

**The Impacts of M&A on the Futures Market: Evidence
from North American Commodities Markets**

By

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Abstract

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This paper researches the correlation between mergers and acquisitions (M&A) and their impact on the futures prices of gold, silver crude oil and natural gas in the following period. I concentrate on the activities that cause the price of these commodities to change in order to find out how M&A affects the prices; whether their correlation is positively or negatively correlated and by how much does the correlation exist. This paper used the event study analysis method to undertake the test. The presented work is based on 2,405 samples of M&A in North America in four different areas of futures and the sample of the last price available from the historical (2009-2014) futures price and the M&A announcement payment on the corresponding date since we assume the existence of EMH.

The final result indicated that there is a positive relationship between the announcement value of M&A and futures prices, meaning that M&A could create a short-term wealth.

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Chapter 1: Introduction

1.1 Background

In today's market, mergers and acquisitions are increasingly essential for a firm to accelerate its further development. For both event analysts and technical analysts, it becomes very important for firms to implement a measure to look into this form of activity; they should not only to detect the effects or potential risks of M&A but also the relationship between it and market conditions.

As illustrated by most of the tests undertaken in recent years, most of the M&A has led to an increase of firm value and the related securities (Andrade *et al.*, 2001; Berkovitch and Narayanan, 1993; Bradley *et al.*, 1983; Dennis and McConnell, 1986) However, referring to the historical mergers and acquisition activities, which come in the form of waves (a series events of mergers and acquisitions which triggered by change of government policy or innovation of private sector...), in 2008 Martynova and Renneboog found that these waves could be identified in six main trends: 1890-1903, 1910-1929, 1950–1973, 1981–1989, 1993–2001 and 2003-2007. They further uncovered a phenomenon indicating that ends of most M&A activities, trigger a financial crisis or recession. For instance, the subprime crisis took place after the sixth wave of M&A in 2007.

On the other hand, the motivation of M&A, theoretically, should aim at maximizing shareholder wealth. However, in reality, not all of M&A would increase firm value, even though we cannot deny the positive effect of M&A, sometimes it may lead to some serious bad results or questionable issues; for example the manager may focus on their own benefit beyond shareholder's rights, which is called agency contradiction.

According to the milestone of derivative market development, it has been shown that the initial purpose of a derivative is to ensure the distance and time of supply of commodity to offset the price change and default risk.

However historically, the derivative security market has very few historical statistics remaining due to small trading volume and typical private trading. This market has therefore remained unexplored for a long time. This can also be attributed to the restriction of participants in the market due to the lack of regular marking, and efforts to bring the default risk under control. The difference in the function of futures and forwards in the market has transferred the way of contracting for conducting the transactions in commodities.

1.2 Purpose of Study

For event study analysts it is essential for them to combine the market performance with the events that have happened in the area of product or sectors.

Based on the semi-weak form of Market Efficiency Hypothesis (EMH), this paper aims at testing the response of future markets towards the M&A in certain firms by using event study techniques, picking up the data through the estimate window and event window then analysing the CAR (Cumulative Abnormal Return) and AAR (Average Abnormal Return). According to the methodologies used in the research, we will then find out the correlation and coefficient between M&A announcement value and the price change in the futures market and determine whether or not they are significant. The results could be useful for future detection and prediction in the futures market.

1.3 Statement of Problem

Even though the issue and the objective of this research paper is very straight forward, there exists some problems during the research which may lead to inaccurate results:

1. Because of the existence of market delaying effects in the futures market, the information of an M&A announcement may not trigger an immediate response. So the change or trend of price may not be totally reflected by this activity. Even if we could analyse the

issue by using the event study window, the result may be inaccurate as well. Some error detection methods may exist which may affect the results. We should try to find out a more precise way to test the results in this kind of event.

2. Since the price of futures in the market is determined by too many factors it is very complicated for researchers to analyse the weights of the influence on different factors. Therefore we should focus on each different component respectively and research those effects.

Although the above limitations exist in this paper, we will attempt to work out the correlation and coefficient between how M&A and futures prices change by the proper models and data. A momentum or trend could be detected by event study method.

1.4 Research Process

In the process of research I reviewed the books and periodicals on M&A analysis and futures markets. I searched through six years (2009-2014) of historical data of more than 500 hundred commodity companies and institutions on the announcement value of acquisition in North America and the dates of the last six years futures prices on the Bloomberg and investment websites. Based on the basic theory of econometrics, I built up models and choose the proper event study

methodologies to test their correlation. I selected these data and compared the CAR in the estimate window and event window which are referred to as the period of clear date and event date. Then, we determined the correlation between M&A announcements and future market price changes, which is called the market response test.

Chapter 2: Literature Review

2.1 Previous Research on Mergers and Acquisitions

Based on the theories of previous researchers, nowadays, M&A have become one of the biggest means of unitizing the economies of the world. (Zou & Simpson, 2008, p.491). They occupied more than 78% of the foreign direct investments (FDI) in 1999 and the number went far beyond 716 billion US dollars in 2005. This represents an almost 87% increase from the previous year.

1. M&A and Consolidation

Referred to as mergers and consolidation, people always get misled by its meaning. The difference between mergers and consolidation is tremendously affected by the legal structure of finance (Bovee and Thill, 2001). Generally, for mergers, one company buys another one or part of its assets or liabilities. However, for consolidation, several old companies combine their assets and properties, then the old ones exit the market and a new combined company is created. Acquisition is a mean of business combination in which one company buys another company's stock for voting (Healy, Palepu and Ruback, 1997).

2. Factors that affect M&A and Price Volatility in the Futures Market

There are several factors that should be tested to ensure attractive M&A candidates:

Market Size: a large size of market share could provide the firm with sufficient revenue to allow them to carry out R&D (research and development). For instance, foreign enterprises usually lack access to the local resources which, generally speaking, creates a big obstacle for their investments. By acquiring a large local company, they can reduce the uncertainty in the market and increase their operating efficiency. For example, by doing so the new foreign company could release their burden on exploring the supply chain and network in the market.

Market Growth: generally, a higher acquisitions would happen in the industries with a lower average growth.

Industrial Probability: the companies that are looking for higher profit and potential growth express a higher interest in the more profitable target companies. On the other hand, the managers with the poorer performance would find it more attractive for them to sell the companies to the more productive acquirer.

Industrial Competition: If firms could purchase an appropriate target company they could gain the existing market share, reputation, brands, supply and sales owned by that company.

Technological Intensity: Acquisitions happen more easily in industries with an intensive R&D. So the firms can enter a new market and use the R&D advantage to develop a monopoly power.

Deregulation: This could provide the firm with several opportunities for improving competencies and efficiency. China, for instance, after joining the WTO (world trade organization), opened a lot of industry sectors to foreign investors.

3. Previous Theories of M&A

Horizontal Merger Theory: Weston Synergy theoretically believes that M&A would bring the companies an increase in their efficiencies of operation. On the other hand, and more significantly, it is a gain on the economies of scale, referred to as “1+1>2” effect. “Economies of scale” is the main source of a horizontal merger. First of all, a horizontal merger would bring the effect of industrial scale of economies, which comes from the undividable property of resources. Secondly, as the growth scale of enterprise increases, the utility of larger and more efficient machines become available, the index of cost of the equipment declines. Thirdly, for the whole company, a horizontal merger would increase the benefit of large scale purchasing. The increase of the number of purchases would strengthen the status of a company in the market, which would be shown in the form of bargaining power of a firm,

as well as an increase in the ability to collect information. On the other hand, a horizontal merger could provide the enterprise with a more professional division of work, which could increase the efficiency and save costs.

Market Share Effect: By means of M&A, a company could increase their ability of control in the market. Through a horizontal merger, a company could reach the lowest limitation of scale, which improves the structure of the industry and the concentration in the industry as well, thus keeping the company in a high standard of rate of return in the industry. However, the horizontal merger is to control the raw materials and the channel, thus controlling the rivals' activities. The mix mergers affect the market in an indirect way, the new company after mergers would threaten the other related companies significantly due to its increased financial resources.

Experience cost curve effect: Including the experience in technology, market, patent, product, management and the culture of company. Since the experience could not be copied, the experience of the target company could be shared, which could decrease the cost of cumulating experience within the firm, saving the expense of further development as well. For those companies that have higher requirements regarding the quality of labor, experience is always an effective barrier of entrance.

Financial Synergy: This theory believes that M&A would bring the company some financial advantage in the form of monetary benefits based on tax, accounting and the inside regulation of stock transactions. For instance by means of M&A, companies could avoid tax expenses. For the stock market, M&A could affect the price of stock thus the acquirer could choose a target company with a low earning but a high earning per share.

2.2 M&A factors which affect the Price Volatility in the Futures Market

Trading Volume

There are two main theories that could explain the relationship between price volatility of futures and the trading volume (TV): the sequential information model (SIM) and the mixture of distributions hypothesis (MDH). SIM assumes that several incomplete equilibrium results are achieved ahead of the equilibrium. However the MDH suggests that the final equilibrium in the market would be reached immediately. The initial signal of SIM is that the reaction in sequence of the market to the information indicates the potential price volatility in the futures market could be detected or predicted by the trading volume (TV). On the other hand, the mixture variable in the function of the MDH model shows that

the relationship between price volatility and the TV is positive in the same period.

The previous research on TV and the price volatility of the futures market shows that generally in the same period a strong form of positive correlation exists between them. By using the Ganger causality framework, the outcome from the testing of this two theories regularly get mixed.

Therefore a new model has been provided by Blume, Easley, and O'Hara (1994), in view of the assumption that traders in the market receive the pricing signals in different levels of quality and accuracy. They claimed that the just price in the market does not provide any information, but the volume could provide either accurate or inaccurate information. They believe that the price could be forecasted by analyzing the trading volume in the market since the TV could represent the traders' expectations. However, Foster (1995) found that the volume itself is not enough of a proxy for the information rate. He thought the lag of information should also be taken into consideration. His findings seemed to conquer the former ones.

OLS (ordinary linear square) was applied by Martell and Wolf (1987) to evaluate the main factors that would affect TV in the market using daily and monthly data. The results showed that not only is TV the function of

price volatility but also open interest (OI), interest rates, exchange rates and other variables.

Bid-Ask Spread, Transaction Cost and Trading Volume

The three main theories to determine the bid-ask spread (BASs) are the inventory cost model, asymmetry information model and order processing model. Even though these three rationales are not the same in their debate they all concluded that BASs and price volatility are positively correlated and have a negative correlation with TV.

Benston and Hagerman (1974) emphasize the factors that affect the quoted BASs in the securities market. According to the OLS regression's results, it showed BASs are positively correlated to volatility of price and negatively correlated with the competition (mainly in the number of deals and makers of the market) in the market.

Berkman (1992) undertook some research and concluded that BASs and TV were negatively correlated in the Exchange of European Options, allowing other factors to remain under controlled in a two equation cointantaneous equation system. Similarly, George and Longstaff (1993) also discovered a negative correlation between BASs and transaction rates in S&P (standard and poor's) 100 index option market in a two equation structure model. Wang Yau, Baptiste (1997) also discovered the same result in a model of two equation simultaneous equation.

Generally speaking, according to these previous demonstrations and research results, BASs and TV are negatively correlated in the same period of time in the market.

Bid-Ask Spread and Price Volatility

During the previous research of Roll (1984), French and Roll (1986), they constructed the model of standard deviation of price change and BASs for a specific time span. Schwartz, Whitcomb (1986) have reviewed the former research. All of them get the result that the correlation coefficient between transaction price volatility and BASs was positive. Furthermore, they found that in a smaller time frame, this kind of correlation was much more significant than in a longer time frame.

Harris (1987) combined the effects of liquidity and information and found out an opposite result between price volatility and liquidity, although liquidity was not examined by the BASs. Instead, they used some hypothesized variables. The result showed that both BASs and price volatility are jointly determined and the correlation between them is positive.

Through the empirical experience and previous research we could conclude that the factors of TV, BASs, and price volatility are jointly determined.

2.3 Previous Research on Market Response to M&A

Most of the previous studies on the market response to M&A focus on measuring the change of shareholders' wealth before and after the event. Researchers believe the motive of synergy of M&A is due to a positive wealth increase for the shareholder (Andrade *et al.*, 2001; Berkovitch and Narayanan, 1993; Bradley *et al.*, 1983; Dennis and McConnell, 1986).

On the other hand, some researchers suggest that the M&A would decrease the firm's value, which would lead to a decrease of the price of securities in the market. Based on maximizing shareholders' wealth, a manager could achieve an increase in the value of shareholders' wealth but not the return on shareholders (Shleifer and Vishney, 1989). In addition, Weston and Weaver (2001) believed that whether M&A would increase the value in the market was determined by the motive of the method. On one hand, the shareholder or investor in one kind futures of the acquiring firms would gain wealth from the enhanced efficient mergers. However, others would lose wealth if the M&A were motivated by the agencies' considerations.

Unlike the initial expectations that M&A would increase a firm's value and provide the futures market a positive increase on their commodities, many studies revealed that a large negative return, varying from 1-5 percent in different event windows, were shown in their event studies results; especially before the announcement of intent to investors

(Beitel *et al.*, 2004; Corhay and Rad, 2000; Datta and Puia, 1995; DeLong, 2001; Doukas *et al.*, 2002; Goergen and Renneboog, 2004; Houston *et al.*, 2001; Mitchell and Stafford, 2000; Mulherin and Boone, 2000; Sirower, 1997; Walker, 2000).

Kale and Singh (2005) divided their examination on value enhancement through M&A events into two periods, 1992-1997 and 1998-2002.

During their research in the period of 1992-1997, the acquirers got about 5 percent abnormal returns.

So, according to the previous research and studies, the impact of M&A on the futures market could not be determined commonly. Different purposes and periods and even motivations could lead to totally different results.

2.4 Objective

Through the previous studies we could conclude that in the futures market especially price volatility is jointly determined by several factors like trading volume, bid-ask spread and some other factors. How much the price volatility is correlated with the announcement of a company's M&A and how are they correlated should be considered in the area of event study. Based on the hypothesis of efficient market and the event study analysis method, the information of M&A should be reflected by the abnormal returns in the futures market during the event windows.

Since these factors should be taken into consideration in this issue, each of the factors may occupy a small fraction of the influence on the price of futures. I researched the event of M&A and considered its effect in the commodity of futures markets, the objective of this research is to test the sensitivity of the market and whether an abnormal return could be achieved near or after the announcement of M&A. I am attempting to determine whether the correlation coefficient between these events is significant, and whether they are positively correlated or negatively correlated.

Chapter 3: Methodology

3.1 Data Source

For M&A I deliberately collected the data of announcement acquisition values from July 1, 2009 – July 1, 2014 of North America commodity companies from Bloomberg as the global financial crisis may influence the result of the research significantly, due to the fact that the commodities (gold, silver, natural gas and crude oil) are a tool of value conservation and a media of tradable asset. Thus a big event, such as an M&A may alter the normal condition of the market. Similarly, I collected the futures historical price from July 1, 2009 – July 1, 2014 both the last price and price change from the official website of investing (<http://www.investing.com/>) and I incorporated the last price data into my research.

On the other hand, I split the historical M&A announcement information into two parts, the first is the completed M&A and the second is the pending M&A. In this way we could clearly test the M&A condition regarding which has a larger impact on the price volatility of futures.

3.2 Model and Rationale

Dummy Variables

Since the M&A has different processes and conditions and the announcement of an M&A could be divided into several parts, we should examine the both pending and completed status. I set these two statuses into to dummy variables, so the common slope model is:

$$Y_i = \alpha + \beta X_i + \gamma D_i + \varepsilon_i$$

$$D_i = \begin{cases} 1 & \text{if completed} \\ 0 & \text{if pending} \end{cases}$$

Y_i : Last price of gold futures

X_i : The announcement of M&A

ε_i : Residual

β : Coefficient between futures last price and M&A announced value

γ : Impact of completed M&A

Thus, for the completed M&A the model could be written as follows:

$$Y_i = \alpha + \beta X_i + \gamma(1) + \varepsilon_i$$

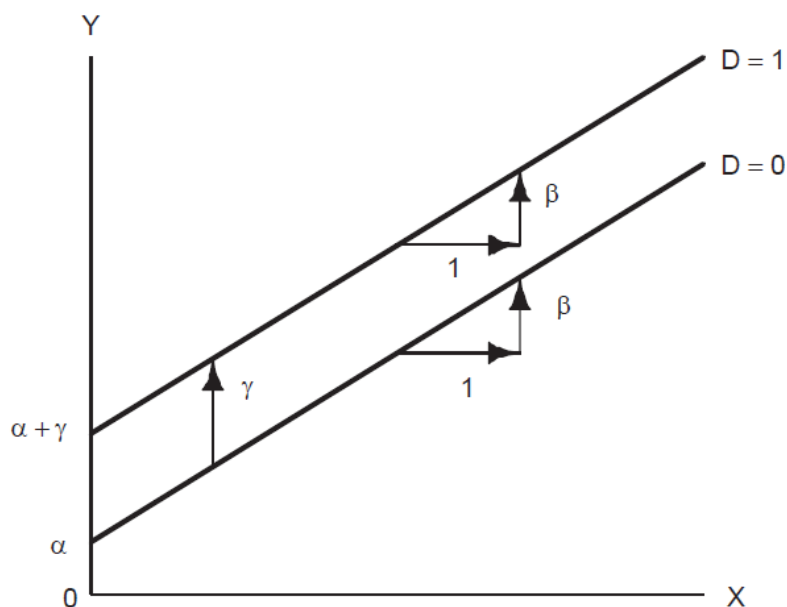
$$= \alpha + \beta X_i + \gamma + \varepsilon_i$$

And for the pending M&A:

$$Y_i = \alpha + \beta X_i + \gamma(0) + \varepsilon_i$$

$$= \alpha + \beta X_i + \varepsilon_i$$

This linear regression model could be shown on the axis below:



(Figure 1. The parameters in the additive dummy regression model)

The Y axis represents the last price of futures of the corresponding commodities. The X axis is referred to as the announcement value of mergers and acquisitions. The intercept γ represents the impact of completed M&A on the last price of futures. In this model, we assume both the pending and completed mergers and acquisitions have the same coefficient with futures market conditions. Therefore we can easily identify through the graph that the slope of these two dummies are exactly the same.

Even this model could take these two important factors into consideration. Their correlations may not be just linear. In other words, it could be either quadratic or even Ln/Log correlated as well. I would test the two possibilities in the further regressions by STATA.

Even Study Methodology

I considered the event study methodology to test the short term reaction of the futures market to the announcement of M&A. The linear model I mentioned before:

$$R_{i,t} = \hat{\alpha}_i + \hat{\beta}R_{m,t} + \varepsilon_{i,t}$$

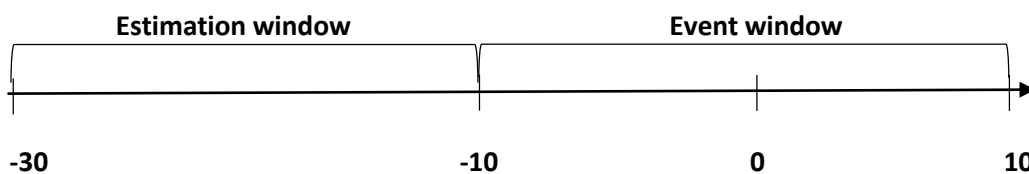
As well as this more traditional method for estimating abnormal return.

In this equation:

$R_{i,t}$: The return of futures “i” on the days of t.

$R_{m,t}$: The corresponding market returns of futures or the index in the market.

$\varepsilon_{i,t}$: The error term in the equation. (t= -30...-10)



(Figure 2. The window of estimation and event)

In this paper, I chose the estimation date (-30,-10) which is referred to as the period before the announcement of M&A, or 20 days in total. The event window (-10, 10), which is referred to as the examination period around the event, is a duration of 20 days as shown on the graph above. The event starts at t=0, and the division of these two periods could focus on the impact of M&A on the futures market and the price change on the commodities.

Thus, the abnormal return (AR) on each day on different commodities could be obtained by the equation:

$$AR_{i,t} = R_{i,t} - (\hat{\alpha}_i + \hat{\beta}R_{m,t})$$

OR

$$AR_{i,t} = R_{i,t} - R_{m,t}$$

And in this equation, t= -10...+10

In the estimation date, returns on the sample commodities price and the market price level could be represented by the following equations:

$$R_{i,t} = (P_{i,t} - P_{i,t-1})/P_{i,t-1}$$

$$R_{m,t} = (P_{m,t} - P_{m,t-1})/P_{m,t-1}$$

The first equation shows the daily return of the sample commodity in the futures market, P represents the price level of corresponding securities and the second equation indicates the market index return in the same period.

The average abnormal return (AAR) for the event window could be expressed by the equation below:

$$AAR_t = \frac{\sum_{i=1}^n AR_{i,t}}{n}$$

In this equation, n is the number of commodities or firms, t stands for that on the day of t, commodity or futures could have an average abnormal return of AAR_t

By using the results from the average abnormal return, we determine that the cumulative average return could be expressed by this equation:

$$CAR_t = \frac{\sum_{i=1}^n AAR_{i,t}}{n}$$

In this equation, n is the number of commodities or firms, t stands for that on the day of t, by adding up all of the average abnormal returns then dividing by the number of commodities, we could get the final results.

After we get the final results of CAR, we could use that to analyse whether the significance of price volatility exists during the announcement of M&A.

3.3 Hypothesis

Asset Risk Premium Hypothesis

Considering that in a market where risk premiums were shown we could conclude that:

$$E(f_T(T)) > f_0(T).$$

Where:

$E(f_T(T))$: Expected value of futures price at expiration date T

$f_0(T)$: Futures price today

In this hypothesis, the futures price is expected to increase. That is to say, buyers with a future contract at price $f_0(T)$ are expected to sell their futures contract at $E(f_T(T))$. The spot price and the futures price would finally converge at the expiration date T. $E(f_T(T)) = E(S_T)$,

$$E(f_T(T)) = E(S_T) > f_0(T).$$

So, it could be concluded that the futures price is a relatively low estimation of the futures spot price and that many investors or individuals would exercise their rights before the expiration date.

Efficient Market Hypothesis

Another important rationale I must mention is the efficient market hypothesis. Without this hypothesis, all my research and results obtained from the data would make no sense.

The concept of EMH can be divided into two parts. First of all, the returns of securities in the market are random. Secondly, the investors or participants in the market could not earn extra profits in this kind of market. Even though the EMH is highly controversial and usually been disputed believers of this theory argue that it makes no sense to predict the market nor to try to search the undervalued securities or assets in the market. All the information in the market could be reflected by the price of securities at once. However, as we all know, the market cannot be perfectly efficient and there will always exist some delays while the information is translated into the market.

I have to use this hypothesis in my research, because if I cannot ensure the EMH, the M&A's announcements will not be correctly reflected by the price volatility of gold futures.

Chapter 4: Empirical Results

In this chapter, I display the results of data analysis from STATA version 12.0. Based on the hypothesis above, I set four variables in the software, which are: announcement value of M&A, last value of gold futures, daily value change of gold futures, deal status of M&A. Dummy variable: d1=completed M&A, d2=pending M&A. Since the amount of M&A is limited for these four commodities, I chose gold futures as the test target in the regression process.

4.1 Summary Statistics

After the match of time range of announcement date and historical price, the four year observations decreased to 551; the announced value has a large standard deviation due to the different sizes of the gold mining companies. The mean value of gold futures in the past four years is very near to the current price, which showed the ability of gold as a means to conserve value.

Variable	Obs	Mean	Std. Dev.	Min	Max
announcedt~1	551	139.0018	715.4045	0	10172.9
last	551	1394.613	231.8219	915.9	1888.7
change	551	-.0003895	.0113416	-.0561	.0291
dealstatus	0				

(Figure 3. Summary of statistics of announced value, last value, %change and deal status)

Then, I input the two dummy variables of trading status; the table varies as below:

dealstatus	Freq.	Percent	Cum.
Completed	498	90.38	90.38
Pending	53	9.62	100.00
Total	551	100.00	

(Figure 4. Tabulating dummy variables of completed and pending status of M&A)

Variable	Obs	Mean	Std. Dev.	Min	Max
announcedt~1	551	139.0018	715.4045	0	10172.9
last	551	1394.613	231.8219	915.9	1888.7
change	551	-.0003895	.0113416	-.0561	.0291
d1	551	.9038113	.2951178	0	1
d2	551	.0961887	.2951178	0	1

(Figure 5. Summary of statistics of announced value, last value, %change and deal status)

4.2 Regression Results

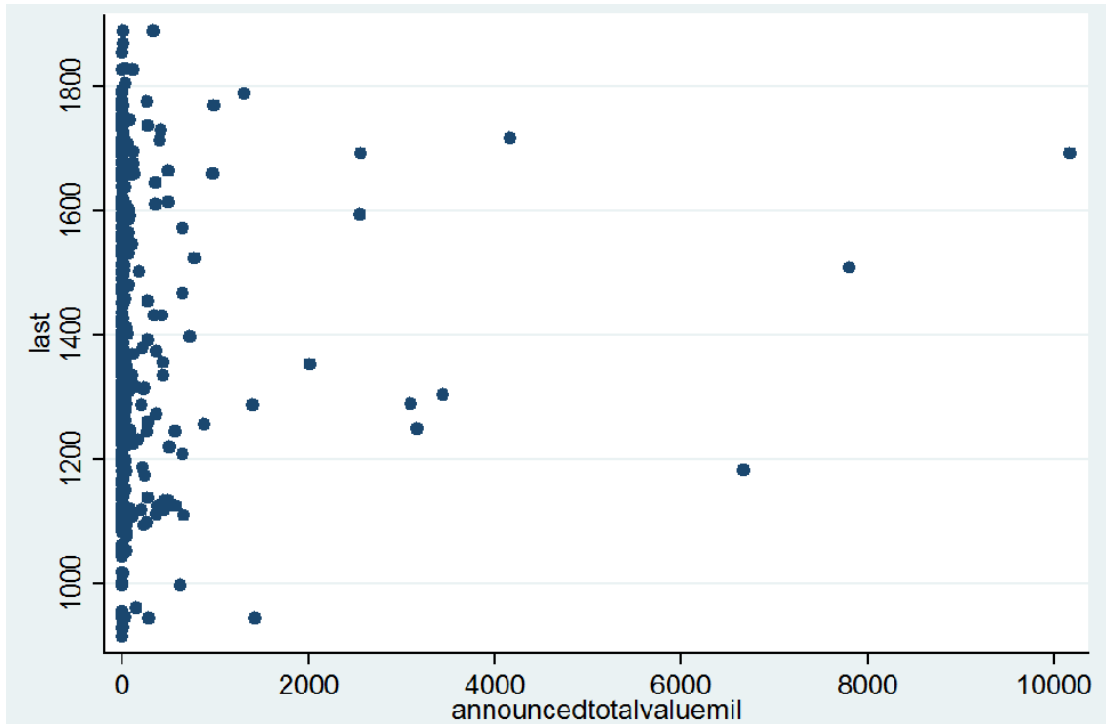
(1) Simple Linear OLS Regression

Source	SS	df	MS			
Model	389550.516	2	194775.258	Number of obs =	551	
Residual	281102401	548	512960.585	F(2, 548) =	0.38	
Total	281491951	550	511803.547	Prob > F =	0.6842	
				R-squared =	0.0014	
				Adj R-squared =	-0.0023	
				Root MSE =	716.21	

announcedt~1	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
last	.1148482	.1319556	0.87	0.384	-.1443525	.3740488
change	17.87553	2697.179	0.01	0.995	-5280.2	5315.951
_cons	-21.16001	186.4825	-0.11	0.910	-387.4681	345.1481

(Figure 6. OLS regression result of announced value, last value, %change)

The OLS regression between the gold futures last price and the announced M&A value showed that they have a correlation. However, based on the theory of OLS regression, the set model is a linear model and the results demonstrate that at the 95% of confident interval, the value of R-square is 0.0014 meaning that a very small fraction of gold futures price volatility could be explained by the M&A announcement value under the linear relation. The coefficient between the announcement value and last price is about 0.115 and about 17.88 between the announcement value and %change of last value. Both of the coefficients are positives.



(Figure 7. The two-way scatter of announced value and last value)

Through the two way scatter graph, we could conclude that as the announcement value increases, most of the dots located in the higher level range of announcement values would correspond to a higher last value. We could easily identify that the small value (approximately 0-10 mil) of M&A do not have a significant effect on the volatility of the gold price from 2009-2014.

(2) Dummy Variable Regression

As far as I am concerned, the dealing status of M&A should have an effect on the performance of gold futures price in the market and we should take this factor into consideration. So, I constructed the dummy

variable model to consider this situation separately. The regression result is listed below:

Source	SS	df	MS			
Model	41988.7361	2	20994.3681	Number of obs =	551	
Residual	29515778	548	53860.9088	F(2, 548) =	0.39	
				Prob > F =	0.6774	
				R-squared =	0.0014	
				Adj R-squared =	-0.0022	
Total	29557766.8	550	53741.3941	Root MSE =	232.08	

	last	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
announcedtotalvaluemil		.011972	.0138447	0.86	0.388	-.0152232	.0391672
d1		4.767274	33.56142	0.14	0.887	-61.1575	70.69204
d2		0	(omitted)				
_cons		1388.641	31.88532	43.55	0.000	1326.008	1451.273

(Figure 8. Dummy variable regression result of completed, pending M&A, last value)

Through this result, as I mentioned before, the d1 is the dummy variable of completed M&A and d2 is the dummy variable of pending M&A.. The coefficient of d2 is omitted due to the fact it is collinear with d1, and we could also conclude that under 95% level of confident interval, the announcement value of M&A is positively correlated with the last price of gold futures. The R-square is 0.0014, and the coefficient of d1 is approximately 4.77, which suggests that the completed M&A has a larger effect on the last price than the pending ones.

4.3 Event window analysis

In this research, I picked four commodities including gold, silver, natural gas and crude oil of a sample size of 2,405 as the test targets in the analysis, based on the data through these commodity companies which has claimed mergers and acquisition histories from July 1· 2013 to July 1· 2014, and the historical prices of these four different commodities in the market. I put all my data into four different spreadsheets and figured out the abnormal return and cumulative returns of them respectively. Then, I combined the average return and cumulative average return from the four spreadsheets into one sheet, resulting in the final table below:

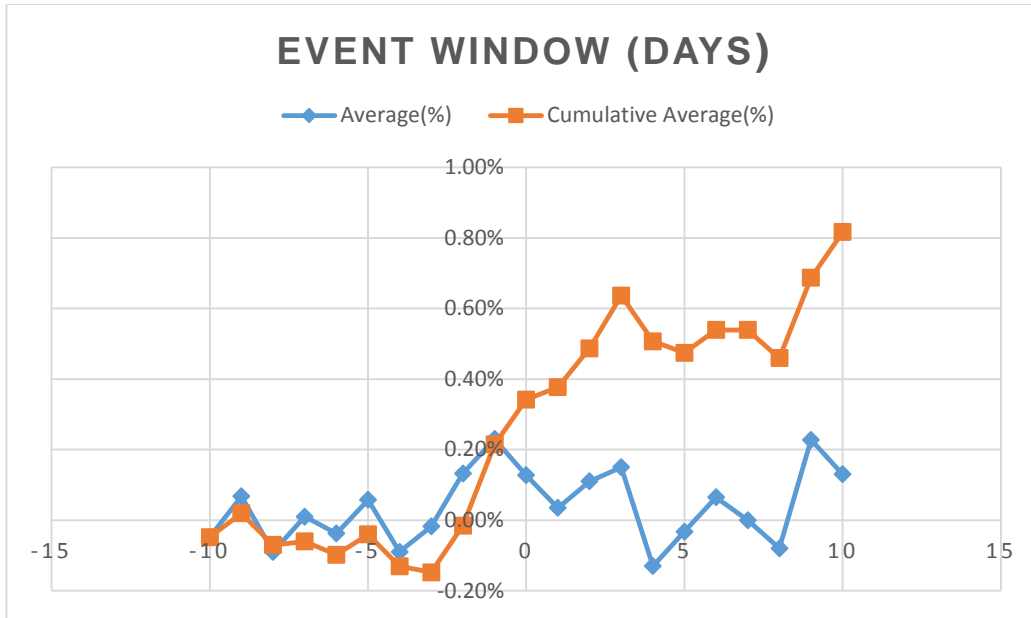
(Table 1. The abnormal return in M&A event)

<u>Abnormal Return</u>		
<u>Day</u>	<u>Average (%)</u>	<u>Cumulative Average (%)</u>
-10	-0.05%	-0.05%
-9	0.07%	0.02%
-8	-0.09%	-0.07%
-7	0.01%	-0.06%
-6	-0.04%	-0.10%
-5	0.06%	-0.04%
-4	-0.09%	-0.13%
-3	-0.02%	-0.15%
-2	0.13%	-0.02%
-1	0.23%	0.21%
0	0.13%	0.34%
1	0.04%	0.38%
2	0.11%	0.49%
3	0.15%	0.64%
4	-0.13%	0.51%
5	-0.03%	0.47%
6	0.07%	0.54%
7	0.00%	0.54%
8	-0.08%	0.46%

9	0.23%	0.69%
10	0.13%	0.82%

Looking at Table 1, we cannot easily find the impact of mergers and acquisition on the futures market by the average abnormal return, however, through the cumulative abnormal return, we can clearly see that the momentum of the return in the market is gradually increasing after the event day of 0, which means that on the M&A announcement day the overall returns on these commodities are increased. In other words, in this year, the correlation between M&A events and futures prices is positive.

In order to have a better view and understanding of the relationship between M&A and the futures market, I combined all the table data into a graph below. In this graph depicting the event window, the blue line indicates the average abnormal return and the red line represents the cumulative abnormal return. We can easily find that in the interval of (-5, 5), both the AAR and CAAR are sharply and significantly increasing. The impact of mergers and acquisitions without a doubt have a positive effect on the performance of the futures market.



(Figure 9. Event window analysis result)

4.4 Result Implication

Based on our theories, the correlation between futures prices and other factors are complicated, and although the result of STATA and regression shows that there existed a slight positive correlation between M&A announcement value and last price of futures, the regression based on the division of samples into two dummy variables also concludes that the completed M&A plays a more significant role in the determination of the futures price, and their correlation is positive as well. On the other hand, through the results of the event study analysis, we can better identify the positive relationship between M&A and the futures market. This result could give us some clues and inspire a further analysis on market price volatility, especially in the area of event study, asset pricing and market predictions.

Chapter 5: Conclusion, Limitations and Recommendations

Conclusion:

M&A as a sign of a company's development or means to enlarge its further investments have become more important in large enterprises, like in the area of rare metals and energy. Through all of my research we could conclude there is a positive correlation between the amount of announcement value of M&A and futures prices. That reveals the fact that until the announcement day of an event within a company, the related market would be influenced. Based on the EMH, all of the information would be translated into the price performance of the market. M&A as an infrequent event usually has a large influence on both the company itself and the market, especially in the derivative market.

Limitations:

As I mentioned before, the EMH is an optimal situation in the market and some analysts do not have any confidence in that theory. In my research process, this hypothesis is essential since I chose the methodology of event study and I could not precisely fix the time the M&A influence takes effect. We could not deny the possibility that the market may not be able to translate all the information into the price of

financial derivatives. If this situation is true, my research results could be biased or at least include some errors. On the other hand, since M&A do not happen frequently and the price volatility in the market depends on a lot of elements, the observations in the sample are limited to demonstrate some of the conclusions.

Recommendations:

For further research, I recommend using a longer time horizon to increase the size of the database and the use of separate event research on the financial crisis because most of the market historical data could not omit its influence. Since the price volatility in the futures market is jointly determined by different factors, the research should be undertaken from different angles on different hypotheses and factors.

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