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# Do merger-related operating synergies exist?\*

Gennaro Bernile<sup>†</sup>, Scott Bauguess<sup>‡</sup>

July 2011

## Abstract

Executives frequently forecast large operating efficiency gains from mergers. Using these projections, we study the impact of operating synergies on merger performance. Investors' reaction to mergers varies directly with the availability of these forecasts and the gains they imply, and post-merger operating performance increases with the predictable component of forecasted synergies based on deal characteristics. The realized improvements, however, do not depend on the availability of forecasts or the surprise they convey, and post-merger stock returns reconcile discrepancies between investors' ex ante beliefs and mergers' ex post performance related to management forecasts. Overall, the evidence supports the neoclassical view that synergies' expectations and realizations are important determinants of merger activity and performance.

Keywords: Mergers and Acquisitions, Synergies, Management Forecasts, Merger Performance.

JEL Classification Numbers: G14, G17, G34.

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## **Abstract**

Executives frequently forecast large operating efficiency gains from mergers. Using these projections, we study the impact of operating synergies on merger performance. Investors' reaction to mergers varies directly with the availability of these forecasts and the gains they imply, and post-merger operating performance increases with the predictable component of forecasted synergies based on deal characteristics. The realized improvements, however, do not depend on the availability of forecasts or the surprise they convey, and post-merger stock returns reconcile discrepancies between investors' ex ante beliefs and mergers' ex post performance related to management forecasts. Overall, the evidence supports the neoclassical view that synergies' expectations and realizations are important determinants of merger activity and performance.

## 1. Introduction

Neoclassical theories maintain that the ability of a merged entity to operate more efficiently than the merging stand-alone firms, i.e., availability of synergies, is an important determinant of merger activity and performance.<sup>1</sup> Existing empirical studies commonly infer the existence of synergies from various measures of merger performance. Short-term return event studies indicate that net gains to merging firms' shareholders are positive, while analyses of post-merger operating and stock performance provide mixed evidence, at best. In fact, several researchers highlight that it may be difficult or even unfeasible to draw inference about the existence and magnitude of merger synergies from the available evidence (e.g., Kaplan, Mitchell, and Wruck, 2000; Andrade, Mitchell, and Stafford, 2001; Hietala, Kaplan, and Robinson, 2003). In this study, we collect and analyze operating efficiency gains forecasted by merging firms' insiders to test whether the potential and actual success of M&A depends on the existence and magnitude of synergies.

In principle, managerial projections provide a unique experimental tool with which to assess the economic relevance of merger-related efficiencies, because insiders are in a unique position to evaluate them. Yet, that insiders would portray M&A as having the potential to generate large gains does not in and of itself constitute evidence that synergies exist. Indeed, behavioral and agency theories imply that management projections, either knowingly or not, may not provide a meaningful representation of merger-related gains.<sup>2,3</sup> Therefore, whether

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<sup>1</sup>See, for instance, Bradley, Desai, and Kim (1988), Kaplan (2000), Maksimovic and Phillips (2001), Jovanovic and Rousseau (2002), and Houston, James, and Ryngaert (2001).

<sup>2</sup>Insiders' self-interested behavior is the driver of the merger decision in Jensen (1986), Morck, Shleifer, and Vishny (1990), and Gorton, Kahl, and Rosen (2005); bidder managers' overconfidence characterizes Roll's (1986) 'hubris hypothesis'; and market misvaluations drive mergers in Shleifer and Vishny (2003) and Rhodes-Kropf and Viswanathan (2004).

<sup>3</sup>Houston, James, and Ryngaert (2001) note that "it is often treacherous to 'take management's word for it' on a given matter" - p. 285. Along the same lines, a Wall Street Journal article characterizes management's attitude around mergers as follows: "In a business world populated by spinmeisters, colorless conference calls, and business-school jargon, there is still a special place for M&A rhetoric: it is universally optimistic, and dressed in a dreamy gauze of post-deal cooperation. Its practitioners are by custom prevented from admitting the slightest weakness."

insiders' forecasts in fact reflect the existence and magnitude of *real* synergies is ultimately an empirical question, which we analyze as part of our two-pronged empirical strategy.

First, we examine how market participants' ex ante beliefs and merging firms' ex post operating performance relate to the availability of operating synergies projections and their implied gains. Here, based on observable merger-specific factors, we decompose available synergies' forecasts into their expected and unexpected components, and predict the synergies that may be expected when insiders' projections are not available. We then analyze the relation between merger performance and the 'predictable' and 'surprise' components of synergies forecasts. Second, to further gauge the economic relevance of operating efficiency gains in mergers, we test whether post-completion stock returns reconcile discrepancies between ex ante expectations and ex post realizations of those gains. Specifically, we analyze the relation between post-merger returns and the availability of synergies forecasts, as well as investors' ex ante capitalization of and firms' ex post ability to deliver the gains projected by management.

To conduct our analysis, we collected news stories and press-releases for 3,935 M&A deals between firms listed on U.S. exchanges that were announced between 1990 and 2005. Whenever available, we retrieve management forecasts of synergies: 23% percent of the deals are accompanied by insiders' forecasts, and their availability varies systematically with factors expected to proxy for the existence of synergies, as well as the benefit of communicating them to market participants.<sup>4</sup> The projected efficiency gains are economically significant, on average, varying between \$200 (3.4%) and \$830 (14%) million (of the combined pre-merger equity market cap) depending on the valuation model. And, controlling for self-selection, firm and deal characteristics typically used as proxies of merger motives explain over 40% of the variation in the projected operating gains.

Supporting the notion that synergies are an important determinant of capital markets' assessment of mergers, announcement returns are higher when insiders provide synergies forecasts and the implied efficiency gains are larger. Interestingly, the relation between investors' reaction to merger offers and the 'predictable' component of synergies forecasts is similar

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<sup>4</sup>In the Section 5, we present and discuss the tests that control for the potential effect of self-selection bias on our main results.

across deals with and without management projections. However, merger announcement returns are also directly, significantly related to the ‘surprise’ conveyed by the forecasts, when insiders disclose them.

The post-merger operating performance analysis confirms that the success of mergers varies directly with their potential for operating gains, although there are some important distinctions compared to the market expectations analysis. Like for investor’ expectations, post-merger changes in operating performance increase with the predictable component of merger-related gains forecasted by management, whether an actual forecast is available or not. In contrast with the ex ante analysis, however, post-merger operating performance does *not* vary significantly with actual forecasts’ availability or the surprise those convey. This evidence is consistent with the notion that insiders’ forecasts of merger synergies may be overly optimistic, whether knowingly or not, and that investors’ ex ante assessment is biased upward when synergies forecasts that convey large positive surprises are disclosed.

In efficient capital markets, if investors view the realization of synergies as a determinant factor of post-merger valuations, stock returns should reconcile discrepancies between investors’ ex ante beliefs and actual post-merger operating performance relative to management forecasts of synergies. Our tests support this conjecture, which may partly explain the ‘post-merger performance puzzle’ (Agrawal and Jaffe, 2000). In particular, calendar-time long portfolios of completed mergers accompanied by synergies forecasts earn negative abnormal returns, while long portfolios of deals without forecasts earn zero or positive returns. The risk-adjusted return differentials between the two portfolios become progressively more significant as investors have an opportunity to learn about the realized gains, ranging between over 3% and 12% on an annualized basis depending on the portfolio formation criteria and expected return model. Finally, our last set of tests show that investors’ ex ante assessment of the projected gains and firms’ ability to deliver them have opposite effects of similar magnitude, negative and positive respectively, on post-merger stock returns. Therefore, both expectations and realizations of operating synergies are economically important determinants of merger success.

Our study is most closely related to the analysis by Houston, James, and Ryngaert (2001) (HJR, henceforth) of synergies forecasts in 41 large bank mergers. Our research design, how-

ever, differs in several important ways. First, our analysis relies on a substantially larger and more diverse sample of M&A, spanning a period during which synergies projections became increasingly common and regulatory reforms may have affected their quality. Second, by decomposing projected synergy gains into expected and residual components, we investigate how merger performance is related to ‘synergy surprises’. Third, to the extent possible, we analyze the effect of synergies on the performance of *all* mergers. Specifically, we assess how merger performance varies with the availability of synergies forecasts, as well as how it relates to ‘predictable synergies’ when no projection is available. Finally, we analyze whether the post-merger stock returns reconcile potential discrepancies between investors’ ex ante assessment and firms’ ex post operating performance with respect to the availability and magnitude of synergies projections.

The remainder of the paper is divided in five sections. In Section 2, we briefly review the related literature and establish the framework of our analysis. In Section 3, we present our data, and discuss the relation between the gains projected by management and merging firms characteristics typically associated with the existence of synergies. Section 4 presents our main empirical tests and results, while Section 5 summarizes the robustness tests where we control for the potential effect of self-selection bias on our analysis. Finally, Section 6 concludes.

## **2. Related literature and empirical framework**

Academic studies rely on various measures of ex ante and/or ex post merger performance to draw inferences about synergies. Starting with Bradley, Desai, and Kim (1988), countless researchers have assessed synergies using the combined announcement returns to merging firms’ shareholders based on event study methods.<sup>5</sup> The combined return estimates are typically positive, suggesting that M&A announcements convey net positive information. Nonetheless, returns around merger announcements reflect both new ancillary information about the merging firms’ stand-alone values as well as the value of expected synergies. Therefore, relying on short-term event studies to infer the existence and magnitude of synergies is

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<sup>5</sup>See recent and extensive reviews provided in Kaplan (2000) and Bruner (2004, 2005).

theoretically unfeasible in most cases (Hietala, Kaplan, and Robinson, 2003).

More recently, researchers have used changes in analysts' forecasts to assess the potential effect of M&A on efficiency (Harford, 2005; Chen, Harford, and Li, 2007; Devos, Kadanpakkam, and Krishnamurthy, 2009). Using Value Line estimates, Devos et al. find that changes in combined forecasts for 264 completed deals imply positive synergies, over 80% of which are due to operating efficiencies. However, there are some drawbacks to this approach. First, it requires analyst coverage, potentially biasing the analysis towards larger and possibly more successful companies (Rhodes-Kropf, Robinson, and Viswanathan, 2005). Moreover, if merger events indeed reveal information about the stand-alone entities, changes in analysts' forecasts may suffer from the same issues highlighted by Hietala et al. (2003) for the announcement returns.

Another common approach is to assess the ex post performance of mergers using accounting-based measures of operating performance or the merged entity's risk-adjusted long-term stock performance. The inference drawn from post-merger changes in operating performance tends to depend on the sample period and the method used to measure performance, casting doubts on the systematic existence of synergies.<sup>6</sup> Moreover, clinical studies suggest that the noise in accounting measures may dwarf merger-related effects (e.g., Kaplan, Mitchell, and Wruck, 2000).<sup>7</sup> Finally, as Harford (2005) notes, there is a 'benchmark problem' because expectations of how stand-alone firms may have fared absent the deal are hard to measure.

The evidence based on long-term stock returns is least supportive of the idea that synergies exist, with some suggesting the typically post-merger negative drift in stock prices systematically outweighs the combined announcement gains (Loughran and Vijh, 1997; Rau and Vermaelen, 1998; Agrawal and Jaffe, 2000). The evidence, however, is mixed with re-

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<sup>6</sup>Ravenscraft and Scherer (1989) find that the raw profitability of acquired business lines decreases following mergers in the 1960-70's, while Lichtenberg (1992) documents plant-level productivity improvements in the 1970's and Healy, Palepu, and Ruback (1992) report improved industry-adjusted asset productivity for the 50 largest deals in the 1980's. For more recent samples, 1981-1995 and 1985-1997 respectively, Ghosh (2001) and Lie and Heron (2002) report contrasting results as well.

<sup>7</sup>Maksimovic, Phillips, and Prabhala (2008) circumvent this issue by using plant-level data and find that acquirers' restructuring activity is consistent with mergers fostering allocation of resources to higher-valued users.



spect to the magnitude of the drift and largely dependent on the method used to measure abnormal returns. Using the calendar-time portfolio approach advocated by Fama (1998), Mitchell and Stafford (2000) report negative estimates of smaller magnitude compared to earlier studies.<sup>8</sup> Based on the available evidence, it is not obvious what the empirical relation between post-merger long-term returns and synergies' expectations and realizations may be.

## 2.1. Insiders' view on merger synergies

HJR (2001) are the first to analyze synergies forecasts by merging firms' insiders. Although limited to a sample of 41 large deals in the banking sector, their study provides valuable insights. First, the gains implied by insiders' forecasts are typically large, approximately 13% of the merging banks' combined equity. Moreover, equity returns capitalize large fractions of the projected cost efficiencies, but virtually none of the revenue enhancements. Finally, a qualitative assessment of analysts' opinions and merged entities' financial reports suggests that some of the cost synergies are in fact available. Although HJR caution against drawing inferences about optimism in managers' forecasts, their analysis provides indication that synergies projections by insiders may overstate the available merger-related gains.

Indeed, insiders' incentives to provide synergies forecasts that are in fact informative are likely affected by many aspects of the M&A process, such as the need to win over shareholder and regulatory approval, competition by other potential bidders, and the existence of proprietary, litigation, and/or reputation costs. Therefore, whether the availability of insiders' forecasts is indication that potential synergies exist and whether the implied gains are economically relevant are empirical questions, which we address in this study.

In our main tests, we estimate the relation between ex ante and ex post measures of merger performance and the availability of synergies projections as well as the gains implied by the forecasts. To begin, we analyze how merging firms' combined abnormal returns around

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<sup>8</sup>Mitchell and Stafford (2000) argue that earlier studies suffer from methodological problems that affect the analysis of long-term returns in general and advocate adopting the calendar-time portfolio approach because it is robust to most of those problems, including the clustering of merger events (see also Barber and Lyon, 1997; Kothari and Warner, 1997; Fama, 1998; Brav, 2000).

merger announcements vary with the availability of insiders' projections and their magnitude, when available. Moreover, we estimate a model of 'predictable' synergies based on observable deal characteristics. Based on the estimates from this model, we assess the relation between the market participants' reaction to mergers and the residual portion of the forecasts for deals that have them, as well as expectations of synergies for those that do not.

We then focus on post-merger performance measures. Here, first, we conduct an analysis similar to the one just described using post-merger changes in industry-adjusted operating performance - i.e., return on assets and operating expenses to sales ratios (equivalent to one minus operating margin). Second, we examine whether the post-merger stock performance is related to ex ante expectations and ex post realizations of synergies. In particular, on the one hand, we estimate long-term calendar-time portfolio abnormal returns conditional on management forecast availability. On the other, we test whether a merged entity's ability to deliver the projected gains and investors' ex ante assessment of management projection may explain the 'post-merger performance puzzle' documented in prior studies.

### **3. Description of the sample and insiders' forecasts of synergies**

The sample consists of M&A deals between companies listed on NYSE, NASDAQ, or AMEX that were announced between January 1, 1990 and December 31, 2005 and are in the *Securities Data Company* (SDC) database. We restrict the initial sample to acquisitions of assets, acquisitions of a majority interest, or mergers where the bidder holds less than 50% of the target's common stock on the offer date and the deal has come to a resolution (i.e., completed or withdrawn). Furthermore, we discard offers by the same bidder that are less than 20 days apart, resulting in a sample of 3,935 unique announcements of merger offers - see Appendix A.1 for further details.

Table 1 presents the distribution of offers by calendar year and by bidder industry based on Fama-French's (1997) 12-industry classification. The frequency with which offers become public is consistent with the idea that mergers occur in waves and cluster by industry (e.g., Mitchell and Muhlerin (1997), Hartford (2005), Rhodes-Kropf et al. (2005), Bruner (2004, 2005)). The aggregate volume measured by the number of deals rises during the 1990's reaching its peak toward the end of the decade followed by a notable decline. Moreover,

the three most active sectors - i.e. Financial, Business Equipment and Electronics, and Healthcare - account for almost 60% of the announcements.

[Insert Table 1 here]

For each deal, we inspect news stories and press releases published between the offer announcement and its resolution to retrieve insiders' projections of merger-related gains. Deal-specific news stories and press releases are from all English sources on Factiva and satisfy the criteria detailed in Appendix A.2.<sup>9</sup> As shown in Table 1, management forecasts of synergies are publicly available in 894 cases, or 22.7% of the sample.

### 3.1. Merger characteristics

Synergies communication strategies can be an important part of the M&A process.<sup>10</sup> As the evidence in Table 1 shows, however, publicly available forecasts of synergies by management are common but not ubiquitous. The variation in forecast frequency across industries and over time suggests there may be a systematic cost/benefit trade-off that determines merger communication strategies. To further examine this aspect, we compare the characteristics of deals with insiders' projections, *Forecast* sample, to those of all other deals, *No Forecast* sample. This analysis sheds some light on the trade-off that determines the availability and quality of synergies forecasts and, thus, their relevance, and is useful in assessing the potential for self-selection bias.

Table 2 presents summary statistics for a large set of target, bidder, and deal characteristics conditional on whether synergies forecasts are available.<sup>11</sup> These characteristics are typically used as proxies for merger motives and, thus, the potential for business combinations to create (or destroy) value. For 31 (32) of the 37 measures, the mean difference

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<sup>9</sup>Appendix A.3 provides some representative extracts from articles and press releases that contain management forecasts of synergies.

<sup>10</sup>Lipin and Sirower (2003), for instance, state that "communications strategy can make the difference between success and failure of an acquisition by impacting every phase (including) shareholder approval [...] investors performing their own due diligence use the information contained in press releases, investor presentations, conference calls, and interviews to reach buy and sell decisions in the fast-moving equity markets". See also Bruner (2005).

<sup>11</sup>Appendix C describes each variable in detail and the sources from which the necessary data are obtained.

test (Wilcoxon rank-sum test) supports rejection of the hypothesis that the *Forecast* and *No Forecast* samples are drawn from the same distribution. The evidence is consistent with the notion that the availability of forecasts may be systematically related to the existence of potential synergies, as well as the net benefits of communicating them to capital market participants. Although the direction of causality is not obvious, the differences across the two samples indicate that the release of projections is not random and motivate the robustness tests discussed in the next subsection and in Section 5, where we apply self-selection bias corrections to our main tests (Heckman, 1979).

[Insert Table 2 here]

### **3.2. Types of synergies forecasts, valuation approach, and typical implied gains**

Publicly available operating synergies' forecasts by management are most often explicitly associated with cost savings, 87.9% of the cases. When insiders rationalize these projections, they tend to ascribe the savings to elimination of duplicate costs through layoffs, combination of production capabilities and administrative functions, increased purchasing power in input markets, and elimination of redundant R&D and capital expenditure programs. In our sample, insiders seldom project revenue increases, 4.7% of forecasts. This is perhaps not surprising in light of the evidence in HJR (2001) that announcement returns does not reflect revenue enhancements' projections, suggesting that revenue synergies may be a utopia or that, because they are viewed as such, it is not worth forecasting them publicly. For 6.9% of the forecasts, there is no explicit indication of the underlying driver.

The level of detail provided by insiders about the timing of the projected synergies varies substantially. In 7.6% of cases, management forecasts cover multiple, consecutive years starting in the first post-completion year. In the remaining portion of the sample, however, the projections are not as precise. In 16.9% of cases, the forecast is limited to the first post-completion year. In 25.5 % of cases, the forecast refers to annual synergies to be realized between two to four years post-completion, but provides no guidance on all or some of the intermediate years. In 43.6% of cases, the projection quantifies annual gains with no indication about the timing. In 5.4% of cases, insiders forecast the cumulative amount of synergies

to be realized during 3, 5, or 10 years after the deal's completion, and finally, in 9 cases, managers provide their own valuations of the synergies but no details about the underlying cash flow profile.

Following previous studies, we use the discounted cash flow method to estimate the value of after-tax synergies from insiders' projections (Kaplan and Ruback, 1995; Gilson et al., 2000; HJR, 2001).<sup>12</sup> This approach requires a well defined annual cash-flow profile and an appropriate discount rate for each deal. For the forecasts lacking precision about the timing, we make some assumptions to derive a suitable cash flow profile. In particular, when annual forecasts are provided, we assume the last year projected is the steady-state level of synergies. When we cannot apply this assumption (i.e., annual forecast with no timing or 5 and 10-year cumulative forecasts), we assume synergies reach the steady-state in year 4 after completion - or year 3, for 3-year cumulative forecasts. Whenever necessary, we assume annual synergies grow at a rate of 100% until the steady-state is reached.<sup>13</sup>

The discount rate should reflect the risk associated with the realization of the projections. We assume the synergies' risk profile is similar to that of the pre-merger cash flows and use the weighted-average of the merging firms' unlevered equity return,  $r_u$ , to discount the projected gains. Similar to Kaplan and Ruback (1995), we adopt two separate approaches to estimate  $r_u$ . In the first, we apply the CAPM model to the asset-weighted average of the merging firms' unlevered equity beta. In the second, we apply the CAPM model to the asset-weighted average of the merging firms' industry unlevered equity beta. In both cases, we use an annual risk premium of 7.5% and 10-year T-bond yield as the risk-free rate.<sup>14</sup>

Table 3 presents sample statistics for the projected operating synergy gains. In Panel A, the projected operating synergies are scaled by the combined firms' pre-merger revenues. The synergistic cash-flows projected by insiders are economically significant when compared to typical time-series variation in firm fundamentals (e.g., Ou and Penman, 1989), and relative to other corporate events typically associated with the attainment of operating efficiencies.<sup>15</sup>

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<sup>12</sup>We rely on managers' own valuations in those nine case where they are provided and the analysis does not require information about the underlying cash flow profiles.

<sup>13</sup>Appendix B.1 describes the adjustments in greater detail.

<sup>14</sup>Appendix B.2 describes the valuation models in more detail.

<sup>15</sup>See, for instance, Brickley and Van Drunen (1990) for the case of internal corporate restructuring.

The implied mean (median) improvement in annual operating margins varies between 2.1% (1.1%) and 2.9% (1.9%). The lower block of Panel A presents similar statistics when missing forecast-years are filled based on the assumptions outlined above and detailed in Appendix B.1. The remaining analysis is based on these adjusted forecasts.

[Insert Table 3 here]

Panel B summarizes four valuations of the net-of-tax projected synergies, which differ with respect to the horizon (infinite or five years) and discount rate (merging firms' or industry's unlevered equity rate of return). The value of the efficiency gains is economically significant, both in dollar terms and when scaled by the combined pre-merger market equity, although the magnitude is naturally sensitive to the assumed horizon. For the *Perpetuity Model*, the mean (median) value of the net-of-tax total synergies is between \$776 (\$179) and 829 (\$190) million depending on the discount rate. When scaled by the combined market value of equity as of 60 trading days prior to the date when the target is 'put in play', the mean (median) gains vary between 14% (7.1%) and 13.2% (6.6%).<sup>16</sup> These estimates are roughly in line with those reported by HJR (2001), 13.1% (9.5%). The first five years account for approximately one-quarter of the perpetuity value. Hence, while alternative discount rates produce similar results, the valuations are notably sensitive to the synergy-horizon. In this sense, it is noteworthy that insiders almost never disclose details about the appropriate horizon.

### **3.3. What explains the value of operating gains projected by management?**

Taking insiders' projections at face value, a large fraction of deals have the potential to generate substantial operating gains for the companies involved. Whether insiders' forecasts of synergies reflect the *real* potential of mergers to enhance efficiency remains, however, an open question. Here we address this question by analyzing how the projected gains vary with merger characteristics typically used as proxies for merger motives: existence and magnitude of merger synergies, severity of agency problems, hubris, and bidder overvaluation.

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<sup>16</sup>We define the 'put in play' event as the date on which a merger or acquisition offer for the same target is first made public in a sequence of bids that are no more than a calendar year apart from each other.

Table 4 reports regression coefficient estimates for the relations between the value of the synergies normalized by the merging firms' equity and the merger characteristics. Columns 1-4 present Tobit regression estimates for four different specifications.<sup>17</sup> Column 5 reports the second-step coefficient estimates and their bootstrapped standard errors for the full model including the self-selection correction derived by Heckman (1979). The (untabulated) first-step probit model for the decision to announce the forecasts includes as instruments the number of analysts following the merging companies and the number of 13-F filers holding their common stock.<sup>18</sup> The last column reports mean marginal effects for the variables that are also included in the selection equation, following Sigelman and Zeng (1999). The *Two-Step Heckman* estimates are fairly consistent with those from the full Tobit model.<sup>19</sup>

**[Insert Table 4 here]**

The projected operating gains vary with many of the factors suggested by neoclassical theories (model 1). The synergies are higher for horizontal deals, which provide greater scope for cost savings through economies of scale, bargaining power with suppliers, and elimination of operating and administrative redundancies (see, for example, Comment and Jarrell, 1995; Kaplan, 2000). The implied gains are strongly related to the merging firms' operating performance prior to the deal. They increase with bidder and target asset turnover ratios (i.e., Sales/Assets), suggesting that higher efficiencies are available when the firms' production scale is larger, and decrease with bidder and target return on assets (i.e., EBITDA/Assets), suggesting that the ability to attain operating efficiencies is bounded by the firms' pre-merger efficiency. Moreover, the projected gains increase with the size of the target, but decrease

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<sup>17</sup>We use the Tobit estimation because synergies are naturally left-censored at zero.

<sup>18</sup>Strictly speaking, estimation of Heckman selection models does not require exclusion restrictions for identification purposes, because the model is identified by non-linearity (Li and Prahabla, 2005; Heckman and Navarro-Lozano, 2004). To be conservative, we experimented with a number of specifications adopting various exclusion restrictions. The qualitative results turn out to be largely independent of the specification of the model and, for sake of brevity, we only report one such specification.

<sup>19</sup>In few cases, there are differences between the coefficients estimates in the parsimonious versus the full model. Because we allow the sample to vary across various specifications depending on data availability, we also estimated all the models with the most restricted sample for which all the data are available. The results do not change materially when we use this sample (722) for all specifications and are available upon request.

with that of the bidder.<sup>20</sup> This evidence suggests that the potential synergies directly depends on the scope for ‘trimming fat’ at the target firm, while acquisitions by larger acquirers generate lower gains, consistent with Moeller, Schlingemann, and Stulz (2004).

The ‘efficiency defense’ under the 1997 Merger Guidelines gives firms incentives to promote and possibly inflate the expected efficiency gains. This incentive is stronger when merging firms have a larger market share and/or serve overlapping markets. The Tobit coefficient estimates on market share support this argument, yet, this relation is not statistically significant when we control for the incentives to provide forecasts. Moreover, the projected synergies do not vary with whether the deal follows industry deregulation events or the degree of merging firms’ geographic proximity, somewhat surprisingly.<sup>21,22</sup>

The relation between the projected operating gains and factors related to agency explanations for mergers is, in principle, less clear. While deals motivated by managers’ self-interest are more likely to be associated with lower synergies, management may also be more likely to tout synergistic gains to rationalize the firm’s acquisition strategy. Financial leverage, dividends, and institutional ownership are typically identified as bonding and monitoring mechanisms that limit insiders’ opportunistic behavior (Jensen and Meckling, 1976; Jensen, 1986; Chen, Harford, and Li, 2007). Conversely, acquirer’s excess cash holdings increase the scope for wasteful deals (Harford, 1999). The evidence indicates that the projected synergies are not significantly related to the acquirer’s abnormal cash holdings and financial leverage, but vary directly with the bidder’s dividend payout ratio and the target’s leverage ratio, consistent with the theory.

Hubris can lead managers to overestimate the synergies available from mergers (Roll, 1986), and superior pre-merger performance may breed managers’ overconfidence. Moreover,

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<sup>20</sup>These effects are robust to excluding relative size from the model and remain significant at a 1% confidence level, although the estimated coefficients are approximately 40% smaller. These specifications are available upon request.

<sup>21</sup>If regulation limits firms’ ability to pursue efficiency-enhancing deals, the gains may be larger when such barriers are removed - e.g., regulation restricting interstate bank mergers or contiguous utilities mergers.

<sup>22</sup>Admittedly, our measure of geographic proximity mainly reflects the availability of administrative cost savings, especially for large firms where the relation between headquarter’s and operating units’ locations is weaker.



mergers provide bidders an opportunity to use overvalued equity as currency (Rhodes–Kropf and Viswanathan, 2004; Shleifer and Vishny, 2003). While bidders have incentives to tout the benefits of a merger to alleviate target shareholders’ concerns about receiving overvalued equity, the expected reputational and/or litigation costs of setting high performance benchmarks may also be higher when using overvalued equity. The relevance of these considerations should depend on the acquiring firm’s recent stock performance, relative valuation, and volatility of equity prices. The evidence shows that bidders with higher asset market-to-book ratios and better pre-merger stock performance release significantly lower forecasts, while the coefficient estimates on the method of payment and the stock returns volatility are not significantly different from zero. Finally, the number of competing bidders is positively associated with the forecasted gains, consistent with heightened competition when targets provide opportunities for larger gains, or bidders strategically releasing inflated projections when competition is heightened.

Overall, much of the cross-sectional variation in the projected merger-related gains is explained by observable factors, including those typically associated with the existence and magnitude of synergies, consistent with the notion that management forecasts may be economically meaningful. In closing this discussion, it is also worth noting the significantly positive coefficient estimate on the inverse Mills ratio in Model (5), which indicates a positive association between the (unexpected) decision to make projections available and the projected operating gains.

#### **4. Relation between merger performance and synergies forecasts**

The gains projected by insiders are related to merger characteristics expected to proxy for the existence and magnitude of synergies. In this section, we discuss our tests of the relation between three common measures of merger performance and the availability and magnitude of insiders’ forecasts of synergies. One of these measures reflects investors’ expectations of synergies around merger announcements, combined cumulative abnormal returns (CAR), and two reflect their subsequent realizations, changes in operating performance and post-merger abnormal returns.

#### 4.1. Do announcement returns reflect management projections of operating synergies?

Table 5 presents mean and median merger announcement CAR's by forecast availability, Panel A, and their relation with management projections of synergies, Panel B. We measure a deal's CAR as the sum of daily residuals from the Carhart (1997) four-factor model estimated using the equity returns of the bidder and target value-weighted portfolio.<sup>23</sup> The daily weights are based on the firms' market value of equity at close of the previous trading day and adjusted for the toehold of the bidder on the bid announcement date, following Bates, Lemmon, and Linck (2005).<sup>24</sup>

[Insert Table 5 here]

The typical announcement CAR is positive and significant at conventional confidence levels, independent of the window or forecast availability. Both mean and median announcement CAR of *Forecast* deals, however, are significantly higher than the CAR of deals without management projections. This may be because *Forecast* deals are more likely to generate larger synergies and, thus, to be accompanied by insiders' forecasts. Or, because insiders' forecasts, almost always released together with or shortly following an offer announcement, positively affect investors' reaction to merger announcements.

Differences in announcement CAR, however, may be due to uncertainty about deal completion, if the latter varies with forecast availability.<sup>25</sup> Thus, we also analyze announcement-

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<sup>23</sup>In particular, first, we estimate the expected return model using at least 60 and as many as 250 daily value-weighted portfolio returns in the pre-event window ending 60 trading days prior to the date when the target is 'put in play'. Then, we use the model estimates to compute the daily value-weighted portfolio return residuals over the relevant event window, with weights adjusted for the toehold of the bidder on the bid announcement date. The date when a target is 'put in play' demarcates the end of the pre-event window, while the current bid announcement or completion dates demarcate the beginning of the post-event window.

<sup>24</sup>To limit the effect of confounding events, we restrict the 'announcement analysis' to deals where the bidder announces no bid for other targets over the (-20, 20) announcement window, as defined in the text. Similarly, we restrict the 'completion analysis' to deals where the bidder announces no bid for other targets over the (-20, 20) announcement-to-completion window, as defined in the text.

<sup>25</sup>Luo (2005) shows that announcement returns may also affect, rather than simply reflect, the likelihood of completion.

to-completion CAR. The typical announcement-to-completion CAR is positive and significant in the *Forecast* sample, mean=5.2% (median=4.2%), while it is not statistically significant for *No Forecast* deals, mean=-0.9% (median=-0.1%). Consistent with the announcement returns, the differences across the two samples are statistically significant.

Panel B of Table 5 summarizes our tests of whether investors' reaction to mergers varies with the value of synergies projected by management. The dependent variable is the risk-adjusted CAR over the (-20, 20) announcement window (models 1 through 4) or announcement-to-completion window (models 5 through 8).<sup>26</sup> The explanatory variable of interest is the projected synergies value (infinite horizon and firm-based discount rate) normalized by the combined pre-merger equity.<sup>27</sup> Moreover, using the selection-adjusted model in Table 4, we estimate the 'predictable' synergies for *all* deals, independent of forecast availability, as well as the 'residual' synergies that could not be predicted based on observable merger characteristics, for deals accompanied by insiders' forecasts. For the models including these generated regressors, we adjust standard errors following Wooldridge (2002).

Investors' reaction to mergers is directly related to the gains projected by management, consistent with the idea that investors' assessment reflects expectations of synergies. The regression coefficient estimates are statistically significant and economically large: a 1% increase in the normalized synergy value is associated, on average, with a 25 and 45 basis points increase in the announcement and completion CAR, respectively. These magnitudes are large, given that the standard deviation of the normalized synergies is approximately 20% and the mean announcement and completion CAR are 3.3% and 5.2%, respectively. When merger characteristics are included in the model (2 and 6) the relation between CAR and forecasts becomes somewhat weaker, but remains statistically significant at least at the 5% probability level. This suggests that the market reaction reflects synergies that are related

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<sup>26</sup>We have repeated our analysis using *market-adjusted* returns, which for sake of brevity we do not report because the results are very similar, and in particular the estimated slopes are nearly identical to those reported in Table 5. These results are available upon request.

<sup>27</sup>We performed the same analysis using the five-year horizon and/or the industry discount rate valuations. Using the alternative discount rate to value the synergies does not materially affect our results. Conversely, and perhaps not surprisingly, the coefficients estimates are substantially larger when we assume a five-year horizon for the synergies. These results are available upon request.

to observable merger characteristics, as well as information contained in the forecasts that could not be inferred from those factors included in our model.

The remaining models (3-4 and 7-8) focus on the predictable and residual synergies analysis. In the *Forecast* sample, investors' reaction to mergers is directly related to both the predictable as well as the residual portion of the synergy value implied by management projections. Thus, we can reject the hypothesis that investors' beliefs about the effects of mergers are uncorrelated with the residual information contained in management projections. Moreover, there is a significant positive relation between CAR and predictable synergies in the sample of deals *without* projections. In particular, independent of forecast availability, we cannot reject the hypothesis that investors' reaction capitalizes 100% of the changes in predictable synergies by the time a deal is completed. Overall, the evidence supports to the notion that investors' ex ante assessment of mergers varies significantly with the operating synergies that business combinations have the potential to generate when and as projected by insiders.

### **4.3. Does post-merger operating performance reflect management projections of synergies?**

Here we test whether changes post-completion operating performance are consistent with the notion that mergers deliver on management projections. For each completed deal, we calculate the difference between the average three-year post-completion operating performance measure and the merging firms' value-weighted performance in the last year prior the deal announcement:

$$\Delta X = \left( \sum_{t=1}^3 X_t / 3 \right) - X_{-1},$$

$$X_t = \left\{ \frac{\text{OperatingExpenses}_t}{\text{Sales}_t}, \frac{\text{EBITDA}_t}{\text{Assets}_t} \right\},$$

where  $t = \{1, 2, 3\}$  refers to the first three fiscal years following completion,  $X_t$  is the industry-year median-adjusted measure, and  $X_{-1}$  is the corresponding value-weighted measure for the stand-alone firms in the last fiscal year prior to the offer announcement. Similar to the

earlier tests, we eliminate completed deals by the same bidder whose measurement periods overlap.<sup>28,29</sup>

**[Insert Table 6 here]**

Panel A of Table 6 summarizes the changes industry-adjusted operating performance when completed deals are partitioned by whether insiders' projections of synergies are publicly available. Because this comparison may be affected by the differences between *Forecast* and *No Forecast* deals documented in Table 2, we further condition the sub-sample formation on these firm- and industry-level characteristics. In particular, pre-deal industry-adjusted profitability of the merging firms, their industry sales growth, and their industry horizontal merger intensity.

The evidence shows that merging firms experience some cost savings that improve operating margins, independent of whether management forecasts are available. The typical improvement in industry-adjusted operating margins is economically and statistically significant, as implied by a mean (median) reduction of operating costs-to-sales of 3.5% (0.63%) and 1.4% (0.8%) in the *No Forecast* and *Forecast* samples, respectively. There is mixed evidence, however, on whether the cost savings improve asset profitability. The typical change in industry-adjusted ROA is positive, but the mean change is statistically significant in the *No Forecast* sample only. Regardless of the measure, however, we cannot reject the hypothesis that the two samples are drawn from the same distribution, and this inference is largely unaffected when *Forecast* and *No Forecast* deals are matched on pre-deal profitability, industry growth, and merger activity. Thus, in contrast with the earlier evidence for investors' expec-

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<sup>28</sup>The evidence in Fuller, Netter, and Stegemoller (2002) suggests that shareholders of non-serial bidders fare better on announcement of merger offers. While there is some debate about the interpretation of this empirical regularity, it is possible that serial acquirers make worse acquisitions and, thus, that eliminating serial acquisitions by the same bidder may bias the analysis in favor of finding that synergies exist. This restriction, however, provides a cleaner sample to assess whether merger performance is related to management projections of synergies.

<sup>29</sup>We repeated this analysis using Phillips and Horberg (2010) approach, measuring operating performance changes relative to the first post-merger year and obtain similar results, available upon request from the authors.

tations, these results cast some doubt on the notion that the availability of insiders' forecasts may distinguish deals that are more likely to result in operating performance improvements.

Panel B of Table 6 reports linear regression coefficient estimates for the relation between the post-completion changes in industry-adjusted operating performance and management projections of merger-related gains. Here, we redefine the synergies measure as follows for consistency with the operating performance measures:

$$Synergies = \frac{1}{3} * \sum_{t=1}^3 \frac{TS_t}{Y_t}$$

where  $t = \{1, 2, 3\}$  refers to the first three years following the merger completion,  $TS_t$  are the total synergistic cash flows forecasted for year  $t$ , and  $Y_t = \{Sales_t, Assets_t\}$ . As in our earlier tests, we also decompose the synergy measure into a predictable and a residual component by re-estimating the selection-adjusted model presented in Table 4, and adjust the coefficient standard errors following Wooldridge (2002) when we include these generated regressors.

There is a positive and statistically significant relation between management projections of synergies and changes in profitability, model 1. A 1% increase in average synergies projected for the first three years is associated with a predicted increase of 49 basis points in industry-adjusted ROA. Thus, the relation is also economically significant, given that the mean (median) post-merger ROA change is 22 (20) basis points and a one standard deviation of the synergy measure is approximately 1.5%. Higher projected synergies are also associated with an approximately proportional improvement of the operating expense (i.e., profit margin) ratio (model 3).

In further contrast with the investors' expectations analysis, however, including merger characteristics in the model materially affects the estimated relation between management projections and merger performance. Specifically, the positive relation between the projected synergies and operating profitability or margins becomes weaker and not significant at conventional levels. The remaining evidence in the table suggests this is due to the lack of explanatory power of the residual portion of management projections of synergies. Independent of forecast availability, the changes in industry-adjusted asset profitability are directly

related to the gains associated with merger characteristics, consistent with the notion that predictable synergies exist. Yet, we cannot reject the hypothesis that the ‘surprise’ in the available forecasts represents random noise with respect to post-merger changes in operating performance. Like for the univariate results, this is at odds with the earlier evidence for how investors’ reaction to merger offer announcements varies with insiders’ projections of synergies.

#### 4.4. Does the realization of synergies matter to investors?

The evidence suggests that investors’ reaction to merger offer announcements may be biased by the availability and magnitude of synergies projections released by insiders. Here we analyze whether the post-completion abnormal stock returns reconcile the apparent discrepancy between how *ex ante* and *ex post* measures of merger performance are related to management forecasts.

Table 7 reports average post-merger monthly abnormal returns for completed deals partitioned by whether management projections of synergies are available. We estimate abnormal returns using the calendar-time portfolio approach advocated by Fama (1998) and used in Mitchell and Stafford (2000) analysis of post-merger returns, among others. For each calendar month between January 1992 and December 2008, we form equal-weighted portfolios of firms that complete mergers 1 to 36, or 7 to 42, or 13 to 48 months prior to the current month.<sup>30</sup> This progressive shift of the 36-month window aims to reflect the arrival of new information to investors as firms begin to integrate their operations and their post-merger financial reports become available. For each window, we form three calendar-time portfolios: a portfolio long in *Forecast* deals; a portfolio long in *No Forecast* deals; and a portfolio long in *Forecast* deals and short in *No Forecast* ones. Finally, we estimate the average monthly abnormal return of each portfolio as the intercept of the Carhart (1997) four-factor model.<sup>31</sup>

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<sup>30</sup>We performed a similar analysis using value-weighted portfolios, which we do not present for sake of brevity. Consistent with the evidence in Mitchell and Stafford (2000), the long-portfolios’ alphas are typically higher when we use value-weighted portfolios. However, important for our purposes, the evidence for the long/short-portfolios’ alphas is qualitatively similar to the one presented in Table 7.

<sup>31</sup>Using the Fama and French (1993) three-factor model yields similar results, available from the authors.

[Insert Table 7 here]

As shown in Panel A, on average, the *Long Forecast* portfolio earns statistically significant negative abnormal returns - between -27.4 and -31.4 basis points per month depending on the model and completion horizon. The mean risk-adjusted return of the *Long No Forecast* portfolio is mostly insignificant and increases as the portfolio formation window shifts back in time, becoming significantly positive for the 13-to-48 months window. The mean alpha of the *Long/Short* portfolio is uniformly negative and significant. This evidence is consistent with the idea that long-run returns reconcile the discrepancy between merger announcement returns and operating performance with respect to the availability of synergies forecasts by insiders.

As previously discussed for the post-merger operating performance, the systematic differences between the *Forecast* and *No Forecast* deals may affect our inference. For instance, Loughran and Vijh (1997) and Rau and Vermaelen (1998) find that acquirers' long-term abnormal returns depend on the merger financing method and acquirers' pre-merger book-to-market ratios (see also Mitchell and Stafford, 2000). Table 2 shows that *Forecast* and *No Forecast* deals differ significantly along these dimensions. Therefore, in the remaining portion of Table 6, we repeat the analysis controlling for these factors and only report alphas of the Long/Short portfolios matched on these characteristics, for sake of brevity.<sup>32</sup> Furthermore, similar to Table 6 and for similar reasons, we also repeat the analysis conditioning portfolios on pre-merger profitability of the merging firms, their industry sales growth, and their industry horizontal merger intensity. With few exceptions (i.e. low growth industries), the portfolio formation restrictions have little effect on our earlier inferences, although the magnitude of the annualized *Long/Short* portfolios' abnormal returns varies substantially depending on the portfolio groupings, between 3% and 12% per year.

Thus, overall, post-merger stock returns appear to reconcile the discrepancy between how announcement returns and post merger operating performance relate to synergies forecasts availability. The negative average post-merger abnormal return in the *Forecast* sample is also

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<sup>32</sup>The intermediate group produces results very similar to the high group, which we do not report for sake of brevity.



consistent with realizations of merger-related gains that are systematically lower than implied by management forecasts. This interpretation may also explain the discrepancy documented earlier between how investors' ex ante reaction and ex post changes in operating performance relate to the 'surprise' component of the forecasted synergies.

Indeed, in a simple one period framework where managers forecast synergies equal to  $S_M$ , investors' pre-completion reaction capitalizes some fraction  $\kappa$  of management projections,  $S_{ST} = \kappa * S_M$ , and the merged entity delivers a fraction  $\delta$  of the forecasted gains at the end of the period,  $S = \delta * S_M$ , the post-completion realized returns can be expressed as:

$$R_{LT} = \frac{S}{S_{ST}} - 1 = \frac{\delta}{\kappa} - 1, \text{ or} \quad (1)$$

$$\log(1 + R_{LT}) = \log(\delta) - \log(\kappa). \quad (2)$$

Therefore, if investors' post-completion assessment reflects the realization of synergies, the long-term stock performance should be positively related to the merged firm's ability to deliver the projected gains relative to investors' pre-completion expectations,  $\frac{\delta}{\kappa}$ . Moreover, in the log-transformed model of realized returns, changes in  $\log(\delta)$  and  $\log(\kappa)$  should have opposite effects of similar magnitude.

Table 8 reports linear regression estimates of the relations in equations (1) and (2) above. The dependent variable is either the firm-level post-completion annualized alpha estimated in calendar time using the Carhart (1997) four-factor model, or the natural log of one plus alpha. For completed deals that are accompanied by forecasts, whenever possible, we separately estimate the intercept of the Carhart model in each of the three post-completion calendar years, using daily excess firm and factors returns. For each merger-year estimation, we require that at least 125 daily observations be available and that the merged entity completes no other deal in that calendar year or the previous two. The estimated daily alpha is then multiplied by 250 to obtain an annualized measure of abnormal returns. The synergies' delivery,  $\delta$ , and capitalization,  $\kappa$ , ratios are defined as:

$$\delta = \left[ 1 + \Delta \left( \frac{EBITDA}{Assets} \right)_{1-3} \right] / \left[ 1 + \frac{1}{3} * \sum_{t=1}^3 \frac{TS_t}{Assets_t} \right]$$

$$\kappa = [1 + CAR(Ann_{-20} \text{ to } Compl_{20})] / \left[ 1 + \frac{PV(After-Tax \text{ Tot Syn})}{(MarketCap)} \right]$$

where  $\Delta \left( \frac{EBITDA}{Assets} \right)_{1-3}$  is the post-completion three-year average raw ROA minus the pre-announcement asset value-weighted ROA,  $\frac{1}{3} * \sum_{t=1}^3 \frac{TS_t}{Assets_t}$  is the three-year average projected annual synergies normalized by assets,  $CAR(Ann_{-20} \text{ to } Compl_{20})$  is the (-20, 20) announcement-to-completion four-factor CAR, and  $\frac{PV(After-TaxTotSyn)}{(MarketCap)}$  is the value of after-tax total synergies normalized by the pre-merger combined equity. Following Petersen (2009), standard errors in Panel A are clustered by deal and calendar year to account for deal-level time-series and year-level cross-sectional correlations of returns.<sup>33</sup>

[Insert Table 8 here]

The evidence in the table supports the hypothesis that investors' post-merger assessment is related to the merged entity's ability to deliver the projected gains relative to investors' pre-completion expectations, whether we control for deal characteristics or not. Furthermore, consistent with equation 2 above, we cannot reject the hypothesis that synergies' ex post delivery and ex ante capitalization ratios have opposite effects of equal magnitude on post-completion abnormal returns. Finally, the median regression estimates for the same models reported in Panel B show that this inference is not driven by few outliers.

## 5. Robustness: the effect of self-selection bias

The univariate analysis in Table 2 provides strong indication that the decision to release synergies projections varies systematically with merger characteristics. Moreover, the analysis in Table 4 shows that the propensity to disclose forecasts is directly related to the magnitude of the projected synergies. It is possible that the analysis in section suffers from a similar self-selection bias.

To address this issue, we re-estimate the relation between merger performance and the availability and magnitude of synergies forecasts controlling for the effect of systematic variation in the decision to release synergies forecasts. Specifically, for the univariate tests, we

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<sup>33</sup>We are grateful to Mitch Petersen for making his code available at [http://www.kellogg.northwestern.edu/faculty/petersen/htm/papers/se/se\\_programming.htm](http://www.kellogg.northwestern.edu/faculty/petersen/htm/papers/se/se_programming.htm).

estimate jointly a treatment-effect model that relates each performance measure to an indicator variable for the availability of management forecasts and a model characterizing insiders' decision to provide projections. In the same spirit, we estimate the performance-synergies relation jointly with the decision to disclose synergies forecasts. We include in the selection model the same explanatory variables used in the *Two-Step Heckman* model presented in Table 4. Maximum-likelihood estimates of these models are presented in Tables 9 and 10.<sup>34</sup>

Table 9 reports estimates of the models relating ex ante and ex post merger performance to the availability of management forecasts. Table 10 reports estimates of the models relating the performance measures to the projected synergies. The evidence in Table 9 is qualitatively similar to the one presented in Tables 5 and 6. There is, however, indication that some of our inferences actually become stronger when we control for the non-random nature of the *Forecast* and *No Forecast* samples. Similarly, across all panels of Table 10, the coefficient estimates are not materially different from those reported in Tables 5 and 6. With the only exception of the operating performance models for the *No Forecasts* sample, the correlation between the selection and outcome equations' residuals is typically low and not significantly different from zero. Therefore, overall, it does not appear that the inferences drawn from the earlier tests change when the choice to disclose - or to not disclose - projections is modeled jointly with the relation between merger performance and the availability and magnitude of synergies forecasts.

## 6. Conclusions

Merging firms' insiders universally portray M&A as having the potential to benefit all relevant stakeholders. This is perhaps not surprising given the enormous investment of resources often required and the epochal changes that often result. This attitude is also consistent with neoclassical theories that characterize mergers as firms' rational reaction to a changing environment. During the 1990's, insiders have shown increasing propensity to rationalize merger deals publicly by quantifying their expected operating synergies. At face value, the gains im-

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<sup>34</sup>Alternatively, we also estimate the self-selection structural model using the two-step approach described in Heckman (1979) and obtain similar results, available upon request.

plied by these forecasts are economically large. In this study, we test whether merger-related synergies indeed exist by examining the relation between traditional ex ante and ex post measures of merger performance and the availability and magnitude of insiders' projections.

The evidence shows that investors' ex ante assessment of mergers is directly related both to the availability of management projections and their implied gains, consistent with the idea that operating synergies are indeed an important determinant of (expected) merger performance. Supporting the existence of actual synergies, post-merger operating performance is directly related to the projected synergies and, in particular, to the portion of those gains that is predictable based on observable deal characteristics. There are, however, notable differences between the ex ante and ex post evidence, as realized changes in operating performance are not related to the availability of forecasts or the surprise they convey. Post-merger long-term returns reconcile these discrepancies, partly explaining the 'post-merger performance puzzle', and consistent with the notion that the ability of firms to deliver the projected synergies is a significant determinant of post-merger stock returns. Overall, the evidence supports the idea that market participants reward the availability of synergies forecasts ex ante in proportion to the implied gains, but later use them as economically relevant yardsticks to judge the success of M&A.

We focus on mergers between publicly traded companies, but it is conceivable that the findings may extend to acquisitions of private firms and other strategic alliances. Also, although we focus on the simple, yet fundamental question pertaining the existence of synergies, there may be fruitful areas for future research that analyzes management forecasts of synergies. First, further work seems warranted on the economic determinants of merger communication strategies and how the projected synergies affect other elements of the merger process. Second, it may be interesting to investigate the factors that affect the credibility of synergies projections ex ante and the merged firm's ability to deliver those gains ex post. Finally, given the evidence that synergy-related disappointments are costly to shareholders, it may be natural to investigate whether they also impose private costs on merging firms' insiders in the form of litigation, reputational losses, and/or job-security.

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## Appendix A.1 - SDC Query

We perform the following query on the Thomson Reuters Securities Data Company's Mergers and Acquisitions database to obtain a list of deals between publicly traded companies (NYSE, NASDAQ, and AMEX) involving US targets, announced between January 1, 1990 and December 31, 2005. The query is restricted to proposed deals that are acquisitions of assets, acquisitions of a majority interest, or mergers where the bidder holds an absolute minority stake in the target at the time of the announcement and the deal has come to a resolution (i.e. completed, unconditional, or withdrawn).

Step	Number of Hits	Search Criteria
0	-	DATABASES: Domestic Mergers, 1979-Present (MA, OMA)
1	-	Date Announced: 01/01/1990 to 12/31/2005 (Custom) (Calendar)
2	67,711	Acquiror Stock Exchange : A, NM, N
3	19,239	Target Stock Exchange : A, NM, N
4	4,433	Deal Type: 1, 2
5	4,235	Form of the Deal: AA, AM, M
6	4,234	Percent of Shares Held by Acquiror at Announcement: LO to 50
7	4,017	Deal Status : C, U, W

Eighty-two deals are further eliminated for the purpose of our analysis, either because the proposed deal involves more than two companies (i.e. the sample excludes M&A offers by the same bidder that are less than two days apart) or because the observation is a later bid for the same target by the same bidder occurring less than 365 days after the earlier bid. The initial sample ultimately comprises of 3,935 unique M&A announcements.

## Appendix A.2 – Factiva Query

We perform a keyword search on Factiva for each of the 3,935 deals in the initial sample to collect management's public forecasts of merger-related gains. For each deal, we impose the following criteria when retrieving related news stories and press releases:

- FACTIVA Keyword Search Window*: (“Variations of Target Name” and “Variations of Bidder Name”) and (merger\* or acquisition\* or tender\*) and (earn\* or profi\* or syne\* or enha\* or add or addi\* or accre\* or contrib\* or save or cost\* savi\* or savi\* or reve\* incr\* or incr\* or decr\* or redu\* or CUT or cutt\* or dilut\* or neutr\* or impro\* or econ\* of scal\* or expec\* or anticip\*)
- FACTIVA Date Range Window*: From (Announcement Date-7) To (Completion/Withdrawal Date)
- FACTIVA Included Sources Window*: *Business Wire*: Dow Jones Business News; Dow Jones News Service; Mergers & Acquisitions Report; Mergers & Acquisitions: The Dealmakers Journal; Mergers & Acquisitions Litigation Reporter; PR Newswire; Reuters News; Seeking Acquisitions: FirstList; The Wall Street Journal

## Appendix A.3 – Examples of news stories and press releases containing insiders' forecasts of merger-related gains

Following are extracts from some news stories and press releases that include managerial forecasts of merger-related gains. The relevant sections are in *italics*.

**Example 1: Bell Atlantic, GTE Merger -4: Cost Synergies Within 3 Yrs. 28 July 1998, Dow Jones News Service:** Bell Atlantic and GTE said based on anticipated revenue and cost synergies, the transaction is expected to add to earnings per share [...] *The companies said in a joint press release Tuesday that they see the transaction producing cost synergies totaling \$2*

billion within three years of the deal's completion. The merged company is also expected to generate an additional \$2 billion in revenue synergies.

**Example 2: Newell Faces a Big Challenge in Rubbermaid Takeover — It Hopes ‘Newellization’ Can Revitalize Household-Products Maker. 3 November 1998, The Wall Street Journal:** Newell Co., renowned for squeezing costs out of acquired companies, faces a tough test in its proposed \$5 billion acquisition of Rubbermaid Inc. [...] *Newell Chief Executive John McDonough is promising that the merger plan, announced late last month, will deliver \$300 million to \$350 million in synergies by 2000, 25% of that from selling Rubbermaid products to Newell customers. [...] Newell hopes Rubbermaid will accelerate the combined company's growth. Besides the usual cost savings, Mr. McDonough predicts the merger will produce \$70 million to \$90 million in new sales by 2000 as Newell introduces its customers to Rubbermaid. [...]*

**Example 3: Food Lion Will Buy Hannaford For About \$3.3 Billion, Plus Debt. 19 August 1999, Dow Jones Business News:** Food Lion Inc. Wednesday confirmed it will acquire supermarket operator Hannaford Bros. Co. for about \$3.3 billion in cash and stock, a deal that would create the sixth-largest food retailer in the U.S. [...] *The combined Food Lion and Hannaford will have nearly \$14 billion in pro-forma annual revenue. The combined company is expected to result in synergies estimated at about \$40 million in the first year and about \$75 million annually by the third year. Operations that may be affected include distribution, information systems, training and marketing. [...]*

**Example 4: Hilton to buy Promus Hotel for \$4 billion. 7 September 1999, Reuters News:** Hilton Hotels Corp. on Tuesday said it would buy Promus Hotel Corp. for \$4 billion in cash, stock and debt, creating a giant with 1,700 hotels and operations in almost every segment of the industry. [...] *The combined company will have pro forma 2000 EBITDA of \$1.3 billion, and result in annual cost savings and operating efficiencies of about \$55 million in the first year and \$90 million thereafter. [...]*

**Example 5: Kroger to merge with Fred Meyer. 19 October 1998, Reuters News:** Kroger Co said Monday it would merge with Fred Meyer in a deal that creates the nation's largest grocer. The 1-for-1 stock swap is valued at about \$13 billion including debt. A full text of the company's press release follows. [...] *Kroger plans to generate annual cost savings of approximately \$225 million within three years, including approximately \$75 million in the first year. Kroger plans to generate these savings through combined procurement of goods and services, reduced corporate overhead, in-market synergies, and consolidation of support services. [...]*

**Example 6: Unicom, Peco Confirm Plans To Merge, Create Utility-Industry Giant. 23 September 1999, Dow Jones Business News:** Chicago-based Unicom Corp. and Philadelphia-based Peco Energy Co. Thursday formally announced plans to merge in a deal they valued at more than \$8 billion. [...] *The merger will boost earnings in the first year after the deal closes, excluding one-time merger-related charges, the companies said. They expect annual cost savings of \$100 million in the first year, growing to \$180 million by the third year. The majority of the savings will come from eliminating redundant corporate and administrative positions and programs.*

**Example 7: Amax Inc., Cyprus Minerals merger to create \$5 billion company. 25 May 1993, Reuters News:** Amax Inc. and Cyprus Minerals Co., two of the nation's biggest metals producers, said Tuesday they plan a corporate marriage that will create a new company – Cyprus-Amax – with assets of \$5 billion. [...] *The combined coal operations will produce more than 70 million tons of coal a year and strong oil and gas and lithium businesses, Ward said. "The combination of the companies will present significant opportunities to reduce operating and corporate and divisional overhead costs, with anticipated annual cost savings of at least \$100 million," he said. But the cost-cutting, he said, may result in job cuts. Cyprus has already completed a restructuring that has trimmed 650 jobs in the past year. [...]*

**Example 8: Viatel/Synergies -2: Sees \$500M Savings Over 5 Yrs. 27 August 1999, Dow Jones News Service:** *Viatel Inc. (VYTL) expects its planned acquisition of Destia Communications Inc. (DEST) to generate cost savings of \$500 million over five years, company officials said in a press conference Friday. [...]*

## Appendix B.1 – Adjustment to raw forecasts

Sometimes insiders provide time tables specifying the magnitude of the annual synergy gains expected to be realized during intermediate years before the benefits of the merger fully materialize. In the majority of cases, however, managers' projections are not as detailed. In some cases, the forecast is limited to the first post-completion year. In other cases, the forecast refers to annual synergies expected between two to four years post-completion, but provides no guidance on all or some of the intermediate years. In other cases, the forecast quantifies annual gains with no indication about the timing. Finally, in other cases, insiders disclose the cumulative amount of synergies expected to be realized over 3, 5, or 10 years after the deal's completion.

In general, when annual forecasts are provided, we always assume that the last projected year is the steady-state level of synergies. When no detail about the timing is provided (i.e. single annual forecast with no timing or 5- or 10-year cumulative forecasts), we assume the steady-state level is reached in year 4 after completion. Whenever necessary (i.e. cumulative forecasts or annual forecast with no timing or annual forecast with missing intermediate years), similar to HJR (2001), we assume that expected synergies grow at a rate of 100% until the steady-state is reached.

Therefore, if managers forecast annual gains of  $x$  dollars by year  $t$ , where  $t > 1$  (or provide no timing, in which case we assume  $t = 4$ ), we assume the merged entity realizes  $x/2$  in year  $t - 1$ ,  $x/4$  in year  $t - 2$ , and so forth until year 1 after completion of the merger is reached. If managers forecast annual gains of  $x$  dollars by year  $t$  and  $y$  dollars by year  $t + i$ , where  $i > 1$ , we interpolate the expected synergy gains for the intermediate years, assuming the gains increase linearly over the missing forecast years. When a cumulative forecast is provided, we adopt the following convention. For a 3-year cumulative forecast equal to  $x$ , we assume the first year forecast is equal  $x/7$ , the second  $2x/7$ , and the third  $4x/7$ . For a 5-year cumulative forecast equal to  $x$ , we assume the first year forecast is equal  $x/23$ , the second  $2x/23$ , the third  $4x/23$ , and  $8x/23$  in each remaining year. For a 10-year cumulative forecast equal to  $x$ , we assume the first year forecast is equal  $x/63$ , the second  $2x/63$ , the third  $4x/63$ , and  $8x/63$  in each remaining year.

## Appendix B.2 – Valuation of merger-related synergies forecasts

To estimate the present value of the merger-related incremental cash flows projected by management, we follow Kaplan and Ruback (1995), Gilson et al. (2000), and HJR (2001). In particular, after adjusting the raw data as described in Appendix B.1, we compute the present value of the after-tax synergistic cash flows assuming they are realized in perpetuity as:

$$PV(Synergies) = \sum_{t=i}^5 \frac{(1-0.36)TS_t}{(1+r)^t} + \frac{(1-0.36)TS_{i+5}}{r(1+r)^{i+5}}$$

where  $i = 1 + \frac{\text{Number of Months to Completion}}{12}$ ;  $(1 - 0.36)TS_t$  is the after-tax synergy forecast for the  $t^{\text{th}}$  year after completion, assuming a flat 36% tax rate;  $r$  is the discount rate; and *Number of Months to Completion* is, for completed deals, the actual number of months to completion or, for withdrawn deals, the average number of months to completion of completed deals in the same target industry based on Fama-French (1997) 49-industry classification. In the 5-year Model, the present value of synergies is restricted to the first element on the right-hand side of the equation above.

Following Kaplan and Ruback (1995), we obtain two estimates of synergies' discount rate,  $r_u$ , which we label *Firm Discount Rate* and *Industry Discount Rate*. In the *Firm Discount Rate* model,  $r_u$  is the weighted-average of the merging firms' cost of unlevered equity, using as weights the firms' pseudo-market value of assets – i.e. market value of common equity,  $E$ , plus book value of long-term debt,  $D$ , and liquidation value of preferred equity,  $P$ , measured 60 trading days prior to when the target company is 'put in play'. To calculate each merging firm's cost of unlevered equity: 1) we estimate the firm's equity beta,  $\beta_E$ , using at least 60 and at most 250 daily firm stock returns and the CRSP value-weighted portfolio returns ending 60 days prior to

when the target is ‘put in play’; 2) we assume the firms’ debt and preferred equity betas,  $\beta_D$  and  $\beta_P$ , are equal to 0.25; 3) assuming a flat 36% tax rate, we calculate the unlevered equity beta as  $\beta_U = [(\beta_E E + \beta_P P + 0.64\beta_D D) / (E + P + 0.64D)]$ ; 4) we apply the CAPM equation to the unlevered equity beta,  $\beta_U$ , assuming a 7.5% risk-premium and setting the risk-free rate equal to the 10-year Treasury bond yield at the time of the announcement.

In the *Industry Discount Rate* model, based on the Fama and French (1997) 49-industry classification,  $r_u$  is the weighted-average of the merging firms’ industry cost of unlevered equity, using as weights the firms’ pseudo-market value of assets as defined above. To compute a firm’s industry cost of unlevered equity, we use all firms that are in the relevant Fama-French industry in the fiscal year prior to when the target is ‘put in play’ and have the necessary data in the CRSP/Compustat merged database. In particular, for each merging firm: 1) we estimate the relevant industry equity beta,  $\beta_E^I$ , using at least 60 and at most 250 daily returns for a value-weighted portfolio of all firms in the relevant industry and the CRSP value-weighted portfolio returns ending 60 days prior when the target is ‘put in play’; 2) we assume the industry debt and preferred equity betas,  $\beta_D^I$  and  $\beta_P^I$ , are equal to 0.25; 3) assuming a flat 36% tax rate, we calculate the relevant industry unlevered equity beta as  $\beta_U^I = [(\beta_E^I E^I + \beta_P^I P^I + 0.64\beta_D^I D^I) / (E^I + P^I + 0.64D^I)]$ , where  $E^I$ ,  $P^I$ , and  $D^I$  are total industry values of common equity, preferred equity, and debt; 4) apply the CAPM equation to the relevant industry unlevered equity beta,  $\beta_U^I$ , assuming a 7.5% risk-premium and setting the risk-free rate equal to the 10-year Treasury bond yield at the time of the announcement.

## Appendix C – Definition of Variables

The table below provides the definition of firm and deal characteristics, their timing relative to the merger event, and the source from which the data is obtained (in italics).

<b><i>Variable</i></b>	<b><i>Definition</i></b>
<u><i>Industry Affiliation</i></u>	In Table 1, industries are defined using Kenneth French's algorithm to translate SIC codes into 12 industries. In all other tables, industries are defined using Kenneth French's algorithm to translate SIC codes into 49 industries. (See <a href="http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html">http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html</a> ).
<u><i>Deal Completed</i></u>	Indicator variable equal to 1 if the proposed deal is completed, 0 otherwise. A deal is deemed completed if the bidder acquires an absolute majority of the target outstanding common shares or the bidder and the target merge into a single entity as a result of the transaction, as reported by <i>SDC</i> .
<u><i>Percent Cash (Equity)</i></u>	Continuous variable between 0 and 100, representing the percentage of the offer price paid in cash (bidder equity), as reported by <i>SDC</i> .
<u><i>Num. of Comp. Bidders</i></u>	Number of competing offers for the same target, as reported by <i>SDC</i> .
<u><i>Horizontal Deal</i></u>	Indicator variable equal to 1 if merging firms belong to the same industry, 0 otherwise. Industries are defined using Kenneth French's algorithm to translate <i>SIC</i> codes into 49 industries.
<u><i>Geographical Overlap</i></u>	Discrete variable varying between 0 and 3: equal to 0 if the bidder is a foreign firm; equal to 1 if the bidder is a US company; equal to 2 if the bidder' and target's headquarters are located in the same US region; equal to 3 if the bidder' and target's headquarters are located in the same US state. Locations are as reported by <i>SDC</i> .
<u><i>Deregulation Window</i></u>	Indicator variable equal to 1 if a deal's announcement falls in the year of a deregulation event or in the subsequent 3 years. Deregulation events are from <i>Harford (2005)</i> and <i>Mitchell and Mulherin (1996)</i> .
<u><i>Sales/Assets</i></u>	Continuous variable equal to the ratio of the firm's sales to assets as reported on <i>Compustat</i> for the fiscal year-ending prior to the bid announcement.
<u><i>EBITDA/Sales</i></u>	Continuous variable equal to the ratio of the the firm's earnings before interests, taxes, depreciation and amortization to sales as reported on <i>Compustat</i> for the fiscal year-ending prior to the bid announcement.
<u><i>EBITDA/Assets</i></u>	Continuous variable equal to the ratio of the firm's earnings before interests, taxes, depreciation and amortization to assets as reported on <i>Compustat</i> for the fiscal year-ending prior to the bid announcement.
<u><i>Equity Market Cap</i></u>	Continuous variable equal the product of the firm's stock price and number of shares outstanding as of 60 trading days prior to the first bid announcement date, as reported on <i>CRSP</i> .
<u><i>Relative Market Cap</i></u>	Continuous variable bounded below at 0. In Table 2, it is the ratio of the target to the bidder Equity Market Cap. In all other tables, it is the ratio of the log(Equity Market Cap) of the target to that of the bidder.
<u><i>Total Assets</i></u>	Continuous variable equal the (book) value of the assets on the firm's balance sheet as reported by <i>Compustat</i> for the last the fiscal year-end prior to the merger announcement date.
<u><i>Relative Assets Value</i></u>	Continuous variable bounded below at 0, equal to the ratio of the target to the bidder Total Assets.
<u><i>Sales Market Share</i></u>	Continuous variable varying between 0 and 1, equal to the ratio of merging firms' sales to industry total sales as reported on <i>Compustat</i> for the last the fiscal year-end prior to the merger announcement date. Industries are defined using Kenneth French's algorithm to translate SIC codes into 49 industries.
<u><i>Tobin's Q</i></u>	Continuous variable equal to the ratio of pseudo-market value to book value of the firm's assets. Pseudo-market value of the firm's assets is the sum of common equity market value and book value of long-term debt. Book value of the firm's assets is the sum of book value of common equity and long-term debt. All value are as reported on <i>Compustat</i> for the fiscal year-ending prior to the bid announcement.
<u><i>Num. of Analysts</i></u>	Number of equity research analysts following the firm in the quarter prior to the merger announcement date, as reported by <i>FirstCall</i> .
<u><i>Pct. Inst. Own.</i></u>	Percent of the firm's common equity held by 13-F filers at the end of the quarter prior to the merger announcement date. It is equal to the sum of all stocks held by 13-F filers divided by the number of shares outstanding, as reported by <i>Thompson Financial</i> .
<u><i>Num. of Inst. Owners</i></u>	Number of unique 13-F filers holding a positive stake of the firm's common equity at the end of the quarter prior to the merger announcement date, as reported by <i>Thompson Financial</i> .
<u><i>Debt/Assets</i></u>	Continuous variable equal to the ratio of the firm's long-term debt to pseudo-market value of assets. Pseudo-market value of the firm's assets is the sum of common equity market value and book value of long-term debt. All value are as reported on <i>Compustat</i> for the last the fiscal year-ending prior to the bid announcement.
<u><i>Stock Price Run-up</i></u>	Continuous variable equal to the company's common stock raw return during the 11-month period ending 1 month prior to the bid announcement. Returns data are as reported on <i>CRSP</i> .
<u><i>Stock Ret. Volatility</i></u>	Continuous variable equal to the company's common stock volatility, measured as the standard deviation of daily returns during the 11-month period ending 1 month prior to the merger announcement date.
<u><i>Ind-adj cash balance</i></u>	Continuous variable equal to the firm's cash balance minus the industry-year average cash balance, as reported on <i>Compustat</i> for the last the fiscal year-ending prior to the bid announcement.
<u><i>Dividend/ Cash-flow</i></u>	Continuous variable equal to the total dividend paid divided by EBITDA as reported on <i>Compustat</i> for the last the fiscal year-ending prior to the bid announcement.

**Table 1 – Number of M&A Offers, Proportion of Deals with Operating Synergies Forecasts, and Proportion of Deals Completed by Year and Industry.** This table reports the number of merger and acquisition offers announced between Jan. 1, 1990 and Dec. 31, 2005. The initial sample is obtained from the Thomson Reuters SDC Platinum imposing the restrictions described in Appendix A.1. *Year* is the calendar year in which a deal is announced; *Fama-French Industry* is the bidder industry affiliation to one of twelve industries as described in Appendix C; *Num. of Deals* is the number of deals announced; *Disclose Synergies Forecasts* is the percentage of offers accompanied by insiders forecasts of merger-related (Cost and/or Revenue, or Total) synergies; *Completed Deal* is the percentage of deals ultimately completed.

<i>Year</i>	<i>Num. of Deals</i>	<i>Disclose Synergies Forecasts</i>	<i>Completed Deal</i>	<i>Fama-French Industry</i>	<i>Num. of Deals</i>	<i>Disclose Synergies Forecasts</i>	<i>Completed Deal</i>
1990	112	1.8%	70.5%	<i>Utilities</i>	129	42.6%	72.9%
1991	128	8.6%	69.5%	<i>Chemicals</i>	60	33.3%	86.7%
1992	124	12.9%	75.0%	<i>Energy (Oil, Gas)</i>	140	30.7%	85.0%
1993	161	13.7%	78.9%	<i>Financial</i>	1,191	28.0%	88.8%
1994	244	15.6%	79.1%	<i>Manufacturing</i>	272	24.6%	81.6%
1995	281	21.4%	83.3%	<i>Other</i>	333	23.1%	78.1%
1996	310	21.3%	82.6%	<i>Telecom</i>	218	22.9%	79.8%
1997	383	22.5%	84.6%	<i>Wholesale</i>	233	22.7%	81.1%
1998	422	26.5%	87.7%	<i>Non-Durable Goods</i>	134	19.4%	83.6%
1999	432	22.5%	84.7%	<i>Healthcare</i>	376	18.4%	82.4%
2000	366	21.6%	86.6%	<i>Bus. Equip. &amp; Elec.</i>	793	11.9%	87.6%
2001	283	24.4%	88.0%	<i>Durables Goods</i>	56	10.7%	80.4%
2002	167	22.2%	91.6%				
2003	182	30.2%	92.3%				
2004	177	47.5%	91.0%				
2005	163	36.8%	92.6%				
<i>All years</i>	3,935	22.7%	84.6%	<i>All industries</i>	3,935	22.7%	84.6%

**Table 2 – Merger Characteristics by Availability of Management Forecast of Synergies.** The table reports summary statistics for deal and merging firm characteristics, conditional on whether insiders disclose synergies projections (*No Forecast* vs. *Forecast*). The initial sample is obtained from the Thomson Reuters SDC Platinum imposing the restrictions described in Appendix A.1. All variables are defined in Appendix C. *P-value t-test (Wilcoxon)* provides the two-sided p-value of the t-test (rank-sum test) under the null hypothesis that the two samples are drawn from the same distribution. Dollar figures are inflation-adjusted using the Consumer Price Index and expressed in 2005 dollars.

	<i>No Forecast</i>				<i>Forecast</i>				<i>P-value</i>	
	N	Mean	Median	StDev	N	Mean	Median	StDev	<i>t-test</i>	<i>Wilcoxon</i>
<u><i>Deal characteristics</i></u>										
Deal Completed	3,041	0.834	1	0.371	894	0.885	1	0.318	0.00	0.00
Percent Cash	3,041	43.4	19.9	46.0	894	24.3	0	36.1	0.00	0.00
Percent Equity	3,041	50.7	54.2	46.4	894	67.6	90.1	39.1	0.00	0.00
Num. of Comp. Bidders	3,041	1.07	1	0.31	894	1.12	1	0.40	0.00	0.00
Horizontal Deal	3,041	0.64	1	0.48	894	0.74	1	0.44	0.00	0.00
Geographical Overlap	3,041	1.72	1	0.90	894	1.76	2	0.88	0.27	0.18
Deregulation Window	3,041	0.084	0	0.277	894	0.100	0	0.301	0.13	0.13
Relative Market Cap	2,699	0.275	0.102	0.461	869	0.487	0.318	0.550	0.00	0.00
Relative Assets Value	2,651	0.437	0.161	0.766	844	0.598	0.389	0.704	0.00	0.00
<u><i>Bidder characteristics</i></u>										
Sales/Assets	2,944	0.747	0.622	0.690	880	0.684	0.458	0.723	0.02	0.00
EBITDA/Sales	2,844	0.083	0.182	0.659	851	0.203	0.221	0.274	0.00	0.00
EBITDA/Assets	2,850	0.089	0.098	0.142	851	0.093	0.096	0.100	0.49	0.16
Equity Market Cap	2,931	9,381	1,171	26,815	890	9,767	2,353	22,638	0.70	0.00
Total Assets	2,960	10,097	1,288	26,862	881	18,621	4,259	36,519	0.00	0.00
Sales Market Share	2,944	0.015	0.001	0.047	880	0.016	0.003	0.052	0.64	0.00
Tobin's Q	2,872	2.25	1.48	2.05	869	1.68	1.28	1.10	0.00	0.00
Num. of Analysts	3,041	3.7	1	5.1	894	5.2	4	5.6	0.00	0.00
Pct. Inst. Own.	3,041	45.8	47.7	26.5	894	50.9	52.1	26.0	0.00	0.00
Num. of Inst. Owners	3,041	176.7	97.8	224.0	894	214.8	145.5	213.4	0.00	0.00
Debt/Assets	2,945	0.163	0.105	0.172	881	0.195	0.152	0.172	0.00	0.00
Stock Price Run-up	2,893	0.306	0.175	0.730	888	0.248	0.190	0.508	0.03	0.54
Stock Ret. Volatility	2,893	0.029	0.024	0.017	888	0.024	0.020	0.013	0.00	0.00
Ind-adj cash balance	2,908	0.526	0.525	0.012	874	0.525	0.525	0.007	0.33	0.16
Dividend/ Cash-flow	2,841	0.111	0.019	0.399	845	0.183	0.146	0.366	0.00	0.00
<u><i>Target characteristics</i></u>										
Sales/Assets	2,690	0.900	0.738	0.801	853	0.729	0.531	0.736	0.00	0.00
EBITDA/Sales	2,605	0.023	0.069	0.233	826	0.076	0.083	0.131	0.00	0.00
EBITDA/Assets	2,584	-0.079	0.115	1.041	826	0.143	0.193	0.510	0.00	0.00
Equity Market Cap	2,784	476	99	1,563	873	2,340	572	4,446	0.00	0.00
Total Assets	2,699	925	155	3,785	855	5,271	1,268	10,126	0.00	0.00
Sales Market Share	2,695	0.002	0.000	0.014	854	0.007	0.001	0.018	0.00	0.00
Tobin's Q	2,636	1.91	1.27	1.71	846	1.57	1.19	1.10	0.00	0.02
Num. of Analysts	3,041	1.2	0	2.4	894	3.6	2	4.4	0.00	0.00
Pct. Inst. Own.	3,041	29.0	22.7	25.0	894	46.2	46.2	26.9	0.00	0.00
Num. of Inst. Owners	3,041	38.0	19.0	53.6	894	111.6	73.0	111.9	0.00	0.00
Debt/Assets	2,682	0.161	0.063	0.209	852	0.202	0.165	0.191	0.00	0.00
Stock Price Run-up	2,762	0.115	0.047	0.627	871	0.163	0.124	0.513	0.04	0.00
Stock Ret. Volatility	2,762	0.041	0.036	0.023	871	0.028	0.023	0.016	0.00	0.00

**Table 3 – Projected Synergies.** The table reports summary statistics for management projections of merger-related synergies. *Panel A* reports summary statistics of nominal management projections of operating synergies as a percentage of combined pre-merger operating sales. The combined pre-merger operating sales are the sum of the merging firms’ stand-alone operating sales as reported in the fiscal year prior to when the target is ‘put in play’. *Total Synergies* is either the sum of cost and revenue synergies when a break-down is provided or the amount of projected total synergies when no break-down is provided. *As Projected* refers to management raw forecasts of synergies for year *t* after completion. *Backward/Forward-Filled* refers to the same projections after missing annual forecasts are derived as described in Appendix B.1. *Year 1 (2, 3, 4)* refers to the first (second, third, fourth) year after a deal is completed. As described in Appendix B.1, when no details are provided about the timing of annual synergies, we assume a steady-state is reached in year 4 following completion. *Panel B* reports summary statistics for the value of projected synergies expressed in millions of dollar or as a percentage of combined pre-merger market capitalization of equity. The latter is equal to the sum of the merging firms’ stand-alone market capitalization (i.e., number of common shares outstanding multiplied by stock price) measured 60 trading days prior to when the target is put in play and adjusted for the toehold position of the acquiring firm on the bid announcement date, following Bates, Lemmon, and Linck (2005). The valuation is based on the backward/forward filled projections described in Appendix B.1. The present value of projected synergies is computed following Kaplan and Ruback (1995), Gilson et al. (2000), and Houston, James, and Ryngaert (2001). Details about the valuation models are provided in Appendix B.2. Dollar figures are inflation-adjusted using the Consumer Price Index and expressed in 2005 equivalent.

<i>Panel A: Nominal synergies forecasts relative to combined pre-merger sales (%)</i>															
<i>Year 1</i>				<i>Year 2</i>				<i>Year 3</i>				<i>Year 4</i>			
N	Mean	Med	SD	N	Mean	Med	SD	N	Mean	Med	SD	N	Mean	Med	SD
<i>As Projected:</i>															
287	2.1	1.1	2.9	283	2.3	1.6	2.5	156	2.9	1.9	3.7	377	2.9	1.7	4.8
<i>Backward/Forward-Filled:</i>															
838	1.1	0.4	1.8	838	1.6	0.8	2.2	838	2.1	1.3	2.8	838	2.8	1.7	4.1

  

<i>Panel B: Present value of projected synergies</i>							
	N	<i>Firm Discount Rate</i>			<i>Industry Discount Rate</i>		
		Mean	Median	SD	Mean	Median	SD
<i>Perpetuity Model</i>							
<i>Total Syn. (\$ Millions)</i>	832	828.7	189.7	1868.2	775.8	178.6	1733.7
- scaled by market cap	825	14%	7.09%	20.33%	13.2%	6.64%	20.57%
<i>5-year Model</i>							
<i>Total Syn. (\$ Millions)</i>	832	203.7	47	502.9	199.6	44.9	494
- scaled by market cap	825	3.38%	1.72%	5.21%	3.36%	1.67%	5.35%



**Table 4 – Relation between Projected Synergies and Merger Characteristics.** The table reports linear regression estimates for the relation between the value of projected synergies and bidder, target, and deal characteristics. The dependent variable is the present value of synergies from the *Perpetuity Model* scaled by the combined pre-merger market capitalization as defined in Table 3 Panel B. All other variables are defined in Appendix C. *Columns 1-4* report Tobit regression maximum-likelihood coefficient estimates and standard errors (in parenthesis). *Column 5*, following Heckman (1979), reports second-step OLS estimates of the model that includes the *Inverse Mills Ratio* to correct for potential self-selection bias. In the Heckman two-step model, the mean marginal effects with corresponding standard errors (in parenthesis) are computed following Sigelman and Zeng (1999) for those variables also included in the selection equation. The selection model excludes the percentage of common stock held 13-F filers prior to the deal announcement, while including as explanatory variables of the decision to disclose projections the number of analysts following the merging firms and the number of 13-F filers holding merging firms' common stock prior to the deal announcement. Robust standard errors are in parenthesis. \*, \*\*, \*\*\* indicate significance of the coefficient estimate at the 10%, 5%, and 1% probability level, respectively. *Pseudo-R<sup>2</sup>* is the model's log-likelihood R-square. All models include year and industry fixed effects.

	(1) Coeff. (SE)	(2) Coeff. (SE)	(3) Coeff. (SE)	(4) Coeff. (SE)	(5) Coeff. (SE)	Marg. Effect (SE)
Intercept	0.7910*** (0.1360)	0.5458*** (0.1076)	0.4349*** (0.1110)	0.8693*** (0.1446)	0.6055*** (0.1815)	
Horizontal	0.0273** (0.0135)			0.0181 (0.0141)	0.0218* (0.0120)	0.0187 (0.0000)
Geographical Overlap	-0.0073 (0.0061)			-0.0086 (0.0062)	-0.0071 (0.0067)	-0.0078 (0.0000)
Sales/Assets (B)	0.0166 (0.0121)			0.0205* (0.0122)	0.0301** (0.0136)	0.0227 (0.0001)
Sales/Assets (T)	0.0208* (0.0113)			0.0329*** (0.0116)	0.0376*** (0.0124)	0.0334 (0.0001)
EBITDA/Assets (B)	-0.1499** (0.0711)			-0.1863** (0.0809)	-0.1357 (0.0861)	-0.1649 (0.0004)
EBITDA/Assets (T)	-0.2039*** (0.0491)			-0.2279*** (0.0547)	-0.2703*** (0.0585)	-0.2358 (0.0004)
Log(Market Cap) (B)	-0.0758*** (0.0115)			-0.0832*** (0.0121)	-0.1005*** (0.0146)	-0.0929 (0.0001)
Log(Market Cap) (T)	0.0521*** (0.0128)			0.0645*** (0.0136)	0.1050*** (0.0222)	0.0815 (0.0003)
Relative Market Cap	-0.1758** (0.0890)			-0.2558*** (0.0935)	-0.3142*** (0.1017)	-0.2821 (0.0004)
Market Share	0.1861** (0.0843)			0.1454* (0.0845)	0.1126 (0.0916)	0.1304 (0.0002)
Deregulation Window	0.0106 (0.0101)			0.0068 (0.0100)	0.0097 (0.0108)	0.0075 (0.0000)
Abnormal Cash Held (B)		0.0913* (0.0494)		-0.0671 (0.0476)	-0.0473 (0.0508)	-0.0625 (0.0002)
Payout Ratio(B)		0.0081 (0.0148)		0.0233* (0.0131)	0.0355** (0.0151)	0.0262 (0.0001)
Debt/assets (B)		0.0499 (0.0417)		0.0165 (0.0388)	0.0397 (0.0423)	0.0198 (0.0002)
Debt/assets (T)		-0.0014 (0.0374)		0.0584* (0.0353)	0.0790** (0.0378)	0.0647 (0.0002)
Institutional ownership (B)		-0.1522*** (0.0241)		-0.0640*** (0.0237)	-0.0708*** (0.0242)	
Institutional ownership (T)		-0.0319 (0.0240)		0.0069 (0.0255)	0.0220 (0.0262)	
Tobin's Q (B)			-0.0213*** (0.0060)	-0.0043 (0.0066)	-0.0155* (0.0082)	-0.0086 (0.0001)
Runup (B)			-0.0351*** (0.0131)	-0.0181 (0.0120)	-0.0284** (0.0132)	-0.0226 (0.0001)
Volatility (B)			2.0086*** (0.7310)	-0.3798 (0.7314)	-0.3717 (0.7561)	-0.3396 (0.0004)
Tobin's Q (T)			-0.0186*** (0.0059)	-0.0099* (0.0058)	-0.0147** (0.0063)	-0.0107 (0.0000)
Runup (T)			0.0046 (0.0121)	0.0055 (0.0111)	0.0043 (0.0117)	0.0055 (0.0000)
Volatility (T)			0.5286 (0.5374)	-0.2181 (0.5633)	-0.6245 (0.6029)	-0.3986 (0.0027)
Percent cash			0.0001 (0.0002)	0.0002 (0.0001)	-0.0002 (0.0002)	0.0001 (0.0000)
Number of bidders			0.0373*** (0.0134)	0.0357*** (0.0123)	0.0397*** (0.0134)	0.0375 (0.0000)
Inverse Mills Ratio					0.1054*** (0.0431)	
N	743	735	770	722	2860	
N Uncensored					722	
Pseudo-R <sup>2</sup>	38.6%	21.3%	22.5%	42.1%	47.6%	

**Table 5 – Investors’ Reaction to Merger Announcements and Management Projections of Operating Synergies.** *Panel A* reports summary statistics for announcement and announcement-to-completion combined cumulative abnormal stock return (CAR) around key merger-related events (i.e., offer announcement and completion) dates. *Around Merger Announcement (-t, t)* [*Merger Announcement-to-Completion (-t, t)*] is the event window starting *t* trading days prior to when the target is put in play – i.e., receives the first merger or acquisition offer during the calendar year ending on the current offer announcement date, and ending *t* trading days after the current offer announcement [completion] date. *4-Factor (-t, t)* is the sum of daily residuals from the Carhart’s (1997) four-factor model over the relevant event window. The Carhart (1997) four-factor model is estimated using at least 60 and as many as 250 daily returns on the value-weighted portfolio of target and bidder common equity, ending 60 trading days prior to when the target is put in play. The weights are adjusted for the bidder’s toehold on the offer announcement date, following Bates, Lemmon, and Linck (2005). The *4-Factor* CAR computation is restricted to deals for which the bidder announces no other offer over the estimation and event (-20, 20) windows. We compute (\$) dollar abnormal returns as the product of the daily abnormal return by the toehold-adjusted combined market capitalization at close of the previous trading day and cumulate the daily wealth changes over the relevant event window. *t-stat* is test-statistic for the hypothesis that the mean of the corresponding variable is equal to 0, derived following Boehmer, Musumeci, and Poulsen (1991). The column labeled *P-value t-test (Wilcoxon)* reports the p-value for the null hypothesis that the two samples are drawn from the same distribution.

***Panel A: Sample Characteristics of Combined cumulative abnormal returns around merger announcements***

	<u>No Forecast</u>				<u>Forecast</u>				<u>P-value</u>	
	<u>N</u>	<u>Mean</u>	<u>Median</u>	<u>t-stat</u>	<u>N</u>	<u>Mean</u>	<u>Median</u>	<u>t-stat</u>	<u>t-test</u>	<u>Wilcoxon</u>
<u><i>Around Merger Announcement Date</i></u>										
% 4-Factor (-1, 1)	2125	2.0	1.3	14.0	654	2.7	1.6	9.9	0.00	0.00
% 4-Factor (-20, 20)	2125	1.9	1.8	6.9	654	3.3	2.3	5.7	0.02	0.04
<u><i>From Merger Announcement to Effective Date</i></u>										
% 4-Factor (-20, 20)	1622	-0.9	-0.1	0.4	534	5.2	4.2	4.4	0.00	0.00

*Panel B* reports OLS estimates of the relation between merger CAR and the value of synergies projections. In all models, the dependent variable is the combined CAR computed over the relevant event window based on the Carhart (1997) four-factor model. The variable *Synergies* is the present value of projected synergies from the *Firm Discount Rate Perpetuity Model* scaled by the combined pre-merger toehold-adjusted market value of equity, as defined in Panel B of Table 3. *Predicted (Residual) Synergies* is the predicted (residual) value of *Synergies* from the model (5) in Table 4. *Control Vars.* is the full set of deal characteristics included in Table 4. Estimates in *columns 1-4* and *6-9* – i.e., *Forecast* – use deals accompanied by management projections only, *columns 5* and *10* – i.e., *No Forecast* – use deals for which management releases no forecasts of merger-related gains. Robust standard errors are in parenthesis. \*, \*\*, \*\*\* indicate significance of the corresponding estimate at the 10%, 5%, and 1% probability level, respectively. All models include year and industry fixed effects.

***Panel B: Relation between projected operating synergies and CAR around merger announcements***

	<u><i>Around Merger Announcement (-20, 20)</i></u>				<u><i>Announcement-to-Completion (-20, 20)</i></u>			
	<u>Forecast</u>		<u>No Forecast</u>		<u>Forecast</u>		<u>No Forecast</u>	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.
	(SE)	(SE)	(SE)	(SE)	(SE)	(SE)	(SE)	(SE)
Synergies	0.2531*** (0.0445)	0.1964*** (0.0515)			0.4554*** (0.0970)	0.2593** (0.1199)		
Predicted Synergies			0.3982** (0.1651)	0.4832*** (0.0961)			1.0659*** (0.3014)	1.193*** (0.2963)
Residual Synergies			0.2240*** (0.0651)				0.3081** (0.1377)	
Control Vars.	No	Yes	No	No	No	Yes	No	No
N	654	546	546	1740	534	442	442	1304
Adjusted R <sup>2</sup>	0.089	0.147	0.078	0.04	0.041	0.238	0.056	0.047

**Table 6 – Post-merger Operating Performance Changes and Management Projections of Operating Synergies.** *Panel A* of this table reports summary statistics for changes in merging firms’ operating performance following completed deals, conditional on whether management discloses synergies projections (*No Forecast* vs. *Forecast*). Raw changes are computed as:

$$(\text{Change } X)_{-1, \text{Avg}(1 \text{ to } 3)} = (\text{Avg}(X_{\text{FY1 to FY3}}) - X_{\text{FY-1}}) * 100,$$

where  $\text{Avg}(X_{\text{FY1 to FY3}})$  is the average of the merged entity’s operating performance measure  $X$  over the 1<sup>st</sup>, 2<sup>nd</sup>, and 3<sup>rd</sup> fiscal years following completion;  $X_{\text{FY-1}}$  is the weighted-average of the merging firms’ stand-alone  $X$  as of the last fiscal year prior to the offer announcement.  $X$  is either the *Operating Expenses-to-Sales* ratio or *EBITDA-to-Asset* ratio. *Operating Expenses* is the sum of all operating expenses excluding depreciation and amortization; *EBITDA* is earnings before interest, tax, and depreciation and amortization. The industry-year median benchmark is the median performance measure  $X$  among firms in the same merging firms’ industry – based on Fama-French (1997) 49-industry classification – that do not complete mergers and acquisitions over the measurement period. *High (Low) ROA Acquirers [Targets]* includes deals by acquirers [targets] whose pre-merger industry-adjusted ROA is in the highest (lowest) tercile of the sample. *High (Low) Acquirer [Targets] Industry Growth* includes completed deals by bidders [targets] whose pre-merger industry sales growth is in the highest (lowest) tercile of the sample. *High (Low) Acq. [Tgt] Ind. Horizontal Merger Intensity* includes completed deals by bidders [targets] whose industry horizontal merger intensity is in the highest (lowest) tercile of the sample. Horizontal merger intensity is measured as the value-weighted proportion of same Fama-French industry firms completing horizontal deals in the four quarters prior to the deal announcement. The sample is restricted to deals for which the merged entity completes no other merger or acquisition during the post-completion measurement period. *t-stat* provides the Student-t for the hypothesis that the mean of the corresponding variable is equal to 0. *P-value t-test (Wilcoxon)* reports the p-value for the null hypothesis that the corresponding variable for the two samples is drawn from the same distribution.

<i>Panel A: Post-Merger Change in Industry/Year-adjusted Operating Performance (%)</i>											
	<i>No Forecast</i>				<i>Forecast</i>				<i>P-value</i>		
	<i>N</i>	<i>Mean</i>	<i>Median</i>	<i>t-stat</i>	<i>N</i>	<i>Mean</i>	<i>Median</i>	<i>t-stat</i>	<i>t-test</i>	<i>Wilcoxon</i>	
Oper. Exp./Sales	1518	-3.51	-0.63	-4.52	478	-1.41	-0.80	-1.78	0.15	0.51	
EBITDA/ Asset	1466	0.59	0.50	3.14	456	0.22	0.20	0.87	0.32	0.22	
<i>High ROA Acquirer</i>											
OperExp/Sales	535	-2.01	0.16	-2.50	130	-0.41	-0.71	-0.30	0.53	0.76	
EBITDA/Total Asset	535	0.22	0.44	0.80	130	-0.58	-0.21	-1.20	0.38	0.15	
<i>Low ROA Acquirer</i>											
OperExp/Sales	450	-9.51	-1.61	-3.20	162	-3.83	-1.56	-2.30	0.60	0.59	
EBITDA/Total Asset	443	1.73	1.22	3.90	162	1.48	0.94	3.00	0.97	0.80	
<i>High Acquirer Industry Growth</i>											
OperExp/Sales	479	-2.80	-1.29	-3.50	146	-1.51	-1.84	-1.50	0.59	0.76	
EBITDA/Total Asset	453	1.18	0.89	3.80	135	1.02	0.50	2.00	0.81	0.49	
<i>Low Acquirer Industry Growth</i>											
OperExp/Sales	465	-3.29	0.32	-2.30	168	-0.36	-0.02	-0.40	0.54	0.73	
EBITDA/Total Asset	451	-0.29	-0.05	-0.80	161	-0.49	-0.09	-1.30	0.89	0.59	
<i>High Acquirer Industry Horizontal Merger Intensity</i>											
OperExp/Sales	396	-1.13	-1.29	-0.70	129	-1.00	-1.56	-1.00	0.76	0.73	
EBITDA/Total Asset	393	1.07	0.81	3.30	129	0.61	0.47	1.50	0.91	0.54	
<i>Low Acquirer Industry Horizontal Merger Intensity</i>											
OperExp/Sales	568	-5.85	-0.52	-4.00	151	-0.15	-0.08	-0.10	0.87	0.13	
EBITDA/Total Asset	521	0.20	0.19	0.60	136	0.01	0.15	0.00	0.88	0.53	

*Continued...*

Continued...

<u>High ROA Target</u>										
OperExp/Sales	469	-0.75	0.16	-0.90	149	0.74	0.49	0.70	0.67	0.27
EBITDA/Total Asset	467	-0.09	-0.05	-0.30	149	-1.00	-0.40	-2.30	0.28	0.16
<u>Low ROA Target</u>										
OperExp/Sales	524	-11.55	-2.14	-4.10	125	-5.28	-2.09	-2.80	0.91	0.76
EBITDA/Total Asset	515	1.59	1.33	4.10	122	1.74	1.78	3.50	0.90	0.86
<u>High Target Industry Growth</u>										
OperExp/Sales	464	-2.73	-1.16	-3.10	142	-0.97	-1.84	-1.10	0.56	0.81
EBITDA/Total Asset	438	0.87	0.82	2.60	131	0.79	0.46	1.50	0.86	0.56
<u>Low Target Industry Growth</u>										
OperExp/Sales	476	-1.28	0.32	-1.20	168	-1.31	-0.96	-1.70	0.67	0.12
EBITDA/Total Asset	456	-0.15	-0.08	-0.40	161	-0.16	-0.09	-0.40	0.99	0.92
<u>High Target Industry Horizontal Merger Intensity</u>										
OperExp/Sales	416	-2.29	-1.00	-2.10	131	-1.02	-1.84	-1.00	0.55	0.89
EBITDA/Total Asset	411	0.81	0.64	2.70	131	0.62	0.44	1.60	0.68	0.92
<u>Low Target Industry Horizontal Merger Intensity</u>										
OperExp/Sales	555	-2.84	-0.53	-1.70	157	-0.73	-0.08	-0.80	0.74	0.33
EBITDA/Total Asset	515	0.05	0.18	0.10	142	0.07	0.12	0.10	0.90	0.70

Panel B reports estimates of the relation between changes in merging firms' operating performance and management projections of synergies. In columns 1-2 and 5-6, the dependent variable is the change in the merged entity's ratio of EBITDA to assets. In columns 3-4, the dependent variable is the change in the merged entity's ratio of operating expenses to sales. *Synergies* is the average before-tax projected synergies over the first three years following completion scaled by the merged entity's assets or sales in the relevant year. *Predicted (Residual) Synergies* is the predicted (residual) *Synergies* when the *Two-step Heckman* model in Table 4 is estimated using the current definition of *Synergies*. *Control Vars.* is the full set of deal characteristics included in model 4 of Table 4. Models in columns 1-5, *Forecast*, are estimated using deals accompanied by management projections of synergies; the one in column 6, *No Forecast*, is estimated using deals for which no management forecast of synergies is available. Robust standard errors are in parenthesis. \*, \*\*, \*\*\* indicate significance of the estimate 10%, 5%, and 1% probability level, respectively. All models include year and industry fixed effects.

*Panel B: Relation between projected operating synergies and CAR around merger announcements*

	Forecast				No Forecast	
	<u>EBITDA/Assets</u>		<u>Oper. Exp./Sales</u>		<u>EBITDA/Assets</u>	
	(1)	(2)	(3)	(4)	(5)	(6)
	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.
	(SE)	(SE)	(SE)	(SE)	(SE)	(SE)
Synergies	0.4864**	0.1589	-0.958***	-0.3974		
	(0.2427)	(0.3769)	(0.3592)	(0.3289)		
Predicted Synergies					1.4623**	0.7335*
					(0.5832)	(0.4191)
Residual Synergies					0.2331	
					(0.3563)	
Control Vars.	No	Yes	No	Yes	No	No
N	456	404	478	401	404	1173
Adjusted R <sup>2</sup>	5.80%	11.80%	8.50%	18.50%	6.10%	3.80%

**Table 7 – Post-Merger Stock Returns conditional on Availability Management Projections of Operating Synergies.** This table reports monthly alphas of portfolios of completed mergers formed conditional of whether management discloses synergies forecasts. Starting in January 1992 and ending on December 2008, equally-weighted end-of-month portfolio returns are calculated each month using completed mergers in the relevant sample and period. The relevant period is 1 to 36, 7 to 42, or 13 to 48 months prior to the current calendar month. Monthly portfolio excess returns,  $R_{p,t}-R_{f,t}$ , are then regressed on Carhart (1997) four factors:

$$R_{p,t}-R_{f,t} = \alpha_p + \beta_p *MKT_t + \gamma_p *SMB_t + \delta_p *HML_t + \theta_p *UMD_t + \varepsilon_{p,t} ,$$

where  $R_{f,t}$  is the return of the one-month T-bills,  $MKT_t$  is the excess return to the CRSP value-weighted portfolio,  $SMB_t$  is the difference in returns between portfolios of small and large stocks,  $HML_t$  is the difference in returns between portfolios of high and low book-to-market ratio stocks,  $UMD_t$  is the difference in returns between portfolios of high and low prior 12-month return stocks. The model is estimated by weighted least squares (WLS) regressions, with weights equal to the square root of the number of firms in the calendar-month portfolio. The *P-value* of the intercept for the hypothesis of zero abnormal returns is based on robust standard errors. *Forecast (No Forecast)* refers to portfolios of completed deals for which management discloses (no) forecasts of synergies. *Long/Short Portfolio* refers to portfolios long in completed *Forecast* deals and short in *No Forecast* deals. *All Completed Mergers* includes all completed deals. *All Completed Mergers Financed with Any Equity* includes completed deals financed at least in part with bidder equity. *All Completed Mergers Financed with with All Equity* includes completed deals 100% financed with bidder equity. *All completed deals financed by High BM Acquirers* includes completed deals by bidders whose pre-merger book-to-market ratio is in the highest tercile of the sample. *All completed deals by Low BM Acquirers* includes completed deals by bidders whose pre-merger book-to-market ratio is in the lowest tercile of the sample. *High (Low) ROA Acquirers [Targets]* includes completed deals by bidders [targets] whose pre-merger industry-adjusted ROA is in the highest (lowest) tercile of the sample. *High (Low) Acquirer [Target] Industry Growth* includes completed deals by bidders [targets] whose pre-merger industry sales growth is in the highest (lowest) tercile of the sample. *Mergers High (Low) Acquirer [Target] Industry Horizontal Merger Intensity* includes completed deals by bidders [targets] whose industry horizontal merger intensity is in the highest (lowest) tercile of the sample. Horizontal merger intensity is measured as the value-weighted proportion of same Fama-French industry firms completing horizontal deals in the four quarters prior to the deal announcement.

*Continued...*

Continued...

	1 to 36 months prior Alpha (%) P-Value	7 to 42 months prior Alpha (%) P-Value	13 to 48 months prior Alpha (%) P-Value
<u>Equal-weighted Calendar Time Carhart's (1999) Four-Factor Alphas for Portfolios of Mergers Completed</u>			
<u>All Completed Mergers</u>			
Long No Forecast	0.132 0.22	0.178 0.11	0.275** 0.02
Long Forecast	-0.274** 0.03	-0.301** 0.02	-0.314** 0.02
Long Forecast/Short No Forecast	-0.353** 0.01	-0.471*** 0.00	-0.590*** 0.00
<u>Mergers Financed with Any Equity</u>			
Long/Short Portfolio	-0.371** 0.03	-0.470*** 0.01	-0.658*** 0.00
<u>Mergers Financed with All Equity</u>			
Long/Short Portfolio	-0.32 0.12	-0.460** 0.03	-0.681*** 0.00
<u>Mergers by High BM Acquirers</u>			
Long/Short Portfolio	-0.958*** 0.00	-0.980*** 0.00	-1.326*** 0.00
<u>Mergers by Low BM Acquirers</u>			
Long/Short Portfolio	-0.09 0.52	-0.348* 0.08	-0.382** 0.03
<u>Mergers by High ROA Acquirers</u>			
Long/Short Portfolio	-0.622** 0.02	-0.647** 0.02	-0.824*** 0.01
<u>Mergers by Low ROA Acquirers</u>			
Long/Short Portfolio	-0.374* 0.10	-0.526** 0.03	-0.757*** 0.00
<u>Mergers by High Acquirer Industry Growth</u>			
Long/Short Portfolio	-0.577*** 0.01	-0.594*** 0.01	-0.734*** 0.00
<u>Mergers by Low Acquirer Industry Growth</u>			
Long/Short Portfolio	0.16 0.40	-0.03 0.89	-0.15 0.46
<u>Mergers by High Acquirer Industry Horizontal Merger Intensity</u>			
Long/Short Portfolio	-0.617*** 0.01	-0.591** 0.01	-0.754*** 0.00
<u>Mergers by Low Acquirer Industry Horizontal Merger Intensity</u>			
Long/Short Portfolio	-0.16 0.59	-0.41 0.23	-0.652* 0.08
<u>Mergers by High ROA Targets</u>			
Long/Short Portfolio	-0.31 0.20	-0.472* 0.05	-0.781*** 0.00
<u>Mergers by Low ROA Targets</u>			
Long/Short Portfolio	-0.656** 0.02	-0.881*** 0.00	-1.178*** 0.00
<u>Mergers by High Target Industry Growth</u>			
Long/Short Portfolio	-0.526** 0.01	-0.525** 0.02	-0.723*** 0.00
<u>Mergers by Low Target Industry Growth</u>			
Long/Short Portfolio	0.02 0.90	-0.19 0.32	-0.307* 0.10
<u>Mergers by High Target Industry Horizontal Merger Intensity</u>			
Long/Short Portfolio	-0.563*** 0.01	-0.526** 0.02	-0.615*** 0.01
<u>Mergers by Low Target Industry Horizontal Merger Intensity</u>			
Long/Short Portfolio	-0.25 0.52	-0.704* 0.10	-0.90** 0.05

**Table 8 – Post-Merger Stock Returns conditional on Investors’ Ex-Ante Assessment of and Firms’ Ex-Post Ability to Deliver Operating Synergies Projected by Management.** The table reports linear regression estimates for the relation between post-completion annualized Jensen-alphas and the pre-completion capitalization and post-completion realization of management projections of synergies. In columns 1 and 2 – *Raw*, the dependent variable is the post-completion firm-level annualized alpha from the Carhart (1997) 4-factor model, where the firm-level alpha is estimated separately for the each of three calendar years following completion – at least 200 and as many as 252 trading days – starting 20 trading days after the deal’s completion. *Control Vars.* are all the variables in Table 4 and described in Appendix C. *Syn. Delivery* and *Capitalization* are defined as:

$$Delivery = \left[ 1 + \left( \sum_{t=1}^3 \left( \frac{EBITDA}{Assets} \right)_t / 3 \right) - \left( \frac{EBITDA}{Assets} \right)_{-1} \right] / \left[ 1 + \sum_{t=1}^3 \left( \frac{Tot\ Syn}{Assets} \right)_t / 3 \right],$$

$$Capitalization = \left[ 1 + CAR_{Ann-Compl} \right] / \left[ 1 + \frac{PV(After-Tax\ Tot\ Syn)}{Pre-Ann\ Market\ Cap} \right].$$

In columns 3-6 – *Log-transformed*, the dependent variable, the annualized alpha, as well as the independent variables (*Syn. Delivery Ratio*)<sub>1,3</sub> and (*Syn. Capitalization Ratio*)<sub>Ann-Eff</sub> are log-transformed. Standard errors, reported in parenthesis, are clustered by firm and calendar year following Petersen (2007). \*, \*\*, \*\*\* indicate significance of the corresponding estimate at the 10%, 5%, and 1% probability level, respectively. *F-stat(Hp: Deliv=-Capit)* and *F-stat P-value* provide the Wald test F-statistic and associated p-value for the null hypothesis that the coefficient on (*Syn. Delivery Ratio*)<sub>1,3</sub> equals the additive inverse of the coefficient on (*Syn. Capitalization Ratio*)<sub>Ann-Eff</sub>. All models include year and industry fixed effects. The analysis is restricted to deals for which the merged entity completes no other merger and acquisition during the three calendar years following completion of the current deal and synergies forecasts are publicly available.

<i>Panel A – Ordinary least-square regressions</i>						
	<i>Raw</i>		<i>Log-transformed</i>			
	(1) Coeff. (SE)	(2) Coeff. (SE)	(3) Coeff. (SE)	(4) Coeff. (SE)	(5) Coeff. (SE)	(6) Coeff. (SE)
Ratio	0.0004** (0.0002)	0.0004*** (0.0001)	0.0511*** (0.0131)	0.0653*** (0.0103)		
(Syn. Delivery) <sub>1,3</sub>					0.0526*** (0.0133)	0.0668*** (0.0107)
(Syn. Capitalization) <sub>Ann-Eff</sub>					-0.0472*** (0.0153)	-0.0604*** (0.0139)
Control Vars.	No	Yes	No	Yes	No	Yes
N	1,208	1,133	1,208	1,133	1,208	1,133
Adjusted R <sup>2</sup>	1.5%	2.9%	3.2%	4.1%	3.2%	4.0%
F-stat(Hp: Deliv=-Capit)					0.28	0.29
F-stat P-value					0.59	0.59
<i>Panel B – Median regressions</i>						
Ratio	0.0003*** (0.0001)	0.0003*** (0.0001)	0.0391*** (0.0107)	0.0579*** (0.0117)		
(Syn. Delivery) <sub>1,3</sub>					0.0427*** (0.0074)	0.0586*** (0.0120)
(Syn. Capitalization) <sub>Ann-Eff</sub>					-0.0318*** (0.0091)	-0.0489*** (0.0156)
Control Vars.	No	Yes	No	Yes	No	Yes
N	1,208	1,133	1,208	1,133	1,208	1,133
Pseudo-R <sup>2</sup>	3.3%	4.7%	3.6%	5.1%	3.7%	5.2%
F-stat(Hp: Deliv=-Capit)					2.3	0.63
F-stat P-value					0.13	0.43

**Table 9 – Availability of Synergies Projections and Merger Performance, controlling for Self-Selection.** This table reports full-information maximum-likelihood estimates of the relation between merger performance and the availability of synergies projections (*No Forecast* vs. *Forecast*), when jointly modeled with the management decision to release public forecasts. The equation for the decision to release public projections of synergies includes all the explanatory variables described in model 5 of Table 4. The table reports: the total number of observations used to estimate the treatment-effect model, *N*; the correlation between the residuals of the treatment and selection equations, *Rho*; and the mean performance conditional on the availability of synergies forecast, as well as the difference between the *Forecast* and *No Forecast* sample.  $\chi^2$  *P-Val* provides the chi-squared p-value for the null hypothesis that the corresponding statistic is equal to zero.

	N	<i>No Forecast</i>		<i>Forecast</i>		<i>Treatment Effect</i>		Rho	$\chi^2$ <i>P-Val</i>	
		Mean	$\chi^2$ <i>P-Val</i>	Mean	$\chi^2$ <i>P-Val</i>	Mean	$\chi^2$ <i>P-Val</i>			
<u><i>Announcement CAR (*100)</i></u>										
% 4-Factor (-20, 20)	2,265	1.36	0.01	5.51	0.00	4.15	0.00	-0.12	0.03	
<u><i>Announcement-to-Completion CAR (*100)</i></u>										
% 4-Factor (-20, 20)	1,754	-3.10	0.02	10.93	0.00	14.04	0.00	-0.18	0.01	
<u><i>Change in Industry/Year-adjusted Operating Measures (*100)</i></u>										
EBITDA/Total Asset	1585	0.78	0.00	-0.69	0.13	-1.48	0.01	0.12	0.07	
OperExp/Sales	1556	-2.38	0.00	0.58	0.63	2.96	0.05	-0.07	0.30	



**Table 10 – Relation between Projected Synergies and Merger Performance, controlling for Self-Selection.** This table reports full-information maximum-likelihood estimates of the relation between merger performance and management projections of merger-related gains, when jointly modeled with the decision to disclose (or not disclose) public forecasts of synergies. The equation for the decision to release public projections of synergies includes all the explanatory variables described in model 5 of Table 4. In addition to coefficient estimates and robust standard errors for the performance-forecasts relation, each table reports: the number of observations used to estimate the selection model, *N*; the number of uncensored observations used to estimate the performance-forecasts relation, *Uncensored*; the estimated correlation between the residuals of the two equations in the model, *Rho*, and its standard error, *Std. Err.(Rho)*. \*, \*\*, \*\*\* indicate statistical significance at the 10%, 5%, and 1% probability level, respectively. Refer to earlier tables for variables' definitions and sample restrictions. All models include year and industry fixed effects.

	<i>Ann. CAR (-20, 20)</i>			<i>Ann.-Compl. CAR (-20, 20)</i>		
	<i>Forecast</i>		<i>No Forecast</i>	<i>Forecast</i>		<i>No Forecast</i>
	(1)	(2)	(3)	(4)	(5)	(6)
	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.
	(SE)	(SE)	(SE)	(SE)	(SE)	(SE)
Synergies	0.2474*** (0.0420)			0.4487*** (0.0871)		
Predicted Synergies		0.3794*** (0.1187)	0.4416*** (0.0736)		1.0012*** (0.2663)	1.0086*** (0.1947)
Residual Synergies		0.2150*** (0.0501)			0.3231*** (0.1041)	
N	2,286	2,286	2,286	1,746	1,746	1,746
N Uncensored	546	546	1,740	442	442	1,304
Pseudo R <sup>2</sup>	4.3%	4.6%	4.2%	3.7%	3.8%	4.1%
Rho	-0.079	-0.0429	-0.0699	-0.2194*	-0.1059	0.3797*
Std. Err.(Rho)	(0.0922)	(0.0974)	(0.2151)	(0.1225)	(0.1299)	(0.1471)

*Panel B: Relation with Post-Merger Changes in Ind. Adj. Op. Performance, controlling for self-selection*

	<i>Forecast</i>		<i>No Forecast</i>	
	<i>EBITDA</i>	<i>Oper. Exp.</i>	<i>EBITDA</i>	
	(1)	(2)	(3)	(4)
	Coeff.	Coeff.	Coeff.	Coeff.
	(SE)	(SE)	(SE)	(SE)
Synergies	0.4338*** (0.1802)	-0.921*** (0.2478)		
Predicted Synergies			2.0143*** (0.6134)	0.8171** (0.3269)
Residual Synergies			0.2059 (0.1978)	
N	1577	1539	1577	1577
N Uncensored	404	401	404	1173
Pseudo R <sup>2</sup>	0.037	0.055	0.042	0.057
Rho	-0.0582	0.0301	-0.0099	-0.396**
SE(Rho)	(0.1073)	(0.1205)	(0.1066)	(0.1453)