

The Impacts of Credit Rating Changes on Firm's Dividend
Payout and Investment Policies – Evidence in Thailand



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ลงทุนของบริษัท - กรณีศึกษา บริษัทในประเทศไทย



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จักรภพ ชูจันทร์ : ผลกระทบจากการเปลี่ยนแปลงของเครดิตเรตติ้งของบริษัทต่อการจ่ายเงินปันผลและนโยบาย
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งานวิจัยนี้ศึกษาความสัมพันธ์ระหว่างผลกระทบจากการเปลี่ยนแปลงในเครดิตเรตติ้งต่อนโยบายการจ่ายเงินปันผล
และการลงทุนของบริษัท โดยใช้กรณีศึกษาจากบริษัทที่จดทะเบียนในตลาดหลักทรัพย์แห่งประเทศไทยในระหว่างปี 2000 -
2021 งานวิจัยนี้ใช้วิธี fixed effect ordinary least squares เพื่อประเมินผลกระทบของการเปลี่ยนแปลง
ดังกล่าว จากการศึกษาพบว่า บริษัทที่ถูกควาน์เกรดจะลดการจ่ายเงินปันผลและลดการลงทุน ในขณะที่บริษัทที่ถูกอัพเกรดจะ
เพิ่มการจ่ายเงินปันผลและเพิ่มการลงทุน นอกจากนี้ในงานวิจัยยังได้ศึกษาความสัมพันธ์ระหว่างผลกระทบจากการเปลี่ยนแปลง
ในเครดิตเรตติ้งต่อความมีประสิทธิภาพในการลงทุน จากการศึกษาพบว่า บริษัทที่ถูกควาน์เกรดจะลงทุนสูงเกินไป ในขณะที่
บริษัทที่ถูกอัพเกรดจะลงทุนต่ำเกินไป งานวิจัยดังกล่าวสามารถให้ข้อมูลหรือแนวทางแก่เจ้าหนี้และผู้ถือหุ้นในการประเมินว่า
บริษัทดังกล่าวคุ้มค่าต่อการลงทุนหรือไม่



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This paper studies relationship between impacts of change in credit rating on firm's dividend payout and investment policies. We use data from listed companies in Stock Exchange of Thailand during 2000 - 2021. This paper applies fixed effect ordinary least squares to evaluate impacts of change in credit rating. From this paper, downgraded firms will decrease dividend payout and investment. However, upgraded firms will increase dividend payout and investment. Moreover, this paper studies relationship between impacts of change in credit rating on firm's investment efficiency. From this paper, downgraded firms will overinvest and upgraded firms will underinvest. This paper provides information or guidances to debtholders and shareholders to evaluate the firm is worth to invest.



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Chapter 1

Introduction

In the world of perfect capital market, firm's dividend payout policy and investment decisions are independent because firms can find external financing source for investment in the situation that it uses up all internal cash flows for paying dividends (Miller 1958). However, information asymmetry causes two activities which are firm's dividend payout policy and investment to be interrelated. When the firms make profit, firms have financial constraints to decide whether it should distribute remaining cash to its shareholders or to retain for investment opportunity in attractive projects (Campello, Graham et al. 2010).

Financial constraints of the firms can be measure in various ways. Credit rating is one way to measure financial constraints because it causes firms to decide levels of dividend payment and investment outlays to increase or decrease. Therefore, interaction of dividend payment and investment decisions would be affected from change of firm's credit rating evaluated by credit rating agencies.

Credit rating score is determined according to firm's generated cash flow, firm's scheduled cash repayments for borrowing including principal and interest repayments and variability of firm's earnings. Therefore, most of investors use credit rating from external agencies to measure the firm's default risks evaluating repayment ability. In this study, we examine impacts of change in firm's credit ratings that are assessed by external agencies informing investors the firm's creditworthiness whether it causes change in the firm's dividend payout and capital expenditure.

Credit rating refers quantitative assessment of a firm's creditworthiness with respect to a particular debt or financial obligation. Most of the time, change in credit ratings (both upgrade and downgrade) cause different level of firm's dividend payout and capital expenditure for investment projects opportunity because high credit rating firms tend to have good financial performance with high profitability, lower risk of poor operation and have more liquidity to invest. However, low credit rating firms may have high default risks and pay less or no dividend to its shareholders and unlikely to invest in new projects.

In the world of information asymmetry, credit rating agencies evaluate the firm's creditworthiness to determine firm's ability to meet its financial obligation. Therefore, debtholders and shareholders may concern information of the firms from external agencies to invest in a firm to consider the firm's creditworthiness. In this study, we examine impacts of change in firm's credit ratings that are assessed by external agencies informing investors the firm's creditworthiness whether it causes change in the firm's dividend payout and capital expenditure policies.

Chapter 2

Literature Review

2.1 Firm's credit rating adjustments, dividend payouts, and investment policies

The perfect capital market reveals that investment decisions and dividend payout are independent (Miller 1958). However, in the presence of information asymmetry, the firm has financial constraints, and it is observed that the firm has residual cash flows for new investment and dividend payout. To measure financial constraints, we utilize change in credit rating of firm to indicate situations that trigger level of financial constraints because downgrade and upgrade demonstrate a modification in perception of the firm's repayment ability to satisfy its obligation. Firms with poor credit rating tend to distribute low dividend payout but firms with good credit rating tend to spend more to shareholders (Kim and Kim 2020). When we evaluate credit rating adjustments, it can investigate the impacts of change in credit rating on investment and dividend decision of the firm which these two activities are interrelated in the world of information asymmetry (Khieu and Pyles 2016). An important concept of this paper is the impacts on firm's dividend payout and investment decisions resulting from change in firm's credit rating (Sufi 2009).

First, the firms always consider two important determinants which are dividend payout and investment decisions. The key presumption in this situation is that firms distribute dividends when it has residual free cash flow after it disburses for investment opportunities. Pecking order theory (Myers and Majluf 1984) disputes that dividend payout is restricted to pay in situation that firm's profitability are low and high level of leverage even though there are investment opportunities that provide high return. Firms mostly finance their investments from slack as the first source,

followed by debt and equity. Firms are more dependable on internal funds from slacks before finding from external funds. At this point, announcement of new equity issuance to investors could trigger decrease in the price of firm's shares. Therefore, it argues that managers decide to pass up good investment projects than to adjust their dividend payout even though they have positive NPV projects. In case of downgrade, the firms are expected to make additional cash flows with declined access or enlarged costs of external funds or both because they are evaluated that they have more default risk (DeAngelo and DeAngelo 1990). Therefore, the firms are recommended to retain its cash flow and managers will reduce firm's dividend payout to preserve their investment expenditures. In case of upgrade, the firms have more accessibility to financial resources and grant managers to enhance their investment activities. Moreover, dividend payout followed by situation of upgrade, documents that managers are motivated to spend in investment opportunities (even net loss generated from projects) not distributing any extra cash flow to shareholders (Jensen 1986, Stulz 1990). Downgrade of firm's credit rating causes cost of external fund including debt and equity to be higher but upgrade of firm's credit rating trigger a cost of external funding to be lower (Khieu and Pyles 2016). This cost contributes to restrained entry to external capital markets. Therefore, direct impacts from cost of additional borrowing and indirect from risen return required from debtholder and shareholder reflecting higher risk occurred from a negative credit downgrade. Moreover, firms with improved credit rating appear consistently higher possibility to distribute dividends and these firms are less inclined to the external macroeconomic variations than the decreased rated firms. Downgraded firms are powerless to deal with uncertainty and they display the increasing degree of information asymmetry during timing of financial difficulties.

Therefore, firm's managers accept to use less risky approach to consider dividend distribution and capital expenditure by eliminating cash from dividend disbursement to shareholders and retain more cash in the firm to use for investment opportunities in the following periods (Lang and Litzenberger 1989).

Signal from dividend payout can be viewed as either good or bad information by shareholders. If the firms decide to cut dividend, it will cause negative reactions to the firm's value. If the firms decide to increase dividend, it will be unhappy to maintain stable dividend over periods of financial difficulties in the future. Eventually, managers then keep dividend unchanged over periods due to the behavior of dividend stickiness and it indicates that managers tend to maintain smoothing dividend (Lintner 1956). Therefore, we determine hypothesis as follow:

Hypothesis 1: Downgraded firms will decrease their dividend payout and upgraded firms will not change their dividend payout.

Second, in the world of information asymmetry, firms tend to abandon boosting dividend to create financial "slack" to ascertain that the firm can achieve optimal future investments (Myers and Majluf 1984). If investors trust that firms distributing higher dividend payout have greater firm's values, then increase in dividend payout will be perceived as an optimistic view. However, if investors thinks that firms that reduce dividend payout per share have declined firm's values, then decrease in dividend payout will be viewed as a negative signal. Moreover, information signaling explains that dividend distributed to shareholders in a delicate attempt may reflect a signal that the firm is predicted to have expanded cash flows in the following periods. However, it may signify that the firms employed all profitable investment opportunities. Moreover,

there is empirical study documents that financial factors affect firm's investment. Financial constraints have an impact on available cash flow or liquidity that decrease firm's access to low-cost finance (Fazzari, Hubbard et al. 1988). Downgraded firms will lessen their investment since they derive high financing cost from stressful financial constraints. However, upgraded firms will expand their investment because they can access to funds with lower cost from financial unconstraint. Therefore, we state hypothesis regarding investment outlay as follows:

Hypothesis 2: Downgraded firms decrease their investments but upgraded firms increase their investments.

2.2 Firm's credit rating adjustments and investment efficiency

Firms with financial constraints are mostly concerned about negative rating transition instead of good. Firms are likely to portray significant improvements in operation's efficiency and productivity when the firms face encounter with economic recession (McCarthy 1978). As a result, firms that depend on a financial constraint may portray its self-control for its outlay. It portrays idea that financial restricted firms try to find source of fund with lower cost of capital than unrestricted firms. Financial restriction impose discipline on cash spending, which is linked to greater profitability and better stock returns in the future (Luo 2011). Evaluation of investment efficiency is one method to investigate how firms manage available resources by considering cost and benefit in the situation of credit rating adjustments. When firm does not underinvest or overinvest, firms maintain investment efficiency (Biddle, Hilary et al. 2009). Therefore, we investigate the organizational allotment decision for two significant corporate finance policies which are dividend distribution and investment outlay, and we investigate the likelihood of lower or

rise in overinvestment due to allotment of free cash flow for dividend payout and investment (Khieu and Pyles 2012).

The expectation from managerial protection hypothesis mentioned before is that downgrade causes decrease in both dividend payout and investment. If firm's capital expenditure comprises of ordinary and excessive investments, it is likely to infer that downgrade firms will decrease a portion of overinvestment (Stein 1997). Financing constraints should demand firms to optimize their financing and prioritize greater projects first, resulting in higher efficient firm investment (Miller and Rock 1985).

In accordance with the hypothesis of residual cash flow, following a firm's downgrade, dividends should be reduced to cushion the effects to investments, and after an upgrade, dividends should be increased as dividends become secondary in priority. The free cash flow theory disputes that when given unlimited funds, managers may engage in overinvestments to obtain more capability and reputation at the expense of shareholder wealth (Jensen 1986, Stulz 1990). Moreover, there is empirical study that explore relationship between effects of firm's leverage on firm's overinvestment and underinvestment. It reveals that level of firm's leverage is negatively related to firm's investment outlays. High financially constrained firms are not likely to overinvest due to large debt. It provides insights that this relationship is consistent with the agency theories, and it is supported by information asymmetry existed in the capital markets (Bharath, Pasquariello et al. 2009, Ahmad, Hunjra et al. 2021). These enhance our analysis to explore relationship and we develop hypotheses to test as follows.

Hypothesis 3: Downgraded firms will not overinvest.

Hypothesis 4: Upgraded firms will overinvest.

Chapter 3

Data

This study analyzes SET listed firms in Thailand during 2000 – 2021 having credit rating information that are evaluated by external agencies such as TRIS and FITCH. Thailand is one of emerging market which is experiencing rapid and volatile growth and industrialization are attractive due to higher risk premium over developed markets. However, information asymmetry causes significant impacts to the capital market. It is more interesting to explore relationship between level of financial constraints (measured by credit rating adjustments) and key corporate finance decisions including dividend payout and investment policies of Thai listed firms.

In general, firm's credit ratings are classified as investment grade and speculative grade. Firms with investment grade credit rating states low or moderate credit default risks which reflects high capabilities to repay debt or obligations. While firms with speculative grade credit rating states high credit default risk which reflects low abilities to repay debt or obligations. However, in this study, we focus notch adjustment on credit rating that is more granular to explore change in notch of credit rating.

To determine change in credit rating for upgrades and downgrades of each firm, we first extract credit rating data, cash dividend paid and capital expenditures from Bloomberg terminal to employ in this stud. Then, convert alphabetic credit ratings into numeric scores. For example, firm with credit rating of AAA was converted to numerical value of 1. Next year, firm is rated to be AA+ and it was converted to numerical value of 2. We refer scoring numerical values conversion in Table 1. From the conversion, we calculate our credit rating adjustments (upgrade,

downgrade, and no change) proxies as the numerical values go down (-1 or less), up (1 or more) or no change (0) that scale from year t-1 to year t.

In Table 1, we develop comparison between alphabetic credit rating and numerical value of score. Then, we find difference between numerical value of score of credit rating at year t-1 and year t to determine whether there are modifications of firm's credit rating (upgrade and downgrade).

Table 1: TRIS and Fitch's credit rating and transformations to ordinal scales.

Credit ratings	Numerical values
AAA	1
AA+	2
AA	3
AA-	4
A+	5
A	6
A-	7
BBB+	8
BBB	9
BBB-	10
BB+	11
BB	12
BB-	13
B+	14
B	15
B-	16
CCC+	17
CCC	18
CCC-	19
CC	20
C	21
D	22

We find that there were 649 firms listed in SET. There are 183 firms that are evaluated by credit rating agencies (credit rating as of December 31, 2021). From our data analysis, we find that the number of credit rating modification of listed firms in SET during 2000 – 2021 is 1,373. The number of observations for upgrades is 132 items, observations for downgrades is 124 items and the observations for no change in credit rating is 1,117 items.

In this study, we construct variables to run multiple regressions in Table 2.

Table 2: Variables and explanations and data sources.

Dependent variables	Explanations	Sources
DIV _{i,t}	Natural logarithm of firm's dividend payment at year t	Bloomberg
INV _{i,t}	Natural logarithm of firm's capital expenditure at year t	Bloomberg
EFF _{i,t}	Numerical values of 1, 0 and -1 for overinvestment, normal investment, and underinvestment of firms at year t	Sort of residual values into quartiles
Independent variables		
CHANGE _{i,t-1}	Numerical values of converted firm's credit rating between year t-1 to year t to measure upgrade, no change, and downgrade.	Differences between credit rating at year t-1 and year t

Control variables		
PROFIT _{i,t}	Natural logarithm of firm's earnings before interest expense and income tax expenses at year t	Bloomberg
PBV _{i,t}	Firm's market price to book value per share ratio at year t	Bloomberg
LEVERAGE _{i,t}	Firm's debt to total assets ratio at year t	Bloomberg
ROIC _{i,t}	Firm's return on invested capital at year t	Bloomberg
SIZE _{i,t}	Natural logarithm of firm's total assets at year t	Bloomberg
GROWTH _{i,t}	Firm's percentage of change in total assets from year t-1 to year t	Bloomberg

Chapter 4

Methodology

We define modifications in credit rating of firms and test whether they are related in firm's dividend payout and capital expenditures. We construct model regression on adjustments in credit rating (upgrade, downgrade, and no change) to find significant impacts on dividend payment and capital expenditure of the firms.

The key variable in this study is $CHANGE_{i,t-1}$ in firm's credit rating which are upgrade, downgrade, and no change lagged one year. $CHANGE_{i,t-1}$ is independent variable, and it is determined to be 1 or more if the firm encountered upgrade. Firms experience downgrade in credit rating are defined as -1 or less. Firm's credit rating upgrade and downgrade that are more than 1 notch are also included in this independent variable to measure magnitude of credit rating adjustments. Firms without credit rating adjustments will be defined as 0. To investigate the impacts of credit rating adjustments on dividend payout and capital expenditures for investments particularly, we perform assorted multiple regressions of equations for both dividend distribution and investment outlay as follows.

$$DIV_{i,t} = \beta_0 + \beta_1 CHANGE_{i,t-1} + \beta_2 PROFIT_{i,t} + \beta_3 PBV_{i,t} + \beta_4 LEVERAGE_{i,t} + \beta_5 ROIC_{i,t} + \beta_6 SIZE_{i,t} + \beta_7 GROWTH_{i,t} + \epsilon_{i,t} \quad (\text{Equation 1})$$

$$INV_{i,t} = \beta_0 + \beta_1 CHANGE_{i,t-1} + \beta_2 PROFIT_{i,t} + \beta_3 PBV_{i,t} + \beta_4 LEVERAGE_{i,t} + \beta_5 ROIC_{i,t} + \beta_6 SIZE_{i,t} + \beta_7 GROWTH_{i,t} + \epsilon_{i,t} \quad (\text{Equation 2})$$

We include proxy for financial indicators to explore relationship between those and dividend payout and investment policy of the firm as follows:

$PROFIT_{i,t}$ is a natural logarithm of earnings before interest expense and income tax expense. Normally, upgraded firms have higher profitability level than downgraded firms because upgraded firms had high ability to generate profit from invested capital. $PBV_{i,t}$ is the firm's market price to book value ratio which demonstrate estimate of the firm's growth and profitability from the market. It can infer that upgraded firms have more optimistic trend to grow in the future than downgraded firms.

$LEVERAGE_{i,t}$ is a measure of level of debt consisting of short-term and long-term liabilities that the firms have financial obligation relative to total assets held by the firm. It can indicate a firm's ability to satisfy its obligation including principal and interest payments and provide information about the firm's capital structure. Downgraded firms normally maintain higher levels of debt relative to those in upgraded firms and reflects that downgraded firms are more leveraged from using debt more than equity to finance its assets. $ROIC_{i,t}$ represents return on invested capital. This measures how much operating profit generated from capital invested in the firm. Upgraded firms have higher return than downgraded firms due to higher profitability. $SIZE_{i,t}$ is defined by taking natural logarithm of the number of firm's total assets to proxy the variability of firm's size. $GROWTH_{i,t}$ is defined as the percentage of change in firm's total assets from year $t-1$ to year t and stands for a firm's expansion rate during period of time. In general, downgraded firms have higher growth than upgraded firms because upgrade firms usually have large size with slower growth.

Main independent variables are upgrade, downgrade and no changes dummies which are defined as $CHANGE_{i,t-1}$ and the interaction terms in each model.

$CHANGE_{i,t-1}$ is determined to be 1 if the firms are upgrade, -1 if the firms are downgrade and 0 if the firm's credit rating are not modified during year t-1 to year t.

In equation (1), we include dividend payment with one year lag to state the dividend payment stickiness of the firms. Since the firms are unwilling to neglect or reduce dividend payment, we predict positive relationship between dividend payment and dependent variable. In equation (2), we include investment outlay with one year lag to account for capital investment which is whole amount. However, firms take many years to create large investment before making free cash flow and invest in capital outlay in the following years that are not linked to a rating change. Therefore, it presents a positive relationship between the lagged variables and dividend distribution and investment.

Next, we consider whether credit rating adjustments have impacts on firm's investment efficiency. Most of firms require large amount of cash to invest in any project to obtain their returns. We construct variable of interest to measure level of investments by estimating amount of normal investment as a linear function of firms' revenue growth opportunities (Biddle, Hilary et al. 2009, Khieu and Pyles 2016). Moreover, there is empirical study that document the positive relationship between sales growth and firm's investment outlays (Cleary 1999).

Therefore, we construct the univariate linear regression demonstrated below.

$$INV_{i,t} = \beta_0 + \beta_1 SALES_{i,t-1} + \epsilon_{i,t} \quad (\text{Equation 3})$$

$INV_{i,t}$ is total capital expenditure and $SALES_{i,t-1}$ is percentage of change in revenue from year t-1 to year t. Then, we classify all firms listed in SET into each

sector and run multiple regression by sector to obtain coefficient of $SALESG_{i,t-1}$ and intercept for each sector. Next, we derive the normal investment (predicted value) of each firm. Then, we obtain residuals between actual investment and normal investment to proxy for deviations from normal investment and employ this as dependent variables. We sort residuals of all firms in each sector annually into quartiles. Firm-year items below the 1st quartile are indicated as underinvestment and those items above the 3rd quartile are indicated as overinvestment. The other items between the 1st and the 3rd quartiles are indicated as normal investment. Then, we develop variable ($EFF_{i,t}$) to indicate different levels of firm's investment (underinvestment, overinvestment, and normal investment) as independent variables. Therefore, we define $EFF_{i,t}$ equal to -1 for firm with underinvestment, 1 for firm with overinvestment and 0 for normal investment. Then, we interest relationship between variables of $EFF_{i,t}$ and $CHANGE_{i,t-1}$ and run multiple regression to explore relationship between firm's credit rating adjustment and investment efficiency in a situation of upgrade and downgrade separately as follows.

$$EFF_{i,t} = \beta_0 + \beta_1 CHANGE_{i,t-1} + \beta_2 PROFIT_{i,t} + \beta_3 PBV_{i,t} + \beta_4 LEVERAGE_{i,t} + \beta_5 ROIC_{i,t} + \beta_6 SIZE_{i,t} + \beta_7 GROWTH_{i,t} + \epsilon_{i,t} \quad (\text{Equation 4})$$

Chapter 5

Results

5.1 Baseline model regressions

In Table 3, we demonstrate descriptive statistics for all variables including $DIV_{i,t}$, $INV_{i,t}$, $CHANGE_{i,t-1}$, $PROFIT_{i,t}$, $PBV_{i,t}$, $PROFIT_{i,t}$, $SIZE_{i,t}$ and $GROWTH_{i,t}$. Sampling items are accounted from credit rating adjustments of all firms listed in Stock Exchange of Thailand (SET) during 2000 - 2021. The number of observations in this empirical study is 1,373. Mean value of dividend payment is 18.27. Mean value of natural logarithm of capital expenditure is 19.82. Mean value of changes in credit rating is 0.027. Moreover, the sampling firms have average price-to-book value ratio by 1.92 and it indicates that market price of listed firms are overvalued when comparing with book value of equity. We also note that mean value of total debt relative to total assets ratio of sampling firms is 0.37, meaning that 37% of the firm's assets are finance with debt. We observe that average return on invested capital of the sampling firms is 0.06 and it describes those assets operated under each firm generate operating income from capital invested by 6%. Mean value of natural logarithm of total assets is 10.91. Moreover, we find that average assets growth of the sampling firms is 0.08 and it describes that the firms have expansion in total assets YoY around 8%.

To investigate whether there is existence of correlation among independent variables in our developed linear regression model, we need to check multicollinearity. We demonstrate the Pearson correlation matrix of all variables that are utilized in this empirical study in Table 4. We find that correlation of 0.483 among two independent variables between $PBV_{i,t}$ and $GROWTH_{i,t}$ is the highest number. We

report variance inflation factor value to measure the level of multicollinearity existed in our model regression. From our result of correlation among variables in regression, there is no multicollinearity because VIF is less than 10 and we conclude that multicollinearity is not our severe concern in this empirical study.

To investigate impacts of heteroskedasticity, we apply Modified Wald test for groupwise heteroskedasticity that could be existed in the fixed effect model. We assume null hypothesis that there is heteroskedasticity in this empirical study so that we will reject null hypothesis due to homoskedasticity. From results in this empirical study, we fail to reject null hypothesis and heteroskedasticity exists. Next, we perform Huber-White's Robust Standard Errors method to develop and apply another standard error which is a consistent estimator of standard deviation of parameter in case of heteroskedasticity.

Table 3: Descriptive statistics

	N	Max	Min	Mean	SD	p25	Median	p75
$DIV_{i,t}$	1373	25.166	0.000	18.272	3.311	18.735	20.157	21.37
$INV_{i,t}$	1373	25.467	0.000	19.824	3.524	18.681	20.376	21.689
$CHANGE_{i,t-1}$	1373	2	-2	.027	.434	0	0	0
$PROFIT_{i,t}$	1373	29.097	19.035	24.461	1.7	23.279	24.231	25.346
$PBV_{i,t}$	1373	9.955	0.213	1.92	1.608	.905	1.369	2.232
$LEVERAGE_{i,t}$	1373	.866	0.000	.368	.184	.239	.375	.493
$ROIC_{i,t}$	1373	.409	-0.583	.063	.064	.03	.06	.097
$SIZE_{i,t}$	1373	24.882	6.974	10.906	2.223	9.521	10.488	11.616
$GROWTH_{i,t}$	1373	1.78	-0.963	.081	.25	-.039	.063	.161

Table 4: Correlation matrix

Variables	DIV _{i,t}	INV _{i,t}	CHANGE _{i,t-1}	PROFIT _{i,t}	PBV _{i,t}	LEVERAGE _{i,t}	ROIC _{i,t}	SIZE _{i,t}	GROWTH _{i,t}
DIV _{i,t}	1.000								
INV _{i,t}	0.152***	1.000							
CHANGE _{i,t-1}	0.179***	0.542***	1.000						
PROFIT _{i,t}	0.151***	0.099***	0.074***	1.000					
PBV _{i,t}	0.270***	0.405***	0.275***	0.088***	1.000				
LEVERAGE _{i,t}	0.142***	0.188***	0.273***	0.151***	0.030	1.000			
ROIC _{i,t}	-0.077***	-0.019	0.095***	-0.111***	-0.175***	0.044*	1.000		
SIZE _{i,t}	0.306***	0.076***	0.124***	0.260***	0.048*	0.357***	-0.188***	1.000	
GROWTH _{i,t}	0.113***	0.265***	0.146***	0.060**	0.483***	-0.030	-0.181***	0.094***	1.000

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

5.2 Credit rating adjustments and their impacts on firm's dividend and investment policies

In this empirical study, we evaluate firm's dividend and investment decisions individually that how they interact with situation of financial constraints reflected from credit rating downgrade and no financial constraints reflected from credit rating upgrade. Table 5 reveals the results of fixed effect regression when we manage for factors that possibly influence firm's dividend and investment policies. We apply pooled OLS regression with year and firm fixed effects as controls for specifications to test predetermined hypotheses on impacts of credit rating adjustments on dividend payout (demonstrated in column 1) and investment outlay (demonstrated in column 2).

Firms with financial constraints (credit rating downgrade) will decrease dividend payout and not change their investment because they need to retain cash for investing in potential projects and they do not pay to their shareholders. In contrast, firms without financial constraints (credit rating upgrade) will not change dividend payout but increase investment because they do not desire to increase their obligation for paying shareholder and keep money to invest in optimistic projects.

Based on the results from OLS regression for dividend payout, we find that there are coefficients of credit rating changes with one year lag indicate positive relationship with dividend payout policy. We interpret that downgraded firms decrease their dividend payout and upgraded firms increase their dividend payout. Therefore, we reject hypothesis (H1) that downgrade firms will decrease dividend and upgraded firms will not decrease dividend.

Based on the results from OLS regression for investment policies, we find that there are coefficients of credit rating changes with one year lag indicate positive

relationship with capital expenditure invested by firms. We interpret that downgrade firms will decrease their investment and upgrade firms will increase their investments. Therefore, we fail to reject hypothesis (H2) that downgraded firms decrease their investments but upgraded firms increase their investments.

Table 5: Credit rating adjustments and dividend payout and investment outlays with firm and year fixed effects

VARIABLES	DIV _{i,t}	INV _{i,t}
	Fixed Effects	Fixed Effects
CHANGE _{i,t-1}	0.280 (0.361)	0.146 (0.102)
PROFIT _{i,t}	6.413* (3.533)	-0.0359 (0.470)
PBV _{i,t}	-0.0335 (0.301)	0.0426 (0.0457)
LEVERAGE _{i,t}	-2.842 (2.533)	0.850 (0.939)
ROIC _{i,t}	18.09*** (6.481)	-1.052 (1.520)
SIZE _{i,t}	-6.074* (3.596)	0.819 (0.509)
GROWTH _{i,t}	-0.0366 (0.896)	0.616 (0.511)
Observations	1,373	1,373
Adjusted R-squared	0.113	0.050
Firm FE	YES	YES
Year FE	YES	YES
F-stat	3.161	8.273

Robust standard errors in parentheses

*** p<0.01, * p<0.1

Table 5 reveals coefficient between 1) dividend payout and changes in credit rating (upgrade, downgrade, and no change) and 2) investment and changes in credit rating (upgrade, downgrade, and no change). It also reflects standard errors from robust in parentheses. All of observations are changes in credit rating of Thai firms

listed in Stock Exchange of Thailand (SET) during 2000 – 2021. Firm fixed effects and year fixed effects are documented to control several score of unobserved heterogeneity. The * and *** denote the significant level of at 10% and 1%, consecutively.

5.3 Credit rating adjustments and their impacts on firm's investment efficiency

In this empirical study, we evaluate firm's investment efficiency that how they are affected from firm's credit rating adjustment (upgrade, downgrade, and no change). We analyze OLS regression on investment efficiency equations that documents relationship between $EFF_{i,t}$ and $CHANGE_{i,t-1}$ to find impacts of firm's credit rating on firm's investment efficiency.

Firms with better financial performance such as greater profit, higher growth, lower financial risk from leverage and higher liquidity are likely to invest in inefficient projects because they have more financial resources to invest and become less careful to determine expected cash flow that generated from those invested projects. On the other hand, firms with worsen financial performance such as lower profit, lower growth, high financial risk from leverage and weak liquidity are likely to invest in more efficient projects with higher return because they do have limited resources of fund and try to recover their situation.

Based on the results from OLS regression, we observe that coefficient of interaction variables of $EFF_{i,t}$ and $CHANGE_{i,t-1}$ are negatively related. We interpret that downgraded firms will overinvest and upgraded firms will underinvest. Therefore, we reject hypothesis (H3) that downgraded firms will not overinvest. We also reject hypothesis (H4) that upgraded firms will overinvest.

Table 6 reports the results of fixed effect regression when we control for factors that govern for determinants that have impacts on firm's investment efficiency. We apply pooled OLS regression with year and firm for dummy fixed effects as controls for specifications to test predetermined hypotheses on the relationship between investment efficiency and credit rating adjustment. The *** denote the significant level of at 1%.

Table 6: Credit rating adjustment and investment efficiency with firm and year fixed effects

VARIABLES	EFF _{i,t} Fixed Effects
CHANGE _{i,t-1}	-0.00594 (0.0293)
PROFIT _{i,t}	0.205 (0.144)
PBV _{i,t}	0.00737 (0.0120)
LEVERAGE _{i,t}	0.679*** (0.249)
ROIC _{i,t}	0.213 (0.272)
SIZE _{i,t}	-0.0259 (0.154)
GROWTH _{i,t}	0.193*** (0.0618) (2.491)
Observations	1,373
Adjusted R-squared	0.065
Firm FE	YES
Year FE	YES
F-stat	2.285

Robust standard errors in parentheses

*** p<0.01

Chapter 6

Conclusion

This empirical study investigate relationship between dividend payout and capital expenditures when firms encounter modification of financial constraints regarding credit rating upgrade and downgrade. Our study focuses on Thai firms publicly traded in exchange market (Stock Exchange of Thailand: SET). Our findings report that both upgraded and downgraded firms have positive relationship with their dividend payout. Therefore, our results argue dividend stickiness theory which state that firms with change in credit rating are hesitated to adjust their dividend payout. Increase in dividend payout may have upgraded firms attract external investor to invest in the firms. Decrease in dividend payout causes firms to be more relax in a situation of financial constraints. Our findings report that both upgraded and downgraded firms have positive relationship with their invested capital. Increase in investment causes upgraded firms to expand their business operations. Decrease in capital expenditure causes downgraded firms because there are higher funding cost and limited access to source of funds for the downgraded firms. Our findings confirm residual cash flow hypothesis for downgraded firms. We also investigate insignificant impacts of credit rating modifications on firm's investment efficiency. Our findings discover that downgraded firms overinvest because they struggle to generate return and seek opportunities to invest in many projects. Upgraded firms underinvest because they look for investment opportunities to invest after they mainly distribute dividend to their shareholders which support managerial allocation between dividend payout and investment decisions.

Our study provides contributions to the capital structure and corporate finance decisions literatures. First, we use credit rating adjustments which captures different level of firm's financial constraints to evaluate firm's creditworthiness whether they have ability to repay their financial obligations. This measure impacts of firm's leverage on their liquidity in the existence of information asymmetry. Second, we add linkage between credit rating adjustments evaluated from level of firm's financial constraints to their dividend payout and investment outlays to find how they are interrelated. Third, we explore impacts of firm's credit rating adjustments on investment efficiency.

The results in this study are helpful for debtholders and shareholders to observe creditworthiness of firms because they consider information of the firms from external agencies to determine whether the firm is worth to invest. Moreover, it is valuable for managers to decide how much to invest and distribute to shareholders to maximize firm's value. Credit rating downgrades cause firms decrease in their dividend payout and investment outlays while firm's managers should be aware of overinvestments. Deviations from normal investments is associated with the agency problem, the results imply trade-off between financing and investment decisions to maintain the benefits of shareholders. Our study can be investigated further across countries with an analysis between emerging and developed markets.

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