
An Analysis of Wealth Change of Acquiring-firm Shareholders in the Recent Technology
Mergers Wave in U.S.

By

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Abstract

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This paper examines the experience of acquiring-firm shareholders' wealth during recent technology merger wave in U.S. from 2010 to 2014. The methodology in this paper uses 635 acquisitions from the high-tech industry over the period 2010 to 2014. The mean cumulative abnormal return and aggregate dollar return are used to measure the yearly wealth change of acquirer shareholders. The paper finds that large loss and gain deals lead to different results of acquiring-firm shareholders' wealth change in the same year. In addition, the paper examines the impact of relative firm and deal characteristics on the results. The findings show that these characteristics contribute limitedly to abnormal returns associated with large loss and gain deals.

Table of Contents

Acknowledgments	ii
Abstract	iii
Table of Contents	iv
Chapter 1: Introduction	1
1.1 Background	1
1.2 Structure of the Research	Error! Bookmark not defined.
Chapter 2: Literature Review	5
Chapter 3: Data and Methodology	9
3.1 Data	9
3.2 The Abnormal Return and the Dollar Return	10
3.3 Firm and Deal Characteristics	11
3.31 Firm Characteristics	12
3.32 Deal Characteristics	13
Chapter 4: Regression Analysis	16
4.1 Dollar and Percentage Acquisition Returns	16
4.2 Analysis of Dollar and Percentage Acquisition Returns	18
4.3 The statistical and Economic Significance of the Large and Gain deals	22
4.4 Analysis of Firm and Deal Characteristics	23
Chapter 5: Conclusions	28
References	29

Chapter 1

Introduction

1.1 Background

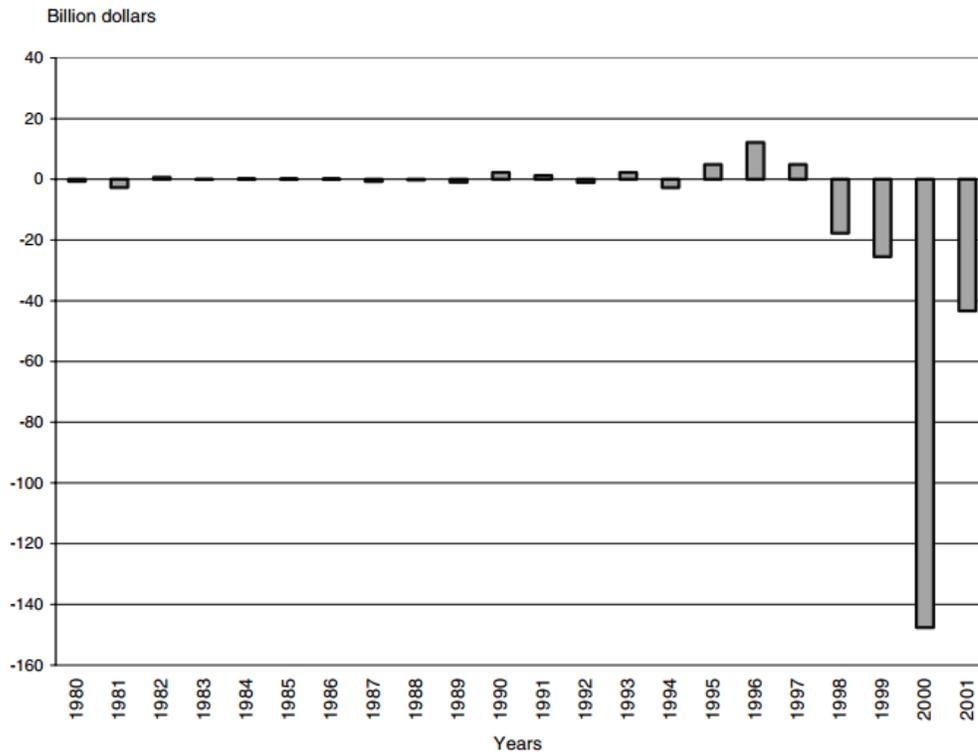
Mergers and acquisitions activities play important roles in businesses. Acquiring firms try to achieve further development for the firms and wealth increase for shareholders through those acquisition activities. Since 2010, a wave of technology M&A activities started in U.S with great impact on the internet. According to data from Bloomberg, the number of acquisitions over period 2010 to 2014 increased from 599 to 693, while aggregate value of acquisitions increased from 30 billion to 42.6 billion. Companies from various industries are participating in this wave. The technology companies with large market capitalization are willing to acquire those newly created firms with unique patent techniques to reduce research and development expenses and maintain relatively high growth. Other companies from traditional industries acquire associated technology companies to hedge against challenges created by high technology by improving products, services and management system. Although these acquisition activities helped benefits for some company operations, not all acquiring-firm shareholders' wealth achieved a net benefit from these acquisitions.

The change in acquiring-firm shareholders' wealth after acquisition has been studied in many ways. Most frequently, abnormal return is used to measure change of acquiring-firm shareholders' wealth. However, a study of the big mergers wave in late

1990s by Moeller, Schlingemann and Stulz (2005) point out that a large aggregate dollar loss will occur even though the mean abnormal returns in the period surrounding acquisition announcements is positive.

Figure 1.1

Yearly aggregate dollar return of acquiring-firm shareholders (1980-2001)



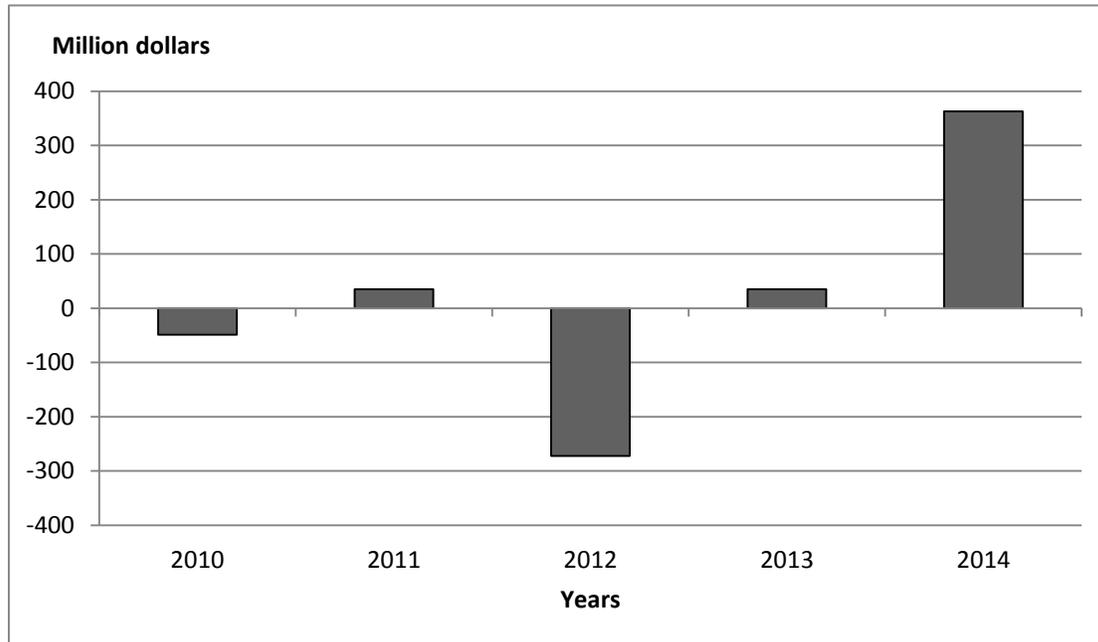
Source: Wealth destruction on a massive scale? A study of acquiring-firm returns in recent merger wave, Moller, Sara B., Frederik P. Schlingemann, and René M. Stulz, 2005, *Journal of Finance* 2, 757-782.

The aggregate dollar returns is defined as the sum of the changes in the acquiring firm's capitalization over 3 days surrounding acquisition announcements date. From Figure 1.1, we can estimate that the aggregate dollar returns from 1998 to 2001 are all large loss; despite the mean abnormal returns for acquisition announcements in these years being positive. The study also suggests that the large aggregate dollar loss is the result of a

small number of extremely large loss deals with negative average abnormal return.

Figure 1.2

**Yearly aggregate dollar return of technology acquiring-firm shareholders
(2010-2014)**



Source: Wealth destruction on a massive scale? A study of acquiring-firm returns in recent merger wave, Moller, Sara B., Frederik P. Schlingemann, and René M. Stulz, 2005, *Journal of Finance* 2, 757-782.

Then, many firm and deal characteristics are found to be significant to explain the low acquiring-firm abnormal returns which exist in large dollar loss deals in researches. For firm characteristics, lower acquiring-firm abnormal returns often occur when firms have low leverage (Maloney, McCormick, and Mitchell (1993)), large capitalization (Moeller et al. (2004)). For deal characteristics, Chang (1998), and Fuller, Netter, and Stegemoller (2002) point out acquisitions of public have lower acquiring-firm abnormal returns. Other firm and deal characteristics, such as the size on capitalization, competitions in

acquisitions, and the relation between the target and the acquiring firm, have also been proved to affect the acquiring-firm's abnormal returns.

In recent U.S. technology mergers wave, I find that the acquiring-firm shareholders get an average dollar gain of 35million with negative mean abnormal return in 2011. And a large dollar loss took place with positive mean abnormal return in 2012. Figure 2 illustrates the yearly aggregate dollar return of acquiring-firm shareholders for sample acquisitions of public or private firms in technology industry from 2010 through 2014 in U.S. We can also find that yearly aggregate dollar returns in these five years changed with high volatility.

The purpose of this paper is to examine the acquiring-firm shareholders' wealth over the past 5 years and figure out whether there exist large loss deals that may cause losses to the acquiring-firm shareholders. The paper will also try to determine whether firm and deal characteristics contribute to the low abnormal returns in large loss deals.

1.2 Structure of the Research

The first section is an introduction the issue of acquiring-firm shareholders' wealth. In Chapter 2, the literature review on the change of acquiring-firm shareholders' wealth is provided. Then Chapter 3 will deal with data source and the methodologies used to measure the wealth change of technology acquiring-firm shareholders. It will also present some firm and deal characteristics and related hypothesis. In Chapter 4, the contents will offer the specific results of the wealth change and analysis possible reason of above results. Finally, the paper will provide a conclusion in last section.

Chapter 2

Literature Review

Considerable researches have been documented on returns to acquiring-firm shareholders over the past decades when mergers and acquisitions market became hot (Healy, Palepu, and Ruback, 1992; Servaes, 1994; Loughram and Vijn, 2005).

First of all, the studies have suggested two measurements to capture the wealth changes to acquiring-firm shareholders, normally, the abnormal percentage return and the abnormal dollar return. The abnormal percentage return is the measurement that most studies focus on. In the research of Brown and Warner (1985), they state the standard event study methodologies using daily stock returns data to generate abnormal returns and relative tests. They also state that standard procedures are typically well-specified even when special daily data characteristics are ignored. On the other hand, Malatesta (1983) points out that the appropriate measure of the wealth effect is the abnormal dollar return cumulated over time. His evidence also reveals that measured abnormal rates of return to acquiring firms are influenced by firm size, with smaller firms realizing significantly negative post-merger returns. In practice, the mean abnormal returns and the aggregate dollar returns will offer opposite opinions on wealth change of acquiring-firm shareholders as the study by Moeller, Schlingemann and Stulz (2005) noted. Their study proves that few large dollar loss deals associated with low abnormal returns lead to positive yearly mean abnormal return and negative yearly aggregate dollar

return. This paper will examine the sample using both measurements to confirm the wealth change of acquiring-firm shareholders and investigate the disparity between two measurements if exist.

Furthermore, the factors affecting abnormal return have been widely and deeply studied. As the returns of acquisition reflect the value of the acquisition itself and the influence made by acquirer on the deal, both firm and deal characteristics are appropriate and important to explain the abnormal return of acquisition.

Among firm features, low Tobin's q of acquiring firm is found to lead to lower abnormal return in study by Lang, Stulz, and Walking (1989) and Servaes (1991). These two researches propose that shareholders of high q acquirers gain significantly more than the shareholders of low q acquirers. However, the researches of Dong et al. (2003) and Moeller, Schlingemann, and Stulz (2004) are against previous statement about Tobin's q . The study by Moeller et al. (2004) also suggest that the abnormal return for acquiring-firm shareholders is higher for small acquirers irrespective of the form of financing and whether the acquired firm is public or private, which means acquiring firms with large capitalization have lower abnormal return.

Other important firm features, such as financial leverage and cash, are also discussed in the literature. Maloney, McCormick, and Mitchell (1993) note that debt improves managerial decision making. Announcement-period acquirer returns are greater the higher the leverage of the acquirer. Besides, Harford (1999) states that mergers in which

the bidder is cash-rich are followed by abnormal declines in operating performance because of cash-rich firms' more diversifying acquisitions and less attractive targets. Some reports investigated the effects from acquiring firms' management to abnormal return. Lewellen, Loderer, and Rosenfeld (1985) support the proposition that managerial welfare affects merger decisions. The abnormal stock returns of acquiring firms, from the time of the announcement of a merger bid through the stockholder approval date, are positively related to the percentage of own-company stock held by the senior management of the acquirer. And Malmendier and Tate (2003) prove that overconfident CEOs overpay for target companies and undertake value-destroying mergers. Therefore, market reaction at merger announcement is significantly more negative than for acquisitions decided by non-overconfident CEOs.

For deal properties, status of targets and payment methods of the acquisition are found to influence percentage returns. Chang (1998) concludes that in stock offer, bidders experience a positive abnormal return, which contrasts with the negative abnormal return typically found for bidders acquiring a publicly traded target. Fuller, Netter, and Stegemoller (2002) confirm that when the target is a private firm or a subsidiary of a public firm, bidding firm shareholders usually gain. And the method of payment chosen in a takeover is partially a function of characteristics of the target. In earlier time, Travlos (1987) also provide evidences revealing significant differences in the abnormal returns between common stock exchanges and cash offers. Payment method of equity offer makes negative effects on bidders' return.

The strategies chosen in acquisition relate to acquirer shareholders' return, either. A hostile takeover results lower acquiring-firm shareholders abnormal return empirically proved by Schwert (2000), because gains from hostile takeovers result from replacing incumbent managers which may not happen after acquisition.

As mentioned in analysis of cash-rich companies before, diversifying acquisitions made by acquiring firm lead to poorer abnormal return (Harford (1999)). The study Morck, Shleifer, and Vishny (1990) also indicates that conglomerate acquisitions have systematically lower and predominantly negative announcement period returns to bidding firms.

Some theories examined competitions in acquisitions and the relative size of the target to the bidder. Bradley et al. (1988) provide a theoretical analysis of the process of competition for control of the target and empirical evidence that competition among bidding firms increases the returns to targets and decreases the returns to acquirers. And Asquith, Bruner and Mullins (1983) find out that bidders' abnormal returns are positively related to the relative size of the merger partners.

Finally, the paper will investigate firm and deal characteristics discussed above based on current data, especially the characteristics which contain different conclusions in popular and academic literature.

Chapter 3

Data and Methodology

3.1 Data

The paper focuses on the effect of acquisitions on changes in the wealth of acquiring firms to evaluate shareholders. Some criteria of sample acquisitions are set based on the criteria in the study about performance of acquisitions for acquiring-firm shareholders by Moeller, Schlingemann and Stulz (2005). The investigated samples of acquisitions are constructed from Bloomberg's Database. The sample deals have to meet the following criteria:

1. The announcement date is in the 2010 to 2014 period;
2. The target is a U.S public firm or private firm in technology industry;
3. The acquirer is a U.S public firm, or private firm;
4. Data on the acquirer is available from CRSP and COMPUSTAT;
5. The acquirer controls less than 50% of the shares of the target at the announcement date and obtains 100% of the target shares if the target is a public or private firm.
6. The deal value is equal to or greater than \$1 million;
7. The deal value is greater than 1% of the market value of the assets of acquiring firm.

The market value of assets is defined as the book value of assets minus the book value of equity plus the market value of equity; and

8. The deal is successfully completed in less than 1,000 days.

Table 1 presents the specific distribution of sample acquisitions in each year.

Table 3.1

Distribution of sample in each year

Year	Total Tech M&A	Sample Size
2010	599	140
2011	590	138
2012	663	134
2013	655	105
2014	693	118
All	3200	635

3.2 The Abnormal Return and the Dollar Return

The wealth change of acquiring-firm shareholders is measured in two methods in this paper: the abnormal return and the dollar return.

The abnormal returns, which the paper follows standard event study methods (Brown and Warner (1985)) to estimate, describe the wealth change in percentage. The estimated market model is assumed as:

$$R_{it} = \alpha_i + \beta_i R_M + \varepsilon_{it}$$

Abnormal returns are defined as the market residuals. The event window is set from day -2 to day +1 relative to announcement date. The paper uses 3-day cumulative abnormal returns (CAR (-1, +1)) to measure the performance of sample acquisition for acquiring-firm shareholders. The parameters in the models are estimated in estimation window as (-205, -6) day interval. In this market model, the data for R_M are equally weighted index returns (includes distributions), and the data for R_{it} are daily holding

period returns of those acquiring firms. All the data come from The Center for Research in Security Prices Database (CRSP). The time-series and cross-sectional variations of abnormal returns have been tested.

The dollar return is another effective measurement to capture acquiring-firm shareholders' wealth changes based on market capitalization of acquiring firm. Compared to the abnormal returns, the dollar returns make acquiring-firms shareholders' wealth changes correspond to related acquiring firms' market capitalization (Malatesta (1983)). The shareholders of large firms will loss or gain more than whom of small firms when facing the same abnormal returns.

As the event window is day -2 to day +1 relative to announcement date, the paper defines the acquisition dollar return as the change in market capitalization during event window.

The dollar returns in this paper, computed using the U.S. Gross Domestic Product Deflator, are all in 2014 dollars. The sum of acquisition dollar returns in each year is the yearly technology industry aggregate dollar return. A value weighted return is equal to the sum of the acquisitions dollar returns divided by the sum of the equity capitalizations two days before acquisition announcements. The yearly aggregate dollar return can also be defined as the sum of the product of the cumulative abnormal return in of each announcement multiplied by the equity capitalization two days before announcement date in each sample year.

3.3 Firm and Deal Characteristics

The paper will try to study several firm and deal characteristics which may result low acquiring-firm abnormal return associated with large loss deals based on the researches.

These characteristics are listed below:

3.31 Firm Characteristics

The means and the medians of firm characteristics will be investigated in the paper.

1. Assets (book)

Assets present the total value of the acquiring firm and decide firm's scale. The operating cash flow and cash will be normalized by book value of assets in the paper. The market value of assets is also widely used in paper; for instance, the proportion calculated as deal value divided by market value of assets decides whether the acquisition is essential to the acquiring firm.

2. Market Capitalization

Market capitalization reflects the equity value of acquiring firm. It also reveals the influence of the acquirer on stock market. A firm with capitalization which exceeds the 25th percentile of NYSE firms will be defined as a large firm in the following analysis.

3. Cash/assets (book)

Cash which is normalized contains cash and marketable securities. The research by Harford (1999) shows that acquiring firms with large holdings of cash relate to lower abnormal return.

4. Debt/assets (book) and Debt/assets (market)

The paper includes two financial leverages computed by book value of assets and market

value of assets respectively. Here, market value of assets is defined as the book value of assets minus the book value of equity plus market value of equity. Maloney, McCormick, and Mitchell (1993) point out that the acquiring firms with low leverage have lower abnormal returns.

5. Tobin's q

Tobin's q is a ratio revealing the market's expectation of acquiring firm on investing in capital. In the paper, Tobin's q is defined as the book value of assets minus the book value of equity plus market value of equity, divided by the book value of the assets. The literatures hold different opinions on the relation between Tobin's q and the abnormal return.

6. $BM_{(equity)}$

The definition of Book-to-Market ratios of equity in this paper follows the definition proposed by Fama and French (1992, 1993). This ratio is used as one of the two proxies of overvaluation in research of Dong et al. (2003). The research stated that overvalued acquiring firms with low BM ratio have lower abnormal returns.

7. OCF/assets (book)

Operating cash flow is defined as sales minus the cost of goods, sales and general administration and working capital change, reflecting the operating profit of acquirer.

Empirically, acquirers with low OCF have lower abnormal returns.

3.32 Deal characteristics

1. Transaction value (TV)

The transaction values (million dollars) in the paper are only the total acquisition values paid by acquirers without the fees and expenses. Study by Asquith, Bruner, and Mullins (1983) stated that the relative size of the target to the bidder affected acquisition's abnormal return.

2. TV/assets (market) and TV/equity (market)

After normalized by market value of the assets and the market value of the equity respectively, transaction values can measure the importance of the acquisition for acquiring firm and its shareholders.

3. Days to completion

The number of days counted from announcement date to completion or termination date is defined as the number of days to completion.

4. Cash in payment (%) and Equity in payment (%)

These two ratios are proportions of cash and of equity paid in the acquisitions which are completed by paying both cash and equity. Travlos (1987) suggests that the deals with higher percentage of equity payment have lower abnormal returns in acquisitions of public firms.

6. Pure cash deal (%) and pure equity deal (%)

The ratios are defined as the number of acquisition paid by cash only or equity only divided by the total number of sample acquisitions. Empirically, the pure equity deals have lower abnormal returns.

8. Tender-offer (%)

The premiums in tender offers raise the costs of acquisitions for acquiring firms. The market probably has less confidence in acquirers to benefit from the acquisition because of higher costs. Empirically, tender offers in acquisitions lead to lower abnormal returns.

9. Hostile deal (%)

The proportions of hostile deals are listed in the paper. Most hostile deals have tough acquiring proceeds which have unexpected costs of acquisition in high probability. Acquisitions opposed by target management (Schwert (2000)) are proved to have lower abnormal returns.

10. Private target (%) and Public target (%)

The distributions of target ownership are also computed. Private targets seem not to matter abnormal returns, while public targets have negative effects on abnormal returns in studies of Fuller, Netter, and Stegemoller (2002) and Chang (1998), respectively.

11. Competed deal (%)

The paper investigates the percentage of deals with actual competition. In research of Bradley et al. (1988), competed acquisitions are shown to have lower abnormal returns.

Chapter 4

Regression Analysis

4.1 Dollar and percentage acquisition returns

Table 4.1 includes the yearly numbers and aggregate transaction values of acquisitions and shows the returns of acquiring-firm shareholders in recent technology merger wave.

The aggregate transaction values and aggregate dollar returns are all in 2014 million dollar. The amount spent on acquisition in 2011 is the highest among five years. Then the cost in 2012 stayed almost the same level as that in 2010 followed by increases in next two years' costs. Additionally, the sample numbers slightly decreased in 2013 and 2014, while the total numbers of acquisitions in these two years all increased as showed in Table 3.1.

Table 4.1

**Full Sample Distribution of Aggregate Transaction Values, Dollar Returns, and
Percentage Returns sorted by Announcement Year**

Year	N	Bidder		CAR(+1, -1)
		Aggregate Transaction Value	Aggregate Dollar Return	
2010	140	31,603	-49	-0.0058
2011	138	49,084	35	-0.0018
2012	134	30,706	-272	0.0238
2013	105	40,412	35	0.0130
2014	118	42,557	363	0.0114
2010-2014	635	194,362	112	0.0081

The aggregate dollar returns dramatically increased 635 million from 2012 to 2014, even though the sample transaction numbers in 2014 decreased 16 compared to the number in 2012. On the other hand, dollar losses in different sample years changes sharply. The average dollar loss per acquisition in 2012 is 2.03 million, while the average dollar loss per acquisition in 2010 is 0.35 million, which means acquirer shareholders loss nearly 6 times more per acquisition in 2012. Similarly, the average dollar gain per acquisition in 2011 and 2013 is 0.29 million. The average dollar gain per acquisition in 2014 is 3.08 million, which is over 10 times more. Furthermore, the dollar loss per \$100 spent on acquisition is \$0.15 in 2010 and \$0.89 in 2012. The dollar gain per \$100 spent on acquisition is \$0.08 in 2011 and 2013, and \$0.85 in 2012. The average dollar returns per acquisition and the average returns per dollar spent on acquisitions indicate that the hypothesis that the acquirer shareholders loss or gain more because of more acquisitions or larger acquisitions cannot be accepted.

Mean cumulative abnormal returns both in 2010 and in 2011 are negative. Aggregate dollar return in 2010 is negative; however, aggregate dollar return in 2011 is positive. The highest positive mean cumulative abnormal return is in 2012, surprisingly with the biggest aggregate dollar loss. Additionally, mean cumulative abnormal returns in 2013 and 2014 are positive and close, though their aggregate dollar gains are significantly different. 2014's average CAR is more than 10 times 2013's average CAR. These results imply that the mean abnormal returns and aggregate dollar returns do not have sufficient connections.

4.2 Analysis of dollar and percentage acquisition returns

Since dollar and percentage returns in 2011 and 2012 suggest opposite acquiring-firm shareholders' wealth changes and yearly aggregate dollar returns in 2013 and 2014 change a lot when the mean abnormal returns are similar, the appropriate statistical explanation for those results is that there are few acquisitions associated with extremely large dollar losses or gains in those years.

Figure 4.1

Box plot of the dollar return of acquiring-firm shareholders (2010 to 2014)

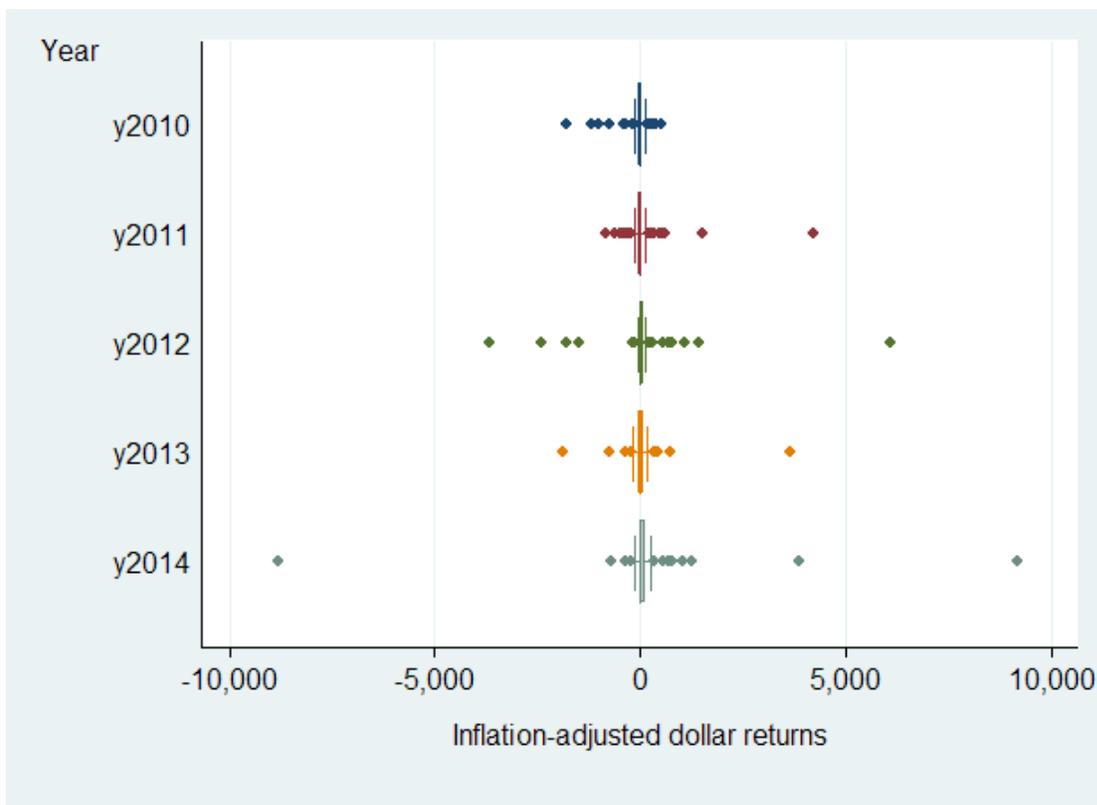


Figure 4.1 is the illustration of a box plot about distribution of dollar returns from 2010 to 2014. There are more extremely large dollar losses or gains in 2011, 2012 and 2014.

Relatively, the yearly volatilities of dollar returns in these three years increase compared

to in 2010 and 2013. In 2012, the increase in the frequency and magnitude of large dollar loss acquisitions is much over the increase in that of large gain acquisitions, which correspond to sharply increase of negative skewness in distribution of dollar returns. On the contrast, the increase in the frequency and magnitude of large dollar gain acquisitions are over the increase in large loss acquisitions in 2011 and 2014. The statistic explanation of above changes can be measured in skewness coefficients and percentiles of distribution presented in Table 4.2. The skewness coefficients in 2012, 2011, and 2014 are -7.16, 5.61 and 4.20, which all are relatively high and have the same signs as aggregate dollar returns do. The table also shows the dollar losses or gains normalized by aggregate transaction value, which correspond to the samples with dollar losses or gains in 5th and 95th percentiles of the distribution of dollar returns. The results indicate that the trails in 2011, 2012 and 2014 are not symmetric.

Table 4.2

The skewness coefficients and percentiles of distribution (2010-2014)

Year	Skewness Coefficients	Percentiles of Distribution	
		5 th	95 th
2010	-3.61	-3%	1%
2011	5.61	-2%	4%
2012	-7.16	-30%	12%
2013	3.77	-3%	5%
2014	4.20	-5%	22%

The unusual aggregate dollar losses result from increases in the amount of dollar losses in the left tails of the distribution of acquisition dollar returns, while the unusual aggregate

dollar gains result from increases in the amount of dollar gains in right tails. In order to analysis the unusual aggregate dollar returns, the paper will investigate the acquisitions with extremely large losses or gain which are assumed as deals with losses or gains exceeding 500 million in each sample year. Table 4.3 list the distribution and relative information of large loss and gain deals assorted by announcement year in two panels.

Table 4.3

Large Loss and Gain Deals Sample Distribution

Panel A: Large Loss Deals over 500 Million Sample Distribution			
Announcement Year	N	Aggregate Transaction Values	Aggregate Dollar Return
2010	4	2919	-4,759
2011	0	0	0
2012	5	8,660	-33,244
2013	2	2,126	-2,653
2014	2	4521	-9,527
All	13	18,226	-50,183

Panel B: Large Gain Deals over 500 Million Sample Distribution			
Announcement Year	N	Aggregate Transaction Values	Aggregate Dollar Return
2010	0	0	0
2011	4	5,517	6,876
2012	6	906	10,613
2013	2	201	4,367
2014	8	11,592	35,220
All	20	18,216	57,076

During period from 2010 to 2014, there are 13 large loss deals and 20 large gain deals out of total 635 sample acquisition announcements. The number of large loss deals is 65% of the number of large gain deals. Almost the same aggregate amounts are spent on large

loss deals and large gain deals. And the aggregate dollar loss is 88% of that of large gain deals. Year 2011 has no large loss deal but 4 large gain deals with total amount of 6876 million, which means the acquiring-firm shareholders will loss 6841 million excluding these 4 acquisitions. Oppositely, the aggregate dollar return will be positive in 2012 without large gain acquisitions. Therefore, few acquisitions with large losses or gains explain the disparities between percentage and dollar returns for acquirer shareholders in 2011 and 2012.

The losses or gains are dramatically large in extreme acquisitions considering the relative transaction values from 2010 to 2014. Every dollar acquiring-firm shareholders spent on large loss deals lost \$2.75 averagely, while the median loss is 0.67 per dollar spent.

Acquiring-firm shareholders gain \$3.13 per dollar spent in large gain acquisitions, while the median gain is 0.85 per dollar spent. In researches, one of possible reasons that make bidder shareholders in large loss deals allow managements making acquisition decisions losing over \$1 per dollar cost is that reassessments of future cash flows for bidders contribute to parts of losses (Moeller et al. (2005)). The studies by McCardle and Viswanathan (1994), and Jovanovic and Braguinsky (2002) confirm that firms with a sign of lacking internal growth opportunities will involve in these reassessments. Another explanation of the reassessment is the signaling of overpriced equity of firms that make equity offer (Travlos (1987)). Furthermore, these extreme acquisitions reflect the market's opinions of bidder firms' current business and operation including management, development strategies, financial structures and corporate governance.

The large loss or gain deals clustered in years with unusual aggregate dollar returns did not distribute as sample acquisition did. Approximately 21% of total acquisitions occurred in 2011, as 38% large loss deals and 30% large gain deals took place in the same year. Similarly, year 2014 has 19% total acquisitions, but 40% large gain deals.

4.3 The statistical and economic significance of the large loss and gain deals

This section will prove the statistical and economic significance of 13 large loss deals and 20 large gain deals during period from 2010 to 2014 in three respects: stock volatility, benchmark and unrelated announcements.

As the volatility of stock market in past five sample years is high, the unusual aggregate dollar returns for acquisitions may be caused by the frequent change of large firms' large market capitalization resulting from market's high volatility. The paper investigates validation of above hypothesis based on relative t -statistics which test whether three-day cumulative abnormal returns (CAR) in announcement event windows are significantly different from zero. The standard deviation in evaluation of test is computed by each firm's time-series returns over estimation window, period (-205, -6). After evaluation, the paper finds out only 20 firms' three-day CARs are insignificant. The average t -statistics for all acquisition announcements is 4.68, and the median is 2.65. Therefore, the paper does not accept the hypothesis.

Then, Moeller et al. (2005) suggest that measurement of benchmark may lead to large loss and gain deals. The considerable absolute dollar changes of large loss and gain deals

are highly possible to affect the market return. However, dollar return can also be defined as product of the cumulative abnormal return in of each announcement multiplied by the equity capitalization two days before announcement date in each sample year, which means dollar return has been adjusted by market through abnormal return already. Further, sample dollar returns will not be affected by differences between industry returns, because all investigating acquisitions come from the same technology industry. Finally, unrelated news announcement may have effects on abnormal returns of extreme acquisitions. The paper examined the news of 33 unusual acquisitions in (-2, +2) day interval through Bloomberg News Search. Although some high-tech companies with large market capitalization create plenty news about their new products and technologies, those companies did not release these news around acquisition announcement date. The positive influence of this news on stock returns should be limited. And the research results show few number of them have negative unrelated announcement. Thus, related news announcements do have little effect on make unusual dollar returns.

4.4 Analysis of firm and deal characteristics

The paper will try to analysis whether firm and deal characteristics can explain abnormal returns of large loss and gain deals in technology industry from 2010 to 2014 or not. Two charts in this section include and compare the mean and median (in brackets) of deal and firm characteristics in extreme deals and other deals. The *t*-tests are used to calculate *p*-values of differences at the 5% confidential level.

Table 4.4 focuses on deal characteristics. Large loss and gain deals have large absolute transaction values. But the transaction values of these extreme deals have similar proposition with those of other deals after normalized by acquirers' market value of assets.

Table 4.4

Deal Characteristics: Large Loss and Gain Deals versus Other Deals

	2010-2014	2010-2014	2010-2014	Differences		
	Large Loss (1)	Large Gain (2)	Other (3)	(1) - (2)	(1) - (3)	(2) - (3)
Transaction Value (TV)	1,363	877	210	486	1153	667
	[772]	[300]	[52]	[472]	[720]	[248]
TV/assets (market)	0.126	0.0115	0.147	0.011	-0.019	-0.036
	[0.075]	[0.060]	[0.089]	[0.015]	[-0.014]	[-0.021]
TV/equity (market)	0.197	0.223	0.361	-0.164	-0.026	-0.138
	[0.101]	[0.116]	[0.150]	[-0.015]	[-0.049]	[-0.034]
Days to completion	87.5	53.6	57	7	3.6	-4
	[65]	[35]	[60]	[30]	[5]	[-25]
Cash in payment (%)	99.0	93.8	81.2	5.2	17.8	12.6
Equity in payment (%)	1.0	4.7	2.7	-3.7	-1.7	2
Pure cash deal (%)	84.6	85	76.8	-0.4	7.8	8.2
Pure equity deal (%)	7.7	0	5.7	7.7	2	-5.7
Tender-offer (%)	7.7	10	4.5	-2.3	3.2	5.5
Private target (%)	46.2	85	83.9	-38.8	-37.7	1.1
Public target (%)	53.8	15	15.6	38.8	38.2	-0.6

Surprisingly, the differences between payment methods used by three kinds of

acquisitions are so little that can be ignored. Cash is used much more often than equity anytime. This may result from the commonly rich cash flows in high-tech companies. Therefore, low abnormal returns of large loss deals will not be caused by equity finance as Moeller et al. (2004) noted. And cash payment cannot be a sufficient reason leading to large gain deals.

Hostile and tender offers seem not to cause the unusual sample dollar returns either. The chart 4.4 does not show the proportion of hostile offer because there is no hostile deal according to available data of sample acquisitions. Then, the total number of tender offers in extreme acquisitions is very small. Slightly higher percentage of tender-offer of large loss deals compared to that of other deals are not strong enough to explain the low mean and median three-day abnormal return of large loss deals, -6.40% and -4.383%, respectively. Similarly, 10% tender offers in large gain deals are meaningless.

Public targets are more likely to lead to low abnormal returns. The large loss deals have a high fraction of public target than other two types deals do. Large gain deals, on the other hand, are less likely to benefit from status of targets because the other deals and large gain deals' distributions of targets' status are almost the same. Additionally, competitions in acquisitions contribute merely for samples' abnormal returns. There are only 4 competed deals in other deals during five-year period.

In Table 4.5, firm features are investigated. Obviously, acquirers in extreme deals compared to firms in other deals are large firms with high market capitalizations. Degrees of firms' cash holding show confusing results. Based on popular theories in studies,

average percentage of cash hold by firms should be the highest in firms with large loss and lowest in firms with large gain. However, firms with other deals have the highest ratio of cash holding.

Table 4.5

Firm Characteristics: Large Loss and Gain Deals versus Other Deals

	2010-2014	2010-2014	2010-2014	Differences		
	Large Loss	Large Gain	Other	(1) - (2)	(1) - (3)	(2) - (3)
	(1)	(2)	(3)			
Assets (book)	105,214 [110,903]	54,914 [30,316]	8,247 [1,248]	50,300 [80,587]	96,967 [109,655]	46,667 [29,068]
Market capitalization	171,612 [158,920]	101,117 [25,612]	13,175 [2,041]	70,495 [133,308]	158,437 [156,879]	87,942 [23,571]
Cash/assets (book)	0.133 [0.141]	0.114 [0.075]	0.174 [0.154]	0.019 [0.066]	-0.041 [-0.013]	-0.060 [-0.079]
Debt/assets (book)	0.413 [0.557]	0.545 [0.551]	0.494 [0.479]	-0.132 [0.006]	-0.081 [0.078]	0.051 [0.072]
Debt/assets (market)	0.176 [0.152]	0.297 [0.238]	0.254 [0.227]	-0.121 [-0.086]	-0.078 [-0.075]	0.043 [0.011]
Tobin's q	1.986 [2.250]	2.582 [2.325]	2.477 [1.979]	-0.596 [-0.075]	-0.491 [0.271]	0.105 [0.346]
$BM_{(equity)}$	0.345 [0.260]	0.285 [0.266]	0.373 [0.310]	0.060 [-0.006]	-0.028 [-0.050]	-0.088 [-0.044]
OCF/assets (book)	0.070 [0.064]	0.061 [0.063]	0.038 [0.046]	0.009 [0.001]	0.032 [0.018]	0.023 [0.017]

Low leverages of firm in large loss deals offer a persuasive explanation for their low abnormal returns. And the relatively high leverages contribute to part of large gain deals' high abnormal returns.

Furthermore, the data proves the theories and hypothesis o that low Tobin's q result low abnormal return when considering large loss deals. But the relatively low mean Tobin's q

ratio of large loss deals may result from few extremely low Tobin's q ratio. Because the median ratio of firms with large loss deals is significantly higher than that of firms made other deals. In addition, differences between ratios of large gain deals and other deals are small enough that these Tobin's q ratio is unlikely to be a source of those large gains.

BM ratios indicate completely opposite results with what the previous researches suggested. As the mean and median ratios do not differ with each other very much, the characteristic is useless to explain large differences between sample acquisitions' unusual abnormal returns.

Finally, operating cash flows have similar conflict with total cash holding. The firms with other deals instead of firms with large gain deals have the lowest average proportion of OCF. The firms with large loss deals have highest ratio indeed. Overall, the average levels of all firms' OCF are low during sample period.

Some factors are confusing and hard to decide their effects on the abnormal returns through comparison analysis, such as the degree of cash holding, Tobin's q ratio and $BM_{(equity)}$ ratio. Excluding these factors, the paper finds that public targets and low leverage are more likely to lead to low abnormal returns compared to other factors. No sufficient characteristic introduced in paper is found to be helpful to understand large gain deals' average three-day abnormal return of 6.237% and the median of 4.046%.

Chapter 5

Conclusions

The paper examined 635 samples of high-tech acquisitions to investigate the acquiring-firm shareholders' wealth changes during recent merger wave from 2010 to 2014. Yearly aggregate dollar returns and average abnormal returns give opposite results of the acquirer shareholders' wealth change in three years. The disparities between two measurements are caused by a small number of relative acquisitions with extremely large losses or gains. The percentage and dollar returns indicate similar acquiring-firm shareholders' wealth changes without considering those large loss or gain deals over 500 million, which consist only 3% of total samples and are statistically and economically significant.

Despite popular and academic researches have proposed several firm and deal characteristics that will affect abnormal returns, the paper finds out those features can only explain very limited part of abnormal returns associated with large loss or gain deals in this paper, especially with large gain deals. Public targets and low leverage are the most possible characteristics to cause low abnormal returns based on analysis, while other features are meaningless or inconsistent with existing researches.

The paper did not study synergistic gains which will transfer shareholders' wealth from bidders to targets. Synergistic gains may also contribute to disparities between dollar and percentage returns. And there may be other factors leading to unusual dollar returns.

These are what I need to improve in further research.

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