Do Announcements of Mergers and Acquisitions Create Value for Shareholders? Evidence from US Industrial Firms

By

Yasir Iqbal

A research project submitted in partial fulfillment of the requirements

for the degree of Master of Finance

Saint Mary's University

Copyright Yasir Iqbal 2013

Written for MFIN 6692.0 under the direction of

Dr. Francis Boabang

Approved: <u>Dr. Francis Boabang</u>
Faculty Advisor

Approved: <u>Dr. Francis Boabang</u>
MFIN Director

Date: August 24, 2013

Acknowledgement

I would like to thank Dr. Francis Boabang for all his help and advice in completing this project. I would also like to thank all the professors of Master of Finance program; especially Dr. Mohammad Rahaman for the help and guidance provided in completion of this study. I would also like to acknowledge the support I received from my friends during this process. Lastly, I would like to express my appreciation to my family for their support and encouragement.

Abstract

Do Announcements of Mergers and Acquisitions Create Value for Shareholders? Evidence from US Industrial Firms

By

Yasir Iqbal

The twenty first century started with the sixth merger wave and a tremendous increase has been observed in the number of corporate mergers and acquisitions since 2003. This study investigates whether the announcements of mergers and acquisitions (M&A) create a value for shareholders or not. In order to study the effect of merger announcements, 5337 M&A announcements in the US industrial firms between January 1, 2003 and December 31, 2006 are considered. This study follows traditional event study methodology. Results indicate that the announcement of takeover or merger is taken as a positive signal by the market and stock prices of the firms involved increase to reflect the effect of announcement. The analysis points to positive abnormal returns realized for shareholders and provide enough evidence to support the assertion that merger announcements create a value to shareholders' wealth.

Keywords: Mergers and acquisitions (M&A), announcements, event study, US industrial firms

Table of Contents

Chapter 1

Introduction

Overview

Whether merger and acquisition (M&A) announcements create value for shareholders or not, is an ongoing debate for researchers. In today's global world, the business environment has become extremely competitive. Companies are growing rapidly in the challenging environment to compete with their counterparts. In order to stay in business, companies have to be strong. Companies also need global presence for competition and growth and hence they are following various techniques to expand. Managers are seeking ways to create value for shareholders. One of the techniques a company uses to grow is mergers and acquisitions (M&A).

Merger and acquisition announcements can create value for shareholders, but at the same time they can also dilute shareholders' value. If markets react positively to a merger announcement, it would create value for shareholders. On the other hand, if markets react negatively to the announcement, it would lead to value destruction for stock holders. Value creation or destruction is reflected in the stock price.

In recent years, mergers and acquisitions have become extremely important. A large number of mergers and acquisitions (M&A) has occurred over the period of last three decades around the globe. In 2012, the total value of worldwide M&A was US$ 2.3 trillion, a 2.3% increase from 2011 (Thompson Reuters, 2012). In 2012, the total value of M&A activity involving the US totaled US$ 1.2 trillion (Thompson Reuters, 2012).

From an economic viewpoint, mergers are mainly divided into three different classifications; vertical mergers, horizontal mergers and conglomerate mergers. The first major type of mergers is horizontal mergers. A horizontal merger occurs between companies that share a similar kind of business activity and compete with each other. Mostly the main objective of horizontal merger is to enjoy economies of scale, but it could lead to a monopoly if it is not controlled by regulatory authorities.

The second major type of mergers is vertical mergers. Vertical mergers involve firms that are at different stage of production activity. Different motivating factors behind vertical mergers involve market expansion, reducing costs and technological economies. Third main type of mergers is conglomerate mergers. Conglomerate mergers occur between firms that are in different type of business activities.

There are three types of conglomerate mergers. The first type of conglomerate merger is a product extension merger, which involves extending the product line for the firm. Geographic market extension, also a conglomerate merger, involves expanding market operations geographically. A third type of merger is a pure conglomerate, and it includes mergers for unrelated business operations (Weston, Mitchell, and Mulherin, 2003).

Background

Companies use merger and acquisition activities to enter new geographic regions or expand to new markets. Firms involve in M&A activities to enjoy the benefits of economies of scale or gain technological economies, management expertise, reducing cost and capital allocation. Despite a large number of studies on M&A activities, results are still unclear related to the value creation for shareholders. It is being argued that

2

synergy is created by M&A and value is created for both shareholders of the acquiring company and consumers (Weston, Mitchell, and Mulherin, 2003). There is another school of thought who argues that M&A destroy value for shareholders, returns decrease due to agency problems (Jensen, 1986). One school of thought argues M&A create value for shareholders whereas opponents justify M&A activities destroy value; net results are unclear even after a number of researches. An ongoing research is needed to measure the net effect of M&A activities, whether M&A create or destroy value for shareholders.

Cross border M&A are becoming more popular and increasing in number rapidly. In order to have global presence companies are merging or acquiring businesses across borders. The total value of cross border mergers and acquisitions is increasing considerably. US involvement in cross border M&A agreements is prominent.

Purpose of Study

The objective of this study is to investigate the impact of merger and acquisition announcements on stock prices. Do mergers and acquisition announcements create value for shareholders? US industrial firms are used as a case study to answer the above mentioned question. Mergers and acquisition announcement during the period 2003 to 2006 (Sixth merger wave) are analyzed. If the signal sent in the form of a merger and acquisition announcement is intercepted positively by the market, share prices go up and it creates value for shareholders, otherwise it can destroy value for shareholders. The announcement of merger or acquisition is considered an event. Markets react differently to the signal (the announcement of M&A).

Importance of Study

Industrial firms of United States are selected for this study after considering various important factors. The United States has one of the biggest economies in the world, and has a huge influence in the international market. Another important factor to consider is that the United States participates more in M&A activity than any other country. The reason for choosing an industrial sector is its importance in the US economy.

Hypotheses

H1. The average abnormal returns (AAR) around merger and acquisition announcements are positive for the securities.

H2. The cumulative abnormal returns (CAR) around merger and acquisition announcements are positive for the securities.

Organization of Study

This study is divided into five chapters. The current chapter gave a brief introduction to the reader about the research. Chapter two will contain a literature review related to the study. In Chapter three, data and methodology used for investigation of value creation in United States industrial firms by M&A announcements will be discussed. In Chapter four, empirical findings related to abnormal returns gained due to merger and acquisition announcement would be discussed**.** Finally, chapter five will conclude, discuss several limitations and recommendations on the study.

Chapter 2

Literature Review

There are a large number of studies revolving the debate that merger and acquisition announcements create or destroy the value for shareholders of both the bidding and target firms. There are researchers who favor the idea that merger and acquisition announcements led to excess returns for shareholders and there are also opponents who concluded that merger announcements did not lead to abnormal returns.

Event Study

In finance, the traditional event study methodology has been used to examine the impact of financial and/or non-financial events on the stock returns of securities. Many reviews are available on financial event study in literature. MacKinlay (1979) and Serra (2002) worked on event study methodology and provided scholarly reviews on event study methodology and techniques. Cox and Portes (1998) studied the uses and abuses of event study and provided a comprehensive summary of event study in merger and acquisition announcements. Pautler (2003) also studied and explained the use of financial event study methodology for merger and acquisition.

Researchers also studied post performance of securities in short run and long run after merger and acquisition announcements. Agrawal and Jaffe (2000) carried out a comprehensive study on post-merger performance of stocks. Langetieg (1978) studied long term post-merger and acquisition performance and found negative cumulative

abnormal returns (CAR) between 2.23% and 2.62% over a period of 6 years after merger and acquisition.

Merger and acquisition announcements

Dodd and Ruback (1977) studied M&A announcements and analyzed abnormal returns gained around M&A announcements. Their study determined that successful takeovers lead to positive and significant returns for shareholders, of both the bidding and the target firms. This leads to the conclusion that merger and acquisition activities create a value for shareholders.

Langetieg (1978) analyzed M&A announcements and measured the gains for shareholders from mergers. M&A announcements create value and cause significant and excessive post-merger returns for shareholders (Langetieg, 1978).

Asquith and Kim (1982) studied abnormal returns gained by shareholders of target firms due to announcements of mergers and acquisitions or completion of mergers. Asquith et al. (1982) concluded that stock holders of the target firms gained positive results from M&A activity while stock holders of the bidding firms did not see the same positive results.

Jensen and Ruback (1983) analyzed work of thirteen researches on significant positive gains due to merger and acquisition announcements. There results indicated that abnormal gains for shareholders of the target firm are twenty percent for mergers. Stock holders of bidding firms enjoyed four percent abnormal gains for the successful tender offers and no abnormal gains for mergers (Jensen and Ruback, 1983).

Frank, Harris and Titman (1991) studied the results of merger announcements on stock holders' returns, but they did not find evidence to support that merger announcements led to abnormal returns over the period of three years after the announcement date. They concluded that merger and acquisition activities did not create value for shareholders of the bidding firms.

Agrawal, Jaffe and Mandelker (1992) investigated abnormal gains around merger announcements. They found that stock holders of bidding firms lost value due to M&A transactions. Their study showed that merger and acquisition activities failed to give abnormal returns of shareholders of bidding firms; in fact, M&A transactions destroyed value.

Wong and Cheung (2009) studied market reaction to takeovers in Asia during the period 2000 – 2007. Their findings indicate that markets reacted negatively to takeover activities and M&A transactions destroyed value for shareholders of target firms. They concluded that Asian markets did not favor mergers for shareholders of target firms.

Studies show that there are various economic motives behind merger and acquisition activities. Acquiring firm for a profitable investment is one of the most common reasons for acquisitions in the literature. Farrell and Shapiro (1990) studied motives behind merger activities and found that the most common motive is the alternative form of profitable investment. Firms go for acquisition when they find merger and acquisition activity as a profitable form of alternative investment.

Firms use mergers and acquisitions to combine their business operations. Firms generally combine their assets to enhance output, reduce operational costs, gain new technologies,

improve product quality, or production of a totally new product. Firms become involved in merger and acquisition activities to enjoy efficiencies. Managerial efficiencies, financial efficiencies and operational are the common forms of efficiencies achieved through mergers and acquisitions.

Management does not always use acquisition for reducing cost or short term goals; it also involves in merger activity for certain long term goals. Firms use M&A transactions to achieve specific long term goals which are part of the firm's strategic plan (Scheffman, 2003).

A large volume of academic research has been conducted to find out some strategy to gain abnormal returns over a long term, in which most researchers have concluded that abnormal returns could be gained in the short term but not in the long term. The field of information technology has highly progressed and information spreads quickly, disallowing for many to enjoy abnormal returns over a period of long term.

Efficient market hypothesis (EMH)

According to efficient market hypothesis (EMH), financial markets are efficient. Stock prices incorporate and reflect all the relevant financial and non-financial information, making it is impossible to beat the market for a longer period of time. According to EMH, stocks trade at their fair value. Efficient market hypothesis is classified into three levels:

1. Weak form EMH
2. Semi-strong form EMH

3. Strong form EMH

The concept of EMH has always been controversial among academic researchers. Jensen (1978) studied the stock price behavior and concluded that it is impossible to earn abnormal returns based on the information set when a market is efficient. No investor can enjoy abnormal profits by trading based on the information set.

Reilly and Brown (1997) argued that stock prices would take no time to adjust to new information. Stock prices reflect all the information available, markets are efficient, and impossible to beat the market based on information (Reilly and Brown, 1997).

Merger waves

Merger and acquisition activities in the US industrial history are classified into six merger waves. The great six merger waves are:

1) First wave (1890s)

2) Second wave (1920s)

3) Third wave (1960s)

4) Fourth wave (1980s)

5) Fifth wave (1990s)

6) Sixth and last wave (2000s)

The last wave includes merger and acquisition announcements between 2003 and 2008. Numerous aspects of sixth merger wave include private equity, leveraged buyout and shareholder activism.

Chapter 3

Data and Methodology

Data Description

To determine whether merger and acquisition announcements create or destroy value for shareholders, data for the period between 2003 and 2006 is gathered. The United States industrial firms are the focus of this study. Data for merger and acquisition announcements is gathered from the Securities Data Company (SDC). Data for daily stock prices and benchmark is obtained from the Center for Research in Security Prices (CRSP) database for the period 2003 to 2006. During the period of January 01, 2003 until December 31, 2006, 5337 mergers and acquisition announcements were identified that meet the following criteria:

1) All the acquiring firms are publically listed

2) Target firms could be public, private or subsidiary

3) The acquirer contains 100% of the target firm after the acquisition

4) Sample considers acquiring firms from US industrial sector

5) The value of a deal is more than $100 million as disclosed in SDC

6) Financial information of the acquiring firm is available from Compustat

7) Daily stock price data of the acquiring firm is available from Center for Research in Security Prices (CRSP)

Rationale

The rationale for choosing the period (2003 – 06) is the fact that recent merger wave (Sixth merger wave) started in 2003. This study analyzes the data for the period 2003-2006. The data for the 2007-08 financial crises is somewhat inefficient and polluted. Data for the period of 2003 to 2006 is efficient enough to make a reasonable conclusion about whether merger and acquisition announcements create value for shareholders or not.

Methodology

Event study methodology is most commonly used to calculate abnormal returns for a merger and acquisition event. The choice of an asset pricing model is very crucial to determine abnormal returns. Scale of abnormal returns depends on the selection of a pricing model to a large extent. In order to determine whether merger and acquisition announcements create or destroy value for shareholders, stock price behavior of firms is studied around takeover period (Brown and Warner, 1985). This stock price behavior of bidding firms would be determined by abnormal returns (AR) and cumulative abnormal returns (CAR) for securities in the event window using the market model. Positive cumulative abnormal returns (CAR) indicate that the merger and acquisition announcements create value for shareholders and a negative CAR indicate that announcements destroy value for shareholders. In order to calculate AAR and CAR, following items need to be defined:

- Event date
- Event window (Time Frame)
- Benchmark

- Estimation Period

Event Date

Event date is date firms announce mergers and acquisitions, not the date they actually acquire. Taking the actual acquiring date would not give meaningful results, since many changes take place after the announcement date. The day firm publically announces its merger and acquisition plan, is taken as the event date (Bowman, 1983).

Event Window

The event window is the time period analyzed to calculate abnormal returns (AR) and cumulative abnormal returns (CAR) for all securities under study. In this study, two event windows are used. The first event window consists of 11 day and the second 21 days. Abnormal returns (AR) are calculated over the period of 11 days as event window or time frame first and then 21 days. These 11 days consist of five days before event date and five days after the announcement date. Interpretation of abnormal returns of a bidding firm could also depend on other factors and event window. The cumulative abnormal returns (CAR) are also calculated for both the event windows.

Benchmark

There are a large number of models to calculate abnormal returns. Abnormal return is the difference between actual return and benchmark return or normal return. In this study CRSP value weighted index returns are used as benchmark for abnormal returns. Benchmark is used to calculate normal or expected returns and then abnormal returns are compared to the expected returns calculated.

Estimation Window

Estimation period is the period in which the parameters for the benchmark are estimated. Researchers have used different estimation periods. In this research paper, an estimation period of -30 to -120 days will be used.

Market Model

The choice of an asset pricing model is very crucial to determine abnormal returns. Scale of abnormal returns depends on the selection of pricing model to a large extent. In this study, the market model is used to determine abnormal returns for securities. The market model used to determine the linear relationship between security returns and returns on market portfolio is given in the following formula:

$$R_{y,t} = \alpha_y + \beta_y R_{m,t} + \varepsilon_{y,t} \quad \cdots\cdots\cdots (1)$$

$R_{y,t}$= the daily rate of return on security y on the day t

$R_{m,t}$= the daily rate of on market index on day t

βy = a covariance between R_{yt} and R_{mt} divided by a variance of R_{mt}

α_y= intercept for security y

$\varepsilon_{y,t}$= model error term on security y on day t, expected value of model error term is zero

The daily rates of return for each security are calculated from closing stock prices by following formulas:

$$R_{i,t} = \frac{\left(P_{i,t} - P_{i,t-1}\right)}{P_{i,t-1}}$$

$R_{i,t}$ = the rate of return on security I on day t

$P_{i,t}$ = the closing price on security I on day t

$P_{i,t-1}$ = the closing price on security I on day t-1

The daily rates of return for market index are calculated from closing values of market index by following formulas:

$$R_{m,t} = \frac{\left(P_{m,t} - P_{m,t-1}\right)}{P_{m,t-1}}$$

$R_{m,t}$ = the rate of return on market m on day t

$P_{m,t}$ = the closing market index on day t

P_{mt-1} = the closing market index on day t-1

Abnormal returns are the excess returns, the difference between estimated expected returns and actual returns. Abnormal returns are calculated by following relationship:

$$AR_{y,t} = R_{y,t} - \left(\alpha_y + \beta_y R_{m,t}\right) \qquad \ldots\ldots\ldots (2)$$

$AR_{y,t}$ = Abnormal return of security y on day t

$R_{y,t}$ = actual daily return of security y on day t

α_y and β_y are estimated parameters

The average abnormal return (AAR) for all securities is calculated by aggregating abnormal returns of all securities on day t and dividing by the number of firms. AAR is calculated as follows:

$$AAR_t = \frac{1}{N}\sum_{y=1}^{N} AR_{y,t} \quad \dots\dots\dots (3)$$

In order to determine whether merger and acquisition announcements create value for shareholders or not, the cumulative abnormal return (CAR) and average cumulative abnormal returns (ACAR) are also calculated. If CAR is greater is than zero for securities for the event window, it reflects that merger announcements create value for shareholders. The cumulative abnormal returns are calculated using formula:

$$CAR_{y,t} = CAR_{y,t-1} + AR_{y,t} \quad \dots\dots\dots (4)$$

Average cumulative abnormal return (ACAR) is calculated using following formula:

$$ACAR_t = \frac{1}{N}\sum_{y=1}^{N} CAR_{y,t} \quad \dots\dots\dots (5)$$

Hypothesis 1:

$$H0: AAR_t = 0$$

$$H1: AAR_t \neq 0$$

Hypothesis 2:

$$H0: ACAR_t = 0$$

$$H1: ACAR \ t \neq 0$$

Chapter 4

Results

In order to calculate abnormal returns two event windows are considered in this study. Average abnormal returns (AAR) and cumulative abnormal returns (CAR) at the announcement and around announcement date in an event window indicate how markets react to the announcement. If markets react positively, stock prices for securities will climb. Positive and significant average abnormal returns (AAR) and cumulative abnormal returns (CAR) during the event window for securities show that merger and acquisition announcements create value for shareholders. The statistical significance of results is also tested.

Event Window [-5, +5]

The results show that for the period 2003 - 06, merger and acquisition announcements in the US industrial firms created positive abnormal returns (AR). For the event window of 11 days [-5, +5], average abnormal returns (AAR) of .42% support the hypothesis that merger and acquisition announcements create value for shareholders. The event window of 11 days means five days before and five days after the announcement. Positive abnormal returns at the day of an announcement also supports that the US market is at the semi-strong form level of market efficiency hypotheses (EMH).
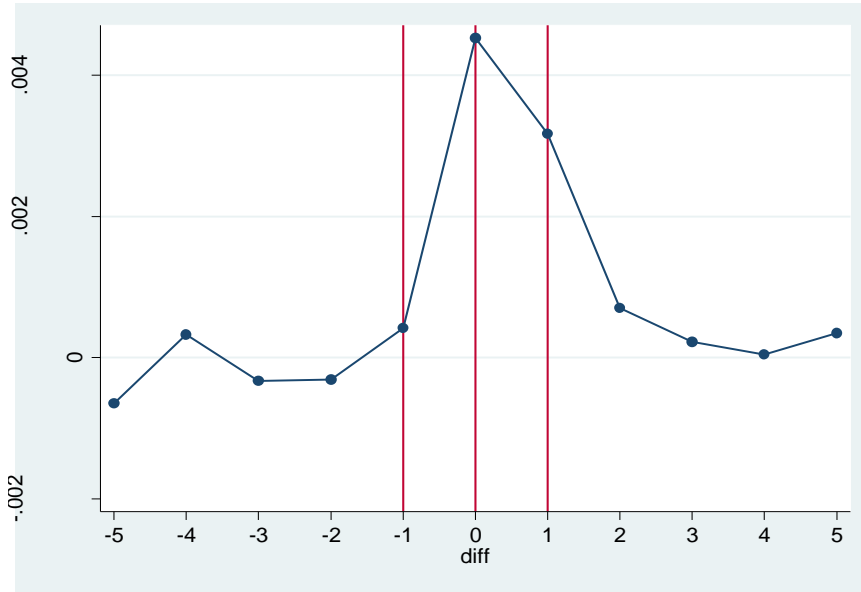
Positive and significant average abnormal returns (AAR) are found on the event date (the announcement date) and around the event date in the event window.

```
Linear regression                                    Number of obs =     5336
                                                     F(  0,  5335) =     0.00
                                                     Prob > F      =       .
                                                     R-squared     =  0.4382
                                                     Root MSE      =  .00955

                              Robust
  average_ab~n |    Coef.    Std. Err.      t    P>|t|     [95% Conf. Interval]
         _cons |  .0007713   .0001307    5.90   0.000      .000515     .0010277
```

The graph below shows that cumulative abnormal returns (CAR) for merger announcements in the event window of 11 days are positive. Positive cumulative abnormal returns (CAR) show that merger and acquisition announcements created value for stock holders during the period 2003 - 06.
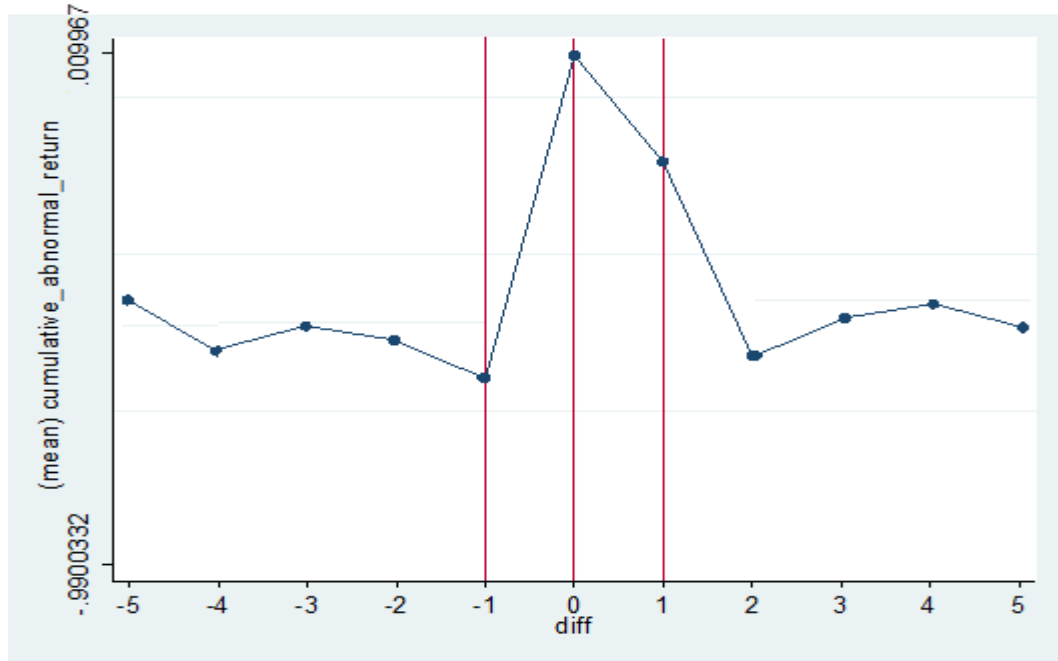
The statistical significance of the results is also tested.

```
Linear regression                          Number of obs =     5336
                                           F(  0,  5335) =     0.00
                                           Prob > F      =        .
                                           R-squared     =   0.4382
                                           Root MSE      =   .10506

                          Robust
cumulative~n    Coef.    Std. Err.      t     P>|t|     [95% Conf. Interval]

     _cons    .0084847   .0014382    5.90    0.000     .0056652     .0113043
```

Event Window [-10, +10]

For the event window of 11 days [-5, 0, +5], positive average abnormal returns (AAR) of .44% support the hypothesis that merger and acquisition announcements create value for shareholders. Positive and significant average abnormal returns (AAR) are found on the event date (the announcement date) and around the event date in the event window.

The significance of AAR is also tested and shown below. Positive and significant average abnormal returns (AAR) are found on the event date (the announcement date) and around the event date in the event window.

```
Linear regression                                    Number of obs =     5337
                                                     F(  0,  5336) =     0.00
                                                     Prob > F       =        .
                                                     R-squared      =   0.4758
                                                     Root MSE       =   .00703

                             Robust
average_ab~n |     Coef.   Std. Err.       t    P>|t|     [95% Conf. Interval]

       _cons |  .0003566   .0000963     3.70   0.000     .0001679    .0005453
```

The graph shows that cumulative abnormal returns (CAR) for merger announcements in the event window of 11 days are positive. Acquiring firms show cumulative abnormal

returns of .44%. Positive cumulative abnormal returns (CAR) show that merger and acquisition announcements created value for stock holders during the period 2003 - 06.

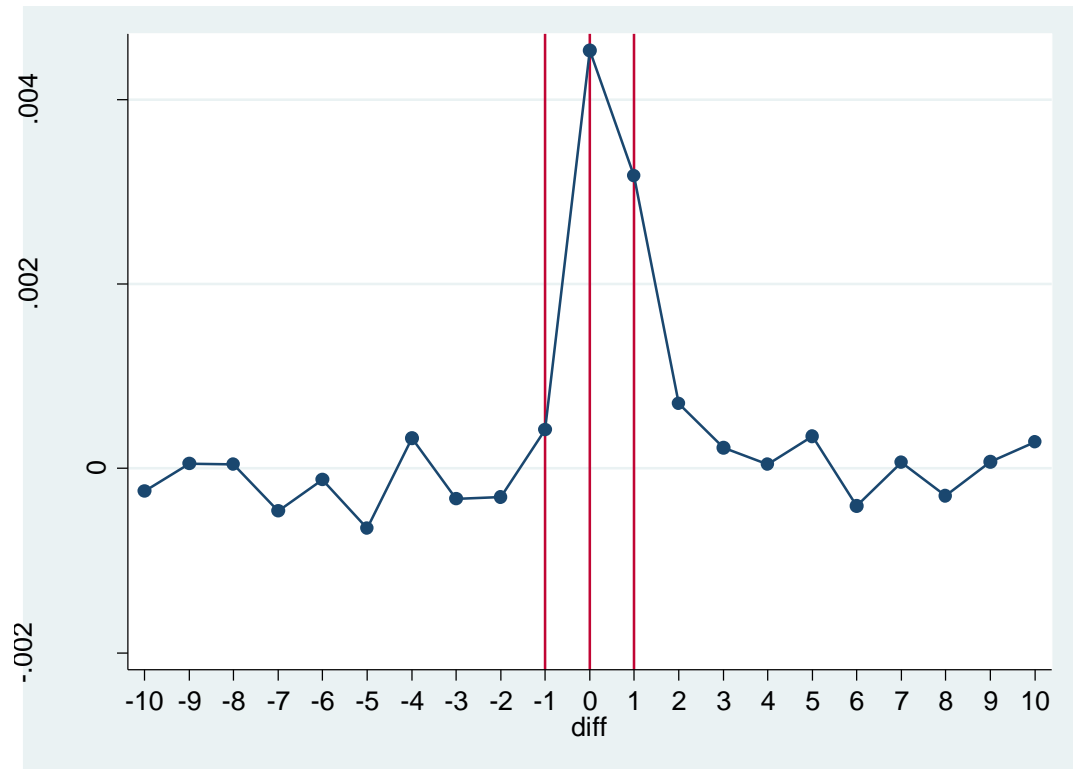The statistical significance of the results is also tested.

```
Linear regression                                   Number of obs =      5337
                                                    F(  0,  5336) =      0.00
                                                    Prob > F       =        .
                                                    R-squared      =   0.5453
                                                    Root MSE       =   .14767
```
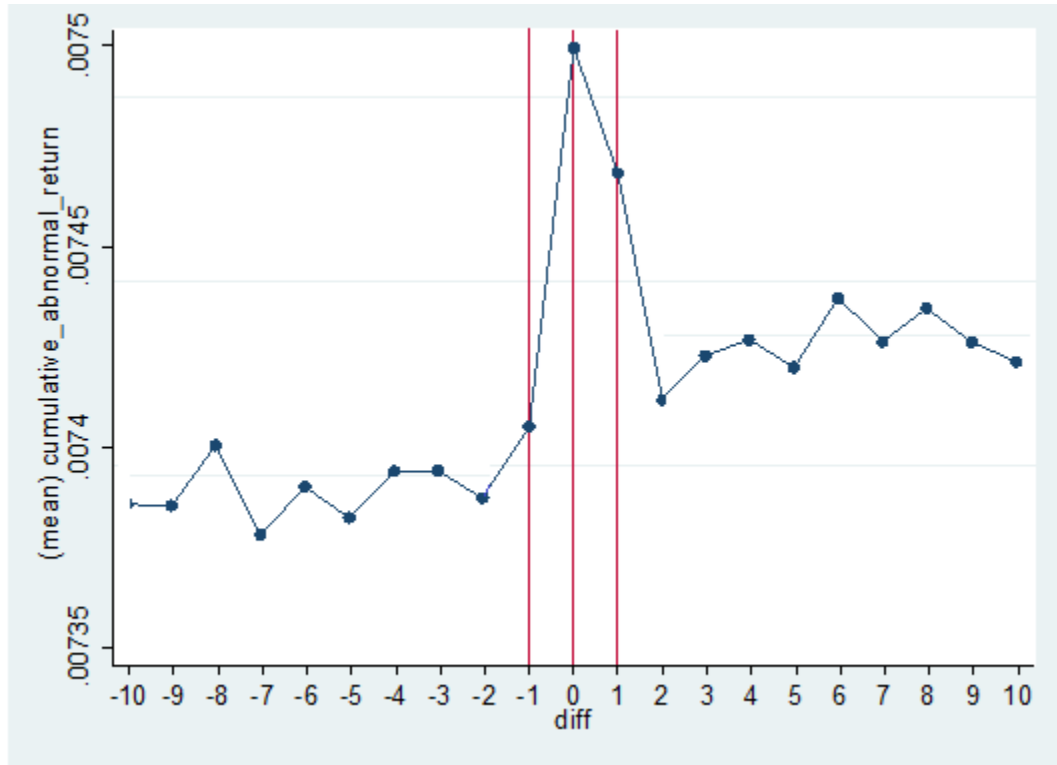
cumulative~n	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf. Interval]	
_cons	.0074758	.0020214	3.70	0.000	.003513	.0114386

Chapter 5

Conclusion and Recommendations

Conclusion

This study examined the stock price behavior of acquiring firms around merger and acquisition announcements between 2003 and 2006. In order to investigate the price run-up around announcements, an event study was conducted. The focus was on short-term abnormal returns gained from merger announcements in the US industrial firms. The event study was conducted using two event windows. The results of the study indicated that stock price show an uptrend on mergers' announcement, resulting in positive returns for the security.

The first event window [-5, +5], presents positive abnormal returns around the merger announcement. Positive average abnormal returns (AAR) are .43% around announcement and results are statistically significant. The cumulative abnormal returns (CAR) are also positive and significant for the time frame. The second event window [-10, 10] shows a positive and statistically significant AAR of .44%. The cumulative abnormal returns (CAR) are also positive and significant for the time frame of 21 days.

In general, the behavior of average abnormal returns (AAR) and cumulative abnormal returns (CAR) is found positive and in accordance with the expectation. The results support the hypotheses that AAR and CAR are positive, and enough evidence is found to conclude that the US stock market is semi-strong form efficient and announcements of mergers and acquisitions create a value for shareholders.

Recommendations

Several recommendations and limitations came into factor while performing and analyzing the study. One limitation of this study is that data is taken for industrial firms only; announcements could have different reactions in other sectors. Another limitation is the time period; impact will be different after the financial crisis 2007-08. An increase in the event window and estimation window will catch more factors. Taking more sectors and time period into consideration in the future, this study can be enhanced to determine the impact of announcements of mergers and acquisitions for the shareholders in the United States.

References

1. Agrawal, A., Jaffe, J. F. and Mandelker, G. N. (1992). The Post-Merger Performance of Acquiring Firms: A Re-examination of an Anomaly. *The Journal of Finance*, 16, 1605 -1621.

2. Asquith, P. and Kim, H. E. (1982). The Impact of Merger Bids on the Participating Firms' Security Holders. *The Journal of Finance*, 37, 1209-1228.

3. Bowman, R. (1983). Understanding and conducting event studies. *Journal of Business Finance and Accounting,* 10(1), 561-584.

4. Brown, S.J. and Warner, J.B. (1985). Using daily stock returns: the case of event studies. *Journal of Finanical Economics,* 14(1), 3-31.

5. Cox, A.J., and J. Portes (1998), "Mergers in regulated industries: The uses and abuses of event studies, *Journal of Regulatory Economics*, 14, 281-304.

6. *Dodd, P. and Ruback, R. (1977). Tender Offers and Stockholder Returns: An Empirical Analysis. *Journal of Financial Economics*, 5, 351-374.

7. Farrell, J., Shapiro, C., (1990), "Horizontal Mergers: An Equilibrium Analysis,"*The American Economic Review,* 80 (1), 107-126.

8. Frank, J., Harris, R. and Titman, S. (1991). The Post-merger Share-price Performance of Acquiring Firms, *Journal of Financial Economics*, 29, 81-96.

9. Jensen, M. C. (1978), "Some Anomalous Evidence Regarding Market Efficiency", *Journal of Financial Economics*, 6, 95-101.

10. Jensen, M.C. (1986), "Agency costs of free cash flow: corporate finance, and takeovers", *American Economic Review*, 76, 323-9.

11. Jensen, M. C., and Ruback, R. S. (1983). The Market for Corporate Control. *Journal of Financial Economics*, 11, 5-50.

12. Langetieg, T. C. (1978). An Application of a Three Factors Performance Index to Measure Stockholder Gains from Merger. *Journal of Financial Economics*, 6, 365-384.

13. MacKinlay, A.C. (1997), "Event studies in economics and finance", *Journal of Economic Literature*, 35, 12-39.

14. Putler, P.A. (2003), "Evidence on mergers and acquisitions", *Antitrust Bulletin*, 48, 119-221.

15. Reilly, F.K. and K. Brown (1997), "Investment analysis and Portfolio Management", *The Dryden Press*, 7, 45-67.

16. Scheffman, D., (2003), "Economic Merger Analysis in the U.S.," InternationalBar Association, San Francisco, Sep 2003.

17. Serra, A.P. (2002), "Event study tests: A brief survey, *Working papers de FEP*, 117, 1-15.

18. Weston, J.F., Mitchell, M.L., and Mulherin, J.H., (2003), "Takeovers, Restructuring, and Corporate Governance," Fourth Edition, Prentice Hall, New Jersey.

19. Wong, A. and Cheung, K. Y. (2009). The Effect of Merger and Acquisition Announcements on the Security Prices of Bidding Firms and Target Firms in Asia. *International Journal of Economics and Finance,* 1, 274 – 283.

Appendix

```
cd "C:\Users\s4577975\Downloads\"

set more off

set memory 5g

use acq_dates1979_2006, clear

gen year=year(date_announce)

keep if year>=2003& year<=2006

sortipermdate_announce

tempfile acq_dates2003_2006

quietly save `acq_dates2003_2006', replace

bysortiperm: gen eventcount=_N


bysortiperm: keep if _n==1

sortiperm

keepipermeventcount

tempfileeventcount

quietly save `eventcount', replace

clear


use crsp_data2003_2006.dta, clear

gen year=year(date)

keep if year>=2003& year<=2006

sortiperm date
```

```
tempfile crsp_data2003_2006

quietly save `crsp_data2003_2006', replace

sortiperm

mergeiperm using `eventcount'

tab _merge

keep if _merge==3

drop _merge

expandeventcount

dropeventcount

sortiperm date

byiperm date: gen set=_n

sortiperm set

tempfile crsp_data2003_2006_new

quietly save `crsp_data2003_2006_new', replace

use `acq_dates2003_2006', clear

byiperm: gen set=_n

sortiperm set

tempfile acq_dates2003_2006_new

quietly save `acq_dates2003_2006_new', replace

use `crsp_data2003_2006_new', clear

mergeiperm set using `acq_dates2003_2006_new'

tab _merge

drop _merge
```

egencompany_id = group(iperm set)

sortcompany_id date

bycompany_id: gen datenum=_n

bycompany_id: gen target=datenum if date==date_announce

egentempdate=min(target), by(company_id)

drop target

gen diff=datenum-tempdate

bycompany_id: gen event_window=1 if dif>=-5 &dif<=5

egencount_event_obs=count(event_window), by(company_id)

bycompany_id: gen estimation_window=1 if dif<-30 &dif>=-120

egencount_est_obs=count(estimation_window), by(company_id)

replaceevent_window=0 if event_window==.

replaceestimation_window=0 if estimation_window==.

drop if count_event_obs<11

drop if count_est_obs<30

drop if estimation_window==0 &event_window==0

****

*Step 2: Estimating Normal Performance using a Market Model

****

genpredicted_return=.

egen id=group(company_id)

sum id, detail

scalarid_N=r(max)

```
locali=1

while `i'<=id_N {

        display "Estimating normal performance for firm: " `i'

        quietlyregretnvwretd if id==`i' &estimation_window==1

        predictp`i' if id==`i'

        replacepredicted_return=p`i' if id==`i' &event_window==1

        dropp`i'

        locali=`i'+1

}
```

****

*Step 3: Abnormal and Cumulative Abnormal Returns

****

```
sort id date

genabnormal_return=ret-predicted_return if event_window==1

by id: egencumulative_abnormal_return=sum(abnormal_return)

by id: egenaverage_abnormal_return=mean(abnormal_return)
```

****

*Step 4: Testing for Significance

****

```
sort id date

by id: egenar_sd = sd(abnormal_return)

gen test =(1/11)*(cumulative_abnormal_return/ar_sd)
```

gen test =(1/11)*(average_abnormal_return/ar_sd)

****

*Step 5: Testing Across All Events

****

regcumulative_abnormal_return if dif==0, robust

regaverage_abnormal_return if dif==0, robust

preserve

collapse (mean) cumulative_abnormal_return, by(diff)

twoway scatter cumulative_abnormal_return diff if diff>=-5 & diff<=5, xlab(-10(1)10)

c(l) xline(-1) xline(0) xline(1)

restore