The Stock Market Impact of Bond Rating Changes

The Honors Program
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Michael Leonard
Dr. Alan Olinsky
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ABSTRACT

This paper examines the impact of a downgrade of a company's credit rating on its stock price in the days surrounding the downgrade. If we consider this downgrade new information, then a negative impact on the company's stock price would be expected. However, if we assume that rating agencies use information that investors have already accounted for, then there would be no impact. There could also be an impact, at least temporarily, due to the fact that a ratings downgrade is bad news, even if the reasons for the downgrade have already been priced in. To perform this analysis I used an event study, a technique commonly used in finance to identify the impact of one event on a particular variable. I discovered that no statistically significant abnormal returns exist on the day of a ratings downgrade, and on the days surrounding it. The information content of a downgrade to equity investors is low as the information resulting in the downgrade has already been reflected in the company's stock price.

INTRODUCTION

There was a lot of criticism regarding bond rating agencies as a result of the financial crisis. The quality of the ratings these companies assigns to bonds was called into question and heavily criticized. People asked what the ratings were worth and if they were accurate or up-to-date. The rating agencies were blasted for assigning some of their highest ratings to the financial instruments most closely tied to the crisis, instruments which ended up being very risky and worthless. However, many of these instruments are traded in over-the-counter markets with little data available regarding the price of the product and the underlying assets and the value of them. Corporate bonds are rated by the same agencies, and these ratings are publically available and comprehensive historical records of them are kept. In addition, these bonds are issued by entities that also have stock traded in public markets. Similar to the bond ratings information, the current and historical price data for stocks is easily accessible. This provides a variable, the company's stock price, which could be related to the rating of the company's bonds, and could allow us to test the value of a rating. To do this, we can look at the impact of a ratings downgrade on the stock market price of the company.

Corporate bonds are rated by three agencies: Moody's, Standard & Poor's, and Fitch Ratings. The ratings range from the highest, AAA, to D or DDD, in default, and there are between 21 and 23 different ratings depending on the agency. A chart of the different ratings by each agency is provided immediately following this paragraph to help illustrate the ratings. The corporate bonds are reviewed by the agencies and given an initial rating at the time of creation. Thereafter, the bond ratings can be changed for two reasons, either a company

specific event or a non-company specific event. A company specific event is any event that impacts the condition or structure of the firm. These events can include a new equity or bond offering which affects the capital structure of the firm, the retirement of debt which also affects the capital structure of the firm, or the acquisition of another company. If these or any other material company specific events take place, the rating agencies will review the ratings of the company's bonds. If there is no company specific event that causes the rating agencies to reevaluate the ratings they have assigned to a company's bonds, they will reevaluate the ratings after a certain period of time, possibly a year or 18 months. This is what is referred to as a non-company specific event, and this reevaluation is simply due to a certain amount of time passing since the last evaluation. When a bond is reevaluated by one of the agencies, there are several different actions the agency can take as a result of the reevaluation. The rating can be upgraded, downgraded, or put on watch, which means although it has not yet deteriorated enough to warrant a downgrade, due to the company's condition it is at risk of being downgraded in the future. If the bond is downgraded, it can be downgraded one step or level, or multiple steps or levels. As an example of what a step or level is, using the S&P ratings in the chart on the next page, a one-step change would be from A+ to A, or BB to BB-, where a two-step change would be BBB+ to BBB-, or B+ to B-, and a three and four or more step changes follow the same pattern.

	Moody's	S&P	Fitch
Investment Grade	Aaa	AAA	AAA
	Aa1	AA+	AA+
	Aa2	AA	AA
	Aa3	AA-	AA-
	A1	A+	A+
	A2	A	A
	A3	A-	A-
	Baa1	BBB+	BBB+
	Baa2	BBB	BBB+
	Baa3	BBB-	BBB-
Junk or High-Yield	Ba1	BB+	BB+
	Ba2	BB	BB
	Ba3	BB-	BB-
	B1	B+	B+
	B2	B	B
	B3	B-	B-
	Caa1	CCC+	CCC+
	Caa2	CCC+	CCC+
	Caa3	CCC-	CCC-
	Ca	CC	CC+
		C	CC
			CC-
	D	D	DDD

Table 1 - Bond Ratings for the Three Agencies

Now that a basic overview of bond ratings, where they come from, and how and when they change has been discussed, I will move on to introducing the specific questions that this paper will hope to address. Earlier in the paper, I noted that corporate bond ratings and equity prices for the company's being examined are data which are well-recorded and easily accessible. This led to the question of whether bond ratings, and changes in ratings, impact the stock market. As will be discussed in the next section, during the literature review, some studies showed that negative information tended to cause more of a reaction than positive information. Based on this, I asked what the information content of bond rating downgrade is, and whether equity investors have already priced in the deterioration that results in the bond

being downgraded. A final question, which was also addressed in some previous papers, is whether equity markets overall are quicker to react than rating agencies are to a change in a company's financial or operating condition. To summarize these questions into a statistically testable hypothesis, I will look for an abnormal return in the stock to determine if the bond rating change has an impact.

LITERATURE REVIEW

As stocks and bonds have been around for over a century, there has been much academic work on all aspects of these financial instruments and the companies that issue them. As time goes on, some of this work becomes outdated because of changes in the markets such as the advancement of technology. There are also new things to look at, or old things to look at but in a different way. Although it was not related to my topic as closely as some of the other work I will discuss later in this section, Craig MacKinley's work entitled "Event Studies in Economics and Finance" was a very informative paper that I looked at often during my analysis. This paper presents a comprehensive discussion of event studies as they pertain to finance, specifically the stock market. It presents several different styles of event studies, and then presents an example using these different styles. This paper was very informative, written almost like an instruction manual on performing an event study. Although it is from 1997, the information it presents is just as relevant today and this was one of the more vital papers I uncovered during my literature review.

The papers I will now discuss are more similar to my work in that they look at bond rating changes and stock prices, either individually or the relationship between the two. In 1978,

Pinches and Singleton published a study entitle “The Adjustment of Stock Prices to Bond Rating Changes.” This research, published over 35 years ago, is the most similar to my own work. In the paper, the authors examined monthly stock returns surrounding a ratings change. This paper found that, in certain months prior to either an upgrade or a downgrade, cumulative abnormal returns were present. These returns were negative for downgrades and positive for upgrades. However, this paper also found that after the ratings change took place, cumulative residuals for both upgrades and downgrades were stable and in some instances actually moved slightly opposite to the direction of the ratings change. This paper concluded that changes in a firm’s condition are recognized by the investment community before they are recognized by bond rating agencies and reflected in the ratings. It attempted to determine the length of this lag, and concluded that it could be between six months and two years depending on the situation. A main difference between this study and my work is the time scale used. This research used monthly returns and looked at longer term affects, while I used daily returns and focused on the immediate impact in the market.

My paper looks at the immediate impact of a ratings change; however, some studies look at the long-term impact. Dichev and Piotroski’s 2001 paper “The Long-Run Stock Returns following Bond Rating Changes” is one such paper. It discusses several important ideas. First, it claims that underperformance following downgrades is larger for small or low-credit quality firms. This could be due to greater information inefficiencies for smaller companies due to less analyst coverage. The paper also concludes that the market fails to fully anticipate the negative implications of downgrades on future firm performance and that the market underreacts to these downgrades. This work failed to find any abnormal returns following

upgrades but did find significant abnormal returns following downgrades. It found these abnormal returns were largest in the first months after a downgrade but lasted at least a year. Finally, their research led them to conclude that downgrades are strong indicators of future firm deterioration.

In their 1992 paper, Hand, Holthausen, and Leftwich examine the effects of bond ratings on both bond and equity prices. Their research produced different results for bond versus stock prices, some of which conflict with prior research. The authors identified statistically significant abnormal returns for both bond and stock prices as a result of a downgrade. However, the results for both items were uncertain when looking at upgrades. As would be expected, they also found that abnormal bond returns were stronger for non-investment grade debt. It is also noted that, when downgrades with concurrent disclosures are removed, abnormal returns remain for stocks but disappear for bonds.

Finally, Purda's more recent paper examines how the stock market reacts to rating changes depending on whether the changes were anticipated or a surprise. The paper's initial hypothesis is that the stock price movement related to a rating change that was anticipated should be smaller than the price movement linked to a surprise change. First, this research found that downgrades were easier to predict than upgrades, with about 20% of downgrades being correctly predicted. However, to the author's surprise, there was not a significant difference between the stock price reaction to anticipated and unanticipated ratings changes.

METHODOLOGY

Event Study

An event study is a method commonly used in the fields of finance and economics when one is seeking to determine the impact of an event on a particular variable. In this paper, the event being examined is a ratings downgrade for a particular company's bond, and the variable of interest is the stock price. However, before looking at how the stock price acted on the day of, and the days surrounding the event, it is important to determine how we expected the price to act if there was no event. There are a few choices for determining the expected return, and while some studies use an average of the returns over some period of time prior to the event, in this paper I use a market model, allowing me to make a more accurate prediction of expected return.

The first step in this market model is to select the estimation window. The estimation window is some period of time prior to the event at time t_0, over which the relationship between the movement of the market and the movement of the stock will be calculated. We also need to select the event window. The event window is the day of the event, t_0, and the days surrounding the event during which we will look for an unexpected change in the stock price of the company. It is good practice to not include the event window as part of the estimation window, as using the data from the event window in the estimation can impact the integrity of the estimation. Once the estimation and the event window have been selected, the following market model is used to calculate beta, β:

(1) Market Model: $r_s = \alpha + r_m\beta + \varepsilon$

where r_s is the return of the stock, α is excess return, r_m is the return of the market, β is the correlation of volatility between the market and the stock, which is what we are looking for, and ε is a random error which is assumed to be normally distributed with a mean of zero. A value-weighted market index from the Center for Research in Security Prices (CRSP) using data from NYSE, AMEX, NASDAQ, and Arca was used as a proxy for the market return. A simple linear regression using ordinary least-squares is run on the data to calculate β. This number represents the correlation between the movement of the market and the movement of the stock. A beta of one means that for each one percent movement in the market, the stock will move one percent in the same direction, while a beta of one-half means that for each market movement of one percent, the stock will move half a percent in the same direction. This correlation value, β, will be used to calculate the expected return during the event window.

Calculating the abnormal return during the event window is the next step in this study. To calculate the abnormal return, AR, I subtract the expected return, $E(R)$, from the actual return, R. This relationship is given by the equation

(2) $AR = R - E(R)$

To complete the calculation of the abnormal return, I first calculate expected return, $E(R)$. This is where the beta calculated from the estimation window is used, such that

$$(3) \quad E(R) = \beta * r_m$$

and therefore

$$(4) \quad AR = \ r_s - r_m\beta$$

where r_s is the return of the stock, r_m is the return of the market, and β is the correlation of volatility from equation 1 above. Again, the same value-weighted index from CRSP was used as a proxy for the market. At this point, there is a large set of abnormal returns, because it has been calculated for each event and there could be hundreds of events. The next step is to aggregate the abnormal returns. First, the returns will be aggregated for each day in the event window, so for event windows containing three days, t_{-1}, t_0, t_1, we would aggregate abnormal returns on each of the three days, but not combine them across days. The calculation for the cumulative abnormal return, CAR, is given by the equation

$$(5) \quad CAR = \frac{1}{N}\sum_{i=1}^{N} AR_i$$

where N is the total number of events. In addition, the variance of CAR is given by the equation

$$(6) \quad Var(CAR) = \frac{1}{N^2}\sum_{i=1}^{N}\sigma_i^2$$

where N again is the total number of events, and σ_i is the standard deviation of AR_i. To aggregate the abnormal returns over all the days in the event window collectively, equation 5 and 6 are reused using the abnormal returns and the standard deviations for all the days.

Once the cumulative abnormal return, CAR, and the variance of it have been calculated, we have the numbers required to calculate a test statistic and determine if the result is significant. Our hypothesis, which we are looking to disprove by finding a statistically significant result, is $CAR = 0$, meaning the ratings downgrade has no effect on stock price. Our alternative is $CAR \neq 0$, meaning the ratings downgrade has a statistically significant effect on stock price. Our test statistic is given by the equation

$$(7) \quad Test\ statistic = \frac{CAR}{\sqrt{Var(CAR)}}$$

Once we have this test statistic, it is used to determine if CAR is statistically significant from zero and, if so, at what significance level.

Data

The bond ratings data was all retrieved from Mergent's Fixed Income Securities Database. This is a comprehensive database of large, publicly traded fixed income securities, with over 140,000 securities in the portfolio including corporate, supranationals, U.S. Agency, and U.S. Treasury issues. The stock data came from the Center for Research in Security Prices, CRSP. This database has stock and indices returns going back to 1925, and a huge selection of data items to choose from. It also has its own indices, including the one used earlier as a proxy for the return of the market. Finally, SAS was utilized for all of the data cleaning and analysis. The stock universe used was S&P 500 companies in the following sectors: Consumer Staples, Financials, Industrials, and Materials. Appendix A contains a list of the companies included. These sectors were selected as they tend to vary in their volatility as well as other price-related characteristics, helping the study to be well-rounded in the securities analyzed. The date range used for the study was January 1st, 2001 through September 30, 2011. This produced a total of 172 companies and 20,271 downgrades. However, many of these downgrades were duplicates, meaning the agencies downgraded several bonds for the same company on the same day. After eliminating the duplicates, the downgrades were separated by the number of steps involved. The downgrades were separated into four groups: one-step changes, two-step changes, three-step changes, and four-plus step changes. The graph below gives an overview of how many downgrades existed after removing the duplicates.

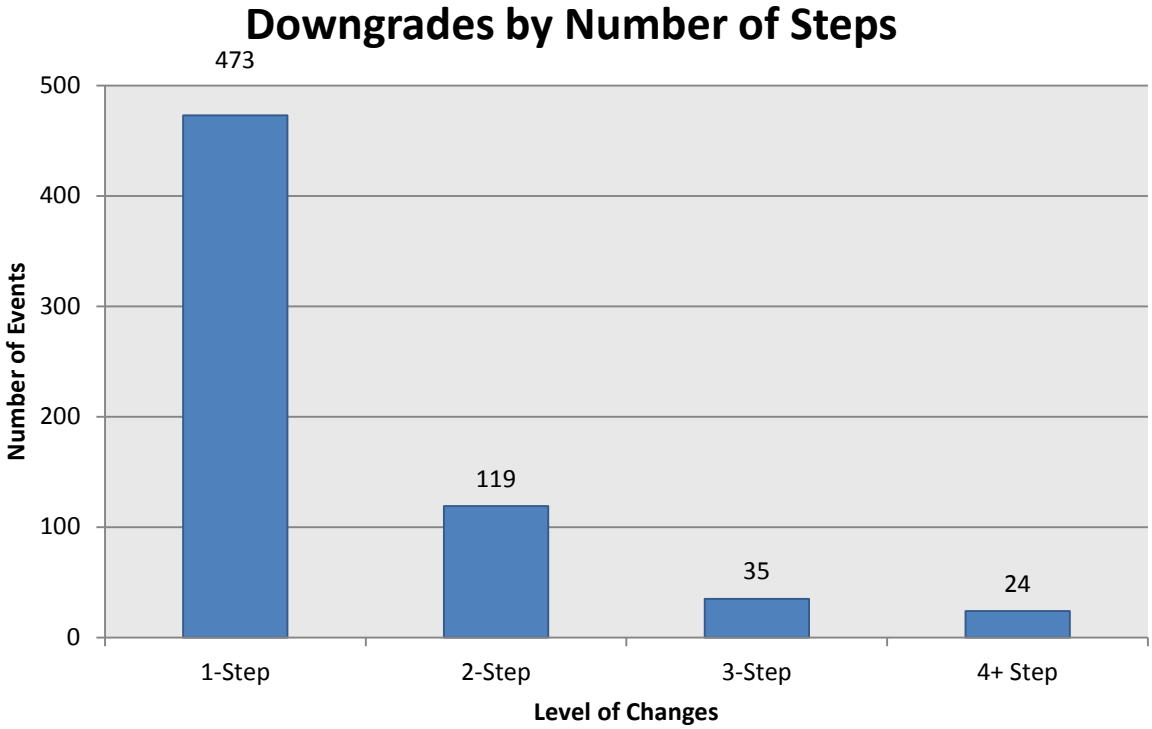


Chart 2 – Number of Downgrades by Steps Downgraded

RESULTS

I ran separate analyses on the one-, two-, and three-step changes. Even though the sample size for three-step was small, I had the data so I chose to run the analysis, and if it came out significant, note the small sample size as a possible issue. I used two different event windows. First, I used an event window of three days, t_{-1}, t_0, and t_1, with an estimation window of 158 days, t_{-160} through t_{-3}. Next, I used an event window of five days, t_{-2}, t_{-1}, t_0, t_1, and t_2, with the same estimation window of 158 days, t_{-160} through t_{-3}. Appendix B contains

scatterplots of the abnormal returns for one-, two-, and three-step changes using a three-day event window.

Three-Day Event Window

Table 2 below shows the results of the test of one-step changes using a three-day event window. The CAR on all three days was very small, although slightly negative. However, a t-score of -1.96 is needed for a 95% confidence level, and the t-scores calculated are not close enough for any high level of significance, and therefore we are unable to reject the null hypothesis. There is no evidence to support abnormal stock returns on the day of and days immediately preceding and following the downgrade of a company's bond rating for one-step downgrades.

One-Step Downgrades: Three-Day Window		
Day	CAR	t-Score
-1	-0.004707	-0.715
0	-0.005323	-0.808
1	-0.000611	-0.093
Overall	-0.003547	-0.311

Table 2

Table 3 on the next page shows the results of the test of two-step changes using a three-day event window. The CAR on all three days was very small, although slightly negative, and on the day after the event larger than for one-step changes. However, as stated previously, a t-score of -1.96 is needed for a 95% confidence level, and the t-scores calculated are not close enough for any high level of significance, and therefore we are unable to reject the null hypothesis. There is no evidence to support abnormal stock returns on the day of or days

immediately preceding and following the downgrade of a company's bond rating for two-step downgrades.

Two-Step Downgrades: Three-Day Window		
Day	CAR	t-Score
-1	-0.017782	-1.160
0	-0.002620	-0.171
1	-0.005967	-0.389
Overall	-0.008790	-0.331

Table 3

Table 4 below shows the results of the test of three-step changes using a three-day event window. Again, while the CAR is negative, and is slightly larger for all three days compared to one- and two-step changes, a t-score of -1.96 is needed for a 95% confidence level. The t-scores calculated are not close enough for any high level of significance, and therefore we are unable to reject the null hypothesis. There is no evidence to support abnormal stock returns on the day of and days immediately preceding and following the downgrade of a company's bond rating for three-step downgrades.

Three-Step Downgrades: Three-Day Window		
Day	CAR	t-Score
-1	-0.011256	-0.376
0	-0.004641	-0.155
1	-0.010958	-0.366
Overall	-0.008952	-0.173

Table 4

Five-Day Event Window

Table 5 below shows the results of the test of one-step changes using a five-day event window. The CAR on all five days was very small, although slightly negative. However, a t-score of -1.96 is needed for a 95% confidence level, and the t-scores calculated are not close enough for any high level of significance, and therefore we are unable to reject the null hypothesis. There is no evidence to support abnormal stock returns on the day of and on the two days immediately preceding and following the downgrade of a company's bond rating for one-step downgrades.

One-Step Downgrades: Five-Day Window		
Day	CAR	t-Score
-2	-0.002904	-0.441
-1	-0.004707	-0.715
0	-0.005323	-0.808
1	-0.000611	-0.093
2	0.002506	0.380
Overall	-0.002208	-0.150

Table 5

Table 6 on the next page shows the results of the test of two-step changes using a five-day event window. The CAR on all five days was very small, although slightly negative and on some days larger than for one-step changes. However, the t-scores calculated are not close enough to the -1.96 needed for a 95% level of confidence, or for any high level of significance to be present, and therefore we are unable to reject the null hypothesis. There is no evidence to support abnormal stock returns on the day of and on the two days immediately preceding and following the downgrade of a company's bond rating for two-step downgrades.

Two-Step Downgrades: Five-Day Window		
Day	CAR	t-Score
-2	-0.003650	-0.238
-1	-0.017782	-1.160
0	-0.002620	-0.171
1	-0.005967	-0.389
2	0.002508	0.164
Overall	-0.005502	-0.161

Table 6

Table 7 below shows the results of the test of three-step changes using a five-day event window. Again, while the CAR is negative and is slightly larger for all 5 days compared to one- and two-step changes, a t-score of -1.96 is needed for a 95% confidence level, and the t-scores calculated are not close enough for any high level of significance, and therefore we are unable to reject the null hypothesis. There is no evidence to support abnormal stock returns on the day of and on the two days immediately preceding and following the downgrade of a company's bond rating for three-step downgrades.

Three-Step Downgrades: Five-Day Window		
Day	CAR	t-Score
-2	-0.024875	-0.832
-1	-0.011256	-0.376
0	-0.004641	-0.155
1	-0.010958	-0.366
2	0.010181	0.340
Overall	-0.008310	-0.124

Table 7

CONCLUSION

Based on my analysis and results, there is no evidence to support the claim that the downgrade of a company's bond rating has an impact on its stock price on the day of and on the days surrounding the downgrade. Of the several individual tests I ran, none of them had a t-score high enough to confirm at any level of significance that the CAR was statistically different from zero. Although the CARs did grow slightly as the number of steps increased, none of the CARs were statistically different from zero, so we cannot conclude that a larger number of steps results in a larger CAR. I can conclude that the information content of bond rating downgrades to equity investors is very low. The firm deterioration that results in this downgrade has most likely already been recognized by investors and the stock price already reflects the deterioration. The findings also confirm the existence of a ratings change lag, the period of time after equity investors recognize firm deterioration compared to when rating agencies react to this change. Although there could be a long-term impact as some previous studies have concluded, I would argue this is not necessarily a result of the downgrade, but rather that a downgrade is foreshadowing continued firm deterioration resulting in stock price decreases.

One final question that I asked when reflecting on my research is whether different results, and statistically significant results, could be found by looking at different sectors individually. When I selected the four sectors I looked at, I consciously selected sectors that had different volatility and characteristics, so I had a well-rounded universe of stocks. However, I began to wonder if more volatile sectors, such as Financials, might have a statistically significant abnormal return which is being masked by the lack of abnormal returns in the Consumer

Staples sector. This paper also looked only at companies in the S&P 500, and therefore only considered larger companies. Some of the previous research argued that smaller and lower credit quality firms have a greater potential for abnormal return, and so looking at smaller companies could result in statistically significant abnormal returns as a result of a bond rating downgrade.

To summarize, there was no evidence of abnormal returns as a result of a one-, two-, or three-step ratings downgrade on the day of and on the days surrounding the downgrade. Therefore, the information content of these ratings downgrades to equity investors is low as the deterioration that results in the downgrade has already been priced in. Once again, there appears to be a ratings change lag between the time investors and bond rating agencies recognize the change in a firm's condition.

APPENDICES

Appendix A – List of Companies Included in Study

Ticker	Company Name
AA	ALCOA INC
ADM	ARCHER DANIELS
AFL	A F L A C INC
AIG	AMERICAN INTERN
AIV	APARTMENT INVES
AIZ	ASSURANT INC
ALL	ALLSTATE CORP
AMP	AMERIPRISE FINA
AMT	AMERICAN TOWER
AON	AON CORP
APD	AIR PRODUCTS &
ARG	AIRGAS INC
ATI	ALLEGHENY TECHN
AVB	AVALONBAY COMMU
AVP	AVON PRODUCTS I
AVY	AVERY DENNISON
AXP	AMERICAN EXPRES
BA	BOEING CO
BAC	BANK OF AMERICA
BBT	B B & T CORP
BEAM	BEAM INC
BEN	FRANKLIN RESOUR
BLK	BLACKROCK INC
BLL	BALL CORP
BMS	BEMIS CO INC
BXP	BOSTON PROPERTI
C	CITIGROUP INC
CAG	CONAGRA INC
CAT	CATERPILLAR INC
CB	CHUBB CORP
CCE	COCA COLA ENTER
CINF	CINCINNATI FINA
CL	COLGATE PALMOLI
CLX	CLOROX CO
CMA	COMERICA INC
CME	C M E GROUP INC
CMI	CUMMINS INC
COF	CAPITAL ONE FIN
COL	ROCKWELL COLLIN
COST	COSTCO WHOLESAL
CPB	CAMPBELL SOUP C
CSX	C S X CORP
CVS	C V S CAREMARK

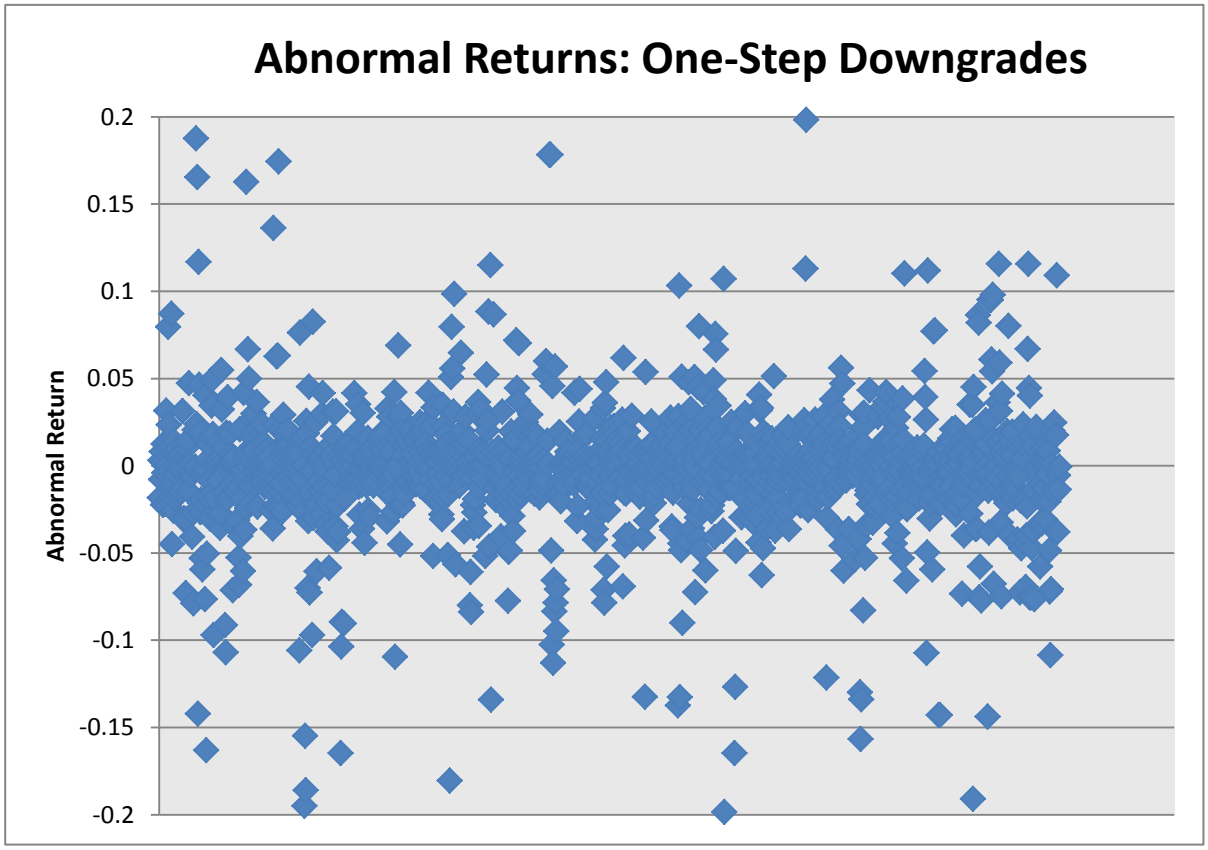
Ticker	Company Name
DD	DU PONT E I DE
DE	DEERE & CO
DF	DEAN FOODS CO N
DFS	DISCOVER FINANC
DNB	DUN & BRADSTREE
DOV	DOVER CORP
DOW	DOW CHEMICAL CO
DPS	DR PEPPER SNAPP
ECL	ECOLAB INC
EFX	EQUIFAX INC
EL	LAUDER ESTEE CO
EMN	EASTMAN CHEMICA
EQR	EQUITY RESIDENT
ETFC	E TRADE FINANCI
ETN	EATON CORP
FCX	FREEPORT MCMORA
FDX	FEDEX CORP
FHN	FIRST HORIZON N
FITB	FIFTH THIRD BAN
FLR	FLUOR CORP NEW
FMC	F M C CORP
GD	GENERAL DYNAMIC
GE	GENERAL ELECTRI
GIS	GENERAL MILLS I
GNW	GENWORTH FINANC
GS	GOLDMAN SACHS G
HBAN	HUNTINGTON BANC
HCN	HEALTH CARE REI
HCP	H C P INC
HIG	HARTFORD FINANC
HNZ	HEINZ H J CO
HON	HONEYWELL INTER
HRL	HORMEL FOODS CO
HST	HOST HOTELS & R
HSY	HERSHEY CO
IP	INTERNATIONAL P
IRM	IRON MOUNTAIN I
ITW	ILLINOIS TOOL W
JOY	JOY GLOBAL INC
JPM	JPMORGAN CHASE
K	KELLOGG CO
KEY	KEYCORP NEW
KFT	KRAFT FOODS INC

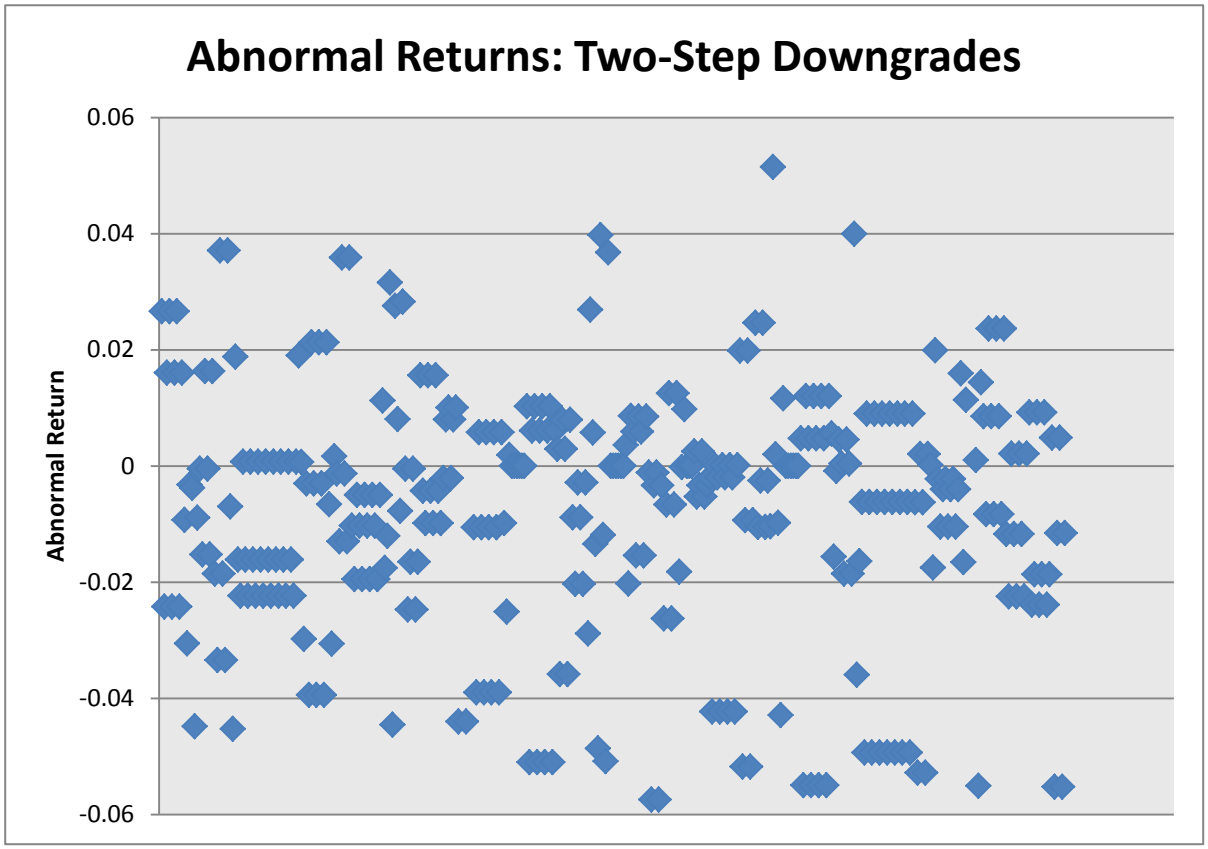
Ticker	Company Name
KIM	KIMCO REALTY CO
KMB	KIMBERLY CLARK
KO	COCA COLA CO
KR	KROGER COMPANY
L	LOEWS CORP
LLL	L 3 COMMUNICATI
LM	LEGG MASON INC
LMT	LOCKHEED MARTIN
LNC	LINCOLN NATIONA
LUK	LEUCADIA NATION
LUV	SOUTHWEST AIRLI
MAS	MASCO CORP
MET	METLIFE INC
MKC	MCCORMICK & CO
MMC	MARSH & MCLENNA
MMM	3M CO
MO	ALTRIA GROUP IN
MON	MONSANTO CO NEW
MOS	MOSAIC COMPANY
MS	MORGAN STANLEY
MTB	M & T BANK CORP
MWV	MEADWESTVACO CO
NDAQ	NASDAQ O M X GR
NEM	NEWMONT MINING
NOC	NORTHROP GRUMMA
NSC	NORFOLK SOUTHER
NTRS	NORTHERN TRUST
NUE	NUCOR CORP
NYX	N Y S E EURONEX
OI	OWENS ILL INC
PBI	PITNEY BOWES IN
PCP	PRECISION CASTP
PEP	PEPSICO INC
PFG	PRINCIPAL FINAN
PG	PROCTER & GAMBL
PGR	PROGRESSIVE COR
PH	PARKER HANNIFIN
PLD	PROLOGIS INC
PLL	PALL CORP
PM	PHILIP MORRIS I
PNC	P N C FINANCIAL
PPG	P P G INDUSTRIE
PRU	PRUDENTIAL FINA

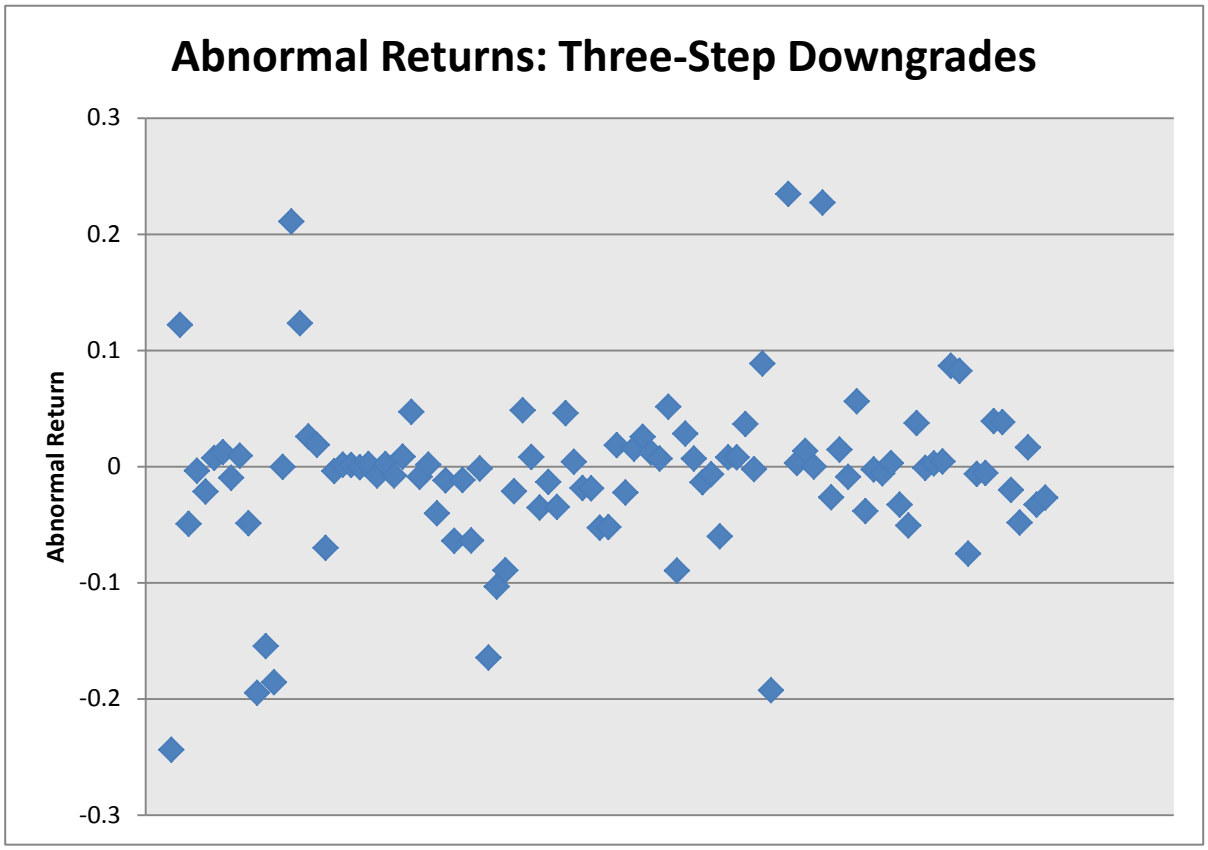
Ticker	Company Name
PSA	PUBLIC STORAGE
PWR	QUANTA SERVICES
PX	PRAXAIR INC
R	RYDER SYSTEMS I
RAI	REYNOLDS AMERIC
RF	REGIONS FINANCI
ROK	ROCKWELL AUTOMA
ROP	ROPER INDUSTRIE
RRD	DONNELLEY R R &
RSG	REPUBLIC SERVIC
RTN	RAYTHEON CO
SCHW	SCHWAB CHARLES
SEE	SEALED AIR CORP
SHW	SHERWIN WILLIAM
SIAL	SIGMA ALDRICH C
SLM	S L M CORP
SNA	SNAP ON INC
SPG	SIMON PROPERTY
STI	SUNTRUST BANKS
STT	STATE STREET CO
STZ	CONSTELLATION B
SWK	STANLEY BLACK &
SWY	SAFEWAY INC
TAP	MOLSON COORS BR
TMK	TORCHMARK CORP
TRV	TRAVELERS COMPA
TSN	TYSON FOODS INC
TXT	TEXTRON INC
UNM	UNUM GROUP
UNP	UNION PACIFIC C
UPS	UNITED PARCEL S
USB	U S BANCORP DEL
UTX	UNITED TECHNOLO
VMC	VULCAN MATERIAL
VNO	VORNADO REALTY
VTR	VENTAS INC
WAG	WALGREEN CO
WFC	WELLS FARGO & C
WM	WASTE MANAGEMEN
WMT	WAL MART STORES
WY	WEYERHAEUSER CO
X	UNITED STATES S
ZION	ZIONS BANCORP

Appendix B – Abnormal Return Graphs

Below are graphs of the abnormal return for one-step, two-step, and three step downgrades using a three day event window. The x-axis is event number and therefore is not significant with respect to any horizontal trend in the data.




Abnormal Returns: Two-Step Downgrades
Abnormal Return
0.06
0.04
0.02
0
-0.02
-0.04
-0.06


Abnormal Returns: Three-Step Downgrades
Abnormal Return
0.3
0.2
0.1
0
-0.1
-0.2
-0.3

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