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An Efficiency Perspective on the Gains from Mergers and Asset Purchases

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Abstract

A simple efficiency-based view states that acquisitions shift assets to more productive owners. This implies that expected returns from acquisitions increase with transaction value. We propose using the sensitivity of abnormal returns to scaled transaction value as a measure of efficiency gains. Using this method, we find that the average acquirer obtains an increase of 3% - 5% in the value of the acquired assets. However, efficiency gains vary sharply across acquirer and deal characteristics. We find statistical significance for interactions of relative value and variables known to affect acquirer normal returns. The inclusion of the interaction term sometimes drives away the significance of the variable of interest. These results suggest that improving productivity via capital reallocation plays an important role in understanding acquirer returns from acquisitions.

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1 Introduction

Do acquisitions lead to gains for acquirers? This question has been vigorously debated since the pioneering work by Jensen and Ruback (1983).[1] More recently, attention has shifted to demonstrating that gains to acquirers, as measured by short-run abnormal returns, vary systematically with various acquirer and deal characteristics. However, the source of gains from acquisitions remains unclear. Some recent work has emphasized improvement in the productivity of the acquired assets as a source of gains from acquisitions.[2] This study examines a particular prediction of these models: improving productivity via acquisitions imply that acquirer gains increase with the transaction size.

The models presented in Jovanovic and Rousseau (2002); Yang (2006); and Warusawitharana (2007) argue that high productivity firms engage in acquisitions as a means of growth. These firms acquire assets from low productivity firms and generate real gains by improving the productivity of these assets. The buyer and the seller share the gain from the transaction, which increases with the transaction size and the productivity increase. Thus, controlling for productivity improvement, these models imply that larger transactions lead to greater gains for buyers. Based on this motivation, we use the sensitivity of acquirer gains to transaction size as a measure of the efficiency gains from the acquisition.[3]

The empirical analysis investigates whether such efficiency gains from improving productivity arise in acquisitions, and whether they vary across different acquisitions. We use the abnormal return around the announcement date as a measure of the anticipated gains to the acquirer.[4] Under some conditions, the regression coefficient of abnormal returns on scaled transaction size also captures the degree of efficiency gains from the acquisition. Our analysis focuses on testing two related null hypotheses: I) anticipated productivity improvement of acquired assets impact acquirer returns; and II) these efficiency gains vary systematically with different acquirer and deal characteristics.

[1] See Jarrell, Brickley, and Netter (1988); Mitchell and Lehn (1990); and Andrade, Mitchell, and Stafford (2001) and Mitchell, Pulvino, and Stafford (2004).

[2] Jovanovic and Rousseau (2002); Eisfeldt and Rampini (2006); Yang (2006); and Warusawitharana (2007) develop this idea in detail. Holmstrom and Kaplan (2001) argue that capital markets improve the efficiency of the allocation of capital to firms. Powell and Stark (2005) demonstrate increases in productivity for UK acquisitions. Devos, Kadapakkam, and Krishnamurthy (2007) use Value Line forecasts to examine the sources of gains from mergers and find that most gains arise from capital reallocation.

[3] Most existing regression analysis on acquirer abnormal returns use relative transaction value as a control variable. Our contribution lies in presenting a new interpretation of the significance of this variable, as well as demonstrating the significance of interactions of relative value with other characteristics of interest.

[4] Kaplan and Weisbach (1992) show that acquirer abnormal returns are higher for *ex post* successful acquisitions.

We test hypothesis I by examining whether acquirer returns covary positively with scaled transaction value. This provides an empirical test of the mechanism underlying the above models. We test hypothesis II by regressing acquirer returns on an interaction term of scaled transaction size and various acquirer and deal characteristics.[5] This identifies whether the sensitivity of abnormal returns to transaction size varies with these characteristics. We interpret such variation as evidence of differences in efficiency gains from improving productivity. Further, if the addition of the interaction term drives away the significance of the initial characteristic, we can argue that the observed characteristic affects abnormal returns *due* to differences in efficiency gains. These results enhance our understanding of the source of variation in acquirer abnormal returns. One caveat is in order: our argument states that efficiency gains from acquisitions imply a positive relationship between scaled transaction size and acquirer abnormal returns; however, this relationship may arise due to other reasons. We tackle this issue by subsequently arguing that other extant models of acquisitions do not imply a positive relationship between abnormal returns and transaction size.

We begin by examining whether efficiency gains arise from all acquisitions. A regression of acquirer abnormal returns on relative transaction value yields a significant point estimate of 5.1. This implies that, on average, acquisitions lead to efficiency gains for acquirers and corresponds to an average anticipated increase in the value of the acquired assets of 5.1% above the purchase price. The evidence indicates the presence of economically substantial gains from reallocating capital to more productive owners via acquisitions.[6]

We next compare the role of efficiency gains in mergers and asset purchases. A merger involves the combination of two firms into a single firm, and an asset purchase entails the transfer of some portion of one firm to another.[7] We find clear evidence of efficiency gains from asset purchases, but find no evidence of gains or losses from mergers. This difference may arise due to the greater impact of hubris and empire-building in mergers. Specifically, a 1% increase in the size of the firm via an asset purchase leads to a 0.09% increase in the acquirer abnormal return. This indicates that asset purchases result in an average 9% increase in the value of the acquirer assets. A regression of abnormal returns from all acquisitions on a merger dummy demonstrates that mergers underperform asset purchases.[8] However, augmenting the regression with an interaction term for merger dummy and relative value yields a negative and significant interaction term and a

[5] Our analysis focuses on the variation of the relative value coefficient with a given characteristic, as opposed to directly examining whether a characteristic affects abnormal returns.

[6] See Bruner (2004, Chapter 3) for a broad survey of the sources of gains from acquisitions.

[7] We use the term acquisition to include both mergers and asset purchases.

[8] See Hite, Owers, and Rogers (1987) for evidence on returns to asset purchases and sales.

positive merger dummy coefficient. This suggests that mergers underperform asset purchases due to differences in efficiency gains, and demonstrates that greater productivity improvement drives the higher returns to asset purchases compared to mergers.

We further investigate the role of efficiency gains in acquirer returns for different types of mergers. Using interactions with relative value, we focus on comparing mergers targeting public firms versus those targeting private firms and stock versus non-stock financed mergers. Efficiency gains vary sharply with whether the merger involves a public target or not. Whereas acquirers obtain efficiency gains with private targets, mergers with public targets lead to efficiency losses. Accounting for the differences in efficiency gains changes the coefficient on the public dummy from -2.3 to an insignificant -.49. This demonstrates that, as before, mergers with public targets underperform due to the difference in anticipated efficiency gains. On the other hand, efficiency gains play no role in the comparison between stock versus non-stock financing. This accords with the common intuition that stock financed mergers underperform because the market treats stock financing as a signal of share overvaluation, as in Shleifer and Vishny (2003).

The acquirer firm size may also affect the productivity improvement from an acquisition. Moeller, Schlingemann, and Stulz (2004) demonstrate that acquirer returns decrease with firm size, and attribute this finding to managerial hubris and empire-building tendencies at large firms. We find a similar relationship between firm size and acquirer returns for both mergers and asset purchases, albeit with a stronger effect for mergers. Augmenting the regressions with an interaction term for firm size and relative value reveals that efficiency gains vary with firm size for mergers but not asset purchases. Our results expand on the findings of Moeller, Schlingemann, and Stulz (2004) by demonstrating that productivity improvements drive some, but not all, of the impact of firm size on acquirer returns. In particular, asset purchases generate efficiency gains similar to those from mergers by small firms. However, mergers by large firms lead to efficiency losses. The efficiency losses specific to mergers by large firms counteracts the efficiency gains from most acquisitions and leads to aggregate shareholder losses, as documented by Moeller, Schlingemann, and Stulz (2005).

The corporate governance of the acquirer provides another possible source of variation in efficiency gains from acquisitions. Masulis, Wang, and Xie (2006) find that acquirer returns decrease as corporate governance worsens and posit that entrenched managers engage in value-destroying acquisitions. We use our framework to analyze the relationship between efficiency gains and acquirer governance. Using the G-index of Gompers, Ishii, and Metrick (2003) as a governance measure,

we regress acquirer returns on the G-index, relative value and an interaction term of G-index with relative value for mergers and asset purchases separately. Somewhat unexpectedly, we find that G-index matters for acquirer returns for asset purchases only.[9] Further, efficiency gains from asset purchases decrease as governance worsens, and the impact of G-index vanishes when we account for the interaction with relative value. On the other hand, neither G-index nor its interaction with relative value affects acquirer returns from mergers. Our findings lead to an alternative interpretation from that of Masulis, Wang, and Xie (2006): corporate governance affects acquirer returns due to better governed firms making more productivity-enhancing acquisitions.

This study examines the role of productivity improvement in acquisitions. We presents a novel identification method for capturing efficiency gains from shifting capital to more productive owners via acquisitions. Using this method, we demonstrate that efficiency gains vary sharply across different types of acquisitions. This indicates that anticipated productivity improvements play a key role in understanding acquirer abnormal returns. These findings enhance our understanding of the sources of gains from acquisitions, a question tackled by Jensen and Ruback (1983), Kaplan (2000), Andrade, Mitchell, and Stafford (2001) and many others.

The paper is organized as follows. Section 2 discusses our identification of efficiency gains from acquisitions. Section 3 discusses the construction of the data set and provides some initial results. Sections 4 presents the empirical analysis on efficiency gains from acquisitions and Section 5 concludes.

2 Identifying Efficiency Gains

A simple efficiency based argument states that acquisitions help shift assets to more productive owners. Assuming acquirers capture some of the gains, the productivity improvements imply that acquirer gains would be increasing with the size of the acquisition. The intuition motivates using the sensitivity of acquirer abnormal returns to scaled transaction value as a measure of efficiency gains from acquisitions. This section builds on the above intuition and presents our empirical identification strategy. First, we begin with a numerical example.

[9]This is not inconsistent with the findings of Masulis, Wang, and Xie (2006) as they analyze a combined sample of mergers and asset purchases.

2.1 Numerical example

Consider two firms, A and B, each with a current market value of $100. Firms A and B acquire assets with a transaction value of $5 and $10, respectively. The market reaction to the transaction includes both a signal component about the value of assets in place and incorporates expected gains arising from the acquisition. Assume that, for both firms, the market infers from the deal that value of assets in place equals $101. Thus, the abnormal return includes a 1% signal component. Further, assume that each transaction increases the value of the acquired assets by 10%. Thus, upon the announcement of the transaction, the values of firms A and B increase to $101.50 (= $100 + $1 + $5 * 10%) and $102, respectively. That corresponds to abnormal returns of 1.5% and 2%, respectively.

Consider an alternative pair of transactions with the same characteristics as above except for no productivity driven increase in the value of the acquired assets. The share price change upon announcement of the deal incorporates only the signal about the value of assets in place. Following the announcement of the transaction, the values of firms A and B equal $101, which corresponds to an abnormal return of 1%.

Figure 1 plots the abnormal returns associated with these transactions as a function of relative transaction value. Panel A examines the first set of transactions with efficiency gains, and panel B examines the second set. The slope of the line connecting the two observations equals 0.1 and 0 for panels A and B, respectively. This corresponds to the degree of efficiency gains realized by the acquisition. A regression of abnormal returns on relative transaction value yields the empirical counterpart of this slope, and identifies the efficiency gains arising from the acquisition. It should be noted that this assumes the signal component is orthogonal to the relative transaction value. While this assumption may not hold, the results would remain true if most of the signal was derived from the existence of the deal rather than its size.

The figure also demonstrates that mean abnormal returns do not necessarily correspond to efficiency gains from acquisitions. The acquisitions in Panel B have a positive mean abnormal return, though those transactions generate no efficiency gains. A revaluation of the assets in place to equal $99 in Panel A would lead to negative mean abnormal returns in the presence of efficiency gains.

2.2 Empirical implementation

The empirical analysis employs regressions of acquirer abnormal returns on relative transaction value. The acquirer abnormal return provides a noisy measure of the anticipated gains from the acquisition. Consider a regression of

$$AR_i = \beta RV_i + \alpha X_i + \gamma Z_i + \epsilon_i,$$

where AR_i denotes the abnormal return, RV_i measures relative transaction value, X_i a characteristic of interest and Z_i other controls for the i^{th} acquisition. The relative (transaction) value is defined as the transaction value divided by the market value of the firm.[10] The closely related relative size variable equals the transaction value divided by the market value of equity. Following our identification scheme, a positive β coefficient reflects efficiency gains to acquirers and provides a test of hypothesis I. Our motivation for the use of relative value differs sharply from that given by Asquith, Bruner, and Mullins (1983) for relative size, who argue that the relative size coefficient captures the effect of downward sloping demand curves for equity, and Martin (1996), who uses it as a measure of information asymmetries between acquirer and target. These alternative interpretations would have difficulty explaining the sharp variation we find in the relative value coefficient.

We can take the analysis a step further by augmenting the above regression with an interaction term of relative value times the characteristic of interest. This yields the following regression:

$$AR_i = \beta_1 RV_i + \alpha_1 X_i + \delta_1 (RV_i \times X_i) + \gamma_1 Z_i + \epsilon_i.$$

A statistically significant coefficient for δ_1 will imply that efficiency gains vary with the characteristic of interest. This enables us to test whether hypothesis II applies for that characteristic of interest. For example, one could use the above specification to test whether efficiency gains from acquisitions vary with whether the transaction is a merger or an asset purchase. Further, if the inclusion of the interaction term leads to an insignificant α_1 coefficient, one can conclude that X affects abnormal returns *due* to differences in anticipated efficiency gains. This captures the degree to which differences in anticipated productivity improvements affect acquirer returns.

One potential issue is the appropriate scaling for the transaction size. In most of the subsequent

[10] The market value of the firm equals the book value of assets + market value of equity - book value of equity - deferred taxation.

analysis, we scale by the market value of the firm. An alternative method scales the transaction size by the market value of equity. The above reasoning applies for this measure as well, with positive coefficient values implying efficiency gains. However, the estimated coefficients will vary due to the presence of leverage in the sample. Scaling by firm value measures the true degree of efficiency gains if bondholders obtain the same percentage gain from the acquisition as shareholders. On the other hand, scaling by equity value measures the true coefficient if bondholders obtain zero gains from the acquisition. We tackle this issue by first reporting the results for scaling transaction value by firm value and then discussing the results for scaling by equity value in the robustness section. We find that scaling by equity value leads to qualitatively similar findings to those obtained with scaling by firm value.

2.3 Alternative explanations

The study argues that a positive relative value coefficient captures efficiency gains from acquisitions. This subsection examines whether alternative theories of acquisitions imply a positive relative value coefficient. An empire-building hypothesis, such as in Jensen and Meckling (1976), predicts a negative relationship between the abnormal return and the relative transaction value. Empire-building managers would seek larger acquisitions even at the cost of potential shareholder losses. The free cash flow based theory of Jensen (1986) also implies a negative relationship between transaction size and abnormal returns. One can plausibly argue that managerial hubris would affect decision making regarding larger acquisitions more than smaller acquisitions (see Roll (1986)). This would lead to a negative relationship between abnormal returns and relative value. Thereby, a positive relative value coefficient would not be consistent with the agency based theories of acquisitions.

Shleifer and Vishny (2003) and Rhodes-Kropf and Viswanathan (2004) present merger models based on market misvaluation. These models suggest that transaction size would increase with the over-valuation of the acquirer. If the abnormal return captures the degree of over-valuation, then larger transactions would lead to lower abnormal returns. The technology based acquisition model of Braguinsky and Jovanovic (2004) and the search model of Rhodes-Kropf and Robinson (2006) do not make any predictions relating transaction size to the abnormal return. The real options model of Morrelec and Zhdanov (2005) relate abnormal returns to the underlying cash flow process of the firms, but not the relative transaction size. Thus, other models of acquisitions do not imply a positive relative value coefficient.

The above discussion demonstrates the robustness of our argument that positive relative value coefficients in acquisitions capture efficiency gains arising from reallocating capital to more productive owners. Other models of acquisitions do not make this prediction, and in particular, would have trouble explaining the sharp variation in the relative value coefficient observed across different acquisitions.

3 Data

This study uses data from the SDC Platinum Mergers and Acquisitions database to construct the sample. Thomson Financial Services maintains the database, which provides a comprehensive list of acquisitions by U.S. companies. The sample dates from 1/1/1985 to 12/31/2006. The sample includes transactions between listed firms, their subsidiaries and private firms. The data set consists of all transactions identified as either mergers, acquisitions, acquisition of assets, or acquisition of certain assets by the SDC 'Form of the Deal' variable.[11] We treat the first two transaction types as mergers between two firms, and the last two types as asset purchases. The results rely on the accuracy of SDC in identifying transactions which combine two firms together (mergers) and those involving the acquisition of some part of a firm (asset purchase). A careful reading of news articles about a subsample of transactions revealed that the SDC classification scheme works well, except for transactions involving private firms. To mitigate this concern, in the robustness section of the paper we replicate the comparison after eliminating transactions with private targets.

We match the SDC sample to CRSP and Compustat using Cusip numbers. The SDC sample includes information on the announcement date, participants' industry codes, the method of payment, number of bidders, whether its a tender offer and whether its a hostile bid. The final sample excludes records with missing transaction values. We also eliminate transactions with relative transaction values below the 5th percentile and above the 95th percentile. Our robustness checks include using different relative value cut-offs as well as Winsorizing relative value at different percentiles.

The study computes abnormal returns over a three-day window centered on the announcement date of the transaction. A three-day window captures both information leakages prior to the announcement as well as the impact of deals announced after the close of trade. Abnormal returns

[11] We exclude transactions where a firm takes a minority interest in another.

are computed as the excess over the CAPM return, implemented using the equally weighted CRSP index as the market portfolio. The benchmark returns are computed from the daily returns over a one year period ending one month prior to the acquisition. Using the same data, we also construct and use as a control variable the stock price run-up in the period from one month to one week prior to the acquisition. We check the robustness of our results to different computations of benchmark returns.

The results reported are clearly sensitive to errors in the announcement date of the transaction. We use Factiva® to search for news articles on 500 asset purchases and use this to test the accuracy of the SDC data.[12] We focus on asset purchases as this data may have more errors than the merger data. The announcement dates found using Factiva match 92% of the sample to within 1 business day. Thus, the abnormal returns employed in the study broadly reflect the market reaction to the announcement of the merger or asset purchase.

3.1 Summary statistics

Table 1 presents the summary statistics for the deal and acquirer characteristics of interest. Panel A reports values for asset purchases, and Panel B focuses on mergers. The study defines the relative transaction value as the transaction size scaled by the market value of the firm. We primarily use the G-index constructed by Gompers, Ishii, and Metrick (2003) as a measure of corporate governance. The firm characteristics are computed as of the end of the fiscal year prior to the transaction, thereby ensuring that these variables are predetermined. The regression specifications use industry median values of the firm characteristics to mitigate endogeneity concerns. The baseline results use industry median values of cash flow, Tobin's Q, and book leverage as control variables. Cash flow is defined as income before extraordinary items plus depreciation scaled by book assets and Tobin's Q equals the market value of assets scaled by book assets. A within industry dummy equals 1 if both the acquirer and the seller have the same 2-digit SIC classification code. The controls include these industry characteristics, a measure of industry M&A activity constructed following Schlingemann, Stulz, and Walkling (2002), dummy variables for private targets and public targets, a dummy for high tech firms as in Loughran and Ritter (2004), the stock price run-up from a month to a week prior to the acquisition, and year and industry dummies. We also use as controls a dummy variable for tender offers, a dummy variable for hostile bids and the

[12] We thank David Cho for assisting with this task.

number of public bidders for the acquisition.[13]

Comparison of the values in Panels A and B of Table 1 reveals that there are few differences in acquirer characteristics between mergers and asset purchases.[14] Acquirers in both transactions have similar size, governance measures as well as similar values for industry median Q, cash flow and leverage. Asset purchases are generally smaller than mergers, which would be consistent with these transactions being acquisitions of parts of firms. There are more mergers involving high tech firms. A substantially larger fraction of mergers involve pure stock transactions, suggesting that market timing matters less for asset purchases. Most asset purchases involve subsidiaries of firms, where as few mergers do. In general, the results indicate many similarities and a few differences between mergers and asset purchases.

3.2 Bivariate analysis

The study argues that covariation of abnormal returns with relative transaction value demonstrates efficiency gains from improving productivity. Table 2 presents the mean abnormal returns obtained by sorting the sample into relative value groups by acquirer firm size for mergers and asset purchases. The variation in abnormal returns across the relative value bins highlights how efficiency gains influence acquirer returns.

Panels A and B present the mean abnormal returns from asset purchases and mergers, respectively, categorized by the relative value of the transaction and the firm size. The relative value bins and size bins use the 30^{th} and 70^{th} percentiles of each variable as cutoff values. The transactions cluster on the off-diagonal, as small firms tend to engage in transactions with higher relative values and *vice versa*. On average, asset purchases lead to higher gains (1.24%) than mergers (0.51%). This effects is more pronounced with value weighted returns, as the value weighted abnormal return for mergers becomes negative. These values qualitatively match the findings of Hite, Owers, and Rogers (1987) and Slovin, Sushka, and Poloncheck (2005), who document significant gains to buyers from asset purchases.

The mean abnormal return for the relative value bins demonstrate that increased transaction size leads to higher abnormal returns for asset purchases. Asset purchases in the largest relative value group lead to mean abnormal returns of 2.66%, while the smallest purchases lead to gains of

[13] The tender offer dummy applies only for either all acquisitions or the merger sample as none of the asset purchases involve a tender offer.

[14] Andrade and Stafford (2004); Harford (2005) and Warusawitharana (2007) present logistic regressions on the determinants of firms decisions to engage in mergers and asset purchases.

only 0.15%. This difference is statistically significant at the 1% level. The increase in abnormal returns with relative transaction value demonstrates that asset purchases create value by transferring capital to more productive owners. The comparable abnormal returns for mergers with high and low relative transaction values equals 0.62% and 0.23%. Thus, while the abnormal return to asset purchases is highly sensitivity to relative value, the abnormal return to mergers varies little with relative value. This suggests that efficiency gains play a much larger role in asset purchases. This difference may be viewed as puzzling given the similarities between the fundamental economic action of these transactions; they both shift the control of some operations from one manager to another. The evidence suggests that some mergers are driven by factors other than by pure efficiency considerations.[15]

Transactions by larger firms lead to lower abnormal returns for both asset purchases and mergers. This effect is somewhat more pronounced for mergers than asset purchases, and the differences between small and large firms are statistically significant at the 5% level. Moeller, Schlingemann, and Stulz (2004) demonstrate that for all acquisitions, acquirer size has a negative impact on the buyer abnormal return. Our results demonstrate that a similar pattern holds for the sub-samples of mergers and asset purchases. Note that for the largest merger acquirers, abnormal returns decrease with relative value. This suggests that mergers by large firms result in efficiency losses and supports the wealth destruction arguments of Moeller, Schlingemann, and Stulz (2005).

The comparison of abnormal returns to mergers and asset purchases by relative value and acquirer firm size highlight how the sensitivity of abnormal returns to relative value varies across different transaction types. Such univariate statistics fail to control for various firm and deal characteristics. The next section uses linear regressions to formally investigate our hypotheses.

4 Results

The empirical analysis focuses on applying our method for identifying efficiency gains for different types of acquisitions. Further, we can test whether variation in anticipated efficiency gains drive abnormal returns across different acquirer and deal characteristics. Our results highlight the role of productivity improvement via capital reallocation in acquisitions.

[15] See Jensen and Meckling (1976); Roll (1986); and Shleifer and Vishny (2003) for different theoretical arguments for mergers.

4.1 Are there efficiency gains?

The initial analysis focuses on establishing the presence of efficiency gains in acquisitions. We carry out this analysis for all acquisitions, as well as for mergers and asset purchases, separately. We consider mergers and asset purchases separately as, based on previous results, one may expect a transfer of assets via an asset purchase to be more influenced by efficiency considerations than combining two firms into one via a merger.[16]

Table 3 presents the results of regressing the acquirer abnormal return on relative transaction value for various samples. The statistically significant and positive coefficient on relative value indicates that acquisitions, as a whole, generate efficiency gains. A 1% increase in the firm size via an acquisition increases the share price of the acquirer by 0.051%.[17] Using the simple algebra in Section 2.1, this translates to an economically meaningful average increase in the value of the acquired assets of 5.1%. Thus, acquisitions help improve the allocative efficiency of capital in the economy.

Separating the sample into mergers and asset purchases reveals significant differences in efficiency gains from these types of acquisitions. Increasing the size of the firm by 1% via an asset purchase leads to an increase in the acquirer abnormal return of 0.094%. This corresponds to an increase in the value of the acquired assets of almost 10%. On the other hand, mergers do not result in efficiency gains for acquirers. This may be either due to target shareholders obtaining all the gains from the merger, or due to the greater complexity involved in integrating two firms together.

The absence of a significant negative coefficient on relative value for mergers rejects the hypothesis that empire-building managers engage in value-destroying mergers. If empire-building drives all mergers, then we would expect a negative coefficient on relative value. The negative coefficient on public targets for mergers supports the findings of Chang (1998) and Fuller, Netter, and Stegemoller (2002) that mergers involving private targets generate higher abnormal returns. We will subsequently examine whether efficiency gains from productivity improvement vary across different types of mergers.

[16]The literature also suggests that target shareholders capture all the gains from mergers.
[17]This equals the point estimate on relative value times 0.01.

4.2 Comparison of mergers and asset purchases

The above results demonstrate that efficiency gains differ across asset purchases and mergers. This finding raises the question of whether variation in mean abnormal returns across mergers and asset purchases is linked to differences in efficiency gains.

Table 4 presents the results of regressing the acquirer abnormal return for the entire sample on a merger dummy, relative value, an interaction term of merger dummy with relative value and various control variables. The inclusion of the interaction term relates variation in mean abnormal returns to differences in efficiency gains. The control variables include deal characteristics, firm size, acquirer industry characteristics, stock price run-up variable and year dummies. The standard errors adjust for heteroskedasticity and the use of predetermined industry characteristics mitigate endogeneity concerns.

The statistically significant and negative coefficient on the merger dummy in the first column demonstrates that mergers underperform asset purchases. The coefficient value of -0.55 maps to an economically significant average 0.55% lower abnormal return over the 3-day window for mergers. This finding matches the findings of significant gains for asset purchases (Hite, Owers, and Rogers (1987)) with smaller gain for mergers (Andrade, Mitchell, and Stafford (2001)). While the literature has noted this difference, the question of why remains unanswered.

Hypothesis II states that differences in abnormal returns reflect differences in anticipated efficiency gains. This hypothesis motivates a regression of abnormal return on a merger dummy, relative value and an interaction of merger dummy with relative value. Column 2 of Table 4 presents the results of this regression. The results confirm our previous finding of substantial variation in the sensitivity of abnormal returns to relative transaction value across mergers and asset purchases. Perhaps the most intriguing finding from this analysis is that the inclusion of the interaction term drives the coefficient on the merger dummy to be positive. This demonstrates that the sensitivity of abnormal returns to relative value drives the difference in market reaction to mergers and asset purchases. These results emphasize the key role of productivity improvement in determining mean abnormal returns to mergers and asset purchases.

Column 3 of Table 4 augments the regression by adding interaction terms of the merger dummy with high tech and stock dummies. The inclusion of these terms do not impact the relative value coefficient or the interaction term. The coefficient on the merger-high tech interaction term is significant and negative at the 5% level, indicating that mergers between firms in high tech

industries fare poorly compared to other mergers. The negative and significant coefficient on the merger-stock dummy supports market timing by managers of over-valued firms. On the other hand, we do not find a significantly positive impact of stock financing for asset purchases as in Slovin, Sushka, and Poloncheck (2005).

4.3 Efficiency gains from mergers

The approach developed in the study enables us to examine whether the impact of stock financing and public targets on acquirer returns reflect differences in expected efficiency gains or a signaling effect. Table 5 reports the results of augmenting the abnormal return regression for mergers by relative value interaction terms. Column 2 adds the interaction between relative value and stock dummy, column 3 adds the interaction between relative value and public target dummy and column 4 adds both. The standard errors adjust for heteroskedasticity, and the regressions control for various deal and firm characteristics as well as year dummies.

The inclusion of the interaction term for stock dummy and relative value has no impact on the regression. Stock financed deals exhibit the same sensitivity of abnormal returns to deal value as other mergers. Further, the coefficient on the stock dummy itself barely changes. These results indicate that the market treats the use of stock financing for mergers as a signal, which is unrelated to the efficiency gains from the transaction. The significant and negative coefficient on the stock dummy supports the argument of Shleifer and Vishny (2003) that over-valued firms use equity to finance mergers. This result also demonstrates that, somewhat surprisingly, the market does not consider larger stock financed transactions as signaling greater overvaluation. The lack of significance for the interaction term validates our argument on efficiency gains as economic intuition suggests that stock financing should have no impact on productivity improvements.

Hansen and Lott (1996), Chang (1998), and Fuller, Netter, and Stegemoller (2002) find that mergers targeting public firms have lower returns than transactions targeting private firms. There is no consensus on what drives this finding. The addition of an interaction term for relative value and public dummy enables us to relate this finding to differences in efficiency gains. Unlike the results for the stock dummy interaction, the public dummy and relative value interaction term is significant and negative. Further, the coefficient on the public dummy variable increases from -2.30 to a statistically insignificant -0.49. This demonstrates that mergers with private targets generate higher returns solely *due* to greater productivity improvements by the acquirer. In particular, the relative value coefficient for deals that target non-public firms is positive and significant at 6.36,

whereas it becomes significantly negative for deals with public targets. These findings would be consistent with acquiring firms capturing a liquidity discount when acquiring privately owned firms as in Officer (2007).

Repeating the regression with both interaction terms has no further impact on the significance of the stock and public dummies, and the interaction terms. The contrast between the effect of relative value on stock financed transactions and those that target public firms demonstrates the additional insight our approach provides when compared to simply evaluating the impact of various characteristics on acquirer abnormal returns.

4.4 Firm size

We next examine whether efficiency gains drive the impact of firm size on the returns to mergers and asset purchases. Moeller, Schlingemann, and Stulz (2004) demonstrate that returns to acquisitions decrease with firm size. They search for potential explanations for this finding and conclude by arguing that managerial hubris and empire-building have a greater impact on acquisitions by large firms. The results in Table 3 demonstrate that the size effect holds for both mergers and asset purchases. Firm size has a greater impact on acquirer returns for mergers than asset purchases. These findings motivate an examination of whether differential relative value coefficients can explain the affect of firm size on acquirer returns.

Table 6 reports the results of augmenting the baseline regression by an interaction term of firm size with relative value for the full sample as well as the asset purchase and merger samples. The negative and significant coefficient for the interaction term for the full sample indicates that efficiency gains associated with acquisitions decrease with firm size. While the inclusion of the interaction term drops the coefficient on firm size by half, it still remains negative and significant at the 10% level. This demonstrates that the size effect can only be partially explained by larger firms engaging in less productivity-enhancing acquisitions.

Columns 2 and 3 report the results of this analysis for mergers and asset purchases separately. The findings demonstrate that mergers by small firms and all asset purchases generate efficiency gains. The similar coefficients on relative value (9.6 and 11.7 for asset purchases and mergers) suggest that small firms generate equal efficiency gains through mergers and asset purchases. However, the negative and significant coefficient on the interaction term for mergers demonstrates that expected efficiency gains from mergers decrease with firm size. Further, the change in the coefficient on size itself, from -.26 (Table 3) to an insignificant value of .001, demonstrates that differences

in efficiency gains explain the variation in acquirer returns with firm size for mergers. However, adding the interaction term barely impacts the size coefficient for asset purchases.

Taken together, the results demonstrate that improving efficiency via reallocating capital to more productive owners helps explain some of the variation in acquirer returns with firm size. However, we also find that variation in efficiency gains do not account for all of the size effect. In particular, the results highlight the lack of efficiency gains for public mergers undertaken by large firms.

4.5 Corporate governance

Another source of potential variation in efficiency gains from acquisitions arises from differences in corporate governance. Managers in well governed firms may have better incentives to engage in acquisitions that generate gains for shareholders. Entrenched managers in firms with poor governance have greater freedom to pursue acquisitions motivated by hubris or empire-building. Building on these motivations, Masulis, Wang, and Xie (2006) demonstrate a link between acquirer abnormal returns and corporate governance. They argue that managers protected by anti-takeover provisions engage in value-destroying acquisitions.

Table 7 reports the results of regressing the acquirer abnormal return on corporate governance and other control variables for the asset purchase and merger samples. The standard errors adjust for heteroskedasticity. In these regressions, we use the G-index of Gompers, Ishii, and Metrick (2003) as our primary measure of governance. We use the Entrenchment index of Bebchuk, Cohen, and Ferrell (2004) as a robustness check. The G-index broadly captures shareholder rights of the firm, while the Entrenchment index focuses on anti-takeover provisions. The G-index takes values ranging from 1 to 17 in the sample. Higher values of both indices correspond to weaker corporate governance. As measures of governance are available for only large firms, the sample size drops to a third of all acquisitions.

The results demonstrate a statistically significant and negative impact of the governance index on acquirer abnormal returns for asset purchases. On average, an increase of G-index by 1, which corresponds to weakening shareholder rights by a single measure, leads to a 0.08% drop in the abnormal return from asset purchases. Surprisingly, the corresponding G-index coefficient for mergers is positive and statistically insignificant.[18] This demonstrates that the negative relationship between

[18]The mean abnormal return for mergers by 'Dictatorship' and 'Democracy' firms equals -.40% and -.64%, respectively.

corporate governance and acquirer returns documented by Masulis, Wang, and Xie (2006) exists only for asset purchases. They argue that corporate governance affects acquirer returns due to managers in poor governed firms making value-destroying acquisitions. Most of the impact of governance arises from asset purchases, which typically generate gains for shareholders.[19] Therefore, our results suggest a different interpretation: corporate governance affects acquirer returns due to managers in better governed firms making more value-enhancing acquisitions. This interpretation places more emphasis on managerial skill and effort rather than managerial self-dealing.

The application of hypothesis II for corporate governance implies that G-index affects acquirer returns due to differences in efficiency gains from capital reallocation. We test this hypothesis by augmenting the regressions with an interaction term for governance times relative value. Columns 2 and 4 of Table 7 reports the results of such an augmented regression for asset purchases and mergers, respectively. A negative coefficient on the interaction term supports hypothesis II and indicates that firms with weaker governance measures engage in transactions with less efficiency gains for the acquirer.

The inclusion of the interaction term leads to a sharp change in the G-index coefficient for asset purchases from -0.08 to -0.02. The interaction term itself is significant at the 10% level, indicating that asset purchases by firms with poor governance generate less efficiency gains that those by good governance firms. This can also be seen in the increase in the relative value coefficient from column 1. Further, this difference in efficiency gains drives away the impact of the G-index, demonstrating that the G-index matters due to variation in efficiency gains for acquirers. Whereas the G-index has no impact on acquirer returns for mergers, the increase in the relative value coefficient from -5.0 to -2.1 indicates that efficiency losses from mergers decrease marginally as governance improves. We find similar results as those obtained for asset purchases for the combined sample, albeit with insignificant p-values in the range of 0.20 for G-index and the interaction term.

The governance literature has focused on understanding the relationship between measures of corporate governance and the excess returns generated by extreme governance portfolios (see Gompers, Ishii, and Metrick (2003); and Cremers and Nair (2005)). Whereas differences in short run abnormal returns to acquisitions can explain only a small fraction of this difference, it can help pinpoint how governance affects the firm's decision making and thereby returns. Our results demonstrate that firms with good governance engage in asset purchases that generate efficiency gains to buyers while firms with weak governance measures fail to do so. This finding suggests

[19] the mean abnormal return to asset purchases by 'Dictatorship' firms equals 0.21%.

that managers in 'Democracy' firms are either more skilled or put in more effort than managers in 'Dictatorship' firms. Such differences in managerial quality may play a role in understanding the long-run underperformance of weak governance firms.

4.6 Robustness

We examine the robustness of our findings by varying the dimensions of our tests. Our results remain robust to computing abnormal returns using the following approaches: using returns over a 5 day window; computing excess returns over the value-weighted index; and using the Fama-French model as the benchmark. Our baseline sample selection eliminates transactions with relative values lesser than the 5th percentile and greater than the 95th percentile. The robustness checks we perform on the relative value cut-offs include eliminating only deals outside the 2.5th and 97.5th percentile, and Winsorizing the entire sample at the 2.5% and 5% cut-offs. Most of our results are not affects by these specifications. However, the results for the interaction of governance index with relative value sometimes becomes insignificant, though still negative. In each case, adding the interaction term drives away the significance of G-index for asset purchases.

Our relative transaction value definition scales the transaction value by the market firm value of the acquirer. An alternative scaling method, more typically used in the literature, would be to use the market value of equity as a scaling variable.[20] The argument presented in Section 2 would apply in this setting, but the coefficients will differ due to the presence of leverage and gains to the bondholders from the acquisition. Table 8 reports the results of replicating the analysis in Table 3 with transaction size scaled by the market value of equity. The analysis reveals the same pattern of efficiency gains from acquisitions as before: efficiency gains arise from asset purchases but not mergers. The lower point estimate of relative size may be due to the mechanical result of using a smaller variable as the denominator; alternatively, this may reflect shareholders capturing most of the gains from the acquisitions with little gains accruing to bondholders. Replicating the results in the other tables using the relative size variable generates mostly similar findings.

The robustness checks include modifying the regression specification by adding industry median values of cash holdings and sales growth as well as dummy variables for the 48 Fama-French industries. This does not impact the coefficients on the variables of interest. The entrenchment index of Bebchuk, Cohen, and Ferrell (2004) provides a more focused measure of anti-takeover provisions at the firm level. Repeating our analysis using the entrenchment index leads to a lack of

[20] We compute market value of equity using CRSP data as of 2 days prior to the announcement.

statistical significance for the governance measure. However, the point estimate for asset purchases is negative, and much larger in absolute value than the positive point estimate for mergers.[21]

The study relies on the classification by SDC of acquisitions to separate mergers from asset purchases. This classification may fail for private targets. SDC sometimes classifies an acquisition of an entire private firm as an asset purchase. We eliminate potential classification biases by repeating our analysis after eliminating all deals with private targets. Table 9 reports the results for replicating the analysis in Tables 3 and 4 for this sample. Eliminating private firms does not impact the coefficients on the merger dummy and the interaction of merger dummy with relative value. The merger dummy is negative and significant in column 1. The inclusion of the interaction term changes the dummy to be positive, with the interaction term negative and significant. Columns 3 and 4 report the results obtained by splitting the sample in to mergers and asset purchases, and highlights the differences in expected efficiency gains from these transactions. One difference which arises when compared to the full sample results is that mergers now lead to efficiency losses. This matches the previous finding of efficiency losses from mergers with public targets.

The gains to acquirers may reflect fire sales by distressed firms. In particular, fire sales imply that larger transactions lead to lower returns for the seller. In unreported results, we examine this hypothesis by regressing the seller abnormal return from asset purchases on the seller's relative transaction value. The positive and significant coefficient on relative value indicates that most asset sales are not forced sales. This indicates that the efficiency gains we document do not come at the expense of the target firms.

5 Conclusion

The study examines a new prediction of models that argue acquisitions generate gains by improving the productivity of the acquired assets. Specifically, such efficiency gains imply a positive relationship between transaction size and acquirer abnormal returns. We use regressions of abnormal returns on relative transaction value and interactions of relative value with variables of interest to investigate the impact of efficiency gains on acquisitions. Using this method, we demonstrate that anticipated differences in efficiency gains play a key role in determining acquirer abnormal returns.

We find an average sensitivity of abnormal returns to relative transaction value of 3.3% - 5.1%.

[21] We also repeat our analysis using the blockholder data from Dlugosz, Fahlenbrach, Gompers, and Metrick (2006) and find no clear impact of blockholders on acquirer returns.

Assuming this reflects real gains to the acquirer, this translates to an improvement in the value of the acquired assets of 3.3% - 5.1%. However, all of these gains come from asset purchases and none from mergers. These results suggest that acquiring managers are less influenced by efficiency considerations when evaluating mergers between two firms compared to when evaluating a purchase of some division or subsidiary of a firm.

We also find systematic variation in efficiency gains across different types of acquisitions: mergers compared to asset purchases; mergers with private targets compared to those with public targets; acquisitions by large firms compared to those by small firms; and asset purchases by firms with good governance compared to those by poor governance firms. Such differences in anticipated efficiency gains also account for most of the observed impact of those factors on acquirer returns. Our results indicate that efficiency gains from productivity improvement plays a central role in understanding the source of gains to acquirers.

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Table 1: Summary statistics for acquirers in mergers and asset purchases

The table reports summary statistics for the independent variables used in the study. The sample of transactions is obtained from the SDC Platinum database and dates from 1/1/1985 to 12/31/2006. Mergers include transactions identified as mergers or acquisitions by SDC, and asset purchases include transactions identified as acquisition of assets or acquisition of certain assets. The sample includes only transactions for which SDC reports a transaction value. The study obtains firm characteristics from CRSP and Compustat, and governance information from the IRRC surveys. The study employs the following variable definitions: size equals the log of book assets, relative value equals the transaction value divided by the market value of the firm, G-index is as constructed by Gompers, Ishii, and Metrick (2003), the high tech dummy follows Loughran and Ritter (2004), Tobin's Q equals the market value of assets scaled by book assets, cash flow equals EBIDTA divided by book assets, leverage measures book leverage, same industry equals 1 if the buyer and seller are in the same 2-digit SIC industry code and industry M&A activity equals the dollar value of all acquisitions in a given industry-year divided by the sum of book assets. The table reports the industry median values for the firm characteristics we include as controls in the regressions.

Panel A: Asset Purchase Acquirers

Variable	N	Mean	Std. Dev	Median
Log Size	8058	5.70	1.92	5.59
Relative Value	8058	0.09	0.12	0.04
Governance Index	2508	9.12	2.75	9.00
High-Tech	8058	0.23	0.42	0.00
Stock Dummy	8058	0.05	0.22	0.00
Tobin's Q	8058	1.55	0.47	1.40
Cashflow	8054	0.07	0.06	0.08
Leverage	8058	0.19	0.15	0.22
Industry M&A	8058	0.05	0.06	0.03
Same Industry	8058	0.61	0.49	1.00
Private Target	8058	0.51	0.50	1.00
Public Target	8058	0.00	0.06	0.00

Panel B: Merger Acquirers

Variable	N	Mean	Std. Dev	Median
Log Size	4348	6.01	2.07	5.82
Relative Value	4348	0.14	0.15	0.08
Governance Index	1608	9.06	2.75	9.00
High-Tech	4348	0.32	0.47	0.00
Stock Dummy	4348	0.36	0.48	0.00
Tobin's Q	4348	1.65	0.54	1.49
Cashflow	4341	0.06	0.07	0.08
Leverage	4348	0.16	0.14	0.14
Industry M&A	4348	0.06	0.07	0.04
Same Industry	4348	0.58	0.49	1.00
Private Target	4348	0.50	0.50	0.00
Public Target	4348	0.40	0.49	0.00

Table 2: Abnormal returns by relative value and size bins

The table reports the mean abnormal return for acquirers in mergers and asset purchases. The sample of acquisitions is obtained from the SDC Platinum database and dates from 1/1/1985 to 12/31/2006. The categorization of deals into mergers and asset purchases follows the SDC variable 'Form of the Deal'. The abnormal returns are computed over a 3-day window around the announcement date. The benchmark returns are computed using the CAPM over a window of (-274, -23) days prior to the announcement. Panels A and B report the mean abnormal returns for asset purchases and mergers, respectively, categorized by relative deal value and firm size. The cut-off values are set at the 30^{th} and 70^{th} percentiles of the distribution for relative value and firm size.

Panel A: Asset purchases by firm size and relative value (N = 8058)

	Value Bins			
Size Bins	Small	Medium	Large	Total
Small	-0.17	1.12	3.00	1.82
Medium	0.30	1.15	2.70	1.40
Big	0.17	0.38	1.69	0.51
Total	0.15	0.91	2.66	1.24

Panel B: Mergers by firm size and relative value (N = 4348)

	Value Bins			
Size Bins	Small	Medium	Large	Total
Small	0.31	1.66	2.37	1.70
Medium	0.37	0.35	-0.07	0.22
Big	0.11	-0.24	-1.49	-0.38
Total	0.23	0.69	0.62	0.51

Table 3: Acquirer abnormal returns and relative value for separate samples

The table reports the results of a regression of acquirer abnormal return on relative deal value and various controls for all acquisitions and the merger and asset purchase subsamples. Table 1 details the variable construction. The sample of acquisitions is obtained from the SDC Platinum database and dates from 1/1/1985 to 12/31/2006. The categorization of deals into mergers and asset purchases follows the SDC variable 'Form of the Deal'. The dependent variable is the abnormal return to the buyer over a 3-day window around the announcement date. The first two columns report results for all acquisitions, the next two for asset purchases, and the last two columns report the results for mergers. The regressors include unreported year dummies and a stock price run-up variable. The standard errors adjust for heteroskedasticity. $^{+}$, * and ** denote statistical significance at the 10%, 5% and 1% levels, respectively.

	All Acquisitions		Asset Purchases		Mergers	
Regressors	Baseline	With Controls	Baseline	With Controls	Baseline	With Controls
Log Size	-0.254	-0.154	-0.063	-0.075	-0.419	-0.259
	(0.032)**	(0.036)**	(0.041)	(0.043)$^{+}$	(0.055)**	(0.064)**
Relative Value	3.882	5.130	9.555	9.412	-1.099	0.223
	(0.597)**	(0.612)**	(0.850)**	(0.857)**	(0.840)	(0.887)
High-Tech	-0.339	-0.322	0.028	-0.013	-0.691	-0.711
	(0.155)*	(0.169)$^{+}$	(0.198)	(0.216)	(0.250)**	(0.269)**
Stock Dummy	-1.140	-0.544	0.044	0.083	-1.271	-0.949
	(0.195)**	(0.205)**	(0.401)	(0.403)	(0.252)**	(0.267)**
Number of Bidders		0.137		-1.769		0.242
		(0.476)		(1.354)		(0.480)
Tender Offer		1.394		-		1.059
		(0.342)**		-		(0.347)**
Hostile Flag		-0.203		0.846		-0.202
		(0.592)		(1.521)		(0.602)
Tobin's Q		-0.668		-0.786		-0.495
		(0.217)**		(0.265)**		(0.378)
Cashflow		-2.212		-2.050		-2.664
		(1.232)$^{+}$		(1.546)		(2.078)
Leverage		-1.249		-1.423		-0.670
		(0.608)*		(0.730)$^{+}$		(1.110)
Private Target		-0.229		-0.207		-0.506
		(0.140)		(0.154)		(0.410)
Public Target		-2.499		-2.897		-2.335
		(0.241)**		(0.820)**		(0.421)**
Industry M&A		0.131		1.491		-0.904
		(1.275)		(1.548)		(2.187)
Same Industry		0.082		0.113		0.102
		(0.127)		(0.154)		(0.224)
Observations	12406	12395	8058	8054	4348	4341
Adjusted R-squared	0.021	0.031	0.031	0.032	0.034	0.044

Table 4: Acquirer abnormal returns and merger × relative value interactions

The table reports the results of a regression of acquirer abnormal return on a merger dummy, interaction variables for merger dummy and various controls. Table 1 details the variable construction. The sample of acquisitions is obtained from the SDC Platinum database and dates from 1/1/1985 to 12/31/2006. The categorization of deals into mergers and asset purchases follows the SDC variable 'Form of the Deal'. The dependent variable is the abnormal return to the buyer over a 3-day window around the announcement date. The first column reports results using size, relative value, the merger dummy and various controls as regressors. The second column reports results obtained by including a merger dummy-relative value interaction term. The third column adds interaction variables for merger dummy with high tech dummy and stock dummy. The regressors include unreported year dummies and a stock price run-up variable. The standard errors adjust for heteroskedasticity. $^{+}$, * and ** denote statistical significance at the 10%, 5% and 1% levels, respectively.

Regressors	Merger Dummy	Merger × Rel. Value	More Interactions
Log Size	-0.230	-0.208	-0.199
	(0.034)**	(0.034)**	(0.034)**
Relative Value	4.227	8.550	8.711
	(0.615)**	(0.827)**	(0.829)**
Merger	-0.550	0.442	0.840
	(0.160)**	(0.180)*	(0.204)**
Merger * Rel. Value		-8.912	-9.139
		(1.162)**	(1.165)**
Merger * High-Tech			-0.787
			(0.316)*
Merger * Stock Dummy			-0.993
			(0.471)*
High-Tech	-0.331	-0.316	-0.007
	(0.170)$^{+}$	(0.169)$^{+}$	(0.210)
Stock Dummy	-0.839	-0.807	-0.076
	(0.217)**	(0.216)**	(0.403)
Number of Bidders	-0.204	-0.080	-0.130
	(0.468)	(0.459)	(0.458)
Tender Offer	-0.076	-0.066	-0.221
	(0.303)	(0.300)	(0.302)
Hostile Flag	-0.179	0.119	0.098
	(0.567)	(0.552)	(0.547)
Tobin's Q	-0.656	-0.682	-0.668
	(0.218)**	(0.217)**	(0.217)**
Cashflow	-1.731	-1.928	-1.778
	(1.239)	(1.236)	(1.239)
Leverage	-1.218	-1.225	-1.242
	(0.611)*	(0.609)*	(0.607)*
Industry M&A	-0.062	0.062	0.026
	(1.281)	(1.278)	(1.276)
Same Industry	0.073	0.092	0.101
	(0.128)	(0.128)	(0.128)
Observations	12395	12395	12395
Adjusted R-squared	0.023	0.030	0.031

Table 5: Acquirer abnormal returns for mergers and relative value interactions

The table reports the results of a regression of acquirer abnormal return on relative deal value, interactions of relative deal value with public and stock dummies, and various controls for the merger subsample. Table 1 details the variable construction. The sample of acquisitions is obtained from the SDC Platinum database and dates from 1/1/1985 to 12/31/2006. The categorization of deals into mergers and asset purchases follows the SDC variable 'Form of the Deal'. The dependent variable is the abnormal return to the buyer over a 3-day window around the announcement date. The first column reports the results for the baseline regression. The second column reports the results with an interaction term for stock dummy and relative value. The third column reports the results with an interaction term for public target and relative value. The fourth column includes both interaction variables. The regressors include unreported year dummies and a stock price run-up variable. The standard errors adjust for heteroskedasticity. $^{+}$, * and ** denote statistical significance at the 10%, 5% and 1% levels, respectively.

	Interaction with Relative Value Terms for Mergers Only			
Regressors	Baseline	Stock Dummy	Public Target	Both Interactions
Log Size	-0.259	-0.261	-0.248	-0.249
	(0.064)**	(0.064)**	(0.064)**	(0.064)**
Relative Value	0.223	0.713	6.356	6.580
	(0.887)	(1.031)	(1.356)**	(1.418)**
Stock Dummy	-0.949	-0.758	-0.809	-0.714
	(0.267)**	(0.313)*	(0.266)**	(0.311)*
Stock Dummy * Rel. Value		-1.407		-0.705
		(1.755)		(1.725)
Public Target	-2.335	-2.304	-0.490	-0.482
	(0.421)**	(0.422)**	(0.453)	(0.453)
Public Target * Rel. Value			-11.556	-11.515
			(1.676)**	(1.684)**
High-Tech	-0.711	-0.706	-0.740	-0.737
	(0.269)**	(0.268)**	(0.266)**	(0.266)**
Number of Bidders	0.242	0.236	0.290	0.287
	(0.480)	(0.480)	(0.469)	(0.469)
Tender Offer	1.059	1.042	0.876	0.868
	(0.347)**	(0.348)**	(0.343)*	(0.344)*
Hostile Flag	-0.202	-0.235	0.421	0.402
	(0.602)	(0.602)	(0.601)	(0.602)
Tobin's Q	-0.495	-0.491	-0.503	-0.501
	(0.378)	(0.378)	(0.376)	(0.375)
Cashflow	-2.664	-2.695	-2.334	-2.350
	(2.078)	(2.079)	(2.059)	(2.061)
Leverage	-0.670	-0.661	-0.755	-0.750
	(1.110)	(1.109)	(1.097)	(1.096)
Private Target	-0.506	-0.506	-0.286	-0.287
	(0.410)	(0.409)	(0.409)	(0.409)
Industry M&A	-0.904	-0.957	-0.574	-0.602
	(2.187)	(2.185)	(2.169)	(2.167)
Same Industry	0.102	0.101	0.175	0.175
	(0.224)	(0.224)	(0.223)	(0.223)
Observations	4341	4341	4341	4341
Adjusted R-squared	0.044	0.044	0.057	0.057

Table 6: Acquirer abnormal returns and interaction of log size with relative value

The table reports the results of a regression of acquirer abnormal return on relative deal value, size, interactions of relative deal value with size, and various controls. Table 1 details the variable construction. The sample of acquisitions is obtained from the SDC Platinum database and dates from 1/1/1985 to 12/31/2006. The categorization of deals into mergers and asset purchases follows the SDC variable 'Form of the Deal'. The dependent variable is the abnormal return to the buyer over a 3-day window around the announcement date. The first column reports results for the entire sample using a merger dummy. The second and third columns report corresponding results for the asset purchase and merger subsamples, respectively. The regressors include unreported year dummies and a stock price run-up variable. The standard errors adjust for heteroskedasticity. $^{+}$, * and ** denote statistical significance at the 10%, 5% and 1% levels, respectively.

Regressors	All Acquisitions	Asset Purchases	Mergers
Log Size	-0.073	-0.072	0.001
	(0.038)$^{+}$	(0.047)	(0.074)
Relative Value	13.208	9.627	11.749
	(1.718)**	(2.515)**	(2.548)**
Log Size * Rel. Value	-1.698	-0.044	-2.020
	(0.281)**	(0.466)	(0.378)**
High-Tech	-0.358	-0.013	-0.803
	(0.169)*	(0.216)	(0.268)**
Stock Dummy	-0.838	0.082	-0.932
	(0.216)**	(0.403)	(0.266)**
Number of Bidders	-0.063	-1.760	0.342
	(0.464)	(1.357)	(0.482)
Tender Offer	-0.004	-	1.027
	(0.300)	-	(0.345)**
Hostile Flag	0.212	0.845	0.237
	(0.546)	(1.521)	(0.592)
Tobin's Q	-0.680	-0.786	-0.544
	(0.218)**	(0.265)**	(0.376)
Cashflow	-1.626	-2.046	-2.306
	(1.237)	(1.546)	(2.067)
Leverage	-1.105	-1.421	-0.505
	(0.611)$^{+}$	(0.732)$^{+}$	(1.107)
Industry M&A	0.520	1.494	0.224
	(1.279)	(1.550)	(2.182)
Same Industry	0.131	0.114	0.229
	(0.128)	(0.154)	(0.223)
Merger	-0.499		
	(0.160)**		
Private Target		-0.208	-0.488
		(0.155)	(0.407)
Public Target		-2.899	-2.314
		(0.819)**	(0.418)**
Observations	12395	8054	4341
Adjusted R-squared	0.027	0.032	0.051

Table 7: Acquirer abnormal returns, governance and relative value

The table reports the results of a regression of acquirer abnormal return on relative deal value, governance index, and various controls for the asset purchase and merger subsamples. The interaction columns also include an interaction of relative deal value and governance. Table 1 details the variable construction. The sample of acquisitions is obtained from the SDC Platinum database and dates from 1/1/1985 to 12/31/2006. The categorization of deals into mergers and asset purchases follows the SDC variable 'Form of the Deal'. The dependent variable is the abnormal return to the buyer over a 3-day window around the announcement date. The first two columns report results for asset purchases, with and without the interaction term. The third and fourth columns reports the corresponding results for mergers. The regressors include unreported year dummies and a stock price run-up variable. The standard errors adjust for heteroskedasticity. $^{+}$, * and ** denote statistical significance at the 10%, 5% and 1% levels, respectively.

	Asset Purchases		Mergers	
Regressors	Baseline	Interaction	Baseline	Interaction
Log Size	-0.118	-0.115	-0.198	-0.192
	(0.082)	(0.081)	$(0.108)^{+}$	$(0.108)^{+}$
Relative Value	7.237	18.318	-5.041	-2.124
	(1.910)**	(6.569)**	(1.333)**	(3.844)
Governance Index	-0.083	-0.019	0.006	0.041
	(0.039)*	(0.046)	(0.052)	(0.060)
G-Index * Rel. Value		-1.193		-0.308
		$(0.674)^{+}$		(0.381)
High-Tech	0.170	0.174	-0.699	-0.694
	(0.322)	(0.321)	(0.345)*	(0.345)*
Stock Dummy	0.573	0.586	-0.998	-1.004
	(0.715)	(0.714)	(0.362)**	(0.363)**
Number of Bidders	-2.314	-2.321	-0.437	-0.423
	(4.375)	(4.327)	(0.613)	(0.617)
Tender Offer	-	-	0.070	0.094
	-	-	(0.443)	(0.441)
Hostile Flag	-1.926	-2.009	0.260	0.289
	(1.336)	(1.361)	(0.732)	(0.731)
Tobin's Q	-0.579	-0.601	-1.058	-1.050
	(0.383)	(0.381)	(0.489)*	(0.489)*
Cashflow	0.131	0.140	-3.147	-3.093
	(2.260)	(2.245)	(2.499)	(2.498)
Leverage	-0.490	-0.611	0.160	0.148
	(1.119)	(1.116)	(1.379)	(1.380)
Private Target	-0.521	-0.518	-0.229	-0.207
	(0.235)*	(0.235)*	(0.483)	(0.484)
Public Target	-4.888	-4.880	-1.399	-1.418
	(1.743)**	(1.760)**	(0.473)**	(0.473)**
Industry M&A	4.970	4.971	-0.809	-0.758
	$(2.880)^{+}$	$(2.850)^{+}$	(2.887)	(2.884)
Same Industry	-0.241	-0.230	0.406	0.407
	(0.228)	(0.227)	(0.296)	(0.296)
Observations	2508	2508	1608	1608
Adjusted R-squared	0.020	0.022	0.059	0.059

Table 8: Acquirer abnormal returns and relative size

The table reports the results of a regression of acquirer abnormal return on relative deal size and various controls for all acquisitions and the merger and asset purchase subsamples. Relative deal size equals the transaction value scaled by the market value of equity, computed as of 2 days prior to the announcement. Table 1 details the variable construction. The sample of acquisitions is obtained from the SDC Platinum database and dates from 1/1/1985 to 12/31/2006. The categorization of deals into mergers and asset purchases follows the SDC variable 'Form of the Deal'. The dependent variable is the abnormal return to the buyer over a 3-day window around the announcement date. The first two columns report results for all acquisitions, the next two for asset purchases, and the last two columns report the results for mergers. No asset purchases involve a tender offer. The regressors include unreported year dummies and a stock price run-up variable. The standard errors adjust for heteroskedasticity. $^{+}$, * and ** denote statistical significance at the 10%, 5% and 1% levels, respectively.

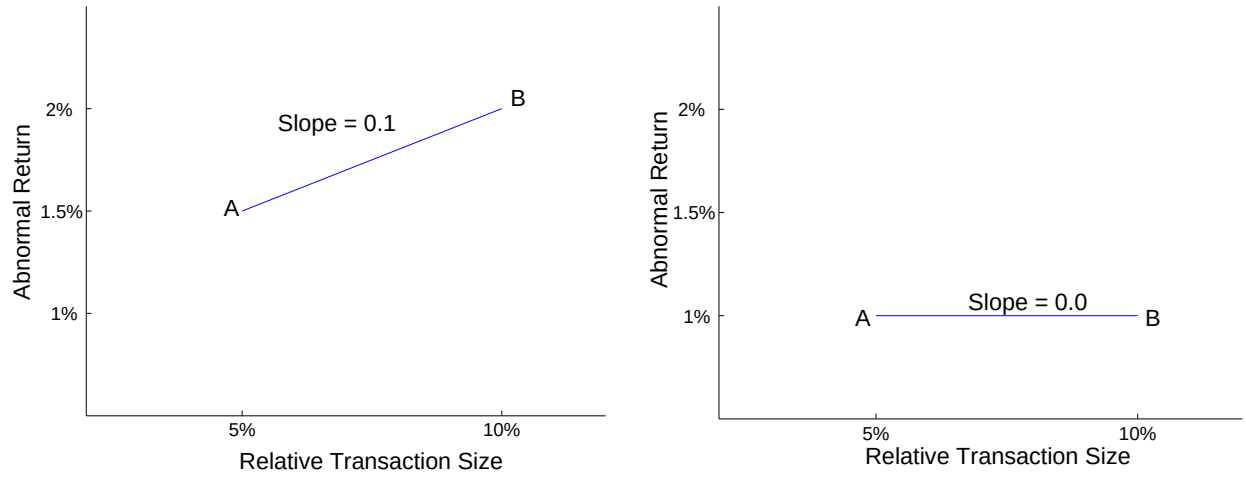
	All Acquisitions		Asset Purchases		Mergers	
Regressors	Baseline	With Controls	Baseline	With Controls	Baseline	With Controls
Log Size	-0.275	-0.166	-0.119	-0.128	-0.419	-0.220
	(0.032)**	(0.035)**	(0.040)**	(0.042)**	(0.054)**	(0.063)**
Relative Size	2.353	3.318	5.946	5.869	-0.616	0.505
	(0.394)**	(0.401)**	(0.526)**	(0.533)**	(0.583)	(0.610)
High-Tech	-0.352	-0.334	0.107	0.025	-0.828	-0.832
	(0.159)*	(0.171)$^{+}$	(0.201)	(0.218)	(0.256)**	(0.275)**
Stock Dummy	-1.257	-0.513	0.114	0.158	-1.439	-0.985
	(0.197)**	(0.207)*	(0.407)	(0.410)	(0.256)**	(0.269)**
Number of Bidders		0.317		-1.597		0.349
		(0.491)		(1.414)		(0.494)
Tender Offer		1.678		-		1.258
		(0.349)**		-		(0.356)**
Hostile Flag		0.366		0.930		0.389
		(0.712)		(1.481)		(0.803)
Tobin's Q		-0.575		-0.612		-0.582
		(0.223)**		(0.268)*		(0.396)
Cashflow		-1.751		-1.622		-2.106
		(1.257)		(1.562)		(2.133)
Leverage		-1.206		-1.437		-0.536
		(0.613)*		(0.734)$^{+}$		(1.134)
Private Target		-0.187		-0.252		-0.406
		(0.142)		(0.156)		(0.419)
Public Target		-2.917		-2.834		-2.878
		(0.240)**		(0.834)**		(0.432)**
Industry M&A		0.060		1.584		-0.983
		(1.314)		(1.575)		(2.288)
Same Industry		0.107		0.115		0.196
		(0.129)		(0.155)		(0.231)
Observations	12369	12358	7963	7959	4406	4399
Adjusted R-squared	0.021	0.034	0.029	0.030	0.033	0.051

Table 9: Acquire abnormal returns and relative value excluding deals with private targets

The table reports the results of a regression of acquirer abnormal return on relative deal value, and various controls for the sample excluding transactions with private targets. Table 1 details the variable construction. The sample of acquisitions is obtained from the SDC Platinum database and dates from 1/1/1985 to 12/31/2006. The categorization of deals into mergers and asset purchases follows the SDC variable 'Form of the Deal'. The dependent variable is the abnormal return to the buyer over a 3-day window around the announcement date. The first two columns report results with a merger dummy and an interaction of merger dummy with relative value for the entire sample. The third and fourth columns report results for the baseline specification for the asset purchase and merger subsamples, respectively. The regressors include unreported year dummies and a stock price run-up variable. The standard errors adjust for heteroskedasticity. $^{+}$, * and ** denote statistical significance at the 10%, 5% and 1% levels, respectively.

Regressors	All Acquisitions		Asset Purchases	Mergers
Log Size	-0.244	-0.220	-0.048	-0.395
	(0.047)**	(0.047)**	(0.058)	(0.084)**
Relative Value	2.239	8.411	9.583	-4.106
	(0.772)**	(1.082)**	(1.125)**	(1.038)**
Merger	-0.867	0.687		
	(0.237)**	(0.253)**		
Merger * Rel. Value		-12.152		
		(1.432)**		
High-Tech	-0.289	-0.271	0.323	-0.951
	(0.242)	(0.240)	(0.315)	(0.365)**
Stock Dummy	-2.028	-1.896	0.631	-2.040
	(0.332)**	(0.329)**	(0.760)	(0.379)**
Number of Bidders	-0.192	-0.099	-1.264	-0.003
	(0.471)	(0.460)	(1.502)	(0.481)
Tender Offer	0.057	-0.090	-	0.239
	(0.329)	(0.325)	-	(0.356)
Hostile Flag	-0.074	0.378	0.553	0.309
	(0.605)	(0.599)	(1.897)	(0.658)
Tobin's Q	-0.958	-0.968	-0.694	-1.209
	(0.296)**	(0.293)**	(0.355)$^{+}$	(0.518)*
Cashflow	-2.615	-2.654	-2.175	-3.066
	(1.640)	(1.624)	(2.010)	(2.805)
Leverage	-1.292	-1.296	-1.553	-1.314
	(0.821)	(0.814)	(0.998)	(1.418)
Industry M&A	-0.468	-0.164	-0.887	0.996
	(1.699)	(1.693)	(2.021)	(2.798)
Same Industry	0.145	0.168	0.232	0.096
	(0.175)	(0.174)	(0.211)	(0.304)
Public Target			-2.756	-1.685
			(0.831)**	(0.438)**
Observations	6138	6138	3964	2174
Adjusted R-squared	0.036	0.052	0.041	0.068

Figure 1: Numerical Example of the Relationship between Relative Value and Abnormal Returns



Panel A Panel B

Notes: The figure plots the abnormal returns from two sets of transactions by two firms. In both transactions, the announcement of the deal has a 1% impact on the share price due to a signaling effect on the value of assets in place and future growth opportunities. For Panel A, the buyer also realizes a 10% increase in the value of the assets acquired due to efficiency gains. The transactions in Panel B do not involve any efficiency gains. In both figures, the slope of abnormal returns on relative transaction value corresponds to the percentage increase in the value of the acquired assets.