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Abstract

This paper considers changes in market comovement of merging US firms. Comparing the expected to the actual post merger comovement, we find that the post merger beta exhibits excess comovement with the acquiring firm. This suggests that the firm's comovement is at least partly determined by its investors. We find that the excess comovement is significantly greater in cash transactions, when target shareholders tender their entire stake, than in pure stock transactions. Additionally, we document that the excess comovement is greater when the target is included in the S&P 500 as a result of the merger.

JEL CLASSIFICATION: G34, G12, G02.

KEYWORDS: Mergers, Comovement, Segmentation, Method of Payment, Index Inclusion.

1 Introduction

Classical asset pricing theory predicts that in a frictionless market the return required by investors depends on the comovement of the firm's assets with the market. In an international context, there is evidence that the comovement changes significantly when the location of listing changes (Froot and Dabora, 1999, and Chan, Hameed and Lau, 2003) and when a company is acquired by a foreign firm (Brealey, Cooper and Kaplanis, 2010). These results suggest that stock comovement with the market is at least partly determined by the firm's investors and that international markets are segmented.

In the average merger, the majority of the target shareholders' stake is acquired and therefore the post merger shareholder base is predominantly comprised of the acquiring firm's shareholders. Given this, and if the market comovement is affected by the firm's investors, we expect the post merger market comovement to be shifted towards the acquiring firm. This paper examines US mergers to provide further evidence that investors partially determine stock comovement by showing a significant shift in market comovement towards the acquiring firm.

We estimate the pre merger comovement of the target and the acquirer and use these estimates to calculate an expected post merger comovement. We then compare the expected post merger comovement to a post merger estimate of the actual comovement. When the acquirer exhibits larger comovement with the market than the target (the prediction is asymmetric depending on the relative riskiness of the target and the acquirer), we find that the expected post merger comovement is 1.09 while the actual post merger comovement with the market is 1.18. This represents an excess comovement with the acquiring firm of 8.26 percent. Additionally, the implied effect on the target's market comovement is an increase in beta of 0.27 or 34 percent relative to the pre merger beta.

Given that investors affect market comovement, the degree of excess comovement is increasing in the fraction of equity tendered by target shareholders. Therefore, cash mergers (which imply that target shareholders do not retain any stake in the merged firm) should be associated with significantly greater excess comovement. For cash mergers, the difference between the actual and expected post merger beta is 0.20 (compared to 0.09 for the overall sample). In cash transactions, target comovement increases by 0.32 or 46.1 percent relative to the pre merger beta. In contrast, for 100 percent stock deals (when there is less exit), the

excess comovement is statistically and economically insignificant.

Building on work by Vijh (1994), Barberis, Shleifer and Wurgler (2005) argue that there is a "habitat" of investors that invest in S&P 500 stocks. This implies that the firm's shareholders change as a result of inclusion into the S&P 500 and therefore the comovement with the S&P 500 increases. Given that there is a S&P 500 habitat, we expect the excess comovement towards a S&P 500 acquirer to be larger when a target firm is included into the index as a result of the merger. Our results support this conjecture and additionally we verify that our results are not driven by an index inclusion effect.

It is well documented that investors show preference over firm characteristics like industry and geographic location.[1] Therefore, target shareholders that have a preference for a particular industry are more likely to sell their shares as a result of a cross industry merger than an intra industry merger. We find some support for this, in inter industry mergers (when the acquirer has a larger beta than the target) the excess comovement towards the acquirer's comovement is 11.71 percent while for intra industry mergers it is 3.77 percent and statistically insignificant. Similarly, there is no excess comovement in within state mergers while in intra state mergers the excess comovement is 9.03 percent.

The findings of this paper suggest that there is not only cross-border segmentation, but also segmentation along other dimensions such as index membership and geography. However, there are a number of possible alternative explanations for our results that we have to consider. First, on average mergers are associated with increases in leverage and this

[1]Empirically it has been documented that investors prefer stocks in their geographic vicinity (Coval and Moskowitz, 1999 and Huberman, 2001). Additionally, it has been shown that shareholders exhibit a preference for stocks from industries that they have experience from (Döskeland and Hvide, 2010).

could potentially explain the excess comovement.[2] However, for leverage changes to explain our results, it must be the case that leverage increases when the beta of acquirer is greater than the beta of the target and that leverage decreases when the beta of the acquirer is smaller than the target's beta, since in the first case we have a higher than expected post merger beta and in the latter a lower than expected post merger beta. In fact, for transactions in which the beta of the acquirer is lower than the target's, we find that leverage increases modestly. Additionally, we conduct multivariate sorts that illustrate that excess comovement is independent of the change in leverage. Finally, in our regression analysis, we find that the change in leverage is insignificantly related to the excess comovement and does not affect our results qualitatively.

Second, some mergers result in synergies which might transform the assets and therefore also the comovement of these assets with the market. However, for synergies to explain our results it must be the case that the synergy asset has a riskiness that is above that of the expected post merger beta when the acquirer has a higher beta than the target and vice versa when the beta of the target is greater than that of the acquirer. Further, it must be that the transformation of these is rather rapid since we measure the post merger beta over 100 weeks after completion. Finally, in regression analysis we verify that synergies are not driving our results.

Third, following completion it is possible that the riskiness of the assets of the target is transformed to become similar to the riskiness of the assets of the acquirer. However, this risk transformation needs to be rapid (see above). Additionally, it has to be greater in

[2] Ghosh and Jain (2000) study leverage increases in mergers. They find that leverage increases by a modest 6.3% on average. We find similar leverage increases in our sample (see Figure 2).

transactions that are associated with greater shareholder exit (e.g., cash deals). Furthermore, we consider the progression of the firm's post merger comovement and do not find evidence of a gradual transformation of the riskiness of the firm's assets.

Prior work has provided evidence of segmentation by examining both returns and market comovements.[3] Concerning comovement, Chan, Hameed and Lau (2003) document a decrease in comovement with the Hong Kong and an increase in the comovement with the Singapore Stock Exchange following a change in listing from Hong Kong to Singapore. Most closely related to us, Brealey, Cooper and Kaplanis (2010) document cross-border segmentation by providing evidence of excess comovement in cross-border mergers. They find that following a merger, the comovement with the exchange where the acquiring firm is traded increases while the comovement with the exchange of the target company decreases. We build on their results by providing evidence of segmentation by considering mergers of US firms. Another paper that illustrates within-border excess comovement is Pirinsky and Wang (2006). They show that when firms change the location of their headquarters they start comoving more with firms in the geographic vicinity of their new headquarters.

The remainder of the paper is organized as follows. In Section 2, we describe our data sources, sample selection criteria and methodology. We start Section 3 by considering sorts illustrating the relation between the pre merger and post merger betas. We then verify these

[3]In terms of return segmentation, early work showed how investment barriers imply return premiums. The barrier to investment can be investment restrictions (Black (1974) and Stulz (1981)) or lack of information (Merton (1987)). In terms of empirical evidence, Hong and Kacperzyk (2009) show that "sin" stocks exhibit abnormal performance that cannot be attributed to traditional factors. Additionally, Sloan and Lehavy (2008) and Bodnaruk and Östberg (2009) show that firms with less recogntion (segmented firms in terms of investor awareness) have higher returns.

results using regression analysis. In Section 4 we show that our results are not driven by asset transformation and Section 5 concludes.

2 Data and Methodology

Our sample of mergers and acquisitions comes from the Securities Data Corporation (SDC). We only include transactions between firms listed on the NYSE, AMEX and Nasdaq. Moreover, our sample covers the period from 1980 to 2008.[4] We only consider completed transactions where the target and acquiring company are publicly traded. Additionally, we require the target and acquirer to be different firms (i.e., we exclude all repurchases). This gives us a total of $8,411$ mergers. We obtain stock return data from the CRSP daily files (this reduces our sample to $6,160$).

In estimating comovement (see next section), we follow Brealey et al. (2010) and require 100 weeks of return data for the target and the acquirer prior to the run-up period and for the merged company after completion. This leaves us with $3,510$ deals.

Further, we only consider deals where 100 percent of the target company is owned by the acquirer after the merger. We only include targets which have a market capitalization above 50 million (Hackbarth and Morellec, 2008). In order to evaluate if the post merger comovement is biased towards the acquirer, we require that the targets assets to represent a non-insignificant proportion of total assets of the merged company.[5] Therefore, we only

[4]SDC includes transactions from before 1980 and after 2008, but these transactions are excluded due to other restrictions.

[5]Brealey et al. (2010) do not have to implement such a restriction since they examine comovement with respect to different markets whereas we consider one market, but examine whether the acquirer determines

consider mergers in which the target company has a market capitalization that is at least 25 percent of the acquirer. Finally, we exclude deals which involve at least one financial firm (SIC code 6000 to 6999). This leaves us with a total of 712 deals.

To control for the change in leverage due to the merger we calculate the leverage change as defined by Ghosh and Jain (2000). Leverage is the fiscal year-end ratio of debt to total firm value. We measure debt as the book value of long-term debt (Compustat Item dltt) added to the debt in current liabilities (Compustat item dlc). Total firm value is the book value of debt added to the market value of equity. The change in leverage is defined as the difference in leverage between the fiscal year end before the announcement of the merger and the fiscal year end after the completion of the merger.

We draw on Brealey et al. (2010) in calculating the synergies of the merger. Synergies are the market adjusted increase in market capitalization of the acquirer and target in the six weeks surrounding the announcement (three before and three after) as a percentage of the pooled firm.

Figure 1 describes the time line of our research design.

Insert Figure 1 here

We estimate the individual comovement of the acquirer, target and merged firm with the market (the value-weighted CRSP index) over the 100 week pre run-up period (acquirer and target) and over 100 weeks post completion (merged firm). To avoid confounding effects of news announcements and rumors, we exclude eight weeks prior (run-up) to the merger

a disproportionate share of the comovement.

announcement (Schwert, 1996). This involves running the following weekly regression for the acquirer, target and merged company:

$$R_{j,t} = \alpha_j + \beta_j R_{m,t} + \varepsilon_{j,t}$$

where j is a firm index, $R_{j.t}$ is the return on the firm and $R_{m,t}$ is the return on the CRSP value weighted index. To reduce the effect of outliers, we winsorize our betas at the one and 99 percent level.

We calculate the expected merged beta as:

$$E(\beta) = \frac{MV_A}{MV_A + (1-\lambda)MV_T}\beta_A + \frac{(1-\lambda)MV_T}{MV_A + (1-\lambda)MV_T}\beta_T \tag{1}$$

where β^A and β^T are the pre merger comovements of the acquirer and target, respectively and MV refers to the market value of equity. If the acquiring firm has a significant toehold, the comovement of the target is already partly reflected in the comovement of the acquirer (Brealey et al., 2010). Put differently, if only a small stake is acquired in the target due to the toehold then the comovement of the acquirer is not expected to change significantly. To control for this, equation (1) adjusts for the fraction of the target held by the acquirer at announcement (λ).

Table 1 presents descriptive statistics of our key variables.

Insert Table 1 here

On average, target companies are roughly half the size of acquiring companies. Target companies represent roughly 35 percent of total pre merger market capitalization. We can

see that on average leverage increases from 23.91 percent pre merger to 31.74 percent post merger. Our descriptive statistics indicate that total synergies only represent a small fraction of the pre merger firm. Additionally, in most deals the acquirer does not have a toehold. The pre merger betas of the target and acquirer are similar and close to one. Turning to the expected beta ($E(\beta)$), as predicted, it is between the target and acquirer beta. Finally, the post merger beta (β_M) is greater than the expected beta which is consistent with a leverage increase.

We use SDC to classify the following methods of payment: cash, stock, mixed and other. Dummy variables *Cash*, *Stock*, *Mixed* and *Other* take the value 1 if the deal is only financed with cash, only with stock, a mix of both and if other methods of payment are used.

3 Empirical Findings

A Univariate Analysis

This paper tests whether the investors contribute to the comovement of the firm with the market. To do so we examine mergers and acquisitions. Given that target investors exit following the merger, the post merger comovement of the firm should be closer to the co-movement of the acquirer than expected. Additionally, the greater the fraction of target shareholders that leave as a result of the merger, the closer the post merger comovement should be to the comovement of the acquirer.

In this section we provide univariate analysis of the relation between the expected and the actual merged beta. Our central hypothesis is that the comovement of the merged

firm is closer to the comovement of the acquirer than expected. When the comovement of the acquirer with the market is greater than comovement of the target with the market ($\beta_A > \beta_T$), we expect the actual merged beta to be greater than the expected beta ($\beta_M > E(\beta)$). Hence, implying that the acquiring firm exhibits undue influence (relative to its market capitalization) on the comovement of the merged firm. Likewise, we expect the actual merged beta to be lower than the expected beta ($E(\beta) > \beta_M$) when the beta of the target is greater than the beta of the acquirer.

Figure 2 presents our pre merger betas (acquirer and target) and our post merger expected and observed beta. Panel A considers deals for which $\beta_A > \beta_T$ while Panel B considers deals for which $\beta_T > \beta_A$.

Insert Figure 2 here

Examining Panel A, it is evident that the actual merged beta is greater than the expected beta indicating excess comovement with the acquirer. Turning to Panel B, we see that the actual merged beta is slightly below the expected beta.

Table 2 compares the actual to the expected betas in our overall sample, split according to whether β_A is higher or lower than β_T, and tests whether the excess comovement is significant.

Insert Table 2 here

When $\beta_A > \beta_T$, the expected beta is 1.09 compared to the actual merged beta of 1.18. The difference between the actual and expected merged beta ($\beta_M - E(\beta)$, excess comovement)

is statistically significant at the one percent level and represents a shift towards the acquirer's beta of 8.26 percent relative to the mean expected beta. This understates the effect on target betas since targets represent on average less than half of the merged firm.

To evaluate the economic impact on target betas, we calculate an implied target beta based on our estimates. We replace for $E(\beta)$ in $\beta_M = E(\beta)$ by using equation (1) and rearrange to obtain an expression for the implied target beta,

$$\beta_T^{\text{Imp}} = \frac{MV_A + (1-\lambda)MV_T}{(1-\lambda)MV_T}\widehat{\beta}_M - \frac{MV_A}{(1-\lambda)MV_T}\widehat{\beta}_A \tag{2}$$

Using our estimates $\widehat{\beta}_A$, $\widehat{\beta}_M$ we calculate an implied target beta for each transaction. The implied target beta ($\beta_T^{\text{Imp}} = 1.05$) is on average 34.2 percent larger than the pre merger estimated target beta ($\beta_T = 0.78$) when $\beta_A > \beta_T$.

Turning to the deals in which $\beta_T > \beta_A$, we see that the excess comovement is negative (-0.01) which is in line with our prediction. However, the difference is not economically or statistically significant. One potential explanation for this finding is that in order to observe excess comovement we require that target investors sell their shares. Therefore, splitting our results according to method of payment (see next section) provides for a more powerful test.

A.1 Method of Payment

If equity comovement is determined by the firm's investors, then the greater the fraction of target shareholders that exit following the merger, the greater the excess comovement (Brealey et al.) with the acquirer. In mergers that are paid only with cash, all target shareholders exit whereas in stock-for-stock mergers no target shareholder has to exit. Therefore, we expect the excess comovement with the acquirer to be significantly larger in cash mergers

than in stock mergers. Figure 3 presents pre merger and post merger betas of our cash deals according to whether $\beta_A > \beta_T$ (Panel A) or $\beta_T > \beta_A$ (Panel B).

Insert Figure 3 here

Both panels of Figure 3 are indicative of the post merger comovement having shifted significantly towards the comovement of the acquirer.

Panel A of Table 3 presents univariate analysis of pre and post merger betas of cash deals.

Insert Table 3 here

When the comovement of the acquirer is greater than the comovement of the target, the expected beta is 0.97 while the actual beta is 1.18 implying that the tilt towards the acquiring firm is 21.65 percent relative to the expected beta. Additionally, this difference is statistically significant at the one percent level. Further, the implied target beta calculated using equation (2) is 46.1 percent larger than the pre merger estimated target beta. Turning to the deals where $\beta_T > \beta_A$, we find an expected beta of 0.93 whereas the actual post merger beta is 0.84, the difference of -0.09 represents a -9.68 percent deviation from the expected merged beta. The implied target beta is now 27.5 percent lower than the pre merger beta. This difference is statistically significant at the 5 percent level.

Panel B of Table 3 presents our results for pure stock transactions. It is striking that irrespective of whether the target beta is higher or lower than the acquirer beta, the difference

between the actual and expected post merger beta is never statistically nor economically significant.

A.2 Index Inclusion

Barberis, Shleifer and Wurgler (2005) document that the comovement with the S&P 500 increases after the inclusion into the S&P 500 and Vijh (1994) documents an increase in comovement with the CRSP value-weighted index following inclusion to the S&P 500. Given that investors have preferences and mandates to invest in particular stocks, some investors will be forced to liquidate their holdings of a company once it is included into the S&P 500 (e.g., small cap funds). This implies a greater degree of exit following inclusion and therefore we would predict greater excess comovement with the acquirer for those targets that are acquired by a S&P 500 firm. In this section, we examine the excess comovement of S&P 500 included targets and verify that our previous results are not driven by index inclusion. Index composition data is obtained from COMPUSTAT. In our sample we have 61 targets that are included into the index as a result of the merger.

Insert Table 4

In Panel A of Table 4 we consider those deals in which the target is included into the S&P 500.[6] Considering those deals for which $\beta_A > \beta_T$ we find a large shift towards the co-

[6]There are very few deals in which the acquirer is included into the S&P 500 as a result of the merger (33). However, for these deals we would expect excess comovement to be smaller since there will be forced exit on the side of the acquirer.

movement of the acquirer. When considering implied target betas, the mean (median) firm experiences an increase in beta of 23.8 (38.8) percent. Unfortunately, the difference is not statistically significant, perhaps due to the low sample size. For the deals in which $\beta_A < \beta_T$, the shift towards the acquirer's comovement is larger. The mean (median) excess comovement ($\beta_M - E(\beta)$) is -0.15 (-0.13) which equals a deviation of 14.56 (12.04) percent. The effect in terms of implied target betas is larger, the mean (median) target firm experiences an decrease in beta of 46.6 (40.1) percent. These differences are statistically significant at the one percent level. Overall, the results of this panel are consistent with the findings of Barberis et al. that document a S&P 500 "habitat." Put differently, the excess comovement seems to be larger when the target is included in the index as a result of the merger.

To illustrate that our results are not driven by index inclusion, in Table 4 Panel B we consider those cash deals (where we predict and document the strongest effect) in which neither the acquirer nor the target experience a change in inclusion status from the start of the pre to the end of the post merger estimation windows. In the $\beta_A > \beta_T$ case, we find a large positive and statistically significant excess comovement while when $\beta_T > \beta_A$, it is negative and statistically significant. Hence, our results are qualitatively unchanged after removing index inclusions.

In summary, Table 4 documents that we observe an index inclusion effect consistent with previous work, but that this effect cannot explain our findings.

A.3 Industry

Investors often have a preference over what industry they invest in (e.g., Barberis and Shleifer, 2003). This implies that we expect to have a greater fraction of target shareholders exiting when mergers are across industries (e.g., industry specific mutual funds) rather than within industry. Hence, we predict the excess comovement towards the acquirer to be greater in across industry mergers than in intra industry mergers.

Table 5 splits mergers into those in which the acquirer and target have the same SIC code and those in which the SIC code of the target and the acquirer differs.[7]

Insert Table 5 here

Panel A of Table 5 considers across industry mergers. When $\beta_A > \beta_T$ the excess comovement with the acquirer beta is 11.71 percent relative to the expected beta. Similarly, the economic effect in terms of implied betas is large and statistically significant at the one percent level. The excess comovement is negative when we consider $\beta_T > \beta_A$, but economically and statistically insignificant.

In Panel B, we do not find any evidence of excess comovement for within industry mergers, which is consistent our prediction.

[7] We have also used the S&P sector classification as our industry measure. The results are qualitatively unaltered, but with a significantly smaller sample of across industry mergers.

A.4 Geography

There is a significant amount of evidence documenting that investors have a strong preference for local stocks (Coval and Moskowitz, 1999, and Huberman, 2001). In terms of geography and comovement, Pirinsky and Wang (2006) document that comovement with local stocks alters following changes in the location of firm headquarters.

Given the strong preference for local stocks, we expect greater target shareholder exit in across state mergers and therefore greater excess comovement with the acquirer. To test this, we classify mergers according to whether the headquarters (SDC) of the two merging firms are located in the same state.

Insert Table 6 here

Panel A of Table 6 considers mergers across state borders. For mergers in which $\beta_A > \beta_T$, we find that the tilt towards the acquirer beta is statistically significant at the one percent level. We consider same state mergers in Panel B and find no significant tilt towards the acquirer. Although our geography results are weaker than our results on industry and method of payment, they are indicative of excess comovement being greater for across state mergers.

A.5 Leverage

We follow Ghosh and Jain (2000) in computing the change in leverage due to the merger. The leverage ratio is the fiscal year-end ratio of debt to total firm value. We measure debt

as the book value of long-term debt added to the debt in current liabilities as reported by Compustat. Total firm value is the book value of debt added to the market value of equity. To facilitate comparison of pre and post merger leverage we construct a hypothetical merged firm prior to announcement by pooling the balance sheet of the target and acquirer.

Figure 4 describes the leverage level from three years before the announcement to three years after the completion to cover the beta estimation windows.

Insert Figure 4 here

Panel A considers the leverage of our entire sample while Panel B considers only cash deals. The results parallel those of Ghosh and Jain, we find that leverage increases as a result of the merger. In Panel A the leverage increases by roughly seven percentage points from three years before the announcement to three years after completion. If we consider the time period from one year prior to the announcement to one year after completion, similar to Ghosh and Jain, we find that leverage increases by seven percent.

In both Panels, A and B, we have split our sample according to whether the beta of the target is higher or lower than the beta of the acquirer. The leverage pattern is strikingly similar irrespective of the relative riskiness of the acquirer and the target. In both cases the leverage increases due to the merger. Since Figure 4 documents that when the beta of the acquirer is smaller than the beta of the target, this leverage increase predicts a higher than expected post merger beta. However, in this case, Table 3 Panel A documents that the post merger beta is in fact lower than expected, indicating that leverage cannot explain our results.

Further, to make sure that leverage is not driving our results, in Table 7 we have split our cash deals (where we predict and document the strongest effect) according to whether they have above (Panel A) or below (Panel B) median change in leverage.

Insert Table 7 here

Table 7 provides different pieces of evidence to suggest that the excess comovement is not due to leverage. Firstly, our transactions in Panel A experience an insignificant average (median) increase in leverage of 2.23 (2.34) percent. Nonetheless, the post merger beta is higher than expected when the beta of the acquirer is larger than the beta of the target ($\beta_A > \beta_T$). Hence we document the effect in the absence of a leverage increase. The difference between the actual and the expected post merger beta is economically significant, however the reduction in power implies that we cannot reject the null. Secondly, in Panel B our transactions experience an average (median) increase in leverage of 34.30 (31.76) percent. For deals in which the beta of the target is larger than the beta of the acquirer (i.e., those deals where leverage increases are predicted to reduce excess comovement with the acquirer) we find a difference between the post merger beta and the expected beta of -0.09. This implies that the excess comovement is still economically significant even though leverage increases substantially. Even though the above two findings suggest that leverage does not explain our excess comovement, it is clear from Table 7 that leverage does influence estimated betas. Consider when the beta of the acquirer is larger than the beta of the target, going from Panel A to Panel B implies an increase in the point estimate of the excess comovement ($\beta_M - E(\beta)$) from 0.12 to 0.25. On the other hand, when the beta of

the acquirer is lower than the beta of the target, going from Panel A to Panel B decreases the median excess comovement from -0.11 to -0.05 indicating that leverage increases are associated with increases in beta. In general, our results are weaker when the beta of the target is greater than the beta of the acquirer which can be justified by the observed leverage increase.

The results of this section are indicative of excess comovement being independent of leverage, which our regression analysis below provides further evidence of.

B Regression Analysis

B.1 Deal Characteristics and Excess Comovement

In this section, we pool all transactions and use regression analysis to document the existence of excess comovement while controlling for deal specific factors. To examine whether the post merger beta is closer to the acquirer, we use as dependent variable excess comovement ($\beta_M - E(\beta)$, equation (1)). To capture the asymmetric prediction of the tilt being positive when $\beta_A > \beta_T$ (see Figure 3, Panel A) and negative when $\beta_T > \beta_A$ (see Figure 3, Panel B) we consider as explanatory variable the conditional beta dummy ($\beta_A|\beta_T$) which takes the value of $1(-1)$ if the beta of the acquirer is larger (smaller) than the beta of the target. This implies that we always expect a positive relation between $\beta_A|\beta_T$ and our dependent variable ($\beta_M - E(\beta)$). We estimate the following regression:

$$\beta_M - E(\beta) = \alpha + b_1(\beta_A|\beta_T) + \mathbf{\Gamma}'\mathbf{W} + \varepsilon \tag{3}$$

where $\mathbf{W}$ is vector of control variables, $\mathbf{\Gamma}$ is a vector of coefficients and ε is an error term.

Insert Table 8 here

Table 8 contains the results from our regression analysis. In the first specification, we estimate equation (3) without control variables. Our main variable of interest, $\beta_A|\beta_T$, is positively and significantly related to excess comovement.

Specification (2) introduces our control variables. To make sure our results are not driven by leverage we introduce as a control variable the absolute change in leverage (defined in section A.5 of the Empirical Findings). It is comforting that the coefficient on leverage is positive and significant, indicating that post merger betas are increased as a result of the leverage added in the merger. Additionally, we control for the synergies associated with the merger and the relative market capitalization of the target. Finally, we control for changes in comovement due to index inclusions with our dummy variable *Index Inclusion*.[8]

The effect of the conditional beta dummy ($\beta_A|\beta_T$) is economically significant, going from deals where $\beta_A < \beta_T$ ($\beta_A|\beta_T$ takes the value -1) to deals where $\beta_A > \beta_T$ results in an increase in excess comovement of 0.09 (specification (2)). This represents a 225 percent change compared to the average excess comovement of the full sample (0.04). Put in terms of betas, our results imply that the post merger beta of the firm increases by 0.09 when $\beta_A|\beta_T$ goes from -1 to 1. This represents a 8.75 percent change compared to the average target beta in our sample.[9]

[8] In our sample we have 66 targets and 37 aquirers that change their S&P 500 status (inclusions and deletions) from the start of the pre merger to end of the post merger estimation period. Since our goal here is to make sure that our regression results are not driven by changes in S&P 500 status, we control for any change in status for either acquirers or targets.

[9] In this regression, the estimated economic impact probably understates the true impact on target betas

For those deals in which we expect particularly large excess comovement, cash (specification (3)), target index inclusion (specification (5)), across industry mergers (specification (6)) and across state mergers (specification (8)), the conditional beta dummy is at least statistically significant at the five percent level. However, we find no evidence of excess comovement in stock deals (specification (4)), same industry (specification (7)) and same state transactions (specification (9)). As expected, there is substantial variation in economic impact across deal characteristics. For example, the economic impact of cash transactions and deals in which the target is included in the S&P 500 is three times the economic impact of the full sample. Overall, the results of Table 8 demonstrate the existence of excess comovement while controlling for leverage and transaction synergies. The next section formally tests whether there are differences in excess comovement across deal characteristics.

B.2 Shareholder Exit and Excess Comovement

In this section, we verify that deals that should be associated with greater shareholder exit also experience greater excess comovement. To capture that, we expect the tilt towards the acquirer's beta to be larger in cash transactions (due to the complete exit of target shareholders), we interact our dummy variable *Cash* with the conditional beta dummy ($\beta_A|\beta_T$). Our prediction is that *Cash* transactions are associated with a greater excess comovement than *Stock* deals. To test this, we keep deals financed with 100 percent stock as our base category and introduce interacted (with $\beta_A|\beta_T$) dummy variables for all other categories (*Cash*,

since targets, on average, represent 35 percent of the market capitalization of the merged firm.

Mixed and *Other*). Thus, specification (3) in Table 9 estimates the following regression,

$$\beta_M - E(\beta) = \alpha + b_2(\beta_A|\beta_T \times Cash) + b_3(\beta_A|\beta_T \times Mixed) + b_4(\beta_A|\beta_T \times Other) + \mathbf{\Gamma'W} + \varepsilon$$

As expected, we find that the excess comovement with the acquirer is statistically significantly greater for cash transactions than for stock transactions. In terms of economic magnitude, cash transactions are associated with a 450 percent greater excess comovement than stock transactions.

Insert Table 9

In specification (4), we consider whether the excess comovement with the acquirer is larger in cases where the target is included in the S&P 500 as a result of the merger.

To do so, we create the dummy variable, *Target Inclusion.* Specifically, this dummy variable takes the value of 1 if the acquirer is included in the S&P 500 prior to the announcement whereas the target is not and the merged firm is not excluded from the S&P 500 during our post estimation window. In the regression, we interact the dummy variable with the conditional beta dummy ($\beta_A|\beta_T$). The point estimate of the coefficient is positive and economically as well as statistically (one sided test at the ten percent level) significant. Thus, suggesting that index inclusion is associated with significant investor exit which results in a larger tilt towards the comovement of the acquirer. The economic magnitude is large and comparable to that of cash deals.

Similarly, we also consider whether the degree of excess comovement varies with other factors such as geography and industry that investors have a clear preference for. To do so, we create two dummy variables, *Different SIC* and *Different State,* that take the value 1 if

target and acquirer have different SIC codes and are headquartered in different states respectively and 0 otherwise. Like before, we interact the dummy variables with the conditional beta dummy ($\beta_A|\beta_T$). In specification (5), we examine whether mergers across industries are associated with a tilt towards the acquirer. The coefficient on our interaction variable $\beta_A|\beta_T \times$ *Different SIC* is positive and significant in both economic and statistical terms. Finally, in specification (6), we consider whether deals in which the target and acquirer are located in different states are associated with larger post merger beta differentials. The coefficient on our interaction variable is positive and statistically significant at the ten percent level. The results of Table 9 suggest that shareholder exit significantly impacts excess comovement.

4 Robustness

One concern raised by Brealey et al. (2010) is that the merger transforms the targets assets to become more like the assets of the acquirer. However, for this transformation to explain our findings it must be that the transformation is more rapid for cash transactions and deals in which the target is included in the S&P 500 index. Furthermore, this transformation has to be rather rapid since we estimate our post merger beta over 100 weeks following completion. Additionally, we follow Brealey et al. and document the progression of comovement post completion. If asset transformation is driving our results we would expect that the unobserver target beta tends towards the acquirer beta over time. This has several implications. First, the beta of the merged firm should be changing as the assets are being transformed. Second,

when the beta of the acquirer is greater than the beta of the target ($\beta_A > \beta_T$), as the beta of the target converges to that of the acquirer the beta of the merged firm should increase. Third, when $\beta_T > \beta_A$ the beta of the merged firm should decrease as the transformation progresses. To test these predictions we have estimated the post merger beta over 100 weeks starting in eight consecutive quarters following completion.

Insert Figure 5 here

Panel A of Figure 5 considers the progression of the post merger beta for cash deals in which $\beta_A > \beta_T$. Contrary to the asset transformation hypothesis we do not find an increase in the post merger beta over time. The beta at completion is 1.17 and the last estimated beta is 1.08.[10] The difference between the two is not statistically significant. In Panel B of Figure 5 we consider cash deals for which $\beta_T > \beta_A$. There is no discernible trend in beta over time, the beta at completion is 0.82 and the last estimated beta is 0.85. The difference is neither statistically nor economically significant.[11]

5 Conclusion

Previous studies (Chan, et al., 2003, and Brealey et al., 2010) document excess comovement in international equity markets. These papers study events in which the shareholder base of

[10] The corresponding post merger beta estimated in Table 3 is 1.18 (compared to 1.17 in this section). To consider the progression in comovement we require the firm to be present in CRSP four years following the completion and this results in a loss of three observations compared to Table 3.

[11] Using the overall sample we have confirmed that asset transformation is not driving our results.

the firm is expected to change (listings and cross-border mergers) and relate this to changes in comovement. Thereby providing evidence of international segmentation and suggesting that stocks are priced on country level rather than internationally (see Karolyi and Stulz, 2003 for a review of the literature).

This paper provides evidence of excess comovement in US mergers and thereby of segmentation on a national level. We do this by comparing a post merger beta to an expected post merger beta based on the pre merger comovement of the target and the acquirer. We find that the post merger comovement is shifted towards the comovement of the acquirer.

In a similar vein, Barberis et al. (2005) document segmentation on a national level by showing that stocks that are included into the S&P 500 experience an increase in comovement with the S&P 500. They argue that there are investor habitats and therefore index inclusion is associated with investor entry and exit. When we consider those target firms that are included into the S&P 500, we find evidence suggesting that the shift towards the acquirer is larger corroborating the existence of a S&P 500 habitat. Additionally, we verify that our results remain qualitatively unchanged even in the absence of index inclusion. Relying on mergers for identification rather than index inclusion has the advantage that we can consider segmentation along other dimensions over which investors may show a preference for, such as industry, geographic location (e.g., Pirinsky and Wang, 2006) and index membership.

Identifying excess comovement relies on two assumptions; first that there is entry or exit of investors associated with the event and second that nothing else is altered as a result of the event. Arguably, firms may undergo significant changes as a result of a merger (e.g., leverage may increase) and therefore, it is important that we are careful in considering alternative stories. However, for any alternative story to explain our results it must be the case that the

explanation generates asymmetric predictions with respect to the relative riskiness of the acquirer and the target. That is, the story has to jointly explain why the post merger beta is greater than expected when the comovement with the market of the acquirer is greater than that of the target and why the post merger beta is smaller than expected when the target is riskier than the acquirer. For example in terms of leverage, it must increase in one set of transactions and decrease for the complement. In particular, we control for changes in leverage and synergies in our analysis.

Given the mounting evidence that markets are segmented (both internationally and nationally), this suggests that care should be taken when estimating betas in situations in which a significant proportion of the investor base has been altered.

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Figure 1
Timeline

This figure depicts the timeline of our research design. During the pre run-up period, which lasts for 100 weeks and ends eight weeks prior to the merger announcement, we estimate the betas for the acquiror (β_A) and the target (β_T). $E(\beta)$ is the market value weighted average of these betas, adjusted for a possible toehold. The run-up period, covering the eight weeks prior to announcement, is excluded from the estimation period due to the possibility of informed trading. The post merger period lasts for 100 weeks after completion. In this period we estimate the beta of the merged firm, β_M.

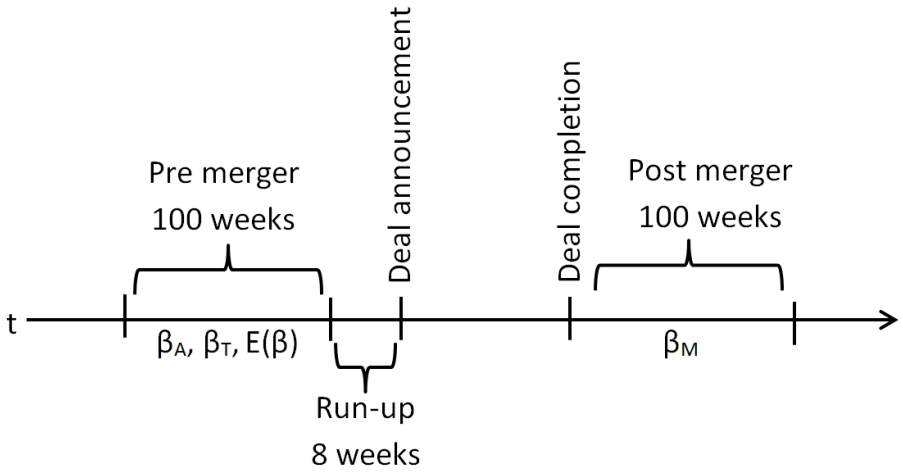
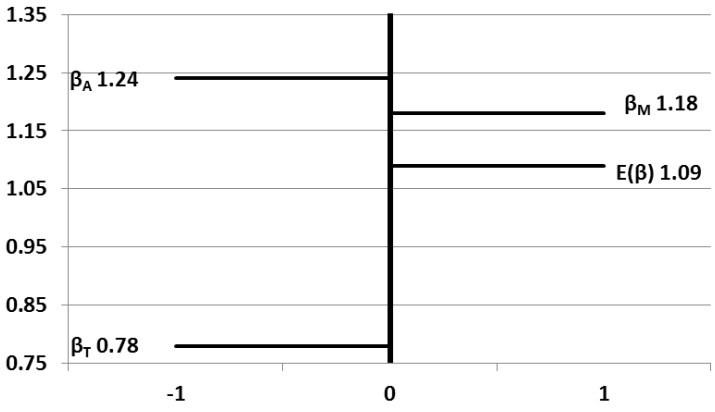


Figure 2
Comovement changes in mergers

These figures illustrate changes in comovement as a result of the merger. Panel A illustrates the deals for which $\beta_A > \beta_T$ and Panel B the deals for which $\beta_A < \beta_T$. The horizontal axis represents the timing of the merger: (-1) is the pre and (1) the post merger period. β_A and β_T are the pre merger betas of the acquirer and target respectively. $E(\beta)$ is the expected beta of the merged firm, calculated as the market value weighted average of β_A and β_T, adjusted for a possible toehold. Finally, β_M is the beta of the merged firm after completion.

(a) Panel A: $\beta_A > \beta_T$



(b) Panel B: $\beta_T > \beta_A$

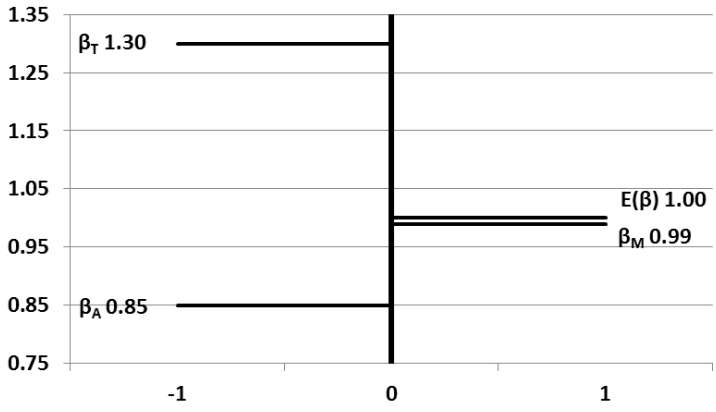
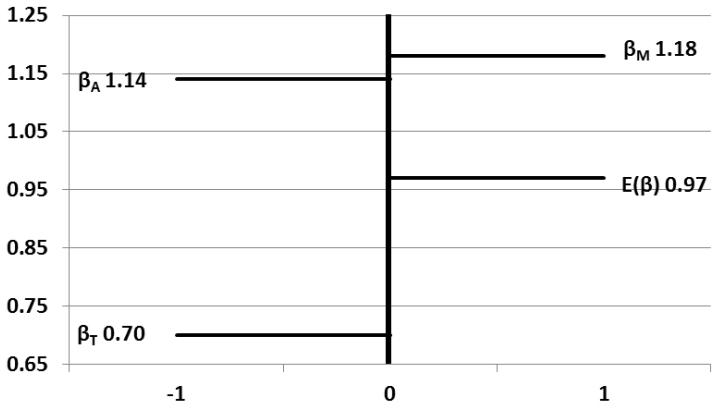


Figure 3
Comovement changes in cash mergers

These figures illustrate changes in comovement as a result of the merger for cash deals only. Panel A illustrates the deals for which $\beta_A > \beta_T$ and Panel B the deals for which $\beta_A < \beta_T$. The horizontal axis represents the timing of the merger: (-1) is the pre and (1) the post merger period. β_A and β_T are the pre merger betas of the acquirer and target respectively. $E(\beta)$ is the expected beta of the merged firm, calculated as the market value weighted average of β_A and β_T, adjusted for a possible toehold. Finally, β_M is the beta of the merged firm after completion.

(a) Panel A: $\beta_A > \beta_T$



(b) Panel B: $\beta_T > \beta_A$

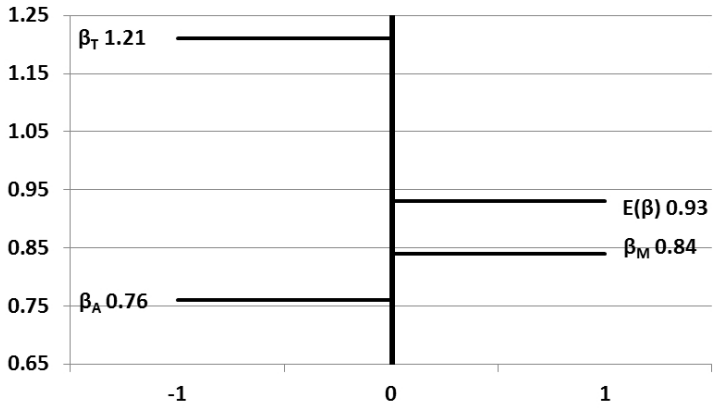
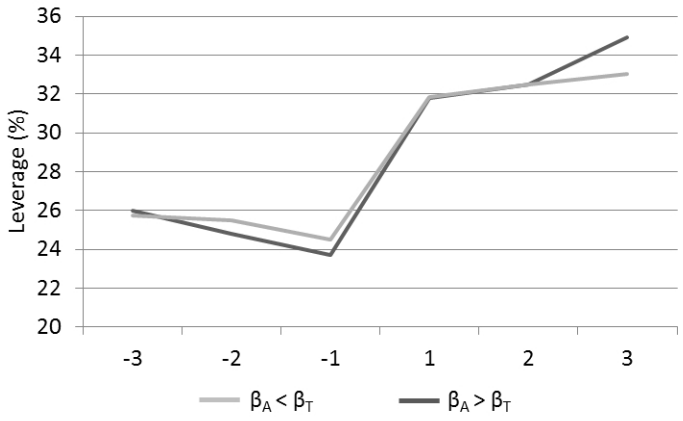


Figure 4
Average change in leverage around mergers

This figure illustrates the average change in leverage around mergers. Panel A contains the data of the full sample while Panel B contains cash deals only. Furthermore, the data is split according to whether $\beta_A > \beta_T$ or $\beta_A < \beta_T$. Leverage is defined as the end-of-year ratio of the sum of the acquirer's and target's book value of debt to the sum of the acquirer's and target's total market value. Total market value is defined as book value of debt plus the market value of equity. Book value of debt is defined as the sum of long-term debt (Compustat-Item dltt) plus debt in current liabilities (Compustat-Item dlc). The leverage levels are shown for the three years prior to announcement and the three years after completion.

(a) Panel A: Full Sample



(b) Panel B: Cash Transactions

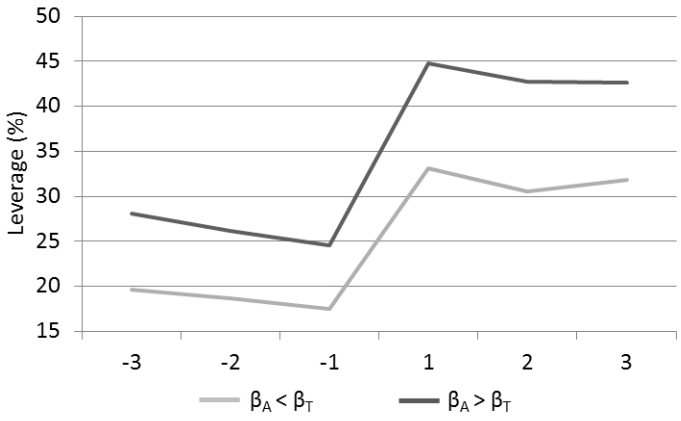
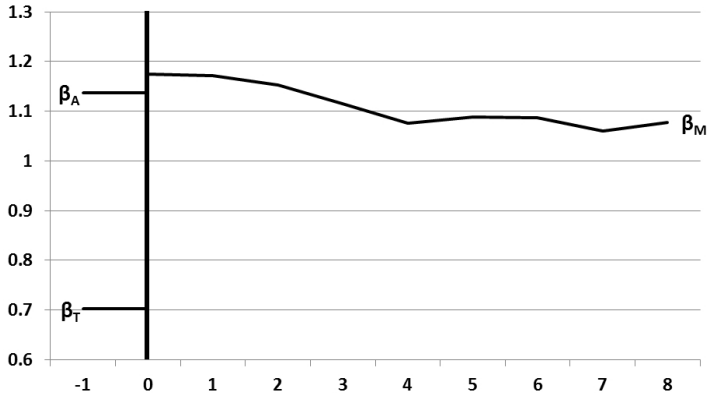


Figure 5
Progression of the merged firm's beta

This figure depicts the progression of the merged firm's beta over time. Panel A illustrates the deals for which $\beta_A > \beta_T$ and Panel B the deals for which $\beta_A < \beta_T$. The horizontal axis represents the timing of the merger: (-1) is the pre merger period, (0) the completion period and positive numbers are quarters after completion (one to eight). During the pre run-up period, which lasts for 100 weeks and ends eight weeks prior to the merger announcement, we estimate the betas for the acquirer (β_A) and the target (β_T). The beta of the merged firm, β_M, is estimated for the first time at completion using 100 weeks of data. In each of the consecutive eight quarters, the beta of the merged firm is estimated anew using 100 weeks of data.

(a) Panel A: $\beta_A > \beta_T$



(b) Panel B: $\beta_T > \beta_A$

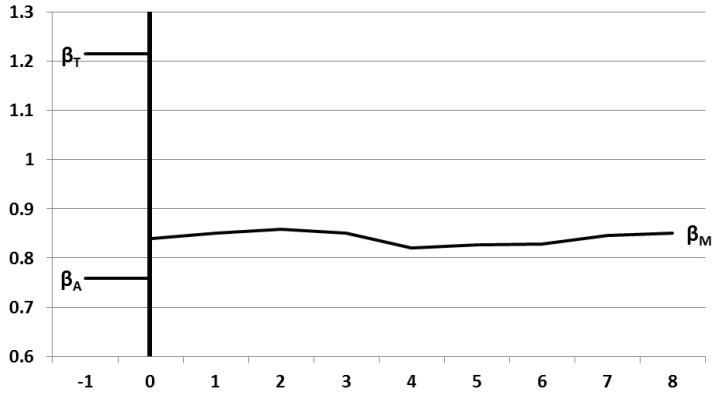


Table 1
Summary statistics of our main variables

We present descriptive statistics for our main variables. *MV Target* and *MV Acquirer* is the market value in Mio. USD of the target and the acquirer firm eight weeks prior to deal announcement. *Target Weight* is the ratio of MV Target to the combined market value, MV Target plus MV Acquirer, adjusted for a possible toehold. *Leverage ex-ante* is the end-of-year ratio of the sum of the acquirer's and target's book value of debt to the combined total market value for the year prior to announcement. Total market value is defined as book value of debt plus market value of equity. Book value of debt is calculated as the sum of long-term debt (Compustat-Item dltt) plus debt in current liabilities (Compustat-Item dlc). *Leverage ex-post* is calculated analogously for the year after deal completion. *Synergies* is the ratio of the combined, market adjusted abnormal value (target and acquirer) created over a six week window around the merger announcement (three weeks before and three weeks after) relative to the combined market value of the target and acquirer eight weeks prior to the merger announcement. Synergies are winsorized at the one and 99 percent level. λ is the toehold the acquirer owns at deal announcement. β's are estimated using weekly data over a 100 weeks estimation period. β_A is the acquirer's and β_T the target's beta based on an estimation window ending eight weeks prior to deal announcement. E(β) is the expected beta of the merged firm, calculated as market value (MV Target and MV Acquirer) weighted average of β_A and β_T, adjusted for possible toeholds. β_M is the beta of the merged firm calculated after deal completion. All β's are winsorized at the one and 99 percent level.

Variable	Mean	Median	Std. Dev.	Min	Max	N
MV Target (Mio.)	2'360	7'117	461	28	81'900	712
MV Acquirer (Mio.)	4'928	17'000	987	22	230'000	712
Target Weight	34.47%	15.74%	32.49%	2.74%	79.77%	712
Leverage ex-ante	23.91%	18.02%	21.05%	0.00%	83.66%	693
Leverage ex-post	31.74%	23.38%	28.27%	0.00%	94.99%	703
Synergies	6.23%	16.76%	5.08%	-38.59%	68.71%	712
λ	2.95%	12.87%	0.00%	0.00%	95.35%	712
β_A	1.05	0.60	0.98	-0.27	3.01	712
β_T	1.03	0.64	0.98	-0.59	3.16	712
E(β)	1.05	0.54	1.00	-0.31	2.90	712
β_M	1.09	0.57	1.03	-0.44	2.78	712

Table 2
Univariate Results for the full sample

We present univariate results for the full sample according to whether $\beta_A > \beta_T$ (columns 2 and 3) or $\beta_A < \beta_T$ (columns 4 and 5). β_A and β_T are the pre merger betas of the acquirer and the target. $E(\beta)$ is the expected merged beta, calculated as the market value weighted average of the target and the acquirer beta. Weights are adjusted for a possible toehold. β_M is the actual merged beta and $\beta_M - E(\beta)$ is *Excess Comovement*. We report mean and median test statistics (in brackets) for Excess Comovement being positive ($\beta_M - E(\beta) > 0$) when $\beta_A > \beta_T$ and negative ($\beta_M - E(\beta) < 0$) when $\beta_A < \beta_T$. β_T^{Imp} is the implicit value of the target beta which would be required for $\beta_M = E(\beta)$ to hold. $\beta_T^{Imp} - \beta_T$ is the difference between the implicit and the observed target beta. Testing procedure and statistics are as above. *Change* is the difference between β_T^{Imp} and β_T in percent. All betas are winsorized at the one and 99 percent level. Test statistics are reported for one sided tests with the significance levels of ten percent(*), five percent(**) and one percent(***).

Overall Sample				
	$\beta_A > \beta_T$		$\beta_T > \beta_A$	
	Mean	Median	Mean	Median
β_A	1.24	1.19	0.85	0.80
β_T	0.78	0.75	1.30	1.18
$E(\beta)$	1.09	1.04	1.00	0.96
β_M	1.18	1.11	0.99	0.94
$\beta_M - E(\beta)$	0.09***	0.06***	-0.01	-0.05
	(3.08)	(2.47)	(-0.45)	(-0.71)
β_T^{Imp}	1.05	0.93	1.26	1.10
$\beta_T^{Imp} - \beta_T$	0.27**	0.18**	-0.04	-0.08
	(2.32)	(1.95)	(-0.43)	(-0.66)
Change	34.2%	23.4%	-3.2%	-7.2%
N	372	372	340	340

Table 3
Univariate results according to method of payment

We present univariate results for different methods of payment. Panel A restricts the full sample to cash deals only while Panel B considers pure stock deals. We measure Excess Comovement according to whether $\beta_A > \beta_T$ (columns 2, 3, 6 and 7) or $\beta_A < \beta_T$ (columns 4, 5, 8 and 9). β_A and β_T are the pre merger betas of the acquirer and the target. $E(\beta)$ is the expected merged beta, calculated as the market value weighted average of the target and the acquirer beta. Weights are adjusted for a possible toehold. β_M is the actual merged beta and $\beta_M - E(\beta)$ is *Excess Comovement*. We report mean and median test statistics (in brackets) for Excess Comovement being positive ($\beta_M - E(\beta) > 0$) when $\beta_A > \beta_T$ and negative ($\beta_M - E(\beta) < 0$) when $\beta_A < \beta_T$. β_T^{Imp} is the implicit value of the target beta which would be required for $\beta_M = E(\beta)$ to hold. $\beta_T^{Imp} - \beta_T$ is the difference between the implicit and the observed target beta. Testing procedure and statistics are as above. *Change* is the difference between β_T^{Imp} and β_T in percent. All betas are winsorized at the one and 99 percent level. Test statistics are reported for one sided tests with the significance levels of ten percent(*), five percent(**) and one percent(***).

	Panel A: Cash Deals				Panel B: Stock Deals			
	$\beta_A > \beta_T$		$\beta_T > \beta_A$		$\beta_A > \beta_T$		$\beta_T > \beta_A$	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median
β_A	1.14	1.14	0.76	0.73	1.36	1.26	0.96	0.89
β_T	0.70	0.69	1.21	1.10	0.86	0.83	1.43	1.22
$E(\beta)$	0.97	0.99	0.93	0.87	1.20	1.12	1.11	1.02
β_M	1.18	1.12	0.84	0.83	1.23	1.18	1.11	1.03
$\beta_M - E(\beta)$	0.20***	0.14***	-0.09**	-0.11**	0.03	-0.05	0.00	-0.04
	(2.97)	(2.42)	(-1.70)	(-1.77)	(0.70)	(0.24)	(-0.06)	(-0.18)
β_T^{Imp}	1.03	1.07	0.88	0.93	0.96	0.66	1.39	1.29
$\beta_T^{Imp} - \beta_T$	0.32*	0.38**	-0.33**	-0.17**	0.11	-0.17	-0.04	0.07
	(1.41)	(1.88)	(-1.94)	(-1.75)	(0.56)	(-0.05)	(-0.20)	(0.12)
Change	46.1%	54.5%	-27.5%	-15.2%	12.7%	-20.2%	-2.5%	5.8%
N	66	66	58	58	148	148	115	115

Table 4

Univariate results according to index inclusion

We present univariate results for index inclusion. Panel A restricts the full sample to deals where the target has become part of the S&P 500 Index as a result of the transaction. Panel B restricts the full sample to only cash deals that are not affected by any change in S&P 500 listing status. We measure Excess Comovement according to whether $\beta_A > \beta_T$ (columns 2, 3, 6 and 7) or $\beta_A < \beta_T$ (columns 4, 5, 8 and 9). β_A and β_T are the pre merger betas of the acquirer and the target. $E(\beta)$ is the expected merged beta, calculated as the market value weighted average of the target and the acquirer beta. Weights are adjusted for a possible toehold. β_M is the actual merged beta and $\beta_M - E(\beta)$ is *Excess Comovement*. We report mean and median test statistics (in brackets) for Excess Comovement being positive ($\beta_M - E(\beta) > 0$) when $\beta_A > \beta_T$ and negative ($\beta_M - E(\beta) < 0$) when $\beta_A < \beta_T$. β_T^{Imp} is the implicit value of the target beta which would be required for $\beta_M = E(\beta)$ to hold. $\beta_T^{Imp} - \beta_T$ is the difference between the implicit and the observed target beta. Testing procedure and statistics are as above. *Change* is the difference between β_T^{Imp} and β_T in percent. All betas are winsorized at the one and 99 percent level. Test statistics are reported for one sided tests with the significance levels of ten percent(*), five percent(**) and one percent(***).

	Panel A: Target Index Incl.				Panel B: Cash Deals w/o Index Incl.			
	$\beta_A > \beta_T$		$\beta_T > \beta_A$		$\beta_A > \beta_T$		$\beta_T > \beta_A$	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median
β_A	0.98	0.87	0.92	0.92	1.14	1.16	0.75	0.73
β_T	0.68	0.60	1.32	1.32	0.68	0.65	1.21	1.08
$E(\beta)$	0.89	0.80	1.03	1.08	0.96	1.01	0.93	0.87
β_M	1.00	0.86	0.87	0.93	1.17	1.13	0.83	0.82
$\beta_M - E(\beta)$	0.11	0.13	-0.15***	-0.13***	0.21***	0.16***	-0.09**	-0.11**
	(1.15)	(1.09)	(-2.54)	(-2.54)	(2.89)	(2.31)	(-1.69)	(-1.75)
β_T^{Imp}	0.84	0.84	0.71	0.79	1.09	1.02	0.89	0.98
$\beta_T^{Imp} - \beta_T$	0.16	0.23	-0.62**	-0.53***	0.41**	0.37**	-0.32**	-0.11*
	(0.41)	(0.58)	(-2.37)	(-2.56)	(1.71)	(1.83)	(-1.84)	(-1.65)
Change	23.8%	38.8%	-46.6%	-40.1%	59.7%	56.8%	-26.4%	-9.7%
N	32	32	29	29	57	57	52	52

Table 5
Univariate results according to industry

We present univariate results for intra versus inter industry mergers. Panel A restricts the full sample to across industry deals (different SIC) only while Panel B considers within industry deals (same SIC) exclusively. We measure Excess Comovement according to whether $\beta_A > \beta_T$ (columns 2, 3, 6 and 7) or $\beta_A < \beta_T$ (columns 4, 5, 8 and 9). β_A and β_T are the pre merger betas of the acquirer and the target. $E(\beta)$ is the expected merged beta, calculated as the market value weighted average of the target and the acquirer beta. Weights are adjusted for a possible toehold. β_M is the actual merged beta and $\beta_M - E(\beta)$ is *Excess Comovement*. We report mean and median test statistics (in brackets) for Excess Comovement being positive ($\beta_M - E(\beta) > 0$) when $\beta_A > \beta_T$ and negative ($\beta_M - E(\beta) < 0$) when $\beta_A < \beta_T$. β_T^{Imp} is the implicit value of the target beta which would be required for $\beta_M = E(\beta)$ to hold. $\beta_T^{Imp} - \beta_T$ is the difference between the implicit and the observed target beta. Testing procedure and statistics are as above. *Change* is the difference between β_T^{Imp} and β_T in percent. All betas are winsorized at the one and 99 percent level. Test statistics are reported for one sided tests with the significance levels of ten percent(*), five percent(**) and one percent(***).

	Panel A: Different SIC				Panel B: Same SIC			
	$\beta_A > \beta_T$		$\beta_T > \beta_A$		$\beta_A > \beta_T$		$\beta_T > \beta_A$	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median
β_A	1.27	1.23	0.83	0.77	1.19	1.11	0.88	0.85
β_T	0.77	0.74	1.28	1.18	0.80	0.76	1.32	1.18
$E(\beta)$	1.11	1.07	0.98	0.90	1.06	1.00	1.03	1.02
β_M	1.23	1.15	0.97	0.93	1.09	1.06	1.02	0.95
$\beta_M - E(\beta)$	0.13***	0.11***	-0.02	-0.02	0.04	-0.04	0.00	-0.08
	(3.15)	(2.78)	(-0.51)	(-0.45)	(0.87)	(0.33)	(-0.11)	(-0.54)
β_T^{Imp}	1.17	0.97	1.22	1.15	0.87	0.84	1.30	1.09
$\beta_T^{Imp} - \beta_T$	0.40***	0.23**	-0.06	-0.03	0.07	0.08	-0.02	-0.09
	(2.49)	(2.26)	(-0.46)	(-0.32)	(0.43)	(0.19)	(-0.12)	(-0.65)
Change	51.9%	31.2%	-4.6%	-2.8%	8.5%	9.9%	-1.4%	-7.5%
N	224	224	197	197	148	148	143	143

Table 6

Univariate results according to geography

We present univariate results for within and across State mergers. Panel A restricts the full sample to across State deals (different State) only while Panel B considers within State deals (same State) exclusively. We measure Excess Comovement according to whether $\beta_A > \beta_T$ (columns 2, 3, 6 and 7) or $\beta_A < \beta_T$ (columns 4, 5, 8 and 9). β_A and β_T are the pre merger betas of the acquirer and the target. $E(\beta)$ is the expected merged beta, calculated as the market value weighted average of the target and the acquirer beta. Weights are adjusted for a possible toehold. β_M is the actual merged beta and $\beta_M - E(\beta)$ is *Excess Comovement*. We report mean and median test statistics (in brackets) for Excess Comovement being positive ($\beta_M - E(\beta) > 0$) when $\beta_A > \beta_T$ and negative ($\beta_M - E(\beta) < 0$) when $\beta_A < \beta_T$. β_T^{Imp} is the implicit value of the target beta which would be required for $\beta_M = E(\beta)$ to hold. $\beta_T^{Imp} - \beta_T$ is the difference between the implicit and the observed target beta. Testing procedure and statistics are as above. *Change* is the difference between β_T^{Imp} and β_T in percent. All betas are winsorized at the one and 99 percent level. Test statistics are reported for one sided tests with the significance levels of ten percent(*), five percent(**) and one percent(***).

	Panel A: Different State				Panel B: Same State			
	$\beta_A > \beta_T$		$\beta_T > \beta_A$		$\beta_A > \beta_T$		$\beta_T > \beta_A$	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median
β_A	1.23	1.17	0.86	0.83	1.26	1.22	0.84	0.73
β_T	0.77	0.72	1.32	1.18	0.81	0.81	1.23	1.19
$E(\beta)$	1.08	1.01	1.01	0.96	1.10	1.09	0.99	0.87
β_M	1.18	1.12	0.99	0.95	1.17	1.09	1.00	0.93
$\beta_M - E(\beta)$	0.10***	0.07***	-0.02	-0.07	0.07	-0.03	0.02	0.04
	(2.90)	(2.47)	(-0.76)	(-1.01)	(1.09)	(0.51)	(0.31)	(0.30)
β_T^{Imp}	1.09	0.92	1.25	1.08	0.93	1.03	1.26	1.26
$\beta_T^{Imp} - \beta_T$	0.31***	0.20**	-0.07	-0.10	0.12	0.22	0.02	0.06
	(2.35)	(1.94)	(-0.55)	(-0.98)	(0.52)	(0.53)	(0.15)	(0.41)
Change	40.6%	27.9%	-5.0%	-8.1%	14.4%	27.0%	1.9%	5.1%
N	285	285	249	249	87	87	91	91

Table 7
Univariate results for changes in leverage

We present univariate results for different level of changes in leverage. We restrict the sample to cash deals only. Panel A contains all deals where the change in leverage is below the median (Q1) change. Panel B includes all deals where the change in leverage is above the median (Q2) change. The mean (median) change in leverage is reported in the second row of each panel. We measure Excess Comovement according to whether $\beta_A > \beta_T$ (columns 2, 3, 6 and 7) or $\beta_A < \beta_T$ (columns 4, 5, 8 and 9). β_A and β_T are the pre merger betas of the acquirer and the target. $E(\beta)$ is the expected merged beta, calculated as the market value weighted average of the target and the acquirer beta. Weights are adjusted for a possible toehold. β_M is the actual merged beta and $\beta_M - E(\beta)$ is *Excess Comovement*. We report mean and median test statistics (in brackets) for Excess Comovement being positive ($\beta_M - E(\beta) > 0$) when $\beta_A > \beta_T$ and negative ($\beta_M - E(\beta) < 0$) when $\beta_A < \beta_T$. β_T^{Imp} is the implicit value of the target beta which would be required for $\beta_M = E(\beta)$ to hold. $\beta_T^{Imp} - \beta_T$ is the difference between the implicit and the observed target beta. Testing procedure and statistics are as above. *Change* is the difference between β_T^{Imp} and β_T in percent. All betas are winsorized at the one and 99 percent level. Test statistics are reported for one sided tests with the significance levels of ten percent(*), five percent(**) and one percent(***).

	Panel A: Δ Leverage Q1 2.23% (2.34%)				Panel B: Δ Leverage Q2 34.70% (32.04%)			
	$\beta_A > \beta_T$		$\beta_T > \beta_A$		$\beta_A > \beta_T$		$\beta_T > \beta_A$	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median
β_A	1.24	1.14	0.77	0.72	1.10	1.16	0.70	0.70
β_T	0.76	0.72	1.26	1.10	0.72	0.76	1.13	1.02
$E(\beta)$	1.10	1.01	0.93	0.89	0.92	0.97	0.90	0.83
β_M	1.22	1.17	0.84	0.84	1.17	1.11	0.80	0.80
$\beta_M - E(\beta)$	0.12	0.06	-0.09*	-0.11*	0.25***	0.16**	-0.09	-0.05
	(1.20)	(0.80)	(-1.33)	(-1.38)	(2.47)	(2.06)	(-1.06)	(-1.02)
β_T^{Imp}	0.86	0.85	0.75	0.81	1.06	1.26	0.98	0.98
$\beta_T^{Imp} - \beta_T$	0.10	0.39	-0.51**	-0.28**	0.34	0.49**	-0.15	-0.04
	(0.27)	(0.00)	(-1.99)	(-1.76)	(1.21)	(2.00)	(-0.94)	(-0.76)
Change	13.5%	19.0%	-40.3%	-25.7%	47.9%	64.5%	-13.3%	-4.1%
N	26	26	32	32	35	35	22	22

Table 8
Regression results for subsamples

We present the regression results for different subsets of the sample in this table. The dependent variable is the difference between the observed and the expected beta of the merged firm ($\beta_M - E(\beta)$). Each column is named after the selection criterion of the sample subset it covers. $\beta_A|\beta_T$ measures relative riskiness and is equal to (-1) for $\beta_A < \beta_T$ and 1 for $\beta_A > \beta_T$. $\beta_A|\beta_T \times Cash$, $\beta_A|\beta_T \times Mixed$ and $\beta_A|\beta_T \times Other$ are interaction variables of the dummy variables of cash, mixed and other deals with $\beta_A|\beta_T$. The base category in regression (3) are stock deals. $\beta_A|\beta_T \times Target\ Inclusion$ is an interaction variable of Target Index Inclusion, a dummy equal to one in case the Target is included in the S&P500 Index as a result of the merger, with $\beta_A|\beta_T$. $\beta_A|\beta_T \times Different\ SIC$ is an interaction variable of Different SIC, a dummy equal to one in case the SIC of the Acquiror and the Target are different, with $\beta_A|\beta_T$. $\beta_A|\beta_T \times DifferentState$ is an interaction variable of Different State, a dummy equal to one in case the State of the Acquiror and the the Target are different, with $\beta_A|\beta_T$. *Target Weight* is the market capitalization of the the target company, adjusted by toeholds, relative to the combined market capitalization of the target and the acquiror firm eight weeks prior to the merger announcement. *Change in Leverage* is the difference in end-of-year leverage of the combined balance sheet (target and acquiror) one year prior to the merger announcement to the merged firm end-of-year leverage one year after the completion of the deal. Leverage is measured as book value of debt to total market value which is defined as book value of debt plus market value of equity. Change in Leverage is winsorized at the one percent level. *Synergy Weight* is the ratio of the target's and acquiror's combined market adjusted abnormal value created over a three week window around the merger announcement relative to the combined market value eight weeks prior to the merger announcement. *Index Inclusion* is a control variable equal to one if either the acquiror or the target changed their S&P 500 listing status during the period we track the stock. All regressions control for a deal announcement year fixed-effect. t-statistics are calculated for a one sided test ($\beta_M - E(\beta) > 0$) with a robust variance estimator and reported in brackets with significance levels of ten percent(*), five percent(**) and one percent(***).

Dependent Variable:	$\beta_M - E(\beta)$								
	(1) Full	(2) Full	(3) Cash	(4) Stock	(5) Target Incl.	(6) Diff SIC	(7) Same SIC	(8) Diff State	(9) Same State
$\beta_A\|\beta_T$	0.052***	0.045**	0.136***	0.013	0.13**	0.065**	0.015	0.058**	0.023
	(2.56)	(2.18)	(2.82)	(0.40)	(2.33)	(2.38)	(0.49)	(2.51)	(0.56)
Target Weight		-0.064	0.625**	-0.067	1.498***	-0.006	-0.143	-0.183	0.234
		(-0.44)	(2.09)	(-0.28)	(2.80)	(-0.03)	(-0.56)	(-1.11)	(0.75)
Change in Leverage		0.002	-0.000	0.001	-0.002	0.002	0.001	0.003**	-0.003
		(1.29)	(-0.08)	(0.31)	(-0.42)	(1.17)	(0.52)	(2.12)	(-0.99)
Synergies Share		0.224	0.035	0.112	0.476	0.206	0.259	0.459***	-0.328
		(1.61)	(0.09)	(0.51)	(0.73)	(1.00)	(1.43)	(2.90)	(-1.11)
Index Inclusion		-0.033	0.025	-0.068		-0.056	0.003	-0.030	-0.013
		(-0.66)	(0.21)	(-0.83)		(-0.84)	(0.04)	(-0.51)	(-0.13)
Constant		0.040	-0.19*	0.045	-0.458***	0.035	0.044	0.049	0.019
		(0.77)	(-1.69)	(0.52)	(-2.79)	(0.55)	(0.48)	(0.83)	(0.18)
Observations	712	685	115	252	59	406	279	517	168
R-squared	0.009	0.016	0.129	0.005	0.193	0.025	0.010	0.042	0.020

Table 9
Regression results for the full sample

We present the regression results with *Excess Comovement* ($\beta_M - E(\beta)$) as our dependent variable. $\beta_A|\beta_T$ measures relative riskiness and is equal to (-1) for $\beta_A < \beta_T$ and 1 for $\beta_A > \beta_T$. $\beta_A|\beta_T \times Cash$, $\beta_A|\beta_T \times Mixed$ and $\beta_A|\beta_T \times Other$ are interaction variables of the dummy variables of cash, mixed and other deals with $\beta_A|\beta_T$. The base category in Regression (3) is pure stock deals. $\beta_A|\beta_T \times Target\ \ Inclusion$ is an interaction variable of Target Inclusion, a dummy equal to one in case the Target is included in the S&P500 Index as a result of the merger, with $\beta_A|\beta_T$. $\beta_A|\beta_T \times Different\ SIC$ is an interaction variable of Different SIC, a dummy equal to one in case the SIC of the acquirer and the target are different, with $\beta_A|\beta_T$. $\beta_A|\beta_T \times DifferentState$ is an interaction variable of Different State, a dummy equal to one in case the State of the acquirer and the the target are different, with $\beta_A|\beta_T$. *Target Weight* is the market capitalization of the the target company, adjusted for toeholds, relative to the combined market capitalization of the target and the acquirer firm eight weeks prior to the merger announcement. *Change in Leverage* is the difference in end-of-year leverage of the combined balance sheet (target and acquirer) one year prior to the merger announcement to the merged firm end-of-year leverage one year after the completion of the deal. Leverage is measured as book value of debt to total market value which is defined as book value of debt plus market value of equity. Change in Leverage is winsorized at the one and 99 percent level. *Synergies* is the ratio of the target's and acquirer's combined market adjusted abnormal value created over a six week window around the merger announcement (three weeks before to three weeks after) relative to the combined market value eight weeks prior to the merger announcement. *Index Inclusion* is a control variable equal to one if either the acquirer or the target changed their S&P 500 listing status from the beginning of the pre to the end of the post merger estimation window. All regressions control for a deal announcement year fixed-effect. T-statistics based on robust standard errors are calculated for a one sided test ($\beta_M - E(\beta) > 0$) and reported in brackets with significance levels of ten percent(*), five percent(**) and one percent(***).

Dependent Variable:	$\beta_M - E(\beta)$					
	(1)	(2)	(3)	(4)	(5)	(6)
$\beta_A\|\beta_T$	0.052***	0.045**				
	(2.56)	(2.18)				
$\beta_A\|\beta_T$ x Cash			0.135***			
			(2.97)			
$\beta_A\|\beta_T$ x Other			0.055*			
			(1.43)			
$\beta_A\|\beta_T$ x Mixed			-0.002			
			(-0.04)			
$\beta_A\|\beta_T$ x Target Inclusion				0.132***		
				(2.38)		
$\beta_A\|\beta_T$ x Different SIC					0.066***	
					(2.41)	
$\beta_A\|\beta_T$ x Different State						0.057***
						(2.45)
Target Share		-0.064	-0.080	-0.079	-0.057	-0.072
		(-0.44)	(-0.54)	(-0.53)	(-0.39)	(-0.49)
Change in Leverage		0.002*	0.002	0.002*	0.002	0.002*
		(1.29)	(1.17)	(1.38)	(1.28)	(1.33)
Synergies Share		0.224*	0.212*	0.232**	0.229**	0.231**
		(1.61)	(1.51)	(1.66)	(1.65)	(1.66)
Index Inclusion		-0.033	-0.039	-0.040	-0.030	-0.032
		(-0.66)	(-0.78)	(-0.82)	(-0.61)	(-0.63)
Constant	0.04**	0.040	0.050	0.046*	0.037	0.040
	(1.95)	(0.77)	(0.96)	(0.87)	(0.71)	(0.78)
N	712	685	685	685	685	685
R-squared	0.009	0.016	0.023	0.014	0.017	0.017

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