

**THE IMPACT OF CREDIT RATING CHANGE ON NORTH AMERICAN
COMPANIES' CORPORATE DECISION AND STOCK PERFORMANCE**

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Abstract

This paper analyses the impact of credit rating changes from two aspects. Firstly, credit rating will impact company capital structure decisions. It is found that companies generally issue more debt when forecasting a credit downgrade to take the advantage of the relatively low cost of capital, while a small number of firms keep corporate structure unchanged due to flexibility concerns. Secondly, there is an offset pattern in daily abnormal returns and volatility of stock returns increases after a credit rating change event. Specifically, downgrade has a bigger impact on stock performance.

Keywords: Credit Rating, Capital Structure, Financial Flexibility, Stock Return
Volatility

Executive Summary

Credit rating is a statistical method to measure the likelihood of default by the borrower. Its impact on the company or the market is not always clear or easy to predict. On the one hand, credit rating changes have an unavoidable impact on managers' capital structure decision. On the other hand, changes in credit rating affect market's expectation on the company's stock performance and thus lead to return volatility. This paper analyses the impact of credit rating changes from these two perspectives.

Firstly, capital structure is one of the most important decisions made by modern firms. A proper capital structure helps companies achieve financial targets and acquire high returns for equity holders. It is such an important concept that numerous scholars have focused their studies on this topic using various research methods. One of the commonly agreed conclusions is that companies normally reduce debt financing activities before anticipated downgrades and take no action before upgrades.

However, some firms that follow this behavior path may do so out of concern for financial flexibility. Our study shows that firms such as these are less likely to increase debt financing dramatically before potential downgrades.

Secondly, we analyse the effects of credit rating change on companies' stock performance. Through an event study, we calculate cumulative abnormal

returns for Canadian companies that were either downgraded or upgraded in the previous three years and conclude that changes to credit rating increase return volatility.

Our study differs from previous works from the following aspects: firstly, we use credit rating and financial flexibility to explain companies' decisions that cannot be explained by traditional theories. We categorize companies into industries to study their capital structure. Secondly, different from Paterson and Gauthier's research (Paterson & Gauthier, 2013), which focused on GIIIP and Bric countries national stock market performance, we analyze the impact of Canadian corporate credit ratings on individual companies' stock returns.

Dedication

We dedicate our dissertation work to our families and friends. A special feeling of gratitude to our loving parents and significant others, who always encourage us to pursue our dreams.

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1: Background

1.1 Traditional theories

The trade-off theory claims the existence of an optimal leverage ratio of corporations. In other words, an optimal point exists where the benefits and costs of using debt are balanced. Firms often set the optimal leverage point as a ruler for their capital structure and if any deviation occurs, firms will gradually move back to it. (Singh, Priyanka; Kumar, Brajesh, 2012)

Pecking order theory demonstrates that firms prefer to fund their projects or expansion plans with their internal funding. Their next financing option would be issuance of new debt. Firms won't issue equity until they run out of their debt capacity and equity is their last resource of capital. (Singh, Priyanka; Kumar, Brajesh, 2012)

1.2 Credit rating

1.2.1 Credit Rating–Capital Structure Hypothesis (CR-CS)

Credit Rating - Capital Structure theory claims that CFOs make changes on firms' capital structure by issuing less debt when they see possible upgrades or downgrades. They tend to act this way in order to forestall credit ratings downgrade. Kisgen, in his study, observes that companies in the top 30% and

bottom 30% in terms of debt to capital ratio within a stratum, which are more likely to be downgraded and upgraded, issue relatively less debt than companies in the middle of the same rating level. Also, CR-CS theory applies to companies in all strata. (Kisgen, Credit Ratings and Capital Structure, 2006)

1.2.2 Information Gap Arguments

Information gap arguments also state that CFOs make changes to companies' capital structure facing downgrades, but the decision made is in the opposite direction. More specifically, firms tend to issue more debt when foreseeing possible downgrades. On the other hand, no major changes to capital structure are made near upgrades. This is due to the information gap between the public and the firm. Before any upgrade/downgrade announcements made by credit rating agencies, firms' managers and credit rating agencies meet and thus managers become aware of the possible downgrade/upgrade. However, it takes time for the credit rating agencies to announce their decisions and this period allows managers to issue more debt if they are anticipating downgrades. (Hung, Banerjee, & Meng, 2017)

1.3 Financial Flexibility

The impact of financial flexibility on capital structure decisions has not been recognized until the comprehensive survey of CFOs performed by Graham and Harvey in 2001. Of 4440 sampled firms, 392 responses from CFOs were received. According to the responses, the most important factors to consider

when making financing policy are financial flexibility and a high credit rating score. They are less concerned about transaction costs, free cash flows, etc. In fact, most CFOs respond that financial flexibility is their top concern when making capital structure decisions. (Graham & Harvey, 2001)

Since Graham & Harvey published their findings from the survey on CFOs, there has been more research on the importance of financial flexibility. However, no research focused on the combined effect of credit rating and financial flexibility until the study of Agha and Faff in 2014. They argue financially flexible firms benefit more from credit rating upgrades, while inflexible firms suffer more from downgrades. (Agha & Faff, 2014)

1.4 Effect of Credit Rating Change on Stock Returns

As for the impact of credit rating change on stock returns, Alexander and Delphine show how sovereign credit rating changes affect national stock market performances in GIIPS and BRIC countries. They argue that sovereign debt downgrades produce negative cumulative abnormal returns for GIIPS countries and that the effect is more obvious in small economies compared to big economies. (Paterson & Gauthier, 2013)

1.5 Innovation

We improve the previous research by the following aspects: firstly, when evaluating the impact of credit rating change on company capital structure decisions, we take financial flexibility into consideration. Secondly, we focus on

Canadian corporate stocks rather than country sovereign bonds. We run regression and simulate returns of individual securities instead of market indices. We exclude financial industry from our research and include both upgraded and downgraded companies.

2: Research Questions and Analysis

When comparing different corporate finance theories, we find some contradictions and conflicts among them. For example, Pecking Order Theory claims that companies prefer internal financing, and then debt. Companies only consider equity financing when running out of debt capacity. Trade-Off Theory indicates that although debt functions as a tax shield, heavy debt may put bankruptcy pressure on companies. Thus, companies should only employ debt up to an optimal level.

Realistically though, deciding on financing strategies is much more complex than simply following theoretical models. Numerous internal and external factors must be taken into consideration such as credit rating and financial flexibility. Conflicts always exist between different scholars who have different theories and empirical proof. Therefore, this paper aims to study various theories and based on the data we collect, we analyse the impacts of credit rating change on a corporation's capital structure and stock returns.

2.1 Credit Rating

Benefits of upgrades and costs of downgrades directly affect managers' capital structure decisions. CR - RS theory stated that companies tend to issue less net debt relative to net equity than firms not near a rating change.

Companies' goals are to either avoid a downgrade or increase the chances of an upgrade.

However, numerous counterexamples inspire us to reconsider the validity of the CR-RS theory. Imperial Metals is a firm operating in the materials industry. It was downgraded on July 7th, 2017. In contrast to the CR-RS theory, their debt/capital level experienced a great increase from 27.58% to 88.89% prior to the downgrade. Another example is Macy's, a US consumer discretionary company which was downgraded on February 22nd, 2017. A quarter before the downgrade was announced, its debt/capital was four times larger than it was one year before the downgrade. Besides these two companies, we can find similar corporations in other industries as well.

These findings lead us to the second theory—Information Gap Arguments. This theory states that historically, companies tend to increase their debt portion, mainly through new debt issuance before being downgraded by a rating agency. This behavior can be explained by the desire to take advantage of the overpriced debt and to borrow additional money at a relatively low cost. However, it seems that corporations don't take any actions before upgrade announcements.

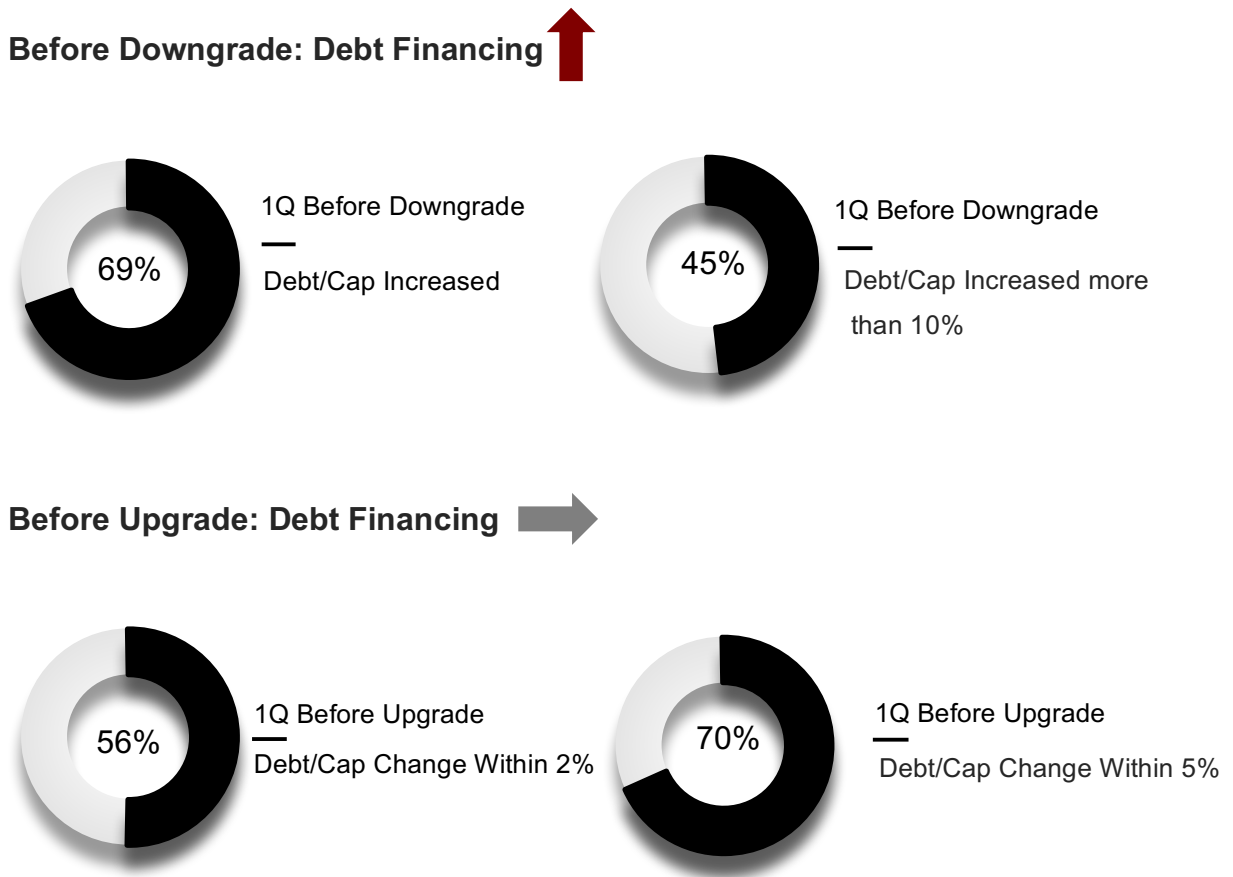
To verify which argument has better empirical support, we implement the following data collection process: we use 2,500 US and Canadian publicly traded companies, all of which were either downgraded or upgraded in the previous 10 years.

Table 2-1 Descriptive Statistics of 2,500 Selected Companies

<i>Companies D/C 1Q Before Credit Change</i>		<i>Companies D/C 1Q After Credit Change</i>	
Mode	0.49	Mean	0.56
Median	0.55	Median	0.65
Mean	0.59	Mode	0.62
Standard Deviation	0.29	Sample Variance	0.07
Kurtosis	3.89	Kurtosis	1.74
Range	1.69	Range	1.37
Minimum	0.12	Minimum	0.14
Maximum	1.81	Maximum	1.51
Count	2500	Sum	58.98
Largest (1)	1.81	Count	2500
Smallest (1)	0.12	Largest (1)	1.51

The ratio we use to measure their financing structure is the debt-to-capital ratio. Each company's debt-to-capital level was collected for two periods: the first period is one year ahead of the rating change and the second period is one quarter before the rating change. Generally, companies' managers can forecast the change one quarter before the rating change event due to their superior knowledge of the company. We then calculate the change rate of the ratio and the percentage of firms whose debt-to-capital ratio fluctuates by 2%, 5%, and 10%.

Figure 2-1 Change in Debt Financing Proportion



It can be seen from *Figure 2-1* that one quarter before the downgrade was announced, about 70% of the companies decided to increase their debt financing proportion and nearly half of the firms increased more than 10% of their debt-to-capital ratio. On the other hand, firms tend to take no action before a foreseeable upgrade: more than 50% of the firms maintained a quite stable debt level (within 2% change rate) and if we increase the range to 5%, 70% of the corporations maintain a stable capital structure. These findings align with the Informational Gap Arguments.

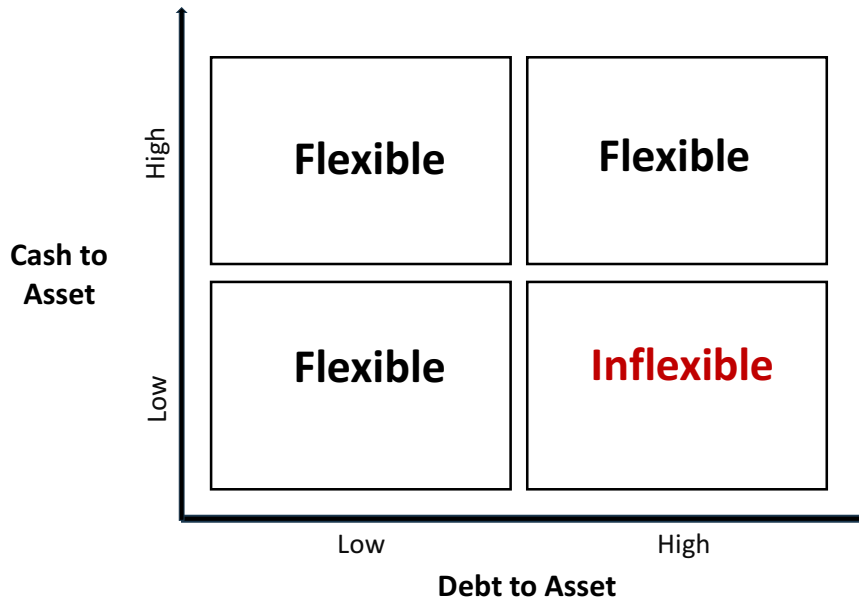
However, it cannot be ignored that a number of companies' action don't fall into this behavior. This finding inspires us to discover other factors that managers consider when they decide financing strategies, and financial flexibility comes to our mind first.

2.2 Financial Flexibility

Financial flexibility is companies' ability to meet unexpected cash needs in a timely manner. Main sources of financial flexibility include unused debt capacity, cash, and lines of credit. Factors that have a significant impact on firms' flexibility include growth, profitability, effective cost of holding cash, cost of external financing and dividend payout policy.

In the previous analysis on credit rating change, we find that even though most firms tend to increase debt level when anticipating a potential credit downgrade, 30% of them choose to keep their capital structure unchanged. We categorize firms according to the following matrix as shown in *Figure 2-2*. Firms with high debt-to-asset ratio and low cash-to-asset ratio are defined as financially inflexible firms, otherwise, they are regarded as flexible firms.

Figure 2-2 Financial Flexibility Matrix



2.2.1 Data Collecting and Processing

Here we use the same data set as in the previous section. Among the firms which didn't change their debt-to-capital ratio significantly when facing credit downgrade, 72% are flexible firms. The ratio is even larger in sectors such as Consumer Discretionary, Consumer Staples, Information Technology and Telecommunication Services, with a ratio of 85%, 83%, 85% and 87% respectively. However, this ratio is quite low in Utilities sector, which is only 40%.

2.2.2 Conclusion

Consumer Discretionary, Consumer Staples, Information Technology and Telecommunication Services industries exhibit higher than average financial flexibility because these industries typically use less leverage and thus are more

flexible than industries like Financial or Energy. These industries enjoy stable cash inflows due to the nature of their products, which are non-cyclical products or services. Information Technology industry is also flexible because of their high growth potential and high profitability. On the other hand, Utilities sector's financial flexibility is below average. Although this sector has a stable income from services provided, such as gas and electricity, it is capital-intensive and needs to leverage its assets to raise capital for facilities maintenance or expansion projects. In conclusion, when anticipating a credit rating downgrade, financially flexible firms are less likely to largely change their debt ratio.

2.3 Credit Rating On Stock Performance

2.3.1 Data Selection

This study focuses on long-term issuer rating change events announced by Standard & Poor's over a 3-year period starting from November 2014. 48 upgraded companies and 51 downgraded companies were randomly selected and all of them are traded on Toronto Stock Exchange.

In this research, the financial industry is excluded during data collection process because of their highly regulated and leveraged characteristics. This is a common practice to ensure that skewed financial fundamentals data don't affect research results.

For each company, we collect day-to-day total returns starting from one year before its rating change date. The database thus contains 100 sets of

returns which include historical rating change events and their return fluctuation. The data statistics are included in the appendix.

To run a regression, risk-free rates and market indices data are required. Canada 3-month T-bills return data are selected for the same testing period and S&P/TSX Composite Index is selected as the market portfolio.

The descriptive statistics of the data are listed in the following table.

Table 2-2 Descriptive Statistics for 100 Selected Companies

<i>Descriptive Statistics for Upgraded Companies</i>		<i>Descriptive Statistics for Downgraded Companies</i>	
Mean	0.86	Mean	-0.87
Standard Error	0.74	Standard Error	1.67
Median	0.55	Median	0.25
Standard Deviation	5.14	Standard Deviation	11.96
Sample Variance	26.43	Sample Variance	143.04
Kurtosis	1.21	Kurtosis	7.41
Skewness	0.38	Skewness	-1.59
Range	26.20	Range	83.44
Minimum	-11.76	Minimum	-53.47
Maximum	14.44	Maximum	29.97
Sum	41.31	Sum	-44.13
Largest (1)	14.44	Largest (1)	29.97
Smallest (1)	-11.76	Smallest (1)	-53.47
Confidence Level (95.0%)	1.49	Confidence Level (95.0%)	3.36

2.3.2 Issues pertaining to the data selection

We exclude financial sector in our research. However, benchmark selected by this paper is S&P/TSX Composite Index which includes all 11 GICS

industry sectors. Thus, benchmark returns are impacted by return volatilities and fluctuations of financial companies.

2.3.3 Methodologies

2.3.3.1 Event Definition

To test market reaction to credit rating change prediction, we carry out an event study. Our study is based on the assumptions that we operate in a well-diversified market and the investors are rational and risk-averse. Every credit rating change is considered as a single event and multiple up/downgrades of the same company are considered as different events.

Our research uses 3-day and 5-day testing windows. The 3-day event window ranges from 1 day before the rating change date to 1 day after the rating change date, while the 5-day event window ranges from 2 days before the rating change date to 2 days after the rating change date. Longer testing windows allows our research to cover unusual market reaction delays and to study the persistence of abnormal returns. However, a longer testing window may decrease the significance of abnormal returns and can lead to less accurate results.

2.3.3.2 CAPM model

In this paper, the CAPM model is used to forecast company stock returns. For each company, 252 days of daily stock returns before the event window are

used to forecast the 5-day or 3-day event window daily returns. The formula for calculating the expected return of an asset given its risk is as follows:

$$\bar{r}_{es} = r_f + \beta_e (\bar{r}_m - r_f)$$

Where,

$r_f =$ Risk free rate

$\beta_e =$ Beta of the security

$\bar{r}_m =$ Expected market return

2.4 Beta estimation

Beta is calculated by dividing the covariance of the return of an asset with the return of the benchmark by the variance of the return of the benchmark over the period from T-252-n to T-n, where n is the number of days before or after the event.

$$\hat{\beta}_i = \frac{\text{Covariance}(r_{security}, r_m)}{\text{Variance}(r_m)}$$

2.4.1.1 Cumulative abnormal return (CAR)

The formula to estimate the cumulative abnormal return is as follows:

$$\widehat{CAR} = \sum_{T_0+n}^{T_0-n} (r_{es} - r_{ac})$$

where,

T_0 = date that the company got updated or downgraded

n = days before or after the credit rating event

r_{es} = estimated daily stock return

r_{ac} = observed actual daily stock return

2.4.2 Results Testing

After determining cumulative abnormal returns for each company, it is necessary to test if they are statistically significant. We set the null hypothesis H_0 that cumulative abnormal returns are equal to zero and calculate t-statistics as

$$t = \frac{CAR - 0}{std(CAR)/\sqrt{N}}$$

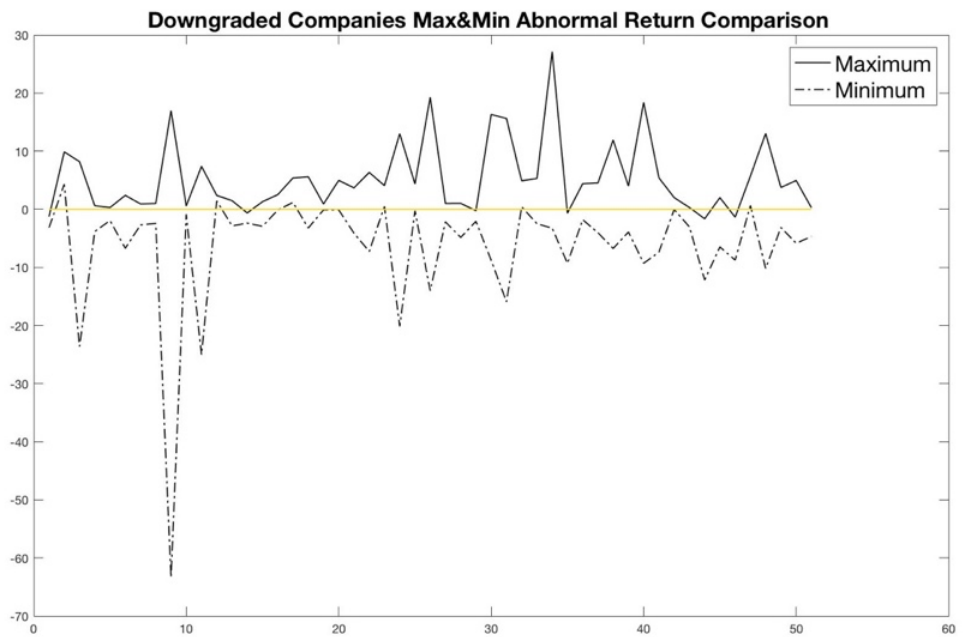
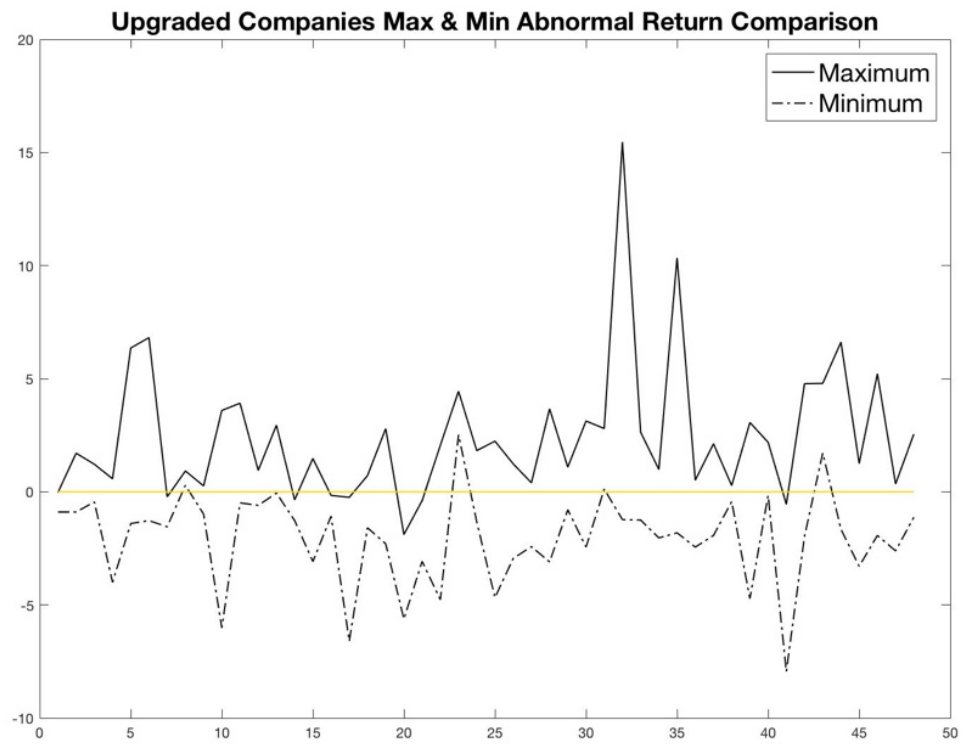
where,

N = number of underlying securities

The calculated t-statistic is compared with the corresponding t-value from the two-tailed t-distribution table with 95% confidence interval. However, the null hypothesis cannot be rejected based on the calculation.

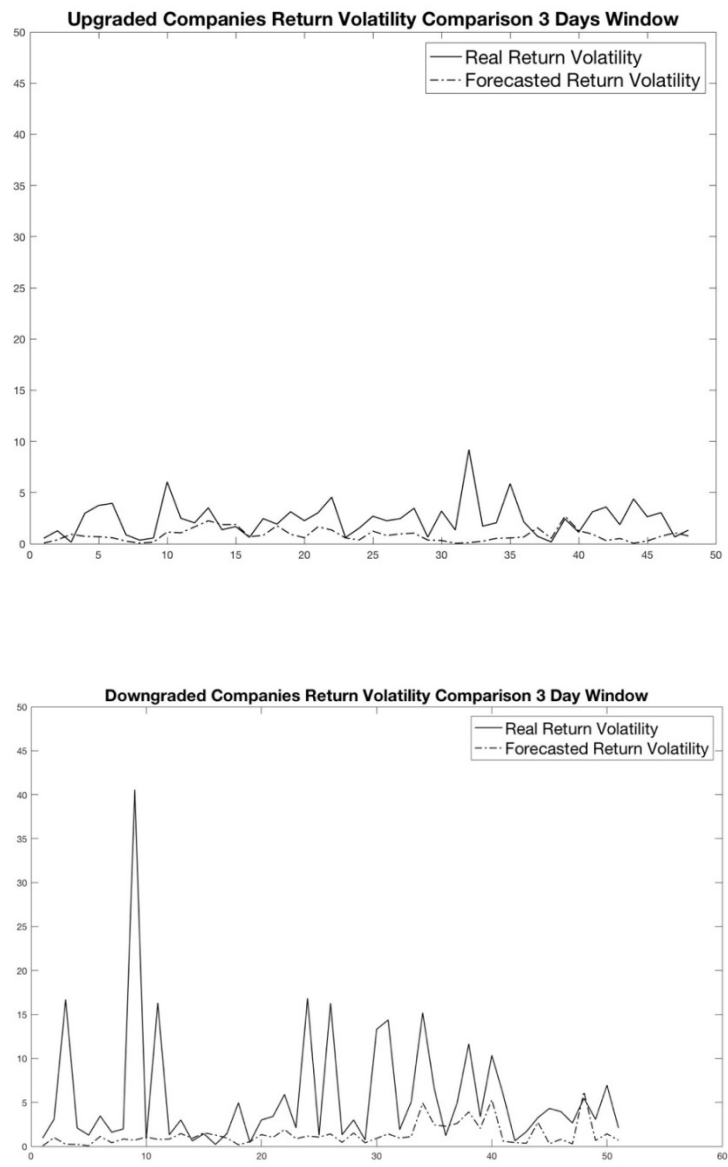
By taking a closer look into the CAR data set, it can be found that there exists an offset pattern between the cumulative abnormal return of each security and thus the total CAR is not significantly different from zero for both upgraded and downgraded companies.

Figure 2-3 Max & Min Abnormal Return Comparison



Therefore, for each security, volatility of daily estimated returns is calculated and compared with the volatility of daily actual returns. The conclusion is made that overall, credit rating upgrade does not have too much impact on stock returns. However, credit rating downgrade will significantly increase return volatility, as indicated in *Figure 2-4*.

Figure 2-4 Return Volatility Comparison 3-day Event Window



3: Conclusion

Numerous scholars have been studying the impact of credit rating on firms' financing strategies since 2006 and conflicts exist on how managers react if they forecast a change in credit rating in the near future. Based on our analyses, we conclude that companies tend to increase their debt financing proportion before the downgrade, mainly because the downgrade is unavoidable and the best option is to take full advantage of current debt price and to borrow additional capital for future. By doing this, a company can benefit from cost reduction and profit retention. In contrast, corporations choose to maintain a relatively stable debt financing level before an upgrade. Some firms keep their capital structure unchanged when forecasting a credit rating downgrade because they want to retain financial flexibility for future unexpected incidence.

Besides the impact of credit rating change on corporate capital structure, we also analyse the effects of credit rating change on companies' stock performance. Through an event study, we reach the conclusion that credit rating change will increase return volatility.

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Appendix 1 List of Upgrade Companies

<i>Company Name</i>	<i>Upgraded Date</i>	<i>Avg Daily Return</i>	<i>Volatility</i>
Innergex Renewable Energy Inc	2017-11-02	-0.30	0.53
Lundin Mining Corp	2017-10-20	0.85	1.27
Teck Resources Ltd	2017-10-12	0.51	0.16
Hudbay Minerals Inc	2017-09-13	-1.28	2.97
Paramount Resources Ltd	2017-09-13	2.28	3.74
Trilogy Energy Corp	2017-09-13	2.42	3.95
Mitel Networks Corp	2017-09-07	-0.78	0.87
Brookfield Renewable Partners	2017-08-16	0.50	0.35
Norbord Inc	2017-08-15	-0.48	0.56
Paramount Resources Ltd	2017-07-07	-0.25	6.04
Trilogy Energy Corp	2017-07-07	2.60	2.48
Canadian Natural Resources Ltd	2017-05-05	0.75	2.04
CES Energy Solutions Corp	2017-03-10	0.28	3.51
Savanna Energy Services Corp	2017-03-10	-1.54	1.37
Western Energy Services Corp	2017-03-10	-1.26	1.67
IAMGOLD Corp	2017-03-07	-1.05	0.63
Taseko Mines Ltd	2017-03-07	-3.92	2.45
Vermilion Energy Inc	2017-03-01	0.72	1.92
Athabasca Oil Corp	2017-02-10	1.92	3.13
Perpetual Energy Inc	2017-01-25	-3.60	2.25
Teck Resources Ltd	2016-11-17	0.62	3.02
Perpetual Energy Inc	2016-11-10	-0.78	4.55
Hudbay Minerals Inc	2016-10-28	3.00	0.61
Mercer International Inc	2016-10-20	0.27	1.53
Perpetual Energy Inc	2016-10-07	0.02	2.69
Alamos Gold Inc	2016-09-22	-1.26	2.24
Agrium Inc	2016-09-13	-0.85	2.46
Air Canada	2016-09-07	-0.29	3.47
Seven Generations Energy Ltd	2016-07-13	0.10	0.65

<i>Company Name</i>	<i>Upgraded Date</i>	<i>Average Daily</i>	<i>Annualized Volatility</i>
Cascades Inc	2016-06-16	-0.45	3.19
Waste Connections Inc	2016-06-02	1.77	1.34
Manitoba Telecom Services Inc	2016-05-02	4.72	9.19
Mitel Networks Corp	2016-04-20	0.70	1.72
Suncor Energy Inc	2016-04-18	0.58	2.05
Waste Connections Inc	2016-01-19	4.81	5.87
Shaw Communications Inc	2016-01-15	-1.37	2.13
Seven Generations Energy Ltd	2015-12-17	-0.86	0.72
Hudson's Bay Co	2015-11-19	-0.05	0.17
Hudbay Minerals Inc	2015-11-13	-0.17	2.42
Imperial Metals Corp	2015-08-07	0.68	1.12
Lightstream Resources Ltd	2015-07-10	-0.92	3.11
AGT Food & Ingredients Inc	2015-06-12	0.66	3.59
Lundin Mining Corp	2015-04-23	2.67	1.86
Alamos Gold Inc	2015-04-13	1.66	4.37
Ainsworth Lumber Co Ltd	2015-03-31	-1.19	2.64
Air Canada	2015-02-02	1.84	3.04
GLENTel Inc	2014-12-01	-0.91	0.67
Mercer International Inc	2014-11-12	0.41	1.33

Appendix 2 List of Downgrade Companies

<i>Company Name</i>	<i>Downgraded Date</i>	<i>Average Daily</i>	<i>Annualized Volatility</i>
Concordia International Corp	2017-09-18	-2.30	0.93
Aimia Inc	2017-08-14	6.11	3.10
Imperial Metals Corp	2017-07-07	-4.55	16.70
Yellow Pages Ltd/Canada	2017-06-20	-1.33	2.08
DHX Media Ltd	2017-06-08	-1.14	1.28
Western Energy Services Corp	2017-06-07	-2.55	3.45
Eldorado Gold Corp	2017-05-26	-1.60	1.60
Concordia International Corp	2017-05-24	-0.75	1.98
Aimia Inc	2017-05-12	-17.82	40.57
Hudson's Bay Co	2017-05-08	0.09	0.84
New Gold Inc	2017-01-31	-9.58	16.32
Perpetual Energy Inc	2016-12-12	2.16	1.31
Calfrac Well Services Ltd	2016-10-07	0.13	3.00
Bombardier Inc	2016-09-23	-1.23	0.62
Methanex Corp	2016-09-19	-0.57	1.43
Trinidad Drilling Ltd	2016-08-26	0.13	0.22
Baytex Energy Corp	2016-08-12	3.50	1.45
SunOpta Inc	2016-08-12	2.24	4.95
Stars Group Inc/The	2016-07-25	0.43	0.45
Trilogy Energy Corp	2016-06-21	3.26	3.01
Western Energy Services Corp	2016-06-20	0.14	3.40
Lightstream Resources Ltd	2016-06-16	-1.15	5.89
Eldorado Gold Corp	2016-05-16	2.53	2.09
Lightstream Resources Ltd	2016-05-04	-4.37	16.83
CES Energy Solutions Corp	2016-04-27	2.03	1.28
CHC Group Ltd	2016-04-19	0.67	16.28
Corus Entertainment Inc	2016-04-19	-0.33	1.32
Perpetual Energy Inc	2016-04-19	-1.02	3.01
Precision Drilling Corp	2016-03-30	-0.30	0.74

CHC Group Ltd	2016-03-16	4.76	13.31
Perpetual Energy Inc	2016-03-11	0.68	14.37
First Quantum Minerals Ltd	2016-02-26	3.56	1.89
Kinross Gold Corp	2016-02-18	2.67	5.05
Teck Resources Ltd	2016-02-12	9.99	15.19
Paramount Resources Ltd	2016-02-05	-3.08	6.58
Taseko Mines Ltd	2016-02-04	1.40	1.22
New Gold Inc	2016-02-02	0.08	4.98
Hudbay Minerals Inc	2016-02-01	2.62	11.66
Imperial Metals Corp	2016-01-27	0.83	3.35
Capstone Mining Corp	2016-01-26	2.35	10.35
Corus Entertainment Inc	2016-01-13	-1.37	5.84
Valener Inc	2016-01-11	0.46	0.63
Centric Health Corp	2015-11-12	-1.69	1.67
Calfrac Well Services Ltd	2015-10-28	-6.02	3.26
SMART Technologies Inc	2015-10-20	-1.58	4.31
Bellatrix Exploration Ltd	2015-10-16	-4.35	3.94
Alamos Gold Inc	2015-10-08	3.12	2.66
Teck Resources Ltd	2015-09-30	0.88	5.47
Mitel Networks Corp	2015-09-21	-0.47	3.07
IAMGOLD Corp	2015-08-31	0.00	6.94
Bombardier Inc	2015-08-12	-2.38	2.07