The Effect of Bond Rating Changes on Stock Prices in the Electric Utility Industry

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Introduction

Problem Statement

Previous literature reaches no agreement about the affect of bond rating changes on stock prices. Some articles come to the conclusion bond rating changes do not affect stock prices, while others conclude they do. Pinches and Singleton's (1978) state bond rating changes do not affect stock prices. They test stock returns the month after the bond rating change and discover there are no abnormally high (low) returns preceding the bond rating upgrade (downgrade). They state the stock market is much more efficient in processing information than the bond market. Therefore, changes in bond ratings do not affect stock prices. This is not to say that there is no relationship between stock prices and bond rating changes because abnormally high (low) returns are found prior to the bond rating upgrade (downgrade), indicating that the equity market and bond market are coming to a similar consensus on the company; however, there is a delay between the bond rating agencies processing this information and the equity market.

Hand, Holthausen and Leftwich (1992) conclude that bond rating changes affect stock prices. They find significant negative average excess stock returns for bond rating downgrades. They define average excess stock returns as post-rating changes from the period Day +62 to +361. For rating upgrades, they report weaker positive average excess stock returns when sampling actual rating changes. Even though rating upgrades do not reveal strong average excess returns results when compared with downgrades, the overall conclusion is that announcements of actual changes in credit ratings do have an effect on stock price.

Others conclude that bond-rating downgrades do affect the stock price while upgrades do not. Griffin and Sanvicente (1982) conclude there is a significant negative stock price reaction to bond downgrades in general, but not to upgrades. They conclude that their findings are consistent with the rationale that rating downgrades convey new information to the equity market. However, they do not rule out the explanation that downgraded companies are already doing worse than normal and this pattern just continues after the downgrade. Goh and Ederington (1993) draw a similar conclusion, but they dissect rating downgrades further, grouping downgrades into two types: those due to deterioration in the firm's financial prospects and those due to an increase in leverage. Goh and Ederington go further to conclude the type of rating downgrade is important. Companies that are downgraded due to deterioration in firm's financial prospects have a negative equity market reaction, while those due to increased leverage do not.

As indicated in the Goh and Ederington study, the affects of bond ratings on stock prices can be studied in various ways. Some papers suggest measuring abnormal returns and running statistical tests on the data to detect abnormal stock returns. Most papers use some form of cumulative abnormal returns or buy-hold returns methodology, the variation of how they determine their samples varies significantly.

Dichev and Piotroski's study (2001) attempts to provide a comprehensive study of long-run returns after bond rating changes by using an extensive sample from 1970 to 1997. Their analysis is based on a large database of about 4,700 observations, which includes small, lower quality firms. The Dichev and Piotroski study is inclusive, in hopes of revealing a more conclusive response by including smaller, lower quality firms. They also examine several time periods, including three-month, six-month, first-year, second-year, and third-year abnormal stock returns following bond ratings.

Hand, Holthausen and Leftwich (1992) classify bond rating changes as "contaminated" or "noncontaminated" by observing whether or not other news indicated the rating change prior to the bond rating change announcement. They also go further and use daily excess returns, claiming daily data will isolate the announcement effect rather than using monthly excess return data. The announcement effect is the reaction to news that a change will occur at some future date that in turn impacts trading (the stock price).

Barber and Lyon (1997) employ reference portfolios as well as control firms to calculate abnormal returns. They select the reference portfolios and control firms based on size, book-to-market ratios, and size and book-to market ratios combined. They conclude that utilizing control firms yields well-specified test statistics by alleviating biases existing in other approaches.

The three biases that Barber and Lyon observe are: new listing bias, rebalancing bias, and skewness bias. New listing bias arises when analyzing abnormal returns versus expected returns gathered from indexes or reference portfolios. It can happen when new firms enter an index in recent months subsequent to the event month. Rebalancing bias occurs when reference portfolios are periodically rebalanced, but sample firm returns are compounded without rebalancing. Skewness bias is present when long-term abnormal returns are positively skewed. The Barber and Lyon control firm approach alleviates all three biases. The new listing bias and rebalancing bias are alleviated by gathering the expected return from just one firm rather than an index or reference portfolio. Skewness bias is avoided because they state that the sample and control firms are equally likely to experience large positive returns.

In this paper, we explore whether or not bond ratings affect stock prices by analyzing a specific industry, U.S. shareholder owned electric utilities. The electric utility industry is selected because of the capital-intensive nature of the business. In fact, electric utilities rank only second to railroad companies as the most capital-intensive industry in the U.S. Since electric utilities are constantly entering public markets to receive financing, it is assumed their stock prices will be more sensitive than other industries to these bond-rating changes.

Narrowing in on just a specific industry for this study differentiates this analysis from other event studies done in the past that analyze bond rating changes and how they affect stock prices. Other studies have analyzed abnormal returns across broad markets. They usually use a broad market index and then identify financial characteristics or news announcements to group their samples. For example, Barber and Lyon (1997) gather their data from the NYSE/AMEX/NASDAQ indices and then create samples using reference portfolios based on size, book-to-market ratios, or a combination of both. Hand, Holthausen and Leftwich (1992) and Ederington and Goh (1998) also collect their stock information from the NYSE/AMEX/Nasdaq indices. The NYSE/AMEX/NASDAQ indices are the most commonly used sources of stock price data in these types of studies. By targeting a highly capital intensive industry, who's credit rating is very important to the vitality of their company, it is assumed that the U.S. shareholder owned electric utility industry will be more sensitive to bond rating changes than a broad index.

Study Objective and Procedures

The objective of this analysis is to determine if bond-rating changes affect stock prices in U.S. electric utilities. This is an industry that is continuously utilizing secondary markets for financing, making their credit rating important to the overall health of the company. This paper will determine if the use of a specific industry provides an answer to whether or not upgrades/downgrades affect stock prices.

To accomplish this objective we calculate abnormal returns by employing several approaches. An overall utility benchmark is used as well as reference portfolios and control firms. Reference portfolios are created by grouping the electric utilities into four size groups. Abnormal returns are also be calculated by pairing the company with a credit rating change to a similar sized control firm.

This paper employs three separate benchmarks for calculating abnormal returns. The first approach is to use an overall utility industry benchmark. In the second and third approaches, reference portfolios and control firms are created based on size. These portfolio returns are used to calculate abnormal returns. Size is specifically identified using market capitalization. Fama and French (1992) conclude that several factors, size, E/P, leverage and book-to-market equity, used alone, have explanatory power on stock returns. Size is of particular interest for this analysis because of not only the varying size of the companies analyzed, but also the change in size of the companies throughout the sample period.

In addition to studying several benchmarks for calculating abnormal returns, the downgrades are further dissected, grouping downgrades into sub-groups based on time (2000 – 2003 and 2004 – 2006) as well as investment grade vs. non-investment grade. By furtherer studying downgrades, this paper attempts to locate a reason as to why abnormal returns are present in downgrades. Upgrades are not further examined because of the small number of upgrades in the sample.

The analysis is structured similar to the Barber and Lyon (1997) study, in the sense that abnormal returns are studied using three separate benchmarks: an overall index benchmark, reference portfolios and control firms. In light of this, similar biases are present in this analysis: new listing bias, rebalancing bias, and skewness bias. New listing bias and rebalancing bias are present in the samples where abnormal returns are calculated using an overall utility index and reference portfolios. New companies are allowed to enter the overall utility index and reference portfolios over time. The utility index used for this analysis is an index created by equally weighting all the companies used in the analysis. In the reference portfolios, we also see new listing bias, as companies change size and move in to and out of the four different reference portfolios. Rebalancing bias also exists in a similar manner for the overall utility benchmark and reference portfolio. As new companies enter the benchmarks, rebalancing bias could occur. Rebalancing bias and the skewness biases are likely small in this analysis, as these biases add up over more long-term study periods. In shorter-term studies (less than a year) these biases likely do not play a role in determining if there are abnormal returns. This study does not look out further than a year preceding or after a credit rating change. The control firm sample alleviates the new listing bias because expected returns are only gathered from just one firm, rather than an index or reference portfolios. In addition, the skewness bias does not arise when a control firm is used as a long-term benchmark rather than a reference portfolio or index.

Scope and Organization

This study focuses on only U.S. shareholder owned electric utilities. The study covers credit rating changes from 2000 – 2006 and analyzes if abnormal returns exist in stock prices one year prior to and after the credit rating change in the specified time period. To determine if abnormal returns exist, stock prices are analyzed against a broad market index, reference portfolios and control firms picked based on size. The study does not explore the reason for the credit rating change or events surrounding the credit rating change.

This study is organized into five chapters. Chapter 2 presents the data and explains how the data was collected (changes in bond ratings over time), and how the reference portfolios are created. Chapter 3 focuses on methodology and discusses cumulative abnormal returns as well as explaining the three ways abnormal returns are calculated, using an overall benchmark, reference portfolios, and control firms. In

Chapter 4 the results are reported and analyzed. Chapter 5 contains the final conclusions based on these results.

Chapter 2
Data

We use the data for a specific industry to determine if credit ratings affect stock prices. Data is gathered from two key data sources: Yahoo! Finance and Bloomberg. From Yahoo! Finance, monthly stock prices are collected for each company. Bloomberg, a highly regarded financial database, is used for information on credit ratings and market capitalization. The data is discussed in three sections: selection of companies, credit ratings, and bond ratings.

Selection of Companies

For this analysis, electric utilities in the Edison Electric Institute (EEI) Index are used to research the affects of bond ratings on stock prices. The EEI Index is made up of U.S. shareholder owned electric companies. The companies comprising this index serve 95 percent of the ultimate customers in the shareholders-owned segment of the electric utility industry. Overall, companies in the EEI Index make up approximately 70 percent of the U.S. electric power industry.

At the time the data was developed, the EEI Index was made up of 75 companies. Of the 75 U.S. shareholder owned electric companies, only 58 companies are used in this analysis. The companies not included in the sample are either privately held, are subsidiaries of a parent company, or do not have stock return data for the selected time period. Additionally, one company, Dynengy, Inc., was deleted from the data set. This company was identified as an outlier and therefore deleted. Dynengy, Inc. is more of a merchant power company than an electric utility. Their performance is very different from electric utility companies. This company does not have end retail/commercial customers like a regular electric utility; rather they perform well in times where extra capacity is needed such as brown outs.

A breakdown of the 75 companies in the EEI Index is reported in Table 1.

Table 1. Companies in the EEI Index

Description	Number of Companies
Used in Analysis	58
Privately Held	5
Subsidiaries	6
Incomplete Stock Return Data	5
Outlier (Dynengy, Inc.)	1
Total	75

Changes in bond rating data were collected from Standard and Poor's. Standard and Poor's is one of three major credit rating agencies for the remaining 58 companies. Their role is to assign credit ratings to companies that issue debt and to individual debt securities. Standard and Poor's assigns forward looking ratings to issuers and their individual debt obligations by evaluating historical data while factoring in changes in business cycles of specific industries as well as trends and events. These rating opinions are not only forward looking, but they can change over time. Changes in credit ratings can occur due to multiple reasons, including changes in key credit metrics, an acquisition or merger, or a change in a government policy, such as changes in Environmental Protection Agency (EPA) rules for electric utilities.

Credit Ratings

Standard & Poor's utilizes a rating scale to communicate the credit quality of a company. The credit rating scale ranges from "AAA" to "D". "AAA" is the highest credit rating a company can receive, while "D" is the weakest. The credit rating scale is represented below:

"AAA"	Highest credit quality
"AA"	
"A"	
"BBB"	Investment grade
"BB"	Non-investment grade
"B"	

"CCC"	
"CC"	
"C"	
"D"	Default

Note that a bond becomes noninvestment grade once it is at a "BB" credit rating level. Issuers below this designation are said to have low credit quality. Standard and Poor's provides further division among the ratings by adding pluses and minuses to a rating. For example, an issuer could be rated "BBB+", which is more creditworthy than an issuer with a "BBB".

Credit ratings are used by potential investors to evaluate companies and to make decisions on whether they would like to invest in the company. They can be used to help companies raise funds through investors, rather than taking out a loan from a bank, which provides companies access to the capital markets. Credit ratings from the big three credit rating companies (Standard & Poor's, Moody's and Fitch) are recognized by many investors and provide them with an efficient way to compare debt among companies. Credit ratings help companies by giving them a recognized means to communicate their creditworthiness to many investors.

Bond Ratings Data

Credit ratings were gathered using Bloomberg data from 2000–2006. Credit ratings were only gathered from Standard and Poor's because of the way Standard and Poor's begin categorizing their credit ratings following 1998. Following 1998, Standard and Poor's provided credit ratings for the issuing company overall, rather than just on individual pieces of debt. During 2000–2006, Moody's was not providing issuer credit ratings for every company, but had credit ratings on just individual pieces of debt, issuers or in some cases both. Fitch was still gaining recognition as a top three agency to provide credit ratings during 2000–2006. Therefore, the number of companies they rated was limited.

Table 2. Bond Rating Changes, 2000-2006

Year	Number of Upgrades	Number of Downgrades	Number of Bond Rating Changes	Percentage of Total Bond Ratings Changes
2000	4	8	12	11%
2001	3	19	22	20%
2002	2	26	28	26%
2003	1	16	17	16%
2004	3	7	10	9%
2005	4	6	10	9%
2006	4	5	9	8%
Total	21	87	108	100%

Table 2 presents the distribution of bond rating changes over time for the full sample. Table 2 reveals there were more downgrades in the early 2000s. This can be attributed to the early 2000s recession, which mostly affected the U.S. in 2001–2003. Also of note, is the amount of upgrades versus downgrades, which was approximately 1 upgrade for every 4 downgrades.

Table 3. Bond Ratings Analyzed

Upgrades	21
Downgrades	66
Total	87

In Table 3 we present the total number of upgrades and downgrades actually analyzed versus the total number of upgrades and downgrades reported in Table 3. Table 3 reveals that only 81% of all credit rating changes were analyzed. 100% of all upgrades were kept in the sample, while only 76% of all downgrades were kept. This was determined by the timing of the credit rating change and the type of change.

Credit ratings are kept if they meet one of two criteria for each company: 1) a credit rating change was kept if there were no credit rating changes 6 months prior or after a particular change or 2) if the credit rating change 6 months prior or after a particular change was different, i.e. an upgrade versus a downgrade. This was done so credit rating changes of the same type, upgrade or downgrade, did not affect the previous or proceeding change when analyzing the stock price return information.

Credit rating changes for U.S. shareholder owned electric utilities are further analyzed by the size of the company. This is done by analyzing the market capitalization of each company at the end of each year. Companies are then broken down into four categories: very small, small, medium and large. Companies were allowed to change size categories each year. Not all 58 companies used in this analysis were present in a given size category each year. To be used in a given year, companies need to provide return data for a 36-month period; 12 months prior to a given year, 12 months during the given year, and 12 months after the given year.

Table 4 reveals the breakdown of companies in each of these categories by year. In the early years, more companies are allocated to the smaller size categories. But as the years progress, more are moved to the larger size categories.

Table 4. U.S. Shareholder Owned Electric Utilities by Size, 1999 - 2007

Category Market Capitalization	Very Small $0 - 1B	Small $1 - $2.5B	Mid $2.5 - $7.5B	Large $7.5B and up
1999	15	13	16	8
2000	11	13	15	15
2001	12	13	14	15
2002	16	14	13	12
2003	12	11	18	14
2004	10	14	12	19
2005	8	14	15	19
2006	5	15	16	22
2007	5	13	19	21

Chapter 3
Methodology

The analysis focuses on the monthly returns of publicly traded electric utilities before and after a bond rating change to determine if bond rating changes affect the stock price or if they are already anticipated by the market. Monthly returns are studied 12-months prior to and after the bond rating change. The monthly returns for the electric utilities are compared to an overall utility benchmark, to a reference portfolio and a control firm to calculate the abnormal returns. In addition, bond rating downgrades are dissected further, grouping downgrades into sub-groups based on time (2000 – 2003 and 2004 – 2006) as well as investment grade vs. non-investment grade. The following chapter includes a discussion on the specific methodology used, population and sample design, and hypothesis and test statistic.

Cumulative Abnormal Returns

The cumulative abnormal returns (CAR) measure is used in this study. It is a standard event study measure used commonly to study the effect of external events on stock prices. Both Goh and Ederington (1993) and Dichev and Piotroski (2001) utilize the CAR methodology when analyzing the effect of bond rating changes on stock prices. Goh and Ederington calculate cumulative abnormal returns prior to the rating change as well as after the rating change. Their time frame for analyzing CAR is short term in nature; only looking at 30 days before the rating change and 30 days after the rating change. Dichev and Piotroski examine cumulative abnormal returns only after the rating change and as far out as three years after the rating change.

The first step is to define and calculate abnormal returns. Abnormal returns are defined as

$$AR_{it} = R_{it} - E(R_{it}) \tag{1}$$

where R_{it} is equal to the monthly return of a sample firm in month *t* and $E(R_{it})$ is equal to the expected return for the sample firm in month *t*.

Abnormal returns are then grouped as either upgrades or downgrades during the 24-month period being studied using the cumulative abnormal returns methodology. The cumulative abnormal return (CAR) from month $T1$ to $T2$ is defined as

$$CAR_{i,T1,T2} = \sum_{t=T1}^{T2} AR_{it} \qquad (2)$$

where $T1$ and $T2$ are the beginning and ending month of the summation period and commonly referred to as the event window or CAR-window.

In Table 5 we illustrate how the cumulative abnormal return is calculated following a bond rating change through a five-month event window (where T1 = 1 and T2 = 5). The expected return is calculated using the equally-weighted EEI Index.

Table 5. Cumulative Abnormal Returns Calculation - Five Months After Bond Rating Change

	Downgrade		Upgrade	
Month	Abnormal Return (AR_{it})	Cumulative Abnormal Return ($CAR_{i,T1,T2}$)	Abnormal Return (AR_{it})	Cumulative Abnormal Return ($CAR_{i,T1,T2}$)
1	-1.94%	-1.94%	1.88%	1.88%
2	-3.33%	-5.26%	-0.22%	1.66%
3	1.31%	-3.95%	1.23%	2.89%
4	-0.78%	-4.74%	2.11%	5.00%
5	-1.69%	-6.43%	0.93%	5.93%

Population and Sampling Method

The population used in the study included all shareholder owned electric utilities in the EEI Index. Several samples are derived from this population and expected returns are calculated. The expected return is calculated using three different methods: an overall utility benchmark, reference portfolios and control firms.

Abnormal returns are calculated using an overall electric utility benchmark which is represented by all firms used in this analysis from the EEI Index. Analysis was run against an equally weighted EEI Index as well as a capitalization-weighted EEI Index. The two indices were highly correlated (92%) and returned similar results. Therefore, only one, the equally weighted EEI Index, has results listed in the Results section for abnormal returns.

Reference portfolios and control firms are used to align the sample firm to an expected return based on size. Research has shown that size is an important determinant of the cross section of stock returns, e.g. Fama and French (1992). Therefore, abnormal returns are calculated after controlling for size. Market capitalization is used to determine the size of a company.

Reference portfolios are separated into four portfolios and are recalculated every year based on the sample firm's market capitalization on December 31st. The four portfolios are grouped as: very small (less than $1 billion), small ($1 billion to $2.5 billion), medium ($2.5 billion to $7.5 billion) and large ($7.5 billion and above).

The monthly return for the reference portfolios is calculated by averaging the monthly returns of all stocks in their respective reference portfolios. Each firm is allowed to change between reference portfolios based on their market cap each December 31st.

A control firm is used as an alternative to the reference portfolios. A control firm is matched to the sample firm based on size by using market capitalization. The control firm is defined as a firm with the closest market capitalization at the time of the bond rating change. The control firm also has to meet the criteria of no bond rating changes over the sample period.

Event windows are studied for all samples used to calculate expected return. Event windows are created monthly out 12 months prior to the rating change and 12 months after the rating change.

In addition to these samples, several other sub-samples were also studied for credit rating downgrades. The first sub-samples were created based on timing of the downgrade. Rating downgrades were studied from 2000 – 2003 as well as 2004 – 2006. As identified in the Data section, most of the credit rating changes occurred in 2000 – 2003. As mentioned above, the U.S. was experiencing a recession during this time. It is of interest to analyze these sub-samples to see if the results differ for abnormal returns between the two.

The final sub-samples were grouped as non-investment grade vs. investment grade. These sub-samples only analyzed rating downgrades. Non-investment grade vs. investment grade is a way to study the financial condition of the company at the time of the credit downgrade. The companies that were considered non-investment grade would be considered to have poorer financials than an investment grade company. As discussed above in the Data section, issuers who are labeled as non-investment grade are said to have low credit quality. Abnormal returns were calculated for all sub-samples against a market index.

Hypothesis and Test Statistics

The hypothesis for this study is that the event windows following the change in bond rating have abnormal returns significantly different from zero. This suggests that bond rating changes are not fully anticipated and are not "priced" into the stock short-term (one year following the bond rating change). The null hypothesis (H_0) is that there are abnormal returns within the event window. The alternative hypothesis (H_1) is that there are no abnormal returns in the event window.

$$H_0: CAR_{i,T1,T2} \neq 0$$

$$H_1: CAR_{i,T1,T2} = 0 \qquad (3)$$

To test this hypothesis, the standard cross sectional t-test is used. The t-test allows us to test if the cumulative abnormal returns for the specified time period are significantly different from zero. The t-test statistic is

$$t = \frac{\overline{CAR}_{T1,T2}}{\sigma(CAR_{T1,T2}) / \sqrt{n}} \qquad (4)$$

where $\overline{CAR}_{T1,T2}$ is the sample mean and $\sigma(CAR_{T1,T2})$ is the cross section sample standard deviation of the cumulative abnormal returns for the sample, and T1 and T2 are the months over which the t-test was calculated.

Chapter 4
Results

In the first section, I discuss results for just companies that had a credit rating downgrade during 2000-2006. In total, there are 66 credit downgrades during this period. Downgrades are analyzed using three separate samples: a market index, reference portfolios and control firms. In the second section on upgrade results, I summarize the results of the upgrades through the sample period. There are 21 upgrades in the sample time period. In addition, there were also two sub-samples created to further analyze downgrades: timing of the rating downgrade and financial condition of the company at the time of the rating downgrade. These results are found in the third section.

Downgrade Results

In Table 6, I summarize the results of credit rating downgrades for three sample groups: Utility (market) index, reference portfolios, and control firms. Cumulative abnormal returns are calculated twelve months prior to the credit rating change and twelve months after the credit rating change.

For the event window to be statistically significant at a 95 percent level, it had to have a t-value of +/- 2.00 or more. This was the case for all calculations of abnormal returns (index, reference portfolios and control firms) twelve month to approximately five months prior to the rating downgrade announcement (the abnormal returns were only significant twelve to eight months prior to the rating downgrade for the equally weighted EEI Index sample). Abnormal returns were significant two to three months after the rating downgrade for all samples out to seven months after the downgrade.

This information suggests that downgrades are anticipated by the market, or at least some sort of negative news has been priced into these companies prior to the downgrades. However, following their downgrade, we again see a negative equity market reaction. Therefore, we accept the null hypothesis, stating that there are abnormal returns after the credit rating downgrade.

Table 6. Cumulative Abnormal Returns for Downgraded Companies

Number of Months CARs Calculated from Rating Change	EEI Index - Equally Weighted		Reference Portfolios		Control Firms	
	Mean	t-Value	Mean	t-Value	Mean	t-Value
-12	-9%	-2.67*	-8.08%	-2.42*	-9.40%	-2.42*
-11	-8%	-2.67*	-9.38%	-2.83*	-10.82%	-2.78*
-10	-7%	-2.58*	-8.27%	-2.62*	-11.41%	-2.93*
-9	-6%	-2.39*	-7.56%	-2.59*	-10.45%	-2.91*
-8	-5%	-2.03*	-6.04%	-2.38*	-7.56%	-2.51*
-7	-5%	-1.87	-5.09%	-2.15*	-6.02%	-2.14*
-6	-4%	-1.79	-5.09%	-2.10*	-7.45%	-2.38*
-5	-3%	-1.33	-4.59%	-2.11*	-7.30%	-2.40*
-4	-1%	-0.27	-2.78%	-1.37	-5.35%	-1.96
-3	-1%	-0.80	-0.90%	-0.45	-3.04%	-1.25
-2	-1%	-0.92	-1.64%	-1.00	-2.55%	-1.24
-1	-2%	-1.88	-1.04%	-0.91	-1.94%	-1.54
1	-1%	-0.92	-2.03%	-1.72	-1.94%	-1.69
2	-2%	-1.88	-5.50%	-2.89*	-2.69%	-2.74*
3	-5%	-2.91*	-4.12%	-2.41*	-5.74%	-2.27*
4	-4%	-2.56*	-5.05%	-2.63*	-4.13%	-2.03*
5	-5%	-2.63*	-6.02%	-2.79*	-4.47%	-2.32*
6	-7%	-3.17*	-5.91%	-2.73*	-6.24%	-1.99
7	-6%	-2.78*	-5.35%	-2.12*	-5.26%	-1.40
8	-5%	-2.02*	-3.94%	-1.59	-3.84%	-0.59
9	-3%	-1.25	-3.24%	-1.39	-1.58%	-0.89
10	-3%	-1.19	-2.32%	-0.94	-2.35%	-0.64
11	-2%	-0.88	-2.32%	-0.76	-1.81%	-0.14
12	-2%	-0.55	-4.25%	-1.18	-0.46%	-0.48

* significant at the 5% level

Upgrade Results

Table 7 summarizes the results of credit rating upgrades of each event window's test statistic as well as the mean for the three samples: utility (market) index, reference portfolios and control firms. Cumulative abnormal returns are calculated twelve months prior to the credit rating change and twelve months after the credit rating change.

For the event window to be statistically significant at a 95 percent level, it had to have a t-value of +/- 2.08 or more. The event windows after the credit rating upgrades are statistically significant for both the utility index and the reference portfolio. Prior to the credit rating change, the utility index's event windows are all statistically significant except for one and two months prior to the credit rating change.

The reference portfolio's event windows are not statistically significant, except for seven and eight months prior to the credit rating upgrade. The control firm had no statistically significant event windows before or after the credit rating upgrade.

The information from analyzing the upgrades varies, but the utility index and reference portfolios do state that the time period after the upgrade is statistically significant. Therefore, we cannot reject or accept the null hypothesis, based on the results in Table 7. There are not consistent results between the samples or the time periods.

These findings are similar to other papers. Ederington and Goh (1998) conclude that upgrades appear to be already priced into the market. They state that upgrades appear to be much less of a surprise than downgrades. They theorize this may be because rating companies are more likely to inform the markets of good news, rather than bad news. Rating agencies are said to have access to private information that equity markets do not have access to. However, Ederington and Goh claim that companies are more willing to release favorable information than unfavorable information, perhaps leading to no surprise for equity investors when companies are upgraded.

The results in Table 7 appear to support this, since there are no abnormal returns at least three months after the rating upgrade announcement for all scenarios in Table 7. Ederington and Goh go further to state that the amount of time rating agencies spend detecting deteriorations in credit quality rather than improvements may also affect abnormal returns. They imply that stock analyst forecasts should adjust more fully prior to upgrades rather than downgrades. In other words, by the time the rating agencies recognizes the company's good financial standing, it has been priced in to the stock price well before the rating change occurs, where downgrades may have more time dedicated to them and information that may not be public knowledge, so everything may not be fully priced into the stock prices following a downgrade.

Table 7. Cumulative Abnormal Returns for Upgraded Companies

	EEI Index - Equally Weighted		Reference Portfolios		Control Firms	
Number of Months CARs Calculated from Rating Change	Mean	t-Value	Mean	t-Value	Mean	t-Value
-12	7.16%	1.46	6.20%	1.35	3.84%	0.79
-11	6.75%	1.47	7.11%	1.57	3.77%	0.82
-10	7.02%	1.60	5.78%	1.38	6.81%	1.42
-9	8.21%	1.83	7.17%	1.77	7.33%	1.65
-8	7.77%	2.01	8.69%	2.14*	6.32%	1.54
-7	7.77%	2.34*	7.54%	2.29*	4.71%	1.28
-6	5.26%	1.94	5.97%	1.99	0.92%	0.27
-5	4.85%	1.91	3.92%	1.54	2.78%	1.01
-4	3.25%	1.46	2.85%	1.29	1.37%	0.44
-3	2.45%	1.42	2.95%	1.62	0.53%	0.22
-2	2.53%	1.26	2.39%	1.18	1.12%	0.42
-1	1.72%	1.36	1.07%	0.88	1.17%	0.85
1	1.72%	1.36	1.79%	1.70	0.22%	0.14
2	1.88%	1.78	1.37%	1.04	1.20%	0.69
3	1.66%	1.15	2.57%	1.43	0.67%	0.28
4	2.89%	1.41	4.68%	2.16*	0.90%	0.38
5	5.00%	1.97	6.32%	3.01*	1.79%	0.68
6	5.93%	2.64*	8.15%	4.49*	4.50%	1.86
7	7.57%	3.98*	8.10%	4.56*	6.04%	1.96
8	7.63%	3.26*	9.23%	4.38*	9.23%	1.79
9	8.47%	3.41*	9.62%	3.63*	9.24%	1.65
10	9.51%	3.37*	8.54%	3.05*	9.46%	1.68
11	9.01%	3.22*	7.87%	2.67*	9.31%	1.59
12	8.27%	2.67*	8.41%	2.50*	9.32%	1.53

* significant at the 5% level

Sub-Sample Results for Downgrades

Two sub-samples are analyzed to further identify the effect of rating downgrades. Upgrades are not analyzed in a similar fashion because the sample size of the upgrades was relatively small.

Results in Table 8 are analyzed to see if the time period in which the downgrade was announced is significant. Recall that a large majority of the downgrades happened during 2000–2003. As stated in the data section, the U.S. economy experienced a recession in the early 2000s. Cumulative abnormal returns are calculated twelve months prior to the credit rating change and twelve months after the credit rating change.

For the event window to be statistically significant at a 95 percent level during 2000-2003, it had to have a t-value of +/-2.00 or larger. This was the case for abnormal returns calculated eleven months to eight months prior to the rating downgrade announcement. Abnormal returns were also significant two months to six months after the rating downgrade.

For the event window to be statistically significant at a 95 percent level during 2004-2006, it had to have a t-value of +/-2.145 or larger. Eight months prior to the credit rating downgrade was the only time that abnormal returns were significantly present.

The results in Table 8 suggest that the timing of the credit rating downgrade was significant. Those downgrades coincided with the U.S. recession (early 2000s) and they exhibited abnormal returns prior to the downgrade and also after the downgrade. This suggests that other factors, such as the state of the economy, may affect abnormal returns when analyzing rating downgrades.

To test this theory further, sub-samples were created for the sub-group 2000–2003. Instead of grouping by a four year time period, each year was examined to analyze if abnormal returns existed from year-to-year during the sub-group. Results from this analysis detailed that only 2002 had consistent significant abnormal returns, leading to inconclusive results that macro events in the economy play a role in abnormal returns for downgrades, as we would have expected to see consistent abnormal returns in the sub time period that the US economy was in a recession.

These results are similar to what Dichev and Piotroski (2001) found. They were testing a longer sample period of 28 years (1970 – 1997) in which they analyzed sample sub-periods to see if systematic risk played a role in downgrades. During their sample period, especially prior to 1980, they saw an increase in corporate distress and bankruptcies. Upon testing this systematic risk explanation, they found strong evidence for poor returns following downgrades. These returns were strongly persistent over the entire sample period, casting doubt on a systematic risk explanation.

Table 8. Cumulative Abnormal Returns for Downgraded Companies Based on Timing of Downgrades

	Sub-Group 2000 – 2003		Sub-Group 2004-2006	
Number of Months CARs Calculated from Rating Change	Mean	t-Value	Mean	t-Value
-12	-8%	-1.96	-4%	-1.67
-11	-10%	-2.41*	-5%	-1.72
-10	-10%	-2.53*	-3%	-1.13
-9	-8%	-2.30*	-4%	-1.70
-8	-6%	-2.06*	-4%	-2.17*
-7	-5%	-1.83	-3%	-1.18
-6	-5%	-1.72	-2%	-0.87
-5	-5%	-1.81	0%	-0.14
-4	-3%	-1.36	0%	-0.04
-3	-1%	-0.21	-1%	-0.35
-2	-2%	-0.88	0%	0.35
-1	-1%	-0.80	-1%	-0.84
1	-3%	-1.96	0%	0.21
2	-7%	-2.88*	-1%	-0.58
3	-5%	-2.51*	-1%	-0.57
4	-6%	-2.48*	-2%	-0.98
5	-8%	-3.03*	-2%	-1.02
6	-7%	-2.68*	-2%	-0.77
7	-6%	-1.88	-2%	-0.82
8	-4%	-1.26	0%	-0.12
9	-4%	-1.31	1%	0.33
10	-3%	-0.92	0%	0.05
11	-2%	-0.63	1%	0.28
12	-4%	-0.98	2%	0.53

* significant at the 5% level

The second sub-sample is based on the financial condition of the company at the time of the downgrade. Downgrades are classified into two groups, those that were investment grade at the time of the downgrade and those that were noninvestment grade at the time of the downgrade. Companies that were investment grade were in stronger financial standing than those that were not. In Table 9 we summarize the results from this sub-sample.

For the event window to be statistically significant at a 95 percent level for the investment grade scenario, it had to have a t-value of +/-2.00 or larger. This was the case for abnormal returns calculated ten months to eight months prior to the rating downgrade announcement. Abnormal returns were also significant two months to six months after the rating downgrade. These results are similar to the earlier results in Table 6. The abnormal returns listed below were not significant as close to the actual downgrade as they were in Table 6, eight months prior vs. about five months prior. Results in Table 6 revealed significant abnormal returns longer after the downgrade as well, however, overall both tables have similar results.

For the event window to be statistically significant at a 95 percent level for the noninvestment grade scenario, it had to have a t-value of +/-2.365 or larger. None of the time periods in Table 8 for the noninvestment grade scenario have abnormal returns. These results should be taken with caution, as there was a very small sample size of only 7 observations.

The results from this sub-sample suggest that companies in a better financial standing, exhibited abnormal returns preceding and following a credit rating change. However, it is hard to compare this with the noninvestment grade sub-sample, as there were limited observations for this analysis.

Table 9. Cumulative Abnormal Returns for Downgraded Companies Based on Financial Condition

	Investment Grade		Noninvestment Grade	
Number of Months CARs Calculated from Rating Change	Mean	t-Value	Mean	t-Value
-12	-4%	-1.44	-34%	-1.91
-11	-6%	-1.97	-33%	-2.03
-10	-6%	-2.04*	-27%	-1.90
-9	-5%	-2.08*	-22%	-1.57
-8	-5%	-2.03*	-13%	-1.23
-7	-4%	-1.71	-10%	-1.09
-6	-4%	-1.70	-10%	-0.74
-5	-3%	-1.53	-10%	-0.88
-4	-2%	-1.08	-7%	-0.74
-3	-1%	-0.43	2%	0.22
-2	-1%	-0.69	-3%	-0.38
-1	-1%	-0.87	-2%	-0.29
1	-1%	-1.31	-11%	-1.39
2	-3%	-2.31*	-24%	-2.09
3	-3%	-2.08*	-15%	-1.55
4	-4%	-2.20*	-11%	-1.48
5	-5%	-2.64*	-20%	-1.87
6	-5%	-2.47*	-12%	-1.23
7	-5%	-1.90	-5%	-0.64
8	-3%	-1.31	-1%	-0.15
9	-3%	-1.24	-1%	-0.09
10	-2%	-0.91	-1%	-0.12
11	-3%	-0.87	5%	0.29
12	-4%	-1.29	5.0%	0.22

* significant at the 5% level

An alternative sub-sample could be tested for downgrades when a bond appears on a Credit Watch List prior to the downgrade. The Credit Watch List is guidance that Standard and Poor’s releases prior to a rating change. The List indicates that a company will likely be upgraded or downgraded. The Standard & Poor’s Credit Watch List allows us to classify downgrades as either “listed” or “not listed.” Classifying downgrades into these two categories would allow us to analyze if there is any difference in the presence of abnormal returns if a downgrade is anticipated prior to the downgrade.

Hand, Holthausen and Leftwich (1992) analyze this effect. They label both downgrades and upgrades as either “contaminated” (those on Standard and Poor’s Credit Watch List prior to the rating change) or “noncontaminated” (those not on the Standard and Poor’s Credit Watch List prior to the credit rating change). In general, that study finds little evidence of positive excess returns following upgrades on stock prices and they do not find a different result when classifying the upgrades as contaminated or noncontaminated. However, they do find excess negative returns on stock prices following a downgrade. When classifying the credit rating change as contaminated or noncontaminated, negative excess returns exist in both categories. For purposes of this study, it would be interesting to see if the results are similar to Hand, Holthausen and Leftwich’s study. This could be a possible analysis for a future study.

Chapter 5
Summary and Conclusions

This study examines abnormal returns for U.S. shareholder-owned electric utilities before and after bond rating changes. Bond rating data is gathered from Standard and Poor's during 2000–2006. We examine the returns using cumulative abnormal returns, controlling for firm size. We find no reliable abnormal returns for upgrades, but we do find significant abnormal returns for downgrades, both before and after the downgrade. Significant abnormal returns are present anywhere from twelve months prior to the downgrade to five months prior to downgrades. Following the credit rating downgrade, significant abnormal returns are present two months to eight months after. When controlling for size, results on downgrades are similar to an overall utility index, both for reference portfolios as well as for control firms.

Downgrades are further broken down into sub-samples: one to look at two time periods (2000–2003 and 2004–2006) and one to consider investment grade versus noninvestment grade bonds. At first glance, the time period appears to be significant, suggesting macroeconomic events affect the significance of abnormal returns. However, the results are not consistent from year-to-year, leading to unreliable conclusions on whether or not macroeconomic events affect abnormal returns.

Finally, the company's current financial status at the time of the downgrade is analyzed. We do this by separating companies into investment grade and noninvestment grade bonds. This analysis reveals that investment grade companies at the time of the downgrade do exhibit abnormal returns before and after the downgrade while noninvestment grade companies do not. However, due to lack of observations, it is not possible to draw conclusions from this sub-sample analysis.

We conclude that bond rating upgrades are processed differently by the equity market than bond rating downgrades. Upgrades appear to be already priced into the market before and after the upgrade announcement. Downgrades exhibit abnormal returns before and after the downgrade. This implies that downgrades provide new information to the stock market and, although they are anticipated by the market (as seen in abnormal returns prior to the downgrade), they still exhibit abnormal returns after the downgrade.

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