SINGLE NOTCH VERSUS MULTI NOTCH CREDIT RATING CHANGES AND THE BUSINESS CYCLE

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Issuers' credit ratings change by one or more notches when credit rating agencies provide new ratings. Unique to the literature, I study the influences affecting multi notch versus single notch rating upgrades and downgrades. For Standard & Poors data, I show that rating changes with multiple notches provide more information to the market than single notch rating changes. Consistent with prior literature on the business cycle, I show that investors value good news rating changes (upgrades) more in bad times (recession) and that investors value bad news rating changes (downgrades) more in good times (expansion).

I model and test probit models using variables capturing the characteristics of the previous issuer's credit rating, liquidity, solvency, profitability, and growth opportunity to determine the classification of single notch versus multi notch rating changes. The determinants of multi notch versus single notch rating changes for upgrades and downgrades differ. Business cycle influences are evident.

Firms that have multi notch rating upgrades and downgrades have significantly different probit variables vis-à-vis firms that have single notch rating upgrades and downgrades. The important characteristics for determining multiple notch upgrades are a firm's prior rating change, prior rating, cash flow, total assets and market value. The important characteristics for determining multiple notch downgrades are a firm's prior rating change, prior rating, current ratio, interest coverage, total debt, operating margin, market to book ratio, capital expenditure, total assets, market value, and market beta. The variables that differ for multi notch upgrades in recessions are cash flow, net income, operating margin, market to book ratio, total assets, and

retained earnings. The variables that differ for multi notch downgrades in expansions are a firm's prior rating change, current ratio, interest coverage ratio, debt ratio, total debt, capital expenditure and market beta.

The power of the explanatory tests improves when the stage of the business cycle is considered. Results are robust to consideration of rating changes across rating categories, changes from probit to logit, alternative specifications of accounting variables, lags and leads of recessions and expansions timing, Fama and French industry adjustments, and winsorization levels of variables.

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CHAPTER 1

INTRODUCTION

This chapter is divided into seven sections. Section 1.1 gives a background on the rating changes. Section 1.2 states the problem that this study investigates. Section 1.3 states the purpose of the study. Section 1.4 discusses the hypotheses of the study. Section 1.5 provides a brief discussion of the data and methodology used in the study. Section 1.6 discusses the contribution of this study. Section 1.7 gives an overview of how the rest of the chapters are organized.

1.1 Background

Credit rating agencies communicate their proprietary information through the single notch and multiple notch (multi notch) rating upgrades and downgrades. Ratings are applied to either a specific bond or to the issuing firm itself.[1] Bonds ratings reflect the issuer's creditworthiness with respect to the specific bonds rated while issuer's ratings (the focus of this study) reflect the issuer's overall creditworthiness to its obligations. Standard & Poor's (2013) states "[Issuer's rating] does not apply to any specific financial obligation, as it does not take into account the nature of and provisions of the obligation, its standing in bankruptcy or liquidation, statutory preferences, or the legality and enforceability of the obligation."

Standard & Poor's (S&P) issuer's credit ratings change by either one notch or more than one notch (multi notch), for example, changing from AA- to AA versus changing from AA- to AA+. More than one-sixth of all upgrades and close to one-third of all downgrades are multi notch rating changes (see Figure 4.1 & Table 4.1).

[1] Note that rating agencies also provide ratings on a firm's preferred stocks or on a government.

1.2 Statement of the Problem

The extant literature has given substantial focus to upgrades and downgrades (see, for example, Dichev and Piotroski, 2001; Bannier and Hirsch, 2010). However, very few (Hand et al., 1992; Bannier and Hirsch, 2010; Purda, 2007) have acknowledged that the size (notch) of the rating changes may matter. Indeed, multi notch rating upgrades and downgrades are expected to be different given S&P's recurrent contentions that the agency changes the ratings of a firm only if it expects the new rating to sustain for a relatively long period (Loffler, 2002; Mahoney, 2002). Put another way, multi notch rating changes imply a "swift change" or "sharp changes" in the credit quality of a firm (Hand et al., 1992; Bannier and Hirsch, 2010; Purda, 2007).

These studies mentioned above, however, do not examine whether investors' reactions to multi notch rating upgrades and downgrades relative to single notch rating upgrades and downgrades are conditioned on the prevailing economic climate. These studies also do not examine whether the explanatory power of firm-specific variables (for example, financial ratios) varies across the stages of the business cycle for single notch versus multi notch rating changes.

Examining investor behavior is important given the 2008-2009 financial crisis that suggests that investors' behavior can amplify the impact of bad information when the market is weak. Conversely, the 2010-2014 interval suggests that investors' behavior may decrease the impact of bad information when the market is strong. Behavioral finance predicts a differential information content and a differential investor reaction to multi notch versus single notch rating upgrades and downgrades, amplified by the changing economic climate (Beber and Brandt, 2010; Loh and Stulz, 2014).

The idea of whether the economic climate may have an impact on rating changes stems from the findings of the extant literature that firm ratings are determined by multitude of factors related not only to the firm but also to the economy or the stages of the business cycle (Nickell et al., 2000; Bangia et al. (2002); Amato and Furfine, 2004; Alp, 2013; S&P, 2014). Bar-Isaac and Shapiro (2013) document that the quality of ratings is likely to be different in economic contraction versus economic expansions; they contend that the quality of ratings is better in economic contractions than in expansions. Nickell et al. (2000) document that a firm's default risk increases during economic contraction and that rating agencies are expected to incorporate this change in the rating assessment. Furthermore, factors predictive of the ratings of a firm, for instance, a firm's liquidity and solvency are affected by the changes in the economic climate as documented in Almeida et al. (2004) and Graham and Harvey (2001).

It is important to note here that the prevailing economic climate has been documented to have an impact on investor reactions to news information (Beber and Brandt, 2010; Loh and Stulz, 2014). A bond market study by Beber and Brandt (2010) find that bad macroeconomic news elicits a stronger market reaction in recessions, and good macroeconomic news elicits a stronger market reaction in expansions. Similarly, Loh and Stulz (2014) find that there are just too many news information about a firm coming out during bad times (e.g., economic contractions); thus, any information from a legitimate source should be of more value to the investors during bad times. Thus, ignoring the economic climate at the time of rating changes could lead to a significant loss of power in the test while evaluating investors' reaction to and the determinants of multi notch versus single notch rating upgrades and downgrades.

1.3 Statement of Purpose

My study gives due consideration to the impact of prevailing economic climate at the time of rating changes on investors reaction to and the predictors of multi notch versus single notch rating changes. As per my knowledge, my study is the first to disaggregate the issuer's rating changes into multi notch and single notch rating upgrades and downgrades and to examine rating changes in the context of the business cycle.

The first part of my analysis investigates the changes in investors' behaviors by analyzing investor pricing of good news and bad news information (rating changes) in good times (expansion) versus bad times (recession). I examine whether the size of investor reactions to multi notch rating upgrades and downgrades relative to single notch rating upgrades and downgrades depends on the prevailing economic climate.

The second part of my investigation examines the predictors of single notch versus multi notch rating changes when rating agencies evaluate firm creditworthiness. I examine whether relative importance and size of theoretical explanatory variables offered in the literature to explain firm ratings differ for multi notch and single notch rating changes and whether the predictive ability of limited dependent variable regression is affected by the stages of the business cycle.

1.4 Hypotheses

My hypotheses stem from the rationale that rating agencies signal the arrival of new information about a firm through the decision to change the rating and the size (notch) of the rating changes and that the stages of the business cycle have an impact on how a firm's creditworthiness is reassessed.

The first part of my hypotheses draws from the extant literature that documents a significant impact of the prevailing economic climate on the size of investor reaction to information news. Beber and Brandt (2010) find that bad news elicits a stronger bond market reaction in recessions, and good news elicits a stronger bond market reaction in expansions. Accordingly, I hypothesize that multi notch rating upgrades elicit larger market reaction than single notch rating upgrades during economic contractions and that multi notch rating downgrades elicit larger market reaction than single notch rating downgrades during economic expansions.

The second part of my hypotheses draws from previous studies that document that the economic cycle has an impact on the magnitude of the explanatory variables that explain firms' ratings. Previous studies (Almeida et al., 2004; Myers, 1977; Opler and Titman, 1994) provide substantial evidence that liquidity, solvency, profitability and growth opportunities of a firm show strong variation to the changes in the stages of the business cycle. Accordingly, I hypothesize that firms that have multi notch rating upgrades and downgrades have larger coefficients versus single notch rating upgrades and downgrades in the explanatory tests of liquidity, solvency, and profitability and growth opportunity measures and that the stages of the business cycle influence the relative importance and size of the coefficients.

1.5 Data and Methodology

1.5.1 Data

I use the Bloomberg database to collect 15,850 issuers' rating reassessments by S&P over the period 1993 and 2013. Having data from 1993 through 2013 allows me to examine the stages of the business cycle in the context of rating changes. Over this sample period, an NBER

defined recession is observed twice; one covers the period from April 2001 through November 2001 and the second one covers January 2008 through June 2009.

Following extant literature (For example, Dichev and Piotrioski (2001), Amato and Furfine (2004)), I exclude privately held companies and subsidiaries. Privately held companies are excluded due to the unavailability of the market and accounting information for these firms. Subsidiaries are excluded following the study by Dichev and Piortioski (2001), which finds that the impact of rating changes on the stock prices of the parent firms (for which data is available) is much less pronounced in case of rating changes on subsidiary firms. I collect the market information from CRSP and the accounting information from COMPUSTAT.

One of the limitations of the data is that Bloomberg does not have complete information on ratings for the period prior to 1993; the data after this period seems complete. Despite this data limitation, my sample period has two complete business cycles. Similarly, as suggested above, this study applies only to the rating changes that occur for the parent firm with an issue, and hence the results may not apply to the holding companies.

Another potential limitation of my study is that my sample only covers the rating changes by S&P. In this regard, I follow most of the extant literature that examine rating changes that sample either S&P or Moody's data but not both. For example, Blume et al. (1998) use S&P, while Dichev and Piotroski (2001) use Moody's in their analysis. Following Blume et al. (1998), I sample only S&P's rating changes; however, the results should apply to ratings in general.

Another limitation of the study is that there could be other factors, besides those that I have taken into consideration, which might have more power in explaining rating changes. For

instance, my model does not consider the presence of institutional investors or corporate governance factors, which are found to have a bearing on the creditworthiness of a firm.

1.5.2 Methodology in the Measurement of Abnormal Returns

Similar to extant literature (for example, Purda, 2007; Jorion and Zhang, 2007) my study estimates the abnormal returns for a given period of interest by finding the predictive residuals from the two parameter approach of Sharpe and Lintner. To account for possible cross-sectional correlation in the returns of event firms, I use the approach of Brown and Warner (1980) to test the significance of market reaction to the rating changes. To account for possible event induced variability in the standard error from the model, I also use Boehmer, Masumeci and Poulsen (1991) approach to compute the test. Finally, as a sensitivity test, I also employ a non-parametric test proposed by Corrado (1981) that accounts for both event-induced variability and cross-sectional correlation in the returns of the event firms.

1.5.3 Methodology in the Measurement of Explanatory Factors

I model and test liquidity, solvency, profitability, and growth opportunity as theoretical explanatory variables explaining multi notch versus single notch rating upgrades and downgrades. Given the discrete nature of the dependent variable, I use the probit model; the dependent variable is an integer that equals one if it is a multi notch upgrade (downgrade), zero if it is a single notch upgrade (downgrade). The independent observable variables are the measures of liquidity, solvency, profitability, growth opportunity and other control variables.

1.6 Contribution of This Study

My study has two distinct contributions to the literature. First, I find that investors show much more reaction to the information revealed by multi notch rating upgrades and downgrades

versus single notch rating upgrades and downgrades. Consistent with prior literature on the business cycle, I show that investors value good news rating changes (upgrades) more in bad times (recession) and that investors value bad news rating changes (downgrades) more in good times (expansion). My findings are partly different from the findings of Purda (2007). Purda (2007) finds that only multi notch downgrades elicit a higher abnormal market reaction in comparison to single notch downgrades; however, the author finds no differential market reaction to multi notch upgrades.

I find that publicly available information on firms' prior ratings, accounting, and market variables are the predictors of single notch versus multi notch rating changes. Also, the power of the explanatory tests improves when the stage of the business cycle is considered. Results are robust to consideration to rating changes across rating categories, changes from probit to logit, alternative specifications of accounting variables, lags of recessions and expansion timing, Fama and French industry adjustments, and winsorization levels of variables.

As mentioned earlier, investors' behavior was at the center of the 2008-2009. My study adds to the literature of behavior finance. My analysis investigates the changes in investors' behaviors by analyzing investor pricing of good news and bad news information (rating changes) in bad times (recession) versus good times (expansion).

Also, my models provide analysts with tools to analyze the likely reactions of investors to a firm's creditworthiness at the stages of the business cycle. Besides, this study contributes to a greater understanding of the mechanism of rating changes and of the interplay among firm and economic level factors that potentially influence the reassessment by the rating agencies of the ratings of a firm.

1.7 Chapter Organization

The rest of this paper is organized as follow: Chapter 2 discusses the extant literature on rating changes. Chapter 3 presents the hypotheses. Chapter 4 explains the data and methodology. Chapter 5 presents the results of the research. Chapter 6 examines all of the rating changes including the stable rating confirmation. Chapter 7 does the robustness test. Chapter 8 discusses the results, gives the concluding remarks, discusses the limitations of the study, and states the direction of future research.

CHAPTER 2

LITERATURE REVIEW

In this chapter, I review the literature relevant to credit ratings. This chapter is further divided into two sections. Section 2.1 reviews the literature on rating changes, the information content of rating changes, and the market reaction to rating changes. Section 2.2 reviews the literature on the determinants of the ratings and rating changes.

2.1 Rating Changes and the Market Reaction:

In this section, I present the literature that examines rating changes and the information content of rating changes in different contexts. This section is further divided into six subsections organized as follow: Section 2.1.1 discusses the market reaction to rating changes. Section 2.1.2 looks into the literature on the information revealed by rating changes. Section 2.1.3 looks into the literature on multiple notch rating changes. Section 2.1.4 discusses the impact of the stages of the business cycle on rating changes. Section 2.1.5 discusses the rating changes that occur within and across rating category. Section 2.1.6 discusses the methodology used by the extant literature in measuring the reaction to the information content of rating changes.

2.1.1 Market Reaction to Rating Changes

Several studies, for example, Kaplan and Urwitz (1979) and Jorion, Liu and Shi (2005), claim that rating agencies use both public and non-public information while determining the credit ratings for issuers[2]; thus rating changes carry new information for investors. Other studies, for example, Holthausen and Leftwich (1986) and Dichev and Piotrioski (2001)

[2] More on the nature of information that the rating agencies possess about a firm is discussed in detail in section 2.1.2.

examine whether investors perceive any new information in the rating changes. Market excess reaction to the announcement of rating changes would be a sign that market perceives new information in rating changes. Based on the studies aforementioned, excess return is expected if a firm has a rating change.

When the reaction to rating changes is examined in the bond market, literature, for example, Katz (1974) and Hand et al. (1992), finds that bond market reacts to the announcement of bond rating changes. These studies conclude that investors in the bond markets do find rating changes to be a new information event.

The stock market should react to the changes in the bond ratings if such bond ratings provide new information to the market (Pinches and Singleton, 1978). Pinches and Singleton (1978) claim that, in an efficient market, information about a change in a firm's financial condition would "flow freely between the bond market and the stock market."

Studies that examine the impact of the announcement of bond rating changes on the stock prices document differing findings. One of the earlier studies, Pinches and Singleton (1978), does not find any impact of rating changes on the monthly stock prices. The study suggests that the change in a firm's financial condition is perceived by the "investment community" long before such rating upgrades and downgrades are announced by the rating agencies. Thus, these authors conclude that the rating agencies use information about a firm's financial and operating performances that investors have already recognized and incorporated in the stock prices.

Studies that use daily data, however, do find the impact of bond rating changes on stock prices. Glascock et al. (1987), one of the first studies to use the daily data, study the effects of bonds rating changes on equity returns and find that information of credit rating changes was

not fully anticipated by the market as claimed by Pinches and Singleton (1978). Glascock et al. (1987) find significant abnormal returns around rating downgrades. For upgrades, Glascock et al. (1987) do not find any significant reaction on the day of the announcement but do find negative drift in the residuals after the announcement.

The finding of asymmetrical reaction to rating upgrades and downgrades by Glascock et al. (1987) is well documented in the literature (Holthausen and Leftwich, 1986; Hand et al., 1992; Dichev and Piotroski, 2001). That is, in case of downgrades, the literature consistently finds negative abnormal stock returns before the announcement of downgrades and establishes that generally, the downgraded firms continue to provide negative returns post-downgrade announcement. While examining the stock market reaction to upgrades, these studies document a positive excess returns before the announcement of upgrades. The abnormal stock returns post announcement of upgrades, however, are either not significant or economically very small.

Hand et al. (1992) conclude that, since the corporations voluntarily release positive information, upgrades simply reflect the positive changes in the firm that has already been embedded in the stock prices and hence upgrades do not provide any new information. On the other hand, firms withhold negative information; thus, downgrades do contain new information as the negative information is revealed by the rating changes.

Beaver et al. (2006), also examine information asymmetry that characterizes rating upgrades and downgrades. They claim that the response to the upgrades and downgrades is bound to be asymmetric since “the losses due to overvaluation is larger than the forgone gain due to undervaluation.” Accordingly the rating agencies incorporate bad news sooner than good news.

Consistent with the information asymmetry idea of Hand et al. (1992) and Beaver et al. (2006), Campbell et al. (2008) find that distressed firms (firms with lower credit ratings) provide lower returns because of more pronounced informational asymmetry compared to less distressed firms.

On a different note, Goh and Ederington (1999) analyze the level of reaction to rating changes that occur within and across the investment or speculative grade. They find that abnormal stock return is much more negative for the rating changes when the downgrades are within the speculative bond category or when the stocks fall into speculative from investment grades ("fallen angels"). The rating downgrades within investment category show a little reaction. They also document that the stock market reacts more strongly if the firm's pre-announcement returns were negative and large.

Dichev and Piotrioski (2001) and Avramov et al. (2009a) examine the market performance of the stocks after the rating changes. Both of these studies document that the stock of downgraded firms continues to underperform post rating changes. Dichev and Piotrioski (2001) claim that investors underreact to the announcement of downgrades. Avramov et al. (2009a) observe "about-to-be downgraded high credit risk stocks" look cheap since their prices decline before the announcement of downgrades. Investors buy these stocks before the downgrades, but as the stocks get downgraded, they start selling the stocks thus, leading to negative returns. Avramov et al. (2009a) claim that this mispricing is sustained by illiquidity and short sell constraints after the downgrades.

2.1.2 Information Content of Rating Changes

Pinches and Singleton (1978) claim that rating agencies review a firm's rating if the firm's financial condition has changed significantly. They also point out that there may be

significant events affecting a company's fundamentals that might make the rating agencies to reconsider the firm's rating. Such event could be an issue of new debt or equity, mergers, reorganization, et cetera. Thus, rating changes potentially convey significant information on the firms rated.

The reaction to bond rating changes on stock prices depends upon the impact of the rating changes in the information asymmetry between the issuer and the investors (He, Wang and Wei, 2011). They observe that when firms get upgraded, the market takes the signal positively as the information gap between the informed and uninformed investors narrows. Further, He et al. (2011) find that, for firms with initial rating grade of BBB or below, the uninformed buyers become more active in the trading of the stocks following the upgrades. Also, they claim that information asymmetry reduces "dramatically" following an unexpected rating change. Thus, the magnitude of the market reaction to rating changes depends on whether or not rating changes carry an element of surprise.

Another take on the content of rating changes comes from Vassalou and Xing (2003). They posit that the stocks that have recently had large increases in their default risk (measured by default likelihood indicator (DLI)) elicit much higher returns in comparison to the stocks with large decreases in their default risks. Thus, Vassalou and Xing (2003) claim, the firms face negative abnormal returns following the downgrades reflecting the increment in the distress risk. They do not find any such evidence of significant change in distress risk around the announcement of the upgrades. Vassalou and Xing (2003) claim that stability in the distress risk is the reason why there is no stock reaction after rating upgrades. They posit that credit rating changes may play a disciplinary role because: (i) rating changes warn the firms that are not doing well through downgrades (thus, penalizing the firms by making their cost of borrowing

high), and (ii) rating changes reward the firms that are doing well with an upgrade (thus, potentially lowering their cost of borrowings).

Another relevant question is: do the rating changes provide any hint about the future performance of the firm being rated? In that line, Ederington and Goh (1998) examine whether rating changes impound any information on the future performance of the firm. They conclude that while the rating changes acknowledge the changes in the economic conditions of the firm in the past, the rating changes also provide information on the future changes in earnings following the rating changes. More specifically, since the market sees information on downgrades about the future performance of the firm, the market continues to penalize the firm after the downgrade announcements as bad news keep coming out for these firms. However, since there is very little, or no stock reaction following upgrades, Ederington and Goh (1998) claim that the market had already "impounded" the information revealed by the upgrades.

Furthermore, Ederington and Goh (1998) claim that earnings (measured by EPS) go down following the downgrades. Thus, downgrades seem to signal that the earnings of the firms are likely to go down in future. However, earnings following the upgrades do not show any significant changes implying that the upgrades do not provide any information on the future earnings of the firm upgraded. Ederington and Goh (1998) insist that this asymmetrical result exist because firms reveal positive information themselves but withhold negative information that downgrades eventually reveals.

Another reason investors find rating changes to be information event is because the credit rating changes cause the firms to change their future policies (Khieu and Pyles, 2012). Khieu and Pyles (2012) document that firms that get downgraded increase their excess cash holdings and that the firms that get upgraded show no significant changes in their cash policy.

Khieu and Pyles (2012) contend that since the firms that get downgraded face more costly financing, the firms respond by saving cash. This finding is consistent with earlier study by Almeida et al. (2004), which claim that firms that are constrained (have difficulty in accessing fund or have costly funding) tend to save cash from their cash flow. Hence, rating changes give a foresight to investors about the future policies of the firms rated.

2.1.3 Multi Notch Rating Changes

Multi notch rating changes imply an assessment of considerable changes in either current or future economic conditions in firms; therefore, multi notch rating changes should reflect more information available to investors than single notch rating changes (Hand et al., 1992; Bannier and Hirsch, 2010; Purda, 2007). These studies acknowledge that the size of rating changes (represented by notch) has an impact on the market reaction following the rating changes. Bannier and Hirsch (2010) find that size of the rating changes has an impact on explaining three days cumulative average returns (CAR) for downgrades.

Similarly, Hand et al. (1992) find that the size of rating changes has an impact on explaining the CAR around the announcement of upgrades and downgrades for contaminated observations (the observations with other announcements/news about the firm being rated). For the sample of non-contaminated observations, they do not find any different price reaction. Hand et al. (1992) claim that multi notch rating changes imply that the rating agencies responded quickly to certain events that led to swift rating changes.

Consistent with these studies, Purda (2007) finds significant abnormal returns for downgrades and multi notch downgrades announcements. Purda (2007) does not find significant abnormal returns for upgrades or multi notch upgrades announcement. Purda (2007) documents

positive significant stock returns post multi notch downgrades announcement, and negative significant stock returns post multi notch upgrades announcement.

2.1.4 Impact of the Stages of the Business Cycle on Rating Changes

Several studies claim that the stages of the business cycle have a strong influence on the rating matrix transitions (Nickell et al. 2000; Bangia et al., 2002; Amato and Furfine, 2004). These studies contend that the stage of the business cycle has an impact on rating changes because default probabilities are heavily influenced by the stage of the business cycle. S&P (2014) also insist that "the pattern of business cycle" is an important factor that goes into ratings in so much as the stage of the business cycle has an impact on the long-term stability of the firms.

Amato and Furfine (2004) suggest that stages of the business cycle factor into rating changes due to the "financial accelerator effects" as documented in Bernanke et al. (1999). Consistent with these views, Bar-Isaac and Shapiro (2013) contend that the credit ratings are countercyclical. More specifically, the quality of rating changes is better in economic contractions than in expansions. A study by Bar-Isaac and Shapiro (2013) suggests that rating agencies use more stringent criteria while reassessing the current issuer's rating in contractions.

A detailed analysis of the impact of the stages of the business cycle on rating changes and the importance of incorporating such impact is found in Bangia et al. (2002). Bangia et al. (2002) documents that, in order to maintain the same rating levels, financial institutions would need to have 30% more economic capital (minimum needed in the worst case scenario) in contractions than in expansion. For example, they find that for 99.9% level, an institution with an A rating would have to have 25% more economic capital in economic contraction versus expansion.

When it comes to market reaction to an information, consistent with the views of the studies above, Beber and Brandt (2010) find that bad news elicit a stronger bond market reaction in recessions and good news elicit a stronger bond market reaction in expansions. Another study, Loh and Stulz (2014), suggest that an investor finds a piece of information more valuable if such information arrives in bad times (the business cycle contractions) than in good times (the business cycle expansions).

Studies that investigate the impact of the business cycle (Bangia et al., 2002; Amato and Furfine, 2004) on rating changes do not give due consideration to the difference between multi notch and single notch rating changes. The studies that examine multi notch and single notch rating changes (Hand et al., 1992; Bannier and Hirsch, 2010; Purda, 2007) do not investigate the impact of the stages of the business cycle on the rating changes.

Purda (2007) that examines whether multi notch rating changes may be different from rating changes (all) uses the sampling period between 1990 and 2001; this period does not include a complete business cycle. Given the finding of Beber and Brandt (2010) and Loh and Stulz (2014) as mentioned above, findings of Purda (2007) is likely not to be a representative of the real picture.

As per my study, no paper has yet examined the stock price reaction to the multi notch versus single notch rating changes in the context of the business cycle; my study fills this gap. My study carefully considers the impact of the business cycle on the market reaction to multi notch versus single notch rating changes.

2.1.5 Rating Changes and Change in Rating Category

An issuer's rating changes can occur within a rating category (e.g., downgrade from AA+ to AA, i.e., within the rating category "AA") or across a rating category (e.g., downgrade from AA to AAA).

Some studies (see Pinches and Singleton, 1978; Hand et al. 1992) that examine bond rating changes (as opposed to issuer's rating changes) examine the rating changes that lead to change in the rating category of the bonds. Holthausen and Leftwich (1986) examine the rating changes that occur within the category (e.g., downgrade from AA+ to AA) and the rating changes that occur across the categories (e.g., downgrade from AA to AAA). Hand et al. (1992) find no reliable reaction to the upgrades announcement, but significant negative returns to the downgrades pre and post downgrades announcement. They, however, do not disaggregate rating changes into the multi notch and single notch rating changes.

Holthausen and Leftwich (1986) find that change in rating category matters. They find substantially higher abnormal stock returns for downgrades that occur across rating category versus those that occur within rating category (-2.66% vs. -0.27% for day 0 to +1). Holthausen and Leftwich (1986) find excess returns only for the sample of downgrades but no significant excess returns for upgrades either within or across rating category. However, when they examined the rating upgrades across category for a sample of non-contaminated upgrades (sample with no "concurrent information") that had credit rating watch prior to the rating changes, they do find significant positive returns for upgrades. These authors claim that the upgrades may not be timely; another factor could be that the management did not have an incentive to release bad news.

2.1.6 Measurement of Information Content of Rating Changes

Studies measure the stock market reactions to the rating changes announcement as a measure information content of the rating changes. Hand et al. (1992) calculate returns as the raw returns in excess of the risk-free rate. However, most of the studies that examine the stock market performances use market model to estimate the abnormal stock returns (see for example, Pinches and Singleton, 1978; Griffin and Sanvicente, 1982; Holthausen and Leftwich, 1986).

More recent studies use either the market model or the Fama-French three-factor model to calculate the abnormal market returns after an event. Dichev and Piotroski (2001), for instance, use three-factor model to account for the risk factors. Results reported by these authors are not very different from the others mentioned above. When it comes to adjusting for the risk measures of Fama-French three factors model, Jorion and Zhang (2007) claim that risk adjustment is not crucial while examining a short event window around the announcement of credit rating changes.

2.2 Determinants of Rating Changes

The information set rating agencies use for assessing and reassessing the ratings (creditworthiness) of a firm has been a focus of many studies (see Kaplan and Urwitz, 1979; Blume et al., 1998; Amato and Furfine, 2004). The proprietary information and analysis are unobservable, yet Avramov et al. (2007, 2009a) and Alp (2013) posit that pre-event firm characteristics capture this information set.

Kaplan and Urwitz (1979) document results consistent with the idea that publicly available information can capture the information set used by the rating agencies. They document that a model that uses cash coverage ratio, leverage ratio, profitability ratio, firm size, idiosyncratic risk (standard error of stocks return) and systematic risk (market beta) correctly

predict up to 69% of the rating changes and 100% of the ratings levels within one category of correct rating.

Blume et al. (1998) observe that S&P uses publicly available information as an input to the mechanism of credit ratings. Blume et al. (1998) thus, attempt to capture credit rating changes from publicly available information. They use several accounting ratios- pretax interest coverage, operating income to sales, long-term debt to assets, total debt to assets, firm size (market value). Besides these ratios, they also include market variables, i.e., beta coefficients and standard errors calculated from the market model. They document a positive relationship between interest coverage, operating margin, market value and credit rating changes, and a negative relationship of long-term debt leverage, beta and standard error with rating changes.

A study that examines credit ratings, Alp (2013), claims that both market and firm's financial variables can explain for firms' credit ratings. The study suggests that interest coverage, operating margin, long-term debt, total debt, NYSE size percentile, market beta of the stock (systematic risk), idiosyncratic risk (market model standard error), dividend payer, market to book ratio, capital expenditure, cash balances, and tangibility capture the information used by rating agencies to reassess a firm's rating.

Amato and Furfine (2004) claim that business cycle should be considered along with business risks and financial risk while predicting rating levels. Accordingly, they use variables that capture business risks and financial risk in predicting the rating levels. They use firm size (market value), systematic (market model beta) and idiosyncratic (market model standard error) components as proxies for business risk and accounting ratios to capture the financial risks (for example, liquidity and leverage ratios). Amato and Furfine (2004) document that, when examined within the context of NBER stages of the business cycle, firms that had investment

grade ratings or firms that have had rating changes show the sign of procyclicality. That is, the stages of the business cycle have an impact on how the rating agencies reassess a firm's credit rating.

Another viewpoint on the impact of the stages of the business cycle in credit rating changes comes from Bangia et al. (2002). Bangia et al. (2002) claim that the "expected appreciation minus unexpected losses [in economic capital], that might occur" would be lower during economic contraction since the maximum loss in value is much higher during contraction (more than twice of that in expansion). To maintain the same rating level, institutions should carry more (30% higher) economic capital during contractions than in expansions. Following the same logic, upgrades would require higher appreciation in economic capital during the contractions than in expansions. This appreciation would be reflected in better fundamentals for the firm. Accordingly, it is likely that downgrades are initiated because of the possibility of lower expected appreciation and/or higher unexpected loss in economic capital for these firms; and that the effect is stronger for multi notch downgrades.

General approach to predicting rating levels is consistent with the approach that predicts distress risk or default probabilities. This similarity is expected since credit rating changes are attempting to capture distress risk of a firm (Kaplan and Urwitz, 1979; Blume et al., 1998). Shumway (2001) claims that the model that includes "market-driven variables" such as, market size, the past returns, and the standard deviation of the past returns, performs much better than the model with only accounting variables in predicting bankruptcy. In a similar tone, Campbell et al. (2008) use firms' accounting variables and market variables to explain distress risk. The market variables used by Campbell et al. (2008) are market capitalization, past stock returns, and the idiosyncratic standard deviation of stock returns. Firms' financial variables they used

are net income to total assets and the ratio of total liabilities to total assets. Campbell et al. (2008) find that firms with higher earnings, bigger size, higher market to book and lower idiosyncratic risks are least likely to fail.

In the following subsections, I discuss several corporate theories that are tied to rating changes. Section 2.2.1 looks into the literature on firm liquidity, 2.2.2 on firm solvency, 2.2.3 on firm profitability, 2.2.4 on firm growth opportunity and 2.2.5 on other factors that can potentially explain rating changes, and 2.2.6 finally discusses the methods that the extant literature have used to explain the rating changes.

2.2.1 Short-term Liquidity, Rating Changes, and Business Cycle

A firm's liquidity has a direct impact on its ability to take valuable projects (Keynes, 1936; Almeida et al., 2004). In the context of rating changes, Acharya (2012) finds that firms that have highest ratings and those that have the lowest ratings tend to have high liquidity, proxied by cash flow, current ratio, quick ratio and interest coverage. Acharya (2012) observes that the firms that are rated highly (AAA and AA) have better ratings probably because these firms have high liquidity and low leverage. Moreover, the firms that have lower ratings (rated below BBB-) also have more liquidity because they need more cash as a cushion against unpredictable events.

Following the same logic, I contend that firms receive multi notch upgrades because these firms had higher than average liquidity and had enough savings to take positive NPV projects. Thus, firms receive multi notch downgrades because these firms were not able to save internally and thus, jeopardizing their ability to pay the creditors.

Almeida et al. (2004) claim that firms' cash flow patterns respond to the macroeconomic shocks. Firms that are financially constrained increase their cash flow while firms that are sound

will not show any systematic patterns over the business cycle. In other words, firms will have "propensity to save" from internal cash flow when macroeconomic shocks constrain their liquidity.

My study reflects the finding that stages of the business cycle has an impact on the measure of liquidity in explaining single notch versus multi notch rating changes. Thus, in case of upgrades subsample, I project that the firms that have multi notch upgrades in contractions are more able to save from their cash flow in comparison to the firms that receive single notch upgrades in contractions. In other words, the weight on the liquidity measures should be more for the upgrades that happen during economic contractions than in expansions. Following the same logic, I project that the firms that have multi notch downgrades have more negative savings from their cash flow in comparison to the firms that have single notch downgrades. The variables used as proxies for liquidity are Cash Flow, Net Working Capital and Current Ratio following the literature above mentioned.

2.2.2 Long-term Solvency, Rating Changes and Business Cycle

Long-term solvency is another factor I hypothesize will have an impact on the credit ratings of a firm. Leverage has a bearing on the distress risk of a firm (Myers, 1977). Myers (1977) also claims that risky firms borrow more than less risky firms.Similarly, Altman and Saunders (1997), Altman (1996), and Blume et al. (1998) examine capital structure as a proxy for distress risk to study the impact of a firm's capital structure in credit ratings. These studies find that firms with high leverage have higher distress risks. Consistent with these studies, Graham and Harvey (2001) find that credit rating is the most important factor for a firm in determining its capital structure. Graham and Harvey's finding is intuitive because highly

levered firms can go insolvent even if there is a little change in firm value (Carey and Hrycay, 2001).

My hypothesis reflects the rationale that the firms with low debt to asset ratio and/or interest coverage ratio, and hence better solvency, tend to have multi notch upgrades rather than single notch upgrades[3]. Similarly, the firms with high debt to asset ratio and/or interest coverage ratio tend to have multi notch downgrades rather than single notch upgrades.

Opler and Titman (1994) find that firms that have high leverage lose firm value during recessions more than their less levered counterparts. Also, these firms with high leverage underperform their counterparts and have constraints in generating cash flow during recessions thus, increasing their default risk. The reasoning given by Opler and Titman (1994) is that firms with high leverage have constraints in generating cash flow during recessions.

Following the finding of Opler and Titman (1994), I contend that the measures on long-term solvency are stronger (weaker) for firms upgraded (downgraded) during economic contraction versus those upgraded (downgraded) during economic expansion. Put another way, firms were upgraded by multiple notches in contraction because these firms consistently had superior solvency than the firms that had single notch upgrades warranting them such upgrades. Similarly, firms that were downgraded by multiple notches during contractions were firms that had worse (high) Debt to Asset Ratio and/or Interest Coverage ratio during contractions than in expansions in comparison to the firms that had single notch downgrades in contractions.

2.2.3 Profitability, Rating Changes, and Business Cycle

Profitability is another important factor considered in rating changes (S&P, 2013). Demirtas and Cornaggia (2013) find that there is a significant positive relationship between

[3] The proxies used to measure long-term solvency based on previous studies are debt to total assets ratio and interest coverage ratio.

earnings and initial credit ratings; they even claim that firms engage in earnings management before credit ratings. In line with Demirtas and Cornaggia (2013), a study by Griffin and Lemmon (2002) documents that a firm's profitability, proxied by return on assets, is inversely related to its distress. Griffin and Lemmon (2002), thus, contend that firms have higher distress risk because of bad performances in the past. It is possible that profitable firms are in better position than their non-profitable counterparts in meeting their financial commitment.

My analysis reflects the claims of S&P (2013) and Demirtas & Cornaggia (2013). I expect that a firm's change in profitability prior to its rating change has an impact on whether the firm will get a multi notch or a single notch rating change. More specifically, I contend that firms upgraded by multiple notches have better profitability than firms upgraded by a single notch. By the same token, the firms that were downgraded by multiple notches had worse profitability than firms that were downgraded by a single notch.

Opler and Titman (1994) find that financial condition has an impact on firm performances. Specifically, during the industry downturn, the firms that were highly leveraged suffer worse performance in comparison to the firms that were less leveraged. If rating agencies consider the changes in the financial performance of firms during the downturn as the future trend for the firm, the new rating change is expected to reflect this trend (Loffler, 2004).

Giving due consideration to the finding of Opler and Titman (1994) and Loffler (2004), my study examines whether the states of the business cycle has an impact on the measures of profitability. I contend that firms upgraded in recession by multiple notches had much better profitability vis-à-vis firms upgraded by a single notch. Similarly, firms downgraded in recession by multiple notches had much worse profitability vis-à-vis firms downgraded by a

single notch. Based on the literature mentioned above, I have Net Income and Operating Margin as the proxies for firm profitability.

2.2.4 Growth Opportunities, Rating Changes and Business Cycle

Literature documents that distress risk is related to growth opportunity. Myers (1977) claims that "thus, part of the value of a firm is accounted for by the present value of options to make further investments on possibly favorable terms." In other words, firms in distress are forced to forgo positive NPV projects due to their inability to borrow corporate debt on favorable terms while firms that have financial slack can easily fund future investments.

My examination reflects the claim by Myers (1977) that a firm's growth opportunity is a function of its distress risk and its ability to borrow corporate debt. Firms that have higher credit ratings are the firms that have taken positive NPV projects; while firms with lower credit ratings are forced to forgo positive NPV projects as these projects would have to be funded at the cost of future default. Thus, I expect that firms with a more positive change in growth opportunities receive multi notch upgrades versus single notch upgrades. Following the same logic, I expect the firms that receive multi notch downgrades had much lower- likely negative- change in growth opportunity versus firms that receive single notch downgrades.

A firm's market value of assets declines during economic contraction; furthermore, a firm's ability to borrow is affected by the stages of the business cycle (Korajczyk and Levy, 2003). Korajczyk and Levy (2003) and Levy and Hennessy (2007) document that unconstrained firms (firms with high level of cash and low agency cost) borrow more debt in recessionary times to fund investment opportunities when the compensation of the managers are low (and a manager's equity share is low). Constrained firms, on the other hand, borrow more during expansionary times when the value of their collateral is highest. Additionally, a constrained

firm's ability to borrow is lower during economic contractions. Thus, I expect that the firms that are rated favorably are unconstrained and thus, have strong ability to borrow and invest in their growth opportunities despite the economic contraction. The proxies used to capture firm growth opportunities, as per the studies aforementioned, are Market to Book Value, Research, and Development Expenditure and Capital Expenditures.

2.2.5 Other Factors Relevant to Rating Changes

The broader the operation of a business and the older a business is, the more likely it is to have stable revenues and cash flows. The broader operation should, thus, translate into higher credit ratings (Blume et al., 1998). Blume et al. (1998) use the size of the firms to proxy for a firm's stability. Fama and French (1995) claims that size of a firm captures its risks. Accordingly, I include size as a variable in my analysis.

Also, retained earnings, a measure of a firm's age (Altman 1968), has been found to have an impact on rating changes (Alp, 2013). Furthermore, consistent with the tradeoff theory of Myers and Majluf (1984), firms use up retained earnings (internal equity) during constrained times (Korajczyk and Levy, 2003).

Also I have the market model beta to capture equity risk of a firm in terms of its ability to generate operating cash flow and the risk arising from its choice of leverage (Shumway, 2001; Campbell et al., 2008). Further, during the economic recession a firm risk is expected to increase reflecting into higher beta.

Previous studies have found that whether a firm previously had upgrades or downgrades has an impact on its future rating changes (see, for example, Purda, 2007). Purda (2007) finds that a firm that has had downgrades is more likely to get downgraded in future while a firm that has had upgrades is more likely to be upgraded again everything else held constant.

2.2.6 Methods of Predicting the Ratings and Rating Changes

Kaplan and Urwitz (1979), one of the earliest to attempt to predict the rating levels, use financial ratios- interest coverage ratios, leverage ratios, profitability ratio, size variables- to capture credit rating mechanisms used by the rating agencies. The ratios Kaplan and Urwitz (1979) use are five-year averages of the respective annual ratios. The rationale is that the rating agencies look at longer time horizon than just a year in reviewing the ratings. They use OLS and confirm that the probit model did not perform better.

Most of the literature that model rating changes, however, use the ordered probit model to predict rating levels (look for example, Blume et al., 1998; Amato and Furfine, 2004; Purda, 2007; Alp, 2013). Naturally, these studies use the firms' level of rating as a dependent variable and their accounting and market variables as independent variables. These studies use a combination of liquidity, solvency, profitability and growth opportunities factors among others.

In terms of the type of ratings, some studies, for example, Holtheusan and Leftwitch, Blume et al., (1998) examine ratings applied to particular issues. Other studies, for example, Amato and Furfine (2004), Purda (2007), Alp (2013) examine ratings assigned to the issuers as opposed to the ratings assigned to a particular issue. Amato and Furfine (2004) claim that issuer's rating are "the purest measure of default risk" and that these ratings "capture the basic ability and willingness of a firm to meet its ongoing financial obligations." Both of these strands of literature document that similar accounting and market variables capture the rating levels.

In the context of rating changes within versus across rating category, Blume et al. (1998) and Amato and Furfine (2004) examine only the rating category ignoring the rating notches. Purda (2007) and Alp (2013) examine the ratings in terms of rating notches.

In order to maintain consistency, literature that examines rating changes (as opposed to rating levels), for example, Amato and Furfine (2004) and Purda (2007), use changes in the values of independent variables rather than the values of the variables. However, the literature that examines rating levels, for example, Blume et al. (1998), use the values of the independent variables in an attempt to predict the rating levels.

To evaluate the validity of the fitted regression models used to classify rating levels, Kaplan and Urtwitz (1979) examine the rate of correct prediction for a holdout sample. The authors hold out a subsample from the main sample. Using the fitted multiple-regression model obtained from the estimation data, the authors assess the rate of correct classification for the hold out subsample. A good rate of classification is an indicator of a well-fitted model.

To mitigate the effects of outlier in the data sets, Core et al. (2003), Alp (2013), winsorize their samples by setting the extreme values of the independent variables equal to the values at the 1% and 99%. Core et al. (2003), suggest that winsorizing by subsamples in interest makes sure that equal proportion of the observations is winsorized from the respective subsamples.

CHAPTER 3

HYPOTHESES

This chapter is divided into three sections. Section 3.1 gives an overview of various attributes and the context of rating changes. Section 3.2 presents the hypotheses on upgrades. Section 3.3 presents the hypotheses on downgrades.

3.1 An Overview of Different Attributes of Rating Changes and Information Content

3.1.1 Rating Upgrades vs. Rating Downgrades

Beaver et al. (2006) suggest that, the decision to leave the rating unchanged, upgrade a rating, or downgrade a rating are generated by different information incorporation processes. More specifically, Beaver et al. (2006) claims that "the costs from losses due to overvaluation are greater than the foregone gains due to undervaluation, i.e., downgrades are more important than upgrades." Similarly, Dichev and Piotrioski (2001), Avramo et al. (2007), and Alp (2013) find that there are consistently more downgrades than upgrades. These studies point to the idea that information that S&P uses and its incentive to upgrade varies with the information and incentive to downgrades.

Not surprisingly, the data pattern in Figure 3.1 shows that upgrades and downgrades behave differently at different stages of the business cycle. More specifically, during economic expansions, multi notch upgrades (per month) are more frequent while both multi notch and single notch downgrades are less frequent. On the other hand, during economic contractions, multi notch downgrades are more frequent during economic contractions while, both multi notch and single notch upgrades are less frequent.

Given this documentation, I analyze upgrades and downgrades separately and test the hypotheses separately. I form hypotheses for my upgrades sample and my downgrades samples within the purview of multi notch rating changes. My upgrades hypotheses depend on samples, beginning with all upgrades and subsampling multi notch upgrades and single notch upgrades. My downgrades hypotheses depend on samples, beginning with all downgrades and subsampling multi notch downgrades and single notch downgrades.

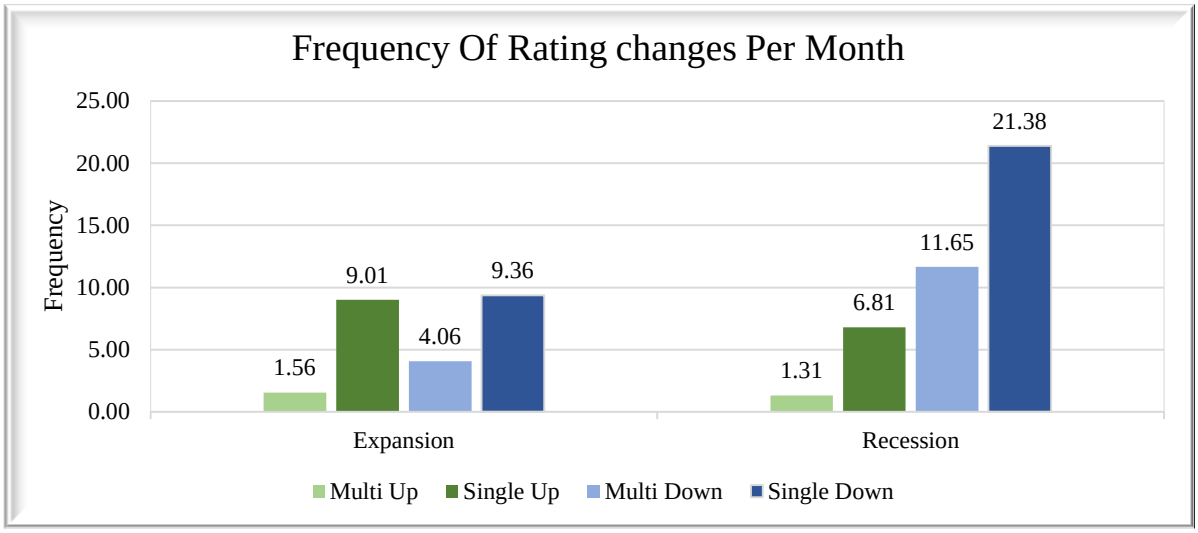

Figure 3.1. Frequency of Multi Notch and Single Notch Rating Changes per Month

This figure shows the frequency of rating changes per month during economic expansion and contraction for the single notch and multi notch rating changes by S&P between 1993 and 2013. Over this sample period, an NBER defined recession is observed twice; one covers the period from April 2001 through November 2001 and the second one covers January 2008 through June 2009. There was a total of 26 months of recession and 226 months of expansions. Multi Up, Single Up, Multi Down and Single Down denote multiple notch upgrades, single notch upgrades, multi notch downgrades, and single notch downgrades respectively.

3.1.2 Market Reaction to Multi Notch vs. Single Notch Rating Changes

As discussed in the literature review section, 2.1.3, multi notch rating changes imply an assessment of considerable changes in either current or future economic conditions in firms (Hand et al., 1992; Bannier and Hirsch, 2010; Purda, 2007). Therefore, I hypothesize that multi notch rating changes should reflect more information available to investors than single notch

rating changes. I expect that for the upgrades subsample, the stock price reaction is more positive for multi notch upgrades than that for single notch upgrades. For the downgrades subsample, I expect the stock price reaction will be more negative for multi notch downgrades than that for single notch downgrades. Hypothesis 1 and Hypothesis 5 examine these contentions for the subsample of upgrades and downgrades respectively.

3.1.3 Market Reaction to Multi Notch vs. Single Notch Rating Changes and Business Cycles

I examine whether economic climate has an impact on relative importance and size of theoretical explanatory variables that literature offers to explain the multi notch versus single notch rating changes.

As discussed in detail in the literature section, 2.1.4, Beber and Brandt (2010) find that, in the bond market, bad news elicit stronger market reaction during recessions and good news elicit stronger market reaction during expansions. Following the same logic, I expect that the differential market reaction to multi notch rating upgrades versus single notch rating upgrades is stronger in economic contraction than in expansion. Also, I expect that the differential market reaction to multi notch rating downgrades versus single notch rating downgrades is stronger in economic expansion than in contraction. Hypothesis 2 and Hypothesis 6 examine this idea for the subsample of upgrades and downgrades respectively.

3.1.4 Determinants of Multi Notch vs. Single Notch Rating Changes

Rating agencies reveal their expertise in processing the public information and confidential information about the issuers through rating changes (Jorion et al., 2005; Kisgen, 2006). I hypothesize that the rating agencies change issuer's ratings depending on their proprietary information set and proprietary analysis. The proprietary information and analysis

are unobservable, yet Avramo et al. (2009) and Alp (2013) posit that pre-event firm characteristics capture this information set. Accordingly, I hypothesize that firms that have multi notch rating upgrades and downgrades have larger coefficients in the explanatory tests of liquidity, solvency, and profitability and growth opportunity measures and that relative importance and size of these theoretical explanatory variables depend on the stages of the business cycle. Hypotheses, 3 and 7 examine the explanatory factors of the multi notch and single notch rating changes.

3.1.5 Factors Explaining Multi Notch vs. Single Notch Rating Changes and the Impact of Business Cycles

Following the logic of Bangia et al. (2002) and Bar-Isaac and Shapiro (2013) as discussed in literature review, section 2.2, I rationale that a firm that gets upgraded in the economic contractions would have to have stronger measures (company fundamentals) than those upgraded in the economic expansion. In other words, rating agencies require stronger firm fundamentals to provide multi notch upgrades rather than single notch upgrades in economic contractions. By the same token, in case of downgrades, I rationale that firms that had multi notch downgrades had much worse fundamentals than those that had single notch downgrades in economic contraction. Hypotheses, 4 and 8 examine the impact of the stages of the business cycle on the factors explaining multi notch and single notch rating changes.

3.2 Hypotheses on Rating Upgrades

3.2.1 Hypothesis: Market Reaction to Multi Notch vs. Single Notch Rating Upgrades

If the market is efficient with respect to prices, public information, and/or confidential information, the information revealed by the announcement of credit rating changes have

already been embedded in the stock prices; hence we will not see any abnormal market reaction to the announcement of the rating upgrades. Accordingly, my null hypothesis is:

$H1_0$: The size of market reaction is not different for single notch vs. multi notch rating upgrade announcements

3.2.2 Hypothesis: Market Reaction to Multi Notch vs. Single Notch Rating Upgrades and Business Cycles

If the stages of the business cycle have no impact on the investors processing of the information content of rating changes, there will not be any differential market reaction to the rating upgrades that occurred in economic recession versus those that occur in expansion. Hence, my null hypothesis is:

$H2_0$: The return differential between single notch and multi notch rating upgrade announcement is not different in economic expansions vs. contractions

3.2.3 Hypothesis: Explanatory Factors of Multi Notch vs. Single Notch Rating Upgrades

If the information processing is the same for the single notch and multi notch upgrades, then there will be no difference in the information content of single notch versus multi notch rating upgrades. Thus, my null hypothesis is:

$H3_0$: The changes in the factors discussed in section 2.2 are significant explanatory factors of rating upgrades and the weights on the measures are not different for single notch and multi notch rating upgrades

3.2.4 Hypothesis: Explanatory Factors of Multi Notch vs. Single Notch Rating Upgrades and the Impact of Business Cycles

If the information arrival process employed by rating agencies actually look through the cycle and hence the stages of the business cycle do not have an impact on the rerating by the rating agencies, we will not find that the stages of the business cycle has any implication in the explanation of single notch versus multi notch rating upgrades. Accordingly, my null hypothesis is:

$H4_0$: The weights on the measures explaining single notch and multi notch rating upgrades are not different for the rating upgrades that occur in economic expansions vs. those that occur in contractions

3.3 Hypotheses on Rating Downgrades

The following hypotheses are based on the same premises as the hypotheses for the subsample of upgrades above.

3.3.1 Hypothesis: Market Reaction to Multi Notch vs. Single Notch Rating Downgrades

$H5_0$: The size of market reaction is not different for single notch vs. multi notch rating downgrade announcements

3.3.2 Hypothesis: Market Reaction to Multi Notch vs. Single Notch Rating Downgrades and Business Cycles

$H6_0$: The return differential between single notch and multi notch rating downgrade announcement is not different in economic expansions vs. contractions

3.3.3 Hypothesis: Determinants of Multi Notch vs. Single Notch Rating Downgrades

$H7_0$: The changes in the factors discussed in section 2.2 are significant explanatory factors of rating downgrades and the weights on the measures are not different for single notch and multi notch rating downgrades

3.3.4 Hypothesis: Explanatory Factors of Multi Notch vs. Single Notch Rating Downgrades and the Impact of Business Cycles

$H8_0$: The weights on the measures explaining single notch and multi notch rating downgrades are not different for the rating downgrades that occur in economic expansions vs. those that occur in contractions

CHAPTER 4

DATA DESCRIPTION AND RESEARCH METHODOLOGY

In this chapter, I discuss the source of the data and examine various attributes of the data. I also present and discuss the methodologies employed for testing the hypotheses presented in chapter 3. Section 4.1 discusses the data, and Section 4.2 discusses research methodology.

4.1 Data

I use the Bloomberg database to collect 15,850 issuers' rating reassessments by S&P over the period 1993 and 2013. Having data from 1993 through 2013 allows me to examine rating changes in the context of the stages of the business cycle. Over this sample period, an NBER defined recession is observed twice; one covers the period from April 2001 through November 2001 and the second one covers January 2008 through June 2009.

Following the extant literature (For example, Dichev and Piotrioski (2001); Amato and Furfine (2004)), I exclude privately held companies and subsidiaries. Privately held companies are excluded due to the unavailability of the market and accounting information for these firms. Subsidiaries are excluded following Dichev and Piortioski (2001); they document that the impact of rating changes of subsidiaries is much less pronounced on the stock prices compared to the rating change of the parent firms.

I collect market information from CRSP and accounting information from COMPUSTAT. CRSP and COMPUSTAT information are collected from 1990 to allow for analysis of firms up to 3 years prior to the rating changes. NBER recession data is from the economic database maintained by the Federal Reserve Bank of St. Louis.

Figure 4.1 reports the total number of issuers that have had rating changes over the sampling period. The figure shows that 9,586 of the publicly traded US issuers had rating changes by S&P over 1993 and 2013. There also were 6,264 observations that were stable ratings, not included in this figure. The total number of upgrades and downgrades are 3,579 and 6,007 respectively. There is a loss of about 32% of the data after the Bloomberg data is merged with CRSP and COMPUSTAT. Out of 2,600 upgrades with complete data, 387 –that is about 15% –are multi notch upgrades and the rest are single notch upgrades. Similarly, out of 3,893 of downgrades with complete data, 1221 –that is about 31% –are multi notch downgrades, and the rest are single notch downgrades. Finally, the numbers in the parentheses show that 1,858 of the single notch upgrades had complete data that are used in the analysis of market returns and regression analysis. Similarly, this number is 362 for multi notch upgrades, 899 for multi notch downgrades and 2220 for single notch downgrades.

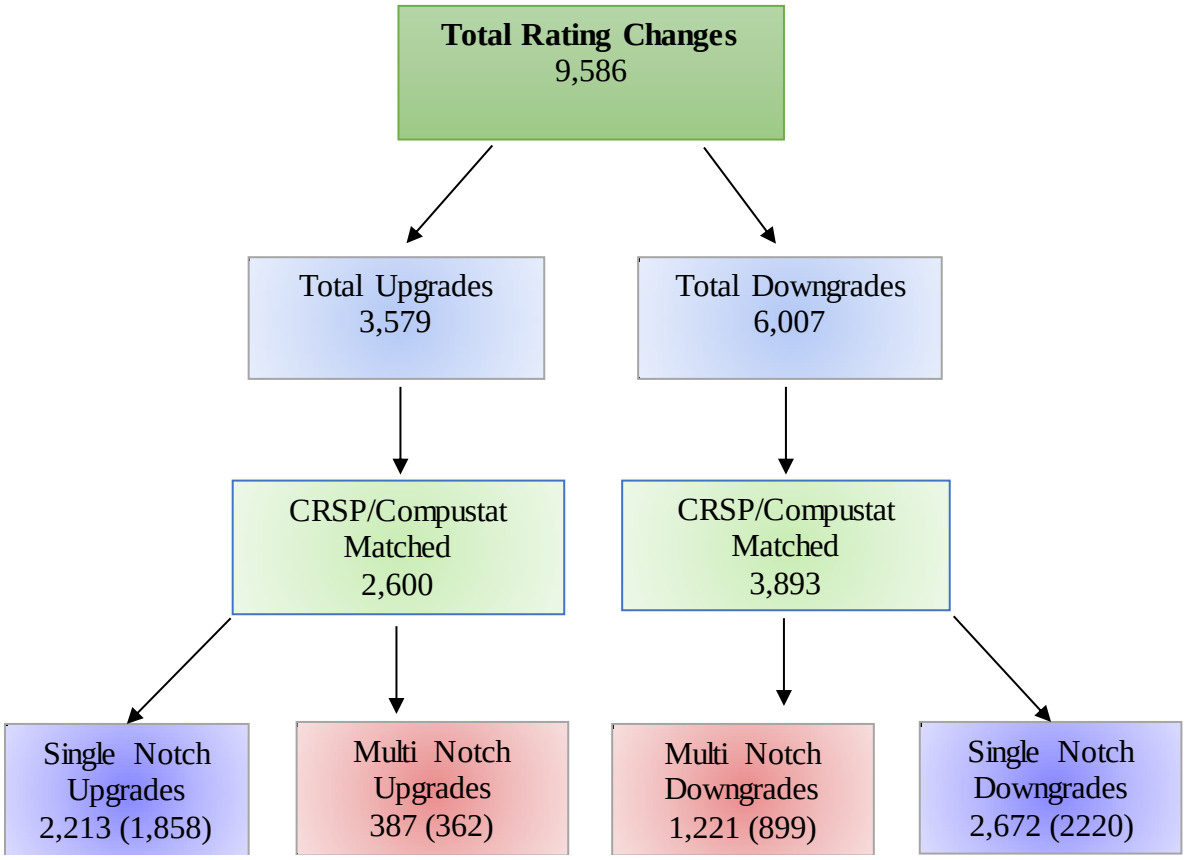

Figure 4.1. Number of Multi Notch and Single Notch Rating Changes

This figure shows the frequency of total rating changes between 1993 and 2013, the frequency of rating upgrades and rating downgrades by S&P, taken from Bloomberg database. It also shows the number of upgrades and downgrades data from the Bloomberg that were matched with CRSP and COMPUSTAT. Finally, it shows the number of the multi notch and single notch rating changes within the subsample of upgrades and downgrades. The values in the parentheses show the number of events that had the complete data used in regression analysis.

Table 4.1 reports the number of firms rated by S&P each year over the period of 1993-2013. Note that the frequency of rating changes increases steadily over time. Furthermore, rating upgrades are less frequent around the recessionary periods versus expansionary periods. For instance, single notch upgrades become much less frequent during the years 1999 through 2002 compared to the years before or after. Similarly, the number of downgrades is more frequent in the recessionary periods of 2001 and 2008-2009 than other times.

Table 4.1

Frequency of Rating Changes by Year

This table shows the frequency of credit rating changes by S&P between 1993 and 2013 and the quarters that were in recession for each year. The table also shows the number of single notch and multi notch rating changes for the subsample of upgrades (column 1 and 2); downgrades (column 3 and 4) and for stable ratings (column 5). Column 6 indicates which of the quarters of each of the years were in recession if any.

Year	Single notch Upgrades	Multi notch Upgrades	Single notch Downgrades	Multi notch Downgrades	Stable	Recession Quarters
1993	47	12	23	13	15	-
1994	31	9	37	11	19	-
1995	46	14	33	19	34	-
1996	48	25	33	13	39	-
1997	94	12	47	16	42	-
1998	92	20	90	40	133	-
1999	60	23	104	72	310	-
2000	64	15	124	83	269	-
2001	57	17	158	103	283	2, 3, 4
2002	54	14	205	62	221	-
2003	80	18	166	57	265	-
2004	88	24	102	38	223	-
2005	105	22	121	39	256	-
2006	124	11	109	32	301	-
2007	114	18	138	31	253	-
2008	99	14	218	83	247	1, 2, 3, 4
2009	63	18	190	111	220	1, 2
2010	155	35	74	18	150	-
2011	158	15	90	20	166	-
2012	116	13	84	20	110	-
2013	163	13	74	18	118	-
N	*1858*	*362*	*2220*	*899*	*3674*	-

Table 4.2 supplements Table 4.1. Table 4.2 reports the number of rating upgrades and downgrades during business cycle expansions and recessions. It shows that the number of upgrades is comparable to the number of downgrades during an expansion. However, the number of downgrades far outnumbers upgrades during recessionary periods.

Table 4.2

Frequency of Rating Change in the Stages of the Business Cycles

This table shows the frequency of S&P credit rating changes between 1993 and 2013 broken down into an economic expansion and recession. Column one and two report the statistics for the sample of upgrades and three and four reports the statistics for the sample of downgrades. Single Notch and Multi Notch stand for the single notch and multi notch rating upgrades and downgrades respectively.

	Upgrades		Downgrades	
	Single Notch	Multi Notch	Single Notch	Multi Notch
Expansion	1661	320	1649	616
Recession	197	42	571	283
N	*1858*	*362*	*2220*	*899*

Table 4.3 reports the number of firms for each rating levels for the rating levels AAA through D. The table shows that very few firms have high level of initial ratings (look at the frequency for AAA through A- for example). The number of firms goes up as we move to the lower rating levels. Most of the ratings are concentrated between BBB+ and B. The number of firms declines again for the firms with lower levels of ratings (look at the frequency for B- and below).

Table 4.3

Frequency for Initial Rating Levels for Firms with Rating Changes

This table reports the frequency of firms for each of the initial rating levels for the firms that had rating changes and also had data on CRSP and Compustat. Column 1 (3) denotes the initial rating levels, and column 2 (4) shows the frequency of firms for those rating levels.

Initial Ratings	Frequency	Initial Ratings	Frequency
AAA	14	BB	490
AA+	13	BB-	578
AA	57	B+	557
AA-	101	B	378
A+	180	B-	252
A	276	CCC+	127
A-	341	CCC	88
BBB+	408	CCC-	34
BBB	525	CC	44
BBB-	468	D	4
BB+	404		
N			*5,339*

Table 4.4 shows that most of the firms had either stable rating, one notch upgrade or one notch downgrade. There are 41 firms with rating changes of more than five notches. Similarly, there are 56 firms with rating downgrades of more than five notches.

Table 4.4

Number of Firms for Each Magnitude of Rating Change

This table reports the number of firms for each magnitude of rating changes and also had data on CRSP and Compustat.

Notch changes	Number of Firms
5+ notch upgrades	41
5 notch upgrades	25
4 notch upgrades	47
3 notch upgrades	42
2 notch upgrades	248
1 notch upgrades	1858
0 (stable)	3674
1 notch downgrades	2220
2 notch downgrades	623
3 notch downgrades	147
4 notch downgrades	88
5 notch downgrades	41
5+ notch downgrades	56

Table 4.5 shows that the firms that had multi notch downgrades are more likely to have another event in the shortest span of time, that is, 437 days. Firms with single notch upgrades are likely to see another event in the longest span of time, that is, 878 days. A noteworthy observation is that firms with single and multi notch upgrades are more likely to have another upgrade based on the positive changes of 0.22 notches on average for firms that have previously had single notch upgrades and 0.24 for firms that have previously had multi notch upgrades. Similarly, firms with single notch and multi notch downgrades are more likely to have another downgrade based on the negative change of -0.54 notches for firms that have previously had single notch downgrades and -0.75 notches for firms that have previously had multi notch downgrades.

Table 4.5

Days between Two Rating Changes and the Average Next Ratings Change

This table shows how many calendar days on average has passed until the following event is observed for the firms with an event in the past (column 1) and the average notches of the next rating change for the firm that has had an event in the past.

	Average Days Until Next Event	Average Next Rating Change
Single Up	878	0.22
Multi notch Up	687	0.24
Single Down	588	-0.54
Multi notch Down	437	-0.75

4.2 Research Methodology

This chapter is further divided into two sections. Section 4.2.1 presents and discusses the methodology employed in investigating the information content of single notch versus multi notch rating changes in the stages of the business cycle. Section 4.2.2 presents and discusses the methodology employed in explaining the difference between the single notch and multi notch rating changes in the context of the business cycle. Section 4.2.3 provides the descriptive statistics for the variables used in the analysis.

4.2.1 Excess Return Measures and Tests

The first part of the analysis centers on examining the market reaction for the sample of upgrades and downgrades. This analysis tests hypotheses 1 and 2 for the sample of upgrades, and hypotheses 5 and 6 for the sample of downgrades. Similar to the extant literature (Purda, 2007; Jorion and Zhang, 2007), I estimate the returns for a given period of interest using the two parameter approach of Sharpe and Lintner as follows:

$$R_{it} = \alpha_i + \beta_i R_{mt} + u_{it} \qquad (1)$$

Where:

R_{it} = daily return for firm (j) for day (t), where (t) ranges from 300 days prior to the event date and ends 45 days prior to the event date,

R_{mt} = daily equally weighted return on CRSP,

α_i and β_i = the parameters to be estimated,

u_{it} = the disturbance term,

We define U_t, the average abnormal returns for event day t as:

$$U_t = \frac{\sum_{i=1}^{N} \hat{u}_{it}}{N} \qquad (2.a)$$

Where

N = the number of event firms in day t,

$\hat{u}_{it}$ = the average predictive residual for each firm in time t.

We then define the cumulative abnormal residual (CAR) from time k through time t as:

$$CAR_t = \sum_k^t U_k \qquad (2.b)$$

While evaluating the statistical significance of the abnormal returns, we have to consider the nature of the event and various issues relevant. If the rating changes are concentrated in certain industries, common industry effect could cause the security's residuals to be correlated. Kolari and Pynnönen (2010) observe that many events related to, for example, financial distress could have event date clustering. In such case, the test statistic should not assume independence of the residuals (Jaffee, 1974; Mandelker, 1974; Brown and Warner, 1980). To account for any possible correlation among the residuals the t-test has to be adjusted.

One of the approaches to address the issue of cross-sectional correlation when there is event clustering is given by Brown and Warner (1980), known as Crude Dependent Adjustment. As per Brown and Warner, the test statistic would be

$$t = \frac{CAR_t}{(T_2 - T_1 + 1)^{1/2}\hat{\sigma}_{AAR}} \quad (3)$$

Where

CAR_t = cumulative abnormal returns of all firms in time t,

AAR= Average abnormal return at time t,

$\hat{\sigma}_{AAR}$ = the standard deviation of AAR from the time series of estimation period abnormal returns,

$T_2 - T_1 + 1$ = length of the event period

Another approach to resolving the issue of event induced variability is to use the approach put forward by Boehmer, Masumeci and Poulsen (1991) as given below:

$$t_B = \frac{\bar{A}\sqrt{n}}{s} \quad (4.a)$$

where

$\bar{A} = \frac{1}{n}\sum_{k=1}^{q} n_k \bar{A}_k$, $\bar{A}_k$ is the average of the residual scaled by the standard deviation of residuals in subgroup *k*. Each of the subgroups has firms with same event date and from the same industry,

n_k = the number of firms in subgroup *k*,

n = the number of firms in the sample,

s = the cross-sectionally estimated standard deviation of the event-day scaled abnormal returns calculated as below:

$$s = \sqrt{\frac{1}{n-1}\sum_{i=1}^{n}(A_i - \bar{A})^2} \quad (4.b)$$

It is to be noted that BMP test does not account for cross-sectional correlation.

A non-parametric test proposed by Corrado (1989) is another way to address the misspecification due to event clustering and cross-sectional correlation in the estimated

residuals. Let K_{it} be the rank of abnormal residual u_{it} where the smallest abnormal return is assigned the rank of 1. N be the number of observation in the sample. Let T be the number of abnormal residuals during the estimation period for security "I". Define $\bar{T} = \frac{T+1}{2}$. Then the day 0 test statistic is expressed as:

$$Rank = {\frac{1}{N}\sum_{i=1}^{N}(K_{i0} - \bar{T})}\Big/{S(K)} \qquad (5.a)$$

Where

$$S(K) = \sqrt{\frac{1}{T}\sum_{t=1}^{T}\left(\frac{1}{N}\sum_{i=1}^{N}(K_{it} - \bar{T})\right)^2} \qquad (5.b)$$

Corrado (1989) suggest the null hypothesis, in this case, is "a day 0 excess-return rank is a drawing from a uniform distribution."

4.2.2 Explanatory Factors of Single Notch vs. Multi Notch Rating Changes

As per my hypotheses 3 and 4 for the sample of upgrades, and hypotheses 7 and 8 for the sample of downgrades, I model and test liquidity, solvency, profitability, and growth opportunity as theoretical explanatory variables in the context of the business cycle. Thus, I examine firm-level proxies for the factors aforementioned for the separate subsamples of upgrades and downgrades. This combination of factors is documented to capture the information set used by the rating agencies in reassessing a firm's rating and deciding whether a firm should receive a single notch or a multi notch rating change.

Given that the dependent variable is a discrete variable, I use the probit model for each subsample of upgrades and downgrades. As discussed in literature review section, 2.2.6, most of the literature that examine ratings employ ordered probit or logit model (see for example Kaplan and Urwitz, 1979; Amato and Furfine 2004; Purda, 2007).

Suppose that there exists a set of variables Y_{it}^{*}:

$$Y_{it}^{*} = X_{it}\beta + \varepsilon_{it} \quad (6)$$

Where

Y_{it}^{*} = a continuous unobservable variable at time t

β = slope coefficients

X_{it} = independent observable variables at time t

ε_{it} = unobserved error term

Consider Y_{it} a binary variable that takes the value of one if it has certain quality zero otherwise. Then the probit model below links Y_{it}^{*} to Y_{it} as:

$$Y_{it} = \begin{cases} 1 \; if \; Y_{it}^{*} > 0 \\ 0 \; if \; Y_{it}^{*} \leq 0 \end{cases} \quad (7)$$

The probit model takes the form Pr (Y=1 | X) = Φ(X'β) where Φ is the cumulative distribution function (cdf) of the standard normal distribution.

The dependent variable is an integer that equals one if a rating is a multi notch upgrade (downgrade) zero if it is a single notch upgrade (downgrade). The independent observable variables are the proxies for liquidity, solvency, profitability, growth opportunity and other variables of interest.

To assess the ability of the model to capture the rating changes, I hold out 10 percent of each of the subsamples of the single notch and multi notch, rating upgrades, and downgrades. Then I examine the rate of correct classification for the holdout sample to assess the predictive ability of the fitted multiple-regression model obtained from the estimation data.

Following are the proxies used in the extant literature (Amato and Furfine, 2004; Alp, 2013) to predict rating levels- Short-term Liquidity Measures: Cash Flow, Current Ratio; Long-term Solvency Measures: Interest Coverage (IC), Long-term Debt, Total Debt; Profitability

Measures: Operating Margin, ROE, ROA; Growth Opportunities Measures: MBE, E/P, R&D, Cap Ex (Goyal et al., 2002). Consistent with Amato and Furfine (2004) and Alp (2013), for Economic Contractions Measure, I adopt the most widely-used measure, NBER Recession.

The measures that explain single notch versus multi notch rating should reflect the fact that I measure rating changes and not rating levels. Hence, the measures that explain rating changes should be the change in the variables (Purda, 2007). Change in the variables captures the changes a firm has gone through that warranted it to have either a single notch rating change or a multi notch rating change. I use change in the measures over previous three years (as used by Blume et al., 1998; Amato and Furfine, 2004; Demirtas and Cornaggia, 2013 and). Amato and Furfine (2004) claim "S&P compares three-year averages of the ratios to ratio guidelines."

Unlike Purda (2007), who uses quarterly data for these measures, I use annual measures since many of these measures (for example, long-term debt) are likely to stay constant over quarters. Altman et al. (2005), while examining the default rates, also uses annual data claiming "quarterly default rates and recovery rates tend to be very volatile."

As explained in the literature review, I also have Change in Size (total asset) as a control variable to capture the risk and growth of the firms that had a bearing on the rating changes given that the extant literature find these to be significant.

Higher equity risk implies the firms will have more difficulty in servicing its debt (Blume et al., 1998; Amato and Furfine, 2004). Following Blume et al. (1998), and Amato and Furfine (2004), I calculate market model beta to capture equity risk. Then the change in beta is used for capturing the change in systematic risk.

Further, Banga et al. (2002) and Purda (2007) suggest that there may be momentum in credit rating change. More specifically, they posit that firms that have been downgraded before

are more "prone to further downgrading" while firms that have been upgraded before are less prone to a downgrade. Thus, I have dummy variables indicating whether a firm previously had an upgrade or a downgrade. Using these dummy variables helps minimize the confounding effect of these previous rating changes, if any, on the new rating changes.

Thus, following is my complete probit model:

$$MultiNotch = \beta_0 + \beta_1 UpLast_i + \beta_2 DownLast_i + \beta_3 Non\text{-}Investment_i + \beta_4 NegativeNI + \beta_5 NegativeCF + \beta_6 CF_i + \beta_7 WC_i + \beta_8 CR_i + \beta_9 IC_i + \beta_{10} DR_i + \beta_{11} TD_i + \beta_{12} NI_i + \beta_{13} OM_i + \beta_{14} MB_i + \beta_{15} CAPEX_i + \beta_{16} RD_i + \beta_{17} TA_i + \beta_{18} MV_i + \beta_{19} RE_i + \beta_{20} Beta_i + \beta_{21} CAR + \varepsilon_i$$

Where,

MultiNotch = 1 if an upgrade is multi notch, zero if it is single notch for upgrade sample

= 1 if a downgrade is multi notch, zero if it is single notch for downgrade sample

UpLast = an indicator variable equal to one if the firm had an upgrade over previous three years, zero otherwise.

DownLast = an indicator variable equal to one if the firm had a downgrade over previous three years, zero otherwise.

Non-Investment = an indicator variable equal to one if the firm had a non-investment (speculative) bond rating prior to rating change

Negative NI= an indicator variable equal to one if the event firm had negative net income in the year prior to the rating change, zero otherwise

Negative CF= an indicator variable equal to one if the event firm had negative cash flow in the year prior to the rating change, zero otherwise

CF =% Change in cash balances over previous three years. Following Alp (2013), cash balances are the cash and short-term investments (che) scaled by total assets (at).

WC =% Change in net working capital over previous three years. Net working capital is calculated as the firm's current assets (act) minus current liabilities (lct)

CR =% Change in the current ratio over previous three years. The current ratio is calculated as the ratio of the firm's current assets (act) to current liabilities (lct).

IC = % Change in interest coverage over previous three years. Following Blume et al. (1998) and Alp (2013), interest coverage is the ratio of [operating income after depreciation (oiadp) + interest expense (xint)] to interest expense (xint).

DR =% Change in debt ratio over previous three years. Debt ratio is calculated as the ratio of the firm's total debt [long-term debt (dltt) + short-term debt (dlc)] to total assets (at).

TD = % Change in total debt ratio over previous three years. Following Blume et al. (1998) and Alp (2013), total debt ratio is the ratio of [long-term debt (dltt) + short-term debt (dlc)] to total assets (at).

NI = % Change in net income over previous three years. Net income is defined as net income (ni) divided by total assets (at).

OM = % Change in operating margin over previous three years. Following Alp (2013), operating margin is defined as the ratio of operating income before depreciation (oibdp) to sales (sale).

MB = % Change in Market/Book value of equity over previous three years. For this variable, I follow Davis, Fama, and French, (2000) and Alp (2013). Market to book is calculated as the market value of assets divided by the book value assets. The market value of assets is the book value of assets (at) minus the book value of equity plus the market value of equity. The market value of equity is calculated as the price (prcc_f) times the number of shares outstanding (csho) at the end of the fiscal year.

Following Alp (2013), the book value of equity is calculated as the sum of stockholder's equity (seq), balance-sheet deferred taxes and investment tax credit (txditc) minus preferred stock. Investment tax credit is set to zero if not available. The missing values for stockholder's equity are replaced by the sum of common equity (ceq) and preferred equity or by assets (at) minus liabilities (lt) in that order. Preferred stock is taken as either redemption (pstkrv) or liquidating (pstkl), or par (pstk) value in that order.

CAPEX= % Change in capital expenditure over previous three years. Following Alp (2013), CAPEX is capital expenditure (capx) divided by total assets (at).

Size = % Change in Size over previous three years. Following Blume et al. (1998), I compute size as the natural algorithm of the market value of the equity in million dollars. The market value of equity is calculated as the price (prcc_f) times the number of shares outstanding (csho) at the end of the fiscal year. Unlike Blume et al. (1998), I do not deflate the market value by CPI since my study looks at the change in the size and explains the change in ratings rather than the rating levels like the authors.

RD= % Change in research and development expenditure over previous three years. Following Alp (2013), RD is research and development expense (xrd) divided by assets (at).

TA= % change in total assets (at) over previous three years

MV= % change in market value over previous three years. Following Davis, Fama, and French, (2000) and Alp (2013), market value of assets is the book value of assets (at) minus the book value of equity plus the market value of equity. The market value of equity is calculated as the price (prcc_f) times the number of shares outstanding (csho) at the end of the fiscal year.

RE= % Change in retained earnings over previous three years. Following Alp (2013), RE is retained earnings (re) divided by assets (at).

Beta = % Change in beta over previous three years. Following Alp (2013) I calculate beta from a regression of a firm's daily stock returns on the CRSP value-weighted index return. Similar to Alp (2013) I require that the beta be measured from at least 50 daily stock returns over a fiscal year. Beta is calculated for the year prior to the rating changes (year "-1") and for year "-3." Change in beta is the difference in beta calculated over previous year "-1" and for year "-3." Beta captures the variability of equity returns due to variability in the general market.
CAR=the cumulative abnormal returns for event firms for the event window [-22, -1]

To examine the impact of the rating changes, I run the probit model for the complete business cycle, economic expansions, and recessions.

Following Alp (2013) and Core et al. (20004) I winsorize all of these independent variables, except for the indicator variables, at 1 and 99 percentile within each subsamples of single notch, multi notch rating upgrades and downgrades and stable rating changes. Also, I limit the rating changes to five notches to avoid influences of extreme observations. Finally, I do not differentiate between firms with negative earnings versus positive earnings and negative cash flow versus positive cash flow for the main results.

4.2.3 Descriptive Statistics on Firm Characteristics

In subsection 4.1.2, I examine the publicly available measures used for explaining the determination of multi notch versus single notch rating changes.

4.1.2 A. Summary statistics of the variables used in regression

Table 4.6 shows statistics on the change in several variables over three years prior to the year of rating changes ([-4 to -1] years, "0" being the year of rating change). These are the variables used in the regression analyzes. Panel A reports the summary for the sample of upgrades while panel B for the sample of downgrades.

Panel A reveals that the average change in cash flow, interest coverage, operating margin, market to book ratio, market value, and total assets are significantly different for single notch versus multi notch upgrades that occur in economic expansions. Only the current ratio is significantly different for single notch versus multi notch upgrades that occur in recessions.

Panel B of Table 4.6 reveals that the average change in current ratio, net income, total debt, market to book ratio, total assets, and market beta are significantly different for single notch versus multi notch downgrades that occur in expansions. Similarly, operating margin, market to book ratio, and market value are significantly different for single notch versus multi notch downgrades that occur in recessions.

Table 4.6

Descriptive Statistics on Variables

This table shows the summary statistics for change in each of the variables used in the probit analysis over previous three years [-4 to -1] years, "0" being the year of rating changes. Cash flow, working capital, net income, interest coverage, research and development expenditure, retained earnings, and capital expenditure are the respective value as a percentage of total assets; current ratio is current assets divided by current liabilities; debt ratio is total debt [long term debt plus current liabilities] divided by total assets; operating margin is operating profit as a percentage of sales; Market Value is the log of market capitalization of the firm. Total asset is the log of total assets of the firm. All the values are for the year prior to the rating changes. Market beta is beta estimated from the market model using daily prices for the year prior to the rating change. The Statistics are shown for the single notch and multi notch rating changes during economic expansion and contraction. Panel A shows the statistics for upgrades and panel B shows the statistics for downgrades. The t-test tests whether the mean of the change in the variables for single notch rating changes is equal to the mean of the change in the variables for the multi notch rating changes that occur in economic expansion and contraction.

Panel A: Rating Upgrades				
	Expansion		Contraction	
Items	Single notch	Multi notch	Single notch	Multi notch
N	*1661*	*320*	*197*	*42*
Cash Flow				
Mean	162.14	233.21	84.15	11.24
Median	7.39	6.76	4.25	-33.09
Standard Deviation	591.38	953.89	300.86	113.97
ttest	-1.78*		1.39	
Working Capital				
Mean	3.53	2.34	-5.09	13.17
Median	0.00	0.00	-3.05	0.00
Standard Deviation	226.20	250.87	196.19	141.12
ttest	0.09		-0.51	

Panel A: Rating Upgrades Continued				
	Expansion		Contraction	
Items	Single notch	Multi notch	Single notch	Multi notch
Current Assets				
Mean	7.29	6.53	0.73	-5.23
Median	0.00	0.00	0.00	-6.43
Standard Deviation	39.31	44.98	38.55	46.59
ttest	0.32		0.78	
Net Income				
Mean	-63.38	-53.10	102.25	-150.09
Median	-11.96	-41.43	21.09	-72.83
Standard Deviation	636.83	530.58	493.19	307.21
ttest	-0.27		2.86***	
Interest Coverage				
Mean	60.4	16.93	55.76	35.82
Median	12.75	0.00	14.19	-13.38
Standard Deviation	246.82	299.17	185.88	291.25
ttest	2.82***		0.50	
Debt Ratio				
Mean	33.08	25.01	72.48	39.49
Median	-7.16	0.00	-3.39	-0.42
Standard Deviation	225.37	123.61	320.70	171.85
ttest	0.63		0.58	
Total Debt				
Mean	159.45	101.04	322.97	193.82
Median	2.07	0.00	14.26	7.92
Standard Deviation	763.32	505.00	1111.11	769.82
ttest	0.63		0.64	
Operating Margin				
Mean	14.63	-6.09	23.94	33.92
Median	4.79	-0.04	7.16	1.47
Standard Deviation	100.87	119.31	89.62	179.31
ttest	3.3***		-0.47	
Market to Book				
Mean	33.75	69.42	9.81	-7.65
Median	13.68	9.62	-0.51	-22.68
Standard Deviation	184.65	359.29	161.37	120.14
ttest	-2.66***		0.59	
Market Value				
Mean	134.58	85.14	130.91	61.08
Median	63.17	37.13	56.70	12.33
Standard Deviation	244.48	194.03	237.96	223.86
ttest	3.46***		1.56	
Total Assets				
Mean	56.13	38.99	100.52	48.90
Median	21.31	9.94	39.22	26.76
Standard Deviation	115.62	110.76	165.40	89.69
ttest	2.47***		1.76*	

Panel A: Rating Upgrades Continued				
	Expansion		Contraction	
Items	Single notch	Multi notch	Single notch	Multi notch
R&D				
Mean	0.52	1.80	2.54	2.91
Median	0.00	0.00	0.00	0.00
Standard Deviation	20.59	26.06	25.18	23.93
ttest	-0.98		-0.08	
Retained Earnings				
Mean	0.28	-31.17	23.39	-236.27
Median	4.51	1.45	0.56	-27.45
Standard Deviation	327.83	827.36	393.15	1667.53
ttest	1.17		1.72*	
Capital Expenditure				
Mean	10.89	9.16	27.15	33.06
Median	0.00	0.00	10.87	8.86
Standard Deviation	79.87	74.19	82.30	105.37
ttest	0.36		-0.36	
Market Beta				
Mean	12.62	11.13	-5.19	10.36
Median	0.00	0.00	-8.61	0.00
Standard Deviation	65.92	72.30	49.29	99.18
ttest	0.37		-1.33	

Panel B: Rating Downgrades				
	Expansion		Contraction	
Items	Single notch	Multi notch	Single notch	Multi notch
N	*1649*	*616*	*571*	*283*
Cash Flow				
Mean	140.88	135.51	72.52	125.55
Median	0.00	0.46	-11.75	-11.85
Standard Deviation	541.81	547.60	370.56	588.58
ttest	0.22		-1.48	
Working Capital				
Mean	-6.53	-33.96	14.86	-16.15
Median	0.00	-5.44	0.00	0.00
Standard Deviation	294.93	375.81	316.45	306.76
ttest	1.88*		1.26	
Current Ratio				
Mean	3.27	-2.61	-0.78	-3.98
Median	0.00	-0.74	0.00	0.00
Standard Deviation	40.34	44.45	34.15	37.01
ttest	3.09***		1.16	
Net Income				
Mean	-71.53	-124.82	-76.07	-104.99
Median	-46.78	-57.63	-48.16	-72.35
Standard Deviation	393.58	450.23	347.2	352.52
ttest	2.84***		1.05	

Panel B: Rating Downgrades Continued				
	Expansion		Contraction	
Items	Single notch	Multi notch	Single notch	Multi notch
Interest Coverage				
Mean	-15.67	-9.63	-20.49	-33.76
Median	-16.00	-24.50	-20.51	-28.85
Standard Deviation	91.67	164.77	81.30	133.00
ttest	-1.13		1.66*	
Debt Ratio				
Mean	62.15	82.27	67.49	72.43
Median	5.13	9.94	11.66	7.04
Standard Deviation	309.04	361.72	309.20	345.77
ttest	-1.35		-0.19	
Total Debt				
Mean	276.52	550.36	239.22	447.36
Median	26.48	37.49	34.40	26.32
Standard Deviation	1386.10	2757.99	1122.65	2685.55
ttest	-3.21***		-1.46	
Operating Margin				
Mean	-14.57	-19.97	-20.02	-35.60
Median	-9.68	-12.39	-10.78	-15.80
Standard Deviation	60.66	88.02	63.85	117.60
ttest	1.7*		2.3**	
Market to Book				
Mean	-2.03	-23.71	-19.47	-38.60
Median	-18.88	-25.56	-32.80	-50.48
Standard Deviation	98.33	116.24	78.98	65.49
ttest	4.57***		3.25***	
Market Value				
Mean	27.89	34.91	-3.05	-22.21
Median	0.00	-9.84	-21.85	-45.42
Standard Deviation	120.21	172.82	88.33	75.54
ttest	-1.12		2.89***	
Total Assets				
Mean	61.11	95.03	55.96	81.71
Median	23.18	26.60	22.80	18.99
Standard Deviation	130.52	244.41	122.23	241.69
ttest	-4.37***		-1.9*	
R&D				
Mean	0.68	1.56	1.79	-0.61
Median	0.00	0.00	0.00	0.00
Standard Deviation	23.27	20.52	21.74	19.97
ttest	-0.85		1.44	
Retained Earnings				
Mean	-16.65	-4.94	4.50	-10.28
Median	-4.84	-6.61	-5.48	-5.03
Standard Deviation	321.90	339.01	245.17	241.11
ttest	-0.78		0.77	

Panel B: Rating Downgrades Continued				
	Expansion		Contraction	
Items	Single notch	Multi notch	Single notch	Multi notch
Capital Expenditure				
Mean	4.38	10.24	17.90	26.62
Median	-6.01	-7.10	0.00	1.04
Standard Deviation	67.22	95.07	70.53	110.30
ttest	-1.69*		-1.29	
Market Beta				
Mean	53.37	18.15	46.84	62.62
Median	4.45	0.00	19.77	20.22
Standard Deviation	200.07	139.36	101.81	134.98
ttest	4.15***		-1.75*	

4.1.2 B. Trend in the variables

Figure 4.2.1 through Figure 4.2.15 show the trends in the variables used in the regression model for the sample of upgrades and downgrades during economic contraction and expansion. The trends in the variables are shown for four years prior to the rating changes and for the year of rating changes. Year 0 is the year of rating changes.

The figures show that, three years before the event, the firms that have multi notch upgrades and multi notch downgrades had lower values for cash flow, net working capital, interest coverage, net income, operating margin, capital expenditure, research and development expenditure, market value of equity, retained earnings, and market beta. Also, firms with multi notch rating upgrades and downgrades had higher debt ratio and total debt. However, the change in the variables are more positive over the four years prior multi notch upgrades and more negative over the four years prior multi notch downgrades in comparison to their single notch counterparts.

Figure 4.2. Trends in variables over five years around the rating changes

The following figures show the trends in each of the variables used in the regression analysis for rating upgrades and downgrades during economic contraction and expansion. "0" is the fiscal year end for the year of the rating changes. Single Notch and Multi Notch denote single notch and multi notch rating changes respectively.

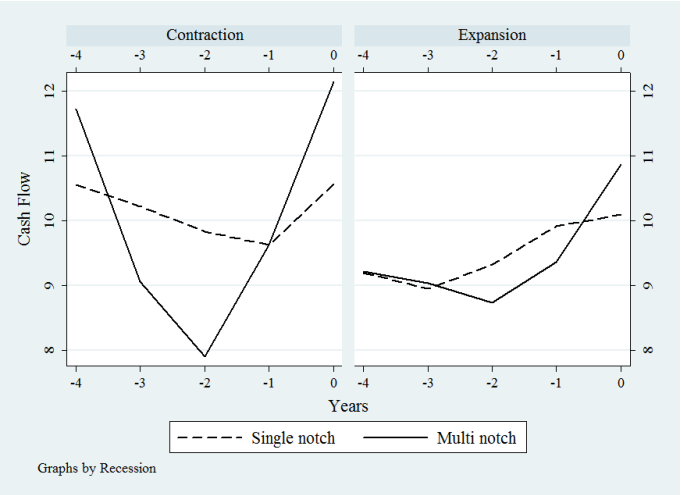

Figure 4.2.1 (a). Cash Flow trend for rating upgrades during economic contraction and expansion.

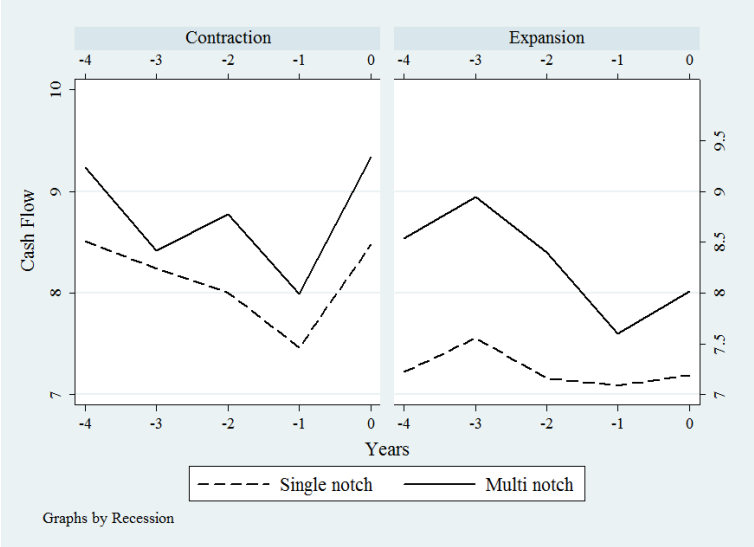

Figure 4.2.1 (b). Cash Flow trend for rating downgrades during economic contraction and expansion.

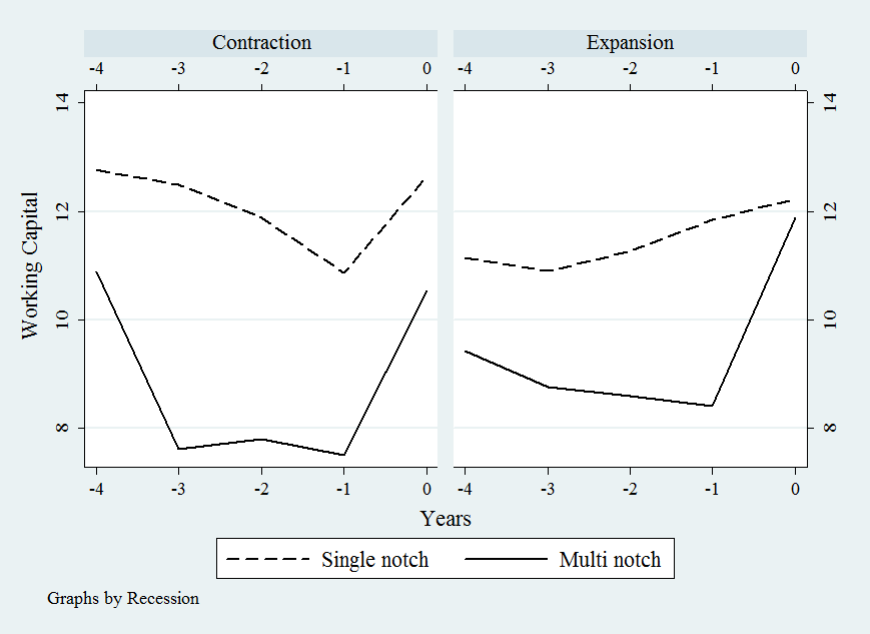

Figure 4.2.2 (a). Working Capital for rating upgrades during economic contraction and expansion

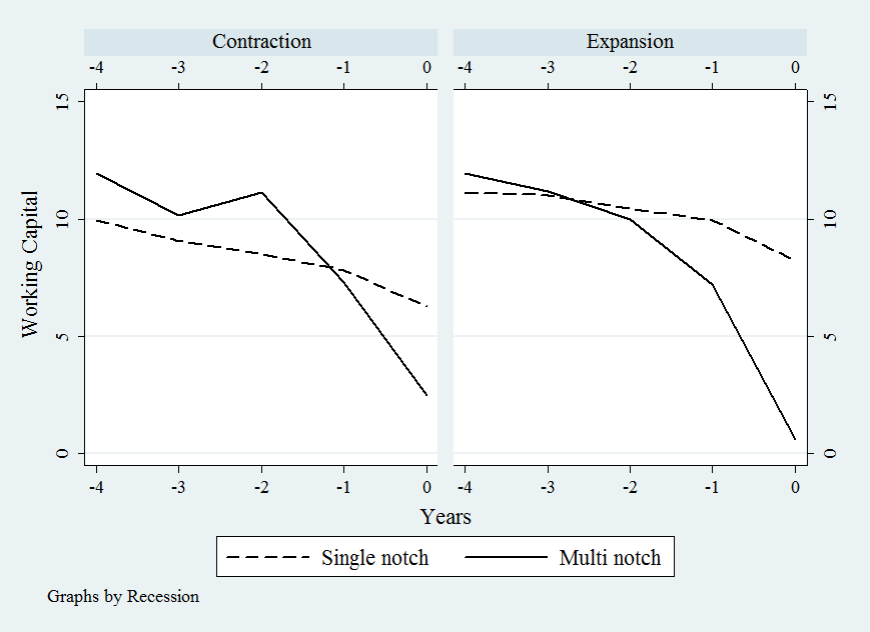

Figure 4.2.2 (b). Working Capital for rating downgrades during economic contraction and expansion.

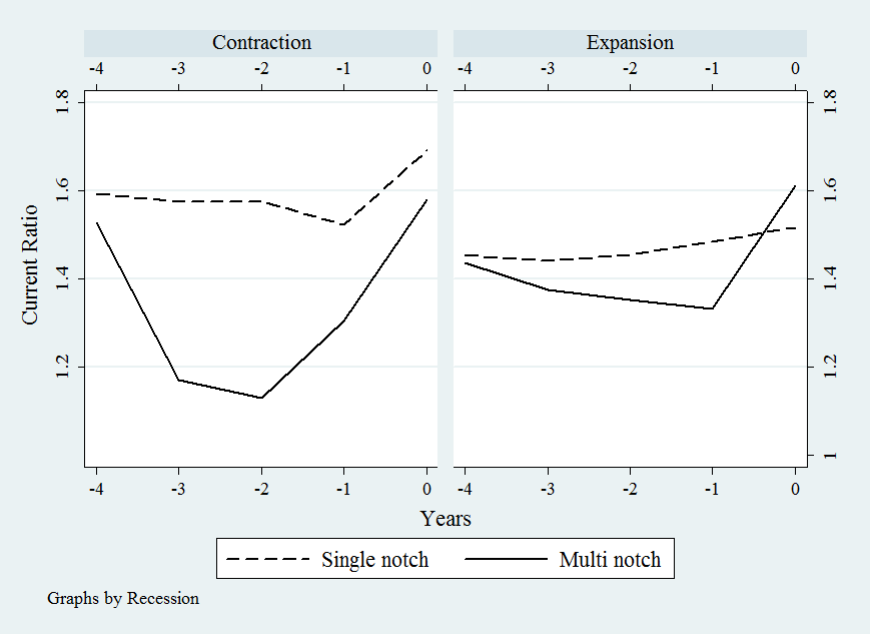

Figure 4.2.3 (a). Current Ratio for rating upgrades during economic contraction and expansion.

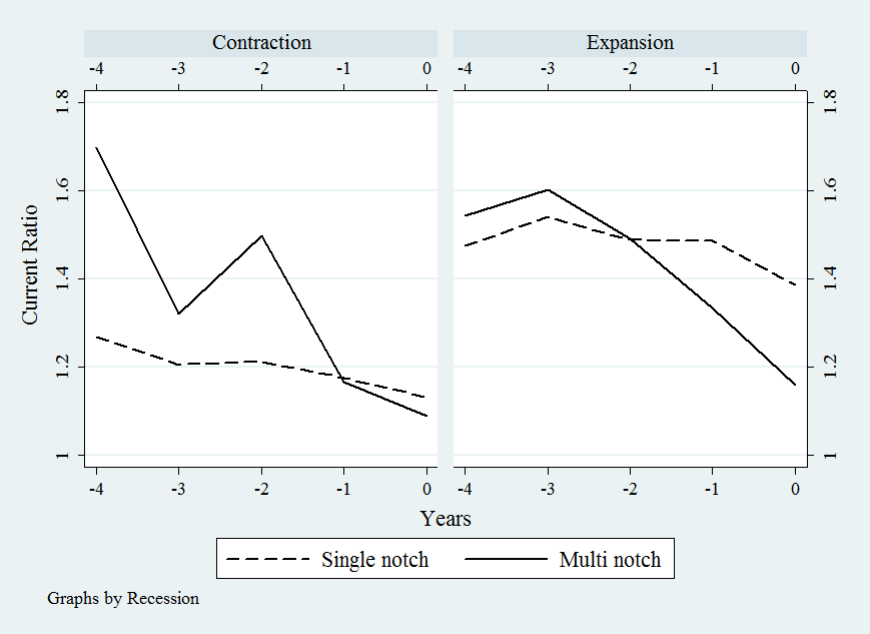

Figure 4.2.3 (b). Current Ratio for rating downgrades during economic contraction and expansion.

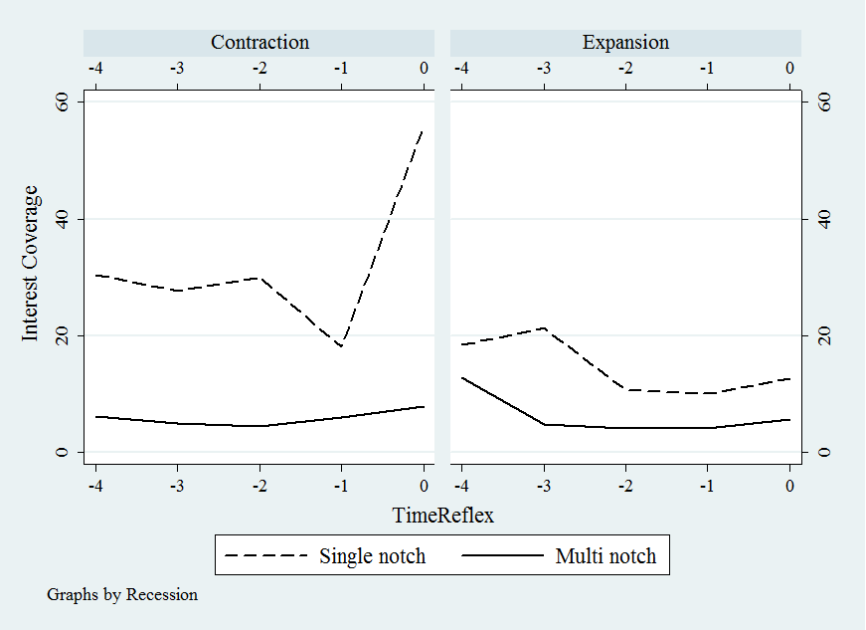

Figure 4.2.4 (a). Interest Coverage for rating upgrades during economic contraction and expansion.

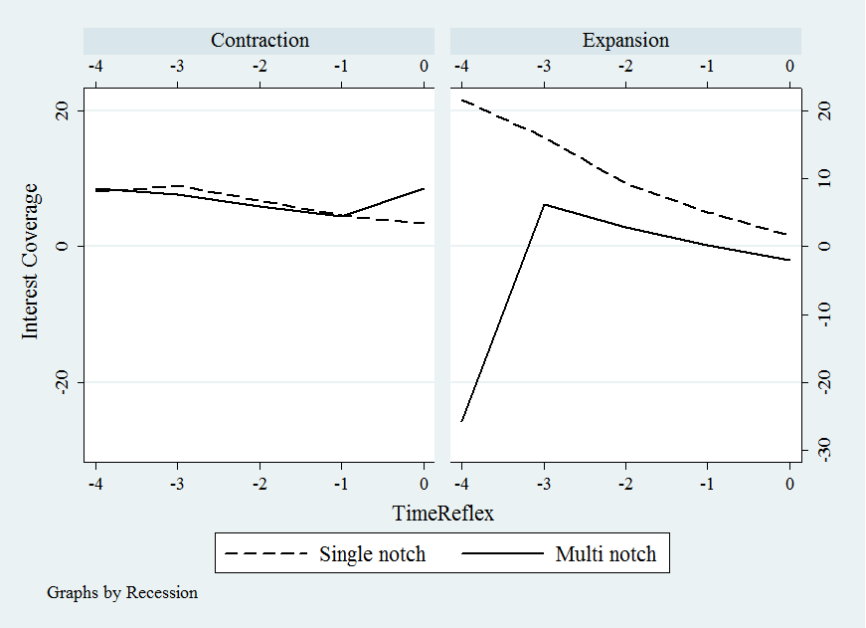

Figure 4.2.4 (b). Interest Coverage for rating downgrades during economic contraction and expansion.

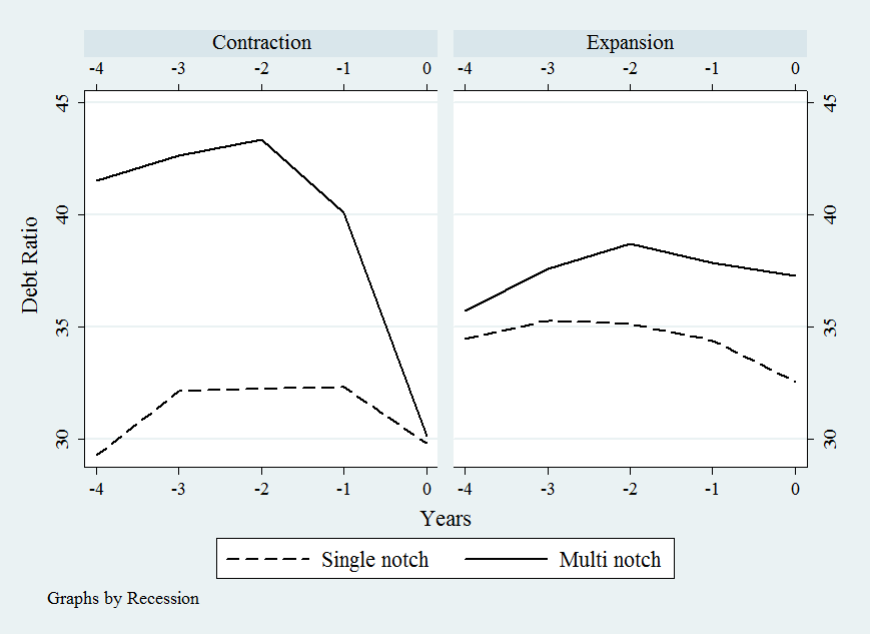

Figure 4.2.5 (a). Debt Ratio for rating upgrades during economic contraction and expansion.

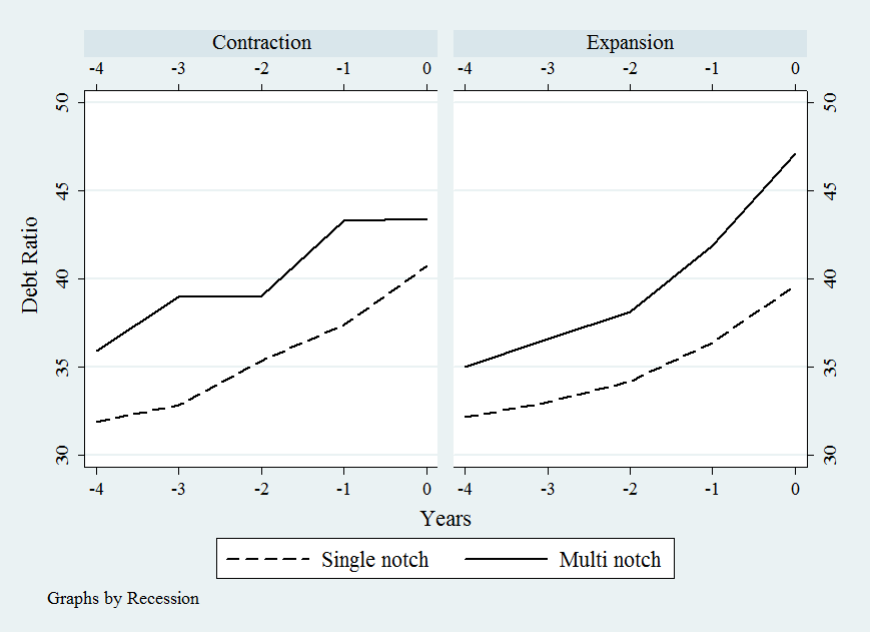

Figure 4.2.5 (b). Debt Ratio for rating downgrades during economic contraction and expansion.

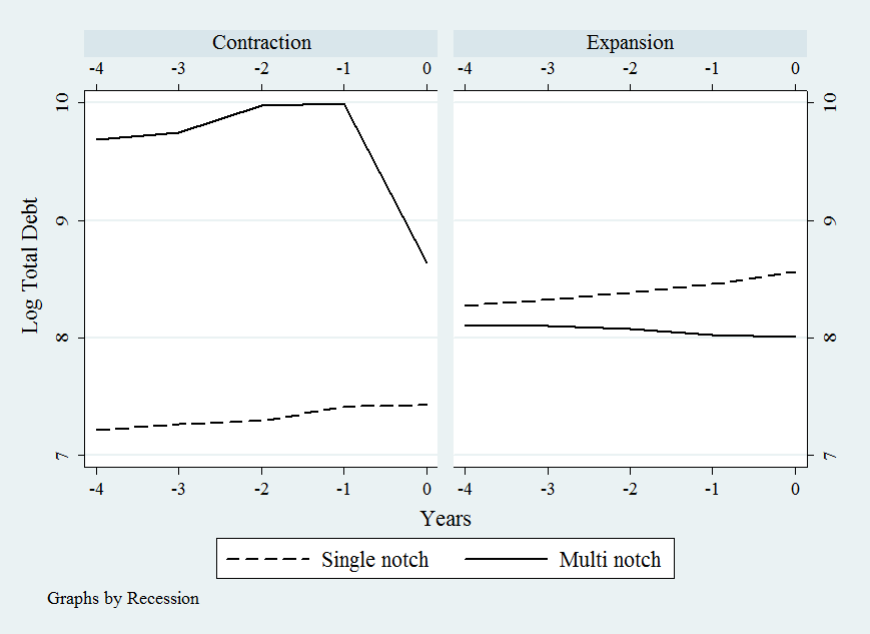

Figure 4.2.6 (a). Total Debt for rating upgrades during economic contraction and expansion.

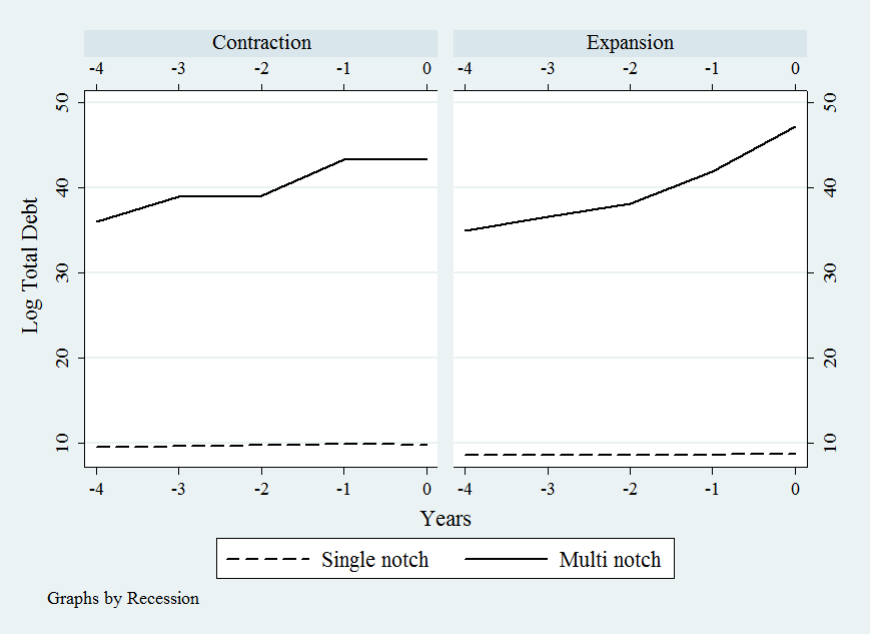

Figure 4.2.6 (b). Total Debt for rating downgrades during economic contraction and expansion.

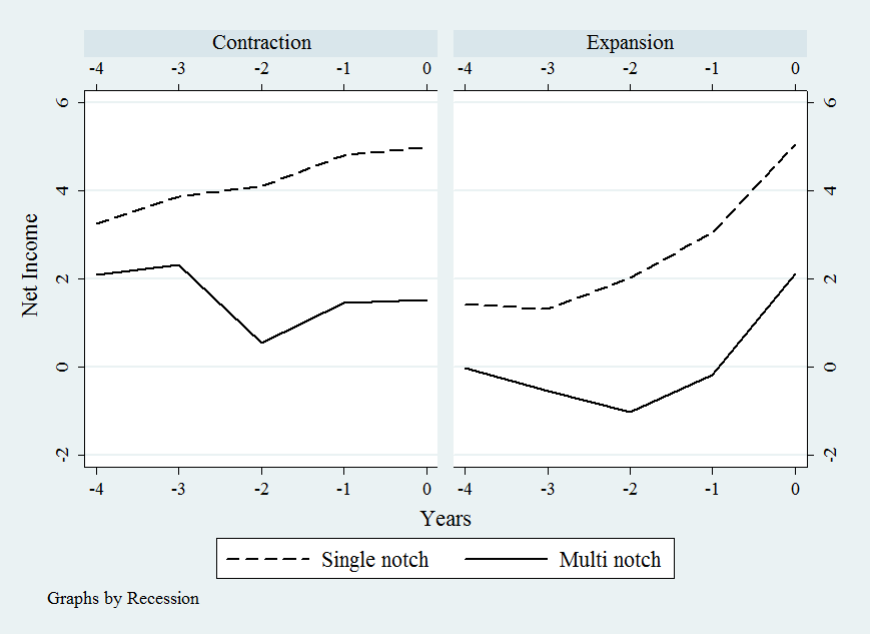

Figure 4.2.7 (a). Net Income for rating upgrades during economic contraction and expansion.

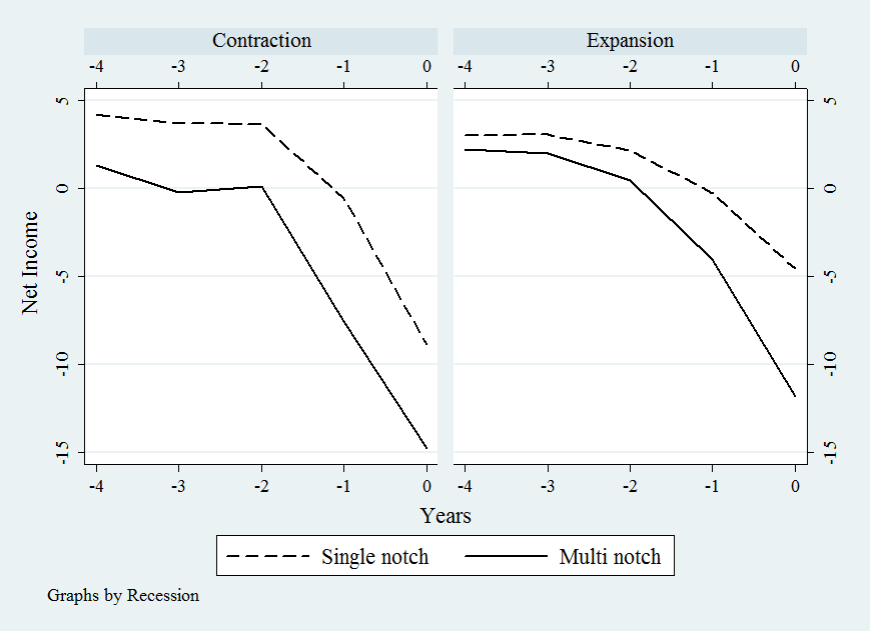

Figure 4.2.7 (b). Net Income for rating downgrades during economic contraction and expansion.

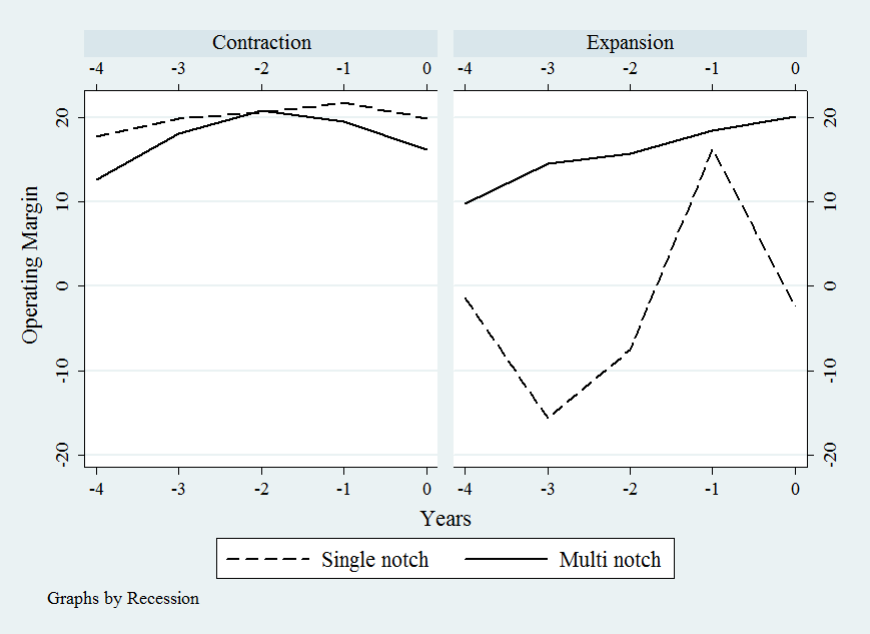

Figure 4.2.8 (a). Operating Margin for rating upgrades during economic contraction and expansion.

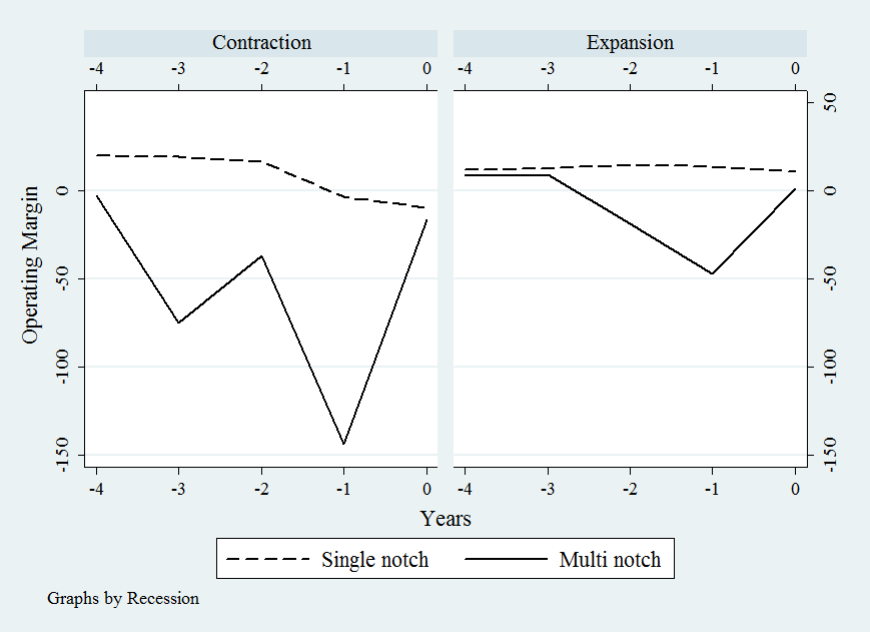

Figure 4.2.8 (b). Operating Margin for rating downgrades during economic contraction and expansion.

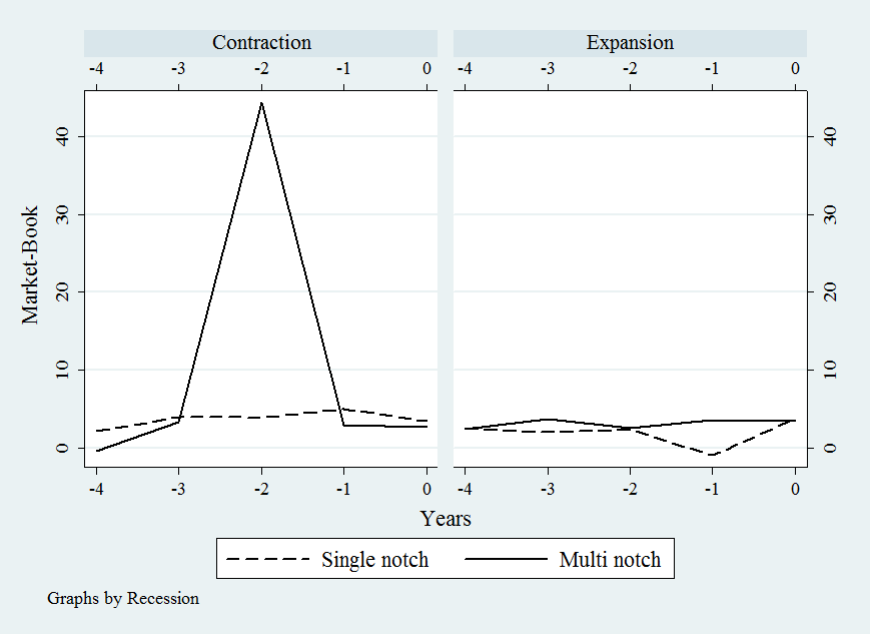

Figure 4.2.9 (a). Market-Book ratio for rating upgrades during economic contraction and expansion.

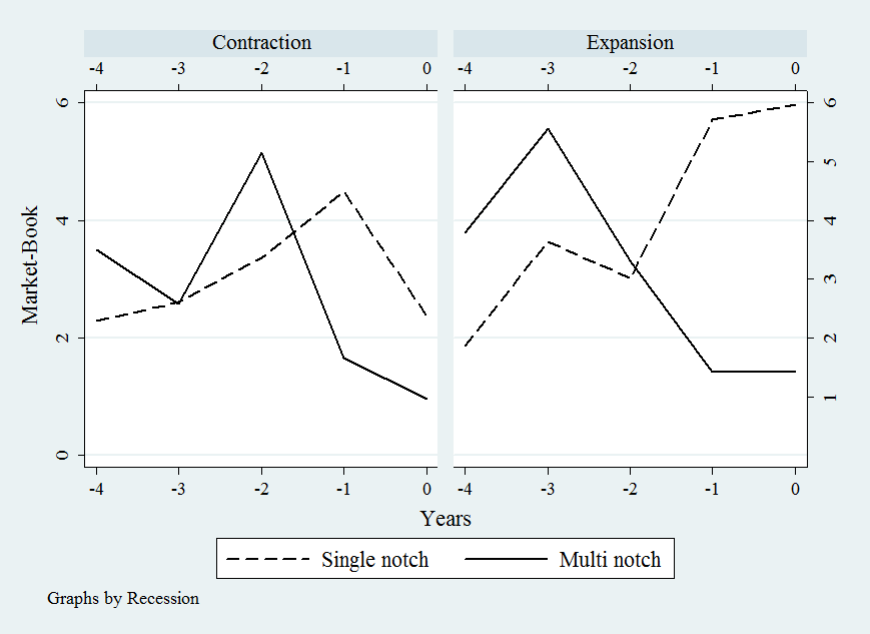

Figure 4.2.9 (b). Market-Book ratio for rating downgrades during economic contraction and expansion.

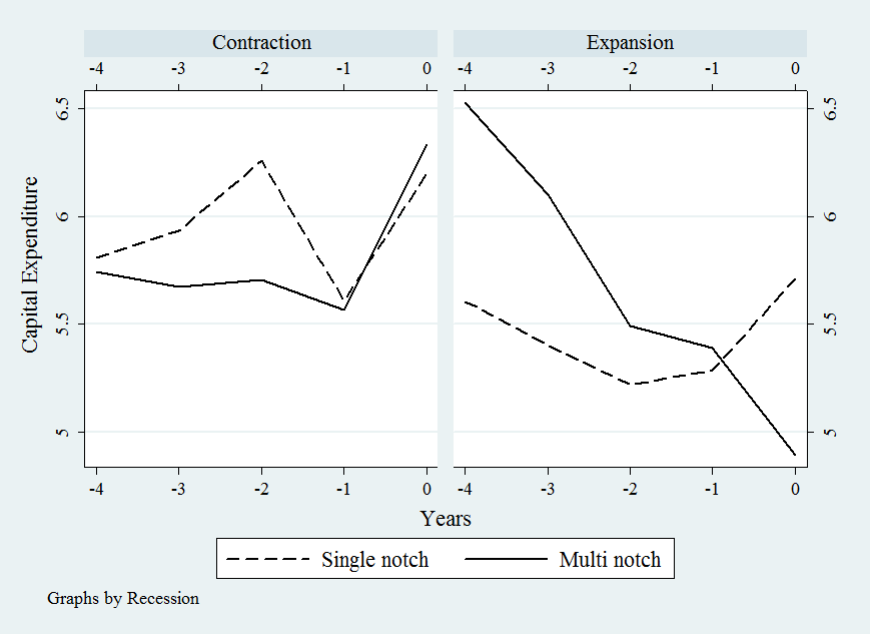

Figure 4.2.10 (a). Capital Expenses for rating upgrades during economic contraction and expansion.

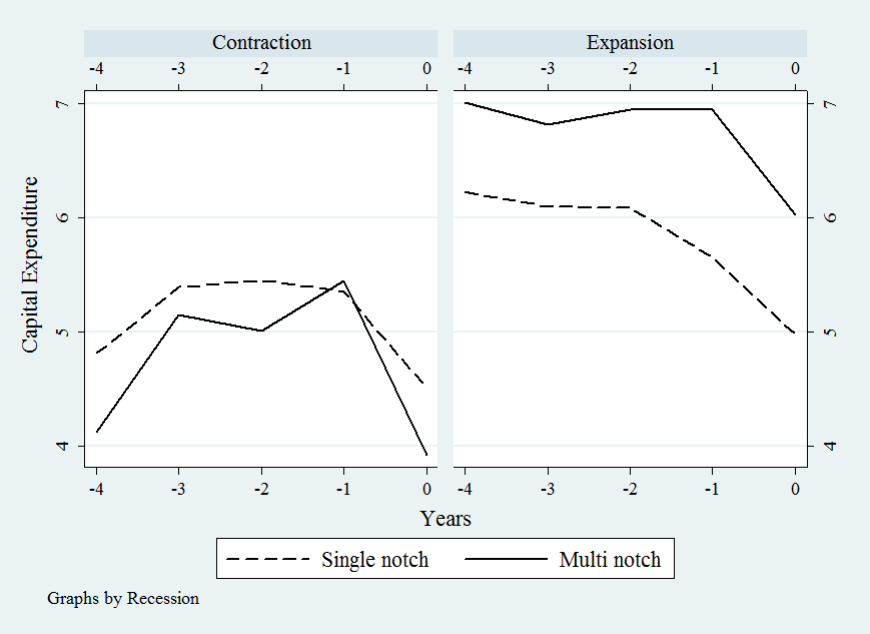

Figure 4.2.10 (b). Capital Expenses for rating downgrades during economic contraction and expansion.

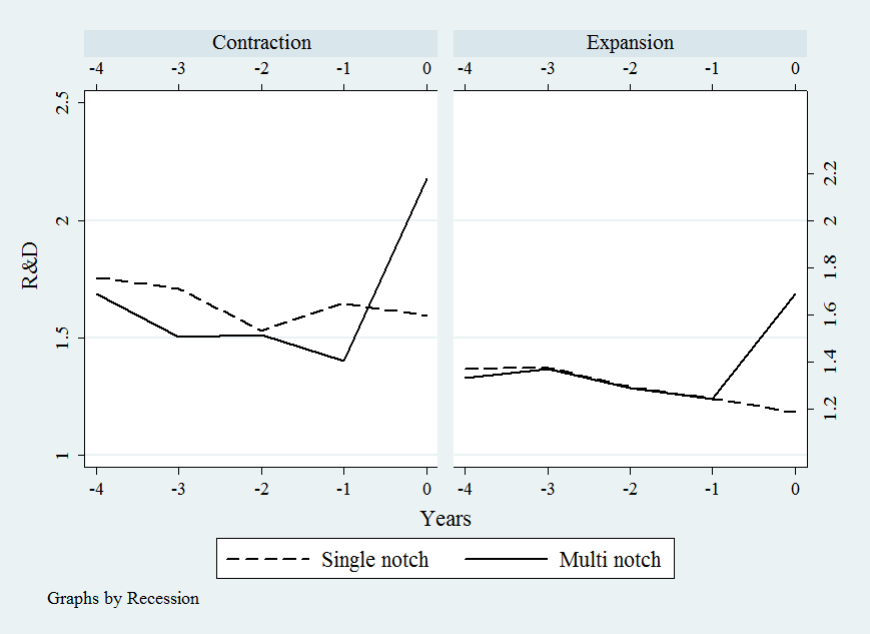

Figure 4.2.11 (a). R&D for rating upgrades during economic contraction and expansion.

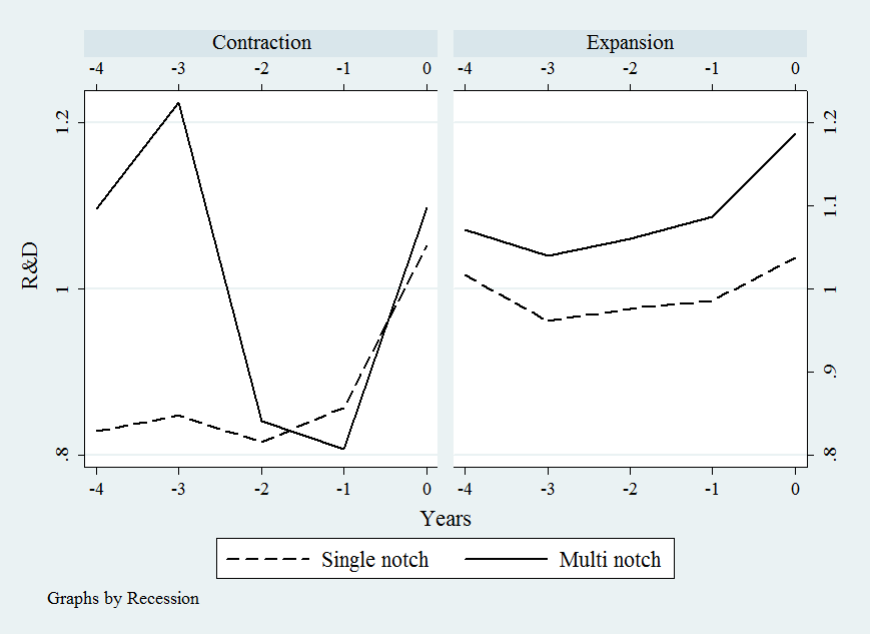

Figure 4.2.11 (b). R&D for rating downgrades during economic contraction and expansion.

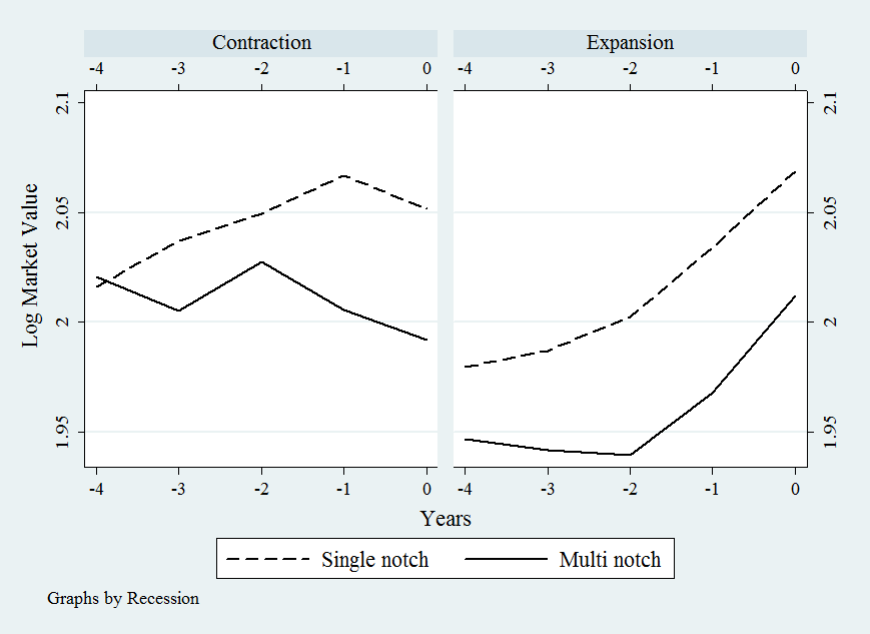

Figure 4.2.12 (a). Market Value of Equity for rating upgrades during economic contraction and expansion.

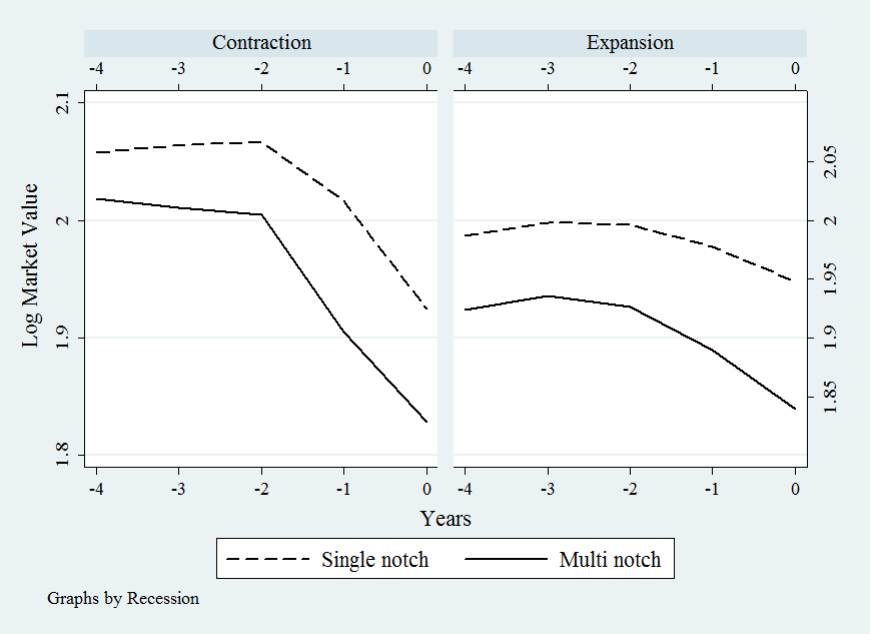

Figure 4.2.12 (b). Market Value of Equity for rating downgrades during economic contraction and expansion.

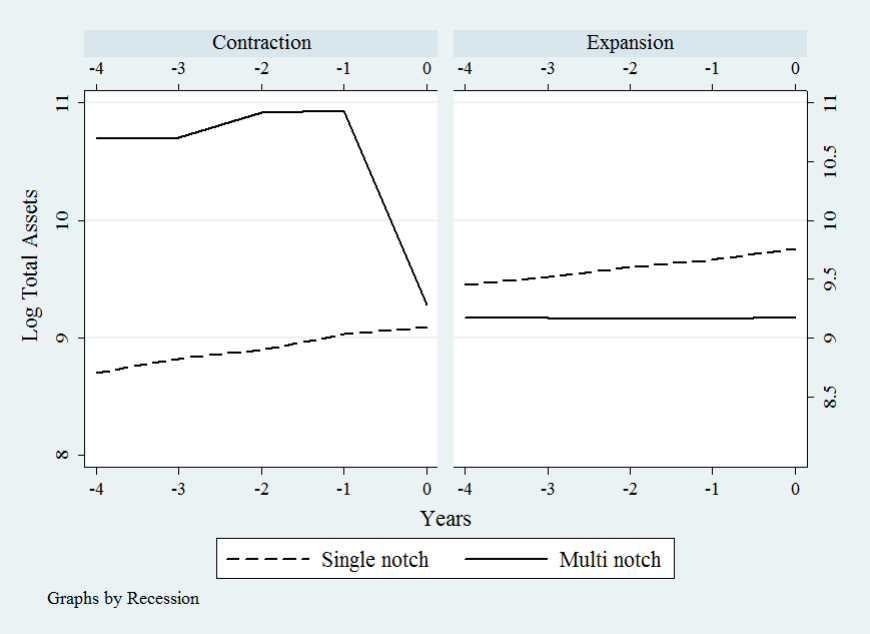

Figure 4.2.13 (a). Total Assets for rating upgrades during economic contraction and expansion.

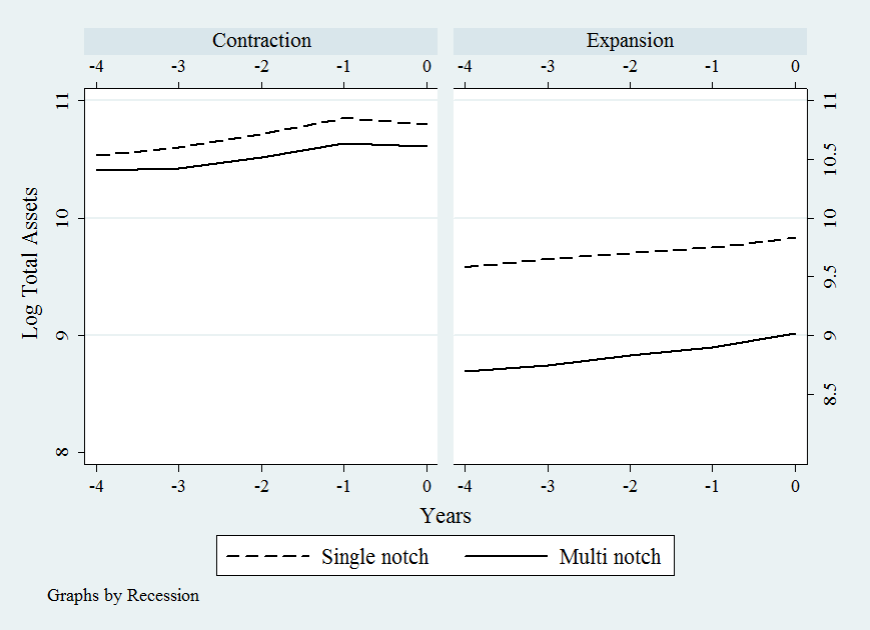

Figure 4.2.13 (b). Total Assets of Equity for rating downgrades during economic contraction and expansion.

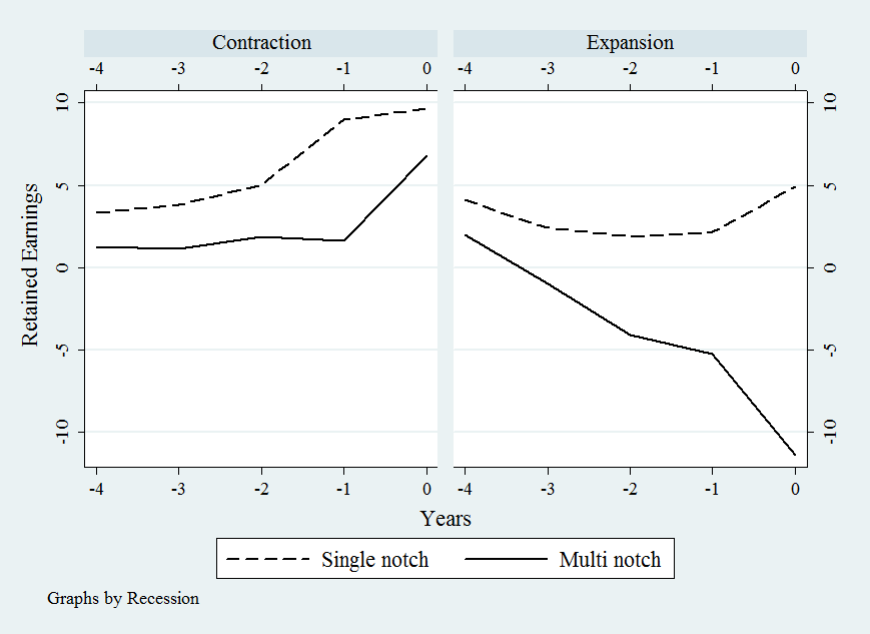

Figure 4.2.14 (a). Retained Earnings for rating upgrades during economic contraction and expansion.

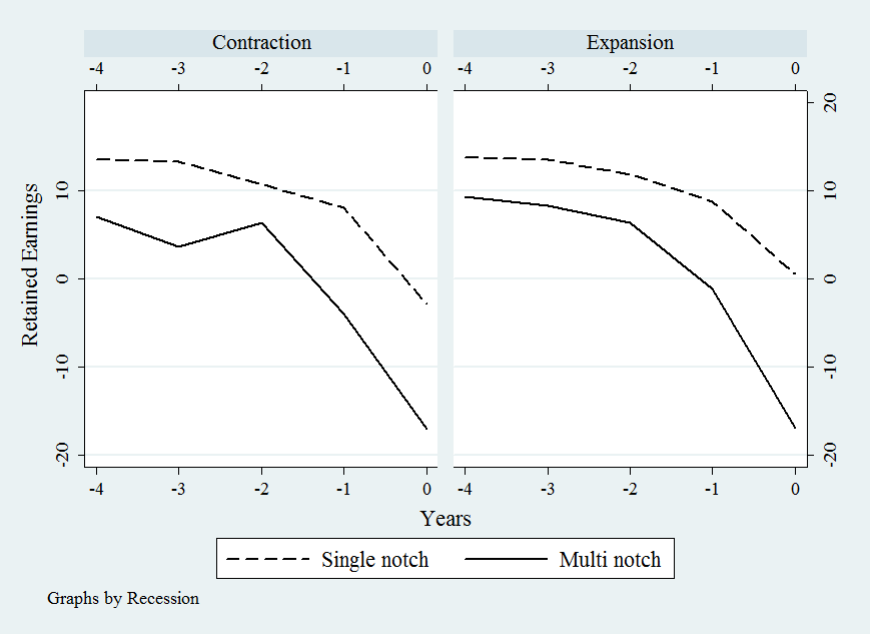

Figure 4.2.14 (b). Retained Earnings for rating downgrades during economic contraction and expansion.

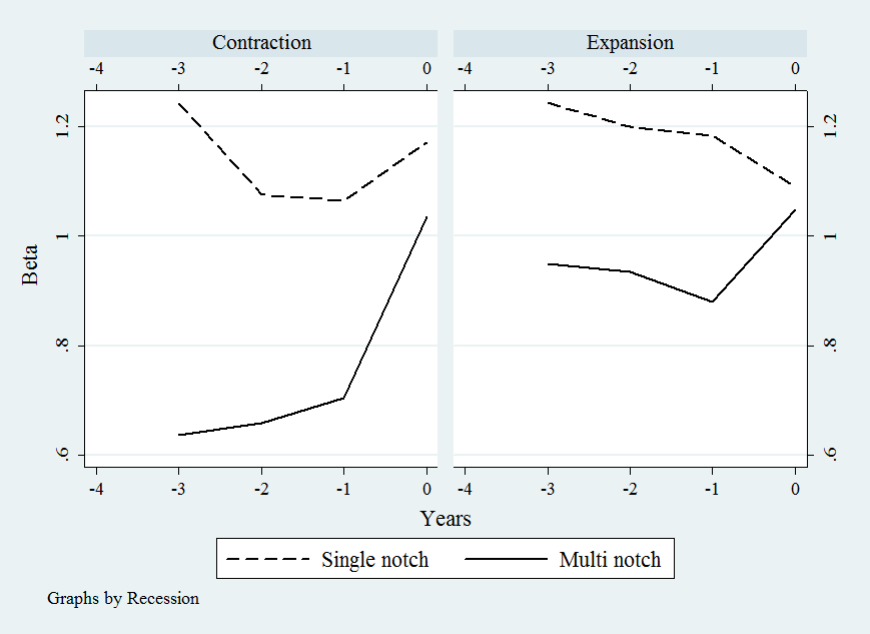

Figure 4.2.15 (a). Market Beta for rating upgrades during economic contraction and expansion.

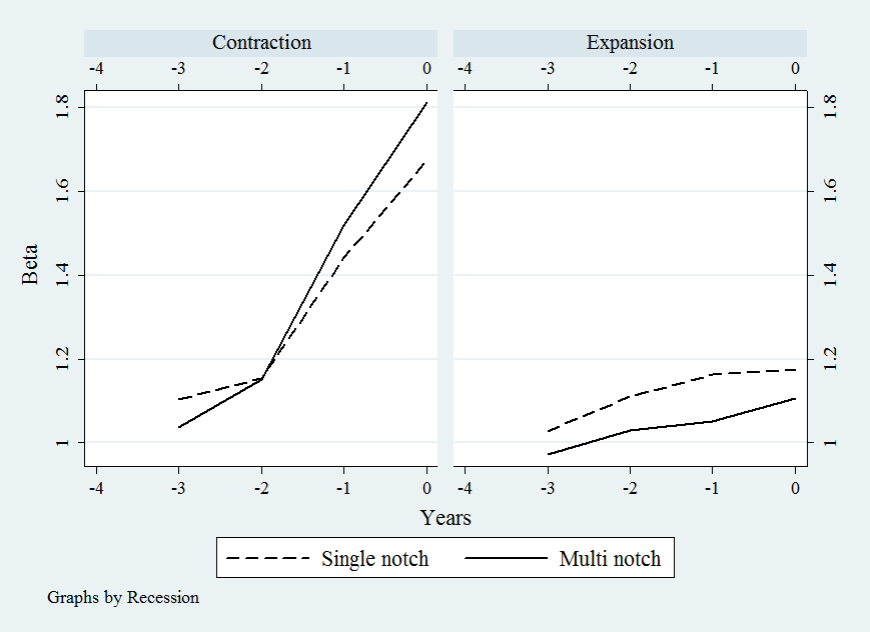

Figure 4.2.15 (b). Market Beta for rating downgrades during economic contraction and expansion.

4.2.1 C. Correlation among (the change in) the variables

Table 4.7 below reports the correlation among the variables in the study.

Table 4.7

Correlation among the Variables

This table shows the correlation between the change in each of the variables used in the probit analysis over previous three years [-4 to -1] years, "0" being the year of the rating change. Cash flow (CF), working capital (WC), interest coverage (IC), net income (NI), research and development expenditure (R&D), capital expenditure (CAPEX), Market value (MV), total assets (TA), and retained earnings (RE), are the respective values as a percentage of total assets; current ratio (CR) is current assets divided by current liabilities; debt ratio (DR) is total debt [long term debt plus current liabilities] divided by total assets; TD is the total debt; operating margin (OM) is operating profit as a percentage of sales. All the values are for the year prior to the rating changes. Market beta (beta) is beta estimated from market model using daily prices for the year prior to the rating change with the condition that prices were available for at least 50 days over the year of estimation. Negative NI is an indicator variable that equals one if the event firm had negative net income in the year prior to the rating change, zero otherwise; Negative CF is an indicator variable that equals one if the event firm had negative cash flow in the year prior to the rating change, zero otherwise. CAR is the cumulative abnormal returns for event firms for event window [-22, -1]. Panel A shows the correlation for all of the firms. Up Last (Down Last) is an indicator variable that equals one if the firm had upgrades (downgrades) previously. Non-Investment is an indicator variable that equals one if the firm had speculative rating prior to the rating change, zero otherwise. Panel B shows the same for the firms with rating upgrades and Panel C for the firms with rating downgrades.

Panel A: All Rating Changes

	CF	WC	CR	IC	TD	DR	NI	OM	MB	CAPEX	RD
CF	1.00										
WC	0.01	1.00									
CR	0.20	0.08	1.00								
IC	0.01	0.00	0.05	1.00							
TD	-0.04	-0.02	-0.06	-0.05	1.00						
DR	-0.03	-0.01	-0.06	-0.06	0.73	1.00					
NI	-0.05	-0.02	0.03	0.03	-0.01	-0.01	1.00				
OM	-0.03	0.05	0.04	0.26	-0.01	-0.02	0.07	1.00			
MB	0.01	0.01	-0.01	0.05	-0.02	-0.01	0.03	0.07	1.00		
CAPEX	-0.06	0.00	-0.05	0.08	0.01	0.03	0.02	0.05	0.03	1.00	
RD	0.01	-0.01	-0.05	0.02	-0.03	-0.02	-0.02	-0.04	0.02	0.08	1.00
MV	0.01	0.00	0.09	0.17	0.07	-0.02	0.07	0.13	0.24	0.11	-0.02
TA	-0.03	-0.02	-0.02	-0.01	0.14	0.05	0.11	0.02	-0.03	0.01	-0.02
RE	0.00	0.00	0.02	-0.33	0.00	0.00	0.01	-0.05	0.00	-0.04	0.00
Betas	0.00	-0.01	0.01	-0.03	-0.01	-0.01	-0.02	-0.03	-0.02	-0.03	-0.01
Negative NI	0.04	-0.05	-0.06	-0.16	0.04	0.02	-0.16	-0.22	-0.03	-0.03	0.07
Negative CF	0.04	-0.02	-0.03	-0.11	0.03	0.03	-0.08	-0.29	-0.02	0.03	0.02
CAR	0.00	-0.02	0.01	0.00	-0.02	0.00	0.00	-0.02	0.01	-0.01	0.00
UpLast	0.00	0.01	0.03	0.10	-0.03	-0.04	0.02	0.08	0.04	0.03	0.01
DownLast	0.01	0.00	-0.02	-0.08	-0.02	0.00	-0.04	-0.11	-0.04	-0.03	0.00
NonInvestment	0.06	0.01	0.04	0.00	0.04	0.03	-0.05	-0.03	-0.01	0.04	0.02

Panel A: All Rating Changes Continued

	MV	TA	RE	Betas	NegNI	NegCF	CAR	UpLast	DownLast	NonInv~t
MV	1.00									
TA	0.32	1.00								
RE	-0.01	0.00	1.00							
Betas	-0.02	-0.01	0.00	1.00						
Negative NI	-0.12	0.01	0.00	0.06	1.00					
Negative CF	-0.05	0.01	0.00	0.02	0.34	1.00				
CAR	-0.01	-0.03	0.00	0.00	-0.01	0.01	1.00			
UpLast	0.14	-0.01	0.01	-0.05	-0.13	-0.06	0.03	1.00		
DownLast	-0.17	-0.03	-0.02	0.06	0.21	0.11	-0.03	-0.30	1.00	
NonInvestment	0.07	0.04	-0.01	-0.02	0.22	0.08	0.01	0.03	0.08	1.00

Panel B: Upgrades

	CF	WC	CR	IC	TD	DR	NI	OM	MB	CAPEX	RD
CF	1.00										
WC	-0.02	1.00									
CR	0.22	0.05	1.00								
IC	0.00	0.00	0.01	1.00							
TD	-0.04	-0.03	-0.06	-0.07	1.00						
DR	-0.03	-0.01	-0.04	-0.08	0.86	1.00					
NI	-0.04	-0.07	0.04	0.02	0.00	-0.02	1.00				
OM	-0.06	0.03	0.04	0.24	-0.01	-0.01	0.01	1.00			
MB	-0.01	-0.01	-0.05	0.04	-0.02	-0.02	0.02	0.04	1.00		
CAPEX	-0.08	0.03	-0.03	0.09	0.03	0.07	0.01	0.03	0.04	1.00	
RD	0.02	0.01	-0.02	0.00	-0.05	-0.01	-0.03	-0.03	0.03	0.06	1.00
MV	0.02	0.00	0.06	0.16	0.07	-0.03	0.09	0.11	0.23	0.15	-0.05
TA	-0.02	-0.01	-0.02	-0.01	0.07	0.02	0.16	0.01	-0.02	0.00	-0.02
RE	0.01	0.01	0.03	-0.44	0.00	0.00	0.02	-0.07	0.00	-0.08	0.00
Betas	0.02	0.03	0.04	-0.02	0.01	0.02	-0.04	-0.07	-0.03	-0.01	-0.01
Negative NI	0.03	0.00	-0.07	-0.14	0.02	0.04	-0.13	-0.15	0.01	-0.04	0.05
Negative CF	0.07	0.01	-0.05	-0.06	0.04	0.05	-0.05	-0.18	0.02	-0.01	0.02
CAR	0.00	0.00	0.00	-0.03	-0.01	-0.02	0.01	-0.03	-0.02	-0.01	-0.01
UpLast	0.01	0.00	0.06	0.07	-0.06	-0.07	0.00	0.06	0.02	0.04	0.04
DownLast	0.03	-0.01	0.01	-0.01	0.00	0.03	-0.02	-0.06	-0.01	-0.03	0.01
NonInvestm~t	0.05	0.01	0.04	0.00	0.04	0.03	-0.03	0.00	0.00	0.01	0.03

Panel B: Upgrades Continued

	MV	TA	RE	Betas	NegNI	NegCF	CAR	UpLast	DownLast	NonInv~t
MV	1.00									
TA	0.35	1.00								
RE	-0.02	0.00	1.00							
Betas	0.05	-0.02	0.01	1.00						
Negative NI	-0.17	-0.02	0.01	0.05	1.00					
Negative CF	-0.04	0.00	0.00	0.05	0.30	1.00				
CAR	-0.05	-0.03	0.01	0.02	0.05	-0.02	1.00			
UpLast	0.09	-0.02	0.01	-0.04	-0.14	-0.05	0.02	1.00		
DownLast	-0.14	-0.03	-0.05	0.03	0.18	0.07	0.01	-0.30	1.00	
NonInvestment	0.05	0.01	-0.01	0.00	0.15	0.06	0.04	0.00	0.06	1.00

Panel C: Rating Downgrades											
	CF	WC	CR	IC	TD	DR	NI	OM	MB	CAPEX	RD
CF	1.00										
WC	0.04	1.00									
CR	0.22	0.10	1.00								
IC	0.02	-0.01	0.05	1.00							
TD	-0.04	-0.02	-0.05	-0.05	1.00						
DR	-0.03	-0.02	-0.06	-0.05	0.68	1.00					
NI	-0.02	0.03	0.02	0.07	-0.03	-0.01	1.00				
OM	0.02	0.10	0.06	0.16	-0.01	-0.02	0.15	1.00			
MB	0.02	0.02	0.00	0.05	-0.05	-0.02	0.07	0.06	1.00		
CAPEX	-0.03	-0.01	-0.02	0.04	0.01	0.02	0.04	0.08	0.00	1.00	
RD	-0.01	-0.01	-0.06	0.03	-0.03	-0.01	-0.01	-0.02	0.02	0.08	1.00
MV	0.01	-0.03	0.10	0.14	0.13	-0.01	0.07	0.16	0.25	0.10	-0.01
TA	-0.04	-0.05	0.00	-0.01	0.34	0.12	-0.01	0.05	-0.07	0.03	-0.04
RE	0.00	-0.02	-0.02	0.00	-0.04	-0.02	-0.02	0.03	-0.01	0.06	-0.02
Betas	0.01	-0.01	0.00	-0.01	-0.02	-0.02	-0.02	-0.02	0.00	-0.04	-0.01
Negative NI	0.05	-0.07	-0.04	-0.15	0.04	0.01	-0.21	-0.27	-0.06	-0.01	0.06
Negative CF	0.03	-0.06	0.03	-0.16	0.04	0.04	-0.10	-0.40	-0.03	0.04	0.00
CAR	0.00	-0.05	0.00	0.00	-0.01	0.01	-0.02	-0.05	-0.01	-0.05	0.02
UpLast	-0.03	0.00	-0.01	0.04	-0.01	-0.01	0.03	0.03	0.01	0.02	0.00
DownLast	0.00	0.00	-0.01	-0.09	-0.04	-0.01	-0.08	-0.11	-0.06	0.01	0.00
NonInvestmentt	0.05	0.00	0.03	-0.06	0.05	0.04	-0.09	-0.11	-0.05	0.04	0.02

Panel C: Rating Downgrades Continued										
	MV	TA	RE	Betas	NegNI	NegCF	CAR	UpLast	DownLast	NonInv~t
MV	1.00									
TA	0.50	1.00								
RE	-0.01	-0.04	1.00							
Betas	-0.02	-0.01	-0.02	1.00						
Negative NI	-0.11	0.06	-0.03	0.04	1.00					
Negative CF	-0.06	0.05	-0.02	0.02	0.35	1.00				
CAR	-0.05	-0.04	0.00	0.01	-0.01	0.03	1.00			
UpLast	0.06	0.00	0.01	-0.03	-0.07	-0.05	-0.01	1.00		
DownLast	-0.13	-0.04	0.01	0.04	0.22	0.13	-0.03	-0.23	1.00	
NonInvestment	0.00	0.09	0.00	-0.02	0.30	0.12	-0.04	0.00	0.17	1.00

As seen in the tables above, the variables are not significantly correlated with each other except for market value and total assets ((50% for the sample of downgrades) and debt ratio and total debt (86% for the sample of upgrades). I run the models separately with each of the variables. Given that the other variables are mostly uncorrelated, the variables should independently contribute to the explanation of the single notch versus multi notch rating changes.

CHAPTER 5

RESULTS

This chapter is further divided into two sections. Section 5.1 presents the findings on market reaction to multi notch versus single notch rating changes. Section 5.2 reports on the factors explaining single notch versus multi notch rating changes.

5.1 Market Reaction to Multi Notch versus Single Notch Rating Changes

Table 5.1 shows estimates of cumulative abnormal returns (predictive residuals from the market model) as discussed in section 4.2.1. The table reveals some clearly different pattern on the stock market reaction for single notch versus multi notch rating changes.

Panel A of the table reveals that for the entire event window, cumulative abnormal returns for multi notch upgrades is higher than that for single notch upgrades. When the entire business cycle is considered, for the day of event, the abnormal returns of 0.7% for multi notch rating upgrades is much higher, in comparison to the abnormal returns of 0.28% for single notch rating upgrades. The table reveals that, for the day of the event, the differential excess return for multi notch versus single notch upgrades is much stronger during recessions and not significantly different during expansions. For the rating upgrades that occur in economic recessions, Table 5.1 shows that the day [0] excess market reaction for multi notch rating changes is much higher, 4.28%, than that for single notch rating upgrades, 0.5%. The excess return during the day [-1, +1] tells a similar story.

Table 5.1

Market Reaction around the Announcement of Rating Changes

This table reports cumulative market excess returns (CAR) around the announcement of rating changes. The event windows are in the brackets. Panel A presents the excess returns for rating upgrades for the entire samples of upgrades and Panel B presents the excess returns for rating downgrades for the complete business cycles, expansions, and recessions. Ttest (Mu=Su) tests the null that the mean CAR for the single notch rating changes is equal to the mean CAR for the multi notch rating changes. Patell, Brown Warner, BMP, and Rank Test test the null that CAR is equal to zero. ***, **, * indicate significance at 1%, 5%, and 10% level respectively for each of the tests.

Panel A: Rating Upgrades

	Complete Business Cycle			Expansion		Contraction	
	All Upgrades	Single notch	Multi notch	Single notch	Multi notch	Single notch	Multi notch
N	*2220*	*1858*	*362*	*1661*	*320*	*197*	*42*
CAR [0,0]	0.33	0.28	0.7	0.25	0.25	0.5	4.28
Ttest (Mu=Su)		2.69***		0.03		3.51***	
Patell	6.32***	4.91***	4.84***	4.38***	1.64**	2.38***	9.87***
Brown Warner	4.37***	4.46***	1.71**	4.17***	1.35*	1.62**	1.28*
BMP	5.14***	4.41***	2.8***	3.87***	0.90	2.39***	6.13***
Rank Test	4.34***	4.32***	1.00	4.18***	0.82	1.43*	0.63
CAR [-1, +1]	0.56	0.48	1.05	0.53	0.67	0.03	4.12
Ttest (Mu=Su)		2.56**		0.91		3.09***	
Patell	5.91***	4.67***	4.31***	4.92***	2.72***	0.05	5.26***
Brown Warner	4.81***	4.26***	2.28***	4.55***	2.52***	0.04	1.09
BMP	4.94***	4.39***	2.43***	4.71***	1.38*	0.09	3.41***
Rank Test	3.57***	3.27***	1.58*	3.79***	1.49*	-0.85	0.38
CAR [-22, -1]	1.15	0.96	2.41	0.96	2.18	0.96	4.22
Ttest (Mu=Su)		1.81*		1.33		1.26	
Patell	3.3***	2.58***	2.5***	2.46***	2.82***	0.77	-0.48
Brown Warner	3.15***	2.58***	1.86**	2.5***	2.96***	0.69	-0.16
BMP	3.77***	3.24***	2.05**	3.14***	1.66**	0.97	1.29*
Rank Test	-0.04	-0.65	1.62**	-0.15	1.8**	-1.7**	-0.52
CAR [+2, +22]	0.17	0.09	0.74	0.08	0.96	0.2	-1.04
Ttest (Mu=Su)		0.58		0.83		-0.37	
Patell	0.18	-0.16	0.92	-0.17	1.02	0.02	-0.12
Brown Warner	0.18	-0.16	1.03	-0.18	1.13	0.02	-0.15
BMP	0.58	0.33	0.65	0.28	0.75	0.21	-0.33
Rank Test	-1.78**	-2.03**	0.33	-1.67**	0.56	-1.56*	-0.78

Panel B: Rating Downgrades							
	Complete Business Cycle			Expansion		Contraction	
	All Downgrades	Single notch	Multi notch	Single notch	Multi notch	Single notch	Multi notch
N	*3119*	*2220*	*899*	*1649*	*616*	*571*	*283*
CAR [0, 0]	-1.44	-0.95	-2.75	-0.93	-3.24	-0.99	-1.67
Ttest (Mu=Su)		-6.46***		-7.73***		-1.17	
Patell	-19.93***	-13.51***	-16.11***	-12.76***	-15.58***	-4.95***	-5.71***
Brown Warner	-7.08***	-5.75***	-4.26***	-5.83***	-4.27***	-1.79**	-1.41*
BMP	-18.39***	-11.73***	-15.75***	-11.32***	-17.91***	-5.65***	-4.26***
Rank Test	-6.52***	-5.63***	-5.35***	-5.25***	-5.34***	-3.37***	-2.93***
CAR [-1, +1]	-2.54	-2.48	-2.68	-2.15	-3.14	-3.45	-1.67
Ttest (Mu=Su)		-2.62***		-7.45***		1.01	
Patell	-22.44***	-20.01***	-10.29***	-15.70***	-12.39***	-12.77***	-0.04
Brown Warner	-5.07***	-9.94***	-1.32*	-8.24***	-2.21***	-5.56***	0.00
BMP	-18.7***	-17.7***	-8.86***	-15.03***	-10.02***	-11.31***	-2.46***
Rank Test	-8.73***	-7.63***	-7.00***	-6***	-6.52***	-6.28***	-4.46***
CAR [-22, -2]	-6.07	-5.32	-8.05	-4.83	-8.29	-6.73	-7.52
Ttest (Mu=Su)		-4.79***		-7.24***		-0.38	
Patell	-24.23***	-18.92***	-15.49***	-15.62***	-12.87***	-10.77***	-8.62***
Brown Warner	-12.48***	-12.59***	-5.56***	-10.98***	-4.96***	-6.28***	-2.72***
BMP	-16.51***	-13.99***	-9.84***	-12.48***	-9.78***	-8.14***	-4.09***
Rank Test	-5.45***	-4.81***	-4.29***	-2.65***	-2.72***	-5.68***	-4.41***
CAR [+2, +22]	-1.1	-1.03	-1.29	-1.17	-2.43	-0.61	1.18
Ttest (Mu=Su)		-0.07		-0.88		0.91	
Patell	-6.94***	-5.12***	-4.93***	-4.72***	-4.75***	-2.08**	-1.78**
Brown Warner	-4.54***	-3.72***	-2.62***	-3.81***	-2.63***	-1.22	-0.87
BMP	-3.06***	-2.77***	-1.62**	-3.10***	-2.93***	-0.76	0.66
Rank Test	-0.31	0.88	-2.16**	1.73**	-0.84	-0.85	-2.9***

Similarly, panel B reveals that, for all of the event window, cumulative abnormal returns for multi notch downgrades is followed by higher abnormal returns than that for single notch downgrades. When the entire business cycle is considered, for the day of event, the abnormal returns of -2.75% for multi notch rating downgrades is much greater, in comparison to the abnormal returns of -0.95% for single notch rating downgrades. The table reveals that the

differential excess return for multi notch versus single notch downgrades is much stronger during expansion and not significantly during a recession. For the rating downgrades that occur in economic expansion, the table shows that the day [0] excess market reaction for multi notch rating downgrades is much greater, -3.24%, than that for single notch rating downgrades, -0.93%. The excess return during the day [-1, +1] tells a similar story.

The results are also shown in Figure 5.1.1 through Figure 5.1.4 below. The figures show the market reaction to single notch upgrades and multi notch upgrades at different stages of the business cycle for the day [0,0] and day [-1, 1].

Figure 5.1. Market reaction to multi notch and single notch rating changes

The figure shows the market reaction to rating upgrades and downgrades for the complete business cycles, economic expansions, and recessions. ***, ** and ** indicate that the two values for the single notch and multi notch rating changes are significantly different at 1%, 5%, and 10% respectively. Figure 5.1.1 A shows the results for rating upgrades for event window [0, 0]; 5.1.1 B shows the results for rating upgrades for event window [-1, +1]; 5.1.2 A shows the result for rating downgrades for event window [0, 0]; 5.1.2 B shows the result for rating downgrades for event window [-1, +1].

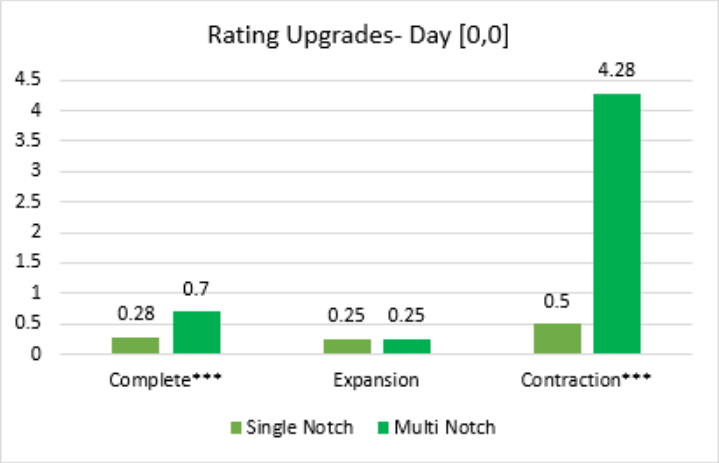

Figure 5.1.1 A. Market reaction to upgrades during the complete cycle, economic contraction and expansion for the day [0,0].

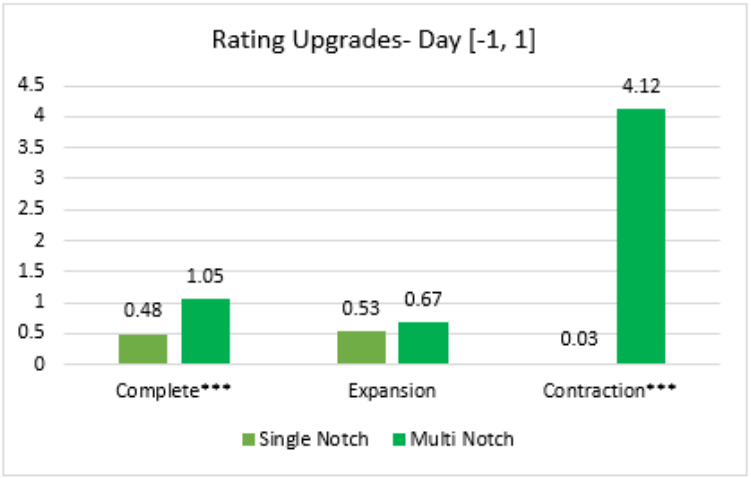

Figure 5.1.1 B. Market reaction to upgrades during the complete cycle, economic contraction and expansion for days [-1, 1].

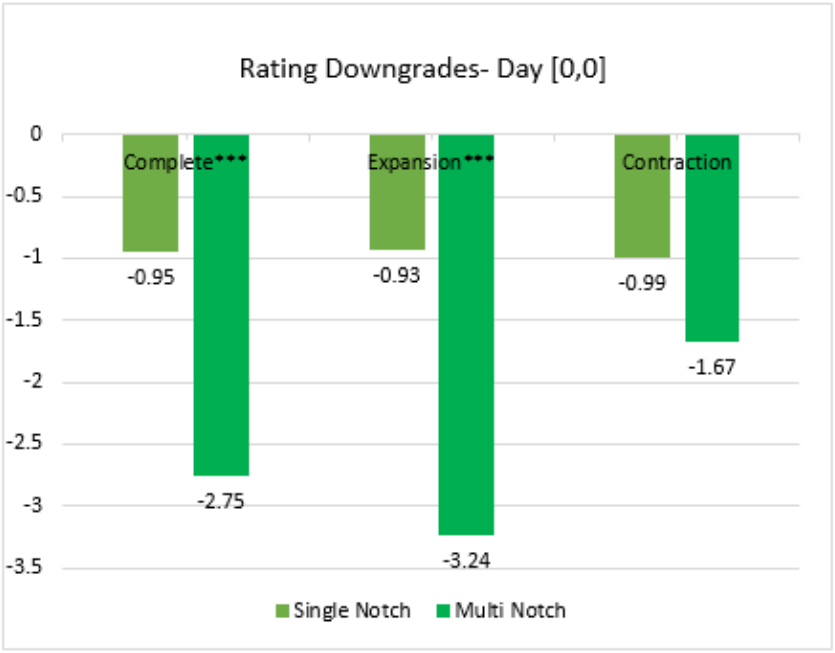

Figure 5.1.2 A. Market reaction to downgrades during the complete cycle, economic contraction and expansion for days [0, 0].

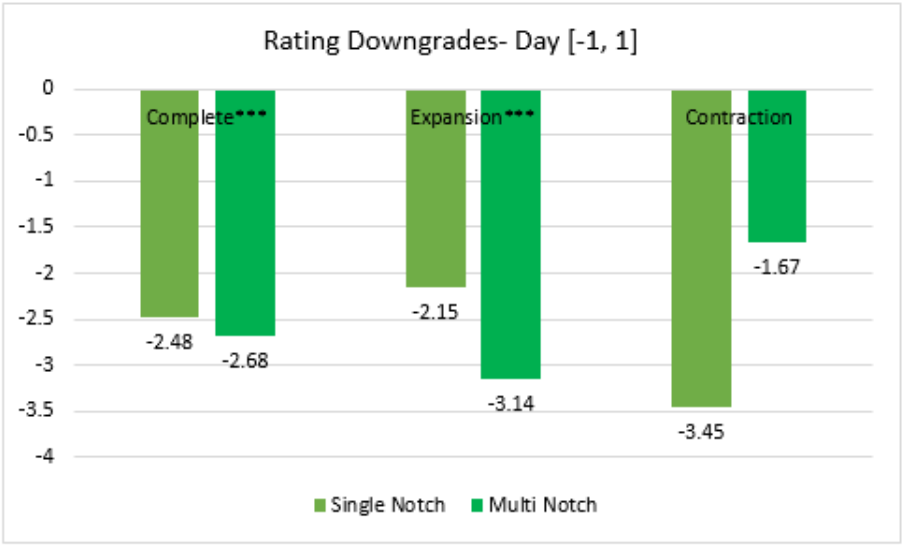

Figure5.1.2 B. Market reaction to downgrades during the complete cycle, economic contraction and expansion for days [-1, 1].

5.2 Explanatory Factors of Multi Notch versus Single Notch Rating Changes

In this section I present the probit model estimates determining single notch versus multi notch rating changes and the impact of the stages of the business cycle in the determination of single notch versus multi notch rating changes. All the results here are shown after holding out 10% of the sample, which are used for cross-validation. Also, all of the results are based on winsorization of the accounting and market variables at 1% limiting the rating changes to five notches. Section 5.2.1 presents results on the probit model estimates. Section 5.2.2 presents goodness of fit of the model.

5.2.1 Results on the probit model Estimates

This section is further divided into two sections. Section 5.2.2 A reports the results for upgrades, 5.2.2 B reports on the results for downgrades.

5.2.2. A Results on Upgrades

Panel A of Table 5.2 shows the probit model estimates for the sample of upgrades for the complete business cycles, expansions, and contractions. When the complete business cycle is considered, the variables that are significant in determining single notch versus multi notch upgrades are a firm's prior rating change, prior rating, cash flow and total assets. Except for total assets, the signs of all other coefficients are as expected. When examined at the stages of the business cycle, the probit estimates suggest some differences between the factors predicting multi notch versus single notch upgrades during expansion versus recession. These factors are a firm's prior rating changes, net income, operating margin, the book to market, and retained earnings. The signs of the coefficients on net income and retained earnings are not as expected while those of the other variables are.

Table 5.2

Explanatory Factors of Multi Notch versus Single Notch Rating Changes

This table reports the regression results from the probit model for the sample of upgrades (Panel A) and the downgrades (Panel B). The dependent variable is an indicator variable equal to one if the rating upgrade (downgrade) is of multiple notches, zero if it is of a single notch. Up Last (Down Last) is an indicator variable that equals one if the firm had upgrades (downgrades) previously. Non-Investment is an indicator variable that equals one if the firm had speculative rating prior to a rating change, zero otherwise. Cash flow, working capital, net income, research and development expenditure, retained earnings, and capital expenditure are the respective value as a percentage of total assets; current ratio is current assets divided by current liabilities; interest coverage is the operating return divided by interest expenses; debt ratio is total debt [long term debt plus current liabilities] divided by total assets; operating margin is operating profit as a percentage of sales. Total asset is the total value of the assets. All the values are the change in each of the variables over previous three years [-4 to -1] years, [0] being the year of the rating change. Beta is the change in beta over previous three years estimated from market model using daily prices for the years in interest with the condition that prices were available for at least 50 days over the year of estimation. ZStat tests the null that the respective coefficient is equal to zero. ***, **, * indicate significance at 1%, 5%, and 10% level respectively for the test.

Panel A: Rating Upgrades

	Complete Cycle		*Expansion*		*Recession*	
Variable	Coefficient	ZStat	Coefficient	ZStat	Coefficient	ZStat
Up Last	-0.5245	-5.92***	-0.5608	-6.00***	-0.2635	-0.85
Down Last	-0.0807	-0.87	-0.1569	-1.57	0.3193	1.26
Non-Investment Grade	0.3628	2.98***	0.4146	3.20***	0.1122	0.3
Intercept	-1.1472	-9.55***	-1.1601	-9.09***	-0.9597	-2.56***
Cash Flow	0.0095	2.26**	0.0096	2.02**	-0.1248	-1.5
Working Capital	0.0001	0.01	-0.0007	-0.04	0.0283	0.75
Current Ratio	-0.0616	-0.65	-0.0705	-0.7	0.1962	0.63
Interest Coverage	-0.0277	-1.48	-0.0198	-1.11	-0.1439	-1.54
Debt Ratio	-0.0025	-0.28	-0.0068	-0.41	-0.0036	-0.41
Net Income	-0.0066	-1.17	0.0028	0.5	-0.0910	-2.52**
Operating Margin	-0.0058	-0.14	-0.0658	-1.77*	0.1263	2.75***
Market to Book	0.0263	1.83*	0.0182	0.98	0.0707	2.55**
Capital Expenditure	0.0429	1.08	0.0247	0.53	0.0376	0.47
R&D	0.0076	0.04	0.0197	0.11	0.0502	0.08
Total Assets	-0.099	-2.62***	-0.0944	-2.26**	-0.2110	-1.71*
Retained Earnings	-0.001	-0.14	0.0008	0.08	-0.0016	-2.01**
Market Beta	-0.0254	-0.45	-0.0342	-0.59	0.1025	0.56
Wald Statistic (χ^2)	82.26		62.63		98.77	
Prob> χ^2	0.000		0.000		0.000	
Pseudo R^2	0.043		0.044		0.169	
N (Total)	1991		1776		215	
N (Single Notch)	1672		1492		180	
N (Multi Notch)	319		284		35	

Panel B: Rating Downgrades						
	Complete Cycle		*Expansion*		*Recession*	
Variable	Coefficient	ZStat	Coefficient	ZStat	Coefficient	ZStat
Up Last	-0.4659	-4.45***	-0.4294	-3.45***	-0.5866	-3.02***
Down Last	0.1529	2.81***	0.1527	2.33**	0.0942	0.92
Non-Investment Grade	-0.0060	-0.1	0.0177	0.24	-0.0444	-0.36
Intercept	-0.6538	-11.69***	-0.6887	-10.70***	-0.6421	-5.35***
Cash Flow	0.0022	0.49	-0.0010	-0.19	0.0154	1.76*
Working Capital	-0.0088	-1.06	-0.0092	-0.91	-0.0124	-0.84
Current Ratio	-0.1733	-2.64***	-0.1676	-2.21**	-0.1527	-1.06
Interest Coverage	0.0583	2.31**	0.0963	3.68***	-0.0646	-1.07
Debt Ratio	-0.0014	-0.27	0.0159	1.62	-0.0137	-2.00**
Net Income	-0.0044	-0.73	-0.0040	-0.61	-0.0027	-0.17
Operating Margin	-0.1368	-3.44***	-0.1032	-2.20**	-0.1800	-2.34**
Market to Book	-0.1149	-4.12***	-0.0869	-3.04***	-0.2611	-2.70***
Capital Expenditure	0.0692	2.48**	0.0267	0.66	0.1095	2.73***
R&D	0.0037	0.04	0.0675	0.56	-0.1151	-0.48
Total Assets	0.0563	4.18***	0.0474	2.33**	0.0579	3.05***
Retained Earning	0.0097	1.29	0.0106	1.3	0.0027	0.12
Market Beta	-0.0374	-2.99***	-0.0480	-3.35***	0.0549	1.18
Wald Statistic (χ^2)	112.04		80.1		65.99	
Prob> χ^2	0.000		0.000		0.000	
Pseudo R^2	0.035		0.034		0.066	
N (Total)	2835		2060		775	
N (Single Notch)	2021		1500		521	
N (Multi Notch)	814		560		254	

5.2.2. B Results on Downgrades

Panel B of Table 5.2 shows the probit model estimates for the sample of downgrades for the complete business cycle, expansions, and contractions. When the complete business cycle is considered, the variables that are significant factors explaining single notch versus multi notch downgrades are a firm's previous rating changes, current ratio, interest coverage, operating margin, market to book, capital expenditure and total assets. Except for total assets, the signs of all other coefficients are consistent.

When examined at the stages of the business cycle, the probit estimates suggest some differences in the factors predicting multi notch versus single notch downgrades during

expansions versus recessions. These factors are a firm's prior rating changes, current ratio, interest coverage, debt ratio, capital expenditure, and market beta. Again, except for total assets, the signs of all other variables are consistent.

5.2.2 Goodness of Fit

Table 5.3 shows the classification statistics, a measure of the goodness of fit of the probit model determining multi notch versus single notch rating changes. In Panel A, for the sample of upgrades (in sample), the sensitivity based on cutoff point of 50% shows that when the complete business cycle is considered, 1.25% of the multi notch rating changes were identified correctly as multi notch upgrades. The table also shows that 100% of the single notch rating upgrades was identified correctly as single notch upgrades. Overall correct classification suggests that 84.18% of firms were correctly classified as either multi notch or single notch upgrades. When looked at the holdout sample, the classification statistic shows that the model does not classify the multi notch upgrades as well as the main sample.

The classification statistics shows that the model fits better for the probit model when the business cycle is divided into expansion and contraction. For instance, 1.25%, that is 4 of 319 multi notch upgrades were correctly classified as multi notch upgrades for the complete business cycle. When the business cycle is broken down into expansions and recessions for the probit model estimates, 0.70% of multi notch upgrades were correctly classified for those occurring in expansions and 14.29% of those that were correctly classified in recessions, which is 7 out of 319 multi notch upgrades.

Table 5.3

Classification Statistics

This table shows the percentage of correct classification based on the probit model. Multi Notch Correctly Predicted implies the percentage of multi notch upgrades that were correctly predicted as multi notch upgrades. Single Notch Correctly Predicted implies the percentage of single notch upgrades that were correctly predicted as single notch upgrades. Overall correct classification gives the percentages of firms correctly identified as either multi notch or single notch. The percentage correction is based on cutoff points of 0.5 and 0.30. Hold out sample is a random sample generated from the main sample. Hold out sample constitutes ten percentages of the single notch and multi notch rating upgrades and downgrades during expansion and contraction. Panel A shows the classification statistics for the sample of upgrades divided into the stages of the business cycles. Panel B shows the classification statistics for the sample of downgrades divided into the stages of the business cycles.

Panel A I: Rating Upgrades- Complete Cycle

	Cut off (0.5)		*Cut off (0.30)*	
Classification statistic	In sample	Hold out sample	In sample	Hold out sample
Multi Notch Correctly Predicted	1.25%	0.00%	5.64%	6.98%
Single Notch Correctly Predicted	100.00%	99.46%	98.68%	99.46%
Overall correct classification	84.18%	80.79%	83.78%	82.10%
N (Total)	1991	229	1991	229
N (Single Notch)	1672	186	1672	186
N (Multi Notch)	319	43	319	43

Panel A II: Rating Upgrades- Expansion

	Cut off (0.5)		*Cut off (0.30)*	
Classification statistic	In sample	Hold out sample	In sample	Hold out sample
Multi Notch Correctly Predicted	0.70%	0.00%	5.28%	2.78%
Single Notch Correctly Predicted	100.00%	100.00%	98.59%	98.22%
Overall correct classification	84.12%	82.44%	83.67%	81.46%
N (Total)	1776	205	1776	205
N (Single Notch)	1492	169	1492	169
N (Multi Notch)	284	36	284	36

Panel A III: Rating Upgrades- Recession

	Cut off (0.5)		*Cut off (0.30)*	
Classification statistic	In sample	Hold out sample	In sample	Hold out sample
Multi Notch Correctly Predicted	14.29%	0.00%	42.86%	42.86%
Single Notch Correctly Predicted	99.44%	100.00%	93.33%	88.24%
Overall correct classification	85.58%	70.83%	85.12%	75.00%
N (Total)	215	24	215	24
N (Single Notch)	180	17	180	17
N (Multi Notch)	35	7	35	7

Panel B I: Rating Downgrades- Complete Cycle				
	Cut off (0.5)		*Cut off (0.30)*	
Classification statistic	In sample	Hold out sample	In sample	Hold out sample
Multi Notch Correctly Predicted	6.51%	5.88%	48.77%	50.59%
Single Notch Correctly Predicted	99.11%	100.00%	63.04%	66.83%
Overall correct classification	72.52%	71.83%	58.94%	61.97%
N (Total)	2835	284	2835	284
N (Single Notch)	2021	199	2021	199
N (Multi Notch)	814	85	814	85

Panel B II: Rating Downgrades- Expansion				
	Cut off (0.5)		*Cut off (0.30)*	
Classification statistic	In sample	Hold out sample	In sample	Hold out sample
Multi Notch Correctly Predicted	5.89%	5.36%	39.46%	42.86%
Single Notch Correctly Predicted	99.33%	100.00%	72.00%	76.51%
Overall correct classification	73.93%	74.15%	63.16%	67.32%
N (Total)	2060	205	2060	205
N (Single Notch)	1500	149	1500	149
N (Multi Notch)	560	56	560	56

Panel B III: Rating Downgrades- Recession				
	Cut off (0.5)		*Cut off (0.30)*	
Classification statistic	In sample	Hold out sample	In sample	Hold out sample
Multi Notch Correctly Predicted	16.54%	6.90%	76.38%	55.17%
Single Notch Correctly Predicted	95.59%	92.00%	46.64%	36.00%
Overall correct classification	69.68%	60.76%	56.39%	43.04%
N (Total)	775	79	775	79
N (Single Notch)	521	50	521	50
N (Multi Notch)	254	29	254	29

For comparison, I also show the test statistics when the cutoff point is lowered to 30%, which is arbitrarily picked to see whether the model fits different specification of cut off points. The ability of the model to classify multiple notch rating changes improves, as expected. Even for the cutoff of 30%, the holdout sample did not classify any of the multi notch upgrades

correctly when the complete business cycle is considered. For the holdout sample, the performance of the model improves when the complete business cycle is broken down into expansions and contractions.

Panel B of the table shows the classification statistic for the sample of downgrades. The model classifies much more of the multi notch, and single notch downgrades in comparison to the sample of upgrades. For instance, more than 6% of multi notch downgrades are correctly classified in the complete business cycle at 50% cut-off level. The ability of the model to classify multi notch downgrades improves when the business cycle is broken down into expansions and recessions. During recessions, more (16.54%) of the multi notch downgrades are correctly classified. The values for the in-sample and hold out sample statistic are very similar and shows that the model fits very well.

Expectedly, the ability of the model to classify multi notch downgrades significantly improves when the cutoff point is reduced to 30%. In recessions, for example, more than three fourth of the multi notch downgrades are correctly classified.

CHAPTER 6

EXAMINATION OF COMPLETE RATING REASSESSMENTS

In this chapter, I examine the explanatory factors of rating reassessments considering the reassessment of stable ratings along with rating upgrades and downgrades. I model and test the ordered probit model using variables capturing characteristics of the previous issuer's credit rating, liquidity, solvency, profitability, and growth opportunity to determine the classification of rating changes including stable ratings. This chapter is divided into two sections. Section 6.1 examines the explanatory factors of rating reassessments, 6.2 examines the goodness of fit of the ordered probit model.

6.1 Factors Explaining Rating Reassessments Including Stable Rating Confirmation

The model for ordered probit will be a little different. Suppose that there exists a variable:

$$Z_{it}^{*} = X_{it}\beta + \varepsilon_{it} \qquad (9)$$

Where

Z_{it}^{*} = a continuous unobservable variable at time t

β = slope coefficients

X_{it} = independent observable variables at time t

ε_{it} = unobserved error term

Consider Z_{it} a binary variable that takes the value of one if it has certain quality zero otherwise.

Then the probit model below links Z_{it}^{*} to Z_{it} as:

$$Z_{it} = \begin{cases} 1 \;\; if\; Z_{it}^{*} \in (-\infty, \mu_1), \\ 2 \;\; if\; Z_{it}^{*} \in [\,\mu_1,\; \mu_2), \\ 3 \;\; if\; Z_{it}^{*} \in [\,\mu_2,\; \mu_3), \\ 4 \;\; if\; Z_{it}^{*} \in [\,\mu_3,\; \mu_4), \\ 5 \;\; if\; Z_{it}^{*} \in [\,\mu_4, \infty), \end{cases} \qquad (10)$$

Where, μ_i are the partition points associated with each value of rating change.

Table 6.1 shows the estimates from the ordered probit model. The dependent variables are multi notch upgrades, single notch upgrades, stable ratings, single notch downgrades and multi notch downgrades. Multi notch upgrades are assigned an order of 5, single notch upgrades 4, stable ratings 3, single notch downgrades 2 and multi notch downgrades 1, that is, higher level implies more positive (less negative) rating changes.

For the complete business cycle, the results show that the magnitude and the direction of the rating changes are associated with a firm's prior rating changes, prior rating, current ratio, interest coverage, debt ratio, operating margin, market to book, total assets and market beta.

When examined at the stages of the business cycle, the probit estimates suggest some differences between the factors determining rating changes during expansions versus recessions. These factors are a firm's prior rating change, current ratio, and debt ratio.

Also, signs of the explanatory factors are consistent with the model that examines upgrades and downgrades separately. One difference is that debt ratio is negative here implying that higher-rated firms have a negative change in assets and that they also lowered their debt.

Table 6.1

Explanatory Factors of All the Rating Reassessments (Including Stable Ratings)

This table reports the regression results from the ordered probit model for the sample of upgrades (Panel A) and downgrades (Panel B). The dependent variable is a qualitative variable equal to one if the rating change is multi notch downgrades, 2 if it is a single notch rating downgrade, 3 if it is a stable rating, 4 if it is a single notch rating upgrade, and 5 if it is a multi notch rating upgrades. Up Last (Down Last) is an indicator variable that equals one if the firm had upgrades (downgrades) previously. Non-Investment is an indicator variable that equals one if the firm had speculative rating prior to the rating change, zero otherwise. Cash flow, working capital, net income, research and development expenditure, retained earnings, and capital expenditure are the respective value as a percentage of total assets; current ratio is current assets divided by current liabilities; interest coverage is the operating return divided by interest expenses; debt ratio is total debt [long term debt plus current liabilities] divided by total assets; operating margin is operating profit as a percentage of sales. Total asset is the total value of the assets. All of the values are the change in each of the variables over previous three years [-4 to -1] years, [0] being the year of the rating change. Beta is the change in beta over previous three years estimated from market model using daily prices for the years in interest with the condition that prices were available for at least 50 days over the year of estimation. ZStat tests the null that the respective coefficient is equal to zero. ***, **, * indicate significance at 1%, 5%, and 10% level respectively for the test.

	Complete Cycle		*Expansion*		*Recession*	
Variable	Coefficient	ZStat	Coefficient	ZStat	Coefficient	ZStat
Up Last	0.3753	12.67***	0.381	11.74***	0.3342	4.63***
Down Last	-0.2527	-9.04***	-0.2526	-7.91***	-0.1129	-1.88*
Non-Investment Grade	0.3352	11.73***	0.3743	11.67***	0.1475	2.20**
Cash Flow	0.0042	1.76*	0.003	1.2	-0.0071	-0.62
Working Capital	0.0025	0.57	0.0059	1.18	-0.0044	-0.59
Current Ratio	0.0863	2.78***	0.0664	1.98**	0.0812	0.94
Interest Coverage	0.0371	4.90***	0.0283	3.66***	0.1065	4.04***
Debt Ratio	-0.0084	-2.07**	-0.0205	-3.18***	0.0016	0.3
Net Income	0.0020	0.75	0.0017	0.55	0.0053	0.88
Operating Margin	0.1027	6.48***	0.0808	4.66***	0.1949	4.16***
Market to Book	0.0735	9.38***	0.0609	7.47***	0.1415	3.52***
Capital Expenditure	-0.0279	-1.67*	-0.0153	-0.85	-0.0235	-0.67
R&D	-0.0594	-1.21	-0.0911	-1.67*	0.0122	0.11
Total Assets	-0.0460	-5.12***	-0.0391	-3.49***	-0.0500	-3.20***
Retained Earnings	-0.0002	-1.43	0.0021	0.54	-0.0068	-0.66
Market Beta	-0.0421	-7.12***	-0.0354	-5.84***	-0.1448	-4.60***
Wald Statistic (χ^2)	953.56		725.66		230.91	
Prob> χ^2	0.000		0.000		0.000	
Pseudo R^2	0.037		0.035		0.054	
N (Total)	8133		6485		1648	
N (Multi Notch Upgrades)	319		284		35	
N (Single Notch Upgrades)	1672		1492		180	
N (Stable)	3307		2649		658	
N (Single Notch Downgrades)	2021		1500		521	
N (Multi Notch Downgrades)	814		560		254	

6.2 Actual Rating Changes versus Predicted Rating Changes

Table 6.2 presents a measure of the goodness of fit of the model used in estimating the rating changes. This table reveals whether the ordered probit model correctly classifies the firms as having right rating changes. Looking at the results for the complete business cycle, the model identifies most of the rating changes as stable ratings. Most of the upgrades are predicted to be

rating upgrades or stable ratings, and most of the downgrades are predicted to be rating downgrades or stable rating.

Table 6.2

Actual Rating Changes versus Predicted Rating Changes

This table shows the matrix of actual rating changes versus rating changes predicted by the ordered probit model. Panel A shows the matrix for the prediction rate in the complete sample. Panel B shows the matrix for the prediction rate in economic expansions. Panel C shows the matrix for the prediction in economic recessions. Panel A, Panel B, and Panel C are further divided into in sample and validation (holdout) sample. Multi Up, Single Up, Stable, Multi Down, and Single Down denote multiple notch upgrades, single notch upgrades, stable ratings, multi notch downgrades, and single notch downgrades respectively.

Panel A: Complete Business Cycle

In Sample

	Predicted					
Actual	Multi Up	Single Up	Stable	Single Down	Multi Down	*N*
Multi Up	5	12	296	6	0	*319*
Single Up	7	100	1556	7	2	*1672*
Stable	2	99	3117	89	0	*3307*
Single Down	0	11	1937	62	11	*2021*
Multi Down	0	5	742	50	17	*814*

Validation Sample

	Predicted					
Actual	Multi Up	Single Up	Stable	Single Down	Multi Down	*N*
Multi Up	0	1	40	1	1	*43*
Single Up	3	15	159	7	2	*186*
Stable	0	8	342	9	8	*367*
Single Down	0	1	187	7	4	*199*
Multi Down	0	1	81	2	1	*85*

Panel B: Expansion

In Sample

	Predicted					
Actual	Multi Up	Single Up	Stable	Single Down	Multi Down	*N*
Multi Up	2	11	266	5	0	*284*
Single Up	7	94	1384	6	1	*1492*
Stable	2	89	2499	59	0	*2649*
Single Down	0	10	1436	43	11	*1500*
Multi Down	0	5	512	31	12	*560*

Validation Sample						
	Predicted					
Actual	Multi Up	Single Up	Stable	Single Down	Multi Down	*N*
Multi Up	0	1	34	0	1	*36*
Single Up	2	14	146	5	2	*169*
Stable	0	6	275	7	3	*291*
Single Down	0	0	143	3	3	*149*
Multi Down	0	1	53	1	1	*56*

Panel C: Contraction						
In Sample						
	Predicted					
Actual	Multi Up	Single Up	Stable	Single Down	Multi Down	*N*
Multi Up	3	1	24	6	1	*35*
Single Up	2	4	167	7	0	*180*
Stable	0	6	521	121	10	*658*
Single Down	0	0	386	130	5	*521*
Multi Down	0	0	151	83	20	*254*
Validation Sample						
	Predicted					
Actual	Multi Up	Single Up	Stable	Single Down	Multi Down	*N*
Multi Up	0	0	6	0	1	*7*
Single Up	1	0	15	1	0	*17*
Stable	0	2	54	15	5	*76*
Single Down	0	0	32	12	6	*50*
Multi Down	0	0	17	11	1	*29*

It is noteworthy to mention that downgrades are more correctly identified when business cycle expansions and contractions are modeled separately. Compare, for instance, 130 single notch downgrades (in-sample) that are correctly identified in economic contractions versus only 62 single notch downgrade (in-sample) correctly identified when the complete business cycle is considered.

CHAPTER 7

ROBUSTNESS TESTS

In this chapter, I run several sensitivity tests. This chapter is organized into 13 subsections. 7.1 discusses the market response considering only the rating changes that occurred across rating categories. 7.2 shows the probit model estimates for the rating changes that that occurred across rating categories. 7.3 shows the probit model estimates with the correlated variables- market value and total debt instead of total assets and debt ratio respectively. 7.4 shows the probit model estimates for the rating changes with economic contraction as a dummy variable. 7.5 shows the logit model estimates for the rating changes. 7.6 shows the probit model estimates for the rating changes after lagging the contraction timing by a year. 7.7 shows the probit model estimates for the rating changes after leading the contraction timing by a year. 7.8 shows the probit model estimates for the rating changes after adjusting the firm variables for industry variables based on 49 Fama-French Industries. 7.9 shows the probit model estimates for the rating changes after winsorizing the continuous dependent variables at 0.1%, 0.25%, 0.5%, 1%, and 2%. 7.10 shows the ordered probit model estimates for complete rating reassessments with the correlated variables- market value and total debt instead of total assets and debt ratio respectively. 7.11 shows the probit model estimates with the cumulative abnormal return as an additional variable. 7.12 shows the probit model estimates with the negative net income dummy as an additional variable. 7.13 shows the probit model estimates with the negative cash flow dummy as an additional variable.

7.1 Market Reaction for Rating Changes within and across the Rating Categories

In this section, I examine multi notch and single notch rating changes that are across the current rating category.

Table 7.1

Market Reaction around the Announcement of Rating Changes across Rating Categories

This table reports the cumulative market excess returns around the announcement of rating changes that occur across rating category. Panel A presents excess returns for upgrades for the entire samples of upgrades and Panel B for downgrades, and the subcategories as noted. Day "0" is the date of announcement of the rating changes. Patell, Brown Warner, BMP, and Rank Test denote the values from the respective t-test. ***, **, * indicate significance at 1%, 5%, and 10% level respectively for the t-tests.

Panel A: Rating Upgrades

		Complete		Expansion		Contraction	
	All Upgrades	Single notch	Multi notch	Single notch	Multi notch	Single notch	Multi notch
N	*755*	*512*	*243*	*457*	*211*	*55*	*32*
CAR [0,0]	*0.45*	*0.29*	*0.91*	*0.3*	*0.24*	*0.2*	*5.3*
Ttest (Mu=Su)			2.33**		-0.18		2.72***
Patell	5.15***	2.94***	5.14***	2.85***	1.16	0.73	11.16***
Brown Warner	2.62***	2.43***	1.58*	2.39***	0.91	0.54	1.35*
BMP	3.77***	2.42***	2.96***	2.39***	0.68	0.55	6.77***
Rank Test	2.81***	2.6***	1.02	2.62***	0.62	0.24	1.22
CAR [-1, +1]	*0.81*	*0.63*	*1.3*	*0.7*	*0.7*	*0.07*	*5.27*
Ttest (Mu=Su)			1.86*		0.27		2.31**
Patell	4.47***	2.78***	4.06***	2.94***	1.97**	0.01	6.13***
Brown Warner	3.05***	2.42***	1.92**	2.59***	1.84**	0.01	1.19
BMP	3.87***	3.01***	2.45***	3.16***	1.16	0.11	3.89***
Rank Test	2.25***	1.65**	1.52*	1.84**	1.23	-0.39	0.97
CAR [-22, -1]	1.44	0.9	2.94	1.08	2.67	-0.63	4.72
Ttest (Mu=Su)			1.73*		1.25		1.16
Patell	2.1**	1.11	2.25***	1.37*	2.68***	-0.58	-0.69
Brown Warner	1.83**	1.1	1.53*	1.38*	2.75***	-0.53	-0.21
BMP	2.54***	1.58*	2.04**	1.8**	1.63**	-0.37	1.29*
Rank Test	0.43	-0.71	1.94**	-0.07	2.28***	-1.95**	-0.79
CAR [+2, +22]	0.54	0.26	1.38	0.47	1.96	-1.53	-2.42
Ttest (Mu=Su)			1.47		-1.83*		-0.09
Patell	1.14	0.59	1.27*	0.8	1.64**	-0.52	-0.7
Brown Warner	1.26*	0.64	1.44*	0.9	1.83**	-0.47	-0.86
BMP	0.97	0.47	0.98	0.8	1.22	-0.92	-0.67
Rank Test	-0.13	-0.82	1.19	-0.28	1.69**	-1.68**	-1.38*

Panel B: Downgrades							
	Complete			Expansion		Contraction	
	All Downgrades	Single notch	Multi notch	Single notch	Multi notch	Single notch	Multi notch
N	*1276*	*635*	*641*	*470*	*451*	*165*	*190*
CAR [0,0]	-2.12	-1.1	-3.24	-1.25	-3.58	-0.68	-2.44
Ttest (Mu=Su)			-0.88		-4.88***		-1.87*
Patell	-17.25***	-9.06***	-15.47***	-10.43***	-14.91***	-0.16	-5.44***
Brown Warner	-5.19***	-3.66***	-3.83***	-4.59***	-3.8***	-0.05	-1.26*
BMP	-17.56***	-7.48***	-16.22***	-8.29***	-17.18***	-2.08**	-4.98***
Rank Test	-5.7***	-3.7***	-5.09***	-3.81***	-4.86***	-1.08	-2.74***
CAR [-1, +1]	-2.59	-2.78	-2.38	-2.87	-2.8	-2.53	-1.39
Ttest (Mu=Su)			0.22		4.16***		0.39
Patell	-14.66***	-13.22***	-7.39***	-12.54***	-10.32***	-4.77***	2.32***
Brown Warner	-2.36***	-6.45***	-0.85	-6.4***	-1.67**	-2.08**	0.18
BMP	-12.37***	-10.94***	-6.88***	-11.03***	-7.76***	-4.47***	-1.64**
Rank Test	-8.08***	-6***	-6.51***	-5.64***	-5.96***	-2.64***	-3.86***
CAR [-22, -1]	-6.51	-5.32	-7.8	-5.29	-8.78	-5.38	-5.46
Ttest (Mu=Su)			0.25		-4.76***		-1.29
Patell	-17.39***	-10.87***	-13.78***	-9.39***	-12.2***	-5.47***	-6.51***
Brown Warner	-7.32***	-6.91***	-4.58***	-6.35***	-4.34***	-3.01***	-1.89**
BMP	-11.48***	-7.72***	-8.33***	-7.51***	-9***	-3.51***	-2.38***
Rank Test	-4.67***	-3.22***	-3.99***	-1.61**	-2.59***	-3.76***	-3.92***
CAR [+2, +22]	-0.86	-1.23	-0.45	-1.5	-1.69	-0.46	2.48
Ttest (Mu=Su)			0.3		-0.39		0.88
Patell	-5.09***	-3.9***	-3.29***	-3.63***	-3.64***	-1.52*	-0.44
Brown Warner	-3.08***	-2.79***	-1.73**	-2.94***	-1.93**	-0.85	-0.23
BMP	-1.55*	-1.83**	-0.49	-2.17**	-1.77**	-0.31	1.11
Rank Test	-1.43*	-0.36	-1.82**	-0.15	-0.85	-0.48	-2.27***

As discussed in detail in section 2.1.5, previous studies suggest that rating changes across a category may be a more significant event than the rating changes within the category (Holthausen and Leftwich, 1986; Hand et al., 1992). The results are reported in Table 7.1.

As seen in Table 7.1, the results for all upgrades and downgrades generally continue to hold in the case of the rating changes across categories. The returns in case of category change are a little bit more pronounced, see for example, the excess return for multi notch rating upgrades and downgrades during contraction for day [0] and days [-1, +1].

7.2 Regression if the Rating Change was across Rating Category

The probit model estimates for the upgrades and downgrades that cross rating categories are reported in Table 7.2.

As seen in Panel A of the table, the probit model estimates in the case of rating upgrades across rating categories are much weaker than all results reported for rating upgrades. Many variables that are significant for all rating changes are not significant in the case of rating changes across rating categories.

The results in Panel B of Table 7.2 shows the results for downgrades. The table shows that results from rating downgrades and rating downgrades across rating categories have differences on a few variables.

The Down last indicator is significant in the case of all downgrades, but insignificant in case of downgrades across all categories. Non-investment grade indicator is insignificant in case of all rating downgrades but significant in the case of downgrades across rating categories.

The rest of the comparison for all downgrades and downgrades across rating categories shows very similar results. Specifically, the current ratio, interest coverage, operating margin, the market to book, and total assets show a similar relationship.

Table 7.2

Regression Results for Multi Notch versus Single Notch Rating Changes across Rating Categories

This table reports the regression results from the probit model for the sample of upgrades (Panel A) and downgrades (Panel B). The dependent variable is an indicator variable equal to one if the rating upgrade (downgrade) is of multiple notches across rating categories, zero if it is of a single notch across rating categories. Up Last (Down Last) is an indicator variable that equals one if the firm had upgrades (downgrades) previously. Non-Investment is an indicator variable that equals one if the firm had speculative rating prior to the rating change, zero otherwise. Cash flow, working capital, net income, research and development expenditure, retained earnings, and capital expenditure are the respective value as a percentage of total assets; current ratio is current assets divided by current liabilities; interest coverage is the operating return divided by interest expenses; debt ratio is total debt [long term debt plus current liabilities] divided by total assets; operating margin is operating profit as a percentage of sales. Total asset is the total value of the assets. All of the values are the change in each of the variables over previous three years [-4 to -1] years, [0] being the year of the rating change. Beta is the change in beta over previous three years estimated from market model using daily prices for the years in interest with the condition that prices were available for at least 50 days over the year of estimation. ZStat tests the null that the respective coefficient is equal to zero. ***, **, * indicate significance at 1%, 5%, and 10% level respectively for the test.

Panel A: Rating Upgrades

	Complete		*Expansion*		*Recession*	
Variable	Coefficient	ZStat	Coefficient	ZStat	Coefficient	ZStat
Up Last	-0.7796	-6.29***	-0.7902	-6.04***	-0.847	-1.92*
Down Last	-0.0789	-0.61	-0.1892	-1.35	0.6737	1.48
Non-Investment Grade	-0.0108	-0.06	0.0654	0.31	-0.6429	-1.03
Intercept	-0.233	-1.19	-0.2997	-1.44	0.5787	0.89
Cash Flow	0.0079	1.57	0.0101	2.03**	-0.1934	-1.38
Working Capital	0.0057	0.3	0.0079	0.4	-0.114	-1.25
Current Ratio	-0.0535	-0.43	-0.0752	-0.55	0.23	0.68
Interest Coverage	-0.0308	-1.37	-0.0277	-1.2	0.0201	0.18
Debt Ratio	-0.0028	-0.21	0.0096	0.27	-0.0074	-0.5
Net Income	-0.0097	-1.39	-0.0029	-0.36	-0.1215	-2.46**
Operating Margin	0.0137	0.32	-0.0404	-0.89	0.0641	1.12
Market to Book	-0.0007	-0.04	-0.01	-0.41	0.043	1.53
Capital Expenditure	0.0692	1.26	0.0314	0.47	0.0155	0.15
R&D	-0.0229	-0.09	-0.0418	-0.16	-0.0497	-0.08
Total Assets	-0.0506	-1.08	-0.0305	-0.56	-0.2676	-1.92*
Retained Earnings	-0.0014	-0.16	-0.0032	-0.34	-0.0002	-0.15
Market Beta	-0.0217	-0.3	-0.0343	-0.43	-0.0089	-0.04
Wald Statistic (χ^2)	49.48		46.6		37.17	
Prob> χ^2	0.000		0.000		0.000	
Pseudo R^2	0.061		0.059		0.296	
N (Total)	755		668		87	
N (Single Notch)	512		457		55	
N (Multi Notch)	243		211		32	

Panel B: Rating Downgrades						
	Complete		*Expansion*		*Recession*	
Variable	Coefficient	ZStat	Coefficient	ZStat	Coefficient	ZStat
Up Last	-0.5823	-3.63***	-0.5359	-2.66***	-0.7255	-2.71***
Down Last	0.0744	0.97	0.1135	1.24	-0.1104	-0.73
Non-Investment Grade	0.2342	2.84***	0.2307	2.42**	0.3285	1.91*
Intercept	-0.2355	-3.28***	-0.2614	-3.18***	-0.2659	-1.69*
Cash Flow	0.0074	0.89	0.0053	0.59	0.0225	0.96
Working Capital	-0.0121	-1.21	-0.01	-0.87	-0.0314	-1.48
Current Ratio	-0.1690	-2.00**	-0.1573	-1.61	-0.2061	-1.17
Interest Coverage	0.0610	2.29**	0.1064	3.48***	-0.0767	-1.15
Debt Ratio	-0.0010	-0.12	0.0228	1.95*	-0.0264	-2.29**
Net Income	-0.0132	-1.66*	-0.0128	-1.49	-0.0032	-0.12
Operating Margin	-0.1259	-2.85***	-0.1154	-2.23**	-0.1611	-1.90*
Market to Book	-0.0966	-2.76***	-0.0727	-1.97**	-0.1395	-1.18
Capital Expenditure	0.0558	1.72*	0.0112	0.21	0.0917	2.04**
R&D	0.0553	0.34	0.2092	1.11	-0.3354	-0.97
Total Assets	0.0449	2.73***	0.0294	1.12	0.0469	2.05**
Retained Earnings	0.0066	0.72	0.009	0.93	-0.0143	-0.41
Market Beta	-0.0270	-1.39	-0.0398	-1.88*	0.1108	1.67*
Wald Statistic (χ^2)	74.65		59.64		43.85	
Prob> χ^2	0.000		0.000		0.000	
Pseudo R^2	0.042		0.044		0.083	
N (Total)	1276		921		355	
N (Single Notch)	635		470		165	
N (Multi Notch)	641		451		190	

7.3 Regression with Market Value and Total Debt

Table 7.3 shows the results after including market value and total debt, the variables correlated with total assets and debt ratio respectively. The table shows that total debt is insignificant for upgrades, while it is significant for downgrades during the entire business cycle and during expansions. Similarly, market value has a negative coefficient for the sample of upgrades while it is not significant for the sample of downgrades.

Table 7.3

Regression Results with Market Value and Total Debt

This table reports the regression results from the probit model for the sample of upgrades (Panel A) and downgrades (Panel B). The dependent variable is an indicator variable equal to one if the rating upgrade (downgrade) is of multiple notches, zero if it is of a single notch. Up Last (Down Last) is an indicator variable that equals one if the firm had upgrades (downgrades) previously. Non-Investment is an indicator variable that equals one if the firm had speculative rating prior to the rating change, zero otherwise. Cash flow, working capital, net income, research and development expenditure, retained earnings, and capital expenditure are the respective value as a percentage of total assets; current ratio is current assets divided by current liabilities; interest coverage is the operating return divided by interest expenses; total debt is the value of total debt [long term debt plus current liabilities]; operating margin is operating profit as a percentage of sales. Market Value is the market capitalization of the firm (number of shares outstanding times price). All the values are the change in each of the variables over previous three years [-4 to -1] years, [0] being the year of the rating change. Beta is the change in beta over previous three years estimated from market model using daily prices for the years in interest with the condition that prices were available for at least 50 days over the year of estimation. ZStat tests the null that the respective coefficient is equal to zero. ***, **, * indicate significance at 1%, 5%, and 10% level respectively for the test.

Panel A: Rating Upgrades

	Complete		*Expansion*		*Recession*	
Variable	Coefficient	ZStat	Coefficient	ZStat	Coefficient	ZStat
Up Last	-0.5036	-5.68***	-0.5368	-5.77***	-0.2834	-0.92
Down Last	-0.0923	-1.01	-0.1685	-1.69*	0.3053	1.18
Non-Investment Grade	0.3706	3.04***	0.4145	3.19***	0.1121	0.31
Intercept	-1.1349	-9.49***	-1.1517	-9.06***	-1.0084	-2.72***
Cash Flow	0.0093	1.92*	0.0102	2.15**	-0.1005	-1.52
Working Capital	0.0020	0.14	0.0007	0.05	0.028	0.7
Current Ratio	-0.0245	-0.26	-0.03	-0.3	0.2101	0.69
Interest Coverage	-0.0238	-1.31	-0.0146	-0.82	-0.1196	-1.3
Total Debt	-0.0067	-1.46	-0.0065	-1.04	-0.0082	-1.68*
Net Income	-0.0016	-0.31	0.0035	0.6	-0.0925	-2.52**
Operating Margin	-0.0075	-0.17	-0.0615	-1.61	0.1354	3.04***
Market to Book	0.0444	2.43**	0.0425	1.98**	0.0885	3.34***
Capital Expenditure	0.0630	1.55	0.0465	0.98	0.0737	0.93
R&D	0.0262	0.15	0.0277	0.15	0.1271	0.2
Market Value	-0.0697	-3.31***	-0.0653	-3.02***	-0.1018	-1.2
Retained Earnings	-0.0007	-3.77***	0.0014	0.14	-0.0014	-1.74*
Market Beta	-0.0072	-0.13	-0.0246	-0.43	0.1169	0.66
Wald Statistic (χ^2)	89.85		66.44		107	
Prob> χ^2	0.000		0.000		0.000	
Pseudo R^2	0.047		0.048		0.169	
N (Total)	1991		1776		215	
N (Single Notch)	1672		1492		180	
N (Multi Notch)	319		284		35	

Panel B: Rating Downgrades						
	Complete		*Expansion*		*Recession*	
Variable	Coefficient	ZStat	Coefficient	ZStat	Coefficient	ZStat
Up Last	-0.4723	-4.51***	-0.4382	-3.51***	-0.5894	-3.07***
Down Last	0.1589	2.90***	0.1553	2.37**	0.1123	1.09
Non-Investment Grade	0.0044	0.07	0.0231	0.32	-0.0319	-0.26
Intercept	-0.6458	-11.56***	-0.6797	-10.61***	-0.6394	-5.33***
Cash Flow	0.0020	0.44	-0.0011	-0.2	0.0151	1.75*
Working Capital	-0.0096	-1.16	-0.0092	-0.92	-0.0158	-1.07
Current Ratio	-0.1745	-2.62***	-0.1731	-2.26**	-0.1613	-1.07
Interest Coverage	0.0535	2.11**	0.0925	3.50***	-0.0699	-1.16
Total Debt	0.0029	2.47**	0.0046	3.34***	0.000	0.01
Net Income	-0.0045	-0.76	-0.0039	-0.59	-0.0044	-0.28
Operating Margin	-0.1318	-3.27***	-0.1105	-2.37**	-0.1652	-2.11**
Market to Book	-0.1343	-4.61***	-0.1021	-3.46***	-0.3249	-3.21***
Capital Expenditure	0.0661	2.35**	0.0201	0.49	0.1084	2.74***
R&D	-0.0077	-0.07	0.0674	0.57	-0.1465	-0.61
Market Value	0.0390	1.89*	0.0321	1.39	0.0866	1.81*
Retained Earnings	0.0096	1.27	0.0113	1.38	0.0015	0.07
Market Beta	-0.0368	-2.95***	-0.0474	-3.32***	0.056	1.21
Wald Statistic (χ^2)	104.87		85.03		56.73	
Prob> χ^2	0.000		0.000		0.000	
Pseudo R^2	0.034		0.035		0.06	
N (Total)	2835		2060		775	
N (Single Notch)	2021		1500		521	
N (Multi Notch)	814		560		254	

7.4 Regression with Variables Interacted with Recession Dummy

In this section, I present the probit result with an alternative specification. I interact the recession dummy with all the accounting and market variables that are expected to change across the business cycles. The results are reported in Table 7.4.

Table 7.4

Regression Results with Dependent Variables Interacted with Recession Dummy

This table reports the regression results from the probit model for the sample of upgrades (Panel A) and downgrades (Panel B). The dependent variable is an indicator variable equal to one if the rating upgrade (downgrade) is of multiple notches, zero if it is of a single notch. Up Last (Down Last) is an indicator variable that equals one if the firm had upgrades (downgrades) previously. Non-Investment is an indicator variable that equals one if the firm had speculative rating prior to the rating change, zero otherwise. Cash flow, working capital, net income, research and development expenditure, retained earnings, and capital expenditure are the respective value as a percentage of total assets; current ratio is current assets divided by current liabilities; interest coverage is the operating return divided by interest expenses; debt ratio is total debt [long term debt plus current liabilities] divided by total assets; operating margin is operating profit as a percentage of sales. Total asset is the total value of the assets. All the values are the change in each of the variables over previous three years [-4 to -1] years, [0] being the year of the rating change. Beta is the change in beta over previous three years estimated from market model using daily prices for the years in interest with the condition that prices were available for at least 50 days over the year of estimation. Contraction is an indicator variable that equals one if the economy was in contraction phase during the rating change. ZStat tests the null that the respective coefficient is equal to zero. ***, **, * indicate significance at 1%, 5%, and 10% level respectively for the test.

Panel A: Rating Upgrades: Complete Cycle		
Variable	Coefficient	ZStat
Up Last	-0.5308	-5.92***
Down Last	-0.1056	-1.14
Non-Investment Grade	0.3738	3.06***
Intercept	-1.14	-9.43***
Contraction	0.1113	0.75
Cash Flow	0.0096	2.02**
Working Capital	-0.0004	-0.03
Current Ratio	-0.0708	-0.7
Interest Coverage	-0.0199	-1.12
Debt Ratio	-0.0068	-0.41
Net Income	0.0029	0.5
Operating Margin	-0.0655	-1.76*
Market to Book	0.0181	0.97
Capital Expenditure	0.0253	0.54
R&D	0.0201	0.11
Total Assets	-0.0916	-2.21**
Retained Earning	0.0007	0.07
Market Model Beta	-0.0347	-0.61
Contraction x Cash Flow	-0.1308	-1.52
Contraction x Working Capital	0.0300	0.72
Contraction x Current Ratio	0.2512	0.75
Contraction x Interest Coverage	-0.1490	-1.54
Contraction x Debt Ratio	0.0015	0.08
Contraction x Net Income	-0.099	-2.59***
Contraction x Operating Margin	0.196	3.41***
Contraction x Market-to-Book	0.0482	1.44

Panel A: Rating Upgrades: Complete Cycle Continued		
Variable	Coefficient	ZStat
Contraction x Capital Expenditure	0.0335	0.36
Contraction x R&D	0.0115	0.02
Contraction x Total Assets	-0.1532	-1.16
Contraction x Retained Earnings	-0.0026	-0.25
Contraction x Market Model Beta	0.1865	0.94
Wald Statistic (χ^2)	164.29	
Prob> χ^2	0.000	
Pseudo R^2	0.056	
N (Total)	1991	
N (Single Notch)	1672	
N (Multi Notch)	319	

Panel B: Rating Downgrades: Complete Cycle		
Variable	Coefficient	ZStat
Up Last	*-0.4759*	*-4.53***
Down Last	*0.1366*	*2.48***
Non-Investment Grade	*0.0033*	*0.05*
Intercept	*-0.6699*	*-11.50****
Contraction	*-0.0332*	*-0.44*
Cash Flow	*-0.0010*	*-0.18*
Working Capital	-0.0091	-0.9
Current Ratio	-0.1677	-2.21**
Interest Coverage	0.0961	3.66***
Debt Ratio	0.0160	1.62
Net Income	-0.0041	-0.63
Operating Margin	-0.1049	-2.23**
Market to Book	-0.0874	-3.05***
Capital Expenditure	0.0273	0.67
R&D	0.0682	0.57
Total Assets	0.0474	2.33**
Retained Earning	0.0106	1.3
Market Beta	-0.0480	-3.34***
Contraction x Cash Flow	0.0165	1.62
Contraction x Working Capital	-0.0039	-0.22
Contraction x Current Ratio	0.0159	0.10
Contraction x Interest Coverage	-0.1597	-2.42**
Contraction x Debt Ratio	-0.0297	-2.47**
Contraction x Net Income	0.002	0.12
Contraction x Operating Margin	-0.0702	-0.78
Contraction x Market-to-Book	-0.1705	-1.71*
Contraction x Capital Expenditure	0.0806	1.42
Contraction x R&D	-0.1802	-0.68
Contraction x Total Assets	0.0097	0.35

Panel B: Rating Downgrades: Complete Cycle Continued		
Variable	Coefficient	ZStat
Contraction x Retained Earnings	-0.0092	-0.38
Contraction x Market Beta	0.1036	2.15**
Wald Statistic (χ^2)	154.89	
Prob> χ^2	0.000	
Pseudo R^2	0.045	
N (Total)	2835	
N (Single Notch)	2021	
N (Multi Notch)	814	

For the upgrades, important differences between this model and the main model (Table 5.2) are that in the main model (Table 5.2) market to book, and retained earnings are significantly different for multi notch upgrades that occur in recession (Table 5.2). This model fails to capture these differences.

For the sample of downgrades, one important difference is that capital expenditure is significantly different for multi notch downgrades in either the complete business cycle or the recession. Similarly, the model presented here shows that interest coverage is significantly different for multi notch downgrades during recessions while the main model (Table 5.2) shows that interest coverage differ during expansions but not during recessions.

7.5 Regression Using Logit Model

The results as per the logit model are very similar to the results from the probit model. For the sample of upgrades, the only notable difference is that based on the probit model retained earnings is a significant factor determining multi notch upgrades in recessions while based on logit model retained earnings is significant only in the complete cycle. For the sample of downgrades, logit model confirms the findings from the probit model.

Table 7.5

Regression Results Using Logit Model

This table reports the regression results from logit model for the sample of upgrades (Panel A) and downgrades (Panel B). The dependent variable is an indicator variable equal to one if the rating upgrade (downgrade) is of multiple notches, zero if it is of a single notch. Up Last (Down Last) is an indicator variable that equals one if the firm had upgrades (downgrades) previously. Non-Investment is an indicator variable that equals one if the firm had speculative rating prior to the rating change, zero otherwise. Cash flow, working capital, net income, research and development expenditure, retained earnings, and capital expenditure are the respective value as a percentage of total assets; current ratio is current assets divided by current liabilities; interest coverage is the operating return divided by interest expenses; debt ratio is total debt [long term debt plus current liabilities] divided by total assets; operating margin is operating profit as a percentage of sales. Total asset is the total value of the assets. All the values are the change in each of the variables over previous three years [-4 to -1] years, [0] being the year of the rating change. Beta is the change in beta over previous three years estimated from market model using daily prices for the years in interest with the condition that prices were available for at least 50 days over the year of estimation. ZStat tests the null that the respective coefficient is equal to zero. ***, **, * indicate significance at 1%, 5%, and 10% level respectively for the test.

Panel A: Rating Upgrades

	Complete		*Expansion*		*Recession*	
Variable	Coefficient	ZStat	Coefficient	ZStat	Coefficient	ZStat
Up Last	-0.9932	-5.79***	-1.0518	-5.81***	-0.522	-0.84
Down Last	-0.1527	-0.93	-0.2897	-1.61	0.5936	1.38
Non-Investment Grade	0.6796	2.89***	0.7607	3.03***	0.1857	0.27
Intercept	-1.9370	-8.30***	-1.9686	-7.89***	-1.6151	-2.34**
Cash Flow	0.0156	1.93*	0.0174	2.23**	-0.2313	-1.5
Working Capital	0.0033	0.13	0.0004	0.01	0.0382	0.62
Current Ratio	-0.1080	-0.6	-0.1335	-0.7	0.4255	0.74
Interest Coverage	-0.0572	-1.52	-0.0387	-1.09	-0.2569	-1.18
Debt Ratio	-0.0069	-0.44	-0.0146	-0.51	-0.005	-0.34
Net Income	-0.0030	-0.35	0.0052	0.52	-0.1506	-2.47**
Operating Margin	-0.0257	-0.28	-0.1104	-1.68*	0.2101	2.68***
Market to Book	0.0396	1.4	0.0314	0.92	0.1226	2.55**
Capital Expenditure	0.0775	1.08	0.0421	0.5	0.0801	0.63
R&D	0.0775	0.24	0.0979	0.29	0.2115	0.14
Total Assets	-0.2022	-2.51**	-0.1872	-2.21**	-0.3957	-1.62
Retained Earnings	-0.0014	-3.32***	0.0006	0.03	-0.0029	-1.56
Market Beta	-0.0319	-0.31	-0.0631	-0.58	0.2193	0.73
Wald Statistic (χ^2)	67.87		61.39		63.17	
Prob> χ^2	0.000		0.000		0.000	
Pseudo R^2	0.044		0.045		0.17	
N (Total)	1991		1776		215	
N (Single Notch)	1672		1492		180	
N (Multi Notch)	319		284		35	

Panel B: Rating Downgrades						
	Complete		*Expansion*		*Recession*	
Variable	Coefficient	ZStat	Coefficient	ZStat	Coefficient	ZStat
Up Last	-0.817	-4.31***	-0.7405	-3.31***	-1.0222	-2.86***
Down Last	0.251	2.79***	0.2517	2.30**	0.1585	0.95
Non-Investment Grade	-0.0090	-0.09	0.0285	0.23	-0.0608	-0.29
Intercept	-1.0725	-11.32***	-1.1286	-10.28***	-1.0703	-5.26***
Cash Flow	0.0041	0.54	-0.0012	-0.14	0.0244	1.74*
Working Capital	-0.0156	-1.1	-0.017	-0.98	-0.0193	-0.82
Current Ratio	-0.2936	-2.60***	-0.294	-2.19**	-0.2556	-1.09
Interest Coverage	0.1019	2.33**	0.1624	3.78***	-0.1086	-1.06
Debt Ratio	-0.0019	-0.22	0.0262	1.64	-0.0216	-1.81*
Net Income	-0.0070	-0.7	-0.0064	-0.59	-0.0016	-0.06
Operating Margin	-0.2362	-3.52***	-0.1733	-2.17**	-0.3034	-2.30**
Market to Book	-0.2014	-4.13***	-0.1536	-3.10***	-0.4545	-2.61***
Capital Expenditure	0.1168	2.61***	0.0474	0.69	0.1781	2.72***
R&D	-0.0139	-0.08	0.0819	0.42	-0.1996	-0.49
Total Assets	0.0919	4.21***	0.0782	2.30**	0.0942	3.06***
Retained Earnings	0.0161	1.28	0.0172	1.25	0.0056	0.15
Market Beta	-0.0612	-2.88***	-0.0811	-3.18***	0.088	1.15
Wald Statistic (χ^2)	110.74		79.7		60.91	
Prob> χ^2	0.000		0.000		0.000	
Pseudo R^2	0.036		0.034		0.067	
N (Total)	2835		2060		775	
N (Single Notch)	2021		1500		521	
N (Multi Notch)	814		560		254	

7.6 Regression after Lagging the Contraction Period by One Year

Table 7.6 shows the regression results after lagging the economic contraction by a year.

Table 7.6

Regression Results after Lagging the Contraction Period by One Year

This table reports the regression results from the probit model for the sample of upgrades (Panel A) and downgrades (Panel B) after lagging the contractionary period by a year. The dependent variable is an indicator variable equal to one if the rating upgrade (downgrade) is of multiple notches, zero if it is of a single notch. Up Last (Down Last) is an indicator variable that equals one if the firm had upgrades (downgrades) previously. Non-Investment is an indicator variable that equals one if the firm had speculative rating prior to the rating change, zero otherwise. Cash flow, working capital, net income, research and development expenditure, retained earnings, and capital expenditure are the respective value as a percentage of total assets; current ratio is current assets divided by current liabilities; interest coverage is the operating return divided by interest expenses; debt ratio is total debt [long term debt plus current liabilities] divided by total assets; operating margin is operating profit as a percentage of sales. Total asset is the total value of the assets. All the values are the change in each of the variables over previous three years [-4 to -1] years, [0] being the year of the rating change. Beta is the change in beta over previous three years estimated from market model using daily prices for the years in interest with the condition that prices were available for at least 50 days over the year of estimation. ZStat tests the null that the respective coefficient is equal to zero. ***, **, * indicate significance at 1%, 5%, and 10% level respectively for the test.

Panel A: Rating Upgrades

	Complete		*Expansion*		*Recession*	
Variable	Coefficient	ZStat	Coefficient	ZStat	Coefficient	ZStat
Up Last	-0.5196	-5.86***	-0.4956	-5.29***	-0.7561	-2.70***
Down Last	-0.0763	-0.83	-0.1328	-1.27	0.0561	0.25
Non-Investment Grade	0.3606	2.96***	0.326	2.61***	0.2558	0.43
Intercept	-1.1539	-9.62***	-1.1612	-9.41***	-0.9611	-1.68*
Cash Flow	0.0090	1.94*	0.0054	0.96	0.0273	1.85*
Working Capital	-0.0029	-0.19	-0.0086	-0.56	-0.0416	-1.22
Current Ratio	-0.0541	-0.57	0.0406	0.41	-0.7082	-2.41**
Interest Coverage	-0.0117	-0.61	-0.0067	-0.3	-0.0597	-0.86
Debt Ratio	0.0066	0.95	0.0025	0.1	0.0027	0.31
Net Income	-0.0067	-1.21	-0.0016	-0.21	-0.0153	-1.87*
Operating Margin	-0.0390	-1.09	-0.0365	-0.94	-0.078	-0.59
Market to Book	0.0270	2.01**	0.0375	2.77***	-0.1642	-2.19**
Capital Expenditure	0.0403	1.01	0.0215	0.47	0.1342	1.61
R&D	0.0357	0.2	0.1647	0.89	-0.7902	-1.69*
Total Assets	-0.0983	-2.62***	-0.0728	-1.83*	-0.2681	-2.38**
Retained Earnings	-0.0060	-0.85	-0.0041	-0.48	-0.0049	-0.42
Market Beta	-0.0202	-0.41	-0.1264	-1.83*	0.1739	1.95*
Wald Statistic (χ^2)	67.91		53.99		40.63	
Prob> χ^2	0.000		0.000		0.000	
Pseudo R^2	0.044		0.040		0.170	
N (Total)	1991		1755		236	
N (Single Notch)	1672		1490		182	
N (Multi Notch)	319		265		54	

Panel B: Rating Downgrades						
	Complete		*Expansion*		*Recession*	
Variable	Coefficient	ZStat	Coefficient	ZStat	Coefficient	ZStat
Up Last	-0.4602	-4.40***	-0.4304	-3.53***	-0.539	-2.61***
Down Last	0.1485	2.73***	0.1674	2.64***	0.0783	0.71
Non-Investment Grade	-0.0064	-0.1	0.0047	0.07	-0.0222	-0.16
Intercept	-0.6698	-11.99***	-0.6813	-10.95***	-0.6142	-4.68***
Cash Flow	-0.0003	-0.06	-0.0016	-0.31	0.0201	1.34
Working Capital	-0.0037	-0.44	-0.0186	-2.24**	0.0192	1.5
Current Ratio	-0.1552	-2.35**	-0.1302	-1.83*	-0.3059	-1.79*
Interest Coverage	0.0633	2.68***	0.056	2.04**	0.0708	1.36
Debt Ratio	0.0033	2.45**	0.0142	1.02	0.004	3.21***
Net Income	-0.0079	-1.59	0.0024	0.31	-0.0202	-3.09***
Operating Margin	-0.1378	-4.01***	-0.1633	-4.44***	-0.0075	-0.08
Market to Book	-0.0990	-3.04***	-0.1228	-4.15***	-0.0847	-1.28
Capital Expenditure	0.0598	3.27***	0.0256	0.68	0.0623	3.30***
R&D	0.0821	0.76	0.1342	1.09	-0.1581	-0.7
Total Assets	0.0537	4.26***	0.0708	5.03***	-0.0531	-1.52
Retained Earnings	-0.0006	-0.12	0.0143	1.73*	-0.0158	-2.20**
Market Beta	-0.0031	-0.27	-0.0795	-3.12***	0.0127	1.32
Wald Statistic (χ^2)	113.18		124.25		63.39	
Prob> χ^2	0.000		0.000		0.000	
Pseudo R^2	0.037		0.048		0.056	
N (Total)	2835		2156		679	
N (Single Notch)	2021		1539		482	
N (Multi Notch)	814		617		197	

Comparison of the upgrades results in Panel A with the main model (Table 5.2) shows that when recessionary period is lagged by a year, market to book ratio becomes positive during expansion but negative only in recession. The comparison also shows that current ratio is significant in recessions but in the main model (Table 5.2), the current ratio is not significant.

Comparison of the downgrades results in Panel B with the main model (Table 5.2) shows that during recessions, the coefficients on debt ratio changes the sign in case of multi notch downgrades when recessionary period is lagged by a year. The comparison also shows that net income and retained earnings during recession becomes significant if contractions was a year prior to the rating changes.

7.7 Regression after Leading the Contraction Period by One Year

Table 7.7 shows the regression results after leading the recessionary period by a year. Comparison of the upgrades results in Panel A with the main model (Table 5.2) shows that debt ratio and market to book ratio is different for multi notch upgrades when the economic contraction is led by a year. When looked at the results for recessions, the comparison shows that working capital is significant, which is not significant in the main model (Table 5.2). Many variables that are significant in recessions in the main model (Table 5.2) are not significant in this model.

Comparison of the downgrades results in Panel B with the main model (Table 5.2) shows that during recessions, debt ratio changes the sign for multi notch downgrades when the economic contraction is led by a year. The comparison also shows that retained earnings during recessions become significant if contraction is to occur a year after the rating change.

Table 7.7

Regression Results after Leading the Contraction Period by One Year

This table reports the regression results from the probit model for the sample of upgrades (Panel A) and downgrades (Panel B) after leading the contractionary period by a year. The dependent variable is an indicator variable equal to one if the rating upgrade (downgrade) is of multiple notches, zero if it is of a single notch. Up Last (Down Last) is an indicator variable that equals one if the firm had upgrades (downgrades) previously. Non-Investment is an indicator variable that equals one if the firm had speculative rating prior to the rating change, zero otherwise. Cash flow, working capital, net income, research and development expenditure, retained earnings, and capital expenditure are the respective value as a percentage of total assets; current ratio is current assets divided by current liabilities; interest coverage is the operating return divided by interest expenses; debt ratio is total debt [long term debt plus current liabilities] divided by total assets; operating margin is operating profit as a percentage of sales. Total asset is the total value of the assets. All the values are the change in each of the variables over previous three years [-4 to -1] years, [0] being the year of the rating change. Beta is the change in beta over previous three years estimated from market model using daily prices for the years in interest with the condition that prices were available for at least 50 days over the year of estimation. ZStat tests the null that the respective coefficient is equal to zero. ***, **, * indicate significance at 1%, 5%, and 10% level respectively for the test.

Panel A: Rating Upgrades

	Complete		*Expansion*		*Recession*	
Variable	Coefficient	ZStat	Coefficient	ZStat	Coefficient	ZStat
Up Last	-0.5237	-5.92***	-0.5187	-5.53***	-0.5664	-1.93*
Down Last	-0.0816	-0.89	-0.0867	-0.87	0.0318	0.12
Non-Investment Grade	0.3573	2.93***	0.3303	2.48**	0.5673	1.68*
Intercept	-1.1458	-9.52***	-1.1167	-8.47***	-1.4591	-4.51***
Cash Flow	0.0092	2.20**	0.0099	2.27**	0.0059	0.32
Working Capital	-0.0012	-0.1	0.0174	1.16	-0.099	-2.27**
Current Ratio	-0.0569	-0.59	-0.0791	-0.78	0.2148	0.78
Interest Coverage	-0.0037	-0.19	-0.0053	-0.24	0.0156	0.35
Debt Ratio	0.0210	1.86*	0.0228	1.97**	0.0042	0.12
Net Income	-0.0071	-1.17	-0.0045	-0.68	-0.0276	-1.71*
Operating Margin	-0.0540	-1.39	-0.0425	-0.96	-0.1006	-1.19
Market to Book	0.0135	0.86	0.0327	2.46**	-0.0444	-1.66*
Capital Expenditure	0.0402	0.93	0.0349	0.75	0.0528	0.46
R&D	0.0169	0.1	0.0462	0.25	-0.0164	-0.04
Total Assets	-0.1098	-2.81***	-0.0923	-2.28**	-0.2242	-1.84*
Retained Earnings	-0.0066	-1.01	-0.0051	-0.73	-0.0345	-0.96
Market Beta	-0.0291	-0.52	-0.0323	-0.55	-0.0347	-0.21
Wald Statistic (χ^2)	69.5		65.78		27.25	
Prob> χ^2	0.000		0.000		0.000	
Pseudo R^2	0.044		0.045		0.039	
N (Total)	1991		1702		289	
N (Single Notch)	1672		1421		251	
N (Multi Notch)	319		281		38	

Panel B: Rating Downgrades						
	Complete		*Expansion*		*Recession*	
Variable	Coefficient	ZStat	Coefficient	ZStat	Coefficient	ZStat
Up Last	-0.4595	-4.39***	-0.4972	-4.16***	-0.3349	-1.48
Down Last	0.1652	3.03***	0.1659	2.78***	0.1444	1.04
Non-Investment Grade	-0.0009	-0.01	0.0332	0.49	-0.2406	-1.56
Intercept	-0.6558	-11.71***	-0.6798	-11.05***	-0.5248	-3.76***
Cash Flow	0.0019	0.41	-0.0053	-1.04	0.0318	2.54**
Working Capital	-0.0132	-1.76*	-0.0123	-1.43	-0.001	-0.06
Current Ratio	-0.1713	-2.64***	-0.144	-2.05**	-0.2244	-1.14
Interest Coverage	0.0402	1.95*	0.1033	3.73***	0.0041	0.14
Debt Ratio	0.0088	1.94*	0.0044	0.51	0.0148	3.58***
Net Income	-0.0065	-1.12	-0.005	-0.82	-0.0093	-0.41
Operating Margin	-0.0508	-1.39	-0.1666	-4.48***	0.0453	1.44
Market to Book	-0.1368	-4.93***	-0.127	-4.44***	-0.1559	-1.54
Capital Expenditure	0.0596	1.91*	0.0668	2.04**	-0.0607	-0.57
R&D	0.0552	0.52	0.1045	0.84	-0.0345	-0.16
Total Assets	0.0435	3.25***	0.0453	2.99***	0.0809	2.45**
Retained Earnings	0.0030	0.48	0.0157	1.87*	-0.0406	-2.03**
Market Beta	-0.0340	-2.57***	-0.0342	-2.56**	0.0327	0.34
Wald Statistic (χ^2)	109.71		118.93		42.21	
Prob> χ^2	0.000		0.000		0.000	
Pseudo R^2	0.035		0.043		0.062	
N (Total)	2835		2369		466	
N (Single Notch)	2021		1690		331	
N (Multi Notch)	814		679		135	

7.8 Regression with the Change in the Variables Adjusted for the Industry

Table 7.8 shows the regression results after adjusting the variables for the industry based on Fama and French's 49 industries. The differences are explained in sections 7.8.1 for upgrades, and 7.8.2 for downgrades.

Comparison of the main model (Table 5.2) with the industry adjusted model for upgrades sample in Panel A shows a few similarities and a few differences between the models.

In case of the rating upgrades, the variables, not adjusted for the industry- dummies for up last, and non-investment have very similar coefficients. None of the industry-adjusted variables is significant except for working capital and total assets which have positive and significant coefficients in case of economic recessions.

The dummies for up last and down last have very similar coefficients. Similarly, operating margin and capital expenditure have the same sign for the coefficients in both models. A firm's current ratio, interest coverage, total assets and market beta are significant in the case of the main model (Table 5.2) while they are insignificant in the case of the industry-adjusted model. The market to book is significant during expansion in the case of the industry-adjusted model in the main model (Table 5.2), it is significant in all of the stages of the business cycle.

Table 7.8

Regression Results with the Change in the Variables Adjusted for the Industry

This table reports the regression results from the probit model for the sample of upgrades (Panel A) and downgrades (Panel B). The dependent variable is an indicator variable equal to one if the rating upgrade (downgrade) is of multiple notches, zero if it is of a single notch. Up Last (Down Last) is an indicator variable that equals one if the firm had upgrades (downgrades) previously. Non-Investment is an indicator variable that equals one if the firm had speculative rating prior to the rating change, zero otherwise. Cash flow, working capital, net income, research and development expenditure, retained earnings, and capital expenditure are the respective value as a percentage of total assets; current ratio is current assets divided by current liabilities; interest coverage is the operating return divided by interest expenses; debt ratio is total debt [long term debt plus current liabilities] divided by total assets; operating margin is operating profit as a percentage of sales. Total asset is the total value of the assets. All the values are the change in each of the variables for firms minus the change in the respective variables for the 49 Fama-French industries, over previous three years [-4 to -1] years, [0] being the year of the rating change. Beta is the change in firm beta minus the industry beta estimated over previous three years. Firms level beta are estimated from market model using daily prices for the years in interest with the condition that prices were available for at least 50 days over the year of estimation; industry beta is calculated using the daily industry returns based on 49 Fama-French industries obtained from Fama-French Library web page. ZStat tests the null that the respective coefficient is equal to zero. ***, **, * indicate significance at 1%, 5%, and 10% level respectively for the test.

Panel A: Rating Upgrades

	Complete		*Expansion*		*Recession*	
Variable	Coefficient	ZStat	Coefficient	ZStat	Coefficient	ZStat
Up Last	-0.5154	-5.95***	-0.5379	-5.97***	-0.2274	-0.63
Down Last	-0.0277	-0.31	-0.1347	-1.39	0.6692	2.20**
Non-Investment Grade	0.3626	2.99***	0.431	3.37***	-0.0232	-0.05
Intercept	-1.1949	-10.10***	-1.2376	-9.90***	-1.0075	-2.32**
Cash Flow	0.0002	0.49	0.0001	0.43	-0.0064	-0.58
Working Capital	0.0001	1.05	0.0001	0.97	0.0361	2.25**
Current Ratio	-0.0014	-0.43	-0.0016	-0.53	0.0016	0.14
Interest Coverage	0.0004	0.6	0.0007	1	-0.0148	-1.43
Debt Ratio	-0.0001	-0.19	-0.0002	-0.3	0.0018	0.48
Net Income	-0.0002	-1.23	-0.0002	-1.24	-0.0224	-1.01
Operating Margin	0.0011	0.63	0.0009	0.5	0.0016	0.12
Market to Book	-0.0002	-1.63	0	-0.2	0.0117	1.29
Capital Expenditure	0.0086	0.96	0.0134	1.32	-0.0407	-1.6
R&D	-0.0103	-0.17	-0.0121	-0.19	0.3698	0.94
Total Assets	-0.0001	-0.94	-0.0002	-1.38	0.0071	2.76***
Retained Earnings	0.0000	0.49	0	0.57	-0.0004	-1.41
Market Beta	-0.0015	-0.12	0	0	-0.0472	-1.51
Wald Statistic (χ^2)	57.37		60.41		110.95	
Prob> χ^2	0.000		0.000		0.000	
Pseudo R^2	0.034		0.039		0.193	
N (Total)	1991		1776		215	
N (Single Notch)	1672		1492		180	
N (Multi Notch)	319		284		35	

Panel B: Rating Downgrades						
	Complete		*Expansion*		*Recession*	
Variable	Coefficient	ZStat	Coefficient	ZStat	Coefficient	ZStat
Up Last	-0.4519	-4.36***	-0.3795	-3.20***	-0.6929	-3.22***
Down Last	0.1510	2.82***	0.1385	2.23**	0.112	1.02
Non-Investment Grade	0.0694	1.14	0.08	1.16	0.041	0.31
Intercept	-0.6105	-10.87***	-0.6542	-10.32***	-0.473	-3.68***
Cash Flow	0.0015	1.42	0.0007	0.7	0.007	1.3
Working Capital	-0.0006	-1.53	-0.0005	-1.28	-0.0001	-0.16
Current Ratio	0.0012	0.5	0.001	0.42	-0.0022	-0.26
Interest Coverage	-0.0014	-0.98	-0.0015	-0.97	-0.001	-0.31
Debt Ratio	-0.0001	-1.06	-0.0001	-1	0.0009	1
Net Income	0.0001	1.19	0.0002	1.17	0.0001	0.83
Operating Margin	-0.0004	-2.08**	-0.0004	-1.91*	-0.009	-2.42**
Market to Book	-0.0001	-1.47	-0.0001	-2.33**	-0.0004	-1.71*
Capital Expenditure	0.0199	3.35***	0.0166	2.51**	0.0336	2.98***
R&D	-0.0347	-0.79	0.0021	0.04	-0.2516	-2.74***
Total Assets	-0.0000	-0.43	0.0002	1.38	0.0012	0.81
Retained Earnings	0.0000	0.24	0	-0.61	0	-0.97
Market Beta	-0.0077	-1.73*	-0.0082	-1.70*	0.0569	1.24
Wald Statistic (χ^2)	66.74		47.21		45.33	
Prob> χ^2	0.000		0.000		0.000	
Pseudo R^2	0.021		0.019		0.047	
N (Total)	2835		2060		775	
N (Single Notch)	2021		1500		521	
N (Multi Notch)	814		560		254	

7.9 Regression Results for Winsorization at Different Levels

Table 7.8 shows the regression results with winsorization of the variables at different levels. Panel A shows the results for the sample of upgrades and Panel B shows the results for the sample of downgrades. The results are generally similar for different levels of winsorization. Slight differences are expected given the extreme nature of events as multi notch rating changes.

Table 7.9

Regression Results for Winsorization at Different Levels

This table reports the regression results for the probit model from 1993 to 2013 for the sample of upgrades (Panel A) and downgrades (Panel B) after winsorizing the variables at different levels. The dependent variable is an indicator variable equal to one if the rating upgrade (downgrade) is multi notch across rating category for the panel of upgrades (downgrades), zero if it is single notch. Cash flow, working capital, net income, interest coverage, research and development expenditure, retained earnings, and capital expenditure are the respective value as a percentage of total assets; current ratio is current assets divided by current liabilities; debt ratio is total debt [long term debt plus current liabilities] divided by total assets; operating margin is operating profit as a percentage of sales; Size is the log of market capitalization of the firm; total asset is the log of total value of total assets. All the values are the change in each of the variables over previous three years [-4 to -1] years, "0" being the year of the rating change. Beta is the change in beta over previous three years estimated from market model using daily prices for the years in interest with the condition that prices were available for at least 50 days over the year of estimation. Up Last (Down Last) is an indicator variable that equals one if the firm had upgrades (downgrades) previously. Panel A shows the results for upgrades and panel B shows the statistics for downgrades. The p-value is presented in the parentheses.

Panel A: Rating Upgrades

Complete Business Cycle

	No Winsor		Winsor- 0.1%		Winsor- 0.25%	
Variable	Coefficient	ZStat	Coefficient	ZStat	Coefficient	ZStat
Up Last	-0.5319	-6.02***	-0.5316	-6.02***	-0.5322	-6.01***
Down Last	-0.0526	-0.57	-0.0533	-0.58	-0.0552	-0.6
Non-Investment Grade	0.3773	3.09***	0.3748	3.07***	0.3711	3.04***
Intercept	-1.1480	-9.60***	-1.1508	-9.62***	-1.1516	-9.63***
Cash Flow	0.0012	0.69	0.0018	0.82	0.0040	1.37
Working Capital	0.0031	0.75	0.0036	0.75	0.0050	0.83
Current Ratio	-0.0607	-0.8	-0.0622	-0.82	-0.0737	-0.92
Interest Coverage	-0.0028	-0.75	-0.0035	-0.77	-0.0041	-0.43
Debt Ratio	0.0014	2.09**	0.0015	2.20**	0.0016	2.51**
Net Income	0.0007	0.69	0.0010	1.31	0.0009	0.45
Operating Margin	0.0069	1.2	0.0084	1.3	0.0091	1.12
Market to Book	0.0003	0.91	0.0049	0.74	0.0065	0.91
Capital Expenditure	0.0182	0.68	0.0188	0.69	0.0227	0.8
R&D	0.0377	0.37	0.0389	0.37	0.0391	0.34
Total Assets	-0.0976	-2.55**	-0.0960	-2.54**	-0.0962	-2.62***
Retained Earnings	0.0000	2.60***	0.0000	2.62***	0.0000	2.64***
Market Beta	0.0023	0.91	0.0035	0.33	-0.0032	-0.19
Wald Statistic (χ^2)	64.57		64.44		66.6	
Prob> χ^2	0.000		0.000		0.000	
Pseudo R^2	0.041		0.042		0.042	
N (Total)	1991		1991		1991	
N (Single Notch)	1672		1672		1672	
N (Multi Notch)	319		319		319	

Panel A: Rating Upgrades						
Complete Business Cycle Continued						
	Winsor- 0.5%		Winsor- 1%		Winsor- 2%	
Variable	Coefficient	ZStat	Coefficient	ZStat	Coefficient	ZStat
Up Last	-0.5184	-5.87***	-0.5245	-5.92***	-0.5334	-6.00***
Down Last	-0.0792	-0.86	-0.0807	-0.87	-0.1037	-1.12
Non-Investment Grade	0.3629	2.98***	0.3628	2.98***	0.3642	2.98***
Intercept	-1.1422	-9.55***	-1.1472	-9.55***	-1.1356	-9.43***
Cash Flow	0.0066	2.70***	0.0095	2.26**	0.0163	2.08**
Working Capital	0.0035	0.43	0.0001	0.01	-0.0066	-0.33
Current Ratio	-0.0689	-0.81	-0.0616	-0.65	-0.0723	-0.67
Interest Coverage	-0.0218	-1.5	-0.0277	-1.48	-0.0272	-1.02
Debt Ratio	0.0078	1.35	-0.0025	-0.28	0.0181	1.02
Net Income	-0.0030	-0.77	-0.0066	-1.17	-0.0113	-1.2
Operating Margin	0.0058	0.4	-0.0058	-0.14	-0.0158	-0.26
Market to Book	0.0103	1.37	0.0263	1.83*	0.0274	1.3
Capital Expenditure	0.0180	0.64	0.0429	1.08	0.055	1.17
R&D	0.0514	0.32	0.0076	0.04	-0.0761	-0.38
Total Assets	-0.0999	-2.67***	-0.099	-2.62***	-0.1456	-3.64***
Retained Earning	-0.0021	-0.37	-0.001	-0.14	-0.0007	-2.95***
Market Beta	-0.0209	-0.69	-0.0254	-0.45	-0.0243	-0.39
Wald Statistic (χ^2)	65.02		82.26		115.48	
Prob> χ^2	0.000		0.000		0.000	
Pseudo R^2	0.045		0.043		0.048	
N (Total)	1991		1991		1991	
N (Single Notch)	1672		1672		1672	
N (Multi Notch)	319		319		319	

Panel A: Rating Upgrades						
Expansion						
	No Winsor		Winsor- 0.1%		Winsor- 0.25%	
Variable	Coefficient	ZStat	Coefficient	ZStat	Coefficient	ZStat
Up Last	-0.5626	-6.03***	-0.563	-6.03***	-0.561	-6.01***
Down Last	-0.1416	-1.41	-0.1438	-1.44	-0.1469	-1.47
Non-Investment Grade	0.4217	3.25***	0.4192	3.23***	0.4146	3.20***
Intercept	-1.1656	-9.17***	-1.1686	-9.19***	-1.1676	-9.19***
Cash Flow	0.0013	0.75	0.0021	0.92	0.0046	1.58
Working Capital	0.0027	0.64	0.0031	0.62	0.0043	0.69
Current Ratio	-0.0570	-0.73	-0.0592	-0.75	-0.0740	-0.88
Interest Coverage	-0.0073	-1.09	-0.0076	-1.24	-0.0131	-1.31
Debt Ratio	0.0014	2.08**	0.0015	2.19**	0.0016	2.51**
Net Income	0.0012	0.93	0.0015	1.41	0.0020	0.93
Operating Margin	0.0060	1.09	0.0071	1.21	0.0072	1.03
Market to Book	0.0003	0.99	0.0048	0.65	0.0067	0.83
Capital Expenditure	0.0132	0.36	0.0142	0.37	0.0220	0.53
R&D	0.0403	0.39	0.0415	0.38	0.0417	0.35
Total Assets	-0.0939	-2.33**	-0.0927	-2.32**	-0.0936	-2.42**
Retained Earnings	0.0001	7.72***	0.0001	7.69***	0.0001	7.44***
Market Beta	0.0036	0.56	0.0078	0.64	0.0028	0.13
Wald Statistic (χ^2)	112.43		113.06		114.68	
Prob> χ^2	0.000		0.000		0.000	
Pseudo R^2	0.045		0.046		0.047	
N (Total)	1776		1776		1776	
N (Single Notch)	1492		1492		1492	
N (Multi Notch)	284		284		284	

Panel A: Rating Upgrades						
Expansion Continued						
	Winsor- 0.5%		Winsor- 1%		Winsor- 2%	
Variable	Coefficient	ZStat	Coefficient	ZStat	Coefficient	ZStat
Up Last	-0.5487	-5.90***	-0.5608	-6.00***	-0.5735	-6.12***
Down Last	-0.1594	-1.59	-0.1569	-1.57	-0.1784	-1.77*
Non-Investment Grade	0.4086	3.16***	0.4146	3.20***	0.4147	3.19***
Intercept	-1.1669	-9.18***	-1.1601	-9.09***	-1.1645	-9.07***
Cash Flow	0.0073	2.98***	0.0096	2.02**	0.0191	2.44**
Working Capital	0.0022	0.25	-0.0007	-0.04	-0.0074	-0.35
Current Ratio	-0.0715	-0.79	-0.0705	-0.7	-0.0786	-0.69
Interest Coverage	-0.0182	-1.27	-0.0198	-1.11	-0.0060	-0.23
Debt Ratio	0.0140	2.36**	-0.0068	-0.41	0.0407	1.01
Net Income	-0.0006	-0.15	0.0028	0.5	-0.0022	-0.21
Operating Margin	-0.0029	-0.24	-0.0658	-1.77*	-0.1139	-2.06**
Market to Book	0.0114	1.31	0.0182	0.98	0.0238	0.91
Capital Expenditure	0.0233	0.54	0.0247	0.53	0.0491	0.91
R&D	0.0564	0.33	0.0197	0.11	-0.0871	-0.41
Total Assets	-0.0977	-2.46**	-0.0944	-2.26**	-0.1435	-3.23***
Retained Earning	-0.0042	-0.7	0.0008	0.08	0.0185	1.33
Market Beta	-0.0258	-0.54	-0.0342	-0.59	-0.0411	-0.63
Wald Statistic (χ^2)	68.7		62.63		77.74	
Prob> χ^2	0.000		0.000		0.000	
Pseudo R^2	0.046		0.044		0.052	
N (Total)	1776		1776		1776	
N (Single Notch)	1492		1492		1492	
N (Multi Notch)	284		284		284	

Panel A: Rating Upgrades						
Recession						
	No winsor		Winsor- 0.1%		Winsor- 0.25%	
Variable	Coefficient	ZStat	Coefficient	ZStat	Coefficient	ZStat
Up Last	-0.3021	-0.99	-0.3021	-0.99	-0.3021	-0.99
Down Last	0.3902	1.53	0.3902	1.53	0.3902	1.53
Non-Investment Grade	0.1287	0.35	0.1287	0.35	0.1287	0.35
Intercept	-0.9571	-2.58***	-0.9571	-2.58***	-0.9571	-2.58***
Cash Flow	-0.137	-1.58	-0.137	-1.58	-0.137	-1.58
Working Capital	0.0245	0.96	0.0245	0.96	0.0245	0.96
Current Ratio	0.1517	0.52	0.1517	0.52	0.1517	0.52
Interest Coverage	-0.0858	-1.2	-0.0858	-1.2	-0.0858	-1.2
Debt Ratio	-0.0038	-0.55	-0.0038	-0.55	-0.0038	-0.55
Net Income	-0.0562	-1.87*	-0.0562	-1.87*	-0.0562	-1.87*
Operating Margin	0.0664	1.28	0.0664	1.28	0.0664	1.28
Market to Book	0.0135	0.8	0.0135	0.8	0.0135	0.8
Capital Expenditure	0.0201	0.5	0.0201	0.5	0.0201	0.5
R&D	0.0469	0.08	0.0469	0.08	0.0469	0.08
Total Assets	-0.2162	-1.69*	-0.2162	-1.69*	-0.2162	-1.69*
Retained Earnings	-0.0012	-1.89*	-0.0012	-1.89*	-0.0012	-1.89*
Market Beta	-0.0165	-0.62	-0.0165	-0.62	-0.0165	-0.62
Wald Statistic (χ^2)	79.75		79.75		79.75	
Prob> χ^2	0.000		0.000		0.000	
Pseudo R^2	0.136		0.136		0.136	
N (Total)	215		215		215	
N (Single Notch)	180		180		180	
N (Multi Notch)	35		35		35	

Panel A: Rating Upgrades						
Recession Continued						
	Winsor- 0.5%		Winsor- 1%		Winsor- 2%	
Variable	Coefficient	ZStat	Coefficient	ZStat	Coefficient	ZStat
Up Last	-0.3021	-0.99	-0.2635	-0.85	-0.2615	-0.84
Down Last	0.3902	1.53	0.3193	1.26	0.2625	1.02
Non-Investment Grade	0.1287	0.35	0.1122	0.3	0.0811	0.22
Intercept	-0.9571	-2.58***	-0.9597	-2.56***	-0.9364	-2.51**
Cash Flow	-0.137	-1.58	-0.1248	-1.5	-0.1257	-1.69*
Working Capital	0.0245	0.96	0.0283	0.75	0.0299	0.55
Current Ratio	0.1517	0.52	0.1962	0.63	0.2988	0.86
Interest Coverage	-0.0858	-1.2	-0.1439	-1.54	-0.1416	-1.36
Debt Ratio	-0.0038	-0.55	-0.0036	-0.41	0.0193	0.75
Net Income	-0.0562	-1.87*	-0.091	-2.52**	-0.1215	-2.66***
Operating Margin	0.0664	1.28	0.1263	2.75***	0.1524	3.07***
Market to Book	0.0135	0.8	0.0707	2.55**	0.077	2.66***
Capital Expenditure	0.0201	0.5	0.0376	0.47	-0.0078	-0.07
R&D	0.0469	0.08	0.0502	0.08	0.0911	0.14
Total Assets	-0.2162	-1.69*	-0.211	-1.71*	-0.2115	-1.86*
Retained Earning	-0.0012	-1.89*	-0.0016	-2.01**	-0.0016	-1.78*
Market Beta	-0.0165	-0.62	0.1025	0.56	0.1183	0.65
Wald Statistic (χ^2)	79.75		98.77		97.45	
Prob> χ^2	0.000		0.000		0.000	
Pseudo R^2	0.136		0.169		0.182	
N (Total)	215		215		215	
N (Single Notch)	180		180		180	
N (Multi Notch)	35		35		35	

Panel B: Rating Downgrades						
Complete Business Cycle						
	No winsor		Winsor- 0.1%		Winsor- 0.25%	
Variable	Coefficient	ZStat	Coefficient	ZStat	Coefficient	ZStat
Up Last	-0.46	-4.45***	-0.4577	-4.43***	-0.461	-4.45***
Down Last	0.1582	2.95***	0.1583	2.95***	0.1574	2.92***
Non-Investment Grade	0.0451	0.74	0.0431	0.71	0.0385	0.63
Intercept	-0.6399	-11.56***	-0.6419	-11.59***	-0.6454	-11.65***
Cash Flow	-0.0002	-0.08	0.0004	0.14	0.0005	0.17
Working Capital	-0.0033	-1.24	-0.0038	-1.18	-0.0038	-1.06
Current Ratio	-0.1130	-2.05**	-0.1155	-2.22**	-0.1318	-2.31**
Interest Coverage	-0.0028	-0.46	-0.0023	-0.35	0.0107	1.03
Debt Ratio	-0.0001	-1.22	0.0000	0.1	-0.0000	0
Net Income	0.0001	0.12	-0.0007	-0.43	-0.0016	-0.64
Operating Margin	-0.0056	-1.55	-0.0056	-1.56	-0.0312	-1.22
Market to Book	-0.0004	-2.24**	0.0019	0.38	-0.0038	-0.46
Capital Expenditure	0.0184	1.67*	0.0200	1.78*	0.0314	2.65***
R&D	-0.0082	-0.15	-0.0096	-0.18	0.0113	0.19
Total Assets	0.0247	2.49**	0.0248	2.49**	0.0258	2.49**
Retained Earnings	0.0002	0.62	-0.0003	-0.24	-0.0011	-0.52
Market Beta	-0.0079	-1.78*	-0.0084	-1.93*	-0.0103	-2.14**
Wald Statistic (χ^2)	64.33		59.54		64.77	
Prob> χ^2	0.000		0.000		0.000	
Pseudo R^2	0.020		0.019		0.022	
N (Total)	2835		2835		2835	
N (Single Notch)	2021		2021		2021	
N (Multi Notch)	814		814		814	

Panel B: Rating Downgrades						
Complete Business Cycle Continued						
	Winsor- 0.5%		Winsor- 1%		Winsor- 2%	
Variable	Coefficient	ZStat	Coefficient	ZStat	Coefficient	ZStat
Up Last	-0.4597	-4.41***	-0.4659	-4.45***	-0.4587	-4.37***
Down Last	0.1568	2.89***	0.1529	2.81***	0.152	2.77***
Non-Investment Grade	0.0044	0.07	-0.006	-0.1	-0.0252	-0.4
Intercept	-0.6565	-11.80***	-0.6538	-11.69***	-0.6634	-11.71***
Cash Flow	0.0031	0.84	0.0022	0.49	0.0024	0.32
Working Capital	-0.0064	-1.19	-0.0088	-1.06	-0.0084	-0.59
Current Ratio	-0.1357	-2.25**	-0.1733	-2.64***	-0.1879	-2.48**
Interest Coverage	0.0336	2.12**	0.0583	2.31**	0.0979	2.94***
Debt Ratio	0.0031	1.75*	-0.0014	-0.27	0.0492	2.95***
Net Income	-0.0018	-0.4	-0.0044	-0.73	-0.004	-0.47
Operating Margin	-0.0963	-3.08***	-0.1368	-3.44***	-0.2017	-3.84***
Market to Book	-0.0596	-3.22***	-0.1149	-4.12***	-0.154	-4.24***
Capital Expenditure	0.0499	2.65***	0.0692	2.48**	0.0359	0.94
R&D	0.0073	0.08	0.0037	0.04	0.1698	1.24
Total Assets	0.0400	3.46***	0.0563	4.18***	0.0709	4.00***
Retained Earning	-0.0027	-0.83	0.0097	1.29	0.0209	1.89*
Market Beta	-0.0159	-2.28**	-0.0374	-2.99***	-0.0709	-3.54***
Wald Statistic (χ^2)	96.07		112.04		136.71	
Prob> χ^2	0.000		0.000		0.000	
Pseudo R^2	0.032		0.035		0.041	
N (Total)	2835		2835		2835	
N (Single Notch)	2021		2021		2021	
N (Multi Notch)	814		814		814	

Panel B: Rating Downgrades						
Expansion						
	No winsor		Winsor- 0.1%		Winsor- 0.25%	
Variable	Coefficient	ZStat	Coefficient	ZStat	Coefficient	ZStat
Up Last	-0.4125	-3.34***	-0.4108	-3.33***	-0.4167	-3.37***
Down Last	0.1384	2.16**	0.1392	2.17**	0.142	2.20**
Non-Investment Grade	0.0473	0.67	0.0458	0.65	0.0468	0.66
Intercept	-0.6692	-10.57***	-0.6710	-10.60***	-0.6733	-10.64***
Cash Flow	-0.0017	-0.58	-0.0013	-0.38	-0.0013	-0.37
Working Capital	-0.0029	-0.87	-0.0036	-0.73	-0.0036	-0.61
Current Ratio	-0.1090	-1.78*	-0.1134	-1.96**	-0.1424	-2.19**
Interest Coverage	0.0014	0.2	0.0022	0.29	0.0218	1.99**
Debt Ratio	-0.0001	-1.28	0.0000	0.02	-0.0002	-0.59
Net Income	0.0011	0.92	0.0011	0.54	0.0013	0.42
Operating Margin	-0.0095	-1.19	-0.0105	-1.23	-0.0206	-0.73
Market to Book	-0.0004	-2.39**	0.0021	0.41	-0.0031	-0.39
Capital Expenditure	0.0080	0.6	0.0092	0.66	0.0173	1.07
R&D	0.0383	0.47	0.0372	0.46	0.0320	0.38
Total Assets	0.0225	1.91*	0.0226	1.92*	0.0222	1.80*
Retained Earnings	0.0003	0.76	-0.0001	-0.04	-0.0004	-0.15
Market Beta	-0.0084	-1.72*	-0.0089	-1.83*	-0.0108	-2.05**
Wald Statistic (χ^2)	41.01		34.56		39.43	
Prob> χ^2	0.000		0.000		0.000	
Pseudo R^2	0.016		0.016		0.018	
N (Total)	2060		2060		2060	
N (Single Notch)	1500		1500		1500	
N (Multi Notch)	560		560		560	

Panel B: Rating Downgrades						
Expansion Continued						
	Winsor- 0.5%		Winsor- 1%		Winsor- 2%	
Variable	Coefficient	ZStat	Coefficient	ZStat	Coefficient	ZStat
Up Last	-0.4206	-3.38***	-0.4294	-3.45***	-0.426	-3.43***
Down Last	0.1523	2.34**	0.1527	2.33**	0.1525	2.31**
Non-Investment Grade	0.0131	0.18	0.0177	0.24	0.0134	0.18
Intercept	-0.6838	-10.73***	-0.6887	-10.70***	-0.6941	-10.63***
Cash Flow	0.0007	0.16	-0.001	-0.19	0.001	0.13
Working Capital	-0.0034	-0.48	-0.0092	-0.91	-0.0141	-0.87
Current Ratio	-0.1320	-1.92*	-0.1676	-2.21**	-0.1674	-1.93*
Interest Coverage	0.0530	3.22***	0.0963	3.68***	0.1346	3.84***
Debt Ratio	0.0052	2.95***	0.0159	1.62	0.0881	4.40***
Net Income	0.0004	0.08	-0.004	-0.61	-0.0105	-1.14
Operating Margin	-0.0783	-2.22**	-0.1032	-2.20**	-0.1114	-1.71*
Market to Book	-0.0440	-2.37**	-0.0869	-3.04***	-0.1097	-2.88***
Capital Expenditure	0.0193	0.55	0.0267	0.66	-0.0059	-0.12
R&D	0.0765	0.77	0.0675	0.56	0.2816	1.80*
Total Assets	0.0331	2.19**	0.0474	2.33**	0.0425	1.59
Retained Earning	-0.0032	-0.96	0.0106	1.3	0.019	1.62
Market Beta	-0.0175	-2.20**	-0.048	-3.35***	-0.108	-4.64***
Wald Statistic (χ^2)	66.8		80.1		111.25	
Prob> χ^2	0.000		0.000		0.000	
Pseudo R^2	0.027		0.034		0.044	
N (Total)	2060		2060		2060	
N (Single Notch)	1500		1500		1500	
N (Multi Notch)	560		560		560	

Panel B: Rating Downgrades						
Recession						
	No winsor		Winsor- 0.1%		Winsor- 0.25%	
Variable	Coefficient	ZStat	Coefficient	ZStat	Coefficient	ZStat
Up Last	-0.587	-3.07***	-0.587	-3.07***	-0.582	-3.01***
Down Last	0.1427	1.42	0.1427	1.42	0.1151	1.14
Non-Investment Grade	0.0171	0.14	0.0171	0.14	-0.0069	-0.06
Intercept	-0.5783	-4.93***	-0.5783	-4.93***	-0.5937	-5.02***
Cash Flow	0.0068	1.12	0.0068	1.12	0.0068	1.12
Working Capital	-0.0037	-0.88	-0.0037	-0.88	-0.0037	-0.82
Current Ratio	-0.1139	-0.89	-0.1139	-0.89	-0.1063	-0.81
Interest Coverage	-0.0619	-1.57	-0.0619	-1.57	-0.0451	-1.39
Debt Ratio	0.0001	0.16	0.0001	0.16	0.0011	1.48
Net Income	-0.0085	-1.95*	-0.0085	-1.95*	-0.0104	-1.5
Operating Margin	-0.0029	-0.72	-0.0029	-0.72	-0.1291	-2.13**
Market to Book	-0.0166	-0.44	-0.0166	-0.44	-0.0188	-0.45
Capital Expenditure	0.0543	2.49**	0.0543	2.49**	0.0854	2.51**
R&D	-0.0556	-0.68	-0.0556	-0.68	-0.0468	-0.48
Total Assets	0.0308	1.58	0.0308	1.58	0.0401	2.09**
Retained Earnings	-0.0048	-1.15	-0.0048	-1.15	-0.0060	-1.39
Market Beta	0.0536	1.23	0.0536	1.23	0.0520	1.18
Wald Statistic (χ^2)	42.1		42.1		44.84	
Prob> χ^2	0.000		0.000		0.000	
Pseudo R^2	0.044		0.044		0.053	
N (Total)	775		775		775	
N (Single Notch)	521		521		521	
N (Multi Notch)	254		254		254	

Panel B: Rating Downgrades						
Recession Continued						
	Winsor- 0.5%		Winsor- 1%		Winsor- 2%	
Variable	Coefficient	ZStat	Coefficient	ZStat	Coefficient	ZStat
Up Last	-0.5826	-2.99***	-0.5866	-3.02***	-0.5722	-2.94***
Down Last	0.0942	0.92	0.0942	0.92	0.0705	0.68
Non-Investment Grade	-0.0332	-0.27	-0.0444	-0.36	-0.0576	-0.46
Intercept	-0.6315	-5.29***	-0.6421	-5.35***	-0.6959	-5.68***
Cash Flow	0.0121	1.87*	0.0154	1.76*	0.0224	0.83
Working Capital	-0.0155	-2.41**	-0.0124	-0.84	0.0085	0.25
Current Ratio	-0.1383	-1.01	-0.1527	-1.06	-0.2705	-1.54
Interest Coverage	-0.0451	-0.95	-0.0646	-1.07	-0.0578	-0.75
Debt Ratio	-0.0103	-1.89*	-0.0137	-2.00**	-0.0061	-0.2
Net Income	-0.0096	-1	-0.0027	-0.17	0.0302	1.13
Operating Margin	-0.1745	-2.30**	-0.18	-2.34**	-0.301	-3.44***
Market to Book	-0.2381	-2.74***	-0.2611	-2.70***	-0.3653	-3.41***
Capital Expenditure	0.0728	2.94***	0.1095	2.73***	0.1104	1.68*
R&D	-0.1419	-0.76	-0.1151	-0.48	-0.0372	-0.13
Total Assets	0.0529	2.83***	0.0579	3.05***	0.1013	4.09***
Retained Earning	0.0050	0.28	0.0027	0.12	0.0173	0.5
Market Beta	0.0496	1.1	0.0549	1.18	0.0624	1.23
Wald Statistic (χ^2)	69.68		65.99		64.04	
Prob> χ^2	0.000		0		0.000	
Pseudo R^2	0.071		0.066		0.066	
N (Total)	775		775		775	
N (Single Notch)	521		521		521	
N (Multi Notch)	254		254		254	

7.10 Regression Results for Ordered Probit with Market Value and Total Debt

The model with market value and total debt shows that the coefficient on total debt is negative, and market value is positive. The other estimates are similar.

Table 7.10

Regression Results for Ordered Probit with Market Value and Total Debt

This table reports the regression results from the ordered probit model for the sample of upgrades (Panel A) and downgrades (Panel B). The dependent variable is a qualitative variable equal to one if the rating change is multi notch downgrades, 2 if it is a single notch rating downgrade, 3 if it is a stable rating, 4 if it is a single notch rating upgrade, and 5 if it is a multi notch rating upgrades. Up Last (Down Last) is an indicator variable that equals one if the firm had upgrades (downgrades) previously. Non-Investment is an indicator variable that equals one if the firm had speculative rating prior to the rating change, zero otherwise. Cash flow, working capital, net income, research and development expenditure, retained earnings, and capital expenditure are the respective value as a percentage of total assets; current ratio is current assets divided by current liabilities; interest coverage is the operating return divided by interest expenses; total debt is the value of total debt [long term debt plus current liabilities]; operating margin is operating profit as a percentage of sales. Market Value is the market capitalization of the firm (number of shares outstanding times price). All the values are the change in each of the variables over previous three years [-4 to -1] years, [0] being the year of the rating change. Beta is the change in beta over previous three years estimated from market model using daily prices for the years in interest with the condition that prices were available for at least 50 days over the year of estimation. ZStat tests the null that the respective coefficient is equal to zero. ***, **, * indicate significance at 1%, 5%, and 10% level respectively for the test.

	Complete Cycle		*Expansion*		*Recession*	
Variable	Coefficient	ZStat	Coefficient	ZStat	Coefficient	ZStat
Up Last	0.3630	12.27***	0.374	11.54***	0.2991	4.20***
Down Last	-0.2219	-7.89***	-0.2246	-7.02***	-0.0861	-1.42
Non-Investment Grade	0.3108	10.91***	0.3516	10.98***	0.1342	2.03**
Cash Flow	0.0043	1.77*	0.0030	1.19	-0.0028	-0.25
Working Capital	0.0037	0.83	0.0067	1.29	-0.0004	-0.05
Current Ratio	0.0640	2.04**	0.0516	1.53	0.0400	0.44
Interest Coverage	0.0291	3.74***	0.0228	2.89***	0.0853	3.03***
Total Debt	-0.0068	-6.65***	-0.0077	-7.31***	-0.0036	-1.37
Net Income	0.0012	0.43	0.0010	0.34	0.0044	0.74
Operating Margin	0.0952	6.01***	0.0760	4.38***	0.1742	3.89***
Market to Book	0.0584	7.18***	0.0490	5.77***	0.1060	3.32***
Capital Expenditure	-0.0412	-2.45**	-0.0286	-1.57	-0.0353	-0.96
R&D	-0.0272	-0.55	-0.0708	-1.3	0.1140	0.98
Market Value	0.0508	8.11***	0.0406	6.45***	0.0922	3.56***
Retained Earnings	-0.0003	-1.82*	0.0022	0.55	-0.0054	-0.51
Market Beta	-0.0427	-7.17***	-0.0361	-5.92***	-0.1405	-4.48***

Ordered Probit result Continued						
	Complete Cycle		*Expansion*		*Recession*	
Variable	Coefficient	ZStat	Coefficient	ZStat	Coefficient	ZStat
Wald Statistic (χ^2)	989.96		770.2		230.91	
Prob> χ^2	0.000		0.000		0.000	
Pseudo R^2	0.037		0.037		0.054	
N (Total)	8133		6485		1648	
N (Multi Notch Upgrades)	319		284		35	
N (Single Notch Upgrades)	1672		1492		180	
N (Stable)	3307		2649		658	
N (Single Notch Downgrades)	2021		1500		521	
N (Multi Notch Downgrades)	814		560		254	

7.11 Regression with CAR as an Additional Variable

Table 7.11 shows the probit model regression results after including the cumulative abnormal return (CAR) for the events for the event window [-22, -1]. The table provides results on whether the abnormal market return prior to the event may have been input for the rating agencies while reviewing the ratings of a firm. Panel A of the table shows that CAR is significant for upgrades during expansions but not for the upgrades during the entire business cycle or recessions. Panel B of the table shows that the coefficient on CAR is negative and significant for downgrades when the complete business cycle is considered but not significant (at 5% confidence interval) when looked at the rating downgrades that occur during expansions or recessions.

Table 7.11

Regression Results with CAR

This table reports the regression results from the probit model for the sample of upgrades (Panel A) and downgrades (Panel B). The dependent variable is an indicator variable equal to one if the rating upgrade (downgrade) is of multiple notches across rating categories, zero if it is of a single notch across rating categories. Up Last (Down Last) is an indicator variable that equals one if the firm had upgrades (downgrades) previously. Non-Investment is an indicator variable that equals one if the firm had speculative rating prior to the rating change, zero otherwise. Cash flow, working capital, net income, research, and development expenditure, retained earnings, and capital expenditure is the respective value as a percentage of total assets; current ratio is current assets divided by current liabilities; interest coverage is the operating return divided by interest expenses; debt ratio is total debt [long term debt plus current liabilities] divided by total assets; operating margin is operating profit as a percentage of sales. Total asset is the total value of the assets. All of the values are the change in each of the variables over previous three years [-4 to -1] years, [0] being the year of the rating change. Beta is the change in beta over previous three years estimated from market model using daily prices for the years in interest with the condition that prices were available for at least 50 days over the year of estimation. CAR is the cumulative abnormal returns for event firms for event window [-22, -1]. ZStat tests the null that the respective coefficient is equal to zero. ***, **, * indicate significance at 1%, 5%, and 10% level respectively for the test.

Panel A: Rating Upgrades

	Complete		*Expansion*		*Recession*	
Variable	Coefficient	ZStat	Coefficient	ZStat	Coefficient	ZStat
Up Last	-0.5283	-5.96***	-0.5633	-6.01***	-0.2598	-0.84
Down Last	-0.0777	-0.84	-0.1603	-1.6	0.3119	1.24
Non-Investment Grade	0.3512	2.89***	0.4032	3.11***	0.1401	0.37
Cash Flow	0.0095	2.26**	0.0102	2.49**	-0.1220	-1.5
Working Capital	-0.0001	-0.01	-0.0024	-0.16	0.0286	0.75
Current Ratio	-0.0612	-0.65	-0.0635	-0.63	0.1961	0.63
Interest Coverage	-0.0270	-1.46	-0.0176	-0.97	-0.1450	-1.56
Debt Ratio	-0.0020	-0.22	-0.0022	-0.12	-0.0036	-0.42
Net Income	-0.0069	-1.23	-0.0034	-0.55	-0.0911	-2.52**
Operating Margin	-0.0051	-0.13	-0.0514	-1.48	0.1266	2.76***
Market to Book	0.0267	1.87*	0.0254	1.59	0.0711	2.56**
Capital Expenditure	0.0451	1.13	0.0301	0.64	0.0349	0.44
R&D	0.0100	0.06	0.0219	0.12	0.0607	0.1
Total Assets	-0.0988	-2.62***	-0.0914	-2.28**	-0.2093	-1.72*
Retained Earning	-0.0010	-0.13	-0.0047	-0.57	-0.0016	-2.03**
Market Beta	-0.0264	-0.48	-0.0470	-0.8	0.1068	0.57
CAR	0.0458	1.04	0.081	2.23**	-0.0185	-0.29
Intercept	-1.1392	-9.51***	-1.1658	-9.14***	-0.9841	-2.60***
Wald Statistic (χ^2)	64.91		70.54		99.09	
Prob> χ^2	0.000		0.000		0.000	
Pseudo R^2	0.046		0.049		0.169	
N (Total)	1991		1776		215	
N (Single Notch)	1672		1492		180	
N (Multi Notch)	319		284		35	

Panel B: Rating Downgrades						
	Complete		*Expansion*		*Recession*	
Variable	Coefficient	ZStat	Coefficient	ZStat	Coefficient	ZStat
Up Last	-0.4699	-4.47***	-0.4345	-3.47***	-0.5945	-3.07***
Down Last	0.1517	2.78***	0.1500	2.28**	0.0948	0.93
Non-Investment Grade	-0.0117	-0.19	0.0068	0.09	-0.0444	-0.36
Cash Flow	-0.0002	-0.04	-0.0008	-0.15	0.0114	0.68
Working Capital	-0.0137	-1.73*	-0.0143	-1.56	-0.0167	-1.09
Current Ratio	-0.1490	-2.26**	-0.1465	-1.94*	-0.1453	-0.99
Interest Coverage	0.0633	2.63***	0.1001	4.06***	-0.0591	-0.98
Debt Ratio	0.0008	0.14	0.0203	2.18**	-0.0130	-1.83*
Net Income	-0.0026	-0.44	-0.0019	-0.29	-0.0023	-0.14
Operating Margin	-0.1467	-4.14***	-0.1173	-2.97***	-0.1972	-2.57***
Market to Book	-0.1095	-4.10***	-0.0811	-2.97***	-0.2768	-2.85***
Capital Expenditure	0.0662	2.44**	0.0289	0.74	0.1086	2.65***
R&D	0.0799	0.73	0.1517	1.25	-0.0788	-0.31
Total Assets	0.0536	4.03***	0.0431	2.18**	0.0577	2.98***
Retained Earning	0.0060	0.83	0.0056	0.72	0.0098	0.4
Market Beta	-0.0317	-2.49**	-0.0417	-2.88***	0.0601	1.27
CAR	-0.0409	-2.52**	-0.0376	-1.82*	-0.0476	-1.77*
Intercept	-0.6632	-11.83***	-0.6981	-10.83***	-0.6650	-5.49***
Wald Statistic (χ^2)	120.89		88.27		68.11	
Prob> χ^2	0.000		0.000		0.000	
Pseudo R^2	0.038		0.037		0.070	
N (Total)	2835		2060		775	
N (Single Notch)	2021		1500		521	
N (Multi Notch)	814		560		254	

7.12 Regression with Negative Earnings Dummy

Table 7.12 shows the results after the addition of an indicator variable that equals one if an event firm has negative net income in the year prior to the rating changes. The idea is that negative earnings may be a strong indication of a firm's poor performance. Panel A of the table shows that negative net income is a strong indicator of whether a rating upgrade will be a multi notch or single notch for those that occur in the expansion. The dummy is not significant for the rating upgrades that occur during the recessions. Panel B of the table shows that negative net

income dummy is significant for downgrades in the complete business cycle and either recession or expansion.

Table 7.12

Regression Results with Negative Earnings Dummy

This table reports the regression results from the probit model for the sample of upgrades (Panel A) and downgrades (Panel B). The dependent variable is an indicator variable equal to one if the rating upgrade (downgrade) is of multiple notches across rating categories, zero if it is of a single notch across rating categories. Up Last (Down Last) is an indicator variable that equals one if the firm had upgrades (downgrades) previously. Non-Investment is an indicator variable that equals one if the firm had speculative rating prior to the rating change, zero otherwise. Negative Net Income is an indicator variable that equals one if the event firm had negative net income in the year prior to the rating change, zero otherwise. Cash flow, working capital, net income, research and development expenditure, retained earnings, and capital expenditure are the respective value as a percentage of total assets; current ratio is current assets divided by current liabilities; interest coverage is the operating return divided by interest expenses; debt ratio is total debt [long term debt plus current liabilities] divided by total assets; operating margin is operating profit as a percentage of sales. Total asset is the total value of the assets. All of the values are the change in each of the variables over previous three years [-4 to -1] years, [0] being the year of the rating change. Beta is the change in beta over previous three years estimated from market model using daily prices for the years in interest with the condition that prices were available for at least 50 days over the year of estimation. ZStat tests the null that the respective coefficient is equal to zero. ***, **, * indicate significance at 1%, 5%, and 10% level respectively for the test.

Panel A: Rating Upgrades

	Complete		*Expansion*		*Recession*	
Variable	Coefficient	ZStat	Coefficient	ZStat	Coefficient	ZStat
Up Last	-0.5056	-5.65***	-0.5354	-5.69***	-0.2584	-0.83
Down Last	-0.1444	-1.54	-0.2269	-2.23**	0.3116	1.25
Non-Investment Grade	0.2824	2.29**	0.3271	2.50**	0.1032	0.28
Negative Net Income	0.414	4.67***	0.4247	4.55***	0.0683	*0.21*
Cash Flow	0.009	2.11**	0.0101	2.38**	-0.1249	-1.51
Working Capital	-0.0006	-0.04	-0.0031	-0.21	0.0291	0.76
Current Ratio	-0.0248	-0.27	-0.0334	-0.34	0.2044	0.66
Interest Coverage	-0.0197	-1.08	-0.0126	-0.69	-0.1398	-1.49
Debt Ratio	-0.0033	-0.34	-0.0096	-0.48	-0.0034	-0.39
Net Income	-0.0024	-0.41	0.0011	0.17	-0.0892	-2.45**
Operating Margin	0.0028	0.08	-0.0326	-0.93	0.1232	2.60***
Market to Book	0.0251	1.79*	0.0237	1.48	0.0698	2.45**
Capital Expenditure	0.0475	1.2	0.0353	0.76	0.0382	0.48
R&D	-0.0055	-0.03	-0.0047	-0.03	0.0517	0.08
Total Assets	-0.0876	-2.44**	-0.0783	-2.06**	-0.2116	-1.76*
Retained Earning	-0.0007	-2.25**	-0.0034	-0.42	-0.0016	-1.96**
Market Beta	-0.0336	-0.6	-0.0536	-0.92	0.1013	0.55
Intercept	-1.1656	-9.72***	-1.1891	-9.34***	-0.9608	-2.56***
Wald Statistic (χ^2)	93.83		89.14		99.85	
Prob> χ^2	0.000		0.000		0.000	
Pseudo R^2	0.058		0.060		0.169	
N (Total)	1991		1776		215	
N (Single Notch)	1672		1492		180	
N (Multi Notch)	319		284		35	

Panel B: Rating Downgrades						
	Complete		*Expansion*		*Recession*	
Variable	Coefficient	ZStat	Coefficient	ZStat	Coefficient	ZStat
Up Last	-0.4616	-4.38***	-0.4297	-3.44***	-0.5783	-2.95***
Down Last	0.1210	2.20**	0.1293	1.95*	0.0646	0.63
Non-Investment Grade	-0.0816	-1.27	-0.0412	-0.55	-0.1471	-1.14
Negative Net Income	*0.2766*	*4.62****	*0.1904*	*2.69****	*0.407*	*3.48****
Cash Flow	-0.0015	-0.29	-0.0018	-0.34	0.0102	0.59
Working Capital	-0.0112	-1.44	-0.0125	-1.38	-0.0125	-0.83
Current Ratio	-0.1437	-2.21**	-0.1411	-1.89*	-0.1463	-1.01
Interest Coverage	0.0726	3.02***	0.1060	4.31***	-0.0404	-0.66
Debt Ratio	0.0008	0.15	0.0188	2.04**	-0.0105	-1.5
Net Income	0.0011	0.19	0.0004	0.07	0.0060	0.37
Operating Margin	-0.1128	-3.25***	-0.0970	-2.45**	-0.1268	-1.72*
Market to Book	-0.1056	-4.09***	-0.0806	-3.02***	-0.2308	-2.41**
Capital Expenditure	0.0681	2.50**	0.0301	0.77	0.1159	2.73***
R&D	0.0440	0.4	0.1224	1	-0.1186	-0.47
Total Assets	0.0518	3.89***	0.0443	2.23**	0.0513	2.66***
Retained Earning	0.0084	1.16	0.0073	0.94	0.0168	0.69
Market Beta	-0.0340	-2.59***	-0.0427	-2.88***	0.0454	0.96
Intercept	-0.6663	-11.92***	-0.7000	-10.87***	-0.6489	-5.43***
Wald Statistic (χ^2)	139.68		94.58		74.08	
Prob> χ^2	0.000		0.000		0.000	
Pseudo R^2	0.042		0.039		0.079	
N (Total)	2835		2060		775	
N (Single Notch)	2021		1500		521	
N (Multi Notch)	814		560		254	

7.13 Regression with Negative Cash Flow Dummy

Table 7.13 shows the results after the addition of an indicator variable that equals one if an event firm has negative cash flow in the year prior to the rating changes. The idea is that negative cash flow may be a strong indication of a firm's poor performance. Panel A of the table shows that negative cash flow does not indicate whether a rating upgrade will be a multi notch or single notch for any of the stages of the business cycle. Panel B of the table, however, shows that negative cash flow dummy is significant for downgrades in the complete business cycle and the recession but not in the expansion (at 5% confidence interval).

Table 7.13

Regression Results with Negative Cash Flow Dummy

This table reports the regression results from the probit model for the sample of upgrades (Panel A) and downgrades (Panel B). The dependent variable is an indicator variable equal to one if the rating upgrade (downgrade) is of multiple notches across rating categories, zero if it is of a single notch across rating categories. Up Last (Down Last) is an indicator variable that equals one if the firm had upgrades (downgrades) previously. Non-Investment is an indicator variable that equals one if the firm had speculative rating prior to the rating change, zero otherwise. Negative cash flow is an indicator variable that equals one if the event firm had negative cash flow in the year prior to the rating change, zero otherwise. Cash flow, working capital, net income, research and development expenditure, retained earnings, and capital expenditure are the respective value as a percentage of total assets; current ratio is current assets divided by current liabilities; interest coverage is the operating return divided by interest expenses; debt ratio is total debt [long term debt plus current liabilities] divided by total assets; operating margin is operating profit as a percentage of sales. Total asset is the total value of the assets. All of the values are the change in each of the variables over previous three years [-4 to -1] years, [0] being the year of the rating change. Beta is the change in beta over previous three years estimated from market model using daily prices for the years in interest with the condition that prices were available for at least 50 days over the year of estimation. ZStat tests the null that the respective coefficient is equal to zero. ***, **, * indicate significance at 1%, 5%, and 10% level respectively for the test.

Panel A: Rating Upgrades

	Complete		*Expansion*		*Recession*	
Variable	Coefficient	ZStat	Coefficient	ZStat	Coefficient	ZStat
Up Last	-0.5238	-5.90***	-0.5559	-5.94***	-0.2671	-0.86
Down Last	-0.0869	-0.94	-0.1665	-1.65*	0.3368	1.31
Non-Investment Grade	0.3542	2.90***	0.3993	3.08***	0.1184	0.32
Negative Cash Flow	0.2642	1.49	0.266	1.43	-0.4984	-0.89
Cash Flow	0.0091	2.14**	0.0098	2.37**	-0.1301	-1.48
Working Capital	-0.0005	-0.03	-0.0024	-0.16	0.0282	0.74
Current Ratio	-0.0551	-0.59	-0.0572	-0.57	0.2172	0.69
Interest Coverage	-0.0273	-1.47	-0.0183	-1	-0.1378	-1.39
Debt Ratio	-0.0031	-0.33	-0.0050	-0.26	-0.0034	-0.39
Net Income	-0.0061	-1.08	-0.0024	-0.39	-0.0897	-2.47**
Operating Margin	0.0018	0.05	-0.0435	-1.24	0.1225	2.64***
Market to Book	0.0252	1.75*	0.0244	1.5	0.0822	2.49**
Capital Expenditure	0.0441	1.11	0.0310	0.66	0.0337	0.42
R&D	0.0056	0.03	0.0101	0.05	0.0827	0.13
Total Assets	-0.0998	-2.64***	-0.0927	-2.31**	-0.2035	-1.68*
Retained Earning	-0.0009	-0.21	-0.0042	-0.51	-0.0016	-1.83*
Market Beta	-0.0281	-0.51	-0.0484	-0.84	0.1038	0.57
Intercept	-1.1470	-9.56***	-1.1662	-9.15***	-0.9666	-2.56***
Wald Statistic (χ^2)	65.47		67.39		98.23	
Prob> χ^2	0.000		0.000		0.000	
Pseudo R^2	0.046		0.047		0.170	
N (Total)	1991		1776		215	
N (Single Notch)	1672		1492		180	
N (Multi Notch)	319		284		35	

Panel B: Rating Downgrades						
	Complete		*Expansion*		*Recession*	
Variable	Coefficient	ZStat	Coefficient	ZStat	Coefficient	ZStat
Up Last	-0.4624	-4.40***	-0.4321	-3.46***	-0.5736	-2.96***
Down Last	0.1406	2.57***	0.1480	2.26**	0.0864	0.84
Non-Investment Grade	-0.0188	-0.3	0.0047	0.06	-0.0608	-0.49
Negative Cash Flow	0.3737	3.76***	0.2233	1.78*	0.4249	2.36**
Cash Flow	-0.0013	-0.26	-0.0017	-0.33	0.0118	0.71
Working Capital	-0.0121	-1.52	-0.0131	-1.44	-0.0130	-0.84
Current Ratio	-0.1663	-2.54**	-0.1554	-2.08**	-0.1830	-1.24
Interest Coverage	0.0680	2.90***	0.1008	4.12***	-0.0417	-0.7
Debt Ratio	0.0000	0	0.0190	2.05**	-0.0128	-1.83*
Net Income	-0.0020	-0.34	-0.0014	-0.21	-0.0019	-0.12
Operating Margin	-0.0912	-2.52**	-0.0900	-2.18**	-0.1004	-1.21
Market to Book	-0.1089	-4.11***	-0.0812	-3.00***	-0.2706	-2.78***
Capital Expenditure	0.0614	2.22**	0.0297	0.75	0.0971	2.25**
R&D	0.0772	0.71	0.1452	1.2	-0.0511	-0.21
Total Assets	0.0521	3.98***	0.0450	2.30**	0.0514	2.72***
Retained Earning	0.0063	0.87	0.0060	0.78	0.0088	0.36
Market Beta	-0.0330	-2.56***	-0.0417	-2.88***	0.0470	0.99
Intercept	-0.6563	-11.76***	-0.6934	-10.77***	-0.6392	-5.34***
Wald Statistic (χ^2)	133.18		89.51		70.12	
Prob> χ^2	0.000		0.000		0.000	
Pseudo R^2	0.040		0.037		0.072	
N (Total)	2835		2060		775	
N (Single Notch)	2021		1500		521	
N (Multi Notch)	814		560		254	

CHAPTER 8

DISCUSSIONS, CONCLUSION, LIMITATIONS AND FUTURE STUDY

This section is further divided into four section. Section 8.1 discusses the results and findings of the study. Section 8.2 gives a short conclusion of the study. Section 8.3 discusses the limitations of the study. Section 8.4 presents the future direction of the study.

8.1 Discussions

8.1.1 Discussions on Market Reaction to Multi Notch versus Single Notch Rating Changes

The results for upgrades and downgrades reveal that investors react differently to rating changes that occur during economic expansions versus recessions. The return differential between multi notch versus single notch upgrades is larger during economic recessions than in expansions; while the return differential between multi notch versus single notch downgrades is larger during economic expansions than in recessions. Thus, it seems that rating upgrades are stronger news in recessions and downgrades are stronger news in expansions.

This difference in market reaction to economic expansions versus contractions is consistent with the extant literature (Conrad et al., 2002; Beber and Brandt, 2010; Loh and Stulz, 2014). Consistent with the finding of Beber and Brandt (2010) that market reacts more strongly to bad news in good times and to good news in bad times, I find that single notch and multi notch upgrades elicit much more abnormal returns in economic recessions and single notch and multi notch downgrades elicit much more abnormal returns in economic expansions. Furthermore, the return differential between multi notch and single notch upgrades is amplified during recessions. The opposite is true for downgrades –larger return differential between the multi notch and single notch downgrades during recessions.

This finding is also consistent with Conrad et al. (2002) who claim that regime shifting has an impact on the stock price reaction. The finding of higher market reaction for downgrades during economic expansion is partly consistent with Loh and Stulz (2014) in that in bad times the information implied in downgrades elicit larger market reaction.

Another observation is that the excess returns for the sample of upgrades do not reverse in the month following upgrades. For the sample of downgrades, the excess returns sustain in the month following the rating downgrades. The finding is consistent Dichev and Piotrioski (2001), who document similar continuing negative returns in the periods following the rating downgrades but no such result for rating upgrades. Dichev and Piotrioski (2001) claim that this negative returns following the downgrades are caused by underreaction to the downgrades since the investors do not seem to impound the information of future deterioration in the earnings for the downgraded firms.

Also, my sensitivity test shows that the market reaction to rating changes that occur across rating categories is larger than when a change in the rating category is not considered.

8.1.2 Discussions on the Explanatory Factors of Multi Notch versus Single Notch Rating Changes

8.1.2. A Discussion on Rating Upgrades

The results on the determining factors of single notch versus multi notch rating upgrades generally show the expected relationship. Consistent with Purda (2007), the negative for the coefficients on the "Up Last' variable indicates that a firm is less likely to be upgraded by multiple notches if it has already been upgraded before.

The significant coefficient for the non-investment grade dummy indicates that firms that had lower ratings, more likely to get upgraded by multiple notches vis-à-vis single notch upgrades. This finding is consistent with Purda (2007), which suggests that a firm's previous rating change can predict the firm's newer rating change. It is also possible that firms that have speculative ratings have more market pressure to cross into the investment category.

Also, based on the coefficients on CAR, it appears that the rating changes news arrive after the investors have already incorporated good and bad firm news into the stock prices, more so for the rating downgrades. However given that market responds to the rating changes announcements (Table 5.1), investors do appear to find rating changes to provide new firm information.

The study also suggests that negative earnings are a strong clue to the magnitude of the rating changes.

Also I find that firms upgraded by multiple notches had more positive (or less negative) coefficients on the change in the value of cash flow, a measure of liquidity, during the complete business cycle and the expansion. This finding that firms with better liquidity have better ratings is consistent Acharya, Davydenko, and Strebulaev (2012). Cash flow is not significant during

recession probably because all of the firms would have the incentive to save during difficult times (Almeida et al., 2004).

Also, the firms upgraded by multiple notches also have a less positive change in the net income in comparison to single notch upgrades, but a more positive change on the coefficients on operating margin during recessions. Thus, it is likely that firms that had multi notch upgrades had higher interest costs than those for single notch upgrades.

Similarly, the firms with multi notch upgrades also had positive coefficients on market-to-book value during the recession. Put another way, these firms had better growth opportunities, which got reflected in higher ratings.

Also, the coefficient on total assets for multi notch upgrades is less positive than that for single notch upgrades. However when the ordered probit model is studied alongside the probit model, the coefficient on the total asset is positive and significant indicating that higher magnitude of rating changes implies more positive changes in assets. Also, the negative coefficient on the total debt for the ordered probit model indicates that firms with more positive rating changes have lowered their debt.

When the main model (Table 5.2) for rating upgrades is compared with the model with alternative specifications –upgrades across rating category, alternative specifications of accounting variables, interaction with recession dummy, logit model, lagging and leading of recessions and expansion timing, adjustment for Fama-French 49 industries, and winsorization –the model does not improve significantly or significantly alter the main findings of rating upgrades.

8.1.2. B Discussions on Rating Downgrades

The results on the determining factors of single notch versus multi notch rating downgrades generally show the expected relationship. The probit results for all of the models show that if a firm has been upgraded before, it is less likely to be downgraded by multiple notches in future. If a firm has been downgraded before, it is more likely to be downgraded by multiple notches again vis-à-vis by a single notch. This finding is consistent with the documentation by Purda (2007) and Altman and Kao (1992) that rating downgrades may have momentum.

The results also show that firms that were downgraded by multiple notches had a more negative coefficient on current ratio, a measure of liquidity. The result is consistent with the study by Acharya (2012) that degrading liquidity has a negative impact on firm ratings.

Firms downgraded by multiple notches also have a more positive change in interest coverage ratio. The result indicates that these firms had better solvency than the firms downgraded by a single notch. This finding is counterintuitive and inconsistent with the findings of previous studies, for example, Amato and Furfine (2004) which documents that better-rated firms have better interest coverage.

Also, firms downgraded by multiple notches have negative coefficient on operating margin, negative market to book and negative market beta. The total asset has a positive change in assets; which is counterintuitive and would require further studies.

When the main model (Table 5.2) for rating downgrades is compared with the model with different considerations –downgrades across rating category, alternative specifications of accounting variables, interaction with recession dummy, logit model, lagging and leading of recessions and expansion timing, adjustment for Fama-French 49 industries, and winsorization –the model does not improve significantly or alter the main findings of rating downgrades.

8.1.3 Discussions on the Explanatory Factors of Rating Changes (Including Stable Ratings)

The study of complete rating changes suggest that a firm will have higher ratings if it has been upgraded before, belongs to non-investment category, has positive changes in current ratio, interest coverage, operating margin, market to book, and market value, and negative changes in debt ratio, total debt, total assets and market beta. Also, a firm is less likely to be upgraded if it has been downgraded before. The only sign that is not consistent is that the coefficient on the total asset is negative implying the firms upgraded are likely to have decreased their total assets. However, the negative and significant coefficient on debt ratio and total debt (in robustness test) suggest that these firms also had reduced debt.

8.2 Conclusion

I examine whether multi notch rating changes is a channel through which the rating agencies signal their expertise and whether the stage of the business cycle has an impact on the information content of multi notch and single notch rating changes.

My hypothesis that the size of market reaction to credit rating changes is different during economic expansions versus recessions is shown to have empirical support, where prior work ignored the economic climate. Second, my theoretical explanatory framework explains the determinants of credit rating reassessment while giving due consideration to the prevailing economic climate at the time of rating changes.

My results show that multi notch rating changes elicit larger abnormal returns over and above single notch rating changes. More specifically, multi notch upgrades provide higher excess returns than single notch upgrades. Furthermore, the differential stock price reaction between multi notch versus single notch upgrades is higher in economic contraction than in expansion. In case of downgrades, firms with multi notch rating downgrades provide negative

excess returns, over and above the excess returns for single notch downgrades, around the downgrades announcement. The differential stock price reaction between multi notch versus single notch downgrades is higher in economic expansion than in a recession. This finding is consistent with the studies by Beber and Brandt (2010) and Conrad et al. (2002) who document that regime shifting has an impact on the stock price reaction.

I also find that firms that have multi notch rating upgrades and downgrades have significantly different probit variables vis-à-vis single notch rating upgrades and downgrades. The important characteristics for predicting multiple notch upgrades are a firm's prior rating change, prior rating, cash flow, total assets, and market value. The variables that differ for multi notch upgrades in recessions are cash flow, net income, operating margin, market to book ratio, total assets, and retained earnings. The important characteristics for determining multiple notch downgrades are a firm's prior rating change, prior rating, current ratio, interest coverage, total debt, operating margin, market to book ratio, capital expenditure, total assets, market value, and market beta. The variables that differ for multi notch downgrades in expansions are a firm's prior rating change, current ratio, interest coverage ratio, debt ratio, total debt, capital expenditure, and market beta.

The power of the explanatory tests improves when the stage of the business cycle is considered. Results are robust to consideration to rating changes across rating categories, changes from probit to logit, alternative specifications of accounting variables, lags and leads of recessions and expansions timing, Fama and French industry adjustments, and winsorization levels of variables.

8.3 Limitations of Study

Data-wise, I collect the data only since 1993, as the data prior to this period seemed incomplete. However, not having the data prior to 1993 should not significantly affect my results since my sample period (1993 to 2013) has two complete business cycles, one occurring in 2001, and the other one occurring in 2008 and 2009. However, the sample over this period had only 32 multi notch upgrades that occurred in recession. The power of the tests may be questionable when such small number of observations are examined. Similarly, following the extant literature, I only collect the rating changes by S&P and hence my results may or may not apply to the rating changes by other rating agencies.

It is possible that public information used to explain the differential information content of multi notch versus single notch rating changes do not capture the information set used by S&P. Indeed the extant literature claim that S&P uses confidential information to arrive at an appropriate rating for a firm (Jorion et al., 2005; Kisgen, 2006).

Another limitation of the study is that there could potentially be other factors, besides those that I have taken into consideration, which might have more power in explaining rating changes. For instance, my model does not consider the presence of institutional investors, and corporate governance factors, which are found to have a bearing on the creditworthiness of a firm.

8.4 Future Study

In future, I will examine whether my results apply to the rating changes by other rating agencies, namely Moody's and Fitch. If the extant literature is to go by, the results are expected to be similar. Nonetheless, the study will provide more validity to the results.

I will also examine the other potential explanation for the difference between rating upgrades and downgrades, for instance, the presence of institutional investors, agency costs, and corporate governance.

I will also investigate whether the rating changes predict the future financial performances of firms. This analysis will examine the performances of the firms post rating changes. More specifically, how do firms perform financially post multi notch upgrades and downgrades vis-à-vis single notch upgrades and downgrades? This idea is motivated by the extant literature (for example, Dichev and Piotroski, 2001) that rating changes may provide some clues on future earnings of the firms rated.

APPENDIX

SUPPLEMENTAL TABLES

Table A.1

List of Firms with 5 Notch Rating Changes

This table lists the firms with rating changes used in the analysis. Panel A lists 25 firms for rating upgrades. Panel B lists 41 firms for rating downgrades. Event Date is the date when the rating changes were announced. Initial Rating is a firm rating prior to the rating change; New Rating is the newly assigned rating for the firm. The table is sorted according to "Event Date".

Panel A: Rating Upgrades			
Company Name	Event Date	Initial Rating	New Rating
Quantum Health Resources Inc	7/1/1996	BB	A-
Standard Federal Bancorp	5/1/1997	BBB	AA-
McDonnell Douglas Corp	7/31/1997	A-	AA+
First Brands Corp	2/3/1999	BBB-	A+
Aqua Alliance Inc	8/23/1999	BB-	BBB+
McNaughton Apparel Group Inc	6/20/2001	B+	BBB
Avado Brands Inc	7/16/2001	D	CCC+
Sensormatic Electronics Corp	11/14/2001	BB+	A
Nash Finch Co	6/13/2003	CCC-	B+
Edison International	12/3/2003	B-	BB+
Coastal Bancorp Inc	5/12/2004	BB-	BBB+
Provident Financial Group Inc	6/30/2004	BB+	A
MBNA Corp	1/3/2005	BBB	AA-
PMA Capital Corp	2/3/2005	CC	B
Unocal Corp	8/11/2005	BBB+	AA
AT&T Corp	11/18/2005	BB+	A
MBNA Corp	1/2/2006	BBB	AA-
21st Century Insurance Group	10/26/2007	BBB+	AA
Wachovia Corp	10/10/2008	BBB-	A+
Unisys Corp	8/5/2009	CC	B
Oracle America Inc	1/28/2010	BB+	A
Bucyrus International Inc	7/11/2011	BB+	A
National Semiconductor Corp	9/26/2011	BBB-	A+
Metropolitan Health Networks Inc	12/20/2012	B+	BBB
Clearwire Corp	7/10/2013	CCC	BB-

Panel B: Rating Downgrades			
Company Name	Event Date	Initial Rating	New Rating
Beckman Coulter Inc	9/22/1997	A	BB+
Fisher Scientific International LLC	12/2/1997	BBB	B+
Global Crossing North America Inc	6/14/1999	A	BB+
Cincinnati Bell Inc	11/22/1999	A	BB+
Tower Air Inc	2/29/2000	CCC+	D
Reliance Group Holdings Inc	7/19/2000	BB-	CCC
Penn Treaty American Corp	4/2/2001	B+	CCC-
Avado Brands Inc	6/4/2001	CCC+	D
Jacuzzi Brands Inc	6/26/2001	BB	CCC+
AMRESCO LLC	7/3/2001	CCC+	D
Polaroid Corp	7/17/2001	CCC+	D
Ames Department Stores Inc	8/21/2001	CCC+	D
Spinnaker Industries Inc	10/16/2001	CCC+	D
Denny's Corp	1/4/2002	B	CC
Williams Cos Inc/The	7/25/2002	BBB	B+
Terra Mississippi Holdings Corp	5/16/2003	CCC+	D
Cone Mills Corp	9/16/2003	CCC+	D
PMA Capital Corp	11/24/2003	BBB-	B
DT Industries Inc	1/7/2004	CCC+	D
PMA Capital Corp	1/30/2004	B	CC
Hostess Brands Inc	9/22/2004	CCC+	D
MBNA Corp	6/30/2005	AA-	BBB
Curative Health Services Inc	12/5/2005	CCC+	D
Harman International Industries Inc	4/26/2007	BBB+	BB-
Alltel Corp	5/21/2007	A-	BB
Wellman Inc	2/25/2008	CCC+	D
Triad Guaranty Inc	4/3/2008	A-	BB
EW Scripps Co	7/8/2008	A	BB+
Wachovia Corp	9/29/2008	A+	BBB-
General Growth Properties Inc	10/28/2008	BB	CCC+
YRC Worldwide Inc	12/4/2008	B	CC
Colonial BancGroup Inc/The	1/30/2009	BBB-	B
Milacron Inc	3/10/2009	CCC+	D
Riviera Holdings Corp	3/31/2009	CCC+	D
Unisys Corp	4/30/2009	B	CC
Allis-Chalmers Energy Inc	5/22/2009	B	CC
Pactiv LLC	12/2/2010	BBB	B+
Nicor Inc	12/14/2011	AA	BBB+
ATP Oil & Gas Corp/United States	8/21/2012	CCC+	D
Exide Technologies	6/11/2013	CCC+	D
HJ Heinz Co	6/17/2013	BBB+	BB-

Table A.2

List of Firms with Rating Changes by More than 5 Notches

This table lists the firms that had rating changes of more than five notches used in the analysis. Panel A lists 41 firms for rating upgrades. Panel B lists 56 firms for rating downgrades. Event Date is the date of the announcement of the rating change. Initial Rating is a firm rating prior to the rating change; New Rating is the newly assigned rating for the firm. Notches Changed is the number of notches of the rating change. The table is sorted according to "Event Date".

Panel A: Rating Upgrades

Company Name	Event Date	Initial Rating	New Rating	Notches Changed
Town & Country Corp	5/18/1993	C	B	6
Michigan National Corp	11/3/1995	BBB-	AA-	6
21st Century Insurance Group	5/14/1996	CCC	BB+	7
Harcor Energy Inc	4/9/1998	CCC	A-	11
Citfed Bancorp Inc	7/1/1998	BB+	AA-	7
Comcast Cable Holdings LLC	2/4/1999	BBB-	AA-	6
SkyTel Communications Inc	10/7/1999	B	A-	8
Reinsurance Group of America Inc	1/7/2000	B	A	9
Vastar Resources Inc	9/18/2000	BBB+	AA+	6
Arcadia Financial Ltd	12/1/2000	B-	BBB	7
Powertel Memphis Licenses Inc	2/26/2001	B	A-	8
Intermedia Communications Inc	7/17/2001	B	BBB+	7
GE Capital Franchise Finance Corp	8/10/2001	BBB-	AAA	9
Pennzoil-Quaker State Co	10/11/2002	BB+	AAA	10
Kroll Inc	7/9/2004	BB-	A+	8
Riggs National Corp	5/15/2005	B-	A-	9
Toppan Photomasks Inc	5/24/2005	B+	A+	9
Western Wireless Corp	8/3/2005	B-	A	10
US Unwired Inc	9/1/2005	CCC+	BBB-	7
Providian Financial Corp	10/2/2005	B	A-	8
Metris Cos Inc	11/30/2005	B	A	9
USG Corp	6/21/2006	D	BB+	11
Greater Bay Bancorp	10/10/2007	BBB-	AA+	8
SunCom Wireless Holdings Inc	3/20/2008	B-	A-	9
Countrywide Financial Corp	7/1/2008	BB+	AA	8
Ricoh USA Inc	12/19/2008	BB-	A+	8
Axiall Corp	9/3/2009	D	B	7
NCI Building Systems Inc	10/22/2009	CC	B+	6
Chattem Inc	2/10/2010	BB-	AA-	9
Xerium Technologies Inc	5/27/2010	D	B	7
Smurfit-Stone Container Corp	6/30/2010	D	BB-	9
Mariner Energy Inc	11/11/2010	B+	A-	7
RR Donnelley Financial Inc	12/19/2010	B	BBB	6
Baldor Electric Co	1/30/2011	BB-	A	7
AirTran Holdings Inc	5/2/2011	B-	BBB-	6
Wilmington Trust Corp	5/16/2011	CCC+	A-	10
Marshall & Ilsley Corp	7/6/2011	BB+	A+	6
Brigham Exploration Co	12/13/2011	B	BBB+	7
MBIA Inc	5/10/2013	B-	BBB	7
McMoRan Exploration Co	6/3/2013	B-	BBB	7
American Airlines Group Inc	12/9/2013	D	B	7

Panel B: Rating Downgrades				
Company Name	Event Date	Initial Rating	New Rating	Notches Changed
Riggs National Corp	4/30/1993	BBB	B	6
21st Century Insurance Group	4/22/1994	A+	BB+	6
Wyeth LLC	9/9/1994	AAA	A-	6
CBS Broadcasting Inc	11/29/1995	A	BB	6
Merisel Inc	8/16/1996	BB-	CCC-	6
Reinsurance Group of America Inc	8/26/1999	A	B	9
Agribiotech Inc	1/26/2000	B-	D	6
Eagle Food Centers Inc	3/1/2000	B	D	7
Crown Vantage Inc	3/9/2000	B	D	7
Flooring America Inc	6/16/2000	B-	D	6
Augusta Furniture Co Inc	8/1/2000	BB-	D	9
Drypers Corp	10/11/2000	B-	D	6
Worldtex Inc/Old	12/15/2000	B	D	7
LTV Corp/The	12/29/2000	B	D	7
Kellogg Co	12/29/2000	AA	BBB	6
Waste Systems International Inc	1/5/2001	B	D	7
Edison International	1/16/2001	A	CC	14
PG&E Corp	1/19/2001	A	D	16
Kevco Inc	2/5/2001	B-	D	6
Borden Chemicals & Plastics LP	4/3/2001	B	D	7
WinStar Communications Inc	4/17/2001	B	D	7
Casual Male Corp	5/18/2001	B+	D	8
USG Corp	6/25/2001	BB-	D	9
Midway Airlines Corp	8/14/2001	B-	D	6
Bethlehem Steel Corp	10/15/2001	B	D	7
Burlington Industries Inc	11/15/2001	B	D	7
Enron Corp	11/30/2001	BBB+	CC	12
XMH Corp 1	12/17/2001	B+	CC	6
ACT Manufacturing Inc	12/26/2001	B-	D	6
IT Group Inc/The	12/27/2001	BB-	CCC-	6
Covanta Energy Corp	1/16/2002	BBB	B	6
Galey & Lord Inc/Old	2/19/2002	B	D	7
Covanta Energy Corp	3/1/2002	B	D	7
Encompass Services Corp	10/14/2002	B	D	7
Oakwood Homes Corp	11/18/2002	B-	D	6

Panel B: Rating Downgrades Continued				
Company Name	Event Date	Initial Rating	New Rating	Notches Changed
Nash Finch Co	2/14/2003	BB	CCC-	7
HealthSouth Corp	3/20/2003	BB	CCC-	7
Fibermark Inc	3/31/2004	B	D	7
Lubrizol Corp	4/16/2004	A+	BB+	6
Intermet Corp	9/30/2004	B+	D	8
New Century Financial Corp	3/12/2007	BB-	D	9
Brixmor LLC	1/2/2008	BB+	CCC+	6
IndyMac Bancorp Inc	7/14/2008	B	D	7
Lehman Brothers Holdings Inc	9/16/2008	A	D	16
Washington Mutual Inc	9/26/2008	BBB-	D	12
Wm Wrigley Jr Co	10/7/2008	A+	BB+	6
Downey Financial Corp	11/24/2008	B-	D	6
LandAmerica Financial Group Inc	11/26/2008	BB+	D	11
Smurfit-Stone Container Corp	1/26/2009	B	D	7
MGIC Investment Corp	3/13/2009	BB+	CCC	7
PMI Group Inc/The/Old	4/8/2009	BBB-	CCC	8
Radian Group Inc	4/8/2009	BB	CCC	6
Wilmington Trust Corp	2/16/2011	BB+	CCC+	6
MF Global Holdings Ltd	10/31/2011	BBB-	D	12
American Airlines Group Inc	11/29/2011	B-	D	6
BMC Software Inc	7/29/2013	BBB+	B+	6

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