

**The Impact of Merger and Acquisition on Canadian Energy Firms**

by

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## **Abstract**

### The Impact of Merger and Acquisition on Canadian Energy Firms

By Zou Yingyi

This study is trying to answer the question M&A can create value for Canadian energy firms or destroy value for them. It uses 37 acquiring firms in 2010 and 42 acquiring firms in 2011 in order to find the relationship between merger and acquisition (M&A) and post-acquisition performance of Canadian energy firms to make a reasonable conclusion whether market reaction to M&A is good or bad. In the thesis, the market model and cumulative abnormal return (CAR) are used. From the output, there exists evidence of statistically significant abnormal returns. It shows higher trading volume during the event window as well.

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## **Chapter 1**

### **Introduction**

#### **1.1 Merger and Acquisitions (M&A's)**

Nowadays, more and more companies are engaging in merger and acquisition transactions throughout the world. The Daimler-Chrysler, merger in 1998, was regarded as the largest industrial merger in the twentieth century. And in 2006, the French telecoms giant Alcatel made a bid for its US rival Lucent Technologies and acquired it. In 2005, eBay Inc., which is a leader in the e-commerce auction industry, spent \$2.6 billion in acquiring the Internet-based communications company Skype Technologies.

The definition of merger and acquisition (M&A) is the combination of two firms. In other words, one company buys another company in order to become more competitive in the market. Although merger and acquisitions have a similar meaning, there is a slight difference between them. A merger is a consolidation of two companies usually to establish a new company. However, an acquisition, which may be contested, is one company that purchases another company and no new company is established after the deal. Some companies prefer a cash transaction. Others choose stock shares to complete the deal.

The Harvard Business Review on Mergers and Acquisitions (2001) explains the difference between cash transaction and stock transaction. It states that the role of two parties, seller and buyer, in a M&A is clear if it is a cash transaction. The ownership in cash transaction is clear as well. However, if it is a stock shares transaction, it is hard for us to distinguish who is the acquirer and who is the target company. In

addition, the acquiring firms will bear more risks if they choose a cash transaction. In stock transaction, both the acquiring firms and the target firms share the risks.

M&A include three types: horizontal merger, vertical merger and conglomerate M&A. A horizontal merger refers to one firm acquiring another firm in the same industry in order to increase market share, lower costs, exploit new opportunities and so on. In this way, the acquiring firm obtains more market share and power. For example, in 2002, Easyjet paid £374 million to acquire Go Fly. As a result, it has become Europe's largest low-cost airline by combining two similar firms.

A vertical merger is usually between two companies, that conduct business with each other, but they are not in the same industry. The acquiring company wants to expand its business operations to obtain more profits. In the 1970s and 1980s, companies such as Shell and BP, engaged in exploration and extraction of crude oil, decided to acquire downstream refineries and distribution networks. This is a typical example of vertical M&A.

Conglomerate M&A's, are different from horizontal and vertical M&A's. They generally happen between two unrelated companies. The objective of this kind of M&A is to realize capital investment diversification and lower operating risks.

M&A's have their own advantages and disadvantages. On the one hand, an acquiring firm can easily get access to new resources and expand business through a M&A. Also, a M&A can cause a higher industry entry barrier, which provides acquiring firms more control in this industry. On the other hand, disadvantages exist in the

process of a M&A. For instance, acquiring firms usually pay more than expected. Post-M&A can also create potential problems in human resources due to different corporate cultures.

One firm chooses to acquire another firm for three main motives.

(1) Market power: firms desire to increase their market power by eliminating competitors, improving efficiencies and adding new business capabilities or technology (Bower, 2001; Hayward, 2002)

(2) Economies of scale and scope: a M&A can lower financing costs, such as flotation costs for issuing bond and shares, and operating costs, such as research development (R&D), meanwhile, it can increase the efficiencies of the firms, including increasing market distribution and strengthening productive capability.

(3) Synergy: a M&A can create opportunity for managerial specialization. Emanuel et al (2011) assert that a synergy effect comes one firm acquires another firm, it expects to perform better than the previous two firms did before,  $2+2=5$ . It results in a “win-win” situation.

Whether a M&A can create value for the firm is still a debate in the academic literature. Some arguments support that M&A's do create value for the firms. For example, Weston et al (2004) argue that synergies can be created after a M&A, which can bring more benefits and opportunities to acquiring firms. However, others point out that M&A's can create some problems and destroy the value of the firm. Jensen (1986) states that M&A can cause agency problem, as a result, firms make less return. Because the answer to this question is not clear, it is meaningful for us to undertake further research on mergers and acquisitions.



## **1.2 Toronto Stock Exchange (TSX)**

The Toronto Stock Exchange (abbreviated TSX), located in Toronto, is the third largest stock exchange in North America. According to the total value of market capitalization, TSX can be ranked the eighth largest stock exchange in the world. It provides a liquid trading environment and convenient investing market. Also, it has been a well-regulated secondary market for a century and a half. Trading mining, oil and gas stocks account for a higher percentage in the TSX than any other stock exchange in the world. Besides trading conventional securities, it lists various exchange traded funds, income trusts, investment funds, and split share corporations. The market currently is exposed to 4,000 companies with total market capitalization of more than \$2 trillion. TSX has six basic sectors: mining, energy, clean technology, life sciences, technology and diversified industries. TSX has the expertise to assist helping companies go public. In addition, it is always innovating, for example, it has recently added a science sector.

## **1.3 NGX Canadian Natural Gas Index**

Given the focus of this project on energy firms, I use the NGX Canadian Natural Gas Index as a market index in the database. It is known that NGX is the Canadian leading energy exchange. The NGX index began on December 19, 2007 and the initial benchmark value of the index was set at 1000. Actually, it is a commodity index because natural gas is traded on the NGX. The NGX index is denominated in Canadian dollars and is calculated on a daily basis. It follows the performance of Alberta's 'One-month spot' physical market price. In addition, the index is an excess return index ( $R_m - R_f$ ) and the investment interval is one month.

Energy Market at a Glance (Table 1.1)

June 2012	TSX Venture (TSXV)	TSX
Number of Issuers	285	121
QMV (C\$)	10,193,228,890	327,254,350,236
New Listings	12	-
Equity Capital Raised (C\$)	900,555,117	2,634,814,386
Number of Financings	135	39
Volume Traded	6,619,094,608	8,534,947,334
Value Traded (C\$)	11,157,900,855	124,708,000,000
# of Trades	1,786,013	22,118,860

Sources: [http://www.tmx.com/en/listings/sector\\_profiles/energy.html](http://www.tmx.com/en/listings/sector_profiles/energy.html)

#### 1.4 Energy Industry in Canada

Canada is a country which is enriched with energy. Therefore, this industry plays an important role in the Canadian economy. This sector involves crude oil and petroleum products, natural gas and electricity.

In 2010, the energy industry accounted for 6.7 percent of Canada's GDP that is the same as year 2009. The key statistics on energy are as presented in Table 1.2. It shows that the energy industry in Canada is growing at an increasing rate. For example, from the perspective of annual energy export revenues, the difference between 2009 and 2010 is positive \$13 billion. In addition, energy companies in Canada can be divided into five categories of companies: coal, natural gas, oil, power and uranium mining.

Energy Statistics for Canada, 2009-2010 (Table 1.2)

	2009	2010	Difference, 2009-2010
The energy industry's direct contribution to GDP (per cent)	6.7	6.7	0
Annual energy export revenues (Billion \$)	81	94	+13
The energy industry's direct contribution to export revenues (per cent)	22.0	23.2	+1.2
Monthly Average Oil Price (US\$/bbl)	61.95	79.48	+17.53

Sources: Statistics Canada, Energy Information Administration

In the paper, I focus on Canadian energy firms for two reasons. First, the energy industry is global in nature and engages in M&A activity extensively. Hence, studies on the energy industry have worldwide applicability. Second, the energy industry is different from other industries because of its products associated with energy resources. There is an inherent incentive for a company to use M&A activity to expand its business and make huge profits. A finding of abnormal short-term returns might be expected given the higher returns needed to offset higher risks. Similarly, studies of enhanced post-M&A efficiency and accounting effects would seem to reflect the synergies claimed in the explanations by companies engaging in M&A transactions.

### **1.5 Organization of the Study**

In Chapter 2, we are going to review the concept of the efficient market hypothesis (EMH). Also, cover some previous academic studies on mergers and acquisitions. In Chapter 3, the methodology, including Market Model, Average Abnormal Return Model (AAR) and Cumulative Abnormal Return Model (CAR), will be introduced in

detail. We analyze the results from the empirical testing in Chapter 4 and make the Conclusion in Chapter 5.

## Chapter 2

### Literature Review

#### 2.1 Efficient Market Hypothesis (EMH)

The idea of efficient market hypothesis (EMH) was introduced by Fama in the 1960's. In a more recent article, Fama (1976) argues that the price of a security is fairly priced in the stock market, because the information is fully reflected on it. In other words, all the information has already been reflected on the stock prices, which means no one can earn abnormal returns in the stock market if the market is efficient. On the other hand, people can get access to the information without efforts. Information is widely, readily and available to everyone. The stock prices follow a random walk pattern. No one can predict the future stock prices based on historical prices or patterns under the efficient market hypothesis. There are three forms associated with EMH. They are weak form, semi-strong form and strong form.

Weak form indicates that all the market data, including trading prices and trading volumes, have already been reflected in the stock prices. Technical analysis is useless under weak form EMH. A lot of previous studies on weak form test show the stock prices do not follow random walk and the abnormal return can be earned. For example Asma (2000) investigated the Dhaka stock market and found that the share return series do not follow a random walk model and the weak-form EMH is rejected.

Francesco et al(2010)tested the EMH for Central and Eastern Europe equity markets from 1999 to 2009. The evidence showed that some markets are not weak form efficient. Kashif et al (2010) performed research on Asia-Pacific markets. They concluded that investors can earn abnormal returns and benefit from arbitrage across different capital markets.

Semi-strong form states that all the public information has already been reflected in the stock prices. Fundamental analysis is useless under semi-strong form EMH. The event study methodology can be used to test this by macro and micro events. Macro-events refer to economic policies and condition. For example, monetary policy, fiscal policy, financial crisis, wars and so on. Micro-events refer to firm specific events, consisting of dividend announcements, stock splits, new products announcement, news of change in CEO, etc. Tobias (2011) tested the semi-strong form of efficiency at the Nairobi Stock Exchange using dividend announcement and firm value. Hussin et al (2011) listed 120 companies to study the announcement effect of both dividend and earnings on stock prices to determine the semi-strong form in the Malaysian Stock Exchange. Their test showed there is a positive abnormal return after dividend and earnings increasing announcements. But there is a negative abnormal return after dividend and earnings decreasing announcements.

The strong form states that all the information, including inside information, has already been reflected in the stock prices. This means that no one can earn an excess return regardless of insiders and outsiders under the strong form EMH. If the insider can make an abnormal return, we can conclude that the strong form market efficiency does not exist. For instance, Khan and Ikram (2011) did the research on the Indian Capital Market to test strong form market efficiency by examining the performance of mutual funds. The results suggest that the mutual funds outperform the market. Therefore, the strong form market efficiency does not exist in the Indian capital market.

## **2.2 Event Studies on M&A's**

In the recent financial literature, most empirical analysis of M&A's is based on event studies. These previous studies can be divided into four categories based on their results and conclusions. First, some studies make the conclusion that significant positive abnormal returns can be earned after a M&A announcement. Second, the result of significant negative abnormal return is obvious in some papers. Third, some studies focus on the relationship between firm size and M&A. It reflects the smaller size of the firm, the more profits it makes after M&A. Finally, there is no clear conclusion in some of the articles.

The evidence on some studies indicates that acquiring firms attain significant positive returns from M&A. For example, Jensen and Ruback (1983) report the acquiring firms can earn a 30 percent target return in tender offers and a 20 percent target return in mergers. Likewise, Baldwin and Gorecki (1987) find a big increase in productivity efficiency after takeovers when they analyze the relationship between M&A and productivity, choosing the Canadian manufacturing sector from 1971 to 1979. Also, Healy et al (1992) examine 50 of the largest U.S. M&A during 1979 and mid-1984 and note that compared to the industrial average, the acquiring firms significantly improve their asset productivity, as a result, they are associated with higher operating cash flow (OCF) returns after M&A.

However, some studies show that a negative return exists for the acquiring firm after a M&A. For instance, Andre et al (2004) choose a sample of 267 Canadian mergers and acquisitions for 1980-2000, using different calendar-time approaches, including and excluding overlapping cases. The results show that Canadian acquirers have obtained significant negative returns over the three-years after a M&A. Loughran and Vjih

(1997) studied 947 acquisitions during 1970-1989. They suggest that the targeted firms with stock transaction earn significantly negative excess returns of negative 25.0 percent. Ravenscraft and Scherer (1989) studied the manufacturing sector in the U.S. from 1957 to 1977 and conclude that the profitability of targeted firms decreased sharply after a M&A.

On the other hand, evidence for some studies of the returns to acquiring firms is based on firm size. Sara et al (2003) investigate 12023 acquisitions by public firms from 1980 to 2001. They state that the announcement return for acquiring firm shareholders is roughly two percentage points higher for small acquirers irrespective of the form of financing and it does not matter whether the targeted firm is public or private.

It is not clear if M&A do good to the long-term performance of acquiring firms or not. And the existing evidence is confusing. Franks et al (1991) find no evidence of significant abnormal returns over a three-year period after a M&A. Agrawal et al (1992) find that acquisitions are associated with insignificant abnormal returns, but significant abnormal returns of negative 10 percent over a five-year period after mergers.

Previous studies have focused on the determinants of M&A's with empirical studies on the difference between cash transaction and stock transaction and the relationship between specific events and M&A's. Nevertheless, this paper is going to study the market reaction to M&A announcements of Canadian energy firms.



## **Chapter 3**

### **Methodology**

#### **3.1 Data Description**

There are four datasets in the sample, including company list, daily stock price list, daily volume list and daily index list. On the company list, it covers 37 M&A Canadian energy firms in 2010 and 42 M&A Canadian energy firms in 2011. What's more, the M&A took place in May, June, July and August. The daily stock prices of these Canadian energy firms are also included on the daily stock price list. It involves daily stock prices for 2010 M&A in 2010 and daily stock prices for 2011 M&A in 2011. However, it excludes firms with a M&A more than once. It means that if another M&A occurs within the estimate event window of the first M&A, this is identified as an over-lapping event.

We perform an analysis based on a separate database, which excludes the overlapping events. Because the second or the third time M&A can have impact on the first time M&A, if it isn't dropped, the results will be biased. I also include the daily volume of the companies for the period 2010 and 2011 to test the change in trading volume ex and post M&A. In addition, the energy index-NGX Canadian Natural Gas Index, is regarded as the market index in the database, including the period 2010 and 2011 daily index.

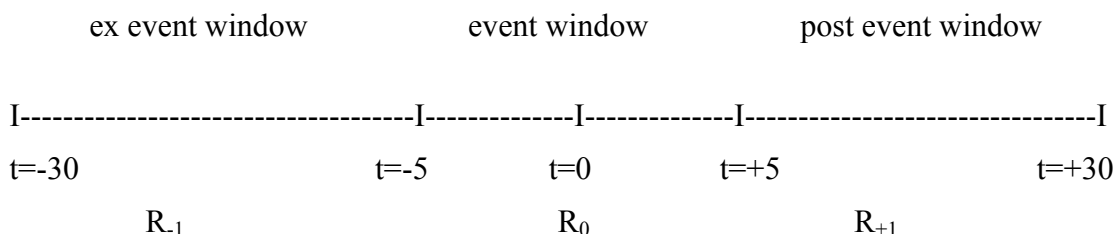
#### **3.2 Rationale**

The rationale for an event study is to test market reaction to M&A's. First, I select an event window of 10 days, which refers to 5 days before  $t=0$  (M&A) and 5 days after

that time, where  $R_0$  stands for the return on the event window. Second, I identify 30 days as an ex-event window and 30 days post event window. Here  $R_{-1}$  and  $R_{+1}$  stand for returns on the ex-event window and returns on post event window respectively.

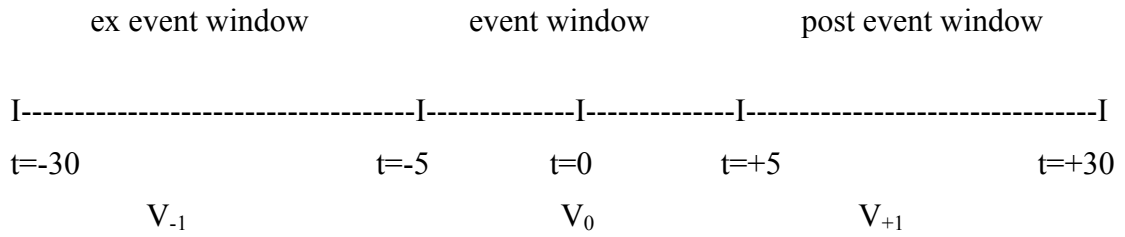
I use STATA to test  $R_0$ ,  $R_{-1}$  and  $R_{+1}$ . Firstly, I compare  $R_0$  and  $R_{-1}$  in order to find whether the M&A announcement has any impact on stock price. If  $R_0$  is bigger than  $R_{-1}$  and it is positive and statistically significant, we can conclude that a M&A announcement does influence changes in stock price and vice versa. Secondly, I compare  $R_{+1}$  and  $R_{-1}$  to test whether post-M&A can create value for Canadian energy firms. If  $R_{+1}$  is bigger than  $R_{-1}$  and it is significantly positive, we can conclude that the value of Canadian energy firms is increased after M&A transactions and vice versa.

Figure 3.1



I also use STATA to test change in volume before and after a M&A. The event window is 10 days as well, which indicates 5 days before  $t=0$  (M&A) and 5 days after that time.  $V_0$  is defined as the volume during event window. I identify 30 days before the event window and 30 days after the event window as a post event window.  $V_{-1}$  and  $V_{+1}$  represent trading volume for the ex event window and post event window, respectively. It is rational to compare the change in trading volume before and after a M&A in order to make sense whether M&A's affect stock trading volume.

Figure 3.2



### 3.3 Models

#### 3.3.1 Market Model

We test the semi-strong form EMH using the market model. Firstly, we have to calculate the return on the stocks. The formula (Equation 3.1) is as follows.

$$R_t = \frac{P_t}{P_{t-1}} - 1 \quad \text{(Equation 3.1)}$$

where:

$R_t$  = return on stock during period t

$P_t$  = stock price during period t

$P_{t-1}$  = stock price during period t-1

Secondly, the following formula (Equation 3.2) represents the Market Model.

$$R_{i,t} = \hat{\alpha}_i + \hat{\beta}_i R_{m,t} + \varepsilon_{i,t} \quad \text{(Equation 3.2)}$$

where:

$R_{i,t}$  = return on security i during period t

$\alpha_i$  = intercept of the equation for security i

$\beta_i$  = slope of the equation for security i

$R_{m,t}$  = return on the market during period t

$\varepsilon_{i,t}$ = error term

I use STATA to do the regression of Equation 3.2. NGX index is regarded as  $R_{m,t}$ . In addition,  $\varepsilon_{i,t}$ , the error term, stands for unsystematic risk, which is the risk for the specific firm.

To do the simple linear regression, we have four assumptions for the error term to keep in mind. (see Hill et al 2011)

The expected value of the random error e:  $E(e)=0$

The variance of the random error e:  $\text{var}(e)=\sigma^2$

The covariance between any pair of random errors  $e_i$  and  $e_j$ :  $\text{cov}(e_i, e_j)=0$

The values of e are normally distributed about their mean:  $e \sim N(0, \sigma^2)$

### **3.3.2 Abnormal Returns (AR) and Average Abnormal Returns (AAR) and Average Cumulative Abnormal Returns (ACAR)**

Equation 3.3 represents the Abnormal Return (AR).

$$AR_{i,t} = R_{i,t} - (\hat{\alpha}_i + \hat{\beta}_i R_{m,t}) \quad (\text{Equation 3.3})$$

where,  $AR_{i,t}$  indicates the abnormal return on security i during period t.  $R_{i,t}$  refers to return on security i during period t.  $\hat{\alpha}_i$  and  $\hat{\beta}_i$  are estimated from Equation 3.2, using data from the appropriate estimation window. Meanwhile,  $R_{m,t}$  represents the NGX index.

Equation 3.4 is for Average Abnormal Return (AAR).

$$AAR_t = \frac{1}{N} \sum AR_{it} \quad (\text{Equation 3.4})$$

where, N stands for the number of securities.

A T-test can be used. Null hypothesis is stated:  $H_0: AAR_t=0$  (if it is true, market is efficient). Alternative hypothesis is stated:  $H_a: AAR_t \neq 0$  (if it is true, market is not efficient). If people can get excess return after M&A announcement, we are against semi-strong form EMH. If not, semi-strong form EMH is supported.

Cumulative abnormal return, Equation 3.5, explains the impact of M&A on Canadian energy firms.

$$CAR_{it} = CAR_{it-1} + AR_{it} \quad (\text{Equation 3.5})$$

$$ACAR_t = \frac{1}{N} \sum CAR_{it} \quad (\text{Equation 3.6})$$

Equation 3.6 describes the Average Cumulative Abnormal Return.

Also the T-test is used. Null hypothesis is stated:  $H_0: ACAR_t=0$ . Alternative hypothesis is stated:  $H_a: ACAR_t \neq 0$ . If we accept the null hypothesis, the market is efficient. If we reject the null hypothesis, the market is not efficient.

### **3.4 Data Sources**

My database covers the M&A company list for the period 2010 and 2011 with daily stock prices, daily trading volume and daily NGX index. I collected my database from the Bloomberg, TSX official website and Yahoo Finance.

Data of daily trading volume for period 2010 and 2011 can be found at the website below:

<http://ca.finance.yahoo.com/>

Data of daily NGX index for period 2010 and 2011 can be found at the website below:

<http://www.ngx.com/natgas.html>

## Chapter 4

### Analysis of Results

#### 4.1 Overview

This section is going to analyze and explain the results of the models, which derive from Chapter 3.37 M&A's in 2010 and 42 M&A's in 2011 firm list is attached in Appendix A. I have collected these data and run them in STATA to obtain these results.

#### 4.2 Stock Price

##### 4.2.1 Regression Analysis

Market model (Equation 3.1) is sufficient to derive a linear relationship between beta and expected return. In the sample, I use NGX index as the market return. Table 4.1 is the output of regression of market model, which is shown as follows:

Table 4.1

Source	SS	df	MS	Number of obs = 4141		
Model	.187724234	1	.187724234	F( 1, 4139) =	43.46	
Residual	17.8794513	4139	.004319751	Prob > F	= 0.0000	
Total	18.0671756	4140	.004364052	R-squared	= 0.0104	
				Adj R-squared	= 0.0102	
				Root MSE	= .06572	

return	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
indexreturn	.8012253	.1215413	6.59	0.000	.5629391	1.039512
_cons	-.0004239	.0010235	-0.41	0.679	-.0024306	.0015827

From the output, it indicates that  $\alpha$ , which is the intercept of market model, is -0.0004239 and  $\beta$ , which is the slope of market model, is 0.8012253. The value of  $\beta$  measures the sensitivity of the security to the market return. The larger the value of  $\beta$ ,

the more sensitive the security to the market return. The results show that a change in these securities is sensitive to the market change.

R-squared is widely used in linear regressions. Given a set of data points, linear regression gives a formula for the line most closely matching those points. It also gives an R-squared value to measure how well the resulting line matches the original data points. The higher R-squared value means stocks are the better to match market model equation, which refers that the security performance patterns have been in line with the index. However, in the output, R-squared is 0.0104 and adjusted R-squared is 0.0102. The values are relatively low. The movement of stocks in the sample does not follow the NGX index pattern.

#### 4.2.2 Average Abnormal Return (AAR) Results

The output of average abnormal return is presented in Table 4.2. I use the daily stock price list. The event window is 10 days, which is 5 days before M&A and 5 days after M&A.

Table 4.2

```

One-sample t test

```

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]
aar	4198	.0000969	.0001381	.0089509	-.0001739 .0003678

```

      mean = mean(aar)                                t = 0.7015
Ho: mean = 0                                         degrees of freedom = 4197

      Ha: mean < 0                                     Ha: mean != 0                                     Ha: mean > 0
Pr(T < t) = 0.7585                                Pr(|T| > |t|) = 0.4830                                Pr(T > t) = 0.2415

```



T-test is used. Null hypothesis is stated:  $H_0: AAR_t=0$  (if it is true, market is efficient). Alternative hypothesis is stated:  $H_a: AAR_t \neq 0$  (if it is true, market is not efficient). If P-value is more than 0.05 ( $P > 0.05$ ), we do not reject null hypothesis. If P-value is less than 0.05 ( $P < 0.05$ ), we reject null hypothesis. From Table 4.2, aar stands for average abnormal return (AAR). P- value is 0.4830, which is bigger than 0.05. Therefore, we can accept the null hypothesis and conclude that the market is semi-strong efficient.

Table 4.3

```

Paired t test

```

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
aar2	4198	.0016993	.0002346	.015198	.0012394	.0021592
aar1	4198	-.0003259	.0001332	.0086309	-.000587	-.0000647
diff	4198	.0020252	.0003042	.0197101	.0014288	.0026216

```

      mean(diff) = mean(aar2 - aar1)                                t = 6.6572
Ho: mean(diff) = 0                                                degrees of freedom = 4197

Ha: mean(diff) < 0          Ha: mean(diff) != 0          Ha: mean(diff) > 0
Pr(T < t) = 1.0000          Pr(|T| > |t|) = 0.0000          Pr(T > t) = 0.0000

```

Table 4.3 demonstrates the difference between aar2 ( $R_0$ ) and aar1 ( $R_{-1}$ ). The aar2 and aar1 represent average abnormal return in event window and average abnormal return in ex-event window, respectively. To compare aar2 ( $R_0$ ) and aar1 ( $R_{-1}$ ), we can find whether a M&A can affect stock price or not. The output above shows a slight difference between aar2 and aar1, which is 0.0020252. What's more, the P-value is zero that is below 0.05, we reject null hypothesis that  $H_0 : \text{mean}=0$ . T-value is 6.6572, which means there exists significant abnormal return after M&A. we can conclude that M&A's do have an impact on stock prices.



Table 4.5

Paired t test

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
avg2	1562	863344.1	57002.06	2252844	751535.4	975152.8
avg1	1562	531928.5	36934.41	1459727	459482.2	604374.8
diff	1562	331415.6	21088.88	833477.7	290050.1	372781.1

mean(diff) = mean(avg2 - avg1) t = 15.7152  
 Ho: mean(diff) = 0 degrees of freedom = 1561  
 Ha: mean(diff) < 0 Ha: mean(diff) != 0 Ha: mean(diff) > 0  
 Pr(T < t) = 1.0000 Pr(|T| > |t|) = 0.0000 Pr(T > t) = 0.0000

The avg1 ( $V_{-1}$ ) and avg2 ( $V_0$ ) represent the average volume in ex event window and average volume in event window. They are 531928.5 and 863344.1, respectively. It shows that the average volume ( $V_0$ ) in the event window is much higher than average volume ( $V_{-1}$ ) in ex event window. On the other hand, the T-value and P-value are 15.7125 and 0.0000, respectively. It means the difference between  $V_0$  and  $V_{-1}$  is statistically significant. And we also reject the null hypothesis,  $H_0 : \text{mean}(\text{diff})=0$ .

## Chapter 5

### Conclusion

The purpose of this paper is to find the relationship between M&A and Canadian energy firms. It is going to answer the question: can M&A's create value for Canadian energy firms? I use daily stock price and volume for 2010 and 2011 M&A firms in the Canadian energy sector to perform the empirical research on this topic.

The output of STATA shows the following results:

- (1) regression of Market Model: due to lower R-square, the securities do not track the movement of the NGX index.
- (2) average accumulative return (AAR):
  - (i) we do not reject  $H_0: AAR_t = 0$ , which states the market is efficient.
  - (ii) there exists a significant abnormal return in the event window, which indicates that M&A's have impact on stock prices.
  - (iii) a significant positive return exists after a M&A and we can make a reasonable conclusion that a M&A can create value for Canadian energy firms.
- (3) volume: the average volume in the event window is much higher than that in ex-event window.

The results show that the market is efficient and stock prices follow a random walk. Hence, investors cannot earn abnormal return. The most important conclusion is that M&A's are associated with increasing the value of the firms in the Canadian energy industry. What's more, the trading volume during the event window is higher than before.

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**APPENDIX A**  
**COMPANY LIST**



Announce

Date	Acquirer Name	Payment Type	Acquirer Ticker
10-6-2	Afren PLC	Stock	AFR LN
10-6-10	ARC Resources Ltd	Cash and Stock	ARX CN
10-7-2	Atlantic Power Corp	Cash	ATP CN
10-6-16	Birch Lake Energy Inc	Stock	BLK CN
10-6-1	Colonial Coal Inter. Corp	Stock	CAD CN
10-5-25	CanElson Drilling Inc	Cash and Stock	CDI CN
10-5-3	Chinook Energy Inc	2731593Z RU Equity	CKE CN
10-5-26	Canrock Energy Corp	2731593Z RU Equity	CNK CN
10-7-28	Cequence Energy Ltd	Stock	CQE CN
10-8-16	Corsa Coal Corp	Cash and Stock	CSO CN
10-6-28	Coltstar Ventures Inc	Stock	CTR CN
10-8-9	CommScopeInc	Cash	CTV US
10-6-7	Emerge Oil & Gas Inc	Cash	EME CN
10-8-3	EnQuest PLC	Stock	ENQ LN
10-5-17	Enseco Energy Services Corp	Cash	ENS CN
10-5-14	Gasfrac Energy Services Inc	Stock	GFS CN
10-6-1	Galleria Opportunities Inc	Cash	GOI/H CN
10-7-29	Hyperion Exploration Corp	Cash	HYX CN
10-7-21	CUB Energy Inc	Stock	KUB CN
10-6-22	NovaDx Ventures Corp	Cash and Stock	NDX CN
10-7-19	Petrodorado Energy Ltd	Stock	PDQ CN
10-5-6	PetroglobelInc	Undisclosed	PGB CN
10-7-12	Pengrowth Energy Corp	Stock	PGF CN
10-5-10	Paramount Resources Ltd	Cash	POU CN
10-5-31	Ram Power Corp	Stock	RPG CN
10-5-20	Renegade Petroleum Ltd	Cash	RPL CN
10-6-22	Sagres Energy Inc	Stock	SGI CN
10-6-22	Surge Energy Inc	Stock	SGY CN
10-6-30	Saccharum Energy Corp	Stock	SHM CN
10-5-21	Suroco Energy Inc	Cash and Stock	SRN CN
10-6-2	Torquay Oil Corp	Cash and Stock	TOC/A CN
10-8-16	Trioil Resources Ltd	Cash	TOL CN
10-6-21	VeresenInc	Cash	VSN CN
10-7-20	Western Energy Services Corp	Cash	WRG CN
10-6-9	Western Coal Corp	Stock	WTN CN
10-5-26	Yoho Resources Inc	Cash or Stock	YO CN
10-5-5	ZediInc	Cash	ZED CN

Announce Date	Acquirer Name	Payment Type	Acquirer Ticker
11-7-20	CNOOC Ltd	Cash	883 HK
11-6-30	Barrick Gold Corp	Cash	ABX CN
11-6-3	Americas PetrogasInc	Cash and Stock	BOE CN
11-8-4	Big Sky Petroleum Corp	Stock	BSP CN
11-5-26	Cordy Oilfield Services Inc	Undisclosed	CKK CN
11-5-2	Crew Energy Inc	Stock	CR CN
11-6-9	CWC Well Services Corp	Cash	CWC CN
11-5-3	Dundee Energy Ltd	Cash or Stock	DEN CN
11-8-18	Desert Eagle Resources Ltd	Undisclosed	DER CN
11-8-16	Enbridge Inc	Cash	ENB CN
11-5-24	ENTREC Corp	Cash and Stock	ENT CN
11-7-15	Enhanced Oil Resources Inc	Cash	EOR CN
11-5-31	Essential Energy Services Ltd	Cash and Stock	ESN CN
11-7-28	General Motors Co	Cash	GM US
11-6-7	Hemisphere Energy Corp	Cash and Stock	HME CN
11-8-22	Klondike Silver Corp	Cash and Stock	KS CN
11-7-4	Marquee Petroleum Ltd	Cash	MQE CN
11-5-3	Mullen Group Ltd	Cash and Stock	MTL CN
11-7-26	Mountainview Energy Ltd	Stock	MVW CN
11-5-26	Nordic Oil & Gas Ltd	Cash	NOG CN
11-7-18	North Sea Energy Inc	Stock	NUK CN
11-5-31	Onex Corp	Cash	OCX CN
11-5-3	Pinetree Capital Ltd	Undisclosed	PNP CN
11-7-14	Polo Resources Ltd	Cash	POL LN
11-8-5	Pason Systems Inc	Cash	PSI CN
11-6-13	Pure Technologies Ltd	Cash	PUR CN
11-7-11	Provident Energy Ltd	Cash and Stock	PVE CN
11-7-8	Questerre Energy Corp	Cash	QEC CN
11-7-5	Shoreline Energy Corp	Stock	SEQ CN
11-8-26	San Leon Energy PLC	Cash or Stock	SLE LN
11-8-18	Sonde Resources Corp	Cash	SOQ CN
11-5-26	Savanna Energy Services Corp	Cash or Stock	SVY CN
11-5-13	Strata-X Ltd	Stock	SXE CN
11-7-11	Trican Well Service Ltd	Undisclosed	TCW CN
11-5-19	Tuscany Inter. Drilling Inc	Cash	TID CN
11-8-29	Noravena Capital Corp	Stock	TMV CN
11-5-24	Tourmaline Oil Corp	Stock	TOU CN
11-8-3	Petro Viking Energy Inc	Cash	VIK CN
11-5-11	Westfire Energy Ltd	Stock	WFE CN
11-7-21	Wilton Resources Inc	Cash and Stock	WIL CN
11-6-8	Westport Innovations Inc	Cash and Stock	WPT CN
11-7-27	Xinergy Ltd	Cash	XRG CN