Predictability of Industry Returns After M&A Announcements

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February 2006

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Abstract

This paper documents a strong and prevalent drift in long-term industry returns after M&A announcements. Specifically, industries that experience positive average announcement reactions continue to do well in the future, while industries that experience negative average announcement reactions continue to do poorly. Industry M&A investment strategies, which buy positively reacting industries and sell negatively reacting industries, appear profitable even after controlling for size and book-to-market effects in returns. Profitability has strengthened over time and seems to exist also for the largest stocks. The evidence suggests that capital markets underreact to the industry-wide information provided by merger announcements.

JEL classification: G12, G34

Keywords: Asset pricing, mergers & acquisitions, industry returns

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We thank Yakov Amihud, Hermann Locarek-Junge, Julie Ann Ng, Andreas Rathgeber, Dirk Schiereck, Sebastian Werner and Felix Zeidler for valuable comments and insights. We are also grateful for the input of conference participants at the 13th German Finance Association (DGF) conference in Oestrich-Winkel, the WHU Campus For Finance conference in Vallendar, the HVB doctoral seminar in Eltville, and workshop participants at European Business School. Any remaining errors are ours. Part of this work was completed when Funke was a Visiting Scholar at the Katz Graduate School of Business, University of Pittsburgh, and Johanning was a Visiting Professor at the Ross School of Business, University of Michigan. They thank these institutions for their support and hospitality. Funke acknowledges financial support provided by the German Academic Exchange Service (DAAD) and the EBS Department of Finance. The opinions and views expressed in this paper do not necessarily reflect those of Source For Alpha AG.

1 Introduction

The financial literature has extensively examined the effects of M&A announcements on the stock returns of bidding firms. Short horizon event studies show that bidders lose or at most break even when announcing a transaction. In addition, recent long-term event studies measure significantly negative abnormal returns for the three to five years following merger completion.[1] Although the acquiring firm shareholders significantly lose at the announcement of a transaction, studies that measure the intra-industry effects of M&A transactions show that rivals experience significantly positive abnormal returns when the industry consolidates. Thus, positive information signalling effects, on average, outweigh negative competitive effects for rivals.[2]

In a recent study, Floegel, Gebken and Johanning (2005) show that these positive industry reactions are not pervasive over time. At the beginning of an industry wide consolidation process intra-industry effects are significantly positive. However, due to increasing competition, intra-industry effects decrease steadily and become negative at the end of such a consolidation process. Hence, time-varying competitive effects of M&A activity, depending on time-varying industry structure, are responsible for a significant difference in intra-industry reactions over time. However, as industry structure and therefore the competitive effects of M&A activity change relatively slowly over time, their evidence suggests a certain persistence in average monthly intra-industry announcement reactions.

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[1] A number of deal and firm characteristics impacts bidding firms' returns. Moeller, Schlingemann and Stulz (2004) show that only large bidders lose significantly around the transaction announcement. Loughran and Vijh (1997) document that cash bidders gain significantly in the months following a transaction announcement, although acquirers experience negative long term returns on average.

[2] Eckbo (1983) and Eckbo (1985) find positive intra-industry effects for the announcement of horizontal mergers. Song and Walkling (2000) document positive abnormal returns to rivals of the target for their sample of horizontal and non-horizontal deals. In more recent studies, Shahrur (2005) and Fee and Thomas (2004) also show that competitors experience positive stock market effects at the announcement of horizontal deals.

As short horizon intra-industry effects directly impact industry returns, such a persistence may also influence long-term industry performance. To our best knowledge, long-term industry returns after merger announcements have not yet been studied. Therefore, the objective of this paper is to investigate whether there are systematic differences in industry returns after M&A announcements depending on the initial intra-industry effects of the deal.

Using a dataset of 16,483 transactions that occur within one of 20 industries between 1985 and 2002 we investigate whether the average industry reaction in previous periods affects the intra-industry effects of transaction announcements in later periods. We find that this is indeed the case: the cumulative abnormal return (CAR) at the announcement of an M&A transaction depends on the average reaction to merger announcements in the same industry in the previous month. Thus, our findings concur with the intuition in Floegel, Gebken and Johanning (2005) that intra-industry effects are persistent over time. This raises an interesting question as *daily* abnormal announcement returns directly impact *monthly* industry returns for that respective month. Do monthly industry returns differ conditional on the direction of the average announcement reaction in the previous month?

Based on this we look at monthly industry returns after merger announcements. Paralleling the results for CARs we find that returns depend on the average industry announcement reaction in the previous month. Size and book-to-market (B/M) adjusted returns are significantly positive 27 basis points after months with average positive industry reactions, and significantly negative 45 basis points after months with average negative industry reactions. The difference of 72 basis points is highly statistically significant and is economically large (8.6 percent annualized).

Therefore, our evidence indicates a profitable investment opportunity as the industry-wide information provided by merger announcements does not seem to be incorporated in stock prices immediately. This pattern suggests a certain underreaction by capital markets as

past information in the form of the intra-industry effects of merger announcements in the previous month seem to have an ability to predict the cross-section of industry returns in the current month. Hence, we examine industry portfolio investment strategies in order to investigate the profitability of this cross-sectional pattern in industry returns.

Each month, we form portfolios of industries depending on the sign of the average announcement return, and examine the profits to a zero cost investment strategy taking a long position in all industries with positive average announcement returns and taking a short position in all industries with negative announcement returns. The results indicate that the effect is most pronounced for a one month holding period, where we find a statistically significant return of 105 basis points for raw returns (12.6 percent annualized) and 75 basis points for size-B/M adjusted returns (9 percent annualized). Thereafter, returns decrease steadily with longer holding periods, though they remain statistically significant. This pattern indicates that the industry return drift is most pronounced at shorter horizons.

Our results hold for both the 1980s and the 1990s, while being stronger in the latter half of the sample period. Across different size quintiles, the effect is more relevant for smaller companies, although it remains statistically significant for all size-based subsamples. Additional robustness checks confirm the pervasiveness of the effect across different methodologies. A possible explanation for our finding may be that the zero cost long-short industry portfolio is not free of factor-related risks, i.e. that the significant returns represent compensation for risk inherent in those portfolios. However, when we examine the exposure of the industry portfolio returns to Fama-French three-factor portfolios in a time-series regression, we do not find support for this hypothesis. Instead, at the one month horizon we find a statistically significant intercept for the zero cost industry portfolio not explained by exposure to factor-related risks. In a final test we examine the relation between the cross section of *individual* stock returns and average industry announcement returns. Our Fama-McBeth regres-

sions show that the average industry CAR of the previous month is significantly related to individual stock returns of firms in that industry.

Our results indicate that the industry-wide information provided by merger announcements does not seem to be incorporated into stock prices immediately, a result that is apparently at odds with market efficiency in the sense of Fama (1970, 1991). However, considering the transaction costs associated with monthly portfolio rebalancing on an industry basis to capture the one month effect, the profitability of our industry portfolio investment strategies may be called into question. Nevertheless, the effect is strong and pervasive enough to be of interest for academic researchers as well as market participants.

The remainder of the paper is organized as follows. Section 2 introduces the data and describes our methodology. Section 3 discusses the results and Section 4 concludes.

2 Data and Methodology

2.1 Daily Announcement Effects

Our data of mergers and acquisitions comes from the Securities Data Company's (SDC) U.S. Mergers and Acquisitions Database. We consider all deals that were announced between January 1, 1985 and December 31, 2002 with an inflation-adjusted transaction value of at least $25 million.[3] We assign each transaction to one of 20 industry groups, defined as in Moskowitz and Grinblatt (1999), based on the bidder's SIC code recorded by SDC at the time of the announcement.

Daily stock return data is from the daily CRSP files using all stocks identified as common equity (share code 10 and 11), which excludes all certificates, ADRs, SBIs, REITs,

[3] The $25 million cutoff is imposed for 1985 and adjusted for inflation according to the US consumer price index in the following years. We can report, however, that all our main results remain qualitatively and quantitatively similar without inflation adjustment.

etc. As in previous studies intra-industry reactions are measured as the stock market response of an equal-weighted portfolio of all firms within the industry of the bidder.[4] Following Brown and Warner (1985), we use the modified market model to estimate abnormal returns. We do not use the market model because, for many industries, there are months with several merger announcements, which means a high probability of other bid announcements occurring in the estimation period. Any abnormal returns caused by these announcements will bias the estimation.[5] We calculate the cumulative abnormal return (CAR) for a five-day event window around the announcement date (-2,2).[6] Specifically, the five-day CAR is:

$$CAR_{[-2,+2]} = \sum_{t=-2}^{2} (R_{it} - R_{mt}), \qquad (1)$$

where R_{it} is industry i's daily return on date t and R_{mt} is the return for the equal-weighted CRSP index on date t.

For each sample year, Table 1 shows the number of deals, the percentage of the total number of deals during that specific year, as well as the average industry reaction to M&A announcements. Panel A reports the results for the 22,853 deals with a minimum transaction value of $25 million, Panel B and C display the results for the 16,483 and 11,341 deals with minimum transaction values of $50 million and $100 million, respectively. The pattern is similar across all three panels: the two economy-wide merger waves of the 1980s and 1990s are clearly visible with deal numbers peaking in 1988 and 1998, respectively. Yearly average industry announcements effects are consistent with earlier evidence such as Shahrur (2005) and Fee and Thomas (2004): a slightly positive average around 5 basis points. In addition, a

[4] SIC Codes from the CRSP file, which allow for time-series variation in industry classification, are used to assign stocks to industries according to the Moskowitz and Grinblatt (1999) two-digit classification.

[5] Fuller, Netter and Stegemoller (2002) do not use the market model for the same reasons. Brown and Warner (1980) show that weighting the market return by a firm's beta does not significantly improve the estimation.

[6] Our main findings are not susceptible to the choice of the event window length. They also hold for a shorter horizon, such as three days, to estimate CARs. Results are available on request from the authors.

certain time pattern can be observed. In general, announcement effects seem to be positive, but towards the peak of the merger waves they become negative.

[Insert Table 1 about here]

2.2 Monthly Returns

For our tests of the long-run effects of M&A announcements on industry returns we use monthly stock return data from the monthly CRSP files. As for daily returns, industry portfolio returns are calculated as the equal-weighted average of returns of individual firms. In addition to raw returns, we calculate size (market capitalization) and book-to-market equity (B/M) adjusted returns, since much research has documented the ability of these variables to capture the cross section of expected returns.[7] We use data item 60 (book value of common equity) from the COMPUSTAT files as in Fama and French (1992).[8] We construct our characteristic-matched benchmark portfolios by independently sorting stocks into size and B/M quintiles using NYSE breakpoints. We then intersect those sorts to create 25 portfolios of similar size and B/M. Stocks within each industry are matched with those well-diversified portfolios based on their size and B/M characteristic, and the equal-weighted average in excess of these size-B/M benchmarks represents the monthly industry abnormal return.[9]

Table 2 provides a description of the industry portfolios and summary statistics. The average number of stocks per industry is 290, and the fewest number of stocks at any time in any industry except Railroads is more than 20. Therefore, virtually all portfolios are well di-

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[7] See, for example, Banz (1981), Fama and French (1992, 1993, 1996), and Daniel and Titman (1997).

[8] To avoid any look ahead bias caused by back filled COMPUSTAT data, we include firms only once two complete years of history are available. In addition, we exclude all firms with negative book value of equity

[9] Following Fama and French (1992) portfolio compositions are changed each year in July based on a firm's size quintile in June of year *t* and its B/M quintile in December of year *t*-1. Stock *i* is then matched with one of the 25 portfolios based on its size and B/M characteristic, and the return of the matched portfolio is subtracted from stock *i*'s return at time *t*. We employ this characteristic-matched portfolio adjustment method as opposed to a Fama-French three-factor regression in order to avoid estimation issues regarding factor loadings. Furthermore, Daniel and Titman (1997) find that characteristics better capture cross-sectional variation in mean returns than factor loadings.

versified in that they have negligible firm specific risk. Table 2 also reports the average monthly raw returns and size-B/M adjusted returns of the 20 industries.[10] *F*-tests of whether these mean returns differ across industries are not rejected, which suggests that there is little cross-sectional variation in our industry sample means. Furthermore, *t*-statistics for the average size-B/M adjusted returns provide little evidence that unconditional abnormal industry returns exist per se (*t*-statistics not reported for brevity).[11] Finally, Table 2 reports average industry CARs for the three different M&A transaction samples with minimum transaction values of $25m, $50m, and $100m, respectively. Similar to adjusted returns there is some cross-sectional variation in returns across industries visible, but *F*-tests cannot reject the hypothesis that mean CARs differ. Hence, there is little evidence that unconditional differences between industry portfolio returns exist for any of the measures employed.

[Insert Table 2 about here]

3 Results

In this section we discuss our main empirical findings. It is organized as follows. Section 3.1 presents evidence on the persistence in intra-industry effects and the ensuing predictability of monthly industry returns. Section 3.2 discusses our findings related to industry portfolio investment strategies, and Section 3.3 presents results on the predictability of individual stock returns based on prior intra-industry reactions.

[10] The overall negative average of size-B/M adjusted industry returns implies that stocks from larger industries with more stocks have outperformed stocks from smaller industries with less stocks over our sample period. Table 2 confirms this, the four industries with positive adjusted returns are among the largest seven industries.

[11] The *t*-statistics indicate significant differences from zero only for industries 3 (Apparel) and 8 (Prim. Metals).

3.1 Industry Announcement Effects

3.1.1 Persistence in Intra-Industry Effects

Consistent with earlier evidence such as Shahrur (2005) and Fee and Thomas (2004), in general, industry announcement effects are positive for our samples of M&A transactions. However, Floegel, Gebken and Johanning (2005) show that industry reactions are only positive at the beginning of an industry specific consolidation process, but decrease steadily as it continues and become negative at the end. This pattern is due to increasingly negative competitive effects towards the end of a consolidation process. Hence, time-varying competitive effects of M&A activity, depending on time-varying industry structure, are responsible for a significant difference in intra-industry reactions over time. However, as industry structure and therefore the competitive effects of M&A activity change relatively slowly over time, their evidence suggests a certain persistence in intra-industry announcement reactions, at least at the beginning and end of such industry-specific consolidation processes.

We investigate this issue by examining the intra-industry effects of M&A announcements conditional on the average industry announcement reaction in the previous month. Table 3 reports the median and mean industry CAR to M&A announcements for three subsamples: (1) industries with a positive average CAR in the previous month, (2) industries without M&A activity in the previous month, and (3) industries with a negative average CAR in the previous month. The table is split into Panels A, B, and C, which report results for the minimum transaction values of $25m, $50m, and $100m, respectively. We report complete results in the tables, but limit our discussion to the $50m cut off sample (Panel B) due to the similarity of the results and for expositional simplicity.

For comparison, the average industry CAR for all transactions, a significantly positive 5 basis points, is reported again. Across the subsamples (1) through (3), however, the average intra-industry announcement reaction differs completely: significantly positive average indus-

try CARs of 18 basis points can only be observed if the average industry announcement reaction in the previous month was positive. Otherwise, if there was no M&A activity in the previous month, the CARs are not distinct from zero, and if M&A activity in the previous month caused a negative intra-industry reaction on average, the CARs are significantly negative 10 basis points. The difference between the average industry CAR for subsamples (1) and (3) is a highly significant 27 basis points. Our results do not depend on outliers, as the median values reported in brackets display even more significance.

[Insert Table 3 about here]

3.1.2 Predictability of Monthly Industry Returns

So far, our evidence clearly suggests that industry CARs depend on the average reaction to merger announcements in the same industry in the previous month. This finding raises an interesting question given that average *daily* industry CARs directly impact *monthly* industry returns for that month. Do monthly industry returns differ depending on the direction of the average announcement reaction in the previous month?

We investigate this question by examining monthly size-B/M adjusted industry returns conditional on the average industry announcement reaction in the previous month. Table 4 reports the mean and median size-B/M adjusted industry returns for the whole sample as well as the three subsamples from table 3, which are conditional on the average industry CAR in the previous month. Again, the table is split into Panels A, B, and C depending on the transaction value, but the discussion is limited to the results for $50m in Panel B. Overall, size-B/M adjusted returns are unconditionally negative over the sample period, minus 10 basis points with a *t*-statistic of 2.1.[12] However, conditioning on the previous month's average industry

[12] The reported percentage value of -0.0983 slightly differs from the value reported in Table 2, -0.0991, due to different averaging and a slightly different sample period: the former is the pooled average of all 4,300 monthly industry observations from February, 1985 to December, 2002, while the latter is the cross-sectional

announcement reaction changes the picture completely. Mirroring the results in Table 3, size-B/M adjusted returns are a significantly positive 27 basis points following months with positive average industry CARs, and a significantly negative 45 basis points following months with negative average industry CARs. The difference in means of 72 basis points is highly statistically significant, and the medians confirm the result with somewhat less magnitude, but similar statistical significance. Finally, the difference in means also suggests economic importance, as a monthly return of 72 basis points implies an annualized return of 8.6 percent.

[Insert Table 4 about here]

So far, our evidence indicates a profitable investment opportunity as the industry-wide information provided by merger announcements does not seem to be incorporated in stock prices immediately. This pattern suggests a certain underreaction by capital markets as past information in the form of the intra-industry effects of merger announcements in the previous month seem to have an ability to predict the cross-section of industry returns in the current month. Therefore, we turn to examine industry portfolio investment strategies in the next section in order to investigate the profitability of this cross-sectional pattern in industry returns.

3.2 Industry Portfolio Investment Strategies

3.2.1 Raw and Size-B/M Adjusted Returns

In this section we focus on the question whether the apparent cross-sectional predictability of industry returns by the average industry announcement effects can be exploited by sufficiently sophisticated investors. We examine this issue by investigating the profitability of rolling industry portfolio investment strategies over different holding periods.

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average across industries of the time-series average industry size-B/M adjusted returns from January, 1985 to December, 2002. The first month is lost as we condition on the previous month's industry CAR.

Each month, we assign industries to one of three portfolios depending on the average CAR in industry *i* in portfolio formation month *t*. In addition, we form a self-financing portfolio by taking a long position in all industries with positive average industry $CAR_{i,t}$ and taking a short position in all industries with negative average industry $CAR_{i,t}$. We calculate returns for longer horizons using a standard rolling-portfolio method as in Jegadeesh and Titman (1993) and Fama (1998) in order to avoid test statistics that are based on overlapping returns.

For example, suppose we want to look at the performance of industries with positive average industry CAR over three months. For each calendar month, we calculate equal-weighted industry returns from individual stock returns for all industries with positive average industry announcement reaction in the previous month. We then average the returns for the calendar month across industries to get the return on a portfolio of positively reacting industries. For the same calendar month, we also calculate the returns on portfolios of all positively reacting industries from two and three months ago and average the three resulting portfolio returns. This average tracks the calendar month performance of an investment strategy that holds a series of portfolios formed in the last month as well as in the previous two months. We repeat this process every month to get a time series of returns. We follow the same steps for different horizons (one, three, six, and 12 months after the event), and for other portfolios of industries (positively reacting industries, industries without M&A, negatively reacting industries, and the self-financing long-short strategy).

Panel A of Table 5 reports average raw returns for these portfolios and holding periods. Panel B shows average size-B/M adjusted returns. In addition, time-series *t*-statistics are given for the self-financing long-short strategy. Our results for the one-month holding period are as expected given the evidence in Table 3. The long-short strategy earns a significantly positive 105 basis points (12.6 percent annualized) when we employ raw returns. Using size-B/M adjusted returns leads to a significantly positive 75 basis points (9 percent annualized).

For longer horizons the effect is less pronounced. Returns diminish to 62 and 46 basis points for the three-month horizon. For the 12 month horizon, they decrease further to 30 and 24 basis points, respectively. However, for all holding periods the results remain statistically significant. Nevertheless, the decreasing pattern of average returns to the long-short strategy suggests that the apparent industry return predictability is most pronounced at shorter horizons.

When we examine both legs of the long-short strategy, we can conclude that both sides seem to contribute equally to the profitability of the long-short strategy for raw returns. Compared to the portfolio without M&A activity, industries with positive average CARs in the previous month earn half a percent more at the one month horizon. Portfolios with negative average CARs earn half a percent less. For the case of size-B/M adjusted returns we can meaningfully look at the statistical significance of the different portfolio returns. Adjusted returns for industries with positive average CARs in the previous month are only significantly positive at the one month horizon. However, adjusted returns for industries with negative average CARs in the previous month are significantly negative up to the 12-month holding period (*t*-statistics not reported for brevity). This result suggests that the short leg of the industry portfolio investment strategy is more important, which indicates that some part of the apparent underreaction by capital markets to the industry-wide information provided by merger announcements may be due to short-selling constraints.

[Insert Table 5 about here]

3.2.2 Subperiod Analysis

To check whether our results hold across different time periods, we split our sample into two subperiods. Table 6 shows size-B/M adjusted returns for the different rolling portfolios and holding periods for 1985-1993 (Panel A) and for 1994-2002 (Panel B). In terms of time pattern, it is interesting to observe that the profitability of our strategies seems to have

strengthened over time. For the first period we find a statistically significant size-B/M adjusted return of 53 basis points (6.4 percent per annum) for the long-short strategy, which increases to 98 basis points (11.8 percent per annum) for the latter period. This may be due to the increasing importance of M&A for corporate strategies in the 1990s.

[Insert Table 6 about here]

3.2.3 The Effect of Size

We employ equal-weighting for monthly returns to be in concurrence with our measure of short-term intra-industry effects of M&A announcements, the average industry CAR. This raises the question of whether our findings are only relevant for small, illiquid stocks, or whether the effect can also be found in large, liquid stocks which are more accessible for the general investor. We investigate this issue by dividing the sample into size quintiles.

We divide stocks at the end of each June based on month-end market capitalization using within-industry NYSE break points. Then we calculate equal-weighted industry portfolios from the stocks in the respective quintile. We use within-industry breakpoints to mitigate the problems associated with splitting industries with a few number of stocks, such as Petroleum or Railroads, into quintiles.

Table 7 shows how our industry portfolio investment strategies perform across the different size quintiles. There are several patterns to note when comparing the raw returns to the results reported in Table 5. Firstly, the effect indeed seems to be stronger for smaller stocks. The long-short strategy earns a highly significant return of 134 basis points (16.1 percent annualized) in the smallest quintile at the one-month horizon (Panel A). It decreases almost monotonically to 46 basis points (5.5 percent annualized) for the largest quintile (Panel E), but remains statistically significant at the 5 percent level of confidence. Secondly, the results confirm that the effect is most pronounced at the shorter horizons, average raw returns for the

long-short strategy at the three, six, and 12-month horizons are decreasing monotonically, and lose their statistical significance for the largest quintiles.

[Insert Table 7 about here]

3.2.4 Liquidity Effects

The apparent profitability of our rolling industry portfolio investment strategy, especially in the smaller size quintiles, raises the question whether it can be explained by liquidity effects. One way to investigate how liquidity affects the industry portfolio investment strategies is to exclude those stocks that have high transaction costs. We follow Chan (2003) and eliminate all stocks with prices of $5 or less from our sample before we calculate industry returns. Dropping low-priced stocks considerably reduces the number of stocks underlying our industry portfolios. On average, 30 percent of observations (stocks in all months) are priced at $5 or below. The remaining sample should consist of more liquid stocks, since price is related to ease of buying or selling.

Panel A of Table 8 reports size-B/M adjusted returns for the rolling industry portfolio investment strategies based on the reduced set of stocks. The results are similar to those of Table 5. However, the long-short strategy is slightly less profitable with a return of 61 basis points (7.3 percent annualized) at the one-month horizon. The statistical significance, though, is still considerably high, which indicates that the effects of liquidity can only account for a small portion of the profitability of the industry portfolio investment strategies.

[Insert Table 8 about here]

3.2.5 Results for Strongest Intra-industry Effects

Another issue regarding our industry investment strategy is the number of industries we invest in. For all results reported so far, we take a long position in *all* industries with positive average industry CAR in the previous month, and a short position in *all* industries with

negative average industry CAR in the previous month. This corresponds, according to the median, to six industries on each side of the long-short portfolio, with a minimum investment in two industries and a maximum investment in 12 industries.[13] Judging from the standard deviation of the number of industries per portfolio, which is slightly larger than two, there is substantial variation in what constitutes the long and short portfolio. In addition, there is substantial variation in average industry announcement reactions, i.e. in the factor which determines which portfolio an industry enters. Average industry CARs range from values only marginally different from zero to values reliably greater or smaller than zero.

Hence, the question arises whether it is possible to increase the profitability of the rolling industry portfolio investment strategies by only considering a fixed number of industries for each leg of the trading strategy, and by only considering those industries with announcement reactions reliably different from zero. We investigate this issue by only investing in two industries for the long and short portfolio, respectively,[14] and by selecting these two industries from the top and bottom (90^{th} and 10^{th} percentile), respectively, of a formation month ranking on average industry CARs. Panel B of Table 8 reports size-B/M adjusted returns for these alternative rolling industry investment portfolios.[15] Indeed, the profitability of the long-short strategy improves for all holding periods. At the one-month horizon, returns increase from 75 basis points in Table 5 to 88 basis points (10.6 percent annualized), and at the 12-month horizon they increase from 24 to 31 basis points (3.7 percent annualized). The majority of the improvement in profitability seems to come from the short portfolio, while returns to the long portfolio only change considerably at the one-month horizon. However, statistical signifi-

[13] On average, the long portfolio consists of 6.71 industries, the portfolio without M&A contains 6.75 industries, and the short portfolio holds 6.54 industries. The standard deviations of the number of industries are 2.20, 2.37, and 2.11, respectively.

[14] We selected two industries, as it constitutes the minimum number of industries in each portfolio. Results are quantitatively similar when we select a fixed number of three industries, allowing exceptions for months where there are only two industries available.

[15] The industry portfolio without M&A activity is unchanged and therefore its returns are identical to Table 5.

cance for the long-short strategy is lower across all horizons compared to Table 5, which indicates that only investing in two portfolios on each side of the investment strategy increases the time-series variation in the adjusted returns.

3.2.6 Three-Factor Risks

In our analysis of size-B/M adjusted returns we already accounted for the two most important factors driving cross-sectional differences in stock returns: size and book-to-market characteristics. We still found statistically significant returns to the long-short industry strategy unexplained by those characteristics. However, to investigate an alternative choice of methodology relying on risk factor loadings instead of characteristic-matched returns, Table 9 reports the evolution of month-by-month alphas and three-factor loadings for our industry portfolios. These loadings are from a time-series regression of portfolio excess returns on contemporaneous Fama-French factors in calendar time. Specifically, we regress:

$$R_t - R_f = \alpha_t + \beta_t(R_m - R_f) + \gamma_t(SMB) + \delta_t(HML) + \varepsilon_t, \qquad (2)$$

where R_t is the portfolio return t months after formation, for t=(1,3,6,12), and β_t, γ_t, and δ_t are the coefficients on the Fama and French (1993) market, size, and book-to-market portfolio returns from the same calendar months.[16] Note that the portfolio returns are unadjusted and non-rolling. We conduct these time-series regressions for the long-short industry portfolio (Panel A), as well as the individual portfolios with a long position in all industries with positive average industry CAR (Panel B) and a short position in all industries with negative average industry CAR (Panel C). *t*-Statistics are calculated from White (1980) heteroskedasticity-robust standard errors.

[16] The construction of these portfolio returns is discussed in detail in Fama and French (1993). We thank Kenneth French for providing monthly time-series data for the factor realizations on his website at http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html.

Month-by-month alphas confirm the evidence presented before. The long-short strategy has a significantly positive intercept of 72 basis points one month after portfolio formation. This is due to a significantly positive intercept of 54 basis points for the portfolio taking a long position in all industries with positive average industry CAR, and a significantly negative 61 basis points for the portfolio taking a short position in all industries with negative average industry CAR in the previous month. These intercepts for the two individual portfolios do not exactly add up to the intercept of the long-short portfolio, as their risk factor exposures differ slightly.

In contrast to the next-month regressions, all month-by-month alphas for three, six and 12 months after portfolio formation are not significantly different from zero at conventional levels of confidence.[17] This confirms our earlier conclusion that the industry return predictability by intra-industry announcement effects is most pronounced at the shorter horizon.

[Insert Table 9 about here]

3.3 The Cross-section of Individual Stock Returns

The main objective of this paper relates to the study of long-term industry returns after M&A announcements, depending on the initial intra-industry effects of the announcement. We find that the short-term announcement reaction has an ability to predict the cross-section of future *industry* returns in the sense that a self-financing long-short strategy buying industries with positive average industry CARs and selling industries with negative average industry CARs yields significantly positive profits not accounted for by known risk factors. But as industry returns are calculated directly from individual stock returns, an alternative question arises: does the average announcement reaction to M&A have any predictive power for the

[17] The intercept for the 12th post-formation month is significant at the 10 percent level of confidence for the long-short industry portfolio in Panel A, but it is negative 34 basis points. The longer-horizon evidence is most consistent for the short portfolio, where all intercepts are negative and the six-month intercept is significant at the 10 percent level of confidence.

cross-section of expected *individual* stock returns? We investigate this issue as an additional robustness check on our results with an alternative methodology.

Specifically, we use Fama and MacBeth (1973) cross-sectional regressions to determine the impact of average industry announcement CARs controlling for factors known to predict stock returns. Each month from 1985-2002, we regress the cross-section of individual stock returns over one, three, six and 12-month horizons on a constant and various past firm characteristics. We then average the coefficients across months, and calculate standard errors from the time-series of coefficients. In regressions where individual stock returns over several months are employed as dependent variable, we use Newey and West (1987) autocorrelation-robust standard errors with a lag equal to the number of months over which the returns overlap. Our set of independent variables includes: market β,[18] size (log of market capitalization of month t-1), book-to-market (log of book-to-market ratio calculated using past data as in Fama and French (1992)), several past individual stock return variables (last month's return, $ret_{-1:-1}$, last years return from t-12 to t-2, $ret_{-12:-2}$, as well as the return from t-36 to t-13, $ret_{-36:-13}$), as well as last month's industry announcement reaction (average industry CAR of month t-1).

The results on the control variables reported in Table 10 confirm previous findings in the literature. The use of market β, size and book-to-market as regressors allows us to capture their ability, if any, to explain the cross-section of expected stock returns. The one-month past return controls for liquidity and microstructure effects documented by Jegadeesh (1990) which induce a reversal in short-term stock returns. The nearest year of returns captures the Jegadeesh and Titman (1993) momentum effect, and the long-run return the De Bondt and Thaler (1985) three- to five-year reversal effect. However, for our purposes the coefficient on

[18] Market βs are estimated by regressing the prior 36 months of excess returns for each stock on a constant and the past 36 months of excess returns of the CRSP value-weighted index. Stocks are then ranked based on their coefficient estimates from this regression (pre-ranking betas) and assigned to one of 100 groups based on this ranking. Stocks within a particular beta group are assigned the equal-weighted average beta for that group. This is essentially the procedure employed by Moskowitz and Grinblatt (1999) in their Table VI.

the average industry CAR in month *t*-1 is of main interest: at the one-month horizon is positive and highly statistically significant, with a *t*-statistic of over seven. For the regressions with longer-horizon returns the predictive ability of the average industry CAR is somewhat less reliable as *t*-statistics decrease substantially, but the influence remains positive and the coefficients are still significant, at least at the 5 percent level. This ability of the past month's average industry CAR to predict the cross-section of individual stock returns confirms our earlier evidence on differences in long-term industry returns after observing the initial intra-industry effects and provides strong evidence affirming the robustness of our results.

[Insert Table 10 about here]

4 Conclusion

Most studies that measure the intra-industry effects of M&A transactions show that rivals experience significantly positive abnormal returns when the industry consolidates. In a recent study, however, Floegel, Gebken and Johanning (2005) show that these positive industry reactions are not pervasive over time. At the beginning of an industry wide consolidation process intra-industry effects are significantly positive. However, due to increasing competition, they decrease steadily and become negative at the end of such a consolidation process. Hence, time-varying competitive effects of M&A activity, depending on time-varying industry structure, are responsible for a significant difference in intra-industry reactions over time. However, as industry structure and therefore the competitive effects of M&A activity change relatively slowly over time, this suggests a certain persistence in intra-industry announcement reactions.

We confirm this implication by documenting that industries which experience positive average announcement reactions continue to do well at future merger announcements, while industries that experience negative average announcement reactions continue to do poorly.

These differences in short-term announcement reactions directly impact monthly industry returns, resulting in a difference in monthly returns of 72 basis points (8.6 percent) between industry groups depending on the direction of the previous month's average industry reaction. Rolling industry portfolio investment strategies, which buy positively reacting industries and sell negatively reacting industries, appear profitable even after controlling for size and book-to-market effects in returns. Profitability has strengthened over time and seems to exist also for the largest stocks. Our findings cannot be explained by liquidity effects or exposure to three-factor risks. Additional robustness checks with Fama-McBeth regressions confirm the ability of the past month's average industry announcement reaction to predict the cross-section of stock returns.

In this paper we document a strong and prevalent drift in long-term industry returns after M&A announcements. Our evidence suggests that capital markets underreact to the industry-wide information provided by merger announcements.

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Table 1
Yearly Distribution of M&A Transactions and Average Industry Announcement Effects

The sample contains all U.S. M&A announcements between January, 1985 and December, 2002 with an inflation-adjusted transaction value of at least $25 million (Panel A), $50 million (Panel B), and $100 million (Panel C). For each year, the table shows the number of deals, the percentage of the total number of deals during that specific year, as well as the average industry reaction to M&A announcements during that year. The 20 Industries are defined as in Moskowitz and Grinblatt (1999). CAR is the cumulative abnormal return to the equal-weighted industry portfolio for a five-day event window (-2,2) around the announcement date. Average Industry CAR denotes the average CAR to the industry portfolio at the announcement of deals that take place within that industry.

	Panel A: Transaction value > $25mn			Panel B: Transaction value > $50mn			Panel C: Transaction value > $100mn		
Year	Number of Deals	As % of Total Number	Average Industry CAR (%)	Number of Deals	As % of Total Number	Average Industry CAR (%)	Number of Deals	As % of Total Number	Average Industry CAR (%)
1985	754	3.34	0.0736	600	3.64	0.0843	461	4.06	0.0953
1986	970	4.30	0.0677	776	4.71	0.0721	587	5.17	0.0840
1987	930	4.12	-0.0344	736	4.47	-0.0344	541	4.77	-0.0713
1988	1,197	5.30	0.0010	947	5.75	-0.0022	692	6.10	0.0014
1989	1,040	4.61	0.0077	783	4.75	-0.0128	553	4.87	-0.0230
1990	657	2.91	-0.0463	460	2.79	-0.0423	276	2.43	-0.0834
1991	579	2.56	0.0187	404	2.45	-0.0021	258	2.27	-0.0061
1992	707	3.13	0.1269	496	3.01	0.1229	311	2.74	0.0886
1993	922	4.08	0.0541	621	3.77	0.0443	385	3.39	0.0498
1994	1,138	5.04	0.1212	787	4.77	0.0938	512	4.51	0.1031
1995	1,369	6.06	0.0645	932	5.65	0.0665	610	5.37	0.0797
1996	1,704	7.55	0.0568	1,175	7.13	0.0945	745	6.56	0.1271
1997	2,140	9.48	0.1667	1,541	9.35	0.1853	1,074	9.46	0.1823
1998	2,349	10.40	-0.0026	1,669	10.13	-0.0061	1,123	9.89	-0.0095
1999	2,011	8.90	-0.0278	1,500	9.10	-0.0435	1,076	9.48	-0.0323
2000	1,824	8.08	-0.0081	1,400	8.49	0.0316	1,005	8.85	0.0242
2001	1,196	5.30	0.0636	868	5.27	0.0962	603	5.31	0.0853
2002	1,096	4.85	0.1653	788	4.78	0.1618	539	4.75	0.2195
Total sample	22,583	100.00	0.0477	16,483	100.00	0.0515	11,351	100.00	0.0534

Table 2

Description and Summary Statistics of Industries

Sample statistics of our 20 industry portfolios are reported below, including the two-digit SIC codes used to form the industries as in Moskowitz and Grinblatt (1999). The industries are formed monthly from January, 1985 to December, 2002 using CRSP SIC codes, which allow for time variation in industrial classification. The average number of stocks assigned to each industry portfolio every month is reported, along with the minimum number of stocks appearing in each portfolio at any point in time (reported in parentheses). Also reported for each industry over the sample period are the average raw return, the average adjusted return in excess of the size-B/M matched benchmarks, and the monthly average CAR to own-industry M&A announcements with an inflation-adjusted transaction value of at least $25m, $50m, or $100m. CAR is the cumulative abnormal return to the equal-weighted industry portfolio for a five-day event window (-2,2) around the announcement date. Industry CAR denotes the sample average of the monthly average CAR to each industry portfolio at the announcement of deals that take place within that industry. In addition, the cross-sectional averages of these statistics across industries are reported at the bottom of the table.

	Industry	SIC Codes	Avg. No. of Stocks (Minimum)	Raw Returns (%)	Adjusted Returns (%)	Industry CAR (%) $25m	Industry CAR (%) $50m	Industry CAR (%) $100m
1.	Mining	10-14	273.5 (149)	0.9418	-0.1298	0.1516	0.1452	0.0633
2.	Food	20	109.6 (91)	1.0908	-0.0862	0.0312	0.0193	0.0043
3.	Apparel	22-23	83.3 (43)	0.5717	-0.5108	-0.0431	-0.0632	-0.0603
4.	Paper	26	47.2 (33)	1.1076	-0.1090	-0.0016	-0.0446	-0.0079
5.	Chemical	28	320.6 (199)	1.4671	0.3869	0.0585	0.0623	0.0034
6.	Petroleum	29	26.1 (21)	1.2769	-0.0303	-0.0362	-0.0209	-0.0010
7.	Construction	32	37.9 (23)	1.0145	-0.2113	-0.0499	-0.0378	-0.0369
8.	Prim. Metals	33	73.0 (54)	0.7663	-0.6269	-0.1362	-0.1194	-0.0889
9.	Fab. Metals	34	105.4 (59)	1.1135	-0.1849	0.0085	0.0010	0.0516
10.	Machinery	35	368.5 (261)	1.1652	-0.0722	0.0804	0.0665	0.0370
11.	Electrical Eq.	36	449.8 (375)	1.3860	0.2380	0.0401	0.0332	0.0413
12.	Transport Eq.	37	94.2 (75)	0.8742	-0.1943	-0.0211	-0.0044	-0.0074
13.	Manufacturing	38-39	376.1 (307)	1.2738	0.1610	0.1805	0.1747	0.1442
14.	Railroads	40	12.0 (8)	1.2258	-0.0497	0.0426	0.0214	0.0458
15.	Other Transport	41-47	102.4 (76)	1.0143	-0.1197	0.0522	0.0461	0.0244
16.	Utilities	49	205.0 (132)	1.0279	-0.1760	-0.0707	-0.0601	-0.0109
17.	Dept. Stores	53	39.3 (29)	0.7153	-0.1681	0.1392	0.1541	0.1788
18.	Retail	50-52, 54-59	576.3 (429)	0.9167	-0.1632	-0.0122	-0.0296	-0.0415
19.	Financial	60-69	1165.7 (863)	1.3180	-0.0152	0.0541	0.0608	0.0682
20.	Other	other	1329.1 (957)	1.1178	0.0788	0.0530	0.0608	0.0639
	Average		289.8 (209.2)	1.0693	-0.0991	0.0260	0.0233	0.0236
	F-statistic (identical means)			0.296	1.124	1.382	1.380	1.064
	(*p*-value)			(0.999)	(0.318)	(0.124)	(0.125)	(0.382)

Table 3
Industry Cumulative Abnormal Returns to M&A Announcements and Average Industry CARs of the Previous Month

The sample contains all U.S. M&A announcements between January, 1985 and December, 2002 with an inflation-adjusted transaction value of at least $25 million (Panel A), $50 million (Panel B), and $100 million (Panel C). CAR $_{i,t}$ denotes the cumulative abnormal return to the equal-weighted industry portfolio for a five-day event window (-2,2) around the announcement date. The 20 Industries are defined as in Moskowitz and Grinblatt (1999). Average Industry $CAR_{i,t-1}$ denotes the average CAR to the industry portfolio at the announcement of deals that take place within industry *i* in the previous month *t*-1. All returns are in percentages, median values are in brackets and absolute t-statistics for mean tests and z-values for median tests in parentheses. The difference tests are based on t-tests for equality of means and a Wilcoxon-test for equality of medians. The final row for each panel lists the number of observations.

	All	Average Industry $CAR_{i,t-1} > 0$ (1)	No M&A Activity $Industry_{i,t-1}$ (2)	Average Industry $CAR_{i,t-1} < 0$ (3)	Difference ((1)-(3))
Panel A: Transaction value > $25mn					
CAR $_{i,t}$ (%)	0.0477	0.1732	0.0301	-0.0948	0.2680
	(5.47)	(14.79)	(0.65)	(7.08)	(15.13)
	[0.0347]	[0.1399]	[-0.0124]	[-0.0919]	[0.2319]
	(6.99)	(18.85)	(0.34)	(9.48)	(19.69)
N	*22,583*	*7,932*	*1,015*	*13,636*	
Panel B: Transaction value > $50mn					
CAR $_{i,t}$ (%)	0.0515	0.1765	0.0553	-0.0973	0.2738
	(5.05)	(13.34)	(1.26)	(5.90)	(13.10)
	[0.0357]	[0.1365]	[-0.0019]	[-0.0801]	[0.2166]
	(6.35)	(15.73)	(0.65)	(7.28)	(15.88)
N	*16,483*	*8,351*	*1,093*	*7,039*	*16,483*
Panel C: Transaction value > $100mn					
CAR $_{i,t}$ (%)	0.0534	0.1605	0.0490	-0.0701	0.2306
	(4.31)	(9.61)	(1.16)	(3.52)	(8.93)
	[0.0327]	[0.1270]	[-0.0113]	[-0.0764]	[0.2034]
	(5.25)	(11.75)	(0.82)	(4.73)	(11.42)
N	*11,351*	*5,517*	*1,089*	*4,745*	*11,351*

Table 4
Monthly Industry Size-B/M adjusted Returns and Average Industry CARs of the Previous Month

The sample contains monthly size-B/M adjusted returns of the 20 Moskowitz and Grinblatt (1999) industry portfolios for the period of February, 1985 to December, 2002. Size-B/M Adjusted Industry Return $_{i,\,t}$ denotes the equal-weighted portfolio of individually size-B/M adjusted stock returns for all stocks in industry *i* in month *t*. Average Industry $CAR_{i,t-1}$ denotes the average CAR to the industry portfolio at the announcement of deals that take place within industry *i* in month *t-1* with transaction values of at least \$25mn (Panel A), \$50mn (Panel B) and \$100mn (Panel C). All returns are in percentages, median values are in brackets and absolute t-statistics for mean tests and z-values for median tests in parentheses. The difference tests are based on t-tests for equality of means and a Wilcoxon-test for equality of medians. The final row for each panel lists the number of observations.

	All	Average Industry $CAR_{i,t-1} > 0$ (1)	No M&A Activity $Industry_{i,t-1}$ (2)	Average Industry $CAR_{i,t-1} < 0$ (3)	Difference ((1)-(3))
Panel A: Transaction value > \$25mn					
Size-B/M Adjusted Industry Return $_{i,\,t}$ (%)	-0.0983 (2.07) [-0.1583] (4.33)	0.2472 (3.24) [0.0822] (1.93)	-0.0607 (0.61) [-0.1988] (2.00)	-0.4775 (6.40) [-0.4237] (7.22)	0.7247 (6.79) [0.5060] (6.70)
N	*4,300*	*1,584*	*1,158*	*1,558*	
Panel B: Transaction value > \$50mn					
Size-B/M Adjusted Industry Return $_{i,\,t}$ (%)	-0.0983 (2.07) [-0.1583] (4.33)	0.2661 (3.37) [0.1008] (2.31)	-0.1158 (1.35) [-0.2181] (3.25)	-0.4537 (5.62) [-0.3823] (6.35)	0.7198 (6.38) [0.4831] (6.30)
N	*4,300*	*1,442*	*1,451*	*1,407*	
Panel C: Transaction value > \$100mn					
Size-B/M Adjusted Industry Return $_{i,\,t}$ (%)	-0.0983 (2.07) [-0.1583] (4.33)	0.2521 (3.00) [0.1238] (2.45)	-0.1417 (1.89) [-0.2538] (4.06)	-0.3904 (4.43) [-0.3435] (5.27)	0.6425 (5.28) [0.4673] (5.61)
N	*4,300*	*1,248*	*1,827*	*1,225*	

Table 5
Average Monthly Returns to Industry Trading Strategies

This table shows average monthly returns for rolling industry portfolio investment strategies over different holding periods. Each month from January, 1985 to December, 2002, industries are assigned to one of three portfolios depending on the average CAR in industry *i* in portfolio formation month *t*. Additionally, a self-financing portfolio is formed by going long all industries with positive average industry $CAR_{i,t}$ and going short all industries with negative average industry $CAR_{i,t}$. Returns for longer horizons are calculated using a standard rolling-portfolio method as in Jegadeesh and Titman (1993) and Fama (1998) to create a time-series of non-overlapping returns. Panel A shows average monthly raw returns and Panel B average monthly size-B/M adjusted returns for one, three, six, and 12-month holding periods. All industries are weighted equally in the portfolio averages, and all months are weighted equally in the time-series average. All returns are in percentages, t-statistics are given in parentheses for the self-financing long-short strategy.

Months after portfolio formation	Average Industry $CAR_{i\,t} > 0$ (1)	No M&A Activity $Industry_{i,t}$ (2)	Average Industry $CAR_{i\,t} < 0$ (3)	Long-Short Strategy (1)-(3)	t-statistic
Panel A: Average monthly raw returns (%)					
1	1.5450	1.0176	0.5002	1.0449	(4.92)
3	1.3265	1.0596	0.7071	0.6194	(3.54)
6	1.2105	1.0398	0.7946	0.4158	(2.93)
12	1.1453	0.9988	0.8452	0.3001	(2.78)
Panel B: Average monthly size-B/M adjusted returns (%)					
1	0.2852	-0.1527	-0.4623	0.7475	(4.42)
3	0.1284	-0.0939	-0.3292	0.4576	(3.42)
6	0.0634	-0.1145	-0.2603	0.3237	(3.05)
12	0.0146	-0.1398	-0.2279	0.2424	(3.03)

Table 6
Average Monthly Returns to Industry Trading Strategies for Time-Subsamples

This table shows average monthly size-B/M adjusted returns for rolling industry portfolio investment strategies over different holding periods for two time-subsamples. Panel A reports results for January, 1985 to December, 1993. Panel B shows the performance of the portfolios for January, 1994 to December 2004. Each month, industries are assigned to one of three portfolios depending on the average CAR in industry *i* in portfolio formation month *t*. In addition, a self-financing portfolio is formed by going long all industries with positive average industry $CAR_{i,t}$ and going short all industries with negative average industry $CAR_{i,t}$. Returns for longer horizons are calculated using a standard rolling-portfolio method as in as Jegadeesh and Titman (1993) and Fama (1998). Panel A shows average monthly raw returns and Panel B average monthly size-B/M adjusted returns for one, three, six, and 12-month holding periods. All industries are weighted equally in the portfolio averages, and all months are weighted equally in the time-series average. All returns are in percentages, t-statistics are given for the self-financing long-short strategy.

Months after portfolio formation	Average Industry $CAR_{i\,t} > 0$ (1)	No M&A Activity $Industry_{i,t}$ (2)	Average Industry $CAR_{i\,t} < 0$ (3)	Long-Short Strategy (1)-(3)	t-statistic
Panel A: Average monthly size-B/M adjusted returns (%) for subperiod 1985-1993					
1	0.2557	0.1353	-0.2734	0.5291	(3.46)
3	0.1559	0.1473	-0.2001	0.3560	(3.96)
6	0.0668	0.1351	-0.0973	0.1641	(2.38)
12	0.0393	0.0995	-0.0726	0.1119	(2.12)
Panel B: Average monthly size-B/M adjusted returns (%) for subperiod 1994-2002					
1	0.3285	-0.4491	-0.6463	0.9748	(3.22)
3	0.1070	-0.3369	-0.4692	0.5762	(2.25)
6	0.0542	-0.3555	-0.4308	0.4850	(2.35)
12	-0.0054	-0.3658	-0.3790	0.3736	(2.33)

Table 7
Average Monthly Returns to Industry Trading Strategies for Size-Quintiles

This table shows average monthly raw returns for rolling industry portfolio investment strategies over different holding periods for five size quintiles. Stocks are assigned each year to size quintiles based on within-industry NYSE break points for market capitalization as of December of year *t-1*. Each month from January, 1985 to December, 2002, industries are assigned to one of three portfolios depending on the average CAR in industry *i* in portfolio formation month *t*. In addition, a self-financing portfolio is formed by going long all industries with positive average industry $CAR_{i,t}$ and going short all industries with negative average industry $CAR_{i,t}$. Returns for longer horizons are calculated using a standard rolling-portfolio method as in as Jegadeesh and Titman (1993) and Fama (1998). Panels A through E show average monthly raw returns for one, three, six, and 12 month holding periods in ascending order for smallest quintiles to largest. All industries are weighted equally in the portfolio averages, and all months are weighted equally in the time-series average. All returns are in percentages, t-statistics are given for the self-financing long-short strategy.

Months after portfolio formation	Average Industry $CAR_{i\,t} > 0$ (1)	No M&A Activity $Industry_{i,t}$ (2)	Average Industry $CAR_{i\,t} < 0$ (3)	Long-Short Strategy (1)-(3)	t-statistic
Panel A: Average monthly raw returns (%) for quintile 1 (smallest)					
1	1.7289	1.0389	0.3872	1.3417	(5.74)
3	1.4589	1.0392	0.6695	0.7894	(4.07)
6	1.2986	1.0508	0.7986	0.5000	(3.24)
12	1.2501	1.0149	0.8904	0.3597	(3.28)
Panel B: Average monthly raw returns (%) for quintile 2					
1	1.2627	1.1118	0.3647	0.8981	(3.77)
3	1.1205	1.0660	0.5927	0.5277	(3.12)
6	1.0108	0.9601	0.6616	0.3492	(2.74)
12	0.9174	0.8800	0.6735	0.2440	(2.49)
Panel C: Average monthly raw returns (%) for quintile 3					
1	1.4810	0.9945	0.5250	0.9560	(3.95)
3	1.2008	0.9734	0.7829	0.4180	(2.21)
6	1.1003	0.9421	0.8412	0.2592	(1.78)
12	1.0395	0.8907	0.8200	0.2196	(1.99)
Panel D: Average monthly raw returns (%) for quintile 4					
1	1.4004	1.1541	0.8536	0.5469	(2.61)
3	1.2391	1.2839	0.9475	0.2916	(1.89)
6	1.1759	1.2711	0.9641	0.2118	(1.75)
12	1.1415	1.1756	0.9755	0.1660	(1.78)
Panel E: Average monthly raw returns (%) for quintile 5 (largest)					
1	1.3293	1.2022	0.8653	0.4640	(2.21)
3	1.2490	1.2350	0.9643	0.2847	(1.78)
6	1.1916	1.2011	0.9823	0.2093	(1.57)
12	1.1314	1.1300	0.9539	0.1775	(1.66)

Table 8
Robustness of Average Monthly Returns to Industry Trading Strategies

This table shows average monthly returns for rolling industry portfolio investment strategies over different holding periods. Each month from January, 1985 to December, 2002, industries are assigned to one of three portfolios depending on the average CAR in industry *i* in portfolio formation month *t*. In addition, a self-financing portfolio is formed by going long industries with positive average industry $CAR_{i,t}$ and going short industries with negative average industry $CAR_{i,t}$. Returns for longer horizons are calculated using a standard rolling-portfolio method as in as Jegadeesh and Titman (1993) and Fama (1998), and average monthly size-B/M adjusted returns for one, three, six, and 12-month holding periods are reported. All industries are weighted equally in the portfolio averages, and all months are weighted equally in the time-series average. Panel A excludes stocks priced below 5$ before forming industries. Panel B reports returns if only two industries are included each month in the positive and negative average $CAR_{i,t}$ portfolios, respectively. These two industries are selected by ranking by formation month average industry $CAR_{i,t}$ and selecting the two portfolios each at the top and bottom of the ranking (90^{th} and 10^{th} percentile). The middle portfolio still includes all industries without M&A activity. All returns are in percentages, t-statistics are given for the self-financing long-short strategy.

Months after portfolio formation	Average Industry $CAR_{i,t} > 0$ (1)	No M&A Activity $Industry_{i,t}$ (2)	Average Industry $CAR_{i,t} < 0$ (3)	Long-Short Strategy (1)-(3)	t-statistic
Panel A: Average monthly size-B/M adjusted returns (%) excluding stocks priced < 5$					
1	0.2229	-0.1521	-0.3907	0.6136	(4.09)
3	0.0938	-0.1240	-0.2797	0.3735	(3.27)
6	0.0351	-0.1426	-0.2044	0.2396	(2.70)
12	0.0113	-0.1699	-0.1899	0.2012	(2.91)
Panel B: Average monthly size-B/M adjusted returns (%) including only two industries on each side					
1	0.3456	-0.1527	-0.5354	0.8810	(3.18)
3	0.1053	-0.0939	-0.4621	0.5674	(2.79)
6	0.0938	-0.1145	-0.3339	0.4277	(2.63)
12	-0.0105	-0.1398	-0.3211	0.3106	(2.69)

Table 9
Exposure of Industry Portfolio Returns to Fama-French Three-Factor Portfolios

This table shows month-by-month alphas, coefficients, t-statistics, and R^2 values from a monthly time-series regression of $R_t - R_f = \alpha_t + \beta_t(R_m - R_f) + \gamma_t(SMB) + \delta_t(HML) + \varepsilon_t$ where the left-hand side variable is monthly excess returns for a portfolio formed *t* month ago and the right-hand side variables are contemporaneous Fama and French (1993) market, size, and book-to-market factor mimicking portfolio returns. Industry portfolios are formed each month from January, 1985 until December 2002 by assigning industries to one of three portfolios depending on the average CAR in industry *i* in portfolio formation month *t*. In addition, a self-financing portfolio is formed by going long all industries with positive average industry $CAR_{i,t}$ and going short all industries with negative average industry $CAR_{i,t}$. Panel A reports the regression results for these long-short industry portfolios, while Panel B presents results for the positive average industry CAR portfolios and Panel C displays the findings for negative average industry CAR portfolios. *t*-Statistics are based on White (1980) heteroskedasticity-robust standard errors.

Post-formation month	$\hat{\alpha}$ (%)	$\hat{\beta}$ (R_m-R_f)	$\hat{\gamma}$ (SMB)	$\hat{\delta}$ (HML)	R^2 (%)	*N*
Panel A: Long-Short Industry Portfolio						
1	0.7191	-0.1075	0.1823	-0.0943	7.24	*215*
	(3.06)	(-2.07)	(1.24)	(-0.81)		
3	0.0166	-0.0628	0.3283	-0.0004	13.86	*213*
	(0.07)	(-1.20)	(2.44)	(-0.00)		
6	-0.0741	-0.0874	0.2691	-0.0581	13.66	*210*
	(-0.39)	(-2.02)	(2.98)	(-0.53)		
12	-0.3378	-0.0066	0.2384	0.0122	8.90	*204*
	(-1.76)	(-0.10)	(2.72)	(0.11)		
Panel B: Positive Industry CAR Portfolio						
1	0.5366	0.9275	0.8297	0.3091	84.29	*215*
	(3.32)	(23.84)	(9.57)	(4.46)		
3	0.1935	0.9639	0.9256	0.3415	84.58	*213*
	(1.19)	(23.63)	(9.98)	(3.90)		
6	0.0300	0.9756	0.8528	0.3828	85.99	*210*
	(0.21)	(22.51)	(11.39)	(4.76)		
12	-0.0554	0.9698	0.8095	0.3907	83.68	*204*
	(-0.37)	(22.81)	(9.79)	(4.34)		
Panel C: Negative Industry CAR Portfolio						
1	-0.6114	1.0357	0.6564	0.4108	78.97	*215*
	(-3.45)	(22.24)	(5.89)	(4.06)		
3	-0.2503	1.0275	0.6065	0.3498	79.95	*213*
	(-1.48)	(24.17)	(6.09)	(3.39)		
6	-0.3204	1.0641	0.5929	0.4495	79.87	*210*
	(-1.74)	(30.51)	(6.29)	(5.10)		
12	-0.1393	0.9771	0.5804	0.3868	74.44	*204*
	(-0.73)	(17.53)	(5.46)	(4.01)		

Table 10
Fama/McBeth Regressions: The Cross-Section of Individual Stock Returns and Average Industry CARs

Fama and MacBeth (1973) cross-sectional regressions are run every month on the universe of securities from February 1985 to December 2002. Specifically, the cross-section of individual stock returns over one, three, six, and 12-month horizons are regressed on a constant and a host of firm characteristics: market β (estimated using the prior 36 months of returns), size (log of market capitalization at month t-1), B/M (log of book-to-market ratio calculated using past data as in Fama and French (1992)), several past return variables, as well as the average industry CAR of month t-1. Time series t-statistics are in brackets, below each average coefficient. Newey and West (1987) heteroskedasticity and autocorrelation-robust standard errors are used in all calculations for the three, six, nine and 12-month regressions.

Horizon	Intercept	$\hat{\beta}$	ln(Size)	ln(B/M)	$ret_{-1:-1}$	$ret_{-12:-2}$	$ret_{-36:-13}$	Average Industry CAR_{t-1}	Average R^2 (%)
1	0.0228	0.0008	-0.0009	0.0000	-0.0661	0.0310	-0.1588	0.5036	5.34
	(3.05)	(0.48)	(1.46)	(0.02)	(12.02)	(1.25)	(4.75)	(7.07)	
3	0.0684	0.0017	-0.0026	-0.0006	-0.0061	0.0485	-0.4816	0.4917	5.56
	(3.27)	(0.39)	(1.64)	(0.19)	(0.88)	(0.90)	(4.20)	(2.54)	
6	0.1406	0.0041	-0.0054	-0.0010	0.0096	-0.0491	-0.9129	0.7572	5.79
	(4.06)	(0.53)	(2.00)	(0.17)	(0.88)	(0.43)	(4.11)	(2.15)	
12	0.2154	0.0091	-0.0081	-0.0020	0.0164	-0.2538	-1.3609	0.9855	5.90
	(4.59)	(0.80)	(2.15)	(0.21)	(1.16)	(1.54)	(3.98)	(2.39)	