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## How Do Mergers Create Value? A Comparison of Taxes, Market Power, and Efficiency Improvements as Explanations for Synergies — [Source link](#)

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How do Mergers Create Value? A Comparison of Taxes,  
Market Power, and Efficiency Improvements as Explanations for Synergies

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**Abstract**

There is little evidence in the literature on the relative importance of the underlying sources of merger gains. Prior literature suggests that synergies could arise due to taxes, market power, or efficiency improvements. Based on Value Line forecasts, we estimate the average synergy gains in a broad sample of 264 large mergers to be 10.03% of the combined equity value of the merging firms. The detailed data in Value Line projections allows for the decomposition of these gains into underlying operating and financial synergies. We estimate that tax savings contribute only 1.64% in additional value, while operating synergies account for the remaining 8.38%. Operating synergies are higher in focused mergers, while tax savings constitute a large fraction of the gains in diversifying mergers. The operating synergies are generated primarily by cutbacks in investment expenditures rather than increased operating profits. Overall, the evidence suggests that mergers generate gains by improving resource allocation rather than by reducing tax payments or increasing the market power of the combined firm.

Prior research documents that mergers increase the combined equity value of the target and acquiring firms. In an influential study, Bradley, Desai, and Kim (1988) estimate that the average increase in equity market value was \$117 million, representing 7.4% of the combined firms' equity value, for a sample of 236 successful tender offers during 1963-1984. In their overview of the literature related to mergers, Jensen and Ruback (1983, pg. 47) state that "... knowledge of the sources of takeover gains still eludes us". In spite of considerable related research since this statement, Kaplan (2000) and Andrade, Mitchell, and Stafford (2001) reiterate that the underlying sources of takeover-related gains have not been clearly identified. Our research is motivated by the relative lack of evidence regarding the sources of merger synergies.

We examine three potential reasons for gains to stockholders from mergers. First, mergers may generate productive efficiencies that result in higher operating profits and/or reduced capital spending. Managers often justify mergers by predicting operating efficiencies. Second, firms may undertake mergers due to tax reasons, with the merger gains resulting from a transfer of wealth from the government to the merging firms. Third, potentially anti-competitive mergers among firms in similar industries could enable the combined firm to exercise market power, with the merger gains arising at the expense of customers and suppliers. In the case of mergers motivated by tax or anti-competitive reasons, while the merging firms' shareholders gain, the net benefits to the economy are less obvious.

While prior studies have examined the relevance of each of these sources of synergy, they generally focus on only one source of synergies. Thus, there is little evidence on the relative importance of these three sources of synergy.<sup>1</sup> We estimate synergy gains for a broad sample of mergers by comparing the present value of Value Line cashflow forecasts for the target and acquiring firms before the merger with the forecast for the combined firm after the merger. Our

tests reveal that Value Line forecasts accord well with realized cashflows, and thus provide useful estimates of expected synergies at the time of the merger. In addition, they provide detailed cashflow data since the forecasts include variables such as revenues, operating margin, debt, and capital expenditures. This level of detail allows us to pinpoint the precise sources of the merger gains - whether the gains arise from efficiencies that improve operating profits, or through reductions in investments, or from increased debt tax shields. Such a decomposition of synergies is not possible using other data such as stock returns or IBES analyst forecasts. Since this approach allows us to simultaneously estimate the magnitude of the different sources of value gains, it offers a new methodology to distinguish between the alternative explanations for merger synergies that have been advanced in prior literature.

Total synergies from a merger are the sum of two components: operating synergies arising from changes in cash flow related to operations, and financial synergies generated by increased interest tax shields. We split up operating synergies into two subcategories – increased operating profits, and savings from reductions in investments. If mergers are undertaken due to tax reasons, we would expect them to create value primarily due to financial synergies. On the other hand, mergers that primarily result in increased market power for the merging firms would create higher operating profits due to revenue increases / cost savings. Finally, if the merger gains arise from scale or scope economies, they would lead to operating synergies due to revenue increases / cost savings or cutbacks in investments.

We address these issues by analyzing a broad sample of 264 large mergers of unregulated industrial firms during 1980-2004. We find that the average total synergy in our sample is a highly significant 10.03% (scaled by combined pre-merger equity value of the merging firms). Hayn (1989) finds that the tax attributes of target firms are related to merger gains, suggesting a

role for tax considerations in mergers. In our sample, the average financial synergy in the form of interest tax shields is only 1.64% and comprises less than 17% of the total synergies. This result suggests that tax considerations are not a major source of merger gains. The merger synergies arise primarily from operating sources, which average 8.38%. We further examine the components of operating synergies. Gains from revenue increases and/or cost savings do not contribute positively to synergies. Thus, increased market power does not seem to drive merger gains. Instead, merging firms are able to realize significant economies in their capital expenditures and investments in working capital.

We conduct several additional tests which confirm the validity of Value Line estimates. We examine the relationship between stock price reactions to the merger and Value Line synergy estimates and find a strong positive relationship for focused mergers but not for diversifying mergers. Focused mergers offer greater opportunities to realize synergies through elimination of duplicate investments, while diversifying mergers may be undertaken for reasons other than synergies such as empire-building or the managers' desire to protect their human capital. Consistent with this argument, we find that Value Line estimates of both operating synergies and cutbacks in investments are higher in focused mergers rather than in diversifying mergers. We also document that these gains are higher in mergers undertaken by high book-to-market acquirers, consistent with value acquirers undertaking better mergers (e.g., Rau and Vermaelen (1998)). Additionally, we show that the magnitude of savings arising from cutbacks in investments is positively related to the level of capital expenditures of the combining firms prior to the merger.

Overall, our results suggest that mergers generate benefits by improving resource utilization in the economy rather than merely transferring wealth to stockholders from the

government, customers, and suppliers. However, the lack of evidence for market power may be due to effective regulatory action that prevents anti-competitive mergers. Thus, our evidence does not indicate that regulation of mergers is unnecessary.

Our work also has methodological contributions. Prior literature reports mixed results using long-horizon abnormal operating performance (usually benchmarked to industry performance) to infer efficiency improvements after mergers.<sup>2</sup> As pointed out in the literature (e.g., Harford (2005)), the fact that mergers are clustered in industries experiencing severe economic, technological, and / or regulatory shocks makes it difficult to draw inferences from long-horizon measures of abnormal operating performance. The performance of a merging firm may decline relative to industry benchmarks after a merger, but may still reflect superior performance relative to what may have been observed without a merger (which is unobservable to researchers). Our approach avoids the limitations of employing industry benchmarks. We compare detailed Value Line *forecasts* from before the merger to forecasts after the merger. Since these forecasts are typically one quarter apart, expected industry changes would already be incorporated in the pre-merger forecasts and the differences in forecasts would more accurately capture the impact of the merger. Additionally, our tests minimize concerns of survivorship bias that are inherent in long-horizon studies, since the post-merger forecasts are made within a short period of time after the stand-alone forecasts.

In addition to documenting the relative importance of the different sources of synergy gains in completed mergers, our work is relevant to the considerable debate in the literature on why mergers occur in waves. One stream of literature (e.g., Gort (1969), Jensen (1993), Mitchell and Mulherin (1996), and Harford (2005)) argues that mergers occur in waves, driven by a need for restructuring in the face of economic and/or technological shocks. Under this scenario, we

expect mergers to be efficiency-improving decisions, resulting in synergistic gains. An alternative, behavioral argument posits that mergers occur in waves in response to stock market misvaluation (e.g., Shleifer and Vishny (2003), Bouwman, Fuller, and Nain (2006), Dong, Hirshleifer, Richardson, and Teoh (2006)). A bidder may elect to use overvalued stock to buy an undervalued target, creating value for the bidder's shareholders. Under this argument, the driving force for mergers is not the existence of synergies. While we find evidence consistent with some mergers being driven by stock market mispricing, our results, documenting synergies arising from cutbacks in investments in focused mergers, provide support for the former line of research.

The rest of the paper is organized as follows. Section 1 reviews the earlier literature on sources of merger gains. Section 2 discusses the advantages of using Value Line projections in assessing merger synergies and describes the methodology used to estimate the gains from financial and operating improvements. Section 3 provides a description of the sample, while Section 4 contains the results of the empirical analysis. Section 5 concludes the study.

## **1. Related Literature on Sources of Gains from Mergers**

### **1.1 Productive efficiencies in mergers**

Managers often cite synergy gains arising from operating improvements to justify mergers. For example, the Chairman of ExxonMobil stated that "By year three, the merger is expected to provide recurring positive cash flow of about \$4 billion per year, reflecting the after-tax impact of synergy benefits and optimization of the merged company's capital investment program."<sup>3</sup> The combined firm could benefit from economies of scale and scope and reduce operating costs or capital investments, thus improving cash flow.



Several previous studies use either ex-post accounting performance or plant level productivity data to infer the existence of operating improvements and provide mixed evidence. For example, Ghosh (2001) finds little evidence of operating improvements compared to control firms matched on size and prior performance. Similarly, Ravenscraft and Scherer (1987) find no evidence of operating improvements for targets of tender offers using line of business data from the Federal Trade Commission. However, Healy, Palepu, and Ruback (1992) and Heron and Lie (2002) rely on ex-post accounting performance and find that operating performance improves after a merger. Healy et al. (1992) also find that the gains arise from improvements in asset turnover rather than operating margins. They document savings in capital expenditures to the tune of 25%.<sup>4</sup> Maksimovic and Phillips (2001) use plant-level data for manufacturing firms from the Longitudinal Research Database maintained at the Bureau of the Census, and find no evidence that the productivity of the acquirer's assets improves after a merger. But, when a firm adds capacity to its main divisions and increases the firm's focus, productivity increases. Overall, this body of evidence does not permit definitive conclusions about improvements in operating performance following mergers.

Houston, James, and Ryngaert (2001) rely on management's forecasts to assess synergy gains in 41 large bank mergers. They document average gains of about 13% and report that gains arise from cost savings rather than revenue increases. Bernile (2004) finds that management's forecasts of synergy average about 6% for a sample of 324 mergers during 1991-1999.

## **1.2 Tax benefits in mergers**

Jensen and Ruback (1983, page 24) suggest that financial reasons could motivate mergers. Firms could be attracted by the opportunity to fully utilize tax shields, increase leverage, and exploit

other tax advantages. Empirically, Hayn (1989) examines a sample of 640 acquisitions during 1970-1985 and finds that the announcement period abnormal returns are associated positively with the tax attributes of the target firm such as net operating loss carryforwards, unused tax credits and higher depreciation due to the step-up in the basis of the acquired assets. She concludes that tax considerations could motivate acquisitions.

### **1.3 Increased market power in mergers**

The finance and economics literature has long recognized that firms could increase equity value by exercising market power. If combining large firms in similar industries significantly decreases competition, firms could increase the prices they charge their customers for their products and/or decrease the prices they pay their suppliers for raw materials. This potential source of merger gains has evoked considerable controversy and has led to regulatory oversight of merger activity, although the regulatory enforcement has varied over time.

One set of papers examining the competitive effects of mergers relies on changes in the product prices charged by acquirers in specific industries to infer market power. For example, Kim and Singal (1993) conclude that relative to other routes, merging airlines raised fares significantly on routes affected by the merger. Sapienza (2002) finds that after bank mergers, interest rates charged by the merged entity decreases, likely due to productive efficiency. If the target bank has a large local market share, the combined entity does not lower interest rates on loans, suggesting the exercise of market power.<sup>5</sup> In contrast, Fee and Thomas (2004) and Shahrur (2005) fail to find evidence that mergers lead to market power. They use stock returns of suppliers, buyers, and rivals to evaluate the gains in horizontal mergers. Consistent with prior studies (e.g., Eckbo (1983)), they find little evidence of anticompetitive, collusive behavior.

Berger, Saunders, Scalise, and Udell (1998) find that while merging banks reduce the amount of credit extended to small firms, this is offset by an increase in small business loans by other banks. Thus, the evidence for market power as a source of merger gains is mixed. The positive evidence for market power is confined to studies examining specific industries.

## **2. Assessing Sources of Synergy Using Value Line Forecasts**

### **2.1 Advantages of using Value Line forecasts**

Our study is motivated by the need to enhance our understanding of the relative importance of the underlying sources of merger related synergies, an issue that has not received much attention in the prior literature. Studies such as Bradley, Desai, and Kim (1988) examine stock returns to measure the value gains from mergers. However, stock returns provide a summary measure of the valuation impact, which does not lend itself to a natural decomposition into underlying components of the value gains. Similarly, studies such as Kim and Singal (1993) and Shahrur (2005) provide interesting tests of the market power hypothesis but cannot assess the magnitude of synergies arising from taxes and efficiency improvements.

Other studies have used management forecasts to assess synergies from mergers. Inferences using management forecasts can be affected by selection bias if management discloses precise synergy forecasts only when they are expected to be significantly positive. Consistent with an optimistic bias in management forecasts, the combined bidder and target abnormal announcement return in Houston, James, and Ryngaert (2001) is 3.15% for the 41 cases where managers disclose precise estimates of cost savings and revenue enhancements related to the merger, but is -0.48% in the other 23 cases where no such information was disclosed. Additionally, using management forecasts could result in erroneous synergy estimates

if managers opportunistically include expected operating improvements from other programs that may already be in place (e.g., non-merger related cost-cutting initiatives) in their synergy forecasts, to make the merger look better than it is.<sup>6</sup> More importantly, management forecasts are typically for aggregate merger synergies that are expected to be realized over a period of time. The forecasts may not be very detailed since the individual synergy components are often not reported, and the forecasts are not broken up by year. In other instances, management may state that they expect cutbacks in investments, but refrain from providing precise estimates.

Schwert (2000) suggests that security analysts' reaction to the merger announcement would provide an objective assessment of merger gains by disinterested parties. In addition, using Value Line forecasts to document the sources of synergies has several advantages compared to using management forecasts. Value Line forecasts are standardized and always provide near-term and medium-term forecasts for a complete set of variables, along with the horizon of the forecast. Hence, we are able to simultaneously measure the timing and magnitude of all components of synergies for the sample mergers. Since Value Line provides quarterly forecasts for all firms that it covers, our sample selection procedure would not exclude mergers with negative synergies, minimizing concerns about potential selection bias.

Researchers have also employed ex-post accounting data relative to an industry benchmark to identify the sources of merger synergies. Using a long time-series of financial data increases the likelihood that other factors have changed during this period, rendering the estimates noisy.<sup>7</sup> In case studies of two mergers, Kaplan, Mitchell, and Wruck (2000) find that traditional measures of operating performance led to erroneous inferences about the success of the transaction. Furthermore, using realized data to estimate synergies introduces a survivorship bias since this would require the acquiring firm to survive for several years after the merger

completion. Relatedly, Mitchell and Lehn (1990) find that firms making poor acquisitions were more likely to be the target of subsequent acquisition attempts.

Our approach using Value Line *forecasts* of financial statement data complements the approach adopted in these studies. We present evidence that these forecasts are reliable. The forecasts contain projections several years into the future and provide an assessment of the long-term impact of the merger. To assess the *expected* synergies, we compare the last available Value Line forecasts for the stand-alone acquiring and target firms with the first available forecasts for the combined firm after the merger. The time gap between these forecasts is typically three months. Further, any expected changes in performance unrelated to the merger (e.g., due to industry-wide factors) would be incorporated in the pre-merger forecasts. The short gap in the timing of the forecasts minimizes the concerns regarding survivorship bias and extraneous noise associated with using a long time-series of realized cash flows.<sup>8</sup>

The forecasts by Value Line for the acquirer, target and the combined entity, include income statement variables such as revenues, operating margin, depreciation and tax rates, and balance sheet items such as debt, working capital and capital expenditures. This detailed data enables us to examine the source of the merger gains. Analyst forecasts available on IBES only provide estimates of earnings and earnings growth rates and do not contain the level of detail needed to precisely identify the sources of merger-related gains. Consequently, measuring synergy gains using earnings forecasts from IBES would result in incorrect estimates if the bulk of the gains arise from a reduction in investments, rather than from increases in profits.

## 2.2 Details of the valuation methodology used to estimate synergies

We identify the last Value Line forecast for the stand-alone bidder and target firms and the first post-merger forecast for the combined firm. Since most of these forecasts are in adjacent calendar quarters, any change in the forecasts would be predominantly attributable to the merger.<sup>9</sup> From Value Line, we extract the forecasts for sales (S), operating margin (OM), working capital (WC), depreciation (DEP), capital expenditure (CAPEX) and long-term debt (DEBT). We linearly interpolate the values of operating profits (S\*OM), DEP, CAPEX, DEBT and the ratio of working capital to sales for the intervening years. For example, if the short-term operating profits forecast (year 1) is \$100 and the medium-term forecast for years 3-5 (considered year 4) is \$130, then the forecast for years 2 and 3 would be \$110 and \$120, respectively. Alternatively, if the forecast for year 1 sales is \$100, year 2 is \$120, and year 4-6 (considered year 5) is \$150, then the forecasts for years 1 through 5 would be \$100, \$120, \$130, \$140, and \$150, respectively. This is similar to the approach in Houston et al. (2001). Using the working capital ratio and forecasted sales for the intervening years, we estimate the working capital for each year. The annual change in working capital is  $(WC_t - WC_{t-1})$ . For each set of forecasts, this procedure generates an annual series of capital cash flows (CCF, equation 1).<sup>10</sup>

$$CCF = [S*(OM)*(1 - T_{avg})] - [INVEST] + [DEBT*R* T_{avg}] \quad (1)$$

where  $(S*OM)*(1 - T_{avg})$  is after-tax operating profits, INVEST is investments in fixed assets and working capital net of depreciation, and  $(DEBT*R* T_{avg})$  is the interest tax shield.<sup>11</sup>

We have three sets of forecasts for each merger – two pre-merger forecasts for the stand-alone merging firms and one for the post-merger combined firm. For each of these three sets of forecasts, we compute the present value of capital cash flows using equation 2. We estimate the

terminal value of capital cash flows assuming that the capital cash flows grow for ever at the rate of expected inflation (Inf, the long run forecast from the Philadelphia Federal Reserve Bank).

$$PV(CCF) = \sum [CCF_t / (1 + K)^t] + [CCF_n * (1 + Inf)] / [(K - Inf) * (1 + K)^n] \quad (2)$$

where t ranges from 1 to n, and n is the year of the last available forecast. K is the cost of capital estimated using the CAPM and the asset beta, a market risk premium of 7%, and the yield on the ten-year Treasury bond as the risk-free rate.<sup>12</sup>

The estimate of total synergy is simply the difference between the present value of capital cash flows for the combined firm ('A+T') and the sum of the pre-merger present values for the acquirer ('A') and target ('T') firms (equation 3).

$$\text{Total synergies} = PV(CCF)_{\text{post-merger, A+T}} - PV(CCF)_{\text{pre-merger, A}} - PV(CCF)_{\text{pre-merger, T}} \quad (3)$$

We use a similar approach to estimate operating synergy and financial synergy. Operating synergy is defined as the increase in after-tax operating profits less the changes in investments; changes in interest tax shields are labeled as financial synergy. The present value of operating (financial) synergy is calculated by substituting the sum of the first two terms (last term) from equation 1 instead of CCF in equations 2 and 3.

### **2.3 Distinguishing between tax, productive efficiency and market power hypotheses**

The role of financial synergies is easily assessed since we are able to estimate the value of the additional interest tax shields.<sup>13</sup> However, it is harder to distinguish between the relative importance of productive efficiencies and market power. If a merger results in greater market power, we expect the combined firm to benefit either by charging higher prices to its customers or by paying less for its purchases from its suppliers. In our synergy decomposition, this would show up as higher revenues or lower costs, thus increasing operating profits. Synergy gains due

to productive efficiency may also manifest in the form of higher operating profits. In addition, productive efficiency could be realized in the form of lower investments in working capital and fixed assets. While observing higher operating profits does not allow us to distinguish between the market power and productive efficiency hypothesis, the absence of higher operating profits would indicate that market power is not a significant factor.

### **3. Data and Summary Statistics**

#### **3.1 Sample selection**

From the SDC Mergers and Acquisitions database we identify all completed mergers during 1980-2004 where (a) both the merging firms are publicly traded, (b) the acquisition is 100% of the target firm (we exclude partial acquisitions, sales of subsidiaries etc.), and (c) the consideration offered includes cash, common or preferred stock or debt. We further require that both target and acquirer firms are followed by Value Line.<sup>14</sup> This results in an initial sample of 598 mergers. We exclude 198 mergers in regulated industries such as utilities, financial services and telecommunications, retaining only mergers involving industrial firms. We delete 43 mergers (primarily in the air transport, auto and truck and retail industries) since Value Line does not report some required data for these firms (capital expenditure, operating margin, working capital etc.).<sup>15</sup> We further require that the merging firms are domestic firms with return data available on CRSP, which eliminates 30 firms. We verify that each surviving transaction is a merger and eliminate 15 instances where the transactions were asset sales or sales of subsidiaries. Based on discussions in Value Line and entries in the Wall Street Journal Index, we eliminate 48 cases with confounding events such as other large mergers or asset sales (that



comprise at least 25% of the transaction value of the sample merger) during the synergy estimation period. Finally, we are left with a final sample of 264 mergers.

SDC provides data on transaction value, method of payment, and announcement and ex-dates for mergers. We identify if the merger was hostile or not based on our reading of newswire articles from Lexis-Nexis. Returns are from Center for Research in Security Prices (CRSP) and financial data are from Compustat. We supplement missing data with Value Line data.

### **3.2 Summary statistics**

The sample firms are not concentrated in any one industry, as documented in Table 1. Panel A lists the eight industries with the highest number of bidders. The food processing industry has 16 bidders, while the computer and peripherals industry has 13 bidders. There are 12 bidders in the medical supplies industry as well as the paper and forest products industry. Other industries with a high number of bidders include computer software and services, aerospace/defense, electrical equipment and petroleum (integrated). We find a similarly wide dispersion among target firms, with the food processing and machinery industries accounting for 18 and 14 targets, respectively. There are seven other industries with at least nine targets each. Overall, the acquiring firms come from 73 industries, while the target firms are in 74 different industries. Hence, even though mergers may occur in waves in some industries (Harford (2005), Rhodes-Kropf, Robinson, and Viswanathan (2005)), industry concentration in our sample is low since our sample spans a long time period (1980-2004).

The mean transaction value in our sample is about \$4 billion, and is larger than in other studies (Table 2). This is expected since our sample selection procedure requires the merging firms to be followed by Value Line. While our sample mainly consists of large mergers, it also

includes smaller mergers since the first quartile of transaction value is \$365 million. In comparison, the mean deal value in Moeller, Schlingemann, and Stulz (2004) is \$258 million.<sup>16</sup> The average equity market value, computed forty days before the merger announcement, is about \$12 billion for the bidder, and is \$2.6 billion for the target. The ratio of cash and short-term investments to total assets is 10.23% (12.71%) for bidder (target) firms. The corresponding value for capital expenditure is 6.95% (7.14%). The average equity B/M ratio is 0.50 for acquirers and 0.61 for target firms. In the Moeller, Schlingemann, and Stulz (2004) sample, the average (median) bidder BM ratio is 0.55 (0.48), and average (median) bidder liquidity is 15.2% (6.8%). These values are comparable to our sample values. In untabulated results, we find that the mean four day buy and hold market adjusted abnormal return for bidders (targets) in our sample is -2.44% (+24.02%), with a t-value of -5.61 (14.74). These returns are similar to that reported in prior studies. Hence, despite our sample consisting primarily of the larger mergers, the characteristics of our sample are similar to that of the population of merging firms.

The table also provides the distribution over various five-year periods within the overall sample period. The last sub-period (2000-2004) accounts for about 30% of the sample, while the 1990-1994 sub-period accounts for only 8.3% of the sample. The rest of the sample is fairly evenly spread over the remaining three sub-periods. Hostile bids comprise about 9% of our sample. The sample is split between all stock deals (38%) and deals where at least part of the payment was not in stock (62%). A little over half of the mergers in the sample (56%) are focused mergers, where both the bidder and target firms are in the same Value Line industry.<sup>17</sup>

## **4. Results**

We use our valuation methodology and divide total merger synergies into its components: operating and financial synergies. We further divide operating synergies into gains from revenue increases and/or cost reductions, and gains from cutbacks in investments. We confirm the validity of Value Line forecasts by comparing them with realized cashflows. We also examine the relationship between Value Line synergy estimates and the stock price reaction to the merger. Finally, we conduct cross-sectional tests and explore the association between estimated synergies and other firm- and transaction-specific variables (e.g., whether the transaction is a focused or diversifying merger) that prior research suggests may affect the magnitude of synergies.

### **4.1 Sources of merger synergies**

In order to enable comparison across mergers between firms of different sizes, we deflate estimated synergies by the combined portfolio equity market value prior to the merger. In the second column in Table 3, we estimate the average synergies for the full sample to be 10.03%, which is statistically significant at the one-percent level. The median is 5.11% and is also statistically significant at the one-percent level. Thus, the majority of the mergers in the sample are expected to create value through synergistic gains. The magnitude of the synergies documented here is similar to that documented in other recent studies. For example, Houston, James, and Ryngaert (2001) use management forecasts and estimate synergies in large bank mergers to average about 13%. Bhagat, Dong, Hirshleifer, and Noah (2005) find average value improvements of 13.1% in a sample of tender offers with competing bidders.

Hayn (1989) finds that the tax attributes of the target firms are statistically related to the abnormal returns for the merging firms, and concludes that tax considerations could motivate

acquisitions. Erickson (1998), and Dhaliwal, Newberry, and Weaver (2005)) find that the tax characteristics of the acquiring firm affect the means of payment used to fund the acquisition. In the third column of Table 3, we separately estimate the magnitude of financial synergies in the form of interest tax shields. The average estimate for financial synergies is 1.64% and is significant at the one-percent level. The median is 0.02%, and 51.5% are positive.<sup>18</sup> The relatively small magnitude of interest tax shields documented here suggests that financial synergies are not a major source of merger gains.

In the last three columns, we provide details about the magnitude of operating synergies. The average merger is expected to deliver significant operating synergies of 8.38%. The median operating synergies is 4.45%, and both the mean and median are significant at the five-percent significance level or better. When we further decompose operating synergies, an interesting pattern emerges. Revenue increases and cost savings do not seem to contribute positively to merger synergies. In fact, the mean is -4.91% and is significantly negative at the ten-percent level. The median estimate of -0.52% is not significant.<sup>19</sup>

The bulk of the operating synergies arise from cutbacks in investments, which average a significant 13.29%. The median is 5.39% and is also statistically significant. Healy (2000) and Gertner (2000) offer potential reasons why scaling back investments is easier in the wake of a merger. Managers of acquiring firms may be willing to downsize if the costs of reduced growth are more likely to be borne by managers/employees of the target firm, rather than the acquiring firm. Also, managers could face lesser resistance from employees and customers since there is greater understanding that firms have to consolidate operations after a merger.

If the investment cutbacks are necessitated by leverage increases associated with the merger, then they may not be optimal.<sup>20</sup> Under this possibility, the reduced investment

expenditures would be more than offset by reduced future operating profits, resulting in negative total synergies. We compare the debt forecast for the combined firm (post-merger) with the sum of the debt forecasts for the two stand-alone firms to identify leverage-increasing mergers. We use Value Line forecasts of leverage both for the short-term (year 1 or 2) and the medium-term (year 3, 4 or 5) to measure leverage changes.

We find that on average, both savings from investment cutbacks (8.91%) and total synergies (9.12%) are expected to be significantly positive for mergers expected to result in leverage increases in the medium-term. If leverage increases are assessed using short-term forecasts, the corresponding means are 14.16% and 18.11%. We also find no evidence that synergies from revenue increases/cost savings are significantly negative for these leverage-increasing mergers.<sup>21</sup> Overall, the analysis suggests that the gains from investment cutbacks are not due to increased leverage forcing the firm to forego profitable investments. Instead, they represent synergistic gains that result in overall value increases.

To summarize, we find that on average, mergers are expected to realize significant synergies. These synergies arise from operating sources, mainly due to cutbacks in investments. In contrast, synergies due to financial reasons and revenue increases/cost savings are not expected to be economically significant. Thus, merger gains do not seem to be the result of wealth transfer from the government because the magnitude of financial synergies is relatively small. Since we do not find positive gains arising from revenue increases and cost savings, the synergies also do not seem to be due to wealth transfers from customers and/or suppliers. This evidence is consistent with effective regulation preventing mergers motivated by an increase in market power. The results support the view that completed mergers result in economically beneficial resource reallocation.

## **4.2 Reliability of synergy estimates**

In this section, we present results regarding the reliability of the synergy estimates. We first show that Value Line forecasts provide reasonable estimates of realized cash flows. Next, we link the synergy estimates to the abnormal stock returns on the portfolio of the merging firms. Finally, we examine the robustness of the synergy estimates to changes in the assumptions regarding working capital, asset beta and long-term growth rates for the cash flows embedded in the terminal value estimates, and discuss the sensitivity of the synergy estimates to the inclusion of asset sales by bidders.

**4.2.1 Comparison of Value Line forecasts with realized cash flows.** Estimation of synergies based on realized cash flows would require a relatively long time series of data, introducing survivorship and benchmark problems. The problem may be especially severe if mergers occur at a time of industry and/or regulatory shocks, making it difficult to reliably identify whether the performance characteristics five years later are due to the merger or these shocks. Besides, the post-merger firm could undertake subsequent transactions such as mergers with other firms, asset sales, spin-offs, or other restructuring that would be reflected in the realized cash flows and affect the estimation of synergies. Our method uses forecasts immediately after the merger, so these problems are minimized. Nonetheless, we test whether Value Line forecasts provide reliable estimates of realized cash flows.

In Table 4, we compare the realized cash flows to the Value Line forecasts for the combined firm. We group the cash flows following the same procedure as in equation (1), and compare the total capital cash flows, the cash flow due to after-tax operating profits, investment cash flows, and debt tax shield. All cash flows are deflated by the combined pre-merger equity

market value of the merging firms. Out of the 264 mergers in our sample, complete post-merger financial statements covering the entire forecast horizon are available for 188 mergers. The reasons for missing 76 mergers are – the firm was delisted due to a takeover (21), some variables required to calculate the cash flows were missing (15), or the forecast is for a future year (e.g., 2007) for which financial statements are not yet available (40). The terminal year in Value Line forecasts varies from Year 3 to Year 5. The forecast horizon includes Year 3 in all 188 mergers and includes Year 4 in 178 mergers. Because the Value Line forecast extends to Year 5 only for 24 mergers, we limit our discussion to comparisons of Value Line forecasts and actual cash flows in years 1 through 4, even though Table 4 contains the full five-year results for completeness.

Value Line forecasts for total CCF are not significantly different from realized CCF in years 1, 2 and 3. In year 4, the Value Line estimates are higher than the actual CCF by 1.73% (p-value = 0.08), on average. Overall, these results suggest that Value Line estimates of CCF are relatively accurate. The results support a similar conclusion regarding Value Line forecasts for the debt tax shield. However, we observe that the actual investment cash flows are smaller than Value Line forecasts. The reduced investment relative to Value Line forecasts would inflate the estimate of synergies arising from investment cutbacks. In contrast, the actual operating profits (revenues – operating costs) are smaller than Value Line forecasts, and would show up as a larger drop in synergies from revenue increases/cost savings.

The magnitude of the difference between the forecasted and actual values of investments and operating profits increases as we go from year 1 to year 4. This is expected, since confounding effects of other corporate restructuring events such as plant closings, spin-offs, asset sales, etc. are more likely to occur as the forecast horizon increases. To confirm that this is

indeed the case, we examined news wire reports from Lexis-Nexis for the 10 mergers where the difference in investment cutbacks in year 4 was the largest. In all 10 mergers, we found news reports disclosing significant restructurings such as plant closings, employee layoffs, asset sales, spin-offs, etc. There was no mention in the news reports that the restructuring was a planned event that was related to the merger (e.g., the result of antitrust requirements).<sup>22</sup>

**4.2.2 Relation between synergy estimates and stock returns.** We calculate abnormal stock returns for the bidder, target, and the combined firm as follows. We designate day 0 as the announcement date from SDC or the Wall Street Journal Index whichever is earlier. For each firm, abnormal return is the difference between the buy and hold firm return and the return on the CRSP value weighted market index over the announcement period (AD-40 to the merger ex-date). We start the measurement period forty days before the announcement since Schwert (1996) presents evidence that more than half of the gain to the target's firm stockholders is obtained during the two months before the merger announcement.<sup>23</sup> The abnormal return for the combined portfolio of bidder and target firms is computed as the weighted average of bidder and target abnormal returns, using the equity market value forty days before the merger announcement as the weights. The target shareholders gain significantly since the mean (median) abnormal return is 43.67% (37.92%). While the mean bidder abnormal return is 3.47 % (p-value = 0.07), the median is only 0.93 % and is insignificant. The equity market value of the combined portfolio increases by 10.20%, on average. The median increase is 7.11%, and both the mean and median are significant at the one-percent level. The mean and median estimated total synergies based on Value Line forecasts are 10.03% and 5.11%, respectively (Table 3). Thus, our estimate



of total synergies is broadly consistent with the abnormal stock return on the portfolio of the target and acquired firms during the merger period.

We examine the relation between stock returns and synergy estimates in Table 5. If the reason for the merger is other than expected synergies, then the link between stock returns and synergies will be weak. We identify two instances where mergers may be driven by factors other than synergies: stock-market-driven (SMD) mergers<sup>24</sup> and diversifying mergers.

Shleifer and Vishny (2003) argue that some mergers could be driven by stock market misvaluation of the combining firms. They suggest that overvalued bidders could use their stock as the currency to make acquisitions.<sup>25</sup> Since mergers undertaken by highly valued bidders and paid for with stock are more likely to be SMD acquisitions, we classify all-stock mergers where the bidder book to market ratio is in the bottom one-third as SMD mergers. The mean total synergy is an insignificant 4.7% for SMD mergers, but averages a significant 11.2% (p-value of 0.02) for the other mergers. These results suggest that at least one segment of market participants, i.e., Value Line analysts, recognizes that SMD mergers are not undertaken with a view to realize synergy gains. If the stock price reaction reflects factors other than expected synergies, the relation between estimated synergies and the abnormal returns to the portfolio of the combining firms is expected to be weaker for SMD mergers.

We estimate a weighted least squares (WLS) regression to capture differences in the return-synergy relation between SMD and other mergers.<sup>26</sup> The dependent variable in Table 5 is the combined portfolio abnormal return (AD-40 to ED). The weight employed in the WLS regression is the inverse of the variance of combined acquirer and target portfolio returns during the estimation period (252 days ending on AD-40). The explanatory variables are two interaction terms: Synergy\*SMD and Synergy\*NonSMD. 'Synergy' is the estimate of total synergy based

on Value Line forecasts. ‘SMD’ takes the value of ‘1’ for SMD mergers and ‘0’ for other mergers, and ‘NonSMD’ takes the value of ‘1’ for other mergers and ‘0’ for SMD mergers. We include ‘SMD’ and relative size as control variables. The coefficient  $\beta_1$  on Synergy\*SMD (model 1 in Table 5) is not statistically significant, confirming that synergies are not the driving force behind SMD mergers, and do not explain the stock price reaction to these mergers. In contrast,  $\beta_2$  is positive and significant at the one-percent level indicating that synergies are correlated with abnormal returns for the other mergers.

We next investigate whether the relation between synergies and stock returns is different for focused and diversifying mergers. Focused mergers are likely to be primarily motivated by synergies; hence, stock price reactions should be closely related to synergy gains. In contrast, diversifying mergers may be undertaken for a variety of reasons unrelated to synergy considerations (e.g., managers may diversify to protect human capital). The link between stock returns and synergies will be weaker because returns will reflect these reasons rather than synergy gains. Results reported in Table 5 (model 2) confirm that the return-synergy relation is insignificant for diversifying mergers, while it is highly statistically significant for focused mergers which are more strongly motivated by synergies. This result lends strong support to the concordance between Value Line synergy estimates and stock market reaction to the merger.<sup>27</sup>

If the forecasted investment cutbacks are regarded as suboptimal by investors, stock returns would be negatively related to the magnitude of investment cutbacks. We examine this issue by replicating Models 1 and 2 in Table 5 after replacing total synergies with savings from investment cutbacks for the subsample of firms with positive investment cutback synergies. In untabulated results, we find that stock returns have a significant, positive relationship with cutbacks in the case of both focused and non-SMD mergers. Additionally, to examine whether

investment cutbacks are suboptimal for mergers associated with leverage increases, we further restrict the positive investment cutback subsample to those with forecasted increases in medium-term leverage. In this sample also, stock returns have a significant, positive relationship with investment cutbacks for focused mergers; for non-SMD mergers, the relationship is positive but is not statistically significant. We find similar results if we analyze mergers where both medium-term and short-term leverage are expected to increase. Importantly, there is no evidence of a significant, negative relationship between stock returns and investment cutbacks. These results support the view that investment cutbacks reflect operational synergies rather than suboptimal investment decisions.

**4.2.3 Robustness of synergy estimates to changes in valuation methodology.** As a further check on the synergy estimates, we report the results of several tests that we conducted to examine the robustness of the estimated synergies to changes in the assumptions used to calculate the synergies (Table 6). In estimating the cash flows to capital providers (CCF), we deduct investment expenditures from after-tax operating cash flows. Increases in working capital are included as part of the investment expenditures. As a first robustness check, we adjust working capital to exclude cash and debt in current liabilities. To the extent that cash held by a firm is not directly related to operational needs, excluding cash provides a better measure of operating working capital. Similarly, debt in current liabilities reflects a financing decision rather than an operational one. Thus, these adjustments to working capital may result in a more accurate estimate of the firm's investment expenditures. But, they do not affect the estimates for synergies attributable to revenue increases or cost savings. These adjustments have only a minor impact on the estimated total synergies as reported in Panel A of Table 6. The average estimate

of total synergies drops from 10.03% to 9.27%, but it continues to be statistically significant. The median estimate for total synergies increases slightly from 5.11% to 5.27%, and its statistical significance is unaltered. The revisions to the estimates for cutbacks in investments and operating synergies are also small in magnitude, and both remain significantly positive.

We next examine the sensitivity of the synergy estimates to alternative methods of calculating the discount rate. In Table 3, the cost of capital was estimated using an asset beta, assuming that the debt beta is zero (risk-free). We relax this assumption by recalculating the cost of capital using a debt beta equal to 0.25 (following Gilson, Hotchkiss, and Ruback (2000)). The resulting synergy estimates reported in Panel B of Table 6 again reveal only slight changes in the present values of the synergy estimates. For instance, the mean total synergy estimate is 9.82% rather than 10.03%. Thus, the synergy estimates remain robust to altering the assumption about debt beta used in estimating the cost of capital.

As an additional check, we investigate whether our synergy estimates are sensitive to assumptions made about the growth rate of cash flows in computing the terminal value. As seen in equation (2), we have assumed that the cash flows increase only at the rate of long-run inflation beyond the terminal year (i.e., zero real growth). We recompute the synergy estimates by assuming an annual real growth rate of 1% (Panel C) or 2% (Panel D). We find that assuming a 1% real growth increases the mean estimate for total synergies from 10.03% to 10.65%, while the median estimate increases from 5.11% to 5.85%. Similarly, the mean (median) estimate for operating synergies increases from 8.38% (4.45%) to 8.89% (5.00%). Assuming a real growth rate of 2% again changes our estimates only slightly. Hence, the synergy estimates are not very sensitive to assumptions about the growth rates of terminal cash flows.

Finally, we also consider the impact of adding back asset sales by the bidder in the year of the merger and the subsequent year (results not tabulated). It is unclear whether these asset sales are triggered by the merger or whether they were part of an ongoing process unrelated to the merger. In any case, including these asset sales increases our mean estimate for total synergies by less than 2% to 11.84%. Similarly, the median estimate increases slightly to 6.87%.

Overall, these results indicate that our synergy estimates are robust to alternative specifications of our valuation methodology, and provide good assessments of the sources of these synergies.

### **4.3 Factors influencing the magnitude of synergies**

We now draw upon prior research and examine the impact of firm- and transaction-specific variables (e.g., bidder's book-to-market ratio, whether the transaction is a focused or diversifying merger) on our estimate of merger synergies. Overall, the results are consistent with prior evidence on the impact of these factors and accord well with economic intuition. For instance, we find that operating synergies are higher in focused versus diversifying mergers. These results give us additional confidence about the robustness of our synergy estimates. We first present univariate results for the impact of each of the factors in Table 7. Table 8 contains the results of the multivariate analysis considering all the factors simultaneously.

**4.3.1 Univariate analysis.** In Panel A of Table 7, we stratify the sample firms into focused and diversifying mergers and replicate the analysis presented in Table 3. This classification is motivated by the lack of consensus in the current literature on the benefits from corporate diversification. Prior research (e.g. Lang and Stulz (1994)) finds that diversification destroys value. However, other authors (e.g., Campa and Kedia (2002), Graham, Lemmon, and Wolf

(2002)) suggest that diversification could be a firm's efficient response to poor growth opportunities in its main lines of business. Still others (e.g., Villalonga (2004) provide evidence of a diversification premium.

We find that focused mergers are expected to create significant synergies, averaging 14.40% (p-value of 0.02). Similar to the results for the full sample, the majority of the merger gains arise from operating synergies that average a significant 13.15%. In contrast, the magnitude of financial synergies is relatively small with a mean of 1.25% (p-value of 0.03) and a median of 0.02% (not significant). The operating synergies arise mainly due to savings from cutbacks in investments, which average a significant 16.19%. This is expected, since a merger between two similar firms would afford ample opportunities to eliminate duplicate investments. Synergies due to increased revenues and cost savings are not significantly different from zero.

The results are different for the 115 diversifying mergers in the sample. The mean estimate of total synergy gains is 4.35%, and is not significantly different from zero. The median is 2.46%, and it is not significant either. Both the mean and median estimates for operating synergies are also not statistically significant. The average synergy due to reduction in investments is 9.54% (p-value of 0.03), but this is offset by a negative synergy of -7.34% due to changes in revenue and/or operating costs, resulting in insignificant operating synergies. Interestingly, we find that the average financial synergy in diversifying mergers is 2.16% (p-value of 0.01), and this constitutes almost one-half of the total synergies in such mergers. This is consistent with the assertions in prior research (e.g., Lewellen (1971), Shleifer and Vishny (1992)) that diversified firms could benefit from higher values of the interest tax shield. Diversification could reduce earnings volatility and/or increase asset liquidation value, thus increasing the debt capacity of the conglomerate firm.

In Panel B, we categorize the sample into friendly and hostile mergers. Hostile mergers are commonly characterized as disciplinary in nature and friendly mergers as synergistic (e.g., Morck, Shleifer, and Vishny (1988)). A hostile target management could take actions such as selling off valuable assets or otherwise restructuring the firm so that the acquirer would find it difficult to achieve synergies. Consistent with this argument, we find that hostile mergers are not expected to generate significant synergies. Total synergies average 0.95%, with average financial synergies of 5.15% offsetting negative operating synergies. In contrast, the average synergy in friendly transactions is 10.93%, and is significant at the one-percent level. The magnitude of financial synergies is small (mean of 1.29%, p-value of 0.01), but mean operating synergies are large (9.64%, p-value of 0.02). Much of the operating synergies come from cutbacks in investments (mean of 13.53%, p-value of 0.01) rather than changes in revenues and/or costs.

Panel C presents evidence documenting that the larger the relative size of the target, the greater is the potential for realizing meaningful synergies; this finding is not surprising. However, it is interesting to examine the role of bidder size. Moeller, Schlingemann, and Stulz (2004) show that large bidders experience losses in equity market value when they takeover public targets, whereas small acquirers fare better. They suggest that managerial hubris may play a bigger role in larger firms. The results in Panel D of Table 7 are consistent with their arguments. The mean total synergy for small bidders is 20.4%. Similar to the full sample results, synergies arise mainly from operating synergies driven by cutback in investments. In sharp contrast, total synergies, operating synergies and savings from investment cutbacks are all negligible for mergers undertaken by large bidders.

We further explore the hubris based explanation for mergers. First, we use the book-to-market (BM) ratio for bidder equity. Rau and Vermaelen (1998) find that glamour bidders (low

BM) underperform after a merger, whereas value bidders (high BM) experience superior performance. They conclude that this may be due to ‘performance extrapolation’ and hubris, leading glamour acquirers to make relatively poorer acquisition decisions. Consistent with their argument, Panel E presents evidence that mergers initiated by value bidders experience higher total synergies of 12.46% compared to total synergies of 7.6% for mergers involving glamour bidders. The gains from cutbacks in investments are also higher for value bidders compared to glamour bidders. Next, we segment the sample based on the liquidity of the bidder. Harford (1999) documents that cash-rich acquirers undertake poorer mergers, probably due to the agency costs of free cash flow. More liquid bidders experience lower synergies than low liquidity bidders and have smaller cutbacks in investments (Panel F).

**4.3.2 Multivariate analysis.** The univariate results documented above suggest that estimated synergies vary in the cross-section in a manner consistent with prior research. We now formally investigate the cross-sectional patterns in estimated synergies using a multivariate regression approach. The dependent variables are the various components of synergies. The explanatory variables are the same bidder- and transaction-characteristics used in Table 7. Transaction-specific variables include relative size and two dummy variables that take the value ‘1’ for focused mergers and hostile mergers, respectively, and ‘0’ otherwise. If diversifying transactions destroy value and focused transactions create value, the coefficient on the focused merger dummy variable would be positive. On the other hand, if there is a diversification premium and diversifying mergers are the firms’ efficient response, the coefficient on the focused merger dummy variable could be negative. If synergies are harder to realize in hostile mergers, the coefficient on the hostile merger dummy variable would be negative. We include also include



bidder characteristics - book-to-market (BM) ratio, liquidity and equity market value - as control variables.

Model 1 in Table 8 is the base case model where the dependent variable is total synergies. The coefficient on the focused merger dummy variable is positive and significant at conventional significance levels. This confirms our univariate finding in Table 7 that the average synergies in focused mergers are significantly positive, while it is not significantly different from zero for diversifying mergers. Consistent with Rau and Vermaelen (1998), the coefficient on bidder BM ratio is positive and significant at the one-percent level, suggesting that value bidders do make better acquisition decisions. Also consistent with Harford (1999), the coefficient on bidder liquidity is negative. However, the coefficient is not significant (p-value of 0.13) as is the case for the remaining variables.

In model 2, the dependent variable is financial synergies. Relative size is significantly positively associated with financial synergies. The coefficient for the dummy variable for hostile mergers is positive and significant. This result indicates that expanding debt capacity may be an important motive in hostile mergers. Similar to the first model, value bidders with high BM ratios make better acquisitions. In untabulated tests, we examined whether financial synergies are related to the correlation between the stock returns of the bidding and target firms. The increase in debt capacity of the combined firm and, consequently, the potential for financial synergies should be higher when the return correlation is lower. Although the coefficient on the stock return correlation has the predicted sign, it is small and statistically insignificant.

In models 3-5, the dependent variables are operating synergies, gains from revenue increases / cost savings, and savings from reductions in investments, respectively. In model 4, none of the coefficients are statistically significant. Examining cutbacks in investments (model

5), the focused merger dummy variable is positive and significant at the ten-percent level, suggesting that focused mergers are associated with higher savings from cutbacks in investments. Compared to diversifying mergers, focused mergers better enable the combined firms to eliminate duplicate facilities and investments. This would result in higher operating and total synergies, as evidenced by the significantly positive coefficients on the focused merger dummy variable in both models 3 and 1. This result is consistent with the finding in Houston, James, and Ryngaert. (2001) that the cost savings are larger in large bank mergers with higher geographical overlap.

Similar to the results in model 1, the coefficient on bidder BM is positive in both models 3 and 5. Value bidders seem to engage in better mergers that are expected to deliver significant savings via cutbacks in investments. Results for model 5 indicate that low-liquidity bidders are motivated to achieve significant cutbacks in investments. This is reflected in higher operating synergies and higher total synergies. This further confirms our earlier univariate finding, that glamour and cash-rich bidders make poor acquisition decisions.

Since the analysis thus far suggests that merger synergies are mainly due to operating synergies arising from cutbacks in investments, we examine this in more detail. Firms with higher levels of capital expenditures would have greater potential to realize savings by trimming future investments. The results reported in Table 9 are consistent with this reasoning. In addition to the explanatory variables included in Table 8, we also include the pre-merger level of capital expenditures for the combined firm, measured as a fraction of total assets. The pre-merger capital expenditure is calculated either in the year prior to the merger announcement (model 1), or the average over the three years prior to the merger announcement (model 2). In both models, the coefficient on prior capital expenditure is positive and significant at the ten-percent significance

level. As in Table 8, the coefficients on the focus merger dummy variable, bidder book-to-market ratio and bidder liquidity remain significant.<sup>28</sup>

Overall, the results documented here suggest that merger synergies predominantly arise due to a reduction in investments after the merger, and that the gains are positively related to pre-merger capital expenditures. This is consistent with the notion that the merging firms can improve efficiency by curbing wasteful, duplicate expenditures. We find that synergies are larger in focused mergers and in mergers undertaken by value bidders. We find little evidence that merger gains arise due to a wealth transfer from the government, since the magnitude of financial synergies in the form of higher tax shield on interest is relatively small. We also do not find significant synergies due to revenue increases / cost savings, suggesting that wealth transfer from customers / suppliers is also not a major source of merger gains.

## **5. Conclusions**

Bradley, Desai and Kim (1988) and Andrade, Mitchell and Stafford (2001), among others, argue that corporate mergers, on average, add wealth to stockholders. There are three possible sources of gains to stockholders: productive efficiencies, tax savings, and enhanced product market power. While improved productive efficiencies are economically beneficial, tax savings and increased market power generate stockholders' gains at the expense of the government and other stakeholders such as customers and suppliers. The potential for such wealth transfers in mergers has generated considerable controversy in discussions about public policy towards mergers. Consequently, it is important to understand the relative importance of the three sources of merger gains. While existing research has examined the evidence for each source of merger gains, it

does not address all the sources simultaneously. Thus, there is little evidence on the relative importance of the sources of merger gains.

We analyze Value Line forecasts of cashflows to the acquiring, target, and combined firms for a sample of 264 large mergers of industrial firms during 1980-2004. The sample firms are spread across a broad spectrum of industries and are representative of the population of all mergers during this period. We compare Value Line forecasts with realized cash flows and document that, on average, Value Line forecasts are accurate. We calculate merger synergies as the present value of the forecasted incremental cashflows of the combined firm relative to the sum of the pre-merger forecasted cashflows of the acquiring and target firms. We find that the average gains from mergers are 10.03%. This estimate is similar to those obtained by other merger studies such as Houston, James, and Ryngaert (2001) and Bhagat, Dong, Hirshleifer, and Noah (2005).

The detailed data in the Value Line forecasts allow us to decompose the value gain in mergers into the underlying components. We find that the estimated financial synergies from tax savings are only 1.64%, suggesting that tax considerations typically play only a small role in mergers. Operational synergies average about 8.38%, and are much higher in focused mergers compared to diversifying mergers. Further analysis of the operational synergies reveals that the gains arise mainly from cutbacks in investment expenditures rather than increased operating profits. The small magnitude of synergies arising from increased profits undermines the argument that merger gains represent a wealth transfer arising from increased market power. Rather, it is consistent with the notion that antitrust regulations prevent mergers motivated primarily by an increase in market power. The results documented here suggest that merger

synergies in completed transactions arise as a result of more efficient deployment of economic resources.

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<sup>1</sup> Many of these studies have either used a case-based approach, or used limited data for firms in specific industries. Other studies (e.g., Healy, Palepu, and Ruback (1992)) investigate the sources of merger gains using realized post-merger financial data. We discuss the related literature subsequently in Section 1.

<sup>2</sup> For example, Healy, Palepu, and Ruback (1992) and Heron and Lie (2002) find evidence of operating improvements after a merger, whereas Ravenscraft and Scherer (1987) and Ghosh (2001) do not.

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<sup>3</sup> Newswires reports, as reported in Lexis-Nexis, December 15, 1999, in discussing the Exxon-Mobil merger.

<sup>4</sup> The median capital expenditure declines from 14.4% of the market value of assets to 10.8% after the merger (Table 6, pg 154). However, they report that this decline is not statistically significant after controlling for industry wide changes.

<sup>5</sup> Focarelli and Panetta (2003) find that even though consolidation via bank mergers decreases deposit rates in the short-run, depositors gain in the form of higher rates in the long run, suggesting that efficiency gains may be realized only over a long period of time.

<sup>6</sup> Houston, James, and Ryngaert (2001) provide an example (the Chase Manhattan-Chemical Bank merger), where \$250 million of the forecasted \$1.5 billion cost savings were attributed to cost-cutting programs that were already underway.

<sup>7</sup> Mergers often are the firm's response to significant changes in its industry induced by technological innovations, regulatory changes, etc. Consistent with this argument, Mitchell and Mulherin (1996) and Harford (2005) find that takeovers cluster disproportionately in certain industries that are subject to external shocks. These changes could trigger significant restructuring, and entry and exit of firms, exacerbating concerns about the appropriateness of benchmarks used to estimate abnormal operating performance several years into the future.

<sup>8</sup> One question that arises is whether Value Line updates its stand-alone forecast after the merger is announced. We find that the frequency of forecast revisions in the last stand-alone forecasts is very similar to the frequency of such changes in a random sample of Value Line forecasts. Further, the magnitude of synergies is similar if we use pre-announcement forecasts as the stand-alone forecasts. Using the last stand-alone forecasts reduces noise from extraneous events by minimizing the time gap between the stand-alone and combined firm forecasts.

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<sup>9</sup> Since we are calculating synergies as the difference between two forecasts that are only one calendar quarter apart, other factors affecting the forecasts may add noise, but should not induce a bias when averaged across the sample.

<sup>10</sup> We estimate capital cash flows following Ruback (1995a and 1995b). Other studies (e.g., Kaplan and Ruback (1995), Gilson, Hotchkiss, and Ruback (2000), and Houston, James, and Ryngaert (2001)) adopt a similar approach.

<sup>11</sup>  $T_{avg}$  is the average income tax rate for the first and last forecasted year, and  $R$  is the ten-year constant maturity Treasury Bond yield (from FRED database at the St. Louis Federal Reserve Bank).

<sup>12</sup> Houston et al. (2001) use a similar market risk premium and risk free rate. We use the Value Line equity beta prior to the announcement date (AD), equity value (AD-40) and the total debt reported by Value Line, and a debt beta of zero to estimate the asset beta. The asset beta for the combined firm is the weighted average of the asset betas of the bidder and target, using firm values as the weights. If Value Line does not report equity beta, we estimate the equity beta using the market model over the period AD-280 to AD-40. In a later section, we report the results of several robustness checks using alternative assumptions.

<sup>13</sup> We do not focus on the benefit from net operating loss carry-forwards since the Tax Reform Act of 1986 severely restricted the use of net operating loss carry-forwards in mergers (see Hayn (1989) and Weston, Mitchell, and Mulherin (2004, page 93)), and the major portion of our sample is after 1986.

<sup>14</sup> We use the September issues of Value Line to identify the sample firms.



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<sup>15</sup> The exclusion of these industries limits the comparability of our results to previous studies such as Houston, Ryngaert and James (2001) who analyze banks and Kim and Singal (1993) who analyze airlines.

<sup>16</sup> While the time period we analyze has significant overlap with the sample in Moeller, Schlingemann, and Stulz (2004), we exclude takeovers of non-public firms and takeovers involving financial firms, utilities and telecommunications firms. The aggregate transaction value of the 264 mergers in our sample exceeds \$1 trillion.

<sup>17</sup> Kahle and Walkling (1996) find that using Compustat SIC codes yields more powerful tests than using CRSP SIC codes. Since Compustat does not provide historical SIC codes, we use Value Line industry classifications. Song and Walkling (2000) also use Value Line industry classifications.

<sup>18</sup> Since these cash flows are less risky than operating synergies, we reestimate the present value by discounting at the risk-free rate instead of the firm's cost of capital to obtain upper bounds for the value of financial synergies. The mean upper bound is 3.87%, but the median is only 0.36%.

<sup>19</sup> This result cannot be attributed to Value Line analysts ignoring the potential for increased market power in their estimates. There are explicit references to market power in the discussion of some mergers in their quarterly company reports.

<sup>20</sup> We thank the referee for suggesting this analysis.

<sup>21</sup> Further, for mergers with positive savings from cutbacks in investments, we find no evidence that the stock price reaction to the merger is negatively related to savings from investment cutbacks (see Section 4.2.2).

<sup>22</sup> In untabulated tests, we also compared Value Line forecasts with management forecasts of incremental cash flows in 75 mergers for which we were able to obtain quantitative management

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forecasts (using newswire reports from Lexis-Nexis). Consistent with an optimistic bias, all the management forecasts of incremental post-merger cash flows were positive. When we classify mergers into value-increasing and value-decreasing mergers based on Value Line synergy forecasts, we find an interesting pattern. For value-increasing mergers, there is no significant difference between Value Line and management forecasts. However, in value-decreasing mergers, management forecasts are positive and are significantly higher than Value-Line forecasts in years 1, 2, and 3.

<sup>23</sup> Estimating the abnormal returns over a horizon extending until the ex-date would be appropriate since firms continue to release updated information regarding expected synergies etc., even after the merger announcement date.

<sup>24</sup> We thank the editor for suggesting this analysis.

<sup>25</sup> Rhodes-Kropf, Robinson, and Vishwanathan (2005) also conclude that mergers could be driven by stock market misvaluation. However, Harford (2005) challenges this view.

<sup>26</sup> To prevent distortion by outliers, all the variables are winsorized at 0.5% and 99.5%.

<sup>27</sup> We also examine the relationship between Value Line synergy estimates and premiums for target shareholders. Similar to the portfolio abnormal returns, we find a significant relationship only for focused and non-SMD mergers.

<sup>28</sup> To capture potential non-linearity in bidder size effects, we have replicated the regression analysis using a dummy variable for small bidders (lowest NYSE quartile) instead of bidder equity market value. This dummy variable is positive and significant in Table 9; other results in Tables 8 and 9 are very similar.

**Table 1**  
**Industry distribution of sample firms**

	Value Line Industry	# of firms
<b>A: Bidder firms</b>		
1.	a. Food Processing Industry	16
2.	a. Computer and Peripherals Industry	13
3.	a. Medical Supplies Industry b. Paper and Forest Products Industry	12
4.	a. Computer Software and Services Industry	11
5.	a. Aerospace/Defense Industry b. Electrical Equipment Industry	10
6.	a. Petroleum (Integrated) Industry	9
<b>B: Target firms</b>		
1.	a. Food Processing Industry	18
2.	a. Machinery Industry	14
3.	a. Computer and Peripherals Industry	12
4.	a. Medical Supplies Industry b. Petroleum (Integrated) Industry	11
5.	a. Computer Software and Services Industry	10
6.	a. Aerospace/Defense Industry b. Drug Industry c. Electronics Industry	9

The sample consists of 264 completed mergers that were announced during 1980-2004, where both the bidder and the target are domestic, publicly traded US firms and are followed by Value

Line. The table lists the industries that contain the largest number of firms, separately for the bidder and target firms. No other industry contains more than 8 firms. Industry classifications are from Value Line.

**Table 2**  
**Summary statistics**

	Mean	Median	Q1	Q3	
Deal value (\$mill.)	3,998.36	847.96	364.75	3,526.20	
<u>Bidder characteristics</u>					
MV of equity (\$mill.)	11,979.30	3,127.70	1,139.06	9,630.93	
Liquidity (%)	10.23	5.25	1.97	13.75	
B/M of equity	0.50	0.41	0.26	0.64	
Capital expenditure (%)	6.95	6.08	3.67	8.51	
<u>Target characteristics</u>					
MV of equity (\$mill.)	2,584.75	526.66	212.24	2,227.93	
Liquidity (%)	12.71	6.08	2.17	15.89	
B/M of equity	0.61	0.51	0.31	0.74	
Capital expenditure (%)	7.14	5.57	3.65	8.90	
	1980 to 1984	1985 to 1989	1990 to 1994	1995 to 1999	2000 to 2004
% in period	16.29%	21.59%	8.33%	23.48%	30.30%
	% Yes		% No		
Hostile	9.09		90.91		
All stock	37.88		62.12		
Focused merger	56.44		43.56		

The sample consists of 264 completed mergers that were announced during 1980-2004, where both the bidder and the target are domestic, publicly traded US firms and are followed by Value Line. Deal value is the total value of the transaction, as reported by SDC. Equity market value is calculated 40 days before the announcement date. B/M of equity is the ratio of book value of equity to market value of equity. Liquidity (cash and short term investments) and capital expenditure are scaled by total assets. All financial data are from COMPUSTAT as of the last

fiscal year before the announcement date. We classify mergers as hostile or friendly, based on a reading of news reports from Lexis-Nexis. All-stock mergers use only stock as the means of payment. A merger is focused if bidder and target are in the same Value Line industry. The table lists summary characteristics separately for the bidder and target firms.

**Table 3**  
**Components of synergies**

	Total synergies	Financial synergies	Operating synergies	Revenue incr. / Cost savings	Cutbacks in investments
Mean (p-value)	10.03*** (0.01)	1.64*** (0.01)	8.38** (0.03)	-4.91* (0.09)	13.29*** (0.01)
Median (p – value)	5.11*** (0.01)	0.02** (0.02)	4.45*** (0.01)	-0.52 (0.25)	5.39*** (0.01)
% > 0	58.33	51.52	56.82	48.86	60.61

This table reports the mean, median, and percent positive synergies (p-values using t-test for mean and Wilcoxon rank sum test for median in parentheses) for 264 mergers during 1980-2004. The synergies are measured as the difference between the present value of forecasted capital cash flows (CCF) for the combined firm (including synergies) and the sum of the present values of forecasted CCF for the stand-alone bidder and target firms (excluding synergies). The terminal value is calculated as a perpetual cash flow growing at the rate of inflation. The market risk premium is 7%. Value Line equity beta and leverage are used to calculate the asset beta, and the risk-free rate is the yield on the 10 year Treasury bond. We report the synergy forecast as a percentage of the combined market value of equity of the bidder and target firms (calculated 40 days before the announcement date). We separate the synergy forecasts into forecasts of financial synergies (interest tax shield) and operating synergies. Operating synergies is the sum of revenue increases/cost savings and cutbacks in investments (sum of savings in capital spending, savings in investment in working capital, and changes in depreciation tax shield).

\* Significance at the 10% level

\*\* Significance at the 5% level

\*\*\* Significance at the 1% level



**Table 4**  
**Comparison of Value Line forecasts with realized cash flows**

	Year	1	2	3	4	5
	# Obs.	188	188	188	178	24
Capital cash flows (%)	VL	6.32	6.22	7.71	9.16	9.00
	Actual	5.95	6.37	6.60	7.43	8.19
	Diff.	0.37 (0.64)	-0.15 (0.90)	1.11 (0.38)	1.73* (0.08)	0.81 (0.79)
Debt tax shield (%)	VL	1.20	1.17	1.14	1.09	0.66
	Actual	1.17	1.23	1.22	1.20	1.10
	Diff.	0.03 (0.44)	-0.06 (0.36)	-0.08 (0.32)	-0.11 (0.26)	-0.44** (0.03)
Investment cash flows (%)	VL	8.19	10.56	11.34	11.59	9.55
	Actual	6.49	6.85	7.60	6.84	4.41
	Diff.	1.69* (0.08)	3.71*** (0.01)	3.75*** (0.01)	4.75*** (0.01)	5.14 (0.15)
Operating profits (%)	VL	13.31	15.61	17.91	19.66	17.89
	Actual	11.28	11.99	12.98	13.06	11.50
	Diff.	2.03*** (0.01)	3.62*** (0.01)	4.93*** (0.01)	6.60*** (0.01)	6.39*** (0.01)

This table compares Value Line forecasts with realizations of annual capital cash flows and the individual components for 188 mergers with available data. All the values are deflated by the combined pre-merger equity market value of the merging firms. For each variable, the first two rows list the mean Value Line (VL) forecast and the realized cash flows. The third row lists the mean difference (p-values).

\* Significance at the 10% level

\*\* Significance at the 5% level

\*\*\* Significance at the 1% level

**Table 5**  
**Relation between stock returns and Value Line synergy estimates**

$$\text{ABNRET} = \alpha + \beta_1 * \text{Synergy} * \text{SMD} + \beta_2 * \text{Synergy} * \text{NonSMD} + \beta_3 * \text{Relsz} + \beta_4 * \text{SMD}$$

$$\text{ABNRET} = \alpha + \beta_1 * \text{Synergy} * \text{Focus} + \beta_2 * \text{Synergy} * \text{NonFocus} + \beta_3 * \text{Relsz} + \beta_4 * \text{Focus}$$

Abnormal return regressions		
	SMD mergers / Others	Diversifying/Focus
	1	2
Intercept	0.078*** (0.01)	0.046** (0.04)
$\beta_1$	0.031 (0.88)	0.122*** (0.01)
$\beta_2$	0.071*** (0.01)	-0.019 (0.64)
$\beta_3$	0.081*** (0.01)	0.086*** (0.01)
$\beta_4$	-0.050 (0.22)	0.035 (0.21)
R <sup>2</sup> (%)	8.21	11.07
# Obs.	264	264

The dependent variable (ABNRET) is the combined portfolio abnormal return (AD-40 to ED), where AD and ED are merger announcement and ex-dates. Synergy is the estimate of total merger synergies based on Value Line estimates. In model 1, SMD (NonSMD) is an indicator variable for stock-market-driven mergers (other mergers). SMD mergers are all-stock deals made by bidders whose book to market ratio is in the bottom one-third. In model 2, Focus (NonFocus) is an indicator variable for focused mergers between firms in the same industry (non-focused, diversifying mergers). Relsz is the ratio of target equity market value to bidder equity market value. The data is winsorized at 0.5% and 99.5% to minimize the impact of outliers. The reported

coefficients (p-values in parentheses) are based on weighted least squares estimates, where the weights are inversely proportional to the variance of the value-weighted portfolio return of the acquirer and the target during the control period (252 trading days ending on AD-40).

\* Significance at the 10% level

\*\* Significance at the 5% level

\*\*\* Significance at the 1% level

**Table 6**  
**Results of robustness checks**

	Total synergies	Financial synergies	Operating synergies	Revenue incr. / Cost savings	Cutbacks in investments
<b>Panel A: Adjust working capital to exclude cash and debt in current liabilities</b>					
Mean	9.27**	1.64***	7.63**	-4.91*	12.54***
(p-value)	(0.02)	(0.01)	(0.04)	(0.09)	(0.01)
Median	5.27***	0.02**	4.63***	-0.52	5.44***
(p – value)	(0.01)	(0.02)	(0.01)	(0.25)	(0.01)
<b>Panel B: Assume debt beta = 0.25</b>					
Mean	9.82***	1.62***	8.21**	-4.03	12.23***
(p-value)	(0.01)	(0.01)	(0.02)	(0.12)	(0.01)
Median	5.22***	0.03***	4.41***	-0.73	5.07***
(p – value)	(0.01)	(0.01)	(0.01)	(0.32)	(0.01)
<b>Panel C: Assume 1% real growth</b>					
Mean	10.65**	1.76***	8.89**	-5.80*	14.69***
(p-value)	(0.02)	(0.01)	(0.04)	(0.09)	(0.01)
Median	5.85***	0.03**	5.00***	0.02	5.77***
(p – value)	(0.01)	(0.02)	(0.01)	(0.25)	(0.01)
<b>Panel D: Assume 2% real growth</b>					
Mean	10.99**	1.89***	9.10*	-7.64*	16.74***
(p-value)	(0.03)	(0.01)	(0.08)	(0.09)	(0.01)
Median	6.39***	0.03**	5.38***	-0.49	6.46***
(p – value)	(0.01)	(0.03)	(0.01)	(0.24)	(0.01)

This table reports the estimates of total synergies and the components of synergies using alternative assumptions. In Panel A, we re-estimate the investment in working capital after excluding cash and debt in current liabilities from total working capital. In Panel B, we assume a debt beta of 0.25 (instead of zero) in estimating the asset beta. In Panel C (D), we modify the terminal growth rate using a real perpetual growth rate of 1% per year (2% per year). The synergy forecasts are deflated by the combined equity market value of the merging firms

calculated 40 days before the announcement date. The table reports the mean and median synergies (p-values using t-test for mean and Wilcoxon rank sum test for median in parentheses).

\* Significance at the 10% level

\*\* Significance at the 5% level

\*\*\* Significance at the 1% level

**Table 7**  
**Components of synergies across different categories of mergers**

	Total synergies	Financial synergies	Operating synergies	Revenue incr. / Cost savings	Cutbacks in investments
<b>A: Focused and diversifying mergers</b>					
Focused mergers (N=149)					
Mean	14.40**	1.25**	13.15**	-3.04	16.19***
(p-value)	(0.02)	(0.03)	(0.03)	(0.50)	(0.01)
Median	6.67***	0.02	5.12***	0.27	6.81***
(p – value)	(0.01)	(0.15)	(0.01)	(0.84)	(0.01)
% > 0	61.74	50.34	60.40	50.34	61.07
Diversifying mergers (N=115)					
Mean	4.35	2.16***	2.20	-7.34**	9.54**
(p-value)	(0.29)	(0.01)	(0.59)	(0.02)	(0.03)
Median	2.46	0.06**	1.43	-1.32	4.10**
(p – value)	(0.12)	(0.04)	(0.36)	(0.14)	(0.02)
% > 0	53.91	53.04	52.17	46.96	60.00
<b>B: Friendly and hostile mergers</b>					
Friendly mergers (N=240)					
Mean	10.93***	1.29***	9.64**	-3.89	13.53***
(p-value)	(0.01)	(0.01)	(0.02)	(0.17)	(0.01)
Median	5.25***	0.02**	4.57***	-0.52	5.39***
(p – value)	(0.01)	(0.05)	(0.01)	(0.31)	(0.01)
% > 0	58.75	51.67	57.92	49.17	61.67
Hostile mergers (N=24)					
Mean	0.95	5.15**	-4.21	-15.13	10.93
(p-value)	(0.95)	(0.05)	(0.78)	(0.28)	(0.42)
Median	4.57	1.02*	-5.43	-1.03	6.66
(p – value)	(0.72)	(0.08)	(0.83)	(0.51)	(0.28)
% > 0	54.17	50.00	45.83	45.83	50.00

**Table 7 (cont'd)**

	Total synergies	Financial synergies	Operating synergies	Revenue incr. / Cost savings	Cutbacks in investments
<b>C: Relative size</b>					
< Median relative size (N=132)					
Mean	3.53	0.04	3.49	-1.74	5.22
(p-value)	(0.21)	(0.87)	(0.22)	(0.40)	(0.12)
Median	3.00*	-0.01	2.52*	0.18	2.41**
(p – value)	(0.08)	(0.66)	(0.09)	(0.99)	(0.04)
% > 0	54.55	44.70	55.30	50.76	56.82
> Median relative size (N=132)					
Mean	16.52**	3.25***	13.27*	-8.09	21.36***
(p-value)	(0.02)	(0.01)	(0.06)	(0.13)	(0.01)
Median	10.03***	0.35***	9.05**	-1.16	14.02***
(p – value)	(0.01)	(0.01)	(0.02)	(0.14)	(0.01)
% > 0	62.12	58.33	58.33	46.97	64.39
<b>D: Bidder MV of equity</b>					
< Median bidder MV of equity (N=132)					
Mean	20.40***	2.41***	18.00***	-4.90	22.90***
(p-value)	(0.01)	(0.01)	(0.01)	(0.23)	(0.01)
Median	10.03***	-0.00**	8.84***	-3.22	10.14***
(p – value)	(0.01)	(0.04)	(0.01)	(0.14)	(0.01)
% > 0	59.85	49.24	56.82	45.45	66.67
> Median bidder MV of equity (N=132)					
Mean	-0.35	0.88***	-1.24	-4.92	3.69
(p-value)	(0.94)	(0.01)	(0.78)	(0.23)	(0.25)
Median	4.00	0.03*	3.15	0.48	1.84
(p – value)	(0.11)	(0.07)	(0.18)	(0.87)	(0.13)
% > 0	56.82	53.79	56.82	52.27	54.55



**Table 7 (cont'd)**

	Total synergies	Financial synergies	Operating synergies	Revenue incr. / Cost savings	Cutbacks in investments
<b>E: Bidder B/M of equity</b>					
< Median bidder B/M of equity (N=132)					
Mean	7.60*	0.21	7.38*	3.10	4.28
(p-value)	(0.06)	(0.34)	(0.07)	(0.38)	(0.17)
Median	4.51***	-0.00	3.49**	2.03	1.99*
(p – value)	(0.01)	(0.96)	(0.02)	(0.18)	(0.08)
% > 0	57.58	46.97	56.82	56.06	56.06
> Median bidder B/M of equity (N=132)					
Mean	12.46**	3.08***	9.38	-12.93***	22.31***
(p-value)	(0.05)	(0.01)	(0.14)	(0.01)	(0.01)
Median	8.30***	0.64***	4.99**	-5.72***	11.80***
(p – value)	(0.01)	(0.01)	(0.04)	(0.01)	(0.01)
% > 0	59.09	56.06	56.82	41.67	65.15
<b>F: Bidder liquidity</b>					
< Median bidder liquidity (N=132)					
Mean	11.38*	1.56**	9.82	-6.40	16.21***
(p-value)	(0.08)	(0.02)	(0.13)	(0.19)	(0.01)
Median	6.81***	0.21**	4.45**	-0.51	4.68***
(p – value)	(0.01)	(0.03)	(0.03)	(0.70)	(0.01)
% > 0	61.36	59.09	59.09	48.48	59.09
> Median bidder liquidity (N=132)					
Mean	8.67**	1.73***	6.94*	-3.43	10.37***
(p-value)	(0.02)	(0.01)	(0.06)	(0.26)	(0.01)
Median	4.71**	-0.00	4.36**	-0.53	5.77***
(p – value)	(0.02)	(0.41)	(0.05)	(0.20)	(0.01)
% > 0	55.30	43.94	54.55	49.24	62.12

This table reports the mean, median, and percent positive synergies estimated using forecasts of capital cash flows (p-values using t-test for mean and Wilcoxon rank sum test for median in parentheses). Panel A reports synergy estimates for focused and diversifying mergers. Panels B

through F stratify the sample based on whether the merger is friendly or hostile, relative size (ratio of target equity value to bidder equity value), bidder market value of equity, bidder book to market ratio of equity, and bidder liquidity.

\* Significance at the 10% level

\*\* Significance at the 5% level

\*\*\* Significance at the 1% level

**Table 8**  
**Relationship of estimated synergies with merger and firm characteristics**

Dependent variable	Total synergies	Financial synergies	Operating synergies	Revenue incr. / Cost savings	Cutbacks
	1	2	3	4	5
Intercept	-0.124 (0.14)	-0.017* (0.09)	-0.104 (0.21)	-0.014 (0.86)	-0.070 (0.31)
<i>Merger Characteristics:</i>					
Focused merger dummy	0.152** (0.03)	-0.008 (0.32)	0.159** (0.02)	0.039 (0.50)	0.093* (0.10)
Hostile dummy	-0.152 (0.18)	0.035** (0.02)	-0.185* (0.10)	-0.113 (0.25)	-0.031 (0.74)
Relative size	0.089 (0.23)	0.060*** (0.01)	0.027 (0.72)	-0.062 (0.33)	0.068 (0.27)
<i>Firm Characteristics:</i>					
Bidder MV of equity	0.000 (0.27)	0.000 (0.73)	0.000 (0.29)	0.000 (0.23)	0.000 (0.93)
Bidder B/M of equity	0.275*** (0.01)	0.025** (0.05)	0.247** (0.02)	-0.089 (0.32)	0.315*** (0.01)
Bidder liquidity	-0.413 (0.13)	-0.013 (0.70)	-0.397 (0.15)	0.058 (0.81)	-0.402* (0.08)
Adjusted R <sup>2</sup>	0.045	0.215	0.032	0.011	0.080
N	264	264	264	264	264

This table reports the results of OLS regressions explaining synergies and its components. In model 1, the dependent variable is total synergies. In models 2-5, the dependent variables are the various components of synergies - financial synergies (model 2), operating synergies (model 3), synergies due to revenue increases/cost savings (model 4) and synergies due to cutbacks in investments (model 5). The explanatory variables include a focused merger dummy and a hostile merger dummy variable that take the value '1' for focused mergers and hostile mergers respectively, and '0' otherwise; relative size, the ratio of target to bidder equity market value;

pre-merger equity market value for the bidder; B/M ratio of equity for the bidder firm; and liquidity, the ratio of cash and short term investments to total assets. All financial data are from Compustat and are calculated in the year prior to the merger announcement. Bidder equity market value is calculated 40 days before the merger announcement using CRSP data. The data is winsorized at 0.5% and 99.5% to minimize the impact of outliers. The table shows the coefficients from OLS regressions, with p-values in parentheses.

\* Significance at the 10% level

\*\* Significance at the 5% level

\*\*\* Significance at the 1% level

**Table 9**  
**Relationship of synergies from investment cutbacks with merger and firm characteristics**

	1	2
Intercept	-0.144* (0.08)	-0.142* (0.08)
<i><u>Merger Characteristics:</u></i>		
Focused merger dummy	0.091* (0.10)	0.091* (0.10)
Hostile dummy	-0.035 (0.71)	-0.038 (0.68)
Relative size	0.080 (0.20)	0.077 (0.21)
<i><u>Firm Characteristics:</u></i>		
Bidder MV of equity	0.000 (0.95)	0.000 (1.00)
Bidder B/M of equity	0.300*** (0.01)	0.301*** (0.01)
Bidder liquidity	-0.347 (0.13)	-0.373* (0.10)
Combined capital expenditures	1.049* (0.10)	
Average combined capital expenditures (prior 3 years)		0.995* (0.09)
Adjusted R <sup>2</sup>	0.086	0.087
N	264	264

This table reports the results of alternative specifications explaining synergies arising from cutbacks in investments. The control variables include a focused merger dummy and a hostile merger dummy variable that take the value '1' for focused mergers and hostile mergers respectively, and '0' otherwise; relative size, the ratio of target to bidder equity market value; pre-merger equity market value for the bidder; B/M ratio of equity for the bidder firm; and liquidity, the ratio of cash and short term investments to total assets. Combined capital expenditure is the sum of capital expenditures of the bidder and target divided by the sum of total

assets. Average combined capital expenditure is the average of combined capital expenditures for the three years prior to the merger announcement. All financial data are from Compustat and are calculated in the year (or three years) prior to the merger announcement. Bidder equity market value is calculated 40 days before the merger announcement using CRSP data. The data is winsorized at 0.5% and 99.5% to minimize the impact of outliers. The table shows the coefficients from OLS regressions, with p-values in parentheses.

\* Significance at the 10% level

\*\* Significance at the 5% level

\*\*\* Significance at the 1% level