deals. On the other hand, diversifying acquirers purchase more customer relationships (6.7% vs. 5.7%) and goodwill (50.2% vs. 40.9%).

Since some intangible assets are already recognized in the target's balance sheet prior to the merger (potentially due to previous mergers) and market participants are likely to estimate unrecorded intangibles based on information from the financial statements, we include pre-merger intangible assets as control variables to strengthen our test of whether purchase price allocations provide incremental information to shareholders. Table 2, Panel C reports estimated unrecorded intangibles and recorded intangibles by the acquirer and the target before the merger.

We estimate unrecorded R&D assets and trademarks by relying on capitalization techniques proposed in prior studies.¹⁰ We find that 63% and 67% of the sample acquirers and targets engaged in R&D activities prior to the merger, with the capitalized values representing 8.6% and 12.5% of the acquirer's and target's pre-merger assets (see the means of CAPRD_ACQ and CAPRD_TAR). The capitalized trademark values represent 0.5% and 0.6% of the acquirer's and target's pre-merger total assets (see the means of CAPADV_ACQ and CAPADV_TAR).

Lastly, we incorporate existing intangible assets recognized in the acquirer's and the target's pre-merger balance sheet. On average, prior to the merger, 23.4% of the acquirer's total assets and 17.6% of the target's total assets are recognized as intangible assets (see the means of INTAN_ACQ and INTAN_TAR). Acquirers and targets in diversifying acquisitions possess more existing recognized intangibles than acquirers and targets in related mergers.

¹⁰ Specifically, we calculate the capitalized value of R&D by combining historical R&D expenditures with the industry-specific capitalization coefficients from Lev and Sougiannis (1996). To estimate trademarks, following Penman and Zhang (2002), we capitalize advertising expenditures, assuming a two-year useful life and a straight-line amortization schedule.

To show that purchase price allocations provide incremental information about shareholders' wealth, we include various deal characteristics and merging firms' characteristics as control variables in our regression. Table 2, Panel D reports descriptive statistics on the most important deal characteristics. The median deal value is \$574 million, the form of payment is exclusively stock in 19.5% of the deals, there are few mergers of equals deals (1.6%), 20.4% of the deals are tender offers, 3.1% of the deals have competing offers, and 32% of the deals are diversifying.¹¹ The estimated pre-merger probability of the acquirer being involved in a transaction is on average 8.5%. Only one difference obtains in the sample partition: there are fewer stock-only acquisitions in the diversifying merger sample (14.0%) as compared to the related merger sample (22.0%).

Table 2, Panel E, reports descriptive statistics on various characteristics of both the acquirer and the target (book-to-market, profitability, age, stock price run-up, and analyst following). The average acquirer's market capitalization is \$2.4 billion prior to the merger (SIZE_ACQ). Diversifying acquirers and targets are more profitable (in terms of return on assets) than those in related mergers.

Table 3 presents pairwise correlation coefficients. Although the table has several noteworthy correlations, we do not discuss it thoroughly as we present it for reference. For example, the first five variables are predictably highly correlated as they represent alternative attributes of our wealth effect estimates. Consistent with prior work, stock-only acquisitions are associated with negative wealth effects and book-to-market ratios are related to a number of deal and firm characteristics.

A few correlation coefficients are noteworthy. The correlation coefficient between CAPRD_ACQ and REL_RD is 0.36 and that between CAPADV_ACQ and REL_TM is 0.37,

¹¹ There are only three deals in our sample that are classified as hostile, and as such, we do not report results controlling for hostile deals in the regressions. However, our inferences are unaffected if we include an indicator variable for whether the deal is hostile.

suggesting that acquirers who conduct R&D activities and internally develop trademarks are more likely to acquire firms who undertake similar activities. Similarly, the correlation coefficient between CAPRD_TAR and REL_RD is 0.48 and that between CAPADV_TAR and REL_TM is 0.36, suggesting that allocations to R&D and trademark intangibles are more likely to occur when targets conduct such activities. Because several cross-variable correlations have large magnitudes, we examine variance inflation factors and find no evidence that particular independent variables or groups of variables are inflating the variance of the parameter estimates.

4. Empirical Results

4.1 Merger Synergies

Table 4, Panel A reports results from five specifications of the relation between merger synergies and purchase price allocations. In Models (1) and (2), the dependent variable is PCAR, a synergy estimate calculated following Bradley et al. (1988). In Model (3) the dependent variable is the combined announcement return adjusted for anticipation, industry shocks and signals on the acquirer's standalone valuation (ADJ_PCAR), and in Model (4), it is the combined announcement return adjusted via a withdrawn deal sample (WDADJ_PCAR). In the final column (Model 5), the dependent variable is the amount of dollar synergies relative to the deal value (REL_PCAR).¹²

Model (1) is a base model drawn from variables commonly used in prior work (e.g., Moeller et al. 2004, Ahern 2012, Cai and Sevilir 2012) to capture deal and firm characteristics: it includes 18 explanatory variables plus year and industry fixed effects and its adjusted R^2 is 23.6%. Three variables are noteworthy. In line with evidence from prior research (e.g., Travlos 1987; Moeller et al. 2004; Savor and Lu 2009) that using stock as a payment method potentially signals acquirer

¹² We do not tabulate the estimation results for base models with the three alternative measurements of the dependent variable. These are similar and available on request. For comparison, we tabulate the base model adjusted R^2 below each estimation.

overvaluation, the coefficient on STOCKONLY is significantly negative in four of the five models, the exception being in the estimation with REL_PCAR in Model 5. Acquirer size (SIZE_ACQ) is negatively associated with announcement returns (PCAR, ADJ_PCAR, and WDADJ_PCAR), consistent with evidence in Moeller et al. (2004). Deal value (LDVALUE) is positively related to combined announcement returns (PCAR, ADJ_PCAR, and WDADJ_PCAR), suggesting greater overall synergy creation in larger deals. However, in the regressions with REL_PCAR, deal value (acquirer size) is negatively (positively) associated with the announcement return, suggesting decreasing returns to scale as fewer synergies are created per dollar invested in larger deals.

Model (2) is the base model augmented by the percentage of the purchase price allocated to goodwill and intangible assets, as well as proxies for pre-merger unreported intangibles. As discussed before, we leave out the allocation to tangible assets, which serves as a reference category in our estimation. The model has an adjusted R^2 of 28.1%, representing an improvement in explanatory power over the base model of 19.1%. Three of the purchase price allocation variables are noteworthy. The coefficient on REL_RD, the percentage of the purchase price allocated to R&D intangibles, is positive and marginally significant (0.057, t-statistic=1.70). The coefficient on REL_TECH, the portion of the purchase price allocated to technology intangibles, is also significantly positive (0.093, t-statistic=2.39). These results indicate that purchasing R&D and technology generates more synergies than purchasing net tangible assets. These results are also economically significant: Evaluated at the sample mean, synergies related to R&D and technology intangibles equal 0.19% and 0.44% respectively, which combined represents 21.7% of the sample-average merger synergy estimate of 2.90%.

In contrast, the coefficient on REL_CLIENT, the percentage of the purchase price allocated to customer relationships, is reliably negative (-0.132, t-statistic= -3.24). This suggests that the

purchase of customer relationships, such as client lists and customer contracts, creates less value, for example because the newly acquired customers have the potential to destroy value from the acquirer's existing customer base.¹³

The variable CAPRD_ACQ, our proxy for the acquirer's involvement in R&D activities, is negatively related to synergies (-0.168, t-statistic= -3.10), suggesting either higher risk or greater investor uncertainty about the synergistic value of acquisitions by R&D intensive acquirers. The variable INTAN_TAR, capturing pre-merger reported intangibles at the target, is positively related to synergies (0.041, t-statistic=2.15), suggesting either lower risk or lower investor uncertainty about the synergistic value of acquisitions when the target had existing, recognizable, intangible assets prior to the merger.

We find similar results using our alternative measures of synergies. For example, in Model (3) the coefficients on REL_RD and REL_TECH are positive and equal to 0.066 (t-statistic=1.92) and 0.109 (t-statistic=2.67), respectively, and similarly, in Model (4) the coefficients on REL_RD and REL_TECH equal 0.065 (t-statistic=1.92) and 0.096 (t-statistic=2.46), respectively. Finally, Model (5) also reveals higher synergies associated with R&D and technology intangibles. In particular, the coefficients on REL_RD and REL_TECH are reliably positive and equal to 0.902 (t-statistic=3.51) and 0.854 (t-statistic=3.12), respectively. Evaluated at the sample mean, synergies related to R&D equal 2.98% and those related to technology equal 4.01% of deal value, suggesting that in total, innovation-related synergies account for approximately 26.3% of the sample merger synergies. In sum, we generally find greater (smaller) synergies in acquisitions involving R&D and

¹³ Revenue synergies, presumably driven by acquired customer-related intangibles, tend to be harder to achieve than cost synergies, because integrating sales teams from two merging companies, preventing client cannibalization, and creating incremental sales are often more challenging tasks than cutting cost (e.g., Houston, et al. 2001; Cullinan, et al. 2004, Devos, et al. 2009; E&Y 2013, Chartier, et al. 2017). Our results suggest that market participants seem to recognize this potential for value-destruction and discount the benefits of purchasing customer-related intangibles.

technology (clients) and document that our alternative estimation, which includes information on allocations, explains 23.5%, 38.3%, and 30.6% of the variation in deal synergies. This represents an improvement in explanatory power over the corresponding base models of 12.6%, 10.4%, and 10.1%.

In Table 4, Panel B, we partition the sample into diversifying and related mergers and include all explanatory variables from Equation (3). The results generally suggest that the findings on the full sample in Panel A are driven by the subsample of 304 related (non-diversifying) acquisitions. The coefficients on REL_RD and REL_TECH are positive and significant in all of the regressions. In addition, we find that the percentage of the purchase price allocated to trademark-related intangibles is also significantly associated with deal synergies. For example, in Model (2), with PCAR as the measure of value creation, REL_TM is reliably positive (0.109, t-statistic=2.09). The variable CAPADV_TAR, our proxy for the target's involvement in advertising activities, is negatively related to synergies, and CAPRD_ACQ, our proxy for the acquirer's involvement in R&D activities, is also negatively correlated with synergies.

In sum, we find that the purchase price allocated to R&D, technology, and trademarks explains a significant portion of the sample estimated merger synergies, especially in related deals. Broadly, our findings suggest that synergies stem from a target's intellectual property rather than simply arising from patented innovation.

4.2 Acquirer Wealth Effects

Table 5, Panel A reports the results of five specifications of the relation between acquirer wealth effects and purchase price allocations. In Models (1) and (2), the dependent variable is ACAR, the conventional three-day abnormal return on the stock of the acquirer. In Model (3) the dependent variable is ACAR adjusted for anticipation, industry shocks, and revelations about the

acquirer's standalone valuation (ADJ_ACAR). In Model (4) the dependent variable is ACAR adjusted via a withdrawn deal sample (WDADJ_ACAR), and in the final column (Model 5), the dependent variable is the dollar wealth effect relative to the deal value (REL_ACAR). Relative to their respective base models (shown in column 1 for ACAR), the models augmented with data on allocations have an adjusted R^2 that is equal to 20.4%, 16.5%, 40.9%, and 24.7%. This represents an improvement in explanatory power over their respective base models of 17.9%, 22.2%, 5.7%, and 9.8%, respectively.

The principal finding in these estimations is the negative relation between acquirer wealth and the percentage of the purchase price allocated to goodwill. The coefficient on REL_GW is equal to -0.049 (t-statistic=-2.68), -0.050 (t-statistic=-2.60), -0.039 (t-statistic=-2.16), and -0.224 (t-statistic=-1.90), in Models (2) through (5), respectively. This is consistent with acquirers overpaying for goodwill and investors being uncertain about the suitability of the price paid for the investment in the target. This effect is also economically consequential: evaluated at the sample mean, the wealth loss associated with goodwill ranges from -1.7% to -2.2% of the acquirer's pre-merger market value (in Models (2), (3) and (4)), and implies a negative yield of -9.8% of deal value in Model (5). On the other hand, there is evidence in Model (5) that the acquirer wealth effect increases with the purchase price allocated to R&D and technology: The coefficients on REL_RD and REL_TECH are reliably positive and equal to 0.667 (t-statistic=2.59) and 0.692 (t-statistic=2.56), respectively. Evaluated at the sample mean, the wealth gain associated with these assets is 2.2% for R&D and 3.4% for acquired technology. The variable CAPRD_ACQ, our proxy for the acquirer's involvement in R&D activities, and STOCKONLY are negatively related to the acquirer's wealth, consistent with our previous findings in the synergy analysis (Table 4).

In Table 5, Panel B, we report results for related and diversifying deals. Consistent with our synergy findings, the acquirer findings on the full sample in Panel A are driven by the subsample of 304 non-diversifying acquisitions. The coefficient on REL_GW is negative in all estimations, and the coefficients on REL_RD and REL_TECH are positive in the REL_ACAR estimation.

The novel result in the sample partition is that, consistent with results in Table 4 Panel B, acquirer wealth increases with the proportion of the purchase price that is allocated to trademarks (REL_TM). Trademarks, a word, phrase, symbol, or design that identifies the source of good of one party from the others (i.e., brands), seem to create value in related rather than in diversifying acquisitions. This finding may be explained by the difficulty for customers to recognize brands across different product markets. Indeed, analyzing three-day abnormal returns around the announcements of 136 brand acquisitions, Fine et al. (2016) show that brand acquisitions increase acquirer wealth only in related mergers and suggest that is because information asymmetry is pervasive in diversifying mergers. Moreover, several studies suggest that rebranding activities are more likely to occur when acquirers and targets share a similar product market because customers perceive the combination of two brands in a similar market as a logical fit and reorganizing two sales forces that share similar operations is easier to achieve (e.g., see Capron and Hullan 1999, Lambkin Muzellec 2008, Gussoni and Mangani 2012).

Overall, we find that the purchase price allocated to goodwill and trademarks explain a significant portion of the acquirer's wealth effects, especially in related deals. In addition, there is some, albeit weaker, evidence of greater acquirer value creation in deals with allocations to R&D and technology, which contrasts to their much stronger relation with estimated synergies. Specifically, our results suggest that allocations to goodwill explain the majority of acquirer losses,

while acquisitions of trademarks (in related deals only) and to some extent R&D and technology, explain the majority of acquirer's gains.

4.3 Takeover Premium and Distribution of Gains

Table 6, Panel A reports estimation results for the takeover premium (PREMIUM, Models 1 and 2) and the target's relative gain in the merger (TGAIN, ADJ_TGAIN, and WDADJ_TGAIN, Models 3 to 6). Models 1 and 3 (2 and 4), present base (augmented) models with deal and firm characteristics as well as year and industry fixed effects. Adding variables capturing the purchase price allocation as well as the existence of pre-merger intangible assets increases the adjusted R^2 from 23.8% to 27.5% in Models (1) and (2) and from 28.3% to 31.0% in Models (3) and (4).

In Model (2), we find that the takeover premium increases with the fraction of the purchase price allocated to goodwill and to various types of intangible assets. In particular, the coefficients on REL_GW, REL_RD, REL_TECH, REL_RIGHTS, and REL_INTAN are reliably positive and equal to 0.268 (t-statistic=2.98), 0.435 (t-statistic=2.07), 0.511 (t-statistic=2.86), 0.500 (t-statistic=2.27), and 0.370 (t-statistic=2.45), respectively. Evaluated at the sample mean, the premium related to goodwill represents 11.7% (30% of the sample average premium), the premium portion related to R&D equals 1.4%, and that related to technology, rights, and other intangibles equals 2.4%, 0.8%, and 3.7%, respectively. This suggests that the purchase price allocation explains almost half of the sample takeover premium and that a substantial portion of the premium arises from the acquisition of various intangible assets.

In the estimation of the target's relative gain in Models (4) to (6), the main determinant is the percentage of the purchase price allocated to goodwill. The coefficient on REL_GW equals 0.062 (t-statistic=4.05), 0.063 (t-statistic=3.88), and 0.056 (t-statistic=3.69) in Models (4) to (6), respectively. This effect is economically significant. For example, when the Model (4) estimate is

evaluated at the sample mean, the effect accounts for 2.7 cents or over half of the sample average of 4.6 cents per dollar of combined pre-merger value that targets gain incrementally to acquirers. Coupled with the negative relation between goodwill allocations and acquirer CARs, this result suggests that acquirers overpay for goodwill. The models augmented with information on purchase price allocations and pre-merger intangible assets have an adjusted R^2 that is equal to 31.0% and 30.0% and 50%, respectively suggesting improvements of 9.5%, 8.3%, and 3.3% over the corresponding base models.

Taken together, our results suggest that targets earn a higher premium when acquirers buy goodwill or other intangible assets. The positive relation between premium and intangibles such as R&D and technology is likely driven by the synergies that these intangible assets create (consistent with results in Table 4), while the positive relation between the premium paid and goodwill allocations is likely driven by overpayment on part of the acquirer, as indicated by a higher relative gain earned by the target and a lower acquirer announcement return (Tables 5 and 6).

These conjectures are consistent with the evidence we present in Table 6, Panel B. When we partition the sample into diversifying and related mergers, we expect greater synergies in related mergers than diversifying mergers, but that overpayment is present in both related and diversifying mergers. Consistent with this view, we find that the fraction of the purchase price allocated to goodwill is positively related to both the premium and the target's relative gain across all Models (1)-(8), while allocations to technology and other intangibles explain the premium only in related mergers (see REL_TECH and REL_INTAN in Model (2)). Interestingly, despite the synergies that we document for trademarks in related deals, we do not find that the premium is greater in deals in which acquirers buy trademarks. Coupled with the previous results, the negative relation between the target's relative gain and the allocation to trademarks suggests that unlike synergies arising from

most (intangible) assets, which flow to the target, acquirers reap most of the synergies that arise from trademarks.

4.4 Robustness Tests

4.4.1 Market reaction to the subsequent SEC Filing that contains the PPA disclosure

We identify exact PPA disclosure dates for 427 out of 447 sample deals. The average number of days between the deal announcement and the PPA disclosure date (usually the first 10-K or 10-Q filing after deal completion) is 221 days (see the timeline in Appendix D). The 25th, 50th, and 75th percentiles are 158, 207, and 267 days, respectively. Our earlier results show that investors' recognized synergies at deal announcements are consistent with purchase price allocations disclosed on average 221 days later, suggesting that some form of (voluntary) disclosure regarding the nature of synergies or the assets acquired is available to investors at the time mergers are first announced. These voluntary disclosures, although not audited, are reliable because investors can reconcile the information released on initial deal announcement dates with ex-post audited purchase price allocations disclosed in SEC filings. This confirmation hypothesis follows Ball et al. (2012), who argue that forward-looking financial information released in voluntary disclosures is likely to be truthful if the information will later be verified by independent auditors.

To evaluate whether investors have sufficient information to value deal synergies at deal announcements, we investigate the extent to which there is a market reaction to the subsequent 10-Q/10-K in which the PPA is disclosed. In Table 7, Panel A we report our estimate of the three-day (-1,+1) abnormal (size-adjusted) market reaction to the first 10-Q or 10-K that contains PPA disclosures. When we use all observations, we find that average 10-Q/10-K announcement returns are significantly negative with a mean (median) of -0.64% (-0.46%). This is in contrast to Shalev (2009) who finds no market reaction to PPA disclosures, but in line with Paugam et al. (2015) who

report an average reaction of -0.60%. However, after dropping 10-Q/10-K filings that are concurrent with earnings announcements (defined as 10-Qs/10-Ks with an earnings announcement during the one- or two-day window prior to the 10-Q/10K), we find that announcement returns are no longer significantly different from zero (mean -0.21%), suggesting that the information content in the 10-Q/10-K is mostly driven by earnings news, rather than information in the PPA disclosure.¹⁴

These results are further confirmed by the evidence we report in Table 7, Panel B. In these tests, instead of investigating signed announcement returns, we measure the abnormal variance around the 10-Q or 10-K. Many studies investigating the informativeness of earnings announcement use similar types of measures to infer the extent to which relevant information is released on these days (e.g., Collins et al. 2009; Landsman et al. 2012). Specifically, we compare the average absolute return in the three-day 10-Q/10-K announcement window to the average absolute return during the 50 trading days prior to the announcement of the 10-Q or 10-K (-51,-2). If there is an earnings announcement during this 50-day period we drop the three days (-1,+1) surrounding the earnings announcement for the calculation of benchmark absolute returns. Results are comparable to those reported in Panel A. When we include all observations with available data, there is considerable evidence of information content in 10-Qs/10-Ks, however, after dropping observations with concurrent earnings announcements there is only limited evidence of information content in the 10-Q/10-K that contains the PPA.

In Table 7, Panel C we report the results of tests in which we investigate the relation between deal announcement CARs and the return around the disclosure of the 10-Q/10-K that contains the PPA. Specifically, we run a regression of deal announcement returns on the return around the 10-

¹⁴ In additional tests we find that the change in earnings is a strong predictor of 10-Q or 10-K announcement returns in filings with a concurrent earnings announcement, confirming that it is mainly earnings news in concurrent earnings announcements that drives the significantly negative CAR around the 10-Q or 10-K filing.

K/10-Q that contains the PPA disclosure. After dropping contaminated 10-Q/10-K disclosures, we only find a modest positive and significant relation between acquirer (target) announcement CARs and the return around the 10-Q/10-K in the specification that drops contaminated announcements in the [-1,0] ([-2,0]) window. We do not find a significant relation between estimated synergies (as reflected by *PCAR*) and the 10-Q/10-K announcement return.

Finally, in Table 7, Panel D, we re-estimate our main regressions by replacing the deal announcement CAR with the return around the 10-Q/10-K that contains the PPA. Unlike the main results reported in Table 4 in which we show that purchase price allocations are a significant predictor of deal synergies, we do not find that purchase price allocations are significantly related to the 10-Q/10-K announcement return. Overall, the tests reported in Table 7, Panels A-D suggest that there is only limited information content in the subsequent disclosure of the PPA.

4.4.2 PPA Reporting Bias

Several studies use purchase price allocations (PPA) to explore slightly different research questions. Kimbrough (2007) shows that a target's pre-merger stock price is positively correlated with the proportion of the purchase price that is allocated to R&D, suggesting that investors may possess private information about R&D activities that are not allowed to be recognized on the target's financial statements. Shalev (2009), Shalev et al. (2013), and Zhang and Zhang (2017) examine managers' discretion over the content of PPA disclosures and, for example, show that CEO incentives to meet earnings benchmarks are positively associated with reporting biases in the PPA.

To assess the robustness of our findings, we incorporate the proxy for reporting bias incentives commonly used in these studies. In particular, Shalev et al. (2013) argue that a CEO's cash bonus likely captures their incentives to meet earnings-based benchmarks and they find that the size of an acquirer CEO's bonus is positively associated with the proportion of the purchase price

that is allocated to goodwill. Consequently, we collect acquirer's CEO compensation details from ExecuComp and pre-merger proxy statements and add a variable that captures a CEO's cash bonus deflated by total compensation over the two years prior to the merger in all our analyses. The average bonus percentage in our sample is equal to 7.4 percent of total compensation, with the majority of the acquirers not paying a bonus to their CEO (the median bonus is zero). We find quantitatively and qualitatively similar results (untabulated), suggesting that our findings are not an artifact of biased reporting of purchase price allocations.

5. Conclusion

Our paper shows that purchase price allocation disclosures can help researchers identify sources of synergies in mergers and incrementally explain variation in combined and acquirer wealth effects, target premia, and the division of synergy gains. Results based on a sample of 447 mergers involving publicly traded bidders and targets from 2001 to 2015 show that greater proportions of purchased technology, R&D, and trademarks are positively associated with deal synergies. Our evidence suggests that target firms' intellectual property substantially impacts value creation in mergers and extends prior work on merger synergies as intellectual property encompasses not only patents and on-going R&D activities, but also a variety of unpatented technologies, trade secrets, internally developed software, and trademarks. On the other hand, whereas goodwill can be construed as the present value of unspecified synergies expected by management, we find that any such synergies are no different from the synergies associated with acquired tangible assets. Indeed, we show that acquirers overpay for goodwill resulting in a wealth transfer from acquirer to target shareholders.

We show that these results obtain using alternative measures of deal synergies and acquirer wealth effects. Specifically, in addition to presenting results employing conventionally measured

acquirer and combined announcement returns, we also present our results using three easy-to-implement alternative measures of announcement wealth effects that (1) adjust for anticipation, industry shocks, and revelations about the acquirer's standalone valuation, (2) adjust via a withdrawn deal sample, or (3) express the synergies and acquirer wealth effect relative to the amount invested in the deal to create a ROI-type measure.

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Appendix A: Details on the information and asset classes in the PPA disclosure

Since the adoption of Statement of Financial Accounting Standards No. 141 in 2001, firms have been required to allocate purchase prices to separately identified intangible assets, in addition to tangible assets and goodwill. We argue that the additional disclosure requirement of separately identifying intangible assets can provide investors with richer information about sources and values of merger synergies. Specifically, consistent with the requirements of SFAS 141 we separate a firm's allocation to intangible assets into the following categories: R&D, Technology, Clients, Rights, Trademarks, Goodwill, and other intangibles ("Other"). A short description of each of these asset categories is as follows:

- **R&D:** Incomplete research and development projects that have not reached technological feasibility upon the completion of acquisition. Technological feasibility implies that all necessary planning, designing, coding and testing activities are completed in order to establish commercial products (e.g., software systems or FDA approved drugs).
- **Technologies:** Includes developed R&D, patents, trade secrets, internally developed software or IT processes, databases, and unpatented technologies. The Uniform Trade Secret Act defines a trade secret as information, including a formula, pattern, compilation, program, device, method, technique, or process, that: (i) derives independent economic value, actual or potential, from not being generally known to, and not being readily ascertainable by proper means by, other persons who can obtain economic value from its disclosure or use, and (ii) is the subject of efforts that are reasonable under the circumstances to maintain its secrecy.
- **Client relationships:** Relationships and contract agreements with a target's existing customers, including order backlogs, existing contracts (e.g., mobile phone subscriptions), and anticipated future contracts as well as customer lists.
- **Rights:** Contract-based intangibles such as licensing, franchising, and lease agreements as well as use rights for drilling, water, air, etc.
- **Trademarks:** Words, phrases, symbols, and/or designs that identify the source of good of one party from the others (i.e., brands).
- **Goodwill:** The residual amount of the purchase price that cannot be allocated to any identifiable assets and is not separately identifiable. Firms often describe goodwill as other sources of synergies, such as assembled workforce or cost savings from removing redundancies.

On the next page, we show and shortly discuss two examples of purchase price allocations.

Purchase Price Allocation Disclosures regarding Oracle's Acquisitions of BEA Systems and Sun Microsystems

BEA Systems:

Pursuant to our business combinations accounting policy, the total purchase price for BEA was allocated to the net tangible assets, intangible assets, and in-process research and development based upon their estimated fair values as of April 29, 2008 as set forth below. The excess of the purchase price over the net tangible assets, intangible assets, and in-process research and development acquired was recorded as goodwill:

(in millions)

Cash and marketable securities	\$ 1,775
Trade receivables	167
Goodwill	4,355
Intangible assets	3,343
Other assets	248
Accounts payable and other liabilities	(386)
Restructuring (see Note 7)	(231)
Deferred tax liabilities, net	(551)
Deferred revenues	(164)
In-process research and development (IPR&D)	17
Total purchase price	<u>\$ 8,573</u>

In accordance with SFAS 141, Oracle is also required to decompose the \$3,343 it allocates to intangible assets:

In performing our preliminary purchase price allocation, we considered, among other factors, our intention for future use of acquired assets, analyses of historical financial performance and estimates of future performance of BEA's products. The fair values of intangible assets were calculated using an income approach and estimates and assumptions provided by both BEA and Oracle management. The rates utilized to discount net cash flows to their present values were based on our weighted average cost of capital and ranged from 7% to 17%. This discount rate was determined after consideration of our rate of return on debt capital and equity and the weighted average return on invested capital. The following table sets forth the preliminary components of intangible assets associated with the BEA acquisition:

(Dollars in millions)	Fair Value	Useful Life
Software support agreements and related relationships	\$ 1,115	8 years
Developed technology	1,118	6 years
Core technology	518	7 years
Customer relationships	530	8 years
Trademarks and other	62	5 years
Total intangible assets	<u>\$ 3,343</u>	

Where they continue to describe what is included in each of these categories:

Customer relationships and software support agreements and related relationships represent the underlying relationships and agreements with BEA's customers. Developed technology is comprised of products that have reached technological feasibility and are a part of BEA's product lines. Core technology represents a combination of BEA processes, patents and trade secrets related to the design and development of BEA's software products. This proprietary know-how can be leveraged to develop new technology and improve our existing software products. Trademarks represent the fair value of brand and name recognition associated with the marketing of BEA's products and services.

Following the methodology of our study, we would calculate the allocation to R&D to be 0.20% (17/8,573), the allocation to technology to be 32.09% (2,751/8,573), the allocation to clients to be 6.18% (530/8,573), the allocation to trademarks to be 0.72% (62/8,573), and the allocation to Goodwill to be 50.80% (4,355/8,573).

Sun Microsystems:

Pursuant to our business combinations accounting policy, the total purchase price for Sun was allocated to the preliminary net tangible and intangible assets based upon their preliminary fair values as of January 26, 2010 as set forth below. The excess of the purchase price over the preliminary net tangible assets and intangible assets was recorded as goodwill:

(in millions)	
Cash, cash equivalents and marketable securities	\$ 2,571
Trade receivables	1,120
Inventories	331
Goodwill	1,291
Intangible assets	3,347
In-process research and development	415
Other assets	2,035
Deferred tax assets, net	1,250
Accounts payable and other liabilities	(3,950)
Deferred revenues	(1,115)
Total preliminary purchase price	\$ 7,295

The following table sets forth the components of intangible assets acquired in connection with the Sun acquisition:

(Dollars in millions)	Fair Value	Useful Life
Hardware systems support agreements and related relationships	\$ 771	7 years
Developed technology	1,349	4 years
Core technology	534	4 years
Customer relationships	467	3 years
Trademarks	226	7 years
Total intangible assets subject to amortization	3,347	
In-process research and development	415	N.A.
Total intangible assets	\$ 3,762	

Hardware systems support agreements and related relationships and customer relationships represent the fair values of the underlying relationships and agreements with Sun's customers. Developed technology represents the fair values of Sun products that have reached technological feasibility and are a part of Sun's product lines. Core technology represents the fair values of the Sun processes, patents and trade secrets related to the design and development of Sun's products. This proprietary know-how can be leveraged to develop new technology and improve our existing products. Trademarks represent the fair values of brand and name recognition associated with the marketing of Sun's products and services. In-process research and development represents the fair values of incomplete Sun research and development projects that had not reached technological feasibility as of the date of acquisition.

Following the methodology of our study, we would calculate the allocation to R&D to be 5.69% (415/7,295), the allocation to technology to be 25.81% (1,883/7,295), the allocation to clients to be 6.40% (467/7,295), the allocation to trademarks to be 3.10% (226/7,295), the allocation to rights to be 10.57% (771/7,295), and the allocation to Goodwill to be 17.70% (1,291/8,573).

Appendix B: Alternative Estimates of Acquirer Wealth Effects

We build on prior work to provide an alternative estimate of the effect of merger announcements on acquirer shareholders' wealth. Specifically, we adjust the stock price reaction for (i) industry shocks that often underlie merger activity (e.g., see Kaplan 2000; Andrade et al. 2001), (ii) the partial anticipation of merger announcements by investors (e.g., Schipper and Thompson 1983; Song and Walking 2000; Wang 2018), and (iii) the extent to which a merger announcement reveals new information about the acquirer's standalone valuation, such as incentives to engage in acquisitions in response to overvaluation and an acquirer's limited growth opportunities (e.g., Travlos 1987; Fuller et al. 2002; McCardle and Viswanathan 1994; Moeller et al. 2004; Savor and Lu 2009).

We begin by calculating abnormal returns adjusted for market and industry effects (IACAR). We estimate a bivariate market model that includes both the market return and a value-weighted Fama and French 12 industry return, over the one-year period ending two months prior to the deal announcement.¹⁵ Although the above abnormal return adjusts for both market and industry dynamics, we conjecture it still reflects both a signal of a firm's overvaluation and (limited) growth opportunities and the net acquirer gain arising from previously unanticipated merger synergies. To separate the firm-specific signal from the merger gains, we estimate the following model using all public deals on SDC over the ten calendar years preceding the year in which a deal is announced:

$$IACAR_{it} = a_0 + a_1 STOCKONLY_{it} + a_2 TOBINSQ_{it} + a_3 SGROWTH_{it} + a_4 CASH_{it} + \varepsilon_{it} \quad (1)$$

Where *STOCKONLY* refers to acquisitions with stock as the only mode of payment, *TOBINSQ* is measured as the sum of an acquirer's market value of equity, preferred stock, and total debt, scaled by total assets in the year prior to the deal, *SGROWTH* is the natural logarithm of the change in sales over the year preceding the year in which the deal is announced, and *CASH* is the acquirer's cash balance relative to total assets in the year prior to the deal. We include *STOCKONLY* as the exclusive use of stock as a mode of payment can signal to shareholders that the firm's shares are overvalued. We include *TOBINSQ* and *SGROWTH* as two measures of (declining) growth opportunities for which the announcement of a deal can provide investors with new information that helps them to interpret an acquirer's standalone future prospects. Finally, *CASH* is included as a high cash balance in conjunction with acquisitions can be informative about agency costs. We estimate this model over all public deals in SDC on a rolling window of ten calendar years preceding the year in which a deal is announced and we use the parameter estimates to predict the one-year ahead signal component present in IACAR. The difference between the actual stock price reaction and the predicted value (*RES*) is our estimate of the *unanticipated* merger wealth effect on the acquirer of deal *j* at time *t+1*:

$$RES_{jt+1} = IACAR_{jt+1} - (\hat{a}_0 + \hat{a}_1 STOCKONLY_{it} + \hat{a}_2 TOBINSQ_{it} + \hat{a}_3 SGROWTH_{it} + \hat{a}_4 CASH_{it}) \quad (2)$$

¹⁵ We find quantitatively similar results using two-digit historical SIC codes to calculate industry returns.

As a final step, we obtain our new estimate of merger wealth effects by dividing RES_{jt+1} by $(1-P_{jACQ})$, where P_{jACQ} is the estimated probability that firm j is an acquirer in year $t+1$ (detailed below):

$$ADJ_ACAR_{jt+1} = RES_{jt+1} / (1 - P_{jACQ}) \quad (3)$$

To the extent that a transaction is anticipated, there should be no or a smaller reaction at the time of the announcement of the deal. Building on prior literature (e.g. Cremers, Nair, and John 2008; Edmans, Goldstein, and Jiang 2012), we estimate the following model on all firms with available data on Compustat and CRSP to obtain the probability of acquisition:

$$\begin{aligned} ACQ_{t+1} = & a_0 + a_1 NUMACQ_YEAR_{it} + a_2 NUMACQ_IND_{it} + a_3 FIRM_ACQ_{it} + a_4 FIRM_NOACQ_{it} \\ & + a_5 MVE_{it} + a_6 LEV_{it} + a_7 TOBINSQ_{it} + a_8 CASH_{it} + a_9 SGROWTH_{it} + a_{10} ROA_{it} + a_{11} DIVIDEND_{it} + \\ & a_{12} GDWL_{it} + a_{13} FIRMAGE_{it} + a_{14} R\&D_{it} + a_{15} SEGMENTS_{it} + a_{16} RET_{it} + a_{17} STDRET_{it} + a_{18} HERF_{it} \\ & + a_{19} TRAOWN_{it} + a_{20} DEDOWN_{it} + a_{21} QIXOWN_{it} + a_{22} ANALYST_{it} + \varepsilon_{it} \end{aligned} \quad (4)$$

Where ACQ is an indicator variable for whether a firm is an acquirer in year $t+1$. $NUMACQ_YEAR$ is the natural logarithm of the number of deals in year t , $NUMACQ_IND$ is the natural logarithm of the number of deals in the industry in year t , $FIRM_ACQ$ is an indicator variable that is equal to one if the firm was an acquirer in year t , $FIRM_NOACQ$ is an indicator variable that is equal to one if the firm did not engage in a transaction over the years $t-3$ to $t-1$, MVE is the natural logarithm of the firm's market value of equity, LEV is the firm's leverage, $TOBINSQ$, $CASH$, and $SGROWTH$ are as defined before, ROA is the firm's return on assets, $DIVIDEND$ is an indicator variable that is equal to one if the firm pays a dividend, $GDWL$ is the firm's goodwill balance relative to total assets, $FIRMAGE$ is the natural logarithm of the number of years since the firm's first appearance in CRSP, $R\&D$ is the firm's R&D to sales ratio, $SEGMENTS$ is the natural logarithm of the number of segments, RET is the firm's market-adjusted return over the fiscal year, $STDRET$ is the standard deviation of daily residual returns, $HERF$ is the sales-based Herfindahl index of the industry, $TRAOWN$, $DEDOWN$, and $QIXOWN$, are the percentage of shares owned by transient, dedicated, and index-following institutional owners, and $ANALYST$ is the natural logarithm of the number of analysts issuing an earnings forecast during year t . The Pseudo R^2 of the model is 11.1% and the predicted probability of a deal is equal to 7.5% in cases in which there is an acquisition in year $t+1$ versus 3% in cases in which there is no acquisition in year $t+1$. Overall these results suggest that the model performs reasonably well in predicting future acquirers.

An estimate of acquirer wealth effects based on Wang (2018)

We draw from work by Savor and Lu (2009) and Wang (2018) who show that samples of withdrawn deals are useful in distinguishing between alternative explanations of the impact of mergers, and in estimating synergy gains by reference to synergy losses arising from exogenously failed deals. We identify 161 exogenously withdrawn deals (e.g., deals withdrawn due to regulatory intervention, litigation, and competing offers) over our sample period. Whereas Wang (2018) estimates the *average* acquirer wealth effect by subtracting from the conventional three-day average abnormal price reaction, the average abnormal return over a window starting one day after deal

announcement and ending one deal after the withdrawal date ($ANN+1_WITHDRAWN+1$), we are interested in wealth effect estimates at the *individual* acquirer level for use in our subsequent cross-sectional tests. Because exogenously withdrawn deals are scarce, it is impossible to satisfactorily match withdrawn and completed deals in our sample. As such, we calculate an adjusted three-day price reaction by subtracting from the three-day ACAR, the mean estimated synergy losses in withdrawn deals in the same Fama-French-12 industry:

$$WDADJ_ACAR_{jt+1} = ACAR_{jt+1} - FF12_Mean_ (ANN+1_WITHDRAWN+1) \quad (4)$$

Despite the coarseness of the adjustment, when we require five or more withdrawn deals in each Fama-French 12 industry to compute a mean $ANN+1_WITHDRAWN+1$ return over the *whole sample period*, we lose five of the 12 industry groups, which however only represent a minority of the deals in our sample.

Appendix C: Variable Definitions

Wealth Effects Variables	
<i>ACAR</i>	The acquirer's three-day cumulative abnormal return around the deal announcement (-1, +1). The CAPM model is used to calculate expected returns. Benchmark model parameters are estimated using daily returns over the one-year period ending two months prior to deal announcement.
<i>TCAR</i>	The target's three-day cumulative abnormal return around the deal announcement (-1, +1). The CAPM model is used to calculate expected returns. Benchmark model parameters are estimated using daily returns over the one-year period ending two months prior to deal announcement.
<i>PCAR</i>	The three-day cumulative abnormal return of a value-weighted portfolio of the acquirer and the target. Weights are based on the market capitalization of the acquirer and the target two months prior to deal announcement. The percentage of the target owned by the acquirer prior to the merger (toehold) is deducted from the target's weight.
<i>ADJ_ACAR</i>	The acquirer's three-day cumulative abnormal return around the deal announcement (-1,+1), adjusted for industry shocks, partial anticipation, and signals about the acquirer's standalone valuation, calculated following the procedure described in Appendix B.
<i>ADJ_PCAR</i>	The three-day cumulative abnormal return of a value-weighted portfolio of the acquirer and the target, using <i>ADJ_ACAR</i> calculated following the procedure described in Appendix A as a proxy for the acquirer's return. Weights are based on the market capitalization of the acquirer and the target two months prior to deal announcement. The percentage of the target owned by the acquirer prior to the merger (toehold) is deducted from the target's weight.
<i>WDADJ_ACAR</i>	The acquirer's three-day cumulative abnormal return around the deal announcement (-1,+1), adjusted for the industry-average withdrawn deal return, calculated over the period starting one day after deal announcement to one day after deal withdrawal, on a sample of 166 exogenously withdrawn deals, following the procedure described in Appendix B.
<i>WDADJ_PCAR</i>	The three-day cumulative abnormal return of a value-weighted portfolio of the acquirer and the target, using <i>WDADJ_ACAR</i> as described in appendix A as a proxy for the acquirer's return. Weights are based on the market capitalization of the acquirer and the target two months prior to deal announcement. The percentage of the target owned by the acquirer prior to the merger (toehold) is deducted from the target's weight.
<i>REL_ACAR</i>	The dollar price movement of the acquirer is the market capitalization of the acquirer two months prior to the deal announcement times the acquirer's adjusted three-day cumulative abnormal return around deal announcement (<i>ADJ_ACAR</i>) divided by the deal value (i.e., [(market cap target * <i>ADJ_ACAR</i>) / deal value]. <i>ADJ_ACAR</i> is calculated following the procedure described in Appendix B.
<i>REL_PCAR</i>	The dollar price movement on a value-weighted portfolio of the acquirer and the target is calculated as [(market cap acquirer * <i>ADJ_ACAR</i>) + (market cap target * <i>TCAR</i>) / deal value]. Market capitalization of the acquirer and the target are measured two months prior to deal announcement. The target's market capitalization is adjusted for the percentage of the target owned by the acquirer prior to the merger (toehold). <i>ADJ_ACAR</i> is calculated following the procedure described in Appendix B.
<i>PREMIUM</i>	Premium is the initial offer price, or the final offer price if the initial offer price is missing, divided by the target's stock price two months prior to deal announcement, minus one (i.e., [(offer price / pre-merger price) -1]. We set premium to missing if it is greater than two.
<i>REL_TGAIN</i>	The relative gain to the target firm is the dollar gain of the target (i.e., market cap target * <i>TCAR</i>) minus the dollar gain of the acquirer (market cap target * <i>ACAR</i>), divided by the sum of the acquirer's and target's market capitalization two months prior to the deal announcement, following Ahern (2012).
Purchase Price Allocation Variables	
<i>REL_GW</i>	The amount of the purchase price allocated to goodwill scaled divided by deal value.
<i>REL_RD</i>	The amount of the purchase price allocated to R&D scaled by deal value.
<i>REL_TECH</i>	The amount of the purchase price allocated to technology scaled by deal value.
<i>REL_RIGHTS</i>	The amount of the purchase price allocated to rights scaled by deal value
<i>REL_CLIENT</i>	The amount of the purchase price allocated to client relationships scaled by deal value.

<i>REL_TM</i>	The amount of the purchase price allocated to trademarks scaled by deal value.
<i>REL_INTAN</i>	The amount of the purchase price allocated to other identifiable intangibles scaled by deal value.
<i>REL_TANG</i>	The amount of the purchase price allocated to net tangible assets, scaled by deal value.
Estimated Pre-merger Intangible Assets	
<i>CAPRD_ACQ</i>	The acquirer's capitalized R&D at the end of the fiscal year prior to deal announcement, deflated by total assets. The capitalization schedule follows Lev and Sougiannis (1996). Missing R&D is set to zero.
<i>CAPADV_ACQ</i>	The acquirer's capitalized advertising expenditures at the end of the fiscal year prior to deal announcement, deflated by total assets. The capitalization schedule follows Penman and Zhang (2002). Missing advertising expense is set to zero.
<i>INTAN_ACQ</i>	The acquirer's recognized intangible assets at the end of the fiscal year prior to deal announcement divided by total assets.
<i>CAPRD_TAR</i>	The target's capitalized R&D at the end of the fiscal year prior to deal announcement, deflated by total assets. The capitalization schedule follows Lev and Sougiannis (1996). Missing R&D is set to zero.
<i>CAPADV_TAR</i>	The target's capitalized advertising expenditures at the end of the fiscal year prior to deal announcement, deflated by total assets. The capitalization schedule follows Penman and Zhang (2002). Missing advertising expense is set to zero.
<i>INTAN_TAR</i>	The target's recognized intangible assets at the end of the fiscal year prior to deal announcement divided by total assets.
Deal Characteristics	
<i>LDVALUE</i>	The natural logarithm of deal value (Pratt's).
<i>STOCKONLY</i>	An indicator variable that equals one for mergers paid with stock only (SDC).
<i>HOSTILE</i>	An indicator variable that equals one for hostile mergers (SDC).
<i>MERGER</i>	An indicator variable that equals one for mergers of equals (SDC).
<i>TENDER</i>	An indicator variable that equals one for mergers bought by a tender offer (SDC).
<i>BIDCOMP</i>	An indicator variable that equals one for mergers with competing bids (SDC).
<i>DIVERSIFY</i>	An indicator variable that equals one if the acquirer's and target's primary two-digit SIC codes are different (SDC).
<i>PROBACQ</i>	The pre-deal estimated predicted probability that the acquiring firm is involved in a transaction, estimated using Model (4) in Appendix B.
Merging Firms Characteristics	
<i>SIZE_ACQ</i>	The natural logarithm of the acquirer's market capitalization (in thousands) two months prior to the deal announcement.
<i>BTM_ACQ</i>	The acquirer's book-to-market ratio in the end of the fiscal year prior to the deal announcement. Book-to-market ratio is book value of equity divided by market value of equity (Compustat: $[(SEQ / (PRCC_F * CSHO))]$)
<i>BTM_TAR</i>	The target's book-to-market ratio in the end of the fiscal year prior to the deal announcement. Book-to-market ratio is book value of equity divided by market value of equity (Compustat: $[(SEQ / (PRCC_F * CSHO))]$)
<i>FIRMAGE_ACQ</i>	The number of years the acquirer exists in CRSP up till the end of the fiscal year prior to the deal announcement.
<i>FIRMAGE_TAR</i>	The number of years the target exists in CRSP up till the end of the fiscal year prior to the deal announcement.
<i>RUNUP_ACQ</i>	The acquirer's abnormal buy-and-hold return measured over the one-year period ending two-months before the deal announcement. Abnormal returns are individual firms' returns minus market return.
<i>RUNUP_TAR</i>	The target's abnormal buy-and-hold return measured over the one-year period ending two-months before the deal announcement. Abnormal returns are individual firms' returns minus market return.
<i>ANALYST_ACQ</i>	The natural logarithm of one plus the number of analysts covering the acquirer in the year prior to the deal (IBES)
<i>ANALYST_TAR</i>	The natural logarithm of one plus the number of analysts covering the target in the year prior to the deal. (IBES)

Appendix D: Timeline of the Deal and PPA Disclosures

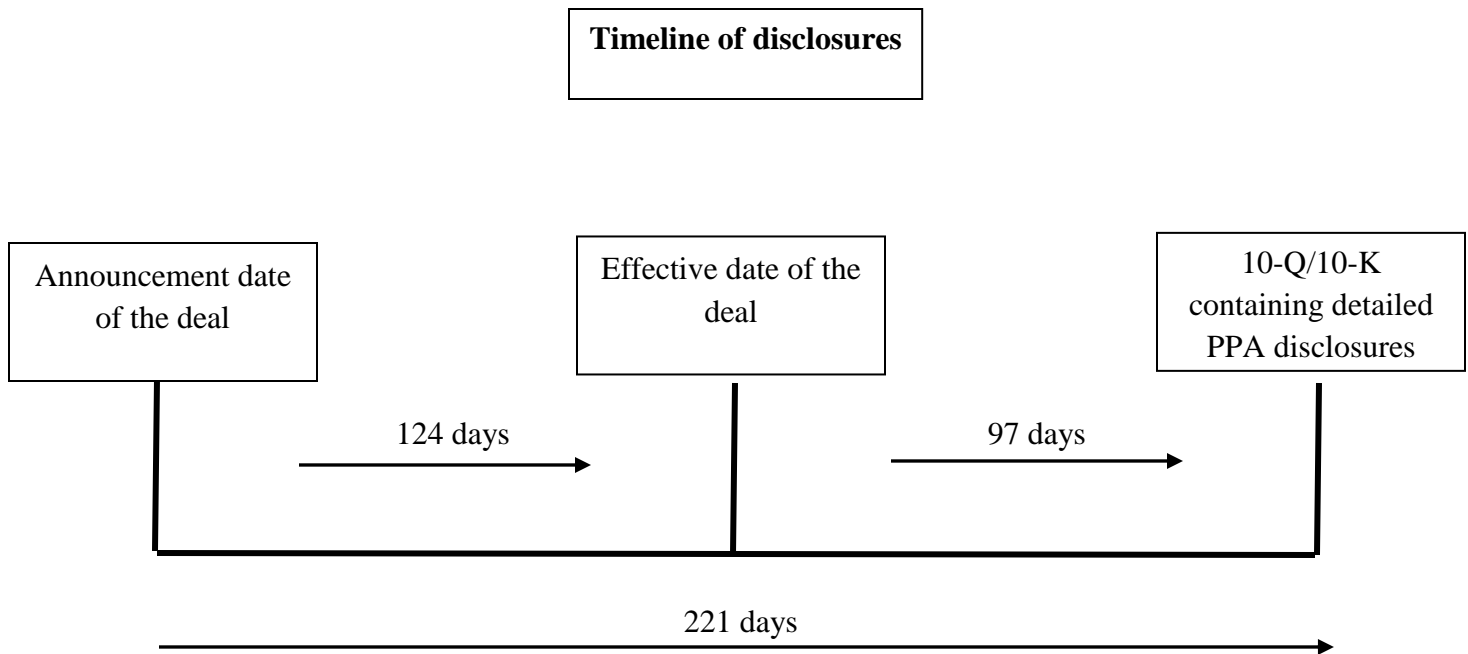


Figure 1: This figure reports the timeline of the typical deal in our sample. After the deal is initially announced it takes on average 124 days for the deal to be completed (25th percentile: 70 days, median: 107 days, 75th percentile: 164 days). After deal completion it takes on average 97 days for the purchase price allocation to be disclosed, in either a 10-Q or a 10-K, whichever comes first (25th percentile: 69 days, median: 91 days, 75th percentile: 117 days). As such from the initial announcement of the deal and the initial market reaction we observe, there is a 221-day delay (25th percentile: 158 days, median: 207 days, 75th percentile: 2617 days) before investors observe the accrual purchase price allocation.

Table 1 Sample Selection and Comparison

This table describes the construction of our final sample of 447 completed deals announced between 2001 and 2015. Panel A reports the sample selection process and Panel B compares our final sample of 447 deals with the SDC/CRSP/Compustat sample of 1,746 deals. Please refer to Appendix C for variable definitions.

Panel A: Sample Selection

	No. of deals
2001-2015 SDC completed deals involving public bidders and targets available in Compustat and CRSP	2,755
Less:	
Deals with a value less than \$5 million	138
Deals with a value less than 1% of the acquirer's market capitalization	395
Deals in which the acquirer already owned more than 50% of the target firm prior to the merger	83
Deals with insufficient data in Compustat	393
SDC/CRSP/Compustat sample before merging with Pratt's	1,746
Less:	
Deals that are not covered by Pratt's	1,299
Final Sample	447

Panel B: Final Sample versus SDC/CRSP/Compustat Sample before Merging with Pratt's

Variable	Mean of final sample	Mean of SDC	p-value diff. mean	Median of final sample	Median of SDC	p-value diff. median
<i>ACAR</i>	-0.011	-0.010	0.78	-0.009	-0.007	0.43
<i>TCAR</i>	0.265	0.239	0.03	0.230	0.193	0.00
<i>PCAR</i>	0.029	0.025	0.21	0.018	0.014	0.18
<i>STOCKONLY</i>	0.195	0.236	0.06	0.000	0.000	0.06
<i>MERGER</i>	0.016	0.029	0.11	0.000	0.000	0.11
<i>TENDER</i>	0.204	0.163	0.04	0.000	0.000	0.04
<i>BIDCOMP</i>	0.031	0.043	0.27	0.000	0.000	0.27
<i>DIVERSIFY</i>	0.320	0.313	0.78	0.000	0.000	0.78
<i>SIZE_ACQ</i>	14.838	14.767	0.48	14.659	14.725	0.53
<i>SIZE_TAR</i>	12.949	12.802	0.13	12.814	12.709	0.36
<i>BTM_ACQ</i>	0.475	0.519	0.01	0.441	0.461	0.14
<i>BTM_TAR</i>	0.578	0.677	0.00	0.481	0.531	0.01
<i>ROA_ACQ</i>	0.041	0.037	0.49	0.046	0.037	0.02
<i>ROA_TAR</i>	-0.016	-0.015	0.97	0.013	0.013	0.95
<i>FIRMAGE_ACQ</i>	2.775	2.656	0.01	2.833	2.708	0.07
<i>FIRMAGE_TAR</i>	2.428	2.323	0.02	2.485	2.303	0.00
<i>RUNUP_ACQ</i>	0.025	0.034	0.32	0.015	0.015	0.88
<i>RUNUP_TAR</i>	0.067	0.071	0.77	0.031	0.041	0.13
<i>ANALYST_ACQ</i>	2.291	2.124	0.00	2.398	2.197	0.02
<i>ANALYST_TAR</i>	1.661	1.496	0.00	1.792	1.609	0.01

Table 2 Descriptive Statistics

This table reports the descriptive statistics of the variables used in our analyses. We present means, medians, and standard deviations based on all 447 mergers in the final sample, and then divide the sample into related mergers (N=304) and diversifying mergers (N=143) and present p values for the difference in means or medians between these two sub-samples. Panel A reports descriptive statistics for our various wealth effect measures. Panel B reports descriptive statistics for the purchase price allocation variables. Panel C reports descriptive statistics for our (estimated) pre-merger intangible assets. Panel D reports descriptive statistics on various deal characteristics. Panel E reports descriptive statistics on the acquirers and targets involved in the transaction. Please refer to Appendix C for variable definitions.

Panel A: Wealth Effect Variables

	All Mergers			Related Mergers		Diversifying Mergers		p-value diff. mean	p-value diff. median
	Mean	Median	Std. Dev	Mean	Median	Mean	Median		
<i>ACAR</i>	-0.011	-0.009	0.073	-0.013	-0.011	-0.007	-0.007	0.46	0.46
<i>PCAR</i>	0.029	0.018	0.070	0.031	0.018	0.024	0.019	0.31	0.89
<i>TCAR</i>	0.265	0.230	0.225	0.263	0.224	0.268	0.242	0.83	0.46
<i>PREMIUM</i>	0.404	0.360	0.308	0.405	0.360	0.400	0.360	0.88	1.00
<i>TGAIN</i>	0.046	0.040	0.065	0.050	0.042	0.038	0.026	0.07	0.04
<i>ADJ_ACAR</i>	0.006	0.003	0.076	0.005	0.001	0.008	0.007	0.63	0.25
<i>ADJ_PCAR</i>	0.043	0.031	0.071	0.045	0.032	0.037	0.029	0.27	0.50
<i>ADJ_TGAIN</i>	0.032	0.025	0.068	0.036	0.028	0.025	0.011	0.12	0.02
<i>WDADJ_ACAR</i>	0.037	0.043	0.084	0.041	0.045	0.030	0.036	0.23	0.26
<i>WDADJ_PCAR</i>	0.067	0.064	0.078	0.073	0.070	0.054	0.053	0.02	0.01
<i>WDADJ_TGAIN</i>	0.007	-0.002	0.077	0.007	-0.002	0.006	-0.002	0.94	0.94
<i>REL_ACAR</i>	0.116	0.014	0.459	0.102	0.003	0.145	0.030	0.36	0.08
<i>REL_PCAR</i>	0.268	0.156	0.487	0.252	0.146	0.303	0.191	0.30	0.25

Panel B: Purchase Price Allocation Variables

	All Mergers			Related Mergers		Diversifying Mergers		p-value diff. mean	p-value diff. median
	Mean	Median	Std. Dev	Mean	Median	Mean	Median		
<i>REL_GW</i>	0.439	0.449	0.220	0.409	0.397	0.502	0.544	0.00	0.00
<i>REL_RD</i>	0.033	0.000	0.110	0.040	0.000	0.019	0.000	0.06	0.01
<i>REL_TECH</i>	0.047	0.000	0.094	0.048	0.000	0.045	0.000	0.75	0.17
<i>REL_CLIENT</i>	0.060	0.000	0.103	0.057	0.000	0.067	0.000	0.32	0.07
<i>REL_RIGHTS</i>	0.016	0.000	0.077	0.021	0.000	0.005	0.000	0.04	0.04
<i>REL_TM</i>	0.027	0.000	0.083	0.025	0.000	0.031	0.000	0.48	0.25
<i>REL_INTAN</i>	0.099	0.001	0.164	0.091	0.000	0.116	0.016	0.13	0.18
<i>REL_TANG</i>	0.280	0.214	0.292	0.310	0.241	0.216	0.153	0.00	0.01

Table 2 Descriptive Statistics (Cont.)

This table reports the descriptive statistics of the variables used in our analyses. We present means, medians, and standard deviations based on all 447 mergers in the final sample, and then divide the sample into related mergers (N=304) and diversifying mergers (N=143) and present p values for the difference in means or medians between these two sub-samples. Panel A reports descriptive statistics for our various wealth effect measures. Panel B reports descriptive statistics for the purchase price allocation variables. Panel C reports descriptive statistics for our (estimated) pre-merger intangible assets. Panel D reports descriptive statistics on various deal characteristics. Panel E reports descriptive statistics on the acquirers and targets involved in the transaction. Please refer to Appendix C for variable definitions.

Panel C: Estimated Pre-merger Intangible Assets

	All Mergers			Related Mergers		Diversifying Mergers		p-value	p-value
	Mean	Median	Std. Dev	Mean	Median	Mean	Median	diff. mean	diff. median
<i>CAPRD_ACQ</i>	0.086	0.035	0.105	0.091	0.034	0.075	0.041	0.14	0.89
<i>CAPADV_ACQ</i>	0.005	0.000	0.012	0.004	0.000	0.006	0.000	0.07	0.38
<i>INTAN_ACQ</i>	0.234	0.172	0.216	0.218	0.148	0.268	0.215	0.02	0.01
<i>CAPRD_TAR</i>	0.125	0.048	0.162	0.131	0.039	0.113	0.049	0.27	0.89
<i>CAPADV_TAR</i>	0.006	0.000	0.014	0.005	0.000	0.006	0.000	0.64	0.06
<i>INTAN_TAR</i>	0.176	0.098	0.199	0.158	0.064	0.215	0.152	0.00	0.00

Panel D: Deal Characteristics

	All Mergers			Related Mergers		Diversifying Mergers		p-value	p-value
	Mean	Median	Std. Dev	Mean	Median	Mean	Median	diff. mean	diff. median
<i>LDVALUE</i>	6.472	6.352	1.716	6.442	6.262	6.534	6.524	0.60	0.46
<i>STOCKONLY</i>	0.195	0.000	0.396	0.220	0.000	0.140	0.000	0.04	0.05
<i>MERGER</i>	0.016	0.000	0.124	0.016	0.000	0.014	0.000	0.85	0.85
<i>TENDER</i>	0.204	0.000	0.403	0.201	0.000	0.210	0.000	0.82	0.82
<i>BIDCOMP</i>	0.031	0.000	0.174	0.039	0.000	0.014	0.000	0.15	0.15
<i>PROBACQ</i>	0.085	0.064	0.067	0.088	0.071	0.078	0.060	0.13	0.09
<i>DIVERSIFY</i>	0.320	0.000	0.467						

Panel E: Merging Firms' Characteristics

	All Mergers			Related Mergers		Diversifying Mergers		p-value	p-value
	Mean	Median	Std. Dev	Mean	Median	Mean	Median	diff. mean	diff. median
<i>SIZE_ACQ</i>	14.838	14.659	1.874	14.691	14.549	15.150	15.029	0.02	0.12
<i>BTM_ACQ</i>	0.475	0.441	0.294	0.493	0.444	0.437	0.411	0.06	0.38
<i>BTM_TAR</i>	0.578	0.481	0.471	0.606	0.498	0.520	0.397	0.07	0.20
<i>ROA_ACQ</i>	0.041	0.046	0.109	0.035	0.039	0.054	0.062	0.09	0.00
<i>ROA_TAR</i>	-0.016	0.013	0.178	-0.024	0.009	0.001	0.034	0.16	0.00
<i>FIRMAGE_ACQ</i>	2.775	2.833	0.830	2.731	2.833	2.869	2.890	0.10	0.78
<i>FIRMAGE_TAR</i>	2.428	2.485	0.840	2.351	2.398	2.594	2.639	0.00	0.01
<i>RUNUP_ACQ</i>	0.025	0.015	0.156	0.035	0.023	0.004	0.004	0.05	0.06
<i>RUNUP_TAR</i>	0.067	0.031	0.227	0.070	0.033	0.060	0.023	0.67	0.38
<i>ANALYST_ACQ</i>	2.291	2.398	0.775	2.267	2.303	2.340	2.485	0.36	0.13
<i>ANALYST_TAR</i>	1.661	1.792	0.925	1.649	1.701	1.686	1.792	0.70	0.94

Table 3 Correlation Matrix

This table reports the correlations among the variables used in the analyses. Bolded correlation coefficients indicate statistical significance at the 5 percent level. Please refer to Appendix C for variable definitions.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38		
1 ACAR	1.00																																							
2 TCAR	0.07	1.00																																						
3 PCAR	0.80	0.26	1.00																																					
4 PREMIUM	-0.01	0.51	0.06	1.00																																				
5 TGAIN	-0.73	0.20	-0.24	0.09	1.00																																			
6 REL_GW	-0.09	-0.03	-0.04	0.03	0.11	1.00																																		
7 REL_RD	-0.01	0.16	-0.03	0.09	-0.02	-0.26	1.00																																	
8 REL_TECH	0.05	0.07	0.04	0.06	-0.06	-0.03	0.01	1.00																																
9 REL_CLIENT	0.04	-0.07	-0.02	-0.07	-0.06	0.08	-0.13	0.29	1.00																															
10 REL_RIGHTS	0.05	0.03	0.03	0.05	-0.05	-0.09	0.16	0.01	-0.08	1.00																														
11 REL_TM	0.17	0.03	0.13	-0.07	-0.12	0.00	-0.01	-0.06	0.11	-0.03	1.00																													
12 REL_INTAN	-0.04	0.05	-0.04	0.12	0.00	0.01	0.00	-0.28	-0.33	-0.11	-0.19	1.00																												
13 REL_TANG	0.02	-0.05	0.03	-0.09	0.01	-0.64	-0.11	-0.22	-0.30	-0.04	-0.17	-0.20	1.00																											
14 CAPRD_ACQ	-0.20	0.00	-0.21	0.03	0.10	-0.05	0.36	0.33	0.05	0.12	-0.09	0.04	-0.22	1.00																										
15 CAPADV_ACQ	0.03	-0.04	-0.02	-0.04	-0.06	0.12	-0.04	-0.04	0.00	0.01	0.37	0.09	-0.19	-0.02	1.00																									
16 INTAN_ACQ	0.09	-0.01	0.06	0.05	-0.10	0.22	-0.02	0.12	0.25	0.03	0.13	0.14	-0.42	-0.06	0.03	1.00																								
17 CAPRD_TAR	-0.13	0.11	-0.14	0.06	0.08	-0.12	0.48	0.36	0.00	0.11	-0.05	0.08	-0.21	0.72	-0.09	0.05	1.00																							
18 CAPADV_TAR	0.04	-0.02	0.01	-0.01	-0.07	0.03	-0.04	-0.02	0.01	0.02	0.36	0.08	-0.13	-0.08	0.54	0.12	-0.04	1.00																						
19 INTAN_TAR	0.07	-0.06	0.10	0.01	-0.02	0.36	-0.03	0.00	0.21	0.11	0.09	0.16	-0.44	0.01	0.14	0.38	-0.06	0.01	1.00																					
20 SIZE_ACQ	0.09	0.03	-0.10	0.06	-0.26	0.19	0.13	0.04	0.06	0.16	0.07	0.12	-0.34	-0.02	0.11	0.21	-0.03	0.02	0.18	1.00																				
21 LDVALUE	0.10	-0.17	0.13	-0.05	-0.03	0.19	0.01	-0.08	0.07	0.17	0.15	0.04	-0.25	-0.18	0.11	0.23	-0.22	0.04	0.26	0.74	1.00																			
22 STOCKONLY	-0.26	-0.16	-0.23	-0.02	0.17	-0.06	-0.05	-0.10	-0.15	-0.07	-0.12	0.03	0.18	-0.04	-0.06	-0.11	-0.04	0.00	-0.10	-0.23	-0.13	1.00																		
23 HOSTILE	0.03	0.00	0.05	-0.07	0.01	0.04	-0.02	0.04	0.03	-0.01	0.02	-0.04	-0.04	0.06	-0.03	0.01	0.01	-0.03	0.06	-0.05	-0.04	-0.03	1.00																	
24 MERGER	0.04	-0.11	0.02	-0.09	-0.04	0.04	-0.04	-0.05	-0.07	0.03	-0.02	-0.02	0.08	-0.05	-0.03	-0.05	-0.03	0.01	-0.04	0.07	0.17	-0.01	1.00																	
25 TENDER	0.06	0.13	-0.04	0.14	-0.13	0.01	0.19	0.16	0.01	0.07	0.08	0.01	-0.16	0.20	0.06	0.10	0.18	0.06	0.04	0.20	0.02	-0.24	0.13	-0.07	1.00															
26 BIDCOMP	0.07	-0.08	0.02	-0.03	-0.10	-0.04	0.19	-0.08	-0.08	0.07	0.10	0.13	-0.11	0.06	0.04	0.08	0.09	0.00	0.12	0.11	0.15	-0.06	-0.01	0.18	0.16	1.00														
27 DIVERSIFY	0.03	0.02	-0.05	-0.01	-0.08	0.20	-0.09	-0.02	0.04	-0.10	0.03	0.07	-0.16	-0.06	0.09	0.09	-0.06	0.03	0.14	0.11	0.01	-0.10	-0.05	-0.01	0.01	-0.07	1.00													
28 BTM_ACQ	-0.03	-0.04	-0.03	-0.03	0.06	-0.15	-0.18	-0.15	-0.12	-0.09	-0.07	-0.08	0.35	-0.29	-0.08	-0.15	-0.23	-0.08	-0.19	-0.35	-0.24	0.16	-0.01	-0.01	-0.12	-0.11	-0.08	1.00												
29 BTM_TAR	-0.06	0.04	-0.09	0.21	0.02	-0.25	-0.17	-0.15	-0.15	-0.04	-0.17	-0.13	0.46	-0.14	-0.14	-0.26	-0.23	-0.08	-0.15	-0.32	-0.33	0.22	0.01	0.05	-0.14	-0.14	-0.07	0.37	1.00											
30 ROA_ACQ	0.08	0.06	0.05	-0.04	-0.07	0.06	-0.05	0.00	0.06	0.01	0.11	-0.01	-0.13	-0.12	0.13	-0.01	-0.09	0.07	0.07	0.38	0.30	-0.19	0.02	-0.09	0.11	0.06	0.08	-0.16	-0.16	1.00										
31 ROA_TAR	0.04	-0.14	0.09	-0.19	0.02	0.16	-0.51	-0.04	0.08	-0.04	0.10	-0.08	-0.01	-0.37	0.11	0.10	-0.55	0.08	0.04	0.18	0.32	-0.07	0.01	0.00	-0.15	-0.05	0.06	0.09	0.01	0.29	1.00									
32 FIRMAGE_ACQ	0.08	0.05	0.00	0.04	-0.15	0.06	0.03	-0.01	-0.05	0.07	0.01	0.13	-0.13	-0.01	0.05	-0.02	-0.02	0.04	-0.03	0.44	0.27	-0.12	0.01	0.01	0.06	0.05	0.08	0.00	-0.03	0.15	0.10	1.00								
33 FIRMAGE_TAR	0.09	0.02	0.09	-0.04	-0.02	-0.01	-0.14	-0.07	0.06	0.07	0.12	0.01	-0.02	-0.17	0.05	0.06	-0.10	0.04	0.00	0.07	0.14	0.00	0.03	-0.01	-0.06	0.06	0.13	0.02	0.04	0.10	0.23	0.27	1.00							
34 RUNUP_ACQ	-0.04	-0.01	0.02	0.17	0.07	0.00	0.01	-0.01	-0.07	-0.11	-0.04	0.04	0.01	0.00	-0.03	0.01	-0.07	-0.05	0.02	-0.05	0.05	0.20	0.05	0.05	-0.01	-0.06	-0.10	0.00	0.04	-0.11	-0.02	-0.13	-0.11	1.00						
35 RUNUP_TAR	0.08	-0.27	-0.07	0.37	-0.21	0.03	0.00	0.03	-0.02	0.05	-0.06	0.00	-0.01	0.08	0.03	0.08	0.03	0.01	0.00	0.13	0.15	-0.03	0.02	0.02	0.12	0.09	-0.03	-0.02	0.09	-0.03	-0.01	0.09	-0.03	0.16	1.00					
36 ANALYST_ACQ	0.04	0.03	-0.11	0.04	-0.20	0.07	0.00	0.09	0.10	0.13	0.06	0.19	-0.30	0.08	0.05	0.10	0.05	-0.03	0.13	0.78	0.55	-0.14	-0.02	0.02	0.20	0.06	0.04	-0.27	-0.27	0.33	0.11	0.30	-0.04	-0.05	0.12	1.00				
37 ANALYST_TAR	0.01	-0.15	0.04	-0.05	0.03	0.05	0.10	0.08	0.12	0.06	0.06	0.23	-0.33	0.06	0.08	0.23	-0.02	0.04	0.28	0.61	0.73	-0.10	-0.05	0.09	0.03	0.10	0.01	-0.31	-0.36	0.22	0.17	0.16	-0.02	0.02	0.06	0.57	1.00			
38 PROBACQ	0.00	-0.04	-0.14	0.04	-0.15	0.02	-0.06	0.02	0.08	0.07	0.01	0.13	-0.15	-0.03	-0.04	0.23	0.00	-0.08	0.05	0.55	0.39	-0.03	-0.04	-0.06	0.04	0.12	-0.07	-0.11	-0.09	0.14	0.14	0.23	0.03	0.03	0.12	0.47	0.31	1.00		

Table 4 Merger Synergies

This table presents results from ordinary least squares (OLS) regressions of merger synergies on purchase price allocations and control variables. Panel A is based on all 447 mergers in the final sample and Panel B splits the sample into related (N=304) and diversifying mergers (N=143). We use several different variables to capture merger synergies. Column (1) and (2) report the results using the three-day cumulative abnormal returns of a value-weighted portfolio of the acquirer and the target (PCAR) as measure of merger synergies. Column (3) uses an adjusted three-day cumulative abnormal return of a value-weighted portfolio of the acquirer and target in which the acquirer three-day return is adjusted for anticipation and signals of the acquirer's standalone valuation (ADJ_PCAR). Column (4) uses an adjusted three-day cumulative abnormal return of a value-weighted portfolio of the acquirer and target in which, in the spirit of Wang (2018), we adjust the acquirer three-day cumulative abnormal return for the industry average withdrawn deal return accumulated from the first day after deal announcement to the first day after deal withdrawal of a sample of exogenously withdrawn deals (WDADJ_PCAR). In column (5), we use the adjusted three-day cumulative abnormal return and measure the dollar price movement on a value-weighted portfolio of the acquirer and the target, scaled by the value of the deal [(market cap acquirer * ADJ_ACAR) + (market cap target * TCAR) / deal value] (REL_PCAR). Purchase price allocations include the amount of the purchase price allocated to goodwill, R&D, technology, client relationships, rights, trademarks, and other identifiable intangibles divided by deal value (REL_GW, REL_RD, REL_TECH, REL_CLIENT, REL_RIGHTS, REL_TM, and REL_INTAN). Please refer to Appendix C for other variable definitions. T-statistics are reported in parentheses under the coefficients. Continuous non-return variables are winsorized at the 1st and 99th percentile. Returns are truncated at the 0.5th and 99.5th percentile. All regressions include year-fixed effects and Fama and French 12 industry fixed effects. Standard errors are clustered at the acquirer level. *, **, *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively (two-tailed).

Panel A: PCAR, ADJ_PCAR, WDADJ_PCAR, and REL_PCAR:

<i>Model:</i>	(1)	(2)	(3)	(4)	(5)
<i>Dependent variable:</i>	<i>PCAR</i>	<i>PCAR</i>	<i>ADJ_PCAR</i>	<i>WDADJ_PCAR</i>	<i>REL_PCAR</i>
<i>REL_GW</i>		-0.013 (-0.68)	-0.014 (-0.72)	-0.012 (-0.61)	-0.131 (-1.07)
<i>REL_RD</i>		0.057* (1.70)	0.066* (1.92)	0.065* (1.92)	0.902*** (3.51)
<i>REL_TECH</i>		0.093** (2.39)	0.109*** (2.67)	0.096** (2.46)	0.854*** (3.12)
<i>REL_CLIENT</i>		-0.132*** (-3.24)	-0.135*** (-3.08)	-0.123*** (-2.79)	-0.386 (-1.57)
<i>REL_RIGHTS</i>		-0.003 (-0.05)	-0.003 (-0.05)	0.011 (0.24)	-0.174 (-0.72)
<i>REL_TM</i>		0.014 (0.34)	0.022 (0.49)	0.014 (0.30)	0.178 (0.81)
<i>REL_INTAN</i>		-0.007 (-0.29)	-0.003 (-0.12)	-0.006 (-0.24)	0.067 (0.33)
<i>CAPRD_ACQ</i>		-0.168*** (-3.10)	-0.170*** (-3.04)	-0.171*** (-2.98)	-0.446 (-1.06)
<i>CAPADV_ACQ</i>		-0.233 (-0.95)	-0.251 (-0.97)	-0.309 (-1.14)	-1.894 (-1.18)
<i>INTAN_ACQ</i>		-0.018 (-0.89)	-0.024 (-1.14)	-0.020 (-0.94)	0.103 (0.82)
<i>CAPRD_TAR</i>		-0.020 (-0.64)	-0.012 (-0.37)	-0.022 (-0.68)	-0.294 (-1.42)
<i>CAPADV_TAR</i>		-0.158 (-0.54)	-0.139 (-0.44)	-0.191 (-0.62)	-0.517 (-0.34)
<i>INTAN_TAR</i>		0.041** (2.15)	0.047** (2.30)	0.040** (2.03)	0.021 (0.16)

<i>SIZE_ACQ</i>	-0.021*** (-5.12)	-0.022*** (-5.32)	-0.020*** (-4.77)	-0.017*** (-4.05)	0.171*** (6.00)
<i>LDVALUE</i>	0.017*** (3.89)	0.016*** (3.62)	0.013*** (2.94)	0.011*** (2.77)	-0.193*** (-6.47)
<i>STOCKONLY</i>	-0.039*** (-4.58)	-0.035*** (-4.21)	-0.022*** (-2.59)	-0.034*** (-3.62)	-0.030 (-0.55)
<i>MERGER</i>	0.015 (0.47)	0.006 (0.17)	-0.005 (-0.12)	0.029 (0.91)	0.182* (1.68)
<i>TENDER</i>	-0.004 (-0.56)	-0.005 (-0.71)	-0.005 (-0.62)	-0.006 (-0.77)	-0.096 (-1.47)
<i>BIDCOMP</i>	-0.013 (-0.73)	-0.019 (-1.17)	-0.014 (-0.75)	-0.025 (-1.42)	-0.051 (-0.39)
<i>DIVERSIFY</i>	-0.001 (-0.19)	-0.002 (-0.31)	-0.003 (-0.45)	-0.002 (-0.28)	0.004 (0.09)
<i>BTM_ACQ</i>	-0.022 (-1.43)	-0.030** (-2.00)	-0.036** (-2.34)	-0.029* (-1.79)	-0.142 (-1.51)
<i>BTM_TAR</i>	0.000 (0.01)	-0.006 (-0.61)	-0.006 (-0.70)	-0.005 (-0.49)	-0.036 (-0.66)
<i>ROA_ACQ</i>	0.036 (0.84)	0.020 (0.54)	0.027 (0.70)	0.021 (0.56)	0.302 (1.62)
<i>ROA_TAR</i>	0.009 (0.43)	0.002 (0.06)	0.008 (0.31)	-0.009 (-0.35)	0.104 (0.58)
<i>FIRMAGE_ACQ</i>	0.005 (1.24)	0.005 (1.27)	0.005 (1.09)	0.006 (1.37)	-0.024 (-0.86)
<i>FIRMAGE_TAR</i>	0.001 (0.16)	0.002 (0.53)	0.002 (0.46)	0.002 (0.37)	0.017 (0.62)
<i>RUNUP_ACQ</i>	0.022 (0.87)	0.012 (0.54)	0.016 (0.64)	0.022 (0.92)	0.115 (0.76)
<i>RUNUP_TAR</i>	-0.014 (-0.96)	-0.004 (-0.32)	0.000 (0.01)	-0.000 (-0.00)	0.142 (1.26)
<i>ANALYST_ACQ</i>	0.004 (0.52)	0.005 (0.69)	0.007 (0.98)	0.006 (0.81)	0.032 (0.70)
<i>ANALYST_TAR</i>	-0.004 (-0.78)	-0.003 (-0.59)	-0.003 (-0.61)	-0.005 (-0.94)	-0.006 (-0.17)
<i>PROBACQ</i>	0.032 (0.56)	0.027 (0.47)		0.042 (0.69)	
Constant	-0.034 (-0.44)	0.007 (0.10)	0.054 (0.74)	0.008 (0.10)	1.376*** (3.05)
Year Fixed Effect	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes
Number of Observations	447	447	447	421	447
Base Model Adj. R-squared		0.239	0.187	0.347	0.278
Adj. R-squared	0.236	0.281	0.235	0.383	0.306

Table 4 Merger Synergies (Cont.)

This table presents results from ordinary least squares (OLS) regressions of merger synergies on purchase price allocations and control variables. Panel A is based on all 447 mergers in the final sample and Panel B splits the sample into related (N=304) and diversifying mergers (N=143). We use several different variables to capture merger synergies. Column (1) and (2) report the results using the three-day cumulative abnormal returns of a value-weighted portfolio of the acquirer and the target (PCAR) as measure of merger synergies. Column (3) and (4) use an adjusted three-day cumulative abnormal return of a value-weighted portfolio of the acquirer and target in which the acquirer three-day return is adjusted for anticipation and signals of the acquirer's standalone valuation (ADJ_PCAR). Column (5) and (6) use an adjusted three-day cumulative abnormal return of a value-weighted portfolio of the acquirer and target in which, in the spirit of Wang (2018), we adjust the acquirer three-day cumulative abnormal return for the industry average withdrawn deal return accumulated from the first day after deal announcement to the first day after deal withdrawal of a sample of exogenously withdrawn deals (WDADJ_PCAR). In column (7) and (8), we use the adjusted three-day cumulative abnormal return and measure the dollar price movement on a value-weighted portfolio of the acquirer and the target, scaled by the value of the deal [(market cap acquirer * ADJ_ACAR) + (market cap target * TCAR) / deal value] (REL_PCAR). Purchase price allocations include the amount of the purchase price allocated to goodwill, R&D, technology, client relationships, rights, trademarks, and other identifiable intangibles divided by deal value (REL_GW, REL_RD, REL_TECH, REL_CLIENT, REL_RIGHTS, REL_TM, and REL_INTAN). Please refer to Appendix C for other variable definitions. T-statistics are reported in parentheses under the coefficients. Continuous non-return variables are winsorized at the 1st and 99th percentile. Returns are truncated at the 0.5th and 99.5th percentile. All regressions include year-fixed effects and Fama and French 12 industry fixed effects. Standard errors are clustered at the acquirer level. *, **, *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively (two-tailed).

Panel B: Diversifying versus Related Mergers:

<i>Model:</i>	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>Dependent variable:</i>	<i>PCAR</i>	<i>PCAR</i>	<i>ADJ_PCAR</i>	<i>ADJ_PCAR</i>	<i>WDADJ_PCAR</i>	<i>WDADJ_PCAR</i>	<i>REL_PCAR</i>	<i>REL_PCAR</i>
	<i>Diversifying</i>	<i>Related</i>	<i>Diversifying</i>	<i>Related</i>	<i>Diversifying</i>	<i>Related</i>	<i>Diversifying</i>	<i>Related</i>
<i>REL_GW</i>	0.014 (0.41)	-0.015 (-0.70)	0.011 (0.30)	-0.018 (-0.81)	0.010 (0.27)	-0.012 (-0.56)	-0.100 (-0.36)	-0.129 (-0.82)
<i>REL_RD</i>	0.007 (0.08)	0.071* (1.73)	0.034 (0.38)	0.078* (1.90)	-0.002 (-0.02)	0.080** (2.01)	-0.043 (-0.06)	1.026*** (3.33)
<i>REL_TECH</i>	0.071 (1.01)	0.101** (2.14)	0.081 (1.08)	0.106** (2.19)	0.076 (1.02)	0.098** (2.14)	1.153 (1.49)	0.780*** (2.69)
<i>REL_CLIENT</i>	-0.140** (-2.03)	-0.145*** (-2.95)	-0.138* (-1.88)	-0.147*** (-2.77)	-0.117 (-1.51)	-0.140*** (-2.76)	-0.758 (-1.30)	-0.199 (-0.73)
<i>REL_RIGHTS</i>	0.457** (2.44)	-0.018 (-0.37)	0.473** (2.33)	-0.023 (-0.48)	0.766*** (4.20)	-0.008 (-0.18)	0.223 (0.20)	-0.088 (-0.35)
<i>REL_TM</i>	-0.046 (-0.46)	0.109** (2.09)	-0.030 (-0.30)	0.103* (1.90)	-0.097 (-0.75)	0.102* (1.96)	-0.054 (-0.07)	0.849*** (3.13)
<i>REL_INTAN</i>	-0.026 (-0.56)	0.017 (0.58)	-0.014 (-0.27)	0.015 (0.47)	-0.030 (-0.63)	0.019 (0.63)	-0.289 (-0.74)	0.308 (1.39)
<i>CAPRD_ACQ</i>	0.139 (1.28)	-0.257*** (-3.99)	0.134 (1.19)	-0.263*** (-3.97)	0.170 (1.42)	-0.267*** (-4.03)	1.385 (1.35)	-0.871** (-2.07)

<i>CAPADV_ACQ</i>	-0.424 (-0.77)	-0.018 (-0.06)	-0.416 (-0.73)	0.006 (0.02)	-0.181 (-0.25)	-0.046 (-0.14)	-2.824 (-0.76)	-0.569 (-0.27)
<i>INTAN_ACQ</i>	0.090** (2.50)	-0.047* (-1.77)	0.079** (2.02)	-0.050* (-1.88)	0.093** (2.28)	-0.045* (-1.72)	0.419 (1.44)	-0.004 (-0.02)
<i>CAPRD_TAR</i>	-0.036 (-0.51)	-0.055 (-1.44)	-0.020 (-0.27)	-0.054 (-1.37)	-0.036 (-0.49)	-0.060 (-1.55)	-0.449 (-0.84)	-0.517** (-1.98)
<i>CAPADV_TAR</i>	-0.093 (-0.20)	-0.590* (-1.80)	-0.029 (-0.06)	-0.601* (-1.68)	0.107 (0.21)	-0.623* (-1.91)	-0.822 (-0.19)	-2.729* (-1.80)
<i>INTAN_TAR</i>	-0.005 (-0.15)	0.022 (0.87)	0.007 (0.21)	0.021 (0.79)	0.002 (0.06)	0.015 (0.59)	-0.245 (-0.82)	-0.137 (-0.81)
Constant	-0.007 (-0.05)	0.015 (0.17)	0.032 (0.21)	0.070 (0.94)	-0.005 (-0.03)	0.010 (0.12)	2.603** (2.00)	1.011** (1.98)
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	143	304	143	304	133	288	143	304
Adj. R-squared	0.347	0.325	0.286	0.282	0.452	0.422	0.209	0.352

Table 5 Acquirer Wealth Effects

This table presents results from ordinary least squares (OLS) regressions of acquirer wealth effects on purchase price allocations and control variables. Panel A is based on all 447 mergers in the final sample and Panel B splits the sample into related (N=304) and diversifying mergers (N=143). We use several different variables to capture acquirer wealth effects. Column (1) and (2) report the results using the three-day cumulative abnormal returns around the announcement date as measure of acquirer wealth effects. Column (3) uses an adjusted three-day cumulative abnormal return in which the acquirer three-day return is adjusted for anticipation and signals of the acquirer's standalone valuation (ADJ_ACAR). Column (4) uses an adjusted three-day cumulative abnormal return in which, in the spirit of Wang (2018), we adjust the acquirer three-day cumulative abnormal return for the industry average withdrawn deal return accumulated from the first day after deal announcement to the first day after deal withdrawal of a sample of exogenously withdrawn deals (WDADJ_ACAR). In column (5), we use the adjusted three-day cumulative abnormal return and measure the dollar price movement of the acquirer, scaled by the value of the deal [(market cap acquirer * ADJ_ACAR) / deal value] (REL_ACAR). Purchase price allocations include the amount of the purchase price allocated to goodwill, R&D, technology, client relationships, rights, trademarks, and other identifiable intangibles divided by deal value (REL_GW, REL_RD, REL_TECH, REL_CLIENT, REL_RIGHTS, REL_TM, and REL_INTAN). Please refer to Appendix C for other variable definitions. T-statistics are reported in parentheses under the coefficients. Continuous non-return variables are winsorized at the 1st and 99th percentile. Returns are truncated at the 0.5th and 99.5th percentile. All regressions include year-fixed effects and Fama and French 12 industry fixed effects. Standard errors are clustered at the acquirer level. *, **, *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively (two-tailed).

Panel A: ACAR, ADJ_ACAR, WDADJ_ACAR, and REL_ACAR:

<i>Model:</i>	(1)	(2)	(3)	(4)	(5)
<i>Dependent variable:</i>	<i>ACAR</i>	<i>ACAR</i>	<i>ADJ_ACAR</i>	<i>WDADJ_ACAR</i>	<i>REL_ACAR</i>
<i>REL_GW</i>		-0.049*** (-2.68)	-0.050*** (-2.60)	-0.039** (-2.16)	-0.224* (-1.90)
<i>REL_RD</i>		0.026 (0.72)	0.030 (0.81)	0.021 (0.60)	0.667** (2.55)
<i>REL_TECH</i>		0.074 (1.58)	0.089* (1.77)	0.082* (1.76)	0.692** (2.56)
<i>REL_CLIENT</i>		-0.090* (-1.75)	-0.095* (-1.71)	-0.094* (-1.78)	-0.310 (-1.25)
<i>REL_RIGHTS</i>		0.006 (0.12)	0.006 (0.11)	0.009 (0.17)	-0.269 (-1.16)
<i>REL_TM</i>		0.054 (1.16)	0.062 (1.23)	0.066 (1.35)	0.074 (0.32)
<i>REL_INTAN</i>		-0.016 (-0.59)	-0.014 (-0.48)	-0.018 (-0.64)	0.006 (0.03)
<i>CAPRD_ACQ</i>		-0.135** (-1.99)	-0.135* (-1.95)	-0.121* (-1.78)	-0.272 (-0.67)
<i>CAPADV_ACQ</i>		-0.235 (-0.78)	-0.263 (-0.83)	-0.347 (-1.13)	-1.899 (-1.09)
<i>INTAN_ACQ</i>		-0.005 (-0.20)	-0.009 (-0.38)	-0.003 (-0.13)	0.110 (0.89)
<i>CAPRD_TAR</i>		-0.052 (-1.33)	-0.039 (-0.97)	-0.055 (-1.42)	-0.379* (-1.78)
<i>CAPADV_TAR</i>		-0.103 (-0.28)	-0.085 (-0.21)	-0.163 (-0.42)	-0.582 (-0.37)
<i>INTAN_TAR</i>		0.049** (2.24)	0.057** (2.42)	0.051** (2.30)	0.065 (0.52)
<i>SIZE_ACQ</i>	-0.000 (-0.05)	-0.000 (-0.04)	0.001 (0.30)	0.000 (0.03)	0.154*** (5.27)

<i>LDVALUE</i>	0.001 (0.22)	-0.001 (-0.37)	-0.003 (-0.80)	-0.000 (-0.02)	-0.168*** (-5.69)
<i>STOCKONLY</i>	-0.036*** (-4.02)	-0.032*** (-3.59)	-0.014 (-1.57)	-0.031*** (-3.34)	0.002 (0.04)
<i>MERGER</i>	0.056* (1.77)	0.051 (1.54)	0.048 (1.32)	0.059* (1.72)	0.216** (2.31)
<i>TENDER</i>	-0.004 (-0.51)	-0.005 (-0.63)	-0.005 (-0.55)	-0.009 (-1.06)	-0.112* (-1.69)
<i>BIDCOMP</i>	0.005 (0.28)	0.002 (0.08)	0.011 (0.52)	0.003 (0.18)	0.011 (0.09)
<i>DIVERSIFY</i>	0.005 (0.68)	0.005 (0.73)	0.003 (0.39)	0.004 (0.53)	0.006 (0.13)
<i>BTM_ACQ</i>	-0.003 (-0.16)	-0.010 (-0.61)	-0.018 (-1.00)	-0.007 (-0.40)	-0.123 (-1.38)
<i>BTM_TAR</i>	0.000 (0.02)	-0.010 (-1.11)	-0.011 (-1.22)	-0.006 (-0.73)	-0.084 (-1.61)
<i>ROA_ACQ</i>	0.026 (0.57)	0.010 (0.25)	0.014 (0.31)	0.008 (0.18)	0.266 (1.44)
<i>ROA_TAR</i>	-0.011 (-0.48)	-0.034 (-1.17)	-0.023 (-0.78)	-0.050* (-1.78)	0.033 (0.18)
<i>FIRMAGE_ACQ</i>	-0.001 (-0.18)	0.001 (0.31)	0.001 (0.21)	0.002 (0.48)	-0.028 (-1.01)
<i>FIRMAGE_TAR</i>	0.002 (0.42)	0.003 (0.78)	0.003 (0.79)	0.003 (0.72)	0.012 (0.45)
<i>RUNUP_ACQ</i>	0.000 (0.01)	-0.004 (-0.15)	0.001 (0.05)	-0.003 (-0.13)	0.069 (0.48)
<i>RUNUP_TAR</i>	0.039** (2.57)	0.049*** (3.40)	0.054*** (3.41)	0.045*** (3.16)	0.263** (2.50)
<i>ANALYST_ACQ</i>	0.002 (0.21)	0.005 (0.53)	0.007 (0.85)	0.006 (0.64)	0.033 (0.74)
<i>ANALYST_TAR</i>	-0.008 (-1.33)	-0.007 (-1.24)	-0.007 (-1.19)	-0.009 (-1.57)	-0.003 (-0.10)
<i>PROBACQ</i>	0.094 (1.47)	0.078 (1.21)		0.063 (0.95)	
Constant	-0.035 (-0.43)	0.010 (0.12)	0.044 (0.56)	-0.041 (-0.50)	1.098** (2.45)
Year Fixed Effect	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes
Number of Observations	447	447	447	421	447
Base Model Adj. R-squared		0.173	0.135	0.387	0.225
Adj. R-squared	0.173	0.204	0.165	0.409	0.247

Table 5 Acquirer Wealth Effects (Cont.)

This table presents results from ordinary least squares (OLS) regressions of acquirer wealth effects on purchase price allocations and control variables. Panel A is based on all 447 mergers in the final sample and Panel B splits the sample into related (N=304) and diversifying mergers (N=143). We use several different variables to capture acquirer wealth effects. Column (1) and (2) report the results using the three-day cumulative abnormal returns around the announcement date as measure of acquirer wealth effects. Column (3) and (4) use an adjusted three-day cumulative abnormal return in which the acquirer three-day return is adjusted for anticipation and signals of the acquirer's standalone valuation (ADJ_ACAR). Column (5) and (6) use an adjusted three-day cumulative abnormal return in which, in the spirit of Wang (2018), we adjust the acquirer three-day cumulative abnormal return for the industry average withdrawn deal return accumulated from the first day after deal announcement to the first day after deal withdrawal of a sample of exogenously withdrawn deals (WDADJ_ACAR). In column (7) and (8), we use the adjusted three-day cumulative abnormal return and measure the dollar price movement of the acquirer, scaled by the value of the deal [(market cap acquirer * ADJ_ACAR) / deal value] (REL_ACAR). Purchase price allocations include the amount of the purchase price allocated to goodwill, R&D, technology, client relationships, rights, trademarks, and other identifiable intangibles divided by deal value (REL_GW, REL_RD, REL_TECH, REL_CLIENT, REL_RIGHTS, REL_TM, and REL_INTAN). Please refer to Appendix C for other variable definitions. T-statistics are reported in parentheses under the coefficients. Continuous non-return variables are winsorized at the 1st and 99th percentile. Returns are truncated at the 0.5th and 99.5th percentile. All regressions include year-fixed effects and Fama and French 12 industry fixed effects. Standard errors are clustered at the acquirer level. *, **, *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively (two-tailed).

Panel B: Diversifying versus Related Mergers:

<i>Model:</i>	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>Dependent variable:</i>	<i>ACAR</i>	<i>ACAR</i>	<i>ADJ_ACAR</i>	<i>ADJ_ACAR</i>	<i>WDADJ_ACAR</i>	<i>WDADJ_ACAR</i>	<i>REL_ACAR</i>	<i>REL_ACAR</i>
	<i>Diversifying</i>	<i>Related</i>	<i>Diversifying</i>	<i>Related</i>	<i>Diversifying</i>	<i>Related</i>	<i>Diversifying</i>	<i>Related</i>
<i>REL_GW</i>	-0.029 (-0.85)	-0.051** (-2.25)	-0.034 (-0.90)	-0.054** (-2.26)	-0.042 (-1.24)	-0.037* (-1.65)	-0.221 (-0.80)	-0.211 (-1.39)
<i>REL_RD</i>	-0.067 (-0.73)	0.027 (0.64)	-0.043 (-0.44)	0.028 (0.64)	-0.113 (-1.10)	0.023 (0.57)	-0.156 (-0.22)	0.818*** (2.66)
<i>REL_TECH</i>	0.085 (1.08)	0.074 (1.34)	0.098 (1.22)	0.078 (1.32)	0.088 (1.11)	0.081 (1.49)	1.017 (1.41)	0.626** (2.16)
<i>REL_CLIENT</i>	-0.089 (-1.00)	-0.094* (-1.69)	-0.093 (-0.97)	-0.097 (-1.58)	-0.091 (-1.00)	-0.094* (-1.68)	-0.748 (-1.33)	-0.018 (-0.07)
<i>REL_RIGHTS</i>	0.433** (2.08)	-0.020 (-0.36)	0.455** (2.06)	-0.027 (-0.46)	0.563*** (3.25)	-0.015 (-0.27)	-0.071 (-0.07)	-0.135 (-0.54)
<i>REL_TM</i>	-0.043 (-0.50)	0.157*** (2.76)	-0.031 (-0.34)	0.153** (2.49)	-0.062 (-0.68)	0.162*** (2.96)	-0.373 (-0.55)	0.843*** (3.23)
<i>REL_INTAN</i>	-0.022 (-0.42)	0.002 (0.07)	-0.011 (-0.19)	-0.002 (-0.05)	-0.021 (-0.39)	0.003 (0.10)	-0.332 (-0.92)	0.260 (1.14)
<i>CAPRD_ACQ</i>	0.247* (1.76)	-0.228*** (-2.83)	0.241* (1.68)	-0.228*** (-2.76)	0.254* (1.69)	-0.210** (-2.59)	1.612 (1.61)	-0.721* (-1.76)
<i>CAPADV_ACQ</i>	-0.920 (-1.41)	0.459 (1.25)	-0.907 (-1.35)	0.467 (1.17)	-0.937 (-1.25)	0.340 (0.96)	-3.406 (-0.95)	0.512 (0.24)

<i>INTAN_ACQ</i>	0.096** (2.16)	-0.028 (-0.93)	0.084* (1.82)	-0.031 (-0.94)	0.097** (2.07)	-0.022 (-0.73)	0.353 (1.25)	0.046 (0.30)
<i>CAPRD_TAR</i>	-0.112 (-1.38)	-0.080* (-1.67)	-0.087 (-1.04)	-0.077 (-1.58)	-0.103 (-1.29)	-0.081* (-1.70)	-0.550 (-1.08)	-0.590** (-2.15)
<i>CAPADV_TAR</i>	0.375 (0.73)	-0.747* (-1.75)	0.436 (0.81)	-0.764 (-1.57)	0.540 (0.98)	-0.784* (-1.84)	0.022 (0.01)	-3.415** (-2.23)
<i>INTAN_TAR</i>	0.023 (0.66)	0.022 (0.75)	0.036 (0.98)	0.023 (0.72)	0.024 (0.67)	0.019 (0.63)	-0.119 (-0.43)	-0.112 (-0.67)
Constant	0.025 (0.15)	-0.007 (-0.08)	0.052 (0.32)	0.042 (0.49)	0.057 (0.29)	-0.067 (-0.74)	2.275* (1.74)	0.719 (1.42)
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	143	304	143	304	133	288	143	304
Adjusted R-squared	0.303	0.238	0.270	0.195	0.528	0.420	0.182	0.287

Table 6 Takeover Premium and Distribution of Gains

This table presents results from ordinary least squares (OLS) regressions of premium and the relative gain to the target firm on purchase price allocations and control variables. Panel A is based on all 447 mergers in the final sample and Panel B splits the sample into related mergers (N=304) and diversifying mergers (N=143). The results on premium reported in column (1) and (2) are based on a premium that is calculated as the initial offer price, or the final offer price if the initial offer price is missing, divided by the target's stock price two months prior to the deal announcement, minus one (i.e., [(offer price / pre-merger price) - 1]). If the calculated premium is greater than zero, in line with prior literature we set it to missing. In column (3) and (4) we report results on the relative gain to the target firm (TGAIN) which is calculated as the dollar gain of the target (i.e., market cap target * TCAR) minus the dollar gain of the acquirer (market cap acquirer * ACAR), divided by the sum of the acquirer's and target's market capitalization two months prior to the deal announcement. Column (5) reports the results using an adjusted relative gain (ADJ_TGAIN) to the target in which the acquirer return is adjusted for anticipation and signals of the acquirer's standalone valuation (market cap acquirer * ADJ_ACAR). Column (6) reports the results using an adjusted relative gain (WDADJ_TGAIN) to the target in which, in the spirit of Wang (2018), we adjust the acquirer three-day cumulative abnormal return for the industry average withdrawn deal return accumulated from the first day after deal announcement to the first day after deal withdrawal of a sample of exogenously withdrawn deals. Purchase price allocations include the amount of the purchase price allocated to goodwill, R&D, technology, client relationships, rights, trademarks, and other identifiable intangibles divided by deal value (REL_GW, REL_RD, REL_TECH, REL_CLIENT, REL_RIGHTS, REL_TM, and REL_INTAN). Please refer to Appendix C for other variable definitions. T-statistics are reported in parentheses under the coefficients. Continuous non-return variables are winsorized at the 1st and 99th percentile. Returns are truncated at the 0.5th and 99.5th percentile. All regressions include year-fixed effects and Fama and French 12 industry fixed effects. Standard errors are clustered at the acquirer level. *, **, *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively (two-tailed).

Panel A: Premium, TGAIN, ADJ_TGAIN, and WDADJ_TGAIN:

<i>Model:</i>	(1)	(2)	(3)	(4)	(5)	(6)
<i>Dependent variable:</i>	<i>Premium</i>	<i>Premium</i>	<i>TGAIN</i>	<i>TGAIN</i>	<i>ADJ_TGAIN</i>	<i>WDADJ_TGAIN</i>
<i>REL_GW</i>		0.268*** (2.98)		0.062*** (4.05)	0.063*** (3.88)	0.056*** (3.69)
<i>REL_RD</i>		0.435** (2.07)		0.003 (0.09)	-0.005 (-0.14)	0.006 (0.20)
<i>REL_TECH</i>		0.511*** (2.86)		-0.038 (-0.94)	-0.050 (-1.14)	-0.043 (-1.04)
<i>REL_CLIENT</i>		-0.018 (-0.12)		0.017 (0.45)	0.022 (0.52)	0.009 (0.24)
<i>REL_RIGHTS</i>		0.500** (2.27)		-0.007 (-0.18)	-0.009 (-0.21)	-0.014 (-0.32)
<i>REL_TM</i>		0.321 (1.64)		-0.043 (-1.13)	-0.052 (-1.30)	-0.033 (-0.86)
<i>REL_INTAN</i>		0.370** (2.45)		0.007 (0.31)	0.007 (0.28)	0.008 (0.33)
<i>CAPRD_ACQ</i>		-0.412 (-1.38)		0.032 (0.60)	0.040 (0.71)	0.019 (0.36)
<i>CAPADV_ACQ</i>		-0.857 (-0.68)		0.122 (0.44)	0.107 (0.38)	0.221 (0.78)
<i>INTAN_ACQ</i>		0.023 (0.27)		-0.017 (-0.84)	-0.017 (-0.77)	-0.018 (-0.88)
<i>CAPRD_TAR</i>		-0.233 (-1.20)		0.076** (2.21)	0.065* (1.88)	0.073** (2.15)
<i>CAPADV_TAR</i>		0.144 (0.12)		-0.021 (-0.07)	-0.017 (-0.05)	0.149 (0.50)
<i>INTAN_TAR</i>		-0.123 (-1.45)		-0.032* (-1.70)	-0.037* (-1.81)	-0.035* (-1.81)

<i>SIZE_ACQ</i>	0.037** (2.09)	0.025 (1.33)	-0.019*** (-5.02)	-0.019*** (-4.96)	-0.022*** (-5.62)	-0.025*** (-6.00)
<i>LDVALUE</i>	-0.019 (-1.15)	-0.018 (-1.13)	0.016*** (4.23)	0.017*** (4.71)	0.020*** (5.06)	0.020*** (4.95)
<i>STOCKONLY</i>	-0.039 (-0.95)	-0.037 (-0.93)	0.010 (1.35)	0.007 (1.06)	-0.007 (-0.93)	0.007 (0.96)
<i>MERGER</i>	-0.153** (-2.25)	-0.172** (-1.97)	-0.054*** (-3.70)	-0.056*** (-3.62)	-0.055*** (-3.62)	-0.050** (-2.55)
<i>TENDER</i>	0.035 (1.01)	0.026 (0.75)	0.004 (0.52)	0.005 (0.60)	0.004 (0.57)	0.005 (0.61)
<i>BIDCOMP</i>	-0.094 (-1.61)	-0.097 (-1.52)	-0.021 (-1.33)	-0.021 (-1.43)	-0.028 (-1.54)	-0.020 (-1.31)
<i>DIVERSIFY</i>	-0.006 (-0.19)	-0.019 (-0.61)	-0.007 (-1.16)	-0.008 (-1.30)	-0.006 (-0.90)	-0.007 (-1.15)
<i>BTM_ACQ</i>	-0.032 (-0.46)	-0.041 (-0.63)	-0.003 (-0.27)	0.001 (0.11)	0.008 (0.58)	-0.006 (-0.42)
<i>BTM_TAR</i>	0.124** (2.22)	0.166*** (3.19)	0.000 (0.04)	0.010 (1.35)	0.010 (1.31)	0.003 (0.42)
<i>ROA_ACQ</i>	-0.014 (-0.08)	0.023 (0.14)	0.011 (0.31)	0.016 (0.46)	0.010 (0.26)	0.027 (0.76)
<i>ROA_TAR</i>	-0.313*** (-2.69)	-0.383** (-2.53)	0.012 (0.62)	0.043* (1.71)	0.038 (1.48)	0.062*** (2.68)
<i>FIRMAGE_ACQ</i>	-0.008 (-0.46)	-0.016 (-0.83)	0.004 (0.99)	0.001 (0.27)	0.002 (0.34)	0.003 (0.59)
<i>FIRMAGE_TAR</i>	0.011 (0.68)	0.011 (0.67)	0.002 (0.52)	0.001 (0.16)	-0.000 (-0.02)	0.001 (0.34)
<i>RUNUP_ACQ</i>	0.263*** (2.89)	0.242*** (2.71)	0.023 (0.96)	0.022 (0.95)	0.016 (0.66)	0.028 (1.11)
<i>RUNUP_TAR</i>	0.440*** (6.42)	0.452*** (6.67)	-0.070*** (-5.22)	-0.075*** (-5.89)	-0.082*** (-5.80)	-0.071*** (-5.25)
<i>ANALYST_ACQ</i>	-0.021 (-0.65)	-0.017 (-0.52)	-0.003 (-0.54)	-0.006 (-1.01)	-0.010 (-1.47)	-0.007 (-1.04)
<i>ANALYST_TAR</i>	-0.003 (-0.14)	-0.003 (-0.13)	0.008* (1.69)	0.008* (1.71)	0.009* (1.77)	0.011** (2.09)
<i>PROBACQ</i>	0.000 (0.00)	-0.070 (-0.29)	-0.106* (-1.88)	-0.090 (-1.63)		-0.086 (-1.45)
Constant	0.264 (0.87)	0.328 (1.05)	0.011 (0.14)	-0.024 (-0.36)	-0.046 (-0.70)	0.025 (0.36)
Year Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	436	436	447	447	447	421
Base Model Adj. R-squared		0.238		0.283	0.277	0.488
Adj. R-squared	0.238	0.275	0.283	0.310	0.300	0.504

Table 6 Takeover Premium and Distribution of Gains (Cont.)

This table presents results from ordinary least squares (OLS) regressions of premium and the relative gain to the target firm on purchase price allocations and control variables. Panel A is based on all 447 mergers in the final sample and Panel B splits the sample into related mergers (N=304) and diversifying mergers (N=143). The results on premium reported in column (1) and (2) are based on a premium that is calculated as the initial offer price, or the final offer price if the initial offer price is missing, divided by the target's stock price two months prior to the deal announcement, minus one (i.e., [(offer price / pre-merger price) - 1]). If the calculated premium is greater than zero, in line with prior literature we set it to missing. In column (3) and (4) we report results on the relative gain to the target firm (TGAIN) which is calculated as the dollar gain of the target (i.e., market cap target * TCAR) minus the dollar gain of the acquirer (market cap acquirer * ACAR), divided by the sum of the acquirer's and target's market capitalization two months prior to the deal announcement. Column (5) and (6) report the results using an adjusted relative gain (ADJ_TGAIN) to the target in which the acquirer return is adjusted for anticipation and signals of the acquirer's standalone valuation (market cap acquirer * ADJ_ACAR). Column (7) and (8) report the results using an adjusted relative gain (WDADJ_TGAIN) to the target in which, in the spirit of Wang (2018), we adjust the acquirer three-day cumulative abnormal return for the industry average withdrawn deal return accumulated from the first day after deal announcement to the first day after deal withdrawal of a sample of exogenously withdrawn deals. Purchase price allocations include the amount of the purchase price allocated to goodwill, R&D, technology, client relationships, rights, trademarks, and other identifiable intangibles divided by deal value (REL_GW, REL_RD, REL_TECH, REL_CLIENT, REL_RIGHTS, REL_TM, and REL_INTAN). Please refer to Appendix C for other variable definitions. T-statistics are reported in parentheses under the coefficients. Continuous non-return variables are winsorized at the 1st and 99th percentile. Returns are truncated at the 0.5th and 99.5th percentile. All regressions include year-fixed effects and Fama and French 12 industry fixed effects. Standard errors are clustered at the acquirer level. *, **, *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively (two-tailed).

Panel B: Diversifying versus Related Mergers:

<i>Model:</i>	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>Dependent variable:</i>	<i>Premium</i>	<i>Premium</i>	<i>TGAIN</i>	<i>TGAIN</i>	<i>ADJ_TGAIN</i>	<i>ADJ_TGAIN</i>	<i>WDADJ_TGAIN</i>	<i>WDADJ_TGAIN</i>
	<i>Diversifying</i>	<i>Related</i>	<i>Diversifying</i>	<i>Related</i>	<i>Diversifying</i>	<i>Related</i>	<i>Diversifying</i>	<i>Related</i>
<i>REL_GW</i>	0.287** (2.01)	0.311*** (2.91)	0.067** (2.50)	0.057*** (2.78)	0.070** (2.44)	0.060*** (2.74)	0.078*** (2.63)	0.049** (2.31)
<i>REL_RD</i>	0.167 (0.36)	0.280 (1.07)	0.055 (0.63)	0.008 (0.21)	0.033 (0.38)	0.002 (0.06)	0.092 (0.98)	0.013 (0.34)
<i>REL_TECH</i>	0.134 (0.32)	0.442** (2.22)	-0.043 (-0.66)	-0.033 (-0.68)	-0.063 (-0.92)	-0.037 (-0.71)	-0.043 (-0.63)	-0.035 (-0.72)
<i>REL_CLIENT</i>	0.057 (0.20)	-0.136 (-0.73)	0.091 (1.27)	-0.050 (-1.10)	0.102 (1.36)	-0.047 (-0.92)	0.073 (0.94)	-0.048 (-1.02)
<i>REL_RIGHTS</i>	1.138** (2.09)	0.443* (1.69)	-0.191 (-1.25)	0.004 (0.08)	-0.221 (-1.37)	0.008 (0.17)	-0.377** (-2.44)	-0.007 (-0.15)
<i>REL_TM</i>	0.780* (1.69)	-0.053 (-0.25)	0.061 (0.77)	-0.132*** (-2.95)	0.045 (0.55)	-0.131*** (-2.68)	0.098 (1.26)	-0.116*** (-2.78)
<i>REL_INTAN</i>	0.200 (0.83)	0.393** (2.11)	0.023 (0.46)	-0.008 (-0.26)	0.020 (0.37)	-0.005 (-0.15)	0.038 (0.73)	-0.011 (-0.36)
<i>CAPRD_ACQ</i>	0.152 (0.30)	-0.404 (-1.22)	-0.153 (-1.48)	0.064 (0.98)	-0.141 (-1.38)	0.072 (1.05)	-0.153 (-1.35)	0.052 (0.80)

<i>CAPADV_ACQ</i>	2.135 (0.98)	-2.470 (-1.55)	0.565 (1.20)	-0.696** (-2.07)	0.522 (1.06)	-0.733** (-2.05)	0.520 (0.91)	-0.436 (-1.34)
<i>INTAN_ACQ</i>	0.296* (1.89)	-0.004 (-0.03)	-0.054 (-1.43)	-0.019 (-0.68)	-0.053 (-1.35)	-0.017 (-0.59)	-0.048 (-1.17)	-0.023 (-0.84)
<i>CAPRD_TAR</i>	0.096 (0.30)	-0.217 (-0.88)	0.127* (1.72)	0.083* (1.97)	0.107 (1.45)	0.082* (1.93)	0.107 (1.42)	0.080* (1.88)
<i>CAPADV_TAR</i>	-3.780 (-1.48)	1.395 (0.97)	-0.449 (-1.04)	0.535 (1.41)	-0.412 (-0.95)	0.551 (1.28)	-0.462 (-0.95)	0.720* (1.91)
<i>INTAN_TAR</i>	-0.294** (-2.01)	-0.154 (-1.27)	-0.041 (-1.34)	-0.003 (-0.10)	-0.047 (-1.51)	-0.003 (-0.10)	-0.043 (-1.35)	-0.002 (-0.06)
Constant	0.766 (1.13)	0.291 (0.86)	-0.124 (-0.84)	0.049 (0.56)	-0.115 (-0.80)	0.008 (0.10)	-0.104 (-0.57)	0.099 (1.07)
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	138	298	143	304	143	304	133	288
Adjusted R-squared	0.472	0.272	0.362	0.299	0.368	0.289	0.564	0.482

Table 7 Information Content of the 10-Q/10-K containing the first PPA disclosure

This table presents results from tests investigating the information content of the disclosure of the purchase price allocation. The sample consists of 427 deals announced between 2001 and 2015 for which we could find a 10-Q or 10-K filing containing detailed PPA disclosures. Panel A presents the results of tests investigating whether the signed three-day abnormal (size-adjusted) return (*ABNRET_SZ*) around the 10-Q or 10-K that contains the PPA disclosure is significantly different from zero. Panel B presents the results of tests investigating the abnormal variance in the three-day window (*ABSRET_SZ*) surrounding the 10-Q or 10-K that contains the PPA disclosure. Panel C investigates whether the deal announcement returns are correlation with the returns around the PPA disclosure date. Panel D replicates the main test results, replacing deal announcement returns with the return around the PPA disclosure date. Purchase price allocations include the amount of the purchase price allocated to goodwill, R&D, technology, client relationships, rights, trademarks, and other identifiable intangibles divided by deal value (*REL_GW*, *REL_RD*, *REL_TECH*, *REL_CLIENT*, *REL_RIGHTS*, *REL_TM*, and *REL_INTAN*). Results reported under the column “All” include all deals for which we could find a 10-Q or 10-K filing containing detailed PPA disclosures. We subsequently drop 10-Q’s or 10-K’s for which there is a concurrent earnings announcement in the (-1,0) or (-2,0) window. In Panels A and B, p-values are reported in parentheses under the coefficients. In Panels C and D, we report the t-values on the respective regression coefficients and winsorized non-return variables at the 1st and 99th percentile. The regression includes year-fixed effects and Fama and French 12 industry fixed effects. Standard errors are clustered at the acquirer level. *, **, *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively (two-tailed).

Panel A: Signed Announcement Returns around the 10-Q/10-K

	All	Dropping overlap -1,0	Dropping overlap -2,0			
<i>ABNRET_SZ</i>	Mean	-0.64%*** (0.007)	Mean	-0.21% (0.327)	Mean	0.02% (0.923)
	Median	-0.46%*** (0.001)	Median	-0.24% (0.115)	Median	-0.06% (0.583)
N	427	316	289			

Panel B: Relative Absolute Returns around the 10-Q/10-K

	All	Dropping overlap -1,0	Dropping overlap -2,0			
<i>ABSRET_SZ</i>	Mean	0.40*** (0.000)	Mean	0.12** (0.031)	Mean	0.07 (0.199)
	Median	0.13*** (0.000)	Median	-0.02 (0.751)	Median	-0.06 (0.427)
N	427	316	289			

Panel C: Regression of ACAR, PCAR, & TCAR on 10-Q/10-K announcement returns

	All	Dropping overlap -1,0	Dropping overlap -2,0
<i>ABNRET_SZ, ACAR</i>	0.029 (0.71)	0.224* (1.84)	0.212 (1.56)
	Adj. R ² : -0.002	Adj. R ² : 0.012	Adj. R ² : 0.008
<i>ABNRET_SZ, TCAR</i>	0.101 (0.55)	0.377 (1.51)	0.461* (1.72)
	Adj. R ² : -0.002	Adj. R ² : 0.001	Adj. R ² : 0.002
<i>ABNRET_SZ, PCAR</i>	-0.057 (0.78)	0.128 (1.31)	0.131 (1.22)
	Adj. R ² : -0.001	Adj. R ² : 0.002	Adj. R ² : 0.002
N	427	316	289

Panel D: Replacing deal announcement CARs with 10-Q/10-K announcement returns

	All	Dropping overlap -1,0	Dropping overlap -2,0
<i>REL_GW</i>	-0.014 (-1.07)	0.004 (0.29)	0.006 (0.46)
<i>REL_RD</i>	-0.016 (-0.43)	0.003 (0.08)	-0.011 (-0.31)
<i>REL_TECH</i>	-0.001 (-0.03)	0.005 (0.14)	0.040 (0.99)
<i>REL_CLIENT</i>	-0.055 (-1.63)	-0.012 (-0.42)	-0.036 (-1.35)
<i>REL_RIGHTS</i>	0.058** (2.16)	0.074*** (2.69)	0.049 (1.44)
<i>REL_TM</i>	0.072* (1.86)	0.032 (0.89)	0.017 (0.54)
<i>REL_INTAN</i>	0.007 (0.36)	0.013 (0.70)	0.010 (0.53)
Controls	Included	Included	Included
N	427	316	289
