

A MULTI-COUNTRY STUDY OF FACTORS AFFECTING CREDIT RATINGS REVISIONS

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ABSTRACT

This paper reveals findings from extending corporate credit rating studies towards (i) *new ratings, affirmation, confirmation, watchlists, and withdrawal*, which together represent five out of eight rating types yet to be studied rigorously (there are several papers on upgrades and downgrades); and (ii) identifying key firm-specific factors affecting stock prices around the rating revisions in markets not yet studied. The firm-specific factor effects are measured using the Ordered Probit methodology. Results show that investment and speculation grade issues have the most pronounced effects on price changes. Further findings are: interest-coverage, profitability and leverage ratios, all of which stand out as the most relevant firm-specific factors correlated with stock price changes. An interesting new finding is the discovery of corruption perception scores as a new measure is significantly influencing *affirmation, confirmation and downgrade* ratings. These new findings are likely to be of interest to investors, corporations wanting to know rating change effects and the external regulators concerned with financial weaknesses/strengths of listed firms facing rating changes.

Keywords: Credit rating, New, Affirmation, Confirmation, Withdrawal Ratings, Ordered Probit Model

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1. INTRODUCTION

This paper has two aims: (i) report new findings on the less studied rating effects from five types of credit ratings yet studied and (ii) identify key firm-specific/general factors associated with credit rating changes. The literatures on credit ratings is mostly about the effects on stock prices from credit upgrades and downgrades in few major world economies such as the United States (U.S.) where data are more readily available due to oversight rules of mature rating markets. There is also an apparent lack of attention on other type of ratings. Whereas, this paper is on four selected developed economies in the Asia-Pacific region: Australia, Hong Kong, South Korea and Japan. This study extends the literature to other less-studied credit rating types and discovers key factors associated with stock-price changes in a multi-market setting. Not only are the results

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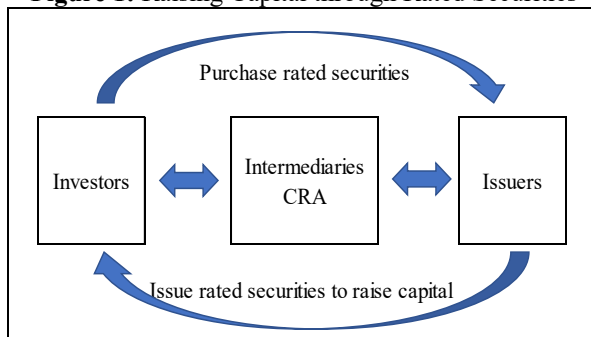
new for the four major Asia Pacific economies, the extension of the study towards item (ii) makes the study offer significant new direction.

Credit rating agencies (CRAs) are independent agents with a critical say as opinion on corporations' abilities to service debts. CRAs play significant and increasingly (allegedly) ominous role in making a verdict based on their private-assessment of a firm's creditworthiness by rating revisions. The credit rating literature is not extensive on the important factors influencing credit rating correlated with stock price changes at the time of rating analysed by different types of ratings. Therefore, this paper will help provide some answers to issuers and investors to make more effective investment decisions on several rating revisions.

CRAs are criticized widely for not warning the public adequately on impending bankruptcies; for amplify ratings due to conflicts of interest in competition for more business; and for their role in the 2008-9 sub-prime mortgage crisis. Gigantic firm such as Lehman Brothers in 2008 were still rated investment grades by Moody's Investors Service (Moody's) and S&P Global Ratings (S&P) near to their bankruptcy filing! Subjective judgments often play vital role in the rating process, it is alleged. Rating inflation is acute if the brokerage firms assist the same firms that solicit funding issues with related parties since the related brokerage firms have high inclination to amplify their stock recommendations to secure more business (Chan, Karceski, & Lakonishok, 2007; Lim, 2001). That is a telling criticism at the micro-level of the rating phenomenon. Notwithstanding shortfalls from critiques, CRAs are still highly sought after for their certification services to induce investors to invest thus they play a pivotal role in information signal to investors and policy makers.

When a country/firm wants to access a capital market for funds, the governments/managers seek credit ratings from the CRAs (Figure 1). The certification impacts are enormous to governments and firms such as higher foreign direct investment flow (Cai, Gan, & Kim. 2018; Ismailescu & Kazemi, 2010), ability to raise funds at cheaper cost (Agarwal, 2013; Modina, 2015), lower merger and acquisition fees for rated targets compared to non-rated firms (Karampatsas, Petimezas, & Travlos, 2014) and significantly increasing incumbent election prospects (Cunha, Ferreira, & Silva, 2016) in governments.

Figure 1: Raising Capital through Rated Securities



The life cycle of a rated firm commences with an ‘*initial*’ (*new*) rating, and this may frequently follow with a rating ‘*affirmation*’ with no changes. Alternately, CRAs may place the firm under ‘*Watchlist*’ status upon receiving news, normally concluded within 90 days by a subsequent announcement whether the firm will be *downgraded* or *upgraded*. Firms with deteriorating finances and high-level debts are potentially downgrade by CRAs, indicating their inability to service debt. On the other hand, a ‘*confirmation*’ rating takes place when removed from Watchlist status (Moody’s, 2009) with no rating revision. The rating life cycle ends when the rating of a firm is ‘*withdrawn*’ from the market for several reasons. Ratings can be withdrawn when issuer consolidates the holding or family control normally wanting to possess better rating. Ratings withdrawal also occurs due to merger and acquisition, insolvency, insufficient information, reorganization and bankruptcy. Once the rating is withdrawn, the issuer will no longer be rated by the CRAs.

Research Questions

CRA’s role is not limited to initial information dissemination but also other rating changes. Past research focus has always been on rating upgrades and downgrades as noted. This study is motivated to address the lack of scrutiny on firms by studying possible factors influencing credit-rating changes/revisions around disclosures times by *individual* rating type: *new*, *affirmations*, *confirmations* and *withdrawal* ratings less studied, using Ordered Probit approach. (There are eight rating revisions in total in this study.) A rating *withdrawal* could be detrimental if the issuer is forced to settle its debt immediately upon a loss of rating. Therefore, do these credit rating disclosures yield valuable information to the investors?

This paper also extends the work of Gray, Mirkovic, and Ragunatha (2006) in three directions. First, we select four developed countries instead of focusing only on Australia, to obtain a wider perspective. Second interesting feature is we extend the ratings approach up to five values using Ordered Probit method to discriminate effectively between the investment and speculation-rated firms. In contrast, Gray et al., (2006) used three types and limited the search to investment grades firms only. Third, we introduce two interesting variables; (i) corruption perception index (CPI), an index published annually by Transparency International since 1995; and (ii) re-investment variable to distinguish the investment issues from the speculation-rated issues for all rating changes.

The paper is first organized with an introduction. This follows a literature review in Section 2 and Section 3 describes the data and methodology. We present the findings and comment our thoughts as our interpretations of major findings reported in Section 4. Lastly, Section 5 concludes the paper.

2. RELEVANT LITERATURE REVIEW

This study is in line with the emergent resurgence of interest concerning the effects of CRA’s rating actions on firms’ behavior compared to the vast literature on credit ratings. We discuss only the articles closely related to our work. Modigliani and Miller (1958) assume market information is symmetric in a perfect market when firms and investors possess the same information. However, this assumption is not realistic since managers possess more information

than investors (Myers & Majluf, 1984). Information asymmetry also known as information failure occurs when one party possesses greater information than another. Hence, one of the market conflicts is information asymmetry between managers and investors about the firm's value, which the CRAs address.

Empirical studies by Barron, Clare, and Thomas (1997), Sufi (2009), Becker and Milbourn (2011), Fulghieri, Strobl, and Xia. (2014), Safari and Ariff (2015), and Ng and Ariff (2019) show significant contributions by CRAs influencing the markets. Information asymmetry is reduced when firms use the assessment and monitoring expertise of CRAs (Boot, Milbourn, & Schmeits, 2006; He, Wang, & Wei, 2011; Livingston & Zhou, 2016). In a survey conducted using 392 chief financial officers, Graham and Harvey (2001) find 57% of respondents indicate a good credit rating is the second most important factor in determining debt policy while financial flexibility is the first factor.

There is a paucity of studies of the impact on stock returns from other than studies of rating upgrades, suggesting the absence of information content (Holthausen & Leftwich, 1986; Goh & Ederington, 1993; Barron et al., 1997) on other types. However for firms with rating downgrades by empirical literature of Holthausen and Leftwich (1986) and Jorion and Zhang (2007) find significant effects on daily stock returns. Issuers have little incentive to leak negative news prior to downgrades. For CreditWatch ratings, where a review is possible for a further upgrade or downgrade or confirmation with no rating change, Matolcsy and Lianto (1995) and Elayan, Hsu, and Meyer (2003) report significant impact from these on stock returns. Boot et al., (2006) note that CreditWatch is a form of monitoring device and the effectiveness of rating changes are influenced by the information collection in the evaluation procedures, hence, this will possibly affect the information content of rating changes. On the other hand, new entrants and firms with rating affirmations are rarely studied; Ng and Ariff (2019) show that these ratings have significant impact also on stock returns.

In response to new information provided by CRAs, investors benefit by separating 'risky/speculative' investments and high-quality investments. Ryan, Villupuram, and Zygo (2017) and Dichev and Piotroski (2001) analysed the speculative and investment-grade firms concentrating on two classification of credit risk (downgrades and upgrades) and find significant impact from rating downgrades. In the same spirit, Tang (2009) shows firms with favourable ratings enjoy better access to capital markets (an "A1" rating (investment-grade) is better than "B1" (speculative-grade)) help raise more funds (Sufi, 2009). Low-credit rated entities pay higher interest rates than those with better credit scores. Therefore, the assessment provided by CRAs stimulate borrowers to pursue sounder financial and economic policies to access international capital markets (Agnello, Castro, & Sousa, 2018). Firms that obtain credit ratings from CRAs increased their borrowings since the managers are able to raise more funds in syndicated debt financing (Sufi, 2009). Thus, these rated firms suffer less from underinvestment due to capital constraints (Harford & Uysal, 2014).

Credit ratings and corporate defaults are closely related. Lower rated firms are more likely to default than those with higher ratings. Using financial ratios in a default prediction model is often analysed in rating prediction and the estimation is centered around the seminal work of Altman (1968) and later. Managers can initiate remedial actions to circumvent deterioration and investors can adjust their investment strategies to reduce anticipated losses. Therefore, a firm's default risk

is a forward-looking measure of the firm's probability of default. Shen, Huang, and Hasan (2012) and Vives (2006) point to the effect of financial ratios on banks' credit ratings as being significant as measured by the level of information asymmetries.

CRA's are concerned with corporate governance issue because weak governance impairs a firm's financial position and may lead to investors vulnerable to losses. Corruption is part of corporate governance measure and countries with higher corruption index show less capability to service debt obligations, and garner lower credit ratings (Erdem & Varli, 2014; Jain, Kuvvet & Pagano, 2017; Mellios & Paget-Blanc, 2006). Jain et al., (2017) argue that countries with high corruption levels will lead to more asymmetric information, thus to investor uncertainty, hence lead to negative impact on foreign equity investment. From an economic standpoint, the operating and financing cost will increase due to corruption.

Dichev and Piotroski (2001), May (2010) and Ryan et al., (2017) studied the credit rating reaction effects of speculative versus investment grade firms using downgrades and upgrades. Firms are more restricted in their access to credit, because of information asymmetry problems in the relationship between management versus investors. May (2010) shows that the reactions to an upgrade are strong if the firm upgrades from speculative to investment grade. While most firms default within the range from one to five years (median) from the original rating have speculative-grade ratings, by comparison, only eight firms with bonds initially rated as AAA defaulted over the 1981–2017 period with 18.5 median years from the original rating: this is a definitive study using 2,672 rated global corporates (Standard & Poor's 2017, p. 37). Akhigbe, Madura, and Whyte (1997) find that private information disclosed to markets through credit rating changes extends not only to rated firms but also to other firms operating in the same industry. Hence, the importance of studying the distinction between speculative and investment grades for study.

3. DATA DESCRIPTION AND METHODOLOGY

3.1 Data Description

Four developed countries are selected for study: Australia, Japan, Korea and Hong Kong (an economy not a country) within the Asia-Pacific region. The sample selection is over a 15-year period from 2004 to 2018, using the rating information from Moody's database to control diversity of ratings. The financial statements are obtained from Datastream, Yahoo Finance and Bloomberg. Corruption perception index data is obtained from the Transparency International Reports. There are 467 observations comprising firms with investment ratings (72%) and speculative ratings (28%) and we study the rating types seldom studied by others.

Australia is selected in this study as the country is amongst ones with the most developed capital markets in the world. Australia has been relatively immune to adverse macroeconomic shocks compared to the U.S. economy often susceptible to financial crises (Brown & Davis, 2010). According to the World Investment Report 2017, Japan is a top prospective investment preference developed countries besides the U.S. This is also pointed to by Ismailescu and Kazemi (2010) that majority of countries look to the U.S. for investment while Asian nations turn to Japan for financing. Korea is selected due to the country's resiliency and improved monitoring

systems following the stronger institutional developed following the 1997 Asian financial crisis, which in turn steered and increased the importance of credit rating in the country (Black & Kim, 2012). Hong Kong’s stock market is mature and highly liquid. The Hong Kong Stock Exchange was ranked fourth globally with funds raised of USD14.7 billion (KPMG, 2017) and the initial public offerings in Hong Kong were oversubscribed in 2017 reflecting strong investor confidence in the Hong Kong economy.

3.2 Rating Scale

Table 1 is a summary of long-term rating symbols and interpretations for three major CRAs; Moody’s, S&P and Fitch Ratings (the ‘Big Three’), all of which dominate 95% of the global rating industry market. Moody’s and S&P each hold 40% and Fitch about 15% (Christopher, 2012). The rating scales are classified into two groups; investment and speculation grades.

Table 1: Rating Scale and Interpretation

Moody’s*	S&P**	Fitch#	Remarks
Panel A: Investment Grade			
Aaa	AAA	AAA	Highest credit quality. The firm has extremely strong credit standing.
Aa1	AA+	AA+] Very strong capacity to meet financial commitments.
Aa2	AA	AA	
Aa3	AA-	AA-	
A1	A+	A+] High credit quality. Capacity to meet financial commitments is still strong.
A2	A	A] Adequate capacity to meet financial commitment.
A3	A-	A-	
Baa1	BBB+	BBB+	
Baa2	BBB	BBB]]
Baa3	BBB-	BBB-	
Panel B: Speculative Grade			
Ba1	BB+	BB+] Indicate vulnerability to default risk.
Ba2	BB	BB] Capacity for continued payment is vulnerable due to deterioration in business and economic environment.
Ba3	BB-	BB-	
B1	B+	B+	
B2	B	B]]
B3	B-	B-	
Caa1	CCC+	CCC] Default is highly likelihood.
Caa2	D	D] Payments are in default.
Caa3	D	D] In bankruptcy or default shortcoming.
Ca/C	D	D]]

Sources: *Moody’s Rating Symbols and Definitions (2009); **Standard & Poor’s Ratings Definitions (2012); #Fitch Ratings – Definitions of Ratings (2014)

3.3 Ordered Probit Methodology

Credit ratings are discrete data that take a finite number ranging from Aaa to D, rather than continuous values. Discrete data can take on only integer values whereas continuous data can take any value (Gray et al., 2006; Kaplan & Urwitz, 1979). Kaplan and Urwitz (1979) document that using publicly available data can predicate to some level of accuracy by employing Ordered Probit methodology. Second, credit ratings have natural ordering/ranking. Aa1 is higher than Aa2, which in turn is higher than Ba1 and so forth. The Ordered Probit methodology is able to make differentiation using the integer values. This method is a well-accepted approach in credit rating literature, following Blume, Lim, and MacKinlay (1998); Bouzouita and Young (1998); Gray et al., (2006); and Ozturk, Namli, and Erdal (2016). The matrix data table consists of five-probability value (Table 2). The dependent variable is assigned the value of 1 if the firm is rated between Aaa to Aa3; 2 if firm is rated A1, A2, A3 and so forth. Probability value from 1 to 3 refers to firms in investment grades whilst speculation firms fall under the values of 4 and 5.

Table 2: Matrix Table for Ordered Probit

Probability Value	1	2	3	4	5
Rating Announcement	Aaa	A1	Baa1,	Ba1,	B1
	Aa1	A2	Baa2,	Ba2,	B2
	Aa2	A3	Baa3	Ba3	B3
	Aa3				C

The ratings are coded in ordinal values as below;

$$R_i^* = \begin{cases} 1 & \text{if } R_i^* \leq \mu_0 \\ 2 & \text{if } \mu_0 < R_i^* \leq \mu_1 \\ 3 & \text{if } \mu_1 < R_i^* \leq \mu_2 \\ 4 & \text{if } \mu_2 < R_i^* \leq \mu_3 \\ 5 & \text{if } R_i^* > \mu_3 \end{cases}$$

The explanatory variable is described in Eq. (1) below;

$$R_i^* = X_i \beta + \varepsilon_i, \tag{1}$$

Where R_i^* is an unobserved continuous variable of the CRA’s assessment of the issuer; R_i is the observed rating category assigned to issuer i (the observed rating categories are assumed to represent ordered partitionings of the above continuous scale); X_i is a vector of explanatory variables for issuer i ; β is a vector of coefficients; ε_i is a standard normal random error with mean zero and variance and μ_i is threshold parameters. The final output of the Ordered Probit analysis is therefore a guideline to reflect the magnitude effect of each explanatory variable on the rating changes. This specification allows the intercept to vary over time while constraining the slope

coefficients β to be constant over time. Changes in the intercept over time can be viewed as a measure of change used in assigning ratings.

The equation for Ordered Probit modeling is as below:

$$R_{i,t} = \alpha + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} + \beta_4 X_{4it} + \dots + \beta_t X_{it} + \varepsilon_{it} \tag{2}$$

Where;

- $R_{i,t}$: dependent variable taking an assigned value
- α : the intercept
- $\beta_1 \dots \beta_t$: coefficients of the independent variables
- $X_1 \dots X_t$: independent variables
- ε : error term

3.4 Transformation of Financial Ratios

Financial data collected are transformed to ratios and subsequently to logarithm, as opposed to using absolute values, to correct deviations from normality and uneven variance (heteroskedasticity), as well as to reduce fat tails. A fat-tailed distribution also known as heavy-tailed statistical distribution describes the probability of certain events. Tail risk is a form of portfolio risk arises when the possibility that an investment will move more than three standard deviations from the mean is greater than what is shown by a normal distribution. Log transformation is applied to the variables to improve normality and reduce heteroskedasticity. The log transformations also reduce skewness in the distributions into one that is more approximately normal.

3.5 Reasons for Selection Specific Ratios

Models should be simple, aid in rational decision making and few parameters are preferable to many, according to the principle of parsimony (Bouzouita & Young, 1998). According to S&P (2006), there are no fixed rules in assigning a credit rating as subjectivity is at the heart of every rating. Moody’s and S&P use key financial ratios on profitability, interest coverage and leverage in their analysis of credit worthiness. This study employed selected ratios including profitability, interest coverage and leverage and included corruption perception index as a corporate governance measure; these are introduced as control variables (Table 3).

Table 3: Tested Variables

No.	Coverage	Independent Variables	Acronym
1	Profitability	Return on capital employed Expressed in ratio of earnings before interest and tax / total capital	ROCE
2	Profitability	Return on assets Expressed in ratio of net income / total asset	ROA
3	Profitability	Operating profit margin measures the percentage of a firm produces from operations before deducting interest charges and taxes.	OPMARGIN
4	Interest	EBITDA interest coverage Expressed in ratio of EBITDA to total interest expense.	EBITDAInt

No.	Coverage	Independent Variables	Acronym
	coverage	(EBITDA is earnings before interest, tax, depreciation and amortization)	
5	Leverage	Long term debt / total capital	LTDCAP
6	Leverage	Total debt / total assets	TDTA
7	Corruption Perception Index	The CPI measures the perceived corruption level of the country. Corruption threatens the sustainability of a country's economic.	CPI
8	Re-Investment	This is a dummy variable that takes value 0 for investment grade firms; and 1 for speculation grade firms.	DGRADE

Profitability

The accounting variables to be examined are (i) operating profit margin (OPMARGIN); (ii) return on capital employed (ROCE); and (iii) ROA; following Adams, Burton, and Hardwick (2003); Bouzouita and Young (1998), Gray et al., (2006); and Jiraporn, Jiraporn, Boeprasert, and Chang (2014) finding profitability variables statistically significant. Profitability reflects the firm's ability to maintain strong operation and adequate pricing. Operating profit margin measures the amount of income earned before paying off interest and tax expenses while ROCE and ROA assess the efficiency of how a firm utilizes equity and assets to generate earnings. ROCE measures a firm's profitability, which is capital-use efficiency. The ROCE ratio is considered an important profitability ratio, often used by investors to select well-funded investments. ROA is measured by net income over total assets, as the firm's ability to generate profit as a percentage of its total assets. The coefficients of the variables are expected to be positive.

Interest coverage

Interest coverage measures a firm's ability to generate sufficient cash to pay interest expenses on outstanding debts (Bouzouita & Young, 1998; Doumpou, Niklis, Zopounidis & Andriosopoulos, 2015). It is represented by EBITDA (earnings before interest, tax, depreciation and amortization) over total interest expense. The interest coverage ratio (EBITDAInt) is expected to have a positive effect because the higher the interest coverage ratio, the firm has greater ability to service interests.

Leverage

Long-term total debt to total capital (LTDTCAP), and total debt to total assets (TDTA) are proxies to the leverage analysis. Rating agencies place more weight on long-term debt relative to short-term debt (Gray et al., 2006). Leverage is tested as the proportion of a firm's assets financed through debt; Altman (1968); Bouzouita and Young, 1998; Jorion, Liu, and Shi (2005); and Ng and Ariff (2019). High level of debt increases a firm's default probabilities, hence it also increases insolvency. The coefficient of the variable is expected to be negative

Corruption Perception Index (CPI)

The CPI measures perception of corrupt behavior of management. Due to the difficulty of measuring absolute levels of corruption, we use the data as in Corruption Perceptions Index (Corruption Perceptions Index, 2010). The higher the CPI scores the better is the investment environment using a scale from 0 (highly corrupted) to 100 (least corrupted). In this research, Australia has a CPI score of 77 compares to Afghanistan with a lower score of 15 according to CPI 2017 Report. Hong Kong and Japan have a CPI score of 77 and 73 respectively while South Korea has a score of 54 in the year 2017.

Corruption is increasingly argued to be a barrier to development and economic growth (Wilhelm, 2002). Podobnik, Shao, Njavro, Ivanov & Stanley (2008) find there is a strong correlation between economic growth and corruption levels. They show that an increase of CPI by one unit leads to an increase of the annual GDP per capita by 1.7 % on an average for all countries. Corruption also distorts a country's legal system, weakens institutions foundation and slower development of the nation. The nation and firms will have lesser resources to work with and resulting in the businesses not effectively operate.

Re-investment

The re-investment variable takes value 0 for investment grade firms; and 1 for speculative grade firms. It serves as a proxy variable for qualitative facts and isolating time effect in a regression model (Gujarati, 2003). The re-investment variable is influenced by quantitative factors, but also by qualitative factors such as the management team and board of directors. This variable is to control the number of rating changes. This distinction is critical because many large institutions and pension funds are mandated to invest in investment grade instruments only (White, 2002).

4. FINDINGS AND DISCUSSIONS ON CREDIT REVISION IMPACT

Table 4 shows results of the relationship between credit rating changes and selected independent variables. The Ordered Probit regression examines each *individual* rating change rather than all ratings together, to have better understanding on the independent variables significantly affect each rating. The variance inflation factors (VIF) for each credit rating variable is below 10 showing no multicollinearity among independent variables. Overall, the model is statistically significant as evidenced by the Wald Chi-squared value with a p-value of 0.0000 for each rating category. The results are analyzed according to the grouping of the financial ratios.

The re-investment variable distinguishes between *investment and speculative* grades yields, and this is an important result of this study. The coefficient for the re-investment ratings level is positive and highly significant at 0.01 level probability almost for all ratings. The standard deviation (measurement of dispersion) of the re-investment (DGRADE) generally is the smallest and nearer to the mean among all the variables in each category of ratings (Appendix 1). Our results are consistent with Becker and Milbourn (2011) and Ryan et al., (2017) document significant coefficient values of the investment grade thus suggesting that investment grade firms have lower probability of default than those rated as speculative. The speculative rated firms generally experience greater negative abnormal returns than investment rated firms, negative

reaction to information asymmetry and have higher tendency to default. Hence, these four developed country behavior is similar to those reported in other studies. Remarkably, affirmation is highly significant and the watch upgrades rating have greater and significant impacts than the watch downgrades as measured by the coefficients size. This suggests that the watch upgrades and affirmation ratings offer more information, so offering greater assurance to investors. With favourable rating upgrades (includes watch upgrades) and no further downgrading (affirmation), investors will gain more confidence to invest in investment grade firms and may raise more capital for business expansion with expectation of lower borrowing cost.

The *profitability* ratios (represented by ROCE, ROA and operating profit margin) are statistically significant particularly for new and withdrawal ratings, followed by watch downgrade, watch upgrade and upgrades. The signs are positive except for one negative sign (ROCE) for rating withdrawal. There is a lack of studies on withdrawals so we are unable to compare. This suggests firms especially with speculative ratings are facing financial difficulties, hence are induced to withdraw from the rating market. Ratings withdrawal signals to investors a potential major change in the firm's performance. Firms and investors are concerned on the firm's ability to generate profits, which is pivotal for new entrants in the credit rating industry. Firms in watch downgrade, watch upgrade and just upgrades are no lesser of concern, as managers need to improve profitability as the first line of defence against losses and risk of downgrading by the CRAs.

Interest coverage is measured by earnings before interest, tax, depreciation and amortization (EBITDA) to interest expense, is significant impacting rating changes. These results are in line with what other researchers have reported; Doumpou et al., (2015), Gray et al., (2006), Amato and Furfine (2004). EBITDA interest coverage is statistically significant; new, affirmation, watch downgrade, and confirmation. These results indicate that rating agencies emphasize the importance of EBITDA as a stringent ratio after depreciation and amortization. It reflects a firm's true ability to service interest obligations from operational revenues. The sign for EBITDAInt is negative in our result. According to Gray et al., (2006) and Amato and Furfine (2004), interest coverage can be negative when earnings are negative. It is arguable that any increase (decrease) in operating incomes after depreciation should have positive (negative) effect for improving (decreasing) ratings. If the operating income is negative, a decline in interest expense will generally improve the net profit margin.

Next, *long term debt* to total capital (LTDCAP) and *total debt to total assets* (TDTA) are measures of leverage and statistically significant similar to previous studies by Amato and Furfine (2004), and Blume et al., (1998). The leverage ratios are significant to rating confirmation, withdrawal, affirmation and watch downgrade. The estimated coefficients are negative except for three positives exceptions for TDTA (rating affirmations, watch downgrades and withdrawal). This exception means that a firm with long-term debt leverage at any given level has more short-term debt in its capital structure while seeking better credit rating. If leverage taken at face value, this exception means that for a given level of long-term debt as leverage, a firm with more short-term debt in its capital structure will tend to receive a higher credit rating. Increases in leverage may increase the risk of insolvency, a result congruent to theory and empirics in the literature.

An interesting observation is how *corruption* perception index (CPI) affects significantly three ratings; affirmation, confirmation and downgrade. Both affirmation and confirmation ratings have smallest standard deviations compared to standard deviation of downgrade which is slightly larger. Coefficients for the CPI are positive for these few ratings; new, upgrade, downgrade and withdrawal. This would have us suggest it is important for firms (especially for newly rated firms and potential firms to be upgraded) located in a country with high CPI value (represent low corruption) with greater transparency and information disclosure attracts more capital investments. It enhances corporate governance and increases firms' value for investors buying in a capital market. From a rating downgrade and withdrawal perspective, this is crucial since any less favorable change in the CPI value may impact ratings to deteriorate further so eventually investors will withdraw their investments. Political instability will increase if bribes and corruption are rampant affecting a firm's operations efficiency. Investors will be less willing to invest and thus in firms that are no longer rated (withdrawal) by the CRAs.

On the other hand, CPI's coefficients are negative for these ratings; affirmation, watch downgrade, watch upgrade and confirmation. An affirmation rating occurs when the rating committee resolved a formal Watchlist (downgrade or upgrade) assessment that the current ratings are retained. A confirmation happens when the rating is removed from the Watchlist. This suggests when there is no major news; the financials of the firms remain intact. Meanwhile, the CPI has not much influence on firms with ratings Watchlist. For firms that are placed under Watchlist pending final evaluation by the CRAs, their performance are not impacted yet.

The results discussed show different variables have different impacts on rating changes. The Ordered Probit helped to analyze the determinants at greater depth for each *individual* rating. Goh and Ederington (1993) report that rating changes cannot be treated as homogenous. There is no fixed set of factors held significant for all rating changes. The firm would have to improve its creditworthiness as quantified by the determinants to improve credit rating.

We observe there are more key determinants impacting watch downgrades and the downgrade ratings in comparisons to watch upgrade and upgrade ratings. This finding is consistent with existing reports in the literatures. Downgrades attract more attractions than upgrades. Any deterioration in a firm's financials will invite close attentions from investors. The variables are also significantly impacting *new* and *affirmation* ratings, which appear to signal important information to investors from this study. *Affirmation* and *confirmation* announcements are critical news and reassurances to market participants that the ratings remain unchanged, wherever information asymmetry is larger. These ratings serve as a certification signal of the issuer's credit quality. Investors probably are not disconcerted since there are no changes to the rating. As such, it warrants that investors pay more attention to these ratings; *new*, *affirmation*, *confirmation* and *withdrawal*. Knowing what and how much firm-specific factors impact these rating revisions will benefit them in their investment decision making.

Table 4: Ordered Probit Results

Panel A:								
Rating	New	Affirmation	Watch Downgrade	Watch Upgrade	Upgrade	Downgrade	Confirmation	Withdrawal
DGRADE	18.131 (6.870) ***	13.099 (21.950) ***	11.738 (17.280) ***	12.282 (23.370) ***	3.195 (7.710) ***	13.328 (13.570) ***	56.745 (2.110) **	12.217 (14.260) ***
LNROCE	0.587 (2.970) ***	0.359 (1.810) *	-0.212 (-1.090)	-0.062 (-0.090)	0.901 (2.530) ***	-0.099 (-0.460)	-0.772 (-0.740)	-0.242 (-2.030) **
LNROA	0.186 (1.650) *	-0.024 (-0.230)	-0.147 (-1.110)	0.715 (1.980) **	0.108 (0.770)	0.165 (1.990) **	4.115 (2.290) **	0.003 (4.490) ***
LNOPMAR GIN	0.373 (2.620) ***	-0.124 (-0.810)	0.412 (2.170) ***	0.001 (0.001)	-0.172 (-0.990)	-0.160 (-0.850)	0.286 (0.450)	0.125 (0.790)
LNEBITDA INT	-0.440 (-2.590) ***	-0.258 (-1.800) *	-0.66 (-3.230) ***	-0.256 (-0.990)	-0.286 (-1.350)	-0.0426 (-0.250)	-5.001 (-2.080) **	0.173 (0.610)
LNLTDCA P	-0.138 (-0.790)	0.015 (1.310)	-0.110 (-1.070)	-0.376 (-1.09)	0.167# (1.150)	-0.056 (-0.790)	-3.001 (-1.650) *	-0.138 (-2.230) **
LNTDTA	0.026 (0.180)	0.560 (1.965) **	0.0864 (1.690) *	-0.091 (-0.510)	0.040 (0.150)	-0.829 (-1.740) *	0.961 (0.400)	0.267 (2.410) **
LNCPI	0.114 (0.640)	-4.574 (-1.930) *	-0.187 (-0.080)	-0.849 (-1.260)	0.073 (0.480)	0.618 (2.550) ***	-29.831 (-2.560) **	0.485 (0.290)
Panel B:								
Vif	1.40	1.50	1.99	6.22	5.02	1.60	1.64	2.17
Wald chi2	1790	7341	2177	3483	145	2259	60	3392
Prob > chi2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pseudo R2	0.5228	0.5437	0.4948	0.5033	0.4291	0.5295	0.795	0.578

Note:

Robust coefficients and z-statistics reported (* denotes significant at 10%; ** significant at 5%; *** significant at 1%).

All the variables are transformed to logarithm except for the re-investment (DGRADE).

DGRADE is a re-investment that takes value 0 for investment grade firms; and 1 for speculation grade firms.

LNROCE is return on capital (Earnings before interest and tax (EBIT)/total capital); LNROA is return on assets.

LNEBITDAInt is expressed in EBIT to total interest expense. (EBITDA is earnings before interest, tax, depreciation and amortization.)

LTDCA is long-term debt to total capital; LNTDTA is long-term debt to total assets

LNOPMARGIN is operating margins; LNCPI refers to corruption perception index.

LNLTDCA is omitted from the analysis of upgrade ratings due to high multicollinearity with total debt/total assets. Instead, we replaced with LNRETA (retained earnings/total assets)

5. CONCLUSION

This paper differs from prior research on downgrades and upgrades whilst this research attempts to analyse the significant impacts on a full range of credit rating revisions (8 types). We contribute to rating literature by focusing on neglected rating movements by dissecting each credit rating revision at granular level using a powerful probit model. The results show that profitability, interest coverage ratio and leverage, all three, have significant impacts from the rating change decisions on the market prices. These are firm-specific variables that move with the price effect from rating changes. The methodology used has not been widely applied in prior studies, which make our findings novel and reliable. *New*, *affirmation*, *confirmation* and *withdrawal* ratings have been ignored as less important for not contributing any new information for too long, but this paper adds value by providing contrary evidence from these unstudied rating types.

From an economic and industry point of view, transparency on financial stability is the focus of quality. Countries with good sovereign credit ratings as the four developed nations we have chosen will attract more foreign direct investment resulting in local firms/industry enjoy low interest rates on debt securities. A low CPI (representing high corruption) is a burden on a nation's wealth and will discourage new investment, uncertainties and obstruct economic development. Private information released to the markets through credit rating changes announced to the market by the CRAs do not only impact rated firms but also influence other firms operating in the same industry. The latter assertion needs a separate in-depth study as well.

From an investor's point of view, identification of factors affecting each rating change is important as reported. Investors may be more watchful to recognize each credit rating change at the firm-specific level to ensure negative factors will not erode profits of their investment. The findings can be used as a reasonable proxy for firms to adopt strategies to capitalize on investment opportunities for fund providers. It aids investors to suffer less from underinvestment due to capital constraints by diverting them away from speculative-grade to investment-grade investments. It is also important for international investors in the context of optimal investment strategies and global portfolio diversification.

From a policy perspective, this distinction between investment and speculation ratings is vital because funding implications can be quite different. The capital losses due to a rating downgrade or rating withdrawal if invested in speculative-grade firms can be relatively huge and if the borrowers are government firms, the governments may force to change investment policies. The findings highlight the importance of credit ratings for policy makers in areas of financing, structuring and regulating markets, based on sound public finances are essential. Furthermore, financial stability depends on the solidity of fiscal conditions in each individual country.

Future more in-depth research on this topic will shed additional light by examining how corruption perception index affects credit rating changes over and above those factors in the firm, how sovereign level factors cascade to firm-level effects. It will be motivating enough to analyze developed versus emerging markets, which we have not done in this paper. A comparative study can be done using different countries to identify country-specific variables that may contribute to credit rating changes. Such extensions will help to build evidence about how the market

intermediation process arising from credit ratings are affecting stock prices, which is value change at firm level.

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APPENDIX 1

RATING	NEW				WATCH DOWNGRADE			
Variable	Mean	S.Dev	Min	Max	Mean	S.Dev	Min	Max
DGRADE	0.270	0.447	0.000	1.000	0.183	0.390	0.000	1.000
LNCPI	2.333	0.947	1.699	4.369	1.872	0.072	1.634	1.945
LNEBITDAINT	2.722	2.300	-3.131	15.897	2.374	1.438	-0.067	7.400
LNLTD CAP	2.965	1.429	-2.040	4.310	2.642	2.576	-9.579	4.354
LNOPMARGIN	2.314	1.108	-1.194	4.043	2.498	1.103	0.630	5.790
LNROA	-2.737	1.504	-5.576	1.017	-2.836	1.753	-8.304	0.545
LNROCE	-1.732	1.015	-8.004	1.127	-1.252	0.921	-3.320	0.967
LNTDTA	-1.613	1.741	-13.720	0.107	1.325	0.390	0.036	2.466

RATING	AFFIRMATION				WATCH UPGRADE			
Variable	Mean	S.Dev	Min	Max	Mean	S.Dev	Min	Max
DGRADE	0.269	0.445	0.000	1.000	0.188	0.397	0.000	1.000
LNCPI	1.855	0.065	1.724	1.909	2.521	1.087	1.699	4.344
LNEBITDAINT	2.430	1.142	-0.067	5.849	3.075	2.282	0.024	13.458
LNLTD CAP	9.803	13.724	0.000	71.010	2.377	0.931	-0.010	4.227
LNOPMARGIN	2.233	0.990	-0.020	4.007	1.466	2.458	-3.173	4.286
LNROA	-2.995	1.573	-6.284	0.611	-3.174	1.332	-6.342	0.011
LNROCE	-1.722	0.897	-4.035	0.575	-1.655	0.669	-3.165	0.015
LNTDTA	-1.254	0.611	-2.932	0.694	-2.003	2.607	-15.091	-0.454

RATING	UPGRADE				DOWNGRADE			
Variable	Mean	S.Dev	Min	Max	Mean	S.Dev	Min	Max
DGRADE	0.328	0.473	0.000	1.000	0.415	0.497	0.000	1.000
LNCPI	2.571	1.112	1.699	4.344	2.017	0.586	1.708	4.382
LNEBITDAINT	2.729	1.337	-0.002	9.088	2.622	1.438	-0.067	5.450
LNLTD CAP	2.793	2.611	-14.881	4.686	2.719	2.762	-9.210	4.350
LNOPMARGIN	2.480	0.888	0.003	4.227	2.085	0.941	0.000	3.834
LNROA	-2.569	1.440	-6.342	1.021	-2.037	2.573	-8.304	1.890
LNROCE	-1.399	0.815	-2.766	1.113	-1.442	1.329	-4.035	1.123
LNTDTA	-1.585	1.918	-15.060	0.018	-1.223	0.713	-5.044	1.057

RATING	CONFIRMATION				CONFIRMATION			
	Variable	Mean	S.Dev	Min	Max	Mean	S.Dev	Min
DGRADE	0.147	0.360	0.000	1.000	0.333	0.480	0.000	1.000
LNCPI	1.873	0.076	1.653	1.945	4.316	0.111	3.807	4.454
LNEBITDAINT	2.406	0.989	-0.067	4.381	-1.464	1.676	-3.511	2.287
LNLTDCAP	2.881	2.467	-9.210	4.228	-1.965	3.066	-6.718	1.360
LNOPMARGIN	2.372	1.115	-1.966	3.917	3.227	1.652	-0.462	5.113
LNROA	-1.095	2.630	-4.784	2.771	2.987	1.824	0.690	9.088
LNROCE	-1.562	0.953	-4.035	1.128	1.984	3.985	-9.210	4.383
LNTDTA	-1.232	0.635	-3.219	0.709	-2.480	4.475	-24.271	1.057