Earnings Management Near Investment- and Speculative- grade Borderline Ratings: Evidence from Japanese Firms with Single or Multiple Ratings

Earnings Management Near Investment- and Speculative-grade Borderline Ratings: Evidence from Japanese Firms with Single or Multiple Ratings

Yuya Koga*

Tohoku Gakuin University

Abstract: The most important credit rating categorization by credit rating agencies is the distinction between investment- and speculative-grade securities. This distinction often affects corporate behavior since companies seek to avoid being rated as speculative. This study focuses on firms with multiple and single ratings and examines whether firms on the borderline between speculative and investment credit rating grades engage in earnings management. This study also examines how multiple ratings influence earnings management's effect on credit rating decisions. Using a sample consisting of Japanese firms and Japanese long-term issuer credit ratings, I find that firms with BBB- and BB+ ratings engage in real activities earnings management to increase their earnings. I also find that credit rating decisions are positively affected by the accrual and real earnings management. However, multiple ratings could weaken this rating inflation, especially when firms have ratings in the BBB- or BB+ rating category. Overall, this study suggests that multiple ratings could be useful in limiting rating inflation through earnings management.

Keywords

Credit rating, Investment grade, Speculative grade, Earnings management, Multiple ratings, Japan

1. Introduction

Credit ratings can provide investors with information useful for assessing a firm's default risk. Credit ratings are issued by three major credit rating agencies (CRAs) in the world: Standard & Poor's (S&P), Moody's Investors Service (Moody's), and Fitch Ratings. The most important credit rating categorization made by these CRAs is the distinction between investment- and speculative-grade securities. This distinction significantly affects corporate bond liquidity (Brister *et al.*, 1994; Bongaerts *et al.*, 2012; Kiff *et al.*, 2012). Generally, investment grade is a rating higher than BBB, while speculative grade is BB or lower (Cantor and

*This work was supported by the Japan Society for the Promotion of Science Grant-in-Aid for Young Scientists [JSPS KAKENHI Grant Numbers 18K12895].

Packer, 1994; 1997). Therefore, companies seek to avoid being rated as speculative grade through capital structure changes or earnings management (Kisgen, 2006; Brown *et al*., 2015). Prior literature finds that firms conduct real and accrual earnings management to achieve favorable credit ratings (Kisgen, 2006; Ali & Zhang, 2008; Alissa *et al*., 2013; Jung *et al*., 2013; Demirtas and Cornaggia, 2013; Brown *et al*., 2015; Liu *et al*., 2018). Consequently, real and accrual earnings management allows firms to obtain more favorable credit ratings (Alissa *et al*., 2013; Demirtas and Cornaggia, 2013; Brown *et al*., 2015; Liu *et al*., 2018).

Despite the importance of credit ratings, there are criticisms of the credit rating industry since the industry is less competitive and the ratings issued by CRAs are mostly paid for by the firms being rated (Becker and Milbourn, 2011; SEC, 2011). These industry features raise questions about the quality of the ratings provided by incumbent players. Having multiple ratings is one solution for increasing competition between CRAs. However, there is no evidence that multiple ratings can improve a CRA's ability to monitor earnings management activities.

Multiple ratings are expected to provide more information about issuers (Becker and Milbourn, 2011), monitor issuers (Morkoetter *et al*., 2017), and improve the quality of ratings (Doherty *et al*., 2012; Xia & Strobl, 2012; Xia, 2014). In contrast, some studies show that multiple ratings reduce the future rents, weakening the incentive to invest in quality and resulting in a decrease in the quality of credit ratings (Becker & Milbourn, 2011; Bolton *et al*., 2012). There are mixed results on the effectiveness of multiple ratings on rating quality. This could be because issuers commonly have multiple ratings from S&P and Moody's in the United States or Europe, and they have a large share of credit rating markets. Such a situation makes it difficult for issuers to differentiate themselves through the use of multiple ratings (Doherty *et al*., 2012), causing difficulty in finding the effectiveness of multiple ratings on credit rating quality.

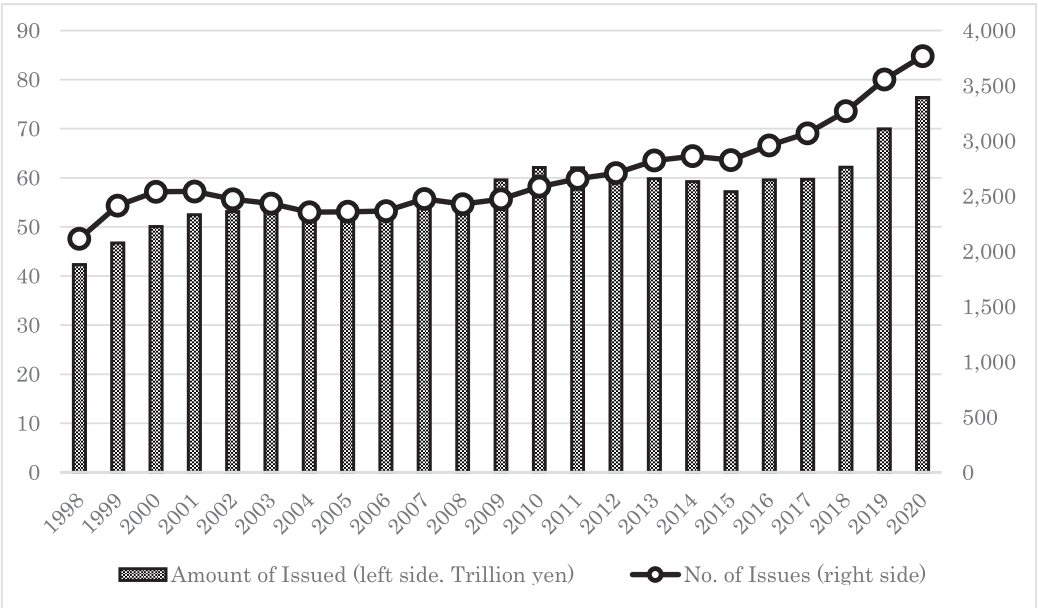
For investigating the effects of multiple ratings on earnings management investment and speculative-grade borderline ratings, the Japanese setting is suitable for the following reasons. First, the credit rating market in Japan is diverse. Five CRAs were registered by the Japanese prime minister. The rating shares of Standard & Poor's and Moody's in the Japanese credit rating industry are relatively small, while the shares of the local rating agencies, Rating & Investment Information (R&I) and the Japan Credit Rating Agency (JCR), are relatively high (Tanaka & Ishiwatari, 2016).[1)] Second, Japanese bond issuers are allowed to issue bonds with a single rating, and more than half of the companies in Japan are rated by a single rating agency (Morita, 2010). In this situation, issuers can differentiate themselves through the use of

1) In 2005, R&I, JCR, Moody's, and S&P provide 533, 509, 236 and 296 long-term issuer ratings, respectively (Katsuda et al., 2011).

multiple ratings, and the effect of multiple ratings is well identified. Third, there is a strong incentive to engage in earnings management in the Japanese credit rating market, especially for issuers with near investment- and speculative-grade borderline ratings. Figure 1 shows the shift in the number of straight corporate bonds from the 1998 fiscal year to 2020. The number of issued bonds and related issues is constantly increasing in Japan. Although the bond market is expanding, there was no record of speculative-grade bond issuance in Japan until 2018. Therefore, bond issuers have a strong incentive to have investment grade. Issuers with near investment- and speculative-grade borderline ratings would have a strong incentive to manage earnings.

This study uses a sample of Japanese firms to examine whether firms on the borderline between speculative- and investment-grade credit ratings engage in earnings management and how multiple ratings affect the effect of earnings management on credit rating decisions. Using 14,553 credit rating/year observations with available long-term issuer credit ratings between 2000 and 2019, I find that BBB- and BB+ firms engage in real activities earnings management to increase their earnings. This result is consistent with Brown *et al.* (2015) that investigate U.S. companies' earnings management activities. In particular, real activity earnings management is pronounced in firms with BBB- and BB+ ratings. In addition, this study examines whether

Figure 1 The trend of the amount and number of bond issuance



Source: The Japan Securities Dealers Association "Issuing, Redemption and Outstanding Amounts of Bonds" (https://www.jsda.or.jp/en/statistics/bonds/index.html)

earnings management affects the rating decisions. I find that credit rating and subsequent year credit rating decisions are positively affected by accrual and real activities earnings management while having multiple ratings eases the favorable effect of earnings management on credit rating decisions. These results suggest that multiple ratings are effective in limiting rating inflation through earnings management.

This study contributes to the literature in several ways. First, it contributes to the literature on earnings management caused by credit rating. I extend prior studies and find that multiple ratings improve CRAs' ability to detect earnings management. Prior literature finds that firms seek to influence their credit ratings through capital structure changes or earnings management (Kisgen, 2006; Brown *et al*., 2015), and that firms could have favorable ratings for such behavior (Kisgen, 2006; Ali & Zhang, 2008; Alissa *et al*., 2013; Jung *et al*., 2013; Brown *et al*., 2015; Liu *et al*., 2018). This study provides the first empirical evidence on the effect of multiple ratings on CRAs' ability to detect earnings management in the case of Japan, where there are firms with single and multiple ratings. Second, it contributes to the literature on the effectiveness of multiple ratings. There are mixed results on the effectiveness of multiple ratings in improving rating quality (Becker & Milbourn, 2011; Bolton *et al*., 2012; Doherty *et al*., 2012; Xia & Strobl, 2012; Griffin *et al*., 2013; Xia, 2014; Sangiorgi & Spatt, 2015; Morkoetter *et al*., 2017). In the United States and E.U., there is less competition between CRAs, and it is common to have multiple issuer ratings. Using the Japanese setting, where the effect of multiple ratings is well-identified, this study provides evidence that competition between CRAs has a positive effect on CRAs' detecting ability of earnings management. Third, this study is of interest to investors and regulators. Multiple ratings can be useful in leading CRAs to make appropriate rating decisions. Therefore, investors can be protected from the harmful effects of earnings management by encouraging issuers to have multiple ratings. Regulators are also interested in encouraging issuers to have multiple ratings to improve rating quality.

The remainder of this paper is organized as follows. The next section describes the characteristics of credit ratings in Japan. Section 3 develops hypotheses related to credit ratings and earnings management, and Section 4 outlines the study design and describes the sample. Section 5 reports the results, and Section 6 presents the robustness test and an additional analysis. Finally, Section 7 presents the conclusions of this study.

2. Credit Ratings in Japan

2.1. CRAs in Japan

Five CRAs, all of which assign credit ratings to bond issuers, have obtained registration from the Japanese Prime Minister: the Japan Credit Rating Agency (JCR), Rating and

Investment Information (R&I), Standard and Poor's (S&P), Moody's, and Fitch. JCR and R&I are Japanese CRAs, and S&P, Moody's, and Fitch are non-Japanese CRAs. JCR was founded mainly by banks and insurance companies in 1985, while R&I was established by Nihon Keizai Shimbun, Inc. (currently Nikkei Inc.) as an in-house department in 1975. The department became independent from Nihon Keizai Shimbun, Inc. in 1985, and was subsequently called the Japan Bond Research Institute (JBRI). Japan Rating and Investment Information, renamed Rating and Investment Information, Inc. in 2000, was established in 1998 through the merger of JBRI and the Nihon Investors Service. Moody's founded a Japanese corporation in 1985, and S&P and IBCA (currently Fitch) established offices in Tokyo between 1985 and 1986.

Appendix A provides the definitions of the long-term issuer credit ratings for each CRA. An issuer's credit rating is the opinion of a CRA about the creditworthiness of the issuer. Although there are some differences in the definitions, for all agencies, the AAA rating represents the highest creditworthiness, and creditworthiness declines in the order of AA, A, and so on.

2.2. Bond Issuance Rules and Investment Grade in Japan

Generally, investment grade is a rating higher than BBB, whereas speculative grade is a rating of BB or lower. The criteria for investment grade in the US have spread through their use by regulators (Cantor & Packer, 1994). In 1931, the Office of the Comptroller of the Currency (OCC) began using credit ratings as a valuation standard for bonds held by banks.[2] In 1936, the OCC and Federal Reserve prohibited banks from holding bonds that were not rated BBB or above by at least two agencies. The Financial Institution Recovery and Reform Act of 1989 banned savings and loan institutions from investing in below-investment-grade bonds (Cantor & Packer, 1997).

The origin of the investment grade in Japan is the bond issuance rules that were in place from 1987 to 1996 to control the issuance of unsecured corporate bonds. Bond issuance was controlled by Kisaikai, a private organization consisting of the Bank of Japan, banks, and major securities companies, and established in 1949.[3] Kisaikai mainly controlled bond issuances and allowed issuers to issue secured corporate bonds as a general rule (Kurosawa,1985). Kisaikai implemented the bond issuance rule in 1979 because of the increasing demand for unsecured bonds and the liberalization of the corporate bond market.

2) Bank holdings of publicly rated bonds had to be rated BBB or better by at least one rating agency if they were to be carried at book value; otherwise, the bonds had to be written down to market value and 50 percent of the resulting book losses were charged against capital (Cantor & Packer, 1994).

3) Kisaikai was renamed in 1968 from Kisaiuchiawasekai.

Bond issuance rules required issuers to meet certain financial ratio criteria (Kurosawa, 1985). In 1987, issuance rules were revised, and credit rating criteria were introduced in the unsecured bond issuance rules. Financial ratio criteria were abolished in 1990, and credit rating criteria were used only in bond issuance rules (Tamura, 2006; Tanaka and Ishiwatari, 2016). Bond issuance rules functioned as bond issuance restrictions at the time, and only secured straight bonds with ratings above BBB or unsecured straight bonds with ratings above A could be issued. In 1992, the Ministry of Finance registered three Japanese CRAs, Moody's, S&P, and Fitch, as registered rating agencies and required bond issuers to acquire more than an A rating from several rating agencies when they used the issuance registration system.[4] In 1996, the bond issuance rules were abolished.

However, even after the bond issuance rules were abolished, the practice of using rating criteria as a bond issuance restriction continued in Japan (Tamura, 2006)[5]. The Government Pension Investment Fund (GPIF) has a policy of investing in bonds with a BBB or higher rating from at least one of the five credit rating agencies (GPIF, 2020). For this reason, the market for speculative-grade bonds has not spread, and there has been little high-yield bond issuance in Japan.[6] On the other hand, there are many cases of high-yield bond issuance overseas, especially in the United States. In the U.S., roughly 10-20% of all corporate bond issuances are high-yield bonds (Tamura, 2021). In Japan, once an issuer receives a speculative grade, it becomes difficult for them to issue new bonds. Therefore, there is no point in obtaining a rating from a rating agency unless the firm obtains an investment-grade rating (Morita, 2010). Therefore, it is assumed that the incentive for firms in Japan to acquire investment-grade credit ratings is considerably high.

2.3. Bond Issuance with a Single Rating

Japanese firms often obtain only a single rating to issue bonds, which is the same as a long-term issuer rating. Because of the low credit risk, bond investors do not necessarily require issuers to obtain multiple ratings (Morita, 2010). Additionally, most issuers obtain credit ratings from a Japanese agency that provides higher ratings than non-Japanese agencies.

The nearly always large, liquid US corporate bond issues have multiple ratings from both

4) The issuance registration system is a system that enables flexible bond issuance. Following Shelf registration, which was introduced in the United States in 1983, it was introduced in Japan with the revision of the Securities and Exchange Law in 1988.

5) R&I and JCR do not explicitly indicate that investment grade is above the BBB rating. However, the cumulative default rates of R&I and JCR tend to rise greatly at the level of BB or lower, as do those of the other three CRAs (Kurosawa, 2007).

6) GPIF has changed the bond investment policy since 2018 so that GPIF could invest speculative grade bonds. In June 2019, AIFUL corporation issued its high-yield bond first time in Japan (Tamura, 2021).

S&P and Moody's (Boot *et al*., 2006; Bongaerts *et al*., 2012).[7] Generally, multiple ratings are meaningful because they provide investors with diverse information and improve their credit rating quality. In Japan, where an investment grade rating is important, it is possible to select a specific rating agency because it provides a higher rating.

3. Prior literature and hypothesis Development

3.1. Earnings management and credit rating

Prior literature identifies situations in which credit rating concerns become pronounced and finds that firms conduct earnings management to enhance their credit ratings (Kisgen, 2006; Ali and Zhang, 2008; Jung *et al*., 2013; Alissa *et al*., 2013; Demirtas and Cornaggia, 2013; Brown *et al*., 2015; Liu *et al*., 2018). Kisgen (2006) first investigated whether capital structure decisions are affected by management rating concerns. Kisgen (2006) identified rating concerns by using two measures of proximity to a rating change. The first is the broad rating measure. The broad rating measure focuses on a plus and a minus rating as situations in which a rating concern becomes pronounced, since firms with a plus or minus rating are near a broad rating change. The second measure is micro-ratings. In this measure, firms within a certain rating category are ranked based on factors (credit score) that tend to indicate credit equality. Using 12,336 firm-year observations of U.S. firms between 1986 and 2001, Kisgen (2006) finds that firms with a credit rating designated as plus or minus issue less debt compared to equity than firms that do not have them.

Ali and Zhang (2008) investigated whether firms inflate their reported earnings near a broad credit rating change. They find that firms with a plus or minus ratings tend to report more discretionary accruals and conduct less timely recognition than firms without plus or minus ratings, suggesting that firms nearing a broad rating change inflate their earnings. Noting that rating agencies consider earnings volatility an important risk factor, Jung *et al*. (2013) investigated whether firms conduct earnings smoothing to reduce earnings volatility to obtain favorable ratings. They find that firms with plus ratings smooth earnings to a larger extent than firms with middle-notch ratings. They also show that firms' earnings smoothing activity increases after rating changes from a middle notch rating to a plus notch rating[8]. Overall, prior literature suggests that a firm will change its capital structure or earnings management to obtain a favorable credit rating, especially at broad rating changes.

7) Fitch typically plays the role of a "third opinion" for large bond issues (Bongaerts et al., 2012).

8) Jung et al. (2013) do not find evidence showing that firms with minus notch rating smooth earning compared to firms with a middle notch rating. As the reason for this, they report that different rating factors may be used by rating agencies to evaluate minus notch firms versus plus notch firms.

Most prior studies examining whether firms conduct earnings management to achieve a favorable credit rating have focused on firms with a plus notch or minus notch rating. More recent studies have tested it using other situations in which credit rating concerns are pronounced and simultaneously examined whether earnings management would affect credit rating levels or changes. These studies included Allisa *et al.* (2013) ; Demirtas and Cornaggia (2013) ; Brown *et al.* (2015); and Liu *et al.* (2018). Instead of broad rating changes, Allisa *et al.* (2013) focus on the "expected" credit rating and investigate whether firms engage in earnings management activities to achieve the "expected" credit rating. They estimate the expected credit ratings using an empirical model. Using U.S. firms with S&P's long-term issuer credit ratings between 1985 and 2010, they find that firms below their expected ratings tend to inflate their earnings, while firms above their expected ratings tend to depress their earnings. Allisa *et al.* (2013) test whether earnings management can move toward a firm's expected credit rating. The results suggest that firms can move toward expected ratings through earnings management, suggesting that they can obtain favorable credit ratings through earnings management.

Demirtas and Cornaggia (2013) investigated whether managers of issuing firms can utilize accounting discretion to obtain favorable credit ratings. Using 1,257 U.S. firms issuing straight corporate debt between 1980 and 2003 and receiving credit ratings from Moody's for the first time, they found that issuers report high discretionary accounting accruals around the time of initial credit ratings, and an increase in discretionary accounting accruals reverses in the subsequent years. This suggests that issuers report favorable earnings patterns at the time of the initial credit rating. They also find that initial credit ratings are strongly associated with the degree of earnings management.

Brown *et al.* (2015) focus on investment grade (BBB or higher) and speculative grade (BB), and examine whether firms at the borderline between investment and speculative grade implement income-increasing real earnings management. They expect that, given the benefits (and costs) of having firms classified in the investment (speculative) rating category, firms will conduct real earnings management and vary their profitability to maintain (move to) an investment grade. They find that BBB and BB manufacturing firms engage in aggressive real earnings management relative to other firms, using 6,402 firm-year observations of U.S. firms with available credit ratings between 1989 and 2009. They also find that the CRA does not appear to adjust for income-increasing discretionary expense management, but they do not report evidence that firms could obtain favorable credit ratings through real earnings management.

Liu *et al.* (2018) focus on credit watches published by rating agencies to investigate

whether issuers with credit watch negatives engage in income-increasing earnings management to resolve them. Credit watches refer to an institutional mechanism whereby a rating agency conducts a formal review of an issuer with uncertain changes in credit risk before changing its rating. During a watch review, the rating agency collects additional information from the issuer, decides whether to change the rating, and dissolves the credit watch. In their analysis of 458 firms with a negative watch placed by Moody's between 1992 and 2006, Liu *et al.* (2018) find that these firms reported more discretionary accounting accruals during the watch period than control firms matched by industry, rating, and performance. This evidence suggests that income-increasing earnings management is implemented in conjunction with negative credit watches to prevent downgrades. Additionally, Liu *et al.*(2018)find that firms with higher discretionary accounting accruals(above median) are 24% less likely to be downgraded than firms with lower accruals (below median), suggesting that earnings management leads to a favorable rating.

Prior studies have reported that firms implement earnings management to obtain favorable ratings (Kisgen, 2006; Ali and Zhang, 2008; Jung *et al*., 2013; Alissa *et al*., 2013; Demirtas and Cornaggia, 2013; Brown *et al*., 2015; Liu *et al*.,2018). However, the results are mixed with the consequences of earnings management on credit rating levels and changes (Allisa *et al*., 2013; Demirtas and Cornaggia, 2013; Brown *et al*., 2015; Liu *et al*., 2018). Prior studies have reported that earnings management affects firms' obtaining favorable ratings in expected ratings (Alissa *et al*., 2013), credit watch (Liu *et al*., 2018), and initial ratings (Demirtas and Cornaggia, 2013), but no such results have been found for investment- speculative grade borderline (Brown *et al*., 2015). The distinction between investment and speculative grade is commonly used by credit investors as an important boundary (Cantor & Packer, 1994), which may reflect the fact that CRAs are more careful when evaluating issuers' earnings management. In particular, it is common to obtain credit ratings from both S&P and Moody's in the U.S. (Boot *et al*., 2006; Bongaerts *et al*., 2012), which may be strictly monitored by CRAs. However, Japanese firms often obtain only a single rating. In addition, there is almost no market for high-yield bond issuance (Katsuda *et al*., 2011; Tamura, 2021), so firms may have stronger incentives to obtain investment-grade ratings than in other countries. Given the abovementioned institutional characteristics of Japan, this study examines whether Japanese firms conduct earnings management on the borderline between investment and speculative grade and tests its consequences.

3.2. Competition between credit rating agencies

There are two conflicting views on whether competition among CRAs enhances credit rating quality. First, increased competition improves the credit rating quality. This view

posits that CRAs attach high value to their reputation. Hörner (2002) shows that competition increases the incentive to maintain a good reputation, and good firms exert greater effort and try to distinguish themselves from bad ones because it generates outside options for customers. Therefore, competition enhances the effectiveness of the reputational mechanism when the competitive choice makes the loss of reputation a real threat (Hörner, 2002). Bae *et al.* (2015) claim that CRAs have a strong incentive to provide credible ratings because they attach high value to their reputation in business. Supporting this view, the literature shows that increased competition among CRAs improves rating quality through increased information content, assigning accurate credit ratings according to default risks, and monitoring (Doherty *et al.*, 2012; Xia, 2014; Bae *et al.*, 2015; Morkoetter *et al.*, 2017).

Doherty *et al.* (2012) investigate how the entrance of a new CRA into a monopolistic credit rating industry (the U.S. insurance industry) affects the information quality of credit ratings. They show that the new entrant applies higher standards than the incumbent CRAs for an insurer to achieve a similar rating, and insurers strategically choose to receive a second rating from the new CRA to differentiate themselves. After entering the new CRA, the incumbent CRAs voluntarily create a finer rate classification scheme and provide additional information to market participants. Doherty *et al.* (2012) reveal that increased competition might improve credit rating quality.

Xia (2014) examined the effects of the entry of an investor-paid rating agency, the Egan-Jones Rating Company (EJR), on credit rating quality. He finds that S&P ratings become more responsive to credit risk and that rating changes incorporate higher information content after EJR's initial coverage, suggesting that the entry of an investor-paid rating agency improves credit rating quality. Morkoetter *et al.* (2017) provided empirical evidence that rating agencies expend more effort with regard to their monitoring activities in the instance of multiple ratings. They reveal that the frequency of credit rating (outlook) reviews and watch list revisions is higher in the case of multiple ratings than in a single credit rating situation. They also find that CRAs can discriminate between tranches with respect to default risk when there are multiple ratings.

Second, increased competition deteriorates credit rating quality through rating inflation. Theoretical studies suggest that reputational concerns affect an organization's investment behavior (John & Nachman, 1985; Diamond, 1989; Diamond, 1991; Chemmanur & Fulghieri, 1994; Goel & Thakor, 2010). Reputation can provide an organization with an incentive to produce high-quality goods in markets; however, this concept is supported by the assumption that a higher reputation leads to higher future rents that exceed the short-term benefit of producing low-quality goods (Doherty *et al.*, 2012). However, increased competition worsens the potential

future rents achieved by improving one's reputation, leading to less investment in information acquisition, given the lack of future market growth (Becker & Millbourn, 2011). Therefore, under this condition, CRAs hesitate to invest resources, causing a decrease in rating quality.

Given the conflict of interest inherent in the rating business, competition also creates pressure to inflate ratings since the majority of CRAs adopt the issuer–pay business model, where they are paid by the firms they rate (Bae *et al*., 2015). Consistent with this view, theoretical studies have shown that rating agencies are prone to inflate ratings when facing competitive pressure (Bolton, *et al*. 2012; Camanho *et al*., 2020). Becker and Millbourn (2011) empirically examined how greater competition affects credit rating quality. They focus on Fitch's entry into the credit market and use its market share, an industry-level variable, to measure increased competition, suggesting that increased competition reduces credit rating levels, the correlation between ratings and market-implied yields, and the ability of ratings to predict default deterioration. Cohen and Manuszak (2013) investigated the relationship between competition among CRAs and the rating of commercial mortgage-backed securities using data from 2002 to 2007. They found that rating competition, measured by Fitch's market share, generates less stringent ratings when Fitch is a more significant competitor. However, this effect disappears when the market share is high. These empirical studies show that increased competition among CRAs from the entrance of a third CRA into an oligopolistic credit rating market inflates credit ratings and deteriorates credit rating quality.

However, a recent study questioned whether competition among CRAs inflates the level of credit ratings. Bae *et al*. (2015) replicate Becker and Millbourn's (2011) model by using firm-year observations from 1995 to 2006. They point out that Becker and Millbourn's estimation model does not control for firm characteristics and industry fixed effects in the same regression, suggesting that their results could be biased because of omitted variables. They find that Fitch's market share is significantly and positively associated with credit ratings when they regress on the same estimation model as Becker and Millbourn. However, they find that Fitch's market share is not significantly associated with credit ratings when they include both industry dummies and firm characteristics. They conclude that Becker and Millbourn's (2011) results are largely driven by the endogeneity problem caused by unobservable industry effects, casting doubt on the view that competition among rating agencies causes rating inflation in the corporate bond market. Thus, there are mixed results regarding the relationship between CRA competition and credit rating quality.

3.3. Hypothesis development

CRAs play three major roles in capital markets: providing information services, certification services, and monitoring services (Gonzalez *et al*., 2004; Kiff *et al*., 2012). Prior literature suggests that rating agency certification services, which inform bond investors about investment or speculative grades, do matter and are likely to have a liquidity effect (Brister *et al*., 1994; Bongaerts *et al*., 2012; Kiff *et al*., 2012).

A downgrade from investment grade to speculative grade leads to significant costs for issuers because of the dramatic decrease in demand for speculative-grade bonds (Brown *et al*., 2015). A downgrade to speculative grade causes significantly negative average abnormal bond and stock returns (Holthausen & Leftwich, 1986; Hand *et al*., 1992).[9)]

Because profitability has a major impact on their credit ratings, firms are motivated to manage earnings to avoid (achieve) speculative (investment) grade ratings and broad rating downgrades (upgrades) and to avoid the negative impact of a downgrade to a speculative grade. Prior literature shows that US firms manage earnings or control real activities to obtain a more favorable credit rating (Kisgen, 2006; Ali & Zhang, 2008; Alissa *et al*., 2013; Jung *et al*., 2013; Brown *et al*., 2015; Liu *et al*., 2018).

In Japan, there is no issuance record of speculative-grade bonds; thus, a BBB rating is the borderline for financing through the bond market. Once an issuer has received a speculative grade, it becomes difficult for them to issue new bonds. In fact, the issuance volume of BBB-rated bonds is extremely small (Tanaka & Ishiwatari, 2016; Tamura, 2021). Therefore, it is assumed that in Japan, the incentive to acquire BBB or a higher rating is considerably high. Therefore, Japanese firms have an incentive to acquire higher ratings than BBB. Therefore, the following null hypothesis is developed:

Hypothesis 1. Firms do not engage in more aggressive income-increasing earnings management if their credit rating is at the borderline between investment and speculative grades.

Earnings management can affect the credit rating decisions for firms to obtain more favorable credit ratings (Kisgen, 2006; Ali and Zhang, 2008; Jung *et al*., 2013; Alissa *et al*., 2013; Demirtas and Cornaggia, 2013; Brown *et al*., 2015; Liu *et al*., 2018). However, the effects of earnings management on their credit ratings depend on the detection ability of CRAs, which is influenced by their incentives to monitor client firms. There is broad consensus that increasing competition between CRAs improves credit rating quality (Becker and Milbourn, 2011). Cantor and Packer (1994) claim that reputation concern as an honest and accurate rating provider

9) A long-term BBB rating is generally necessary for commercial paper access, and a long-term bond rating of A is needed to access the universe of commercial paper investors in the US (Kisgen, 2006).

improves and sustains rating quality.

The theoretical literature shows that the motivation behind reputation acquisition positively affects investment behavior (John & Nachman, 1985; Diamond, 1989; Diamond, 1991; Chemmanur & Fulghieri, 1994; Goel & Thakor, 2010). This motivation encourages additional investment in efforts to improve reputation by CRAs (e.g., information acquisition for strict credit assessment and monitoring) since it might increase future rents. Competition also enhances reputation-building behavior (Hörner, 2002). Under the reputational mechanism, competition would increase the incentive to acquire information. Supporting this view, prior studies show that multiple ratings improve rating quality through competition (Doherty *et al.*, 2012; Xia & Strobl, 2012; Xia, 2014) and encourage CRAs to monitor issuers after bond issuance (Morkoetter *et al.*, 2017). Under the information production hypothesis, I predict that having multiple ratings improves the ability of rating agencies to detect earnings management since competition increases the importance of a CRA's reputation. This assumption leads to the hypothesis that CRAs discount earnings management activities in credit risk assessment when firms have multiple ratings; however, there is an opposite view of the effect of the reputation mechanism on credit rating quality. Becker and Milbourn (2011) claim that competition reduces the future rents of CRAs, weakens the incentive to invest in quality, and found that increased competition from Fitch led to a decrease in the overall information content of the ratings. Because competition reduces rents, it undermines the incentive to make costly investments in rating accuracy. By contrast, Bae *et al.* (2015), controlling for the endogeneity problem caused by unobservable industry effects, find no relationship between Fitch's market share and ratings, suggesting that competition does not lead to rating inflation.

There are mixed results on the effects of increased competition on credit rating quality. I do not predict the direction of increased competition (multiple ratings) leading to a decrease in the ability to detect earnings management, especially for firms positioned between investment and speculative borderline ratings. Based on the above discussion, I have developed the following null hypothesis:

Hypothesis 2. Earnings management does not influence credit rating agencies' decisions when firms have multiple ratings.

4. Research Design

4.1. Accruals-based Earnings Management

I estimate an accrual-based earnings management measure using the following model based on Kothari *et al.* (2005):

$$TA_{i,t} = \alpha_0 + \alpha_1 1/ASSETS_{i,t} + \alpha_2 \triangle SALE_{i,t} + \alpha_3 TANG_{i,t} + \alpha_4 ROA_{i,t-1} + u_{i,t} \quad (1)$$

where $TA_{i,t}$ is the total accruals of firm i in year t, defined as the difference between net income before income taxes and extraordinary items and operating cash flow in year t, deflated by total assets in year t-1; $ASSETS_{i,t}$ is total assets; $\triangle SALE_{i,t}$ is total sales changes in year t-1 to year t deflated by total assets in year t-1; $PPE_{i,t}$ is property, plant, and equipment in year t deflated by total assets in year t-1; $ROA_{i,t}$ is the return on assets, defined as net income before income taxes and extraordinary items in year t, which is income before tax and extraordinary items in accordance with Japanese GAAP, deflated by total assets in year t-1.

$ABACC_{i,t}$ is abnormal accruals, defined as the residual of equation (1). A higher numerical value of $ABACC_{i,t}$ indicates a higher income increase from accrual-based earnings management.

4.2. Real Activities Earnings Management

Real activities earnings management measures are estimated using the regression models developed by Roychowdhury (2006), as shown in Equations (2), (3), and (4). Using these models, I estimate the normal production costs, discretionary expenses, and operating cash flows. The models are estimated by year and Nikkei middle industry classification using all Japanese firms with available credit ratings obtained from the QUICK workstation.[10)]

$$PROD_{i,t} = \alpha_0 + \alpha_1 1/ASSETS_{i,t-1} + \alpha_2 SALE_{i,t} + \alpha_3 \triangle SALES_{i,t} + \alpha_4 \triangle SALES_{i,t-1} + u_{i,t} \quad (2)$$

$$DISC\_EXP_{i,t} = \alpha_0 + \alpha_1 1/ASSETS_{i,t-1} + \alpha_2 SALE_{i,t-1} + u_{i,t} \quad (3)$$

$$CFO_{i,t} = \alpha_0 + \alpha_1 1/ASSETS_{i,t-1} + \alpha_2 SALE_{i,t} + \alpha_3 \triangle SALE_{i,t} + u_{i,t} \quad (4)$$

where $PROD_{i,t}$ is the production costs in year t, defined as the sum of the cost of goods sold and the change in inventories in period t deflated by total assets in year t-1; $DISC\_EXP_{i,t}$ is discretionary expenses in year t, defined as selling, general, and administrative expenses, deflated by total assets in year t-1; $CFO_{i,t}$ is cash flow from operations in period t deflated by total assets in year t-1; $ASSETS_{i,t}$ is total assets in year t; $SALE_{i,t}$ is total sales in year t deflated by total assets in year t-1; and $ROA_{i,t}$ is the return on assets, defined as net income in year t deflated by total assets in year t-1.

$ABCOST_{i,t}$ is the abnormal production cost defined as the residual of regression (2). $ABEXP_{i,t}$ represents abnormal discretionary expenses, defined as the residual of regression

10) I eliminate firms in industries with fewer than ten annual observations to estimate performance matched accrual-based and real activities earnings management.

(3) multiplied by -1, so that a higher value indicates greater upward earnings management. $ABCFO_{i,t}$ is abnormal operating cash flow, defined as the residual of regression (4) multiplied by −1, so that a higher value indicates greater upward earnings management.

A higher numerical value for abnormal production cost indicates that higher income is due to increasing real activities earnings management because abnormally increasing production levels to spread fixed overhead costs over a larger number of units achieves lower fixed costs per unit. A lower numerical value of abnormal discretionary expenses indicates that a higher income increases real activities earnings management. Managers attempt to reduce discretionary expenditures to increase the cash flow component of earnings. A lower numerical value of abnormal cash flow indicates higher income and increased real earnings management activities. In an attempt to temporarily increase sales, managers offer significant price cuts and extend more lenient credit terms, resulting in a boost to current earnings and lower cash flow (Roychowdhury, 2006). However, the net effect of abnormal cash flow from operations is ambiguous. Price discounts, channel stuffing, and overproduction all decrease cash flow from operations, while cutting discretionary expenditures increases it (Roychowdhury, 2006). Since it is difficult to predict which effect will dominate, this study makes no explicit prediction regarding $ABCFO_{i,t}$ but reports the results following Brown *et al.* (2015).

I also compute a composite measure of real activities earnings management ($COMP\_REM_{i,t}$) as the sum of $ABCOST_{i,t}$ and $ABEXP_{i,t}$: I do not include $ABCFO_{i,t}$ in the composite measure because of the ambiguity of its implications for earnings management (Brown *et al.*,2015).

4.3. Models for Testing the Hypotheses

To test the hypotheses, I used the following OLS regression model based on Brown *et al.* (2015). The dependent variables are earnings management (EM) measures $ABACC_{i,t}$, $ABCOST_{i,t}$, $ABCFO_{i,t}$, and $ABEXP_{i,t}$. The independent variables included 16 binary variables for credit rating categories. The B rating category includes B+ and all categories below it, because the number of observations for B+ rating or lower is very small at 154 (the number of observations for B+ rating is 81). A rating is included in the intercept.

$$EM_{i,t} = \alpha_0 + \alpha_1 AAA_{i,j,t} + \alpha_2 AA+_{i,j,t} + \alpha_3 AA_{i,j,t} + \alpha_4 AA-_{i,j,t} + \alpha_5 A+_{i,j,t} + \alpha_6 A-_{i,j,t} + \alpha_7 BBB+_{i,j,t} + \alpha_8 BBB_{i,j,t} + \alpha_9 BBB-_{i,j,t} + \alpha_{10} BB+_{i,j,t} + \alpha_{11} BB_{i,j,t} + \alpha_{12} BB-_{i,j,t} + \alpha_{13} B_{i,j,t} + \alpha_{14} DBTM_{i,t} + \alpha_{15} DROA_{i,t} + \alpha_{16} DLEV_{i,t} + \alpha_{17} DSIZE_{i,t} + \alpha_{18} JCR_{i,j,t} + \alpha_{19} S\&P_{i,j,t} + \alpha_{20} MOODY'S_{i,j,t} + \alpha_{21} FITCH_{i,j,t} + YEAR + IND + u_{i,j,t} \quad (5)$$

where $EM_{i,t}$ are the earnings management measures of firm i in yeat t representing

ABACC, *ABCOST*, *ABCFO*, *ABEXP*, and *COMP_REM*; the rating symbol "$X_{i,j,t}$," except for $B_{i,j,t}$, is equal to 1 if the long-term issuer rating j of firm i in year t is category "*X*," and 0 otherwise; $B_{i,j,t}$ is equal to 1 if the long-term issuer rating j of firm i in year t is *B*+ or a category below that, and 0 otherwise; $DROA_{i,t}$ is the industry-year mean adjusted *ROA*, defined as net income divided by total assets in year t minus the industry-year mean of *ROA*; $DLEV_{i,t}$ is the industry-year mean adjusted *LEV*, defined as long-tem debt divided by total assets in year t minus the industry-year mean of *LEV*; $DSIZE_{i,t}$ is the industry-year mean adjusted *SIZE*, defined as the natural logarithm of total assets in year t minus the industry-year mean of *SIZE*; $DBTM_{i,t}$ is the industry-year mean adjusted *BTM*, defined as the book value of equity divided by the market value of equity in year t minus the industry-year mean of *BTM*; $JCR_{i,j,t}$ is a binary variable that is equal to 1 if the credit rating j is from JCR, and 0 otherwise; $S\&P_{i,j,t}$ is a binary variable that is equal to 1 if the credit rating j is from S&P, and 0 otherwise; $MOODY'S_{i,j,t}$ is a binary variable that is equal to 1 if the credit rating j is from Moody's, and 0 otherwise; $FITCH_{i,j,t}$ is a binary variable that is equal to 1 if the credit rating j is from Fitch, and 0 otherwise; and *IND* represents the dummy variables for the Nikkei middle industry classification.

To test whether CRAs discount the managed portion of earnings in subsequent rating decisions, I estimate the following OLS regression models (6) and (7). Model (7) regresses the level of rating categories on the managed portions of earnings, and Model (8) regresses the change in rating categories.

$$RATE_{i,j,t+1} = \alpha_0 + \alpha_1 ABACC_{i,t} + \alpha_2 COMP\_REM_{i,t} + \alpha_3 ABACC_{i,t}{}^{*} MULTI_{i,t} + \alpha_4 COMP\_REM_{i,t}{}^{*} MULTI_{i,t} + \alpha_5 MULTI_{i,t} + \alpha_6 PMROA_{i,t} + \alpha_7 LEV_{i,t} + \alpha_8 ODEBT_{i,t} + \alpha_9 PPE_{i,t} + \alpha_{10} SIZE_{i,t} + \alpha_{11} JCR_{i,j,t} + \alpha_{12} S\&P_{i,j,t} + \alpha_{13} MOODY'S_{i,j,t} + \alpha_{14} FITCH_{i,j,t} + YEAR + IND + u_{i,j,t} \quad (6)$$

where $RATE_{i,j,t}$ is the issuer rating converted into numerical values from 1 (D) to 21 (AAA) for firm i rated by CRA j in year t, and a higher value of $RATE_{i,j,t}$ indicates a change to higher credit worthiness; $MULTI_{i,t}$ is an indicator variable that is equal to 1 if the firm has ratings from more than two CRAs, and 0 otherwise; $PMROA_{i,t}$ is the pre-managed operating income divided by lagged total assets, defined as operating income minus the sum of the $ABACC_{i,t}$ and $COMP\_REM_{i,t}$; $LEV_{i,t}$ is the leverage ratio defined as long-term debt divided by total assets; $ODEBT_{i,t}$ is the other debt ratio defined as total debt minus long-term debt divided by total assets; $PPE_{i,t}$ is the property, plants, and equipment divided by total assets; $SIZE_{i,t}$ is the natural logarithm of total assets in year.

$$CHRATE_{i,j,t+1} = \alpha_0 + \alpha_1 ABACC_{i,t} + \alpha_2 COMP\_REM_{i,t} + \alpha_3 ABACC_{i,t}{}^{*}MULTI_{i,t} + \alpha_4 COMP\_REM_{i,t}{}^{*}MULTI_{i,t} + \alpha_5 MULTI_{i,t} + \alpha_6 PMROA_{i,t} + \alpha_7 LEV_{i,t} + \alpha_8 ODEBT_{i,t} + \alpha_9 PPE_{i,t} + \alpha_{10} SIZE_{i,t} + \alpha_{11} CHPMROA_{i,t} + \alpha_{12} CHLEV_{i,t} + \alpha_{13} CHODEBT_{i,t} + \alpha_{14} CHPPE_{i,t} + \alpha_{15} JCR_{i,j,t} + \alpha_{16} S\&P_{i,j,t} + \alpha_{17} MOODY'S_{i,j,t} + \alpha_{18} FITCH_{i,j,t} + YEAR + IND + u_{i,j,t} \quad (7)$$

where $CHRATE_{i,j,t+1}$ is the ordinal variable coded as 1 (2, 3) if credit rating j of firm i is downgraded (remains the same or is upgraded) by the end of the next fiscal year $t+1$; $CHPMROA_{i,t}$ is the change in $PMROA_{i,t}$ from year t-1 to year t; $CHLEV_{i,t}$ is the change in $LEV_{i,t}$ from year t-1 to year t; $CHODEBT_{i,t}$ is the change in $ODEBT_{i,t}$ from year t-1 to t; $CHPPE_{i,t}$ is the change in $PPE_{i,t}$ from year t-1 to t.

4.4. Data

The sample used in this study comprises long-term issuer credit rating data of Japanese firms from R&I, JCR, S&P, Moody's, and Fitch between April 2000 and March 2019, based on the following criteria: firms are included if (1) they are not banks, securities, insurance, or other financial firms; (2) their accounting period is 12 months; and (3) their financial data are available on the Quick WorkStation provided by QUICK Inc.

I collected data from April 2000, since it is possible to acquire consolidated cash flow information. All variables except indicator variables are winsorized at the 1.0 and 99.0 percentiles[11] ; thus, the final number of observations is 14,553 credit ratings/year. The sample selection procedure is presented in table 1.

Table 1 The sample selection procedure

Initial sample of the long term issuer credit ratings from April, 2000 to March, 2019	23,100
Less	
(1) Bank, securities, insurance and the other financial firms	6,429
(2) Accounting period is not 12 months	81
(3) Financial data is not available or t-1 data is not available	252
(4) The industry/ year observations of firms is less than 10	1,785
Final observations of credit rating testing accrual and real earnings management	14,553
Less	
(5) Subsequent credit rating and prior financial data to test the rating changes effect is not available	2,082
Final observation of credit rating testing the effect of credit rating changes	12,471

11) All variables except indicator variables are winsorized at the 1.0 and 99.0 percentiles when I estimate the $ABACC_{i,t}$, $ABCOST_{i,t}$, $ABEXP_{i,t}$ and $ABCFO_{i,t}$.

4.5. Descriptive Statistics

Table 2 presents the descriptive statistics for the dependent and independent variables. The category with the most observations is the A-rating, corresponding to 17.6% of the total. The observations gradually decrease below A－. Very few observations have ratings below BB+.

The mean of $ABACC_{i,t}$ is almost negative for the above A+ rating. The highest mean $ABACC_{i,t}$ is 0.005 in the BB- rating sample. The means of $ABCOST_{i,t}$ and $ABEXP_{i,t}$ tend to increase as credit ratings decline, but the values are high for BBB- and BB+ ratings. The means of $COMP\_REM_{i,t}$ and $TEM_{i,t}$ are also high for BBB- and BB+ ratings.

Table 2 The summary of descriptive statistics

VARIABLE	AAA	AA+	AA	AA-	A+	A	A-
$ABACC_{i,t}$	−0.002	−0.008	−0.008	−0.005	−0.004	0.000	0.001
$ABCOST_{i,t}$	−0.001	0.003	−0.024	−0.006	−0.023	−0.010	0.007
$ABEXP_{i,t}$	0.006	−0.001	−0.004	0.003	−0.001	−0.004	0.004
$COMP\_REM_{i,t}$	0.005	0.002	−0.027	−0.003	−0.024	−0.014	0.011
$TEM_{i,t}$	0.003	−0.007	−0.036	−0.007	−0.027	−0.015	0.012
$ABCFO_{i,t}$	−0.015	−0.016	−0.016	−0.008	−0.006	−0.003	0.001
$DBTM_{i,t}$	−0.066	−0.090	−0.181	−0.166	−0.146	−0.112	0.013
$DROA_{i,t}$	0.013	0.009	0.012	0.007	0.005	0.005	0.000
$DLEV_{i,t}$	−0.028	−0.026	−0.029	−0.011	−0.012	−0.016	−0.005
$DSIZE_{i,t}$	0.962	1.063	1.156	1.091	0.522	0.113	−0.162
Observations	202	378	750	1,204	1,460	2,361	2,558
% of Obs	1.4%	2.6%	5.2%	8.3%	10.0%	16.2%	17.6%

VARIABLE	BBB+	BBB	BBB-	BB+	BB	BB-	Below B
$ABACC_{i,t}$	0.002	0.001	−0.001	−0.002	0.005	0.004	0.002
$ABCOST_{i,t}$	0.014	0.002	0.025	0.026	0.018	0.005	0.014
$ABEXP_{i,t}$	0.000	−0.003	0.008	0.008	0.002	0.005	0.000
$COMP\_REM_{i,t}$	0.014	0.000	0.033	0.034	0.020	0.010	0.014
$TEM_{i,t}$	0.016	0.000	0.032	0.032	0.025	0.014	0.016
$ABCFO_{i,t}$	0.004	0.005	0.011	0.013	0.016	0.015	0.004
$DBTM_{i,t}$	0.085	0.153	0.240	0.213	−0.078	0.183	−0.038
$DROA_{i,t}$	−0.001	−0.005	−0.011	−0.019	−0.021	−0.029	−0.045
$DLEV_{i,t}$	0.002	0.013	0.032	0.069	0.054	0.075	0.072
$DSIZE_{i,t}$	−0.572	−0.868	−0.738	−0.063	0.156	0.193	0.620
Observations	1,927	1,858	1,095	351	139	116	154
% of Obs	13.2%	12.8%	7.5%	2.4%	1.0%	0.8%	1.1%

The mean of $ABCFO_{i,t}$ is higher from BBB- to BB-. These results imply that firms with BBB- and BB + ratings engage in income-increasing real earnings management. There is a monotonic decrease in the mean industry-adjusted ROA ratio and a monotonic increase in the mean industry-adjusted LEV ratio as the ratings decline.

5. Results

5.1. Effect of credit rating categories on accrual and real earnings management

Table 3 shows the regression results for Hypothesis 1. To compare the effects of rating categories on the level of earnings management, earnings management variables were adjusted to the fractional ranks of these variables.[12] The coefficients of the 13 rating category variables in panel A of table 3 indicate differences in average accrual and real earnings management between the A rating category and each of the other categories. The average levels of accrual and real activities earnings management in the A-rating category are reflected in the intercept coefficient. The coefficients of $A-_{i,j,t}$, $BBB-_{i,j,t}$, $BBB-_{i,j,t}$, $BB+_{i,j,t}$ and $B_{i,j,t}$ are almost statistically significant in columns (2)–(4). In column (1), except for $A-_{i,j,t}$, the coefficients of $BBB+_{i,j,t}$, $BB-_{i,j,t}$ and $BB+_{i,j,t}$ are positive, but not significant. These results suggest that firms do not seem to engage in accrual management near the borderline ratings.

On the other hand, in columns (2) through (4), the coefficients of $A-_{i,j,t}$, $BBB+_{i,j,t}$, $BBB-_{i,j,t}$ and $BB+_{i,j,t}$ are significantly positive, except for $BBB-_{i,j,t}$ in column (3), suggesting that firms within these rating categories engage in income-increasing real activities earnings management compared to those with A ratings. The coefficients of these rating categories are also significantly positive in columns (5) and (6). The coefficients of $BBB-_{i,j,t}$ in columns (2)through (4) are the highest among all the rating categories, except for the rating category below B. These results suggest that firms at the borderline between A- and BBB+ and BBB- and BB+ conduct earnings management to maintain or inflate their credit ratings.

To check the important rating borderline of earnings management, I tested the significance of the coefficient in the estimation model. Panel B of table 3 shows the results of the F-tests comparing the coefficients of $BBB-_{i,j,t}$ and $BB+_{i,j,t}$ to those of other rating indicator variables. In column (1), the coefficients of $BBB-_{i,j,t}$ and $BB+_{i,j,t}$ are mostly significant compared to those above the A+ rating. In columns (2) through (4), the coefficients of $BBB-_{i,j,t}$ are significantly higher than those of the above BBB rating, while they are not significant compared to those of the below BB+ ratings. Panel B indicates that income-increasing activities earnings management in the BBB- and BB+ rating groups is pronounced compared with other rating categories.

12) $COMP\_REM_{i,t}$ is adjusted to sum of the fractional rank of $ABCOST_{i,t}$ and $ABEXP_{i,t}$ divided by 2. $TEM_{i,t}$ is the sum of the fractional rank of $ABACC_{i,t}$, $ABCOST_{i,t}$ and $ABEXP_{i,t}$ divided by 3.

Table 3 Results of accrual and real earnings management on credit rating categories
Panel A: Regression result of OLS

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable	$ABACC_{i,t}$	$ABCOST_{i,t}$	$ABEXP_{i,t}$	$COMP\_REM_{i,t}$	$TEM_{i,t}$	$ABCFO_{i,t}$
Constant	0.523***	0.507***	0.481***	0.494***	0.503***	0.478***
	(30.546)	(10.940)	(11.170)	(12.210)	(17.771)	(20.602)
$AAA_{i,j,t}$	−0.063***	−0.031	−0.004	−0.017	−0.033	−0.226***
	(−2.974)	(−0.486)	(−0.068)	(−0.339)	(−0.894)	(−6.777)
$AA+_{i,j,t}$	−0.101***	−0.017	−0.041	−0.029	−0.053**	−0.215***
	(−3.050)	(−0.299)	(−0.933)	(−0.810)	(−2.202)	(−8.266)
$AA_{i,j,t}$	−0.074***	−0.049	−0.031	−0.040	−0.052**	−0.157***
	(−3.047)	(−1.521)	(−0.869)	(−1.381)	(−2.239)	(−6.906)
$AA-_{i,j,t}$	−0.035*	−0.015	0.005	−0.005	−0.015	−0.079***
	(−1.800)	(−0.571)	(0.175)	(−0.231)	(−0.944)	(−4.519)
$A+_{i,j,t}$	−0.033**	−0.033	0.013	−0.010	−0.018	−0.052***
	(−2.227)	(−1.571)	(0.559)	(−0.523)	(−1.196)	(−4.362)
$A-_{i,j,t}$	0.020*	0.048***	0.051***	0.049***	0.040***	0.038***
	(1.672)	(2.784)	(2.672)	(2.937)	(3.188)	(3.210)
$BBB+_{i,j,t}$	0.025	0.060***	0.037	0.048**	0.041***	0.068***
	(1.559)	(2.685)	(1.508)	(2.220)	(2.644)	(4.348)
$BBB_{i,j,t}$	0.013	0.050**	0.032	0.041*	0.032*	0.086***
	(0.704)	(2.033)	(1.182)	(1.690)	(1.817)	(4.610)
$BBB-_{i,j,t}$	0.008	0.103***	0.086***	0.095***	0.066***	0.118***
	(0.388)	(3.698)	(2.779)	(3.400)	(3.358)	(5.195)
$BB+_{i,j,t}$	0.021	0.091***	0.069**	0.080***	0.060***	0.111***
	(0.772)	(2.947)	(2.160)	(2.822)	(2.835)	(3.718)
$BB_{i,j,t}$	0.084**	0.095**	0.067	0.081*	0.082**	0.147***
	(2.493)	(2.131)	(1.294)	(1.810)	(2.520)	(3.269)
$BB-_{i,j,t}$	0.065*	0.029	0.054	0.042	0.049*	0.102***
	(1.805)	(0.667)	(1.128)	(1.001)	(1.698)	(2.836)
$B_{i,j,t}$	0.048**	0.114***	0.135***	0.125***	0.099***	0.042
	(2.236)	(2.967)	(3.593)	(3.601)	(3.955)	(1.250)
Controls	Included	Included	Included	Included	Included	Included
YEAR	Included	Included	Included	Included	Included	Included
INDUSTRY	Included	Included	Included	Included	Included	Included
Observations	14,553	14,553	14,553	14,553	14,553	14,553
Adjusted R-squared	0.059	0.111	0.063	0.088	0.064	0.507

*, ** and *** denote statistical significance at the 10%, 5% and 1% level. All variables are as defined in Appendix B. T-statistics are shown in parentheses below coefficient estimates. Standard errors are clustered by firms.

Panel B: Tests of difference in the coefficient estimates

	(1)	(2)	(3)	(4)	(5)	(6)
	$ABACC_{i,t}$	$ABPRO_{i,t}$	$ABEXP_{i,t}$	$COMP\_REM_{i,t}$	$TEM_{i,t}$	$ABCFO_{i,t}$
$BBB\text{-}_{i,j,t} = AAA_{i,j,t}$	0.071**	0.135**	0.089	0.112**	0.098**	0.344***
	(2.50)	(1.97)	(1.39)	(1.96)	(2.51)	(8.15)
$BBB\text{-}_{i,j,t} = AA+_{i,j,t}$	0.11***	0.121*	0.126**	0.123***	0.119***	0.333***
	(2.83)	(1.94)	(2.49)	(2.95)	(4.33)	(8.92)
$BBB\text{-}_{i,j,t} = AA_{i,j,t}$	0.082***	0.153***	0.117***	0.135***	0.117***	0.275***
	(2.72)	(3.64)	(2.64)	(3.61)	(4.32)	(8.39)
$BBB\text{-}_{i,j,t} = AA\text{-}_{i,j,t}$	0.044	0.118***	0.081**	0.100***	0.081***	0.197***
	(1.57)	(3.4)	(2.30)	(3.20)	(3.80)	(6.85)
$BBB\text{-}_{i,j,t} = A+_{i,j,t}$	0.041*	0.137***	0.073**	0.105***	0.083***	0.170***
	(1.81)	(4.08)	(2.20)	(3.46)	(3.94)	(7.21)
$BBB\text{-}_{i,j,t} = A\text{-}_{i,j,t}$	−0.011	0.056***	0.034	0.045*	0.026	0.080***
	(−0.62)	(2.33)	(1.30)	(1.89)	(1.58)	(4.24)
$BBB\text{-}_{i,j,t} = BBB+_{i,j,t}$	−0.017	0.044*	0.048*	0.046**	0.025	0.050***
	(−1.04)	(1.92)	(1.84)	(1.99)	(1.53)	(2.90)
$BBB\text{-}_{i,j,t} = BBB_{i,j,t}$	−0.005	0.054**	0.054**	0.054**	0.034***	0.032**
	(−0.30)	(2.47)	(2.32)	(2.50)	(2.19)	(2.14)
$BBB\text{-}_{i,j,t} = BB+_{i,j,t}$	−0.013	0.012	0.017	0.015	0.006	0.007
	(−0.53)	(0.47)	(0.62)	(0.58)	(0.28)	(0.27)
$BBB\text{-}_{i,j,t} = BB_{i,j,t}$	−0.076**	0.008	0.019	0.014	−0.016	−0.029
	(−2.19)	(0.2)	(0.43)	(0.34)	(−0.53)	(−0.79)
$BBB\text{-}_{i,j,t} = BB\text{-}_{i,j,t}$	−0.056*	0.075*	0.031	0.053	0.017	0.016
	(−1.76)	(1.82)	(0.73)	(1.36)	(0.59)	(0.52)
$BBB\text{-}_{i,j,t} = B_{i,j,t}$	−0.039	−0.011	−0.05	−0.030	−0.033	0.076**
	(−1.46)	(−0.28)	(−1.42)	(−0.90)	(−1.26)	(2.23)
$BB+_{i,j,t} = AAA_{i,j,t}$	0.084***	0.122*	0.072	0.097	0.093**	0.337***
	(2.66)	(1.68)	(1.08)	(1.61)	(2.19)	(7.31)
$BB+_{i,j,t} = AA+_{i,j,t}$	0.122***	0.108	0.109**	0.109**	0.113***	0.326***
	(3.08)	(1.64)	(2.03)	(2.41)	(3.78)	(7.99)
$BB+_{i,j,t} = AA_{i,j,t}$	0.095***	0.140***	0.100**	0.129***	0.112***	0.268***
	(2.86)	(3.09)	(2.12)	(3.06)	(3.81)	(7.07)
$BB+_{i,j,t} = AA\text{-}_{i,j,t}$	0.057*	0.106***	0.064*	0.085***	0.076***	0.191***
	(1.78)	(2.80)	(1.71)	(2.60)	(3.18)	(5.58)
$BB+_{i,j,t} = A+_{i,j,t}$	0.054*	0.124***	0.056	0.090***	0.078***	0.163***
	(1.82)	(3.43)	(1.56)	(2.86)	(3.28)	(5.15)
$BB+_{i,j,t} = A\text{-}_{i,j,t}$	0.002	0.043	0.017	0.030	0.021	0.073***
	(0.07)	(1.55)	(0.61)	(1.2)	(1.10)	(2.67)
$BB+_{i,j,t} = BBB+_{i,j,t}$	−0.004	0.032	0.031	0.031	0.02	0.043*
	(−0.17)	(1.2)	(1.06)	(1.24)	(1.03)	(1.68)
$BB+_{i,j,t} = BBB_{i,j,t}$	0.008	0.041	0.037	0.039	0.029	0.025
	(0.33)	(1.54)	(1.27)	(1.54)	(1.43)	(1.04)
$BB+_{i,j,t} = BB_{i,j,t}$	−0.063*	−0.004	0.002	−0.001	−0.022	−0.036
	(−1.80)	(−0.1)	(0.04)	(−0.03)	(−0.69)	(−1.14)
$BB+_{i,j,t} = BB\text{-}_{i,j,t}$	−0.044	0.062	0.014	0.038	0.011	0.01
	(−1.38)	(1.34)	(0.31)	(0.9)	(0.37)	(0.24)
$BB+_{i,j,t} = B_{i,j,t}$	−0.027	−0.023	−0.067**	−0.045	−0.039*	0.069
	(−1.15)	(−0.74)	(−2.11)	(−1.63)	(−1.95)	(2.33)

*, ** and *** denote statistical significance at the 10%, 5% and 1% level. The coefficient difference is calculated by BBB- or BB+ minus X rating categories. T-statistics are shown in parentheses.

However, the results also indicate that firms below the B rating category aggressively engage in earnings management compared to the firms in other rating categories. This result suggests that firms with a high default risk may implement earnings management to inflate their profitability. Prior studies suggest that firms that are closer to debt covenant violations tend to implement earnings management (DeFond and Jiambalvo,1994; Sweeney,1994). In general, it is assumed that the credit rating grades of issuers with near debt covenant violations are considerably lower because of a lack of creditworthiness. However, there is mixed evidence on bankrupt firms' earnings management directions. Some prior studies examining the earnings management practices of bankrupt firms provide evidence that some bankrupt firms have implemented income-increasing earnings management (Rosner, 2003; Jones, 2011; Enomoto and Shuto, 2013), while others suggest that bankrupt firms have implemented income-decreasing earnings management (García Lara *et al*., 2009). Enomoto and Shuto (2013) examined the earnings management of bankrupt firms in Japan and confirmed that income-increasing earnings management was consistently observed before the bankruptcy period (t=0), but not in the bankruptcy period. As a reason for this result, they point out that firms that fell into bankruptcy can no longer afford to engage in discretionary income-increasing earnings management. Given the results of prior studies on the earnings management practices of firms that are closer to bankruptcy, firms rated B or lower have a strong incentive to engage in income-increasing earnings management because their credit rating reflects a significant decline in creditworthiness.

Table 4 shows the mean values of earnings management measures in the years following the initial BBB- and BB+ years. BBB- and BB+ firms remained in the same broad rating group during the sample period. To check the significance, I tested if the mean value was different from 0 using a t-test. The mean values of $ABCOST_{i,t}$, $ABEXP_{i,t}$, and $COMP\_REM_{i,t}$ of BBB firms are significantly positive during the sample period, while $ABACC_{i,t}$ is not significant. The mean values of $ABCOST_{i,t}$ and $COMP\_REM_{i,t}$ of BB+ firms are significantly positive during the sample period, whereas $ABACC_{i,t}$ is not significantly positive. These results imply that BBB- or BB+ rating categories encourage real earnings management.

Based on these results, the null hypothesis is rejected, implying that speculative and investment borderlines affect earnings management of Japanese firms, which is consistent with previous research in the US. Given that there are almost no bond issuers below the BB+ rating in Japan, increasing the BBB rating is important for Japanese firms. Generally, the investment- and speculative-grade borderlines fall between the BBB and BB rating categories. Japanese firms also seem to engage in real activities earnings management near these borderline ratings, and real activities earnings management is pronounced in BBB ratings.

Table 4 Mean of abnormal accrual and real activities in the years subsequent to the initial BBB- and BB+ years.

	Year 1	Year 2	Year 3	Year 4	Year 5
BBB- firms (N = 60)					
$ABACC_{i,t}$	0.002	−0.006	−0.002	−0.002	−0.004
	(0.39)	(−1.44)	(−0.38)	(−0.45)	(−0.91)
$ABCOST_{i,t}$	0.059***	0.047***	0.048***	0.041***	0.038**
	(5.29)	(3.46)	(3.39)	(2.91)	(2.44)
$ABEXP_{i,t}$	0.022***	0.024***	0.020***	0.017**	0.017**
	(3.22)	(3.44)	(2.90)	(2.37)	(2.30)
$COMP\_REM_{i,t}$	0.082***	0.071***	0.068***	0.059***	0.055**
	(4.80)	(3.64)	(3.35)	(2.84)	(2.55)
BB+ firms (N = 19)					
$ABACC_{i,t}$	−0.004	−0.011	−0.005	−0.002	−0.02**
	(−1.00)	(−1.42)	(−0.72)	(0.97)	(−2.35)
$ABCOST_{i,t}$	0.029*	0.031**	0.037***	0.041***	0.037***
	(2.04)	(2.11)	(3.91)	(4.60)	(3.23)
$ABEXP_{i,t}$	0.01	0.004	0.011**	0.017***	0.009
	(1.52)	(0.58)	(2.11)	(3.33)	(1.54)
$COMP\_REM_{i,t}$	0.039*	0.034*	0.048***	0.059***	0.046***
	(2.04)	(2.03)	(3.63)	(4.80)	(3.44)

The numerical number is the mean value of $ABACC_{i,t}$, $ABCOST_{i,t}$, $ABEXP_{i,t}$ and $COMP\_REM_{i,t}$. BBB- and BB+ firms stay in the same broad rating group during the sample period. T-test was conducted to see if the mean values was different from 0. T-statistics are shown in parentheses below coefficient estimates.*, ** and *** denote statistical significance at the 10%, 5% and 1% level.

5.2. Effects of Accrual and Real Activities Earnings Management on Credit Ratings

To test hypothesis 2, I estimate ordered probit models (6) and (7). Table 5 shows the results for the association between credit ratings and the managed portion of earnings. In column (1), the coefficients of $ABACC_{i,t}$ and $COMP\_REM_{i,t}$ are statistically significant (coefficients = 4.085, 6.048; z = 4.974, 7.996, respectively), suggesting that a managed portion of earnings positively affects the level of credit ratings in the case of single ratings. The coefficients of $ABACC_{i,t}$ * $MULTI_{i,t}$ and $COMP\_REM_{i,t}$ * $MULTI_{i,t}$ are significantly negative (coefficients = -2.325, -1.075; z = -2.084, -2.347, respectively), suggesting that multiple ratings could decrease the positive effect of earnings management on the level of ratings.

Columns (2) and (3) show the results for the effects of earnings management on subsequent rating changes. The coefficients of $ABACC_{i,t}$ and $COMP\_REM_{i,t}$ in column (2) are significantly positive (coefficient = 8.268, 7.201; z = 10.475, 13.208), suggesting that accrual and real earnings

Table 5 Ordered probit estimation results of multiple ratings' effects on the association between ratings and the managed portion of earnings

Dependent variable	(1) ALL $RATE_{i,j,t}$	(2) ALL $CHRATE_{i,j,t}$	(3) BBB- & BB+ $CHRATE_{i,j,t}$
$ABACC_{i,t}$	4.085***	8.268***	14.808***
	(4.974)	(10.475)	(5.876)
$COMP\_REM_{i,t}$	6.048***	7.201***	12.332***
	(7.996)	(13.208)	(5.639)
$ABACC * MULTI_{i,t}$	−2.325**	0.355	−1.375
	(−2.084)	(0.348)	(−0.488)
$COMP\_REM * MULTI_{i,t}$	−1.075**	0.043	−2.443***
	(−2.347)	(0.170)	(−2.615)
$MULTI_{i,t}$	0.072	0.079**	0.359***
	(1.037)	(2.162)	(2.777)
$PMROA_{i,t}$	5.577***	6.873***	12.373***
	(8.487)	(13.002)	(5.785)
$LEV_{i,t}$	−7.186***	0.600***	−0.720
	(−11.672)	(2.862)	(−1.045)
$ODEBT_{i,t}$	−5.953***	1.118***	−0.471
	(−17.582)	(7.676)	(−1.010)
$PPE_{i,t}$	1.120***	0.197	0.953**
	(3.712)	(1.349)	(2.129)
$SIZE_{i,t}$	1.084***	−0.077***	0.119*
	(15.156)	(−4.688)	(1.779)
$CHPMROA_{i,t}$		1.028***	0.608
		(4.011)	(1.075)
$CHLEV_{i,t}$		−6.474***	−6.898***
		(−11.412)	(−4.651)
$CHODEBT_{i,t}$		−5.357***	−6.366***
		(−10.948)	(−5.329)
$CHPPE_{i,t}$		−0.972	0.484
		(−1.259)	(0.253)
$JCR_{i,j,t}$	0.518***	0.030	−0.015
	(10.024)	(1.242)	(−0.144)
$S\&P_{i,j,t}$	−1.763***	0.212***	−0.361**
	(−16.110)	(5.224)	(−2.234)
$MOODY'S_{i,j,t}$	−1.387***	−0.173**	−0.500
	(−9.649)	(−2.215)	(−1.543)
$FITCH_{i,j,t}$	−2.472***	−0.167	−0.357
	(−10.805)	(−1.496)	(−1.396)
YEAR	Included	Included	Included
INDUSTRY	Included	Included	Included
Observations	12,471	12,471	1,148
Pseudo R^2	0.270	0.131	0.206

*, ** and *** denote statistical significance at the 10%, 5% and 1% level. All variables are as defined in Appendix B. Z-statistics are shown in parentheses below coefficient estimates. Standard errors are clustered by firms.

management could positively affect rating changes in the subsequent year. The coefficients of $ABACC_{i,t} * MULTI_{i,t}$ and $COMP\_REM_{i,t} * MULTI_{i,t}$ are positive, but not significant. Column (3) shows the same estimation for BBB+ and BB- firms. The coefficients of $ABACC_{i,t}$ and $COMP\_REM_{i,t}$ in column (3) are also significantly positive (coefficient = 14.808 and 12.332; z = 5.876 and 5.639, respectively). The coefficient of $COMP\_REM_{i,t} * MULTI_{i,t}$ is significantly negative (coefficient = −2.443; z = −2.615) in column (3), suggesting that multiple ratings could ease the positive rating changes caused by income increasing real activities earnings management for borderline ratings.

These results suggest that CRAs do not discount a portion of earnings due to income-increasing accrual and real activities earnings management. However, multiple ratings can ease this situation, especially in the case of borderline ratings. These results suggest that the CRA can carefully monitor client firms in competition with other CRAs. These results are consistent with the conjecture that multiple ratings could lead to accurate credit ratings, supporting the hypothesis 2. It suggests that multiple ratings are useful for investors.

6. Robustness tests and additional analysis

The main result concerns self-selection bias for firms with multiple ratings because issuers have the option to gain multiple ratings. To control for firms'self-selection bias, I estimate a two-stage model using Heckman's (1979) method. In the first stage, we estimate a probit model to explain issuers'decisions to gain multiple ratings. In the second stage, I re-estimate the ordered probit models (6) and (7), including the inverse Mills ratio estimated from the first stage.[13] In the first stage, I estimate the probit model following Cantor and Packer (1997).[14]

$$MULTI_{i,t} = \alpha_0 + \alpha_1 PUBLIC\_D_{i,t} + \alpha_2 CP_{i,t} + \alpha_3 BB+_{i,t} + \alpha_4 INSTOWN_{i,t} + \alpha_5 FOREIGN_{i,t} + u_{i,t} \quad (8)$$

where $PUBLIC\_D_{i,t}$ is an indicator variable equal to 1 if the firm has outstanding public debt (bond issuance), and 0 otherwise; $CP_{i,t}$ is an indicator variable equal to 1 if the firm has outstanding commercial paper (CP issuance), and 0 otherwise; $BB+_{i,t}$ is an indicator variable

13) A Heckman (1979) two-stage method is appropriate when the second stage regression is linear, and the first stage model is probit. However, it is feasible to estimate a non-linear model as a second stage regression model (Tucker, 2010).

14) Cantor and Packer (1997) estimate the probit model that decides having the third ratings since almost all U.S. companies tend to give the S&P and Moody's ratings. They include the weighted average rating and rating dispersion in the probit model, while I exclude them since there are many Japanese companies that have only a single rating.

equal to 1 if the firm has BB+ rating. $INSTOWN_{i,t}$ is the percentage of financial institutions' equity ownership, $FOREIGN_{i,t}$ is the foreign sales intensity, defined as foreign sales divided by total sales.

Cantor and Packer (1997) estimated a model that determines the third credit rating (FITCH rating). They include the issues of public bonds and commercial paper which are marginally below investment grade and credit risk. Following Cantor and Packer (1997), I include $PUBLIC\_D_{i,t}$, $CP_{i,t}$, and $BB+_{i,t}$ in the probit model. These variables proxy for regulatory incentives to have multiple ratings. Bond and commercial paper issuers would tend to have multiple ratings to reduce the uncertainty of a single rating. Firms are also more likely than others to receive another rating that would help put them over a critical regulatory hurdle, especially marginally below investment grade. I also include $INSTOWN_{i,t}$ as a proxy for reliance on financial institutions and $FOREIGN_{i,t}$ as a proxy for the intensity of foreign business. In Japan, financial institutions influence the increase in capital through bond issuance.[15] Issuers would have multiple ratings to ease the uncertainty of relying on a single rating if firms rely on funds from financial institutions. Companies tend to raise funds globally and are required to gain multiple ratings. I exclude a proxy for credit risk because it is already included in the second-stage model. I also exclude year and industry fixed effects in the probit model.

Table 6 A Probit model estimation of the factor of having multiple ratings

Dependent variable	$MULTI_{i,t}$
Constant	−0.843***
	(−6.111)
$PUBLIC\_D_{i,t}$	0.473***
	(5.536)
$CP_{i,t}$	0.813***
	(9.105)
$BB+_{i,t}$	−0.119
	(−0.835)
$INSTOWN_{i,t}$	1.470***
	(4.226)
$FOREIGN\_SALES_{i,t}$	0.407**
	(2.276)
Observations	12,428
Pseudo R^2	0.103

*, ** and *** denote statistical significance at the 10%, 5%, and 1% level. All variables are as defined in Appendix B. Z-statistics are shown in parentheses below coefficient estimates. Standard errors are clustered by firms.

15) The total share of bond holdings by financial institution was 80% in December, 2019, according to flow-of-funds released by Japan Bank (https://www.stat-search.boj.or.jp/).

Table 6 and table 7 present the estimation results of the two-stage model using the Heckman (1979) method. Panel 6 presents the results of the probit model estimation. The coefficients of $PUBLIC\_D_{i,t}$ and $CP_{i,t}$ are significantly positive (coefficient = 0.473, 0.813; z =5.536, 9.105, respectively), suggesting that bond and commercial issuers tend to obtain multiple ratings. The coefficient of $BB+_{i,t}$ is not significant (coefficient = −0.119, z = −0.835). The coefficients of $INSTOWN_{i,t}$ and $FOREIGN_{i,t}$ are significantly positive (coefficient = 1.470 and 0.407; z = 4.226 and 2.276, respectively).

Table 7 presents the outcome estimation results. The coefficients of $ABACC_{i,t}$ and $COMP\_REM_{i,t}$ are statistically significant in columns (1) to (3) (coefficient = 4.055, 6.041; z = 4.921, 7.905 in column (1); coefficient = 8.310, 7.227; z = 10.497, 13.142 in column (2); coefficient = 14.869, 12.443; z = 5.877, 5.673 in column (3), respectively). The coefficients of $COMP\_REM_{i,t} * MULTI_{i,t}$ are significantly negative in columns (1) and (3) (coefficients = −1.153, −2.427; z = −2.436, −2.604, respectively). The coefficient of $ABACC_{i,t} * MULTI_{i,t}$ is significantly negative in column (1) (coefficient = −2.716, z = −2.387). These results are consistent with those in table 5.

Japanese CRAs have a large share of the credit market, and R&I and JCR usually offer multiple ratings. As an additional analysis, I re-estimate regressions (6) and (7) including $2CRAs_{i,t}$, $2CRAs\_LOCAL_{i,t}$, $2CRAs\_GLOBAL_{i,t}$, $3CRAs_{i,t}$ to investigate whether the results change according to the number of CRAs and CRAs'features. $2CRAs_{i,t}$ is an indicator variable equal to 1 if firms have credit ratings from two CRAs and 0 otherwise. $2CRAs\_LOCAL_{i,t}$ is an indicator variable equal to 1 if firms have credit ratings from R&I and JCR and 0 otherwise. $2CRAs\_GLOBAL_{i,t}$ is an indicator variable equal to one if firms have credit ratings from two CRAs, except for R&I and JCR, and zero otherwise. $3CRAs_{i,t}$ is an indicator variable that equals 1 if firms have credit ratings from the above three CRAs and 0 otherwise.

Table 8 presents the results of the ordered probit model estimations. The coefficients of $ABACC_{i,t} * 2CRAs_{i,t}$ are significantly negative in columns (1) and (5) (coefficient = −2.486, −4.767; z = −2.076, −1.778, respectively). The coefficients of $COMP\_REM_{i,t} * 2CRAs_{i,t}$ are significantly negative in columns (1) and (5) (coefficient = −0.822, −3.013; z = −1.701, −3.148, respectively). The coefficients of $COMP\_REM_{i,t} * 3CRAs_{i,t}$ are significantly negative in columns (1) and (2) (coefficients = −2.117, −2.117; z = −2.321, −2.305, respectively). The coefficients of $COMP\_REM_{i,t} * 2CRAs\_LOCAL_{i,t}$ are significantly negative in columns (2) and (6) (coefficient = −0.941, −4.289; z = −1.707, −3.028, respectively). The coefficient of $COMP\_REM_{i,t} * 2CRAs\_GLOBAL_{i,t}$ is significantly negative in column (6) (coefficient = −2.532; z = −1.954). These results indicate that there is no consistent understanding of the characteristics and number of CRAs. However, these results show that multiple ratings improve CRAs' ability to detect earnings management.

Table 7 Ordered probit estimation results of the association between ratings and the managed portion of earnings including invers mill ratio

Dependent variable	(1) ALL $RATE_{i,j,t}$	(2) ALL $CHRATE_{i,j,t}$	(3) BBB- & BB+ $CHRATE_{i,j,t}$
$ABACC_{i,t}$	4.055***	8.310***	14.869***
	(4.921)	(10.497)	(5.877)
$COMP\_REM_{i,t}$	6.041***	7.227***	12.443***
	(7.905)	(13.142)	(5.673)
$ABACC_{i,t} * MULTI_{i,t}$	−2.716**	0.439	−1.432
	(−2.387)	(0.435)	(−0.506)
$COMP\_REM_{i,t} * MULTI_{i,t}$	−1.153**	0.056	−2.427***
	(−2.436)	(0.219)	(−2.604)
$MULTI_{i,t}$	0.033	0.085**	0.359***
	(0.492)	(2.304)	(2.779)
$PMROA_{i,t}$	5.631***	6.884***	12.478***
	(8.469)	(12.904)	(5.824)
$LEV_{i,t}$	−7.691***	0.680***	−0.748
	(−13.511)	(3.073)	(−1.069)
$ODEBT_{i,t}$	−6.059***	1.123***	−0.474
	(−17.817)	(7.689)	(−1.018)
$PPE_{i,t}$	1.079***	0.205	0.941**
	(3.548)	(1.416)	(2.100)
$SIZE_{i,t}$	1.046***	−0.069***	0.116*
	(13.988)	(−4.132)	(1.707)
$CHPMROA_{i,t}$		1.044***	0.580
		(4.012)	(1.027)
$CHLEV_{i,t}$		−6.502***	−6.879***
		(−11.370)	(−4.646)
$CHODEBT_{i,t}$		−5.362***	−6.359***
		(−10.932)	(−5.295)
$CHPPE_{i,t}$		−1.018	0.488
		(−1.321)	(0.256)
$JCR_{i,j,t}$	0.534***	0.028	−0.016
	(10.375)	(1.130)	(−0.148)
$S\&P_{i,j,t}$	−1.772***	0.214***	−0.369**
	(−16.354)	(5.228)	(−2.240)
$MOODY'S_{i,j,t}$	−1.411***	−0.174**	−0.510
	(−9.706)	(−2.196)	(−1.550)
$FITCH_{i,j,t}$	−2.464***	−0.172	−0.361
	(−11.161)	(−1.544)	(−1.410)
$IMR_{i,t}$	−0.640***	0.115	−0.055
	(−4.093)	(1.428)	(−0.271)
YEAR	Included	Included	Included
INDUSTRY	Included	Included	Included
Observations	12,428	12,428	1,148
Pseudo R^2	0.273	0.132	0.206

*, ** and *** denote statistical significance at the 10%, 5% and 1% level. All variables are as defined in Appendix B. Z-statistics are shown in parentheses below coefficient estimates. Standard errors are clustered by firms.

Table 8 Ordered probit estimation results of the effect of the CRAs' characteristics on the association between ratings and the managed portion of earnings

	(1) ALL	(2) ALL	(3) ALL	(4) ALL	(5) BBB- & BB+	(6) BBB-& BB+
Dependent variable	$RATE_{i,j,t}$	$RATE_{i,j,t}$	$CHRATE_{i,j,t}$	$CHRATE_{i,j,t}$	$CHRATE_{i,j,t}$	$CHRATE_{i,j,t}$
$ABACC_{i,t}$	3.951***	3.936***	8.340***	8.418***	15.774***	15.610***
	(4.888)	(4.844)	(10.811)	(10.844)	(6.498)	(6.416)
$COMP\_REM_{i,t}$	5.957***	5.958***	7.211***	7.316***	12.442***	12.337***
	(7.829)	(7.808)	(12.905)	(13.075)	(5.589)	(5.509)
$ABACC_{i,t}$* $2CRAs_{i,t}$	−2.486**		0.752		−4.767*	
	(−2.076)		(0.742)		(−1.778)	
$ABACC_{i,t}$ * $2CRAs\_LOCAL_{i,t}$		−2.164		1.106		0.225
		(−1.449)		(1.031)		(0.064)
$ABACC_{i,t}$ * $2CRAs\_GLOBAL_{i,t}$		−2.804		−0.340		−8.660**
		(−1.487)		(−0.196)		(−2.365)
$ABACC_{i,t}$ * $3CRAs_{i,t}$	−2.804	−2.821	−0.676	−0.529	−1.747	−0.879
	(−1.315)	(−1.321)	(−0.366)	(−0.286)	(−0.382)	(−0.193)
$COMP\_REM_{i,t}$ * $2CRAs_{i,t}$	−0.822*		−0.010		−3.013***	
	(−1.701)		(−0.038)		(−3.148)	
$COMP\_REM_{i,t}$ * $2CRAs\_LOCAL_{i,t}$		−0.941*		−0.144		−4.289***
		(−1.707)		(−0.484)		(−3.028)
$COMP\_REM_{i,t}$ * $2CRAs\_GLOBAL_{i,t}$		−0.522		0.293		−2.532*
		(−0.531)		(0.636)		(−1.954)
$COMP\_REM_{i,t}$ * $3CRAs_{i,t}$	−2.117**	−2.117**	0.356	0.301	−1.112	−0.915
	(−2.321)	(−2.305)	(0.570)	(0.484)	(−0.576)	(−0.483)
$2CRAs_{i,t}$	0.050		0.067*		0.279**	
	(0.827)		(1.860)		(2.357)	
$2CRAs\_LOCAL_{i,t}$		0.020		0.131***		0.487***
		(0.284)		(3.531)		(3.093)
$2CRAS\_GLOBAL_{i,t}$		0.118		−0.072		0.084
		(1.171)		(−1.146)		(0.490)
$3CRAs_{i,t}$	−0.054	−0.035	0.047	0.018	0.100	−0.004
	(−0.478)	(−0.314)	(0.831)	(0.320)	(0.532)	(−0.021)
$IMR_{i,t}$	−0.632***	−0.636***	0.105	0.105	−0.061	−0.035
	(−4.058)	(−4.096)	(1.316)	(1.298)	(−0.299)	(−0.169)
Controls	Included	Included	Included	Included	Included	Included
YEAR	Included	Included	Included	Included	Included	Included
INDUSTRY	Included	Included	Included	Included	Included	Included
Observations	12,428	12,428	12,428	12,428	1,148	1,148
Pseudo R^2	0.274	0.274	0.132	0.133	0.208	0.212

*, ** and *** denote statistical significance at the 10%, 5% and 1% level. All variables are as defined in Appendix B. Z-statistics are shown in parentheses below coefficient estimates. Standard errors are clustered by firms.

7. Conclusion

This study examines the accrual-based and real activities earnings management of firms near borderline credit ratings and their effects on credit ratings. Using the ratings of long-term issuers in Japan, there is evidence that real activities earnings management near borderline ratings is pronounced. Moreover, real earnings management positively affects credit rating decisions. However, the effect of earnings management on rating decisions is weakened by multiple ratings. These results suggest that multiple ratings can improve rating quality, supporting the information production hypothesis of multiple ratings.

This study's findings contribute to the literature on earnings management in relation to credit ratings. This study also contributes to the literature on multiple ratings. My findings suggest that multiple ratings could be useful in decreasing earnings management and leading CRAs to make appropriate rating decisions. These results may be of interest to investors and regulators.

In spite of several contributions, this study has several limitations. First, multiple ratings are endogenously determined, which may lead to self-selection bias. This paper attempts to mitigate the endogeneity problem, but the results may be affected by the potential omitted variables. Second, our results are conditional on the validity of earnings management measures. The measurement problem may raise concern that my results reflect firm performance rather than managerial opportunism. Future research will need to address them further.

Appendix A. The definition of long-term issuer rating symbol by CRAs

	R&I	JCR	MDY	S&P	Fitch
AAA	Highest creditworthiness	The highest level of certainty	The highest quality	Extremely strong capacity to meet its financial commitments	Highest credit quality.
AA	Very high creditworthiness	A very high level of certainty	High quality	Very strong capacity to meet its financial commitments.	Very high credit quality
A	High creditworthiness	A high level of certainty	Upper-medium grade	Strong capacity to meet its financial commitments	High credit quality
BBB	Creditworthiness is sufficient	An adequate level of certainty	Medium-grade	Adequate capacity to meet its financial commitments	Good credit quality.
BB	Creditworthiness is sufficient for the time being	The certainty may not persist in the future	Speculative	Less vulnerable in the near term than other lower-rated obligors	Speculative.
B	Creditworthiness is questionable	A low level of certainty	Speculative and are subject to high credit risk.	More vulnerable than the obligors rated 'BB',	Highly speculative.
CCC	Creditworthiness is highly questionable	There is a possibility of default	Speculative of poor standing	Currently vulnerable	Substantial credit risk
CC	All of the financial obligations of an issuer are likely to default.	A high default risk	Highly speculative	Currently highly vulnerable.	Very high levels of credit risk.
C		A very high default risk	The lowest rated and are typically in default.		Near default
D	All of the financial obligations of an issuer are in default.	All the financial obligations are, in effect, in default		Default will be a general default	Default

Appendix B. Definition of variables

Variables	Definition
ABACC	The residual of the following regression based on Kothari et al. (2005) $TA_{i,t} = \alpha_0 + \alpha_1 1/ASSETS_{i,t} + \alpha_2 \triangle SALE_{i,t} + \alpha_3 TANG_{i,t} + \alpha_4 ROA_{i,t-1} + u_{i,t}$ where TA is total accruals, defined as the difference between net income before extraordinary items and operating cash flow in period t deflated by total assets in year t-1; *ASSETS* is total assets; *SALES* is the total sales deflated by total asset in year t-1; *PPE* is property, plant, and equipment deflated by total assets in year t-1; *ROA* is return on asset defined as net income in period t, which is income before tax and extraordinary items in accordance with Japanese GAAP, deflated by total assets in year t-1.
ABCOST	The residual of the following regression based on Roychowdhury (2006). $PROD_{i,t} = \alpha_0 + \alpha_1 1/ASSETS_{i,t-1} + \alpha_2 SALES_{i,t} + \alpha_3 \triangle SALES_{i,t} + \alpha_4 \triangle SALES_{i,t-1} + \alpha_5 ROA_{i,t-1} + u_{i,t}$ where *PROD* is production costs in year t defined as the sum of cost of goods sold and the change in inventories deflated by the total assets in year t-1; *ASSETS* is the total asset; *SALES* is the total sales deflated by total assets in year t-1; *ROA* is the return on assets defined the net income in period t defined by total assets in year t-1.
ABEXP	The residual of the following regression multiplied by -1based on Roychowdhury (2006). $DISC\_EXP_{i,t} = \alpha_0 + \alpha_1 1/ASSETS_{i,t-1} + \alpha_2 SALES_{i,t-1} + \alpha_3 ROA_{i,t-1} + u_{i,t}$ where *DISC_EXP* is the discretionary expenses in period t defined as selling, general and administrative expenses deflated by total assets in year t-1; *ASSETS* is the total asset; *SALES* is the total sales deflated by total assets in year t-1; *ROA* is the return on assets defined the net income in period t defined by total assets in year t-1.
ABCFO	The residual of the following regression multiplied by -1based on Roychowdhury (2006). $CFO_{i,t} = \alpha_0 + \alpha_1 1/ASSETS_{i,t-1} + \alpha_2 SALES_{i,t} + \alpha_3 \triangle SALES_{i,t} + \alpha_4 ROA_{i,t-1} + u_{i,t}$ where *CFO* is Cash flow from operations in period t deflated by total assets in year t-1; *ASSETS* is the total asset; *SALES* is the total sales deflated by total assets in year t-1; *ROA* is the return on assets defined the net income in period t defined by total assets in year t-1.
COMP_REM	A composite measure of real earnings management as the sum of the *ABCOST* and *ABEXP*.
TEM	A composite measure of accrual and real earnings management as the sum of the fractional ranks of *ABACC*, *ABCOST* and *ABEXP* divided by 3.
AAA(AA+,AA,AA-, A+,A-,BBB+, BBB,BBB-,BB+,BB, BB-,B+,B,B-,CCC)	A binary variable, coded as 1 if a firm is rated as AAA (AA+, AA, AA-, A+, A-, BBB+, BBB, BBB-, BB+, BB, BB-, B+ and below) grade by CRAs, and 0 otherwise.
DBTM	*DBTM* is the industry-year mean adjusted *BTM* defined as the book value of equity divided by market value of equity in year t minus industry-year mean of BTM.
DROA	*DROA* is the industry-year mean adjusted ROA defined as the net income divided by total assets in year t minus industry-year mean of *ROA*.
DLEV	*DLEV* is the industry-year mean adjusted LEV defined as the Interest-bearing debt divided by total assets in year t minus industry-year mean of *LEV*.
DSIZE	*DSIZE* is the industry-year mean adjusted SIZE defined as the natural logarithm of total assets in year t minus industry-year mean of *SIZE*.
JCR	*JCR* is the binary variable that is equal to 1 if the JCR offers the credit rating, and 0 otherwise.
S&P	*S&P* is the binary variable that is equal to 1 if the S&P offers the credit rating, and 0 otherwise.

MOODY'S	*MOODY'S* is the binary variable that is equal to 1 if the Moody's offers the credit rating, and 0 otherwise
FITCH	*FITCH* is the binary variable that is equal to 1 if the FITCH offers the credit rating, and 0 otherwise.
MULTI	*MULTI* is the binary variable that is equal to 1 if the issuers have multiple rating, 0 otherwise.
2CRAs	*2CRAs* is the binary variable that is equal to 1 if the issuers have multiple rating from two CRAs, 0 otherwise.
2CRAs_LOCAL	*2CRAs_LOCAL* is the binary variable that is equal to 1 if the issuers have multiple rating from two R&I and JCR, 0 otherwise.
2CRAs_GLOBAL	*2CRAs_GLOBAL* is the binary variable that is equal to 1 if the issuers have multiple rating from two CRAs except for R&I and JCR, 0 otherwise.
3CRAs	*3CRAs* is the binary variable that is equal to 1 if the issuers have multiple rating from three CRAs, 0 otherwise.
RATE	*RATE* is issuer rating converted into numerical values from 1 (D) to 21 (AAA)
CHRATE	*CHRATE* is the ordinal variable coded as 1 (2, 3) if credit rating is downgraded (stays the same, is upgraded) by the end of the next fiscal year.
PMROA	*PMROA* is pre-managed operating income defined as operating income minus sum of the *ABACC* and *COMP_REM* divided by lagged total assets.
LEV	*LEV* is the leverage ratio defined as long-tem debt divided by total assets.
SIZE	*SIZE* is the natural logarithm of total asset in year t
ODEBT	*ODEBT* is the other debt ratio defined as total debt minus long-term debt divided by total assets.
PPE	*PPE* is the property, plants and equipment divided by total assets.
CHPMROA	*CHPMROA* is the changes on PMROA from year t-1 to t.
CHLEV	*CHLEV* is the changes on *LEV* from year t-1 to t.
CHODEBT	*CHLEV* is the changes on *ODEBT* from year t-1 to t.
CHPPE	*CHLEV* is the changes on *PPE* from year t-1 to t.
MULTI	*MULTI* is an indicator variable that is equal to 1 if the firm has ratings from more than 2 CRAs, and 0 otherwise.
PUBLIC_D	*PUBLIC_D* is an indicator variable that is equal to 1 if the firm had public debt outstanding (bond issuance), and 0 otherwise.
CP	*CP* is an indicator variable that is equal to 1 if the firm had commercial paper outstanding (CP issuance).
INSTOWN	*INSTOWN* is the percentage of financial institutions equity ownership.
FOREIGN	*FOREIGN* is the foreign sales intensity defines as foreign sales divided by total sales.

References

Ali, A. and Zhang, W. 2008. Proximity to broad credit rating change and earnings management. *Working Paper*. Available at SSRN: https://ssrn.com/abstract=1163003

Alissa, W.,Bonsall IV, S. B., Koharki, K., and Penn Jr., M. W. 2013. Firms' use of accounting discretion to influence their credit ratings. *Journal of Accounting and Economics* 55 (2-3) : 129–147.

Bae, K. H., Kang, J. K., and Wang, J. 2015. Does increased competition affect credit ratings? A reexamination of the effect of Fitch's market share on credit ratings in the corporate bond market. *Journal of Financial and Quantitative Analysis* 50 (5) : 1011–1035.

Becker, B. and Milbourn, T. 2011. How did increased competition affect credit ratings? *Journal of Financial Economics* 101（3）: 493–514.

Bolton, P., Freixas, X., and Shapiro, J. 2012. The credit ratings game. *The Journal of Finance* 67（1）: 85-111.

Bongaerts, D., Cremers, M. K. J., and Goetzmann, W. N. 2012. Tiebreaker: certification and multiple credit ratings. *The Journal of Finance* 67（1）: 113–152.

Boot, A. W. A, Milbourn, T. T., and Schmeits, A. 2006. Credit ratings as coordination mechanisms. *The Review of Financial Studies* 19（1）: 81–118.

Brister, B. M., Kennedy, R. E., and Liu, P. 1994. The regulation effect of credit ratings on bond interest yield: the case of junk bonds. *Journal of Business Finance & Accounting* 21（4）: 511–531.

Brown, K., Chen, V. Y. S., and Kim, M. 2015. Earnings management through real activities choices of firms near the investment–speculative grade borderline. *Journal of Accounting and Public Policy* 34（1）: 74–94.

Camanho, N., Deb, P. and Liu, Z. 2020. Credit rating and competition. *International Journal of Finance and Economics* 27（3）: 1–25.

Cantor, R. and Packer, F. 1994. The credit rating industry. *Federal Reserve Bank of New York Quarterly Review* 19, 1–26.

Cantor, R. and Packer, F., 1997. Differences of opinion and selection bias in the credit rating industry. *Journal of Banking & Finance* 21（10）: 1395–1417.

Chemmanur, T. J. and Fulghieri, P. 1994. Reputation, renegotiation, and the choice between bank loans and publicly traded debt. *The Review of Financial Studies* 7（3）: 475–506.

Cohen, A. and Manuszak, M. D. 2013. Ratings competition in the CMBS market. *Journal of money, credit and banking* 45(s1）: 93–119.

DeFond, M. L. and Jiambalvo, J. 1994. Debt covenant violation and manipulation of accruals. Journal of Accounting and Economics 17（1）: 145–176.

Demitras, K. O. and Cornaggia, K. R. 2013. Initial credit ratings and earnings management. *Review of Financial Economics* 22（4）: 135–145.

Diamond, D. W. 1989. Reputation acquisition in debt markets. *The Journal of Political Economy* 97（4）: 828–862.

Diamond, D. W. 1991. Monitoring and reputation: the choice between bank loans and directly placed debt. *The Journal of Political Economy* 99（4）: 689–721.

Doherty, N. A. and Kartasheva, A. V., & Phillips, R. D. 2012. Information effect of entry into credit ratings market: the case of insurers' ratings. *Journal of Financial Economics* 106（2）: 308–330.

Enomoto, M. and Shuto, A. 2013. Detecting accounting manipulation in bankrupt firms. Contemporary Disclosure Research 13: 33–48.（in Japanese）

García Lara, J. M., García Osma, B. and Neophytou, E. 2009. Earnings quality in ex－post failed firms. *Accounting and Business Research* 39（2）: 119–138.

Goel, A. M. and Thakor, A. V. 2010. Credit ratings and litigation risk. *Working Paper*. Washington University in St. Louis. Available at SSRN: https://ssrn.com/abstract=1787206

Gonzalez, F., Haas, F., Johannes, R., Persson, M., Toledo, L., Violi, R. Wieland, M., and Zins, C. 2004. Market dynamics associated with credit ratings: a literature review. *European Central Bank Occasional Paper Series* 16: 1–38. Retrieved from https://ideas.repec.org/p/ecb/ecbops/200416.html

Government Pension Investment Fund（GPIF）. 2020. *Operation policy*. Retrieved from https://www.gpif.go.jp/en/info/legislation.html

Griffin, J. M., Nickerson, J., and Tang, D. Y. 2013. Rating shopping or catering? An examination of the response to competitive pressure for CDO credit ratings. *The Review of Financial Studies* 26（9）: 2270–2310.

Hand, J., Holthausen, R., and Leftwich, R. 1992. The effect of bond rating agency announcement on bond and stock prices. *The Journal of Finance*, 47(2): 733–752.

Heckman, J. J. 1979. Sample selection bias as a specification error. *Econometrica* 47(3): 153–161.

Holthausen, R. and Leftwich, R. 1986. The effect of bond rating changes on common stock prices. *Journal of Financial Economics* 17(1): 57–89.

Hörner, J. 2002. Reputation and competition. *American Economic Review* 92(3): 644–663.

John, K. and Nachman, D. C. 1985. Risky debt, investment incentives, and reputation in a sequential equilibrium. *The Journal of Finance* 40（3）: 863–878.

Jones, S. 2011. Does the capitalization of intangible assets increase the predictability of corporate failure? *Accounting Horizons*: 25(1): 41–70.

Jung, B., Soderstrom, N., and Yang, Y. S. 2013. Earnings smoothing activities of firms to manage credit ratings. *Contemporary Accounting Research* 30(2): 645–676.

Katsuda, H., Tanaka, K. and Hagiwara, M. 2011. *Kakuzuke no kenkyu: shinyo risk bunseki no hyouka*. Chuokeizai-sha, Inc（in Japanese）.

Kurosawa, Y. 1985. *Saiken kakuzuke no kenkyu*. Toyo Keizai, Inc（in Japanese）.

Kurosawa, Y. 2007. *Kakuzuke kaisya no kenkyu*. Toyo Keizai, Inc（in Japanese）.

Kiff, J., Nowak, S., and Schumacher, L. 2012. Are rating agencies powerful? An investigation into the impact and accuracy of sovereign ratings. *IMF Working Paper*. Retrieved from https://ideas.repec.org/p/imf/imfwpa/2012–023.html

Kisgen, D. J. 2006. Credit ratings and capital structure. *The Journal of Finance* 61(3): 1035–1072.

Kothari, S. P., Leone, A. J., and Wasley, C. E. 2005. Performance matched discretionary accrual measures. *Journal of Accounting and Economics* 39(1): 163–197.

Liu, A. Z., Subramanyam, K. R., Zhang, J., and Shi, C. 2018. Do firms manage earnings to influence credit ratings? Evidence from negative credit watch resolutions. *The Accounting Review* 93(3) : 267–298.

Morita, T. 2010. *Inside credit rating*. Nikkei Publishing Inc. (in Japanese).

Morkoetter, S., Stebler R., and Westerfeld, S. 2017. Competition in the credit rating Industry: Benefits for investors and issuers. *Journal of Banking and Finance* 75: 235–257.

Rosner, R. L. 2003. Earnings manipulation in failing firms. *Contemporary Accounting Research* 20(2) : 361–408.

Roychowdhury, S. 2006. Earnings management through real activities manipulation. *Journal of Accounting and Economics* 42(3) : 335–370.

Sangiorgi, F. and Spatt, C. 2015. Opacity, credit rating shopping, and bias. *Working Paper*, Carnegie Mellon University. Available at SSRN: http://ssrn.com/abstract=2260045.

Securities and Exchange Commission (SEC) . 2011. Annual report on nationally recognized statistical rating organizations. Washington, DC: SEC.

Sweeney, A. P. 1994. Debt-covenant violations and managers' accounting responses. *Journal of Accounting and Economics* 17(3) : 281–308

Tamura, K. 2006. Riyousya kara miru kakuzuke no seidoteki tokutyo. *The business review of Kansai University*, 50, 39–53 (in Japanese).

Tamura, K. 2021. High-yield bond issuance in the United States in the 1970s. *The business review of Kansai University*, 66(2), 13–24 (in Japanese).

Tanaka, H. and Ishiwatari, A. 2016. *Kakuzuke: kachi no saininshiki to hirogaru toushi senryaku*. Nikkei Publishing Inc. (in Japanese).

Tucker, J. 2010. Selection bias and econometric remedies in accounting and finance research. *Journal of Accounting Literature* 29: 31–57.

Xia, H. 2014. Can investor-paid credit rating agencies improve the information quality of issuer-paid rating agencies? *Journal of Financial Economics* 111(2) : 450–468.

Xia, H. and Strobl, G. 2012. The issuer-pay rating model and ratings inflation: Evidence from corporate credit ratings. *Working Paper*. Available at SSRN: https://ssrn.com/abstract=2002186