Effect of Temporary Earnings on Dividend Smoothing

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ABSTRACT

A recent research on dividend smoothing emphasizes that frequent accesses to the public debt market enhances incentives for dividend smoothing to mitigate asymmetric information. While the result is consistent with the signaling hypothesis of dividend smoothing, it does not provide analyses regarding incentives of firms with private market debts only for dividend smoothing. In this paper, we investigate whether and how the limited access to the public debt markets influences the effects of temporary earnings on dividend smoothing. In addition to signaling effects, we take into consideration financing constraints that firms with private market debts only may experience. For analyses, we decompose total earnings into permanent and temporary two parts using trend-cycle decomposition method and it is examined whether and why firms make dividend smoothing by reflecting the financing constraints of firms in the error correction model. As a result of analyzing Korean firms, it is found that firms that finance from public financial markets exhibit dividend smoothing and temporary earnings tend to increase dividends for overall firms with private debts only but is less pronounced as investment opportunities increase. These results imply that firms with private market debts only will smooth dividends as long as they have precautionary savings motives.

Key Words: Dividend Smoothing, Financing Constraints, Permanent Earnings, Temporary Earnings, Trend-Cycle Decomposition,

Introduction

A recent research on dividend smoothing emphasizes that frequent accesses to the public debt market enhances incentives for dividend smoothing. Since dispersed public debtholders are more prone to free-riding in producing information than private debtholders, asymmetric information is more prevalent in the public debt markets than in the private debt markets(Petersen and Rajan, 1997). For firms with public market debts smoothing dividends contributes to decreasing cost of debts by reducing asymmetric information between public debtholders and the management of the firms (Aivazian et al., 2006).

While the result is consistent with the signaling hypothesis of dividend smoothing, it does not provide analyses regarding incentives of firms with private market debts only for dividend smoothing. In this paper, we investigate whether and how the limited access to the public debt markets influences the effects of temporary earnings on dividends. In addition to signaling effects, we take into consideration financing constraints that firms with private market debts only may experience.

We argue that another way in which the accessibility to the public debt markets may affect the incentives for dividend smoothing is through the relationship between financial constraints and cash holdings. Houston and James(1996) show that since private debtholders obtain information monopoly on their borrowing firms, they can and will impose higher interest rates than the borrowing firms deserve. This suggests that firms with only private debts are not free from incentives to smooth dividends to reduce financing constraints. Since, in particular, financing constraints are more costly for firms with many investment opportunities, firms with only private debts may prefer to retain temporary earnings in the firm rather than pay out as long as they have investment opportunities[1].

[1] Blanchard et al.(1993) argue that retaining temporary earnings in the firm is more valuable for firms with many investment opportunities if they have to depend on costly external financing.

For analyses, we decompose total earnings into two parts: one is temporary and the other permanent. While Lintner (1956) and many subsequent papers argue that firms smoothing dividends will not relate their dividends with temporary earnings, most of these papers depend on the effects of total earnings instead of those of temporary earnings on dividends in investigating whether firms smooth their dividends. Aivazian et al. (2006) estimates the speed of adjustment of dividends by Lintner's equation and find that it is lower for firms with public market debts than those without public market debts. This approach, however, fails to distinguish the effects of temporary earnings on dividends from those of permanent earnings, since dividend changes associated with total earnings may result from changes in temporary earnings as well as those in permanent earnings.

Decomposing temporary earnings from permanent earnings enables us to investigate whether dividend changes are associated with temporary earnings or permanent earnings or both. Firms that do not relate their dividends with temporary earnings are considered to smooth dividends. Speed of adjustment is not free from controversies as long as total earnings are used for independent variables. By decomposing total earnings into two factors, we can directly observe whether dividends are related with temporary earnings.

Our analyses of the effects of the choice of debt markets on dividend smoothing takes into consideration information monopoly of in the private debt markets as well as information free-riding in the public debt markets. We first follow Aivazian et al.(2006) to investigate signaling effects of dividend smoothing in the public debt markets. We expect that firms with public market debts will not relate dividends with temporary earnings, if dividend smoothing is aimed at mitigating asymmetric information in the debt market.

We then extend the analyses by taking into consideration the possibility that financing constraints due to limited access to the public debt markets affects incentives for dividend smoothing. Almeida et al.(2004) argue that firms with external financial constraints have more incentives for cash holdings. This implies that if firms without access to the public debt market will prefer to retain temporary earnings for future uses to the extent that they may face financing

constraints due to information monopoly of private lenders. In particular, we note that precautionary savings motives are highest for firms with many investment opportunities. Blanchard et al.(1993) argue that firms under financing constraints prefer to hold windfall cash rather than pay out for fear of having to pay higher costs of capital if they have positive net present value projects. We expect that while firms with only private market debts will increase dividends as temporary earnings increase, this positive effect will be undermined by future financial needs as long as information monopoly leads to financing constraints.

The paper is organized as follows. Section II discusses different aspects of asymmetric information in public versus private debt markets. Section III provides basic statistics of data. Section IV investigates whether dividends are affected by temporary earnings conditional on debt ratings and other firm characteristics such as investment opportunities. Section V concludes the paper.

Earnings Decomposition, Related Research and Hypothesis

Asymmetric information and the choice of the public vs. private market debts

Research on financial intermediaries implies that firms face a trade-off regarding two types of asymmetric information in determining whether to issue public market debts. One is between dispersed debtholders in the public debt markets and the management of the borrowing firms; the other between private debtholders and other potential creditors in the private debt markets.

Asymmetric information between the management and the debtholders is known to be more prevalent in public debt markets than in private debt markets. Rajan(1992) shows that public debtholders are prone to free-riding in producing information regarding the prospect of the future cash flows of the borrowing firms due to free-riding among dispersed debtholders while private debtholders are not. Aivazian et al. (2006) argue that information asymmetry is more prevalent in public debt market than in private debt market and that firms with frequent accesses to the public debt markets have more incentives for signaling of the management's private information. Mackie-Masson(1990) find that private debt financing is more popular among firms with attributes of asymmetric information such as asset return volatility. James (1987) and Lummer and McConnell (1989) find a positive share price reaction to the announcement of loan agreements with commercial banks, which is consistent with the hypothesis that bank loan announcements are good news.

On the other hand, firms issuing private market debts only may experience financing constraints due to asymmetric information among private debtholders. Although private lenders such as banks have potential benefits in reducing information asymmetry between debtholders and the management of the borrowing firms, potential creditors remain less informed than the current lenders. Since, furthermore, signaling would not be cost-free, private market debts will be most popular among firms for which information asymmetries create the largest wedge between the cost of internal and external financing. This suggests that firms with

only private market debts may experience financing constraints due to information monopoly of the present lenders.

Rajan(1992) and Sharpe(1990) provide models in which asymmetric information among creditors enable the private lenders to impose a higher interest rate than the borrowing firms deserve to the extent that it is costly for the borrower to switch lenders. Houston and James(1996) point out that while bank loan announcements are good news and can be a source of the value gain, these positive effects are hampered by opportunistic behaviors of private debtholders. They argue that using private market debts exclusively may incur financing constraints since the information monopoly enables the private debtholders to impose higher interest rates than the borrower deserves.

Earnings Decomposition

Lintner (1956) and many subsequent papers argue that firms smoothing dividends will not relate their dividends with temporary earnings. Most of these papers depend on the effects of total earnings on dividends to investigate whether firms smooth their dividends. This approach, however, fails to distinguish the effects of temporary earnings on dividends from those of permanent earnings, since dividend changes associated with total earnings resulting from changes in temporary earnings as well as those in permanent earnings.

The model to decompose earnings is as follows. E_t denotes EPS (Earnings per Share) observed at time *t*. Then it consists of permanent component PE_t, and temporary one TE_t which is stationary autoregressive error of first order that can be extended to a general autoregressive error of p th order. PE_t equals the previous level PE_{t-1}, but at known (or unknown) times M_i, level changes are represented by Δ_i.

$$
\begin{aligned}
&E_t = PE_t + TE_t \\
&PE_t = PE_{t-1} + \Delta_i + w_t, \quad t = M_i \\
&\quad\;\; = PE_{t-1} + w_t, \qquad t \neq M_i \\
&TE_t = \phi TE_{t-1} + v_t, \\
&\begin{pmatrix} w_t \\ v_t \end{pmatrix} \sim \mathrm{N}\left\{ \begin{pmatrix} 0 \\ 0 \end{pmatrix}, \begin{pmatrix} \sigma_w^2 & \rho_{wv}\sigma_w\sigma_v \\ \rho_{wv}\sigma_w\sigma_v & \sigma_v^2 \end{pmatrix} \right\}, t = 1, 2, \mathrm{L}\ , T,
\end{aligned}
\tag{1}
$$

where (w_t, v_t) are serially correlated Gaussian white-noise processes with mean 0 and unknown variance and covariance in equation (1). In order to decompose earnings and find level changes at the same time, Chen & Liu (1993) algorithm is used for recognizing level changes in time series and Joo & Jun (1997) model is used for trend and cycle decomposition in time series with stochastic trends. Both methods are explained in summary in appendix A.

Asymmetric information and dividend smoothing

Since Lintner (1956) proposed a partial adjustment model of dividends, many subsequent studies have presented evidence, theoretical and empirical, supporting views that corporate dividends will be largely affected by permanent earnings and will not be related with temporary earnings. Among others, signaling views emphasize that dividend smoothing is an outcome of firms' efforts to reduce asymmetric information in financial markets.

Garrett and Priestley(2000) find significant evidence of dividend smoothing and dividends conveying information regarding unexpected positive changes in current permanent earnings. Javakhadze et al. (2014) argue that smoothing firms are likely to exhibit attributes of a need to signal. They consider firm size and firm age as candidates of attributes for the need of signal. They also follow O'Hara (2003) to use the volatility of the firm's earnings and stock returns as additional proxies for firm level information asymmetry.

Aivazian et al.(2006) suggest that the use of public market debts can also be considered as a candidate of attributes for the need of signal, since free-riding among dispersed debtholders increase asymmetric information between the management and debtholders. They argue that

asymmetric information in the public debt markets will enhance incentives for dividend smoothing if it is aimed at reducing asymmetric information. They find that firms with public market debts exhibit a low speed of adjustment of dividend relative to those without access to the public debt markets.

Hypotheses

While the effects of asymmetric information between the management and debtholders on dividend smoothing have been frequently discussed, it has not been explored whether asymmetric information among private lenders affects incentives for dividend smoothing. In this research, we investigate whether and how incentives for dividend smoothing are affected by asymmetric information among creditors in private debt markets.

We first analyze whether the use of public market debts affects dividend smoothing. We depend on whether the effects of temporary earnings on the level of dividends are affected by whether or not the firms have issued public market debts. According to the signaling view, the use of public market debts will enhance incentives for dividend smoothing. Therefore, we expect that while temporary earnings tend to increase dividends for overall firms, this positive effect is less pronounced for firms with public market debts if information asymmetry in the public debt markets enhances incentives for dividend smoothing.

H1. The effects of temporary earnings on dividends are more pronounced for firms with private debts only.

While Aivazian et al. (2006) consider frequent accesses to the public debt market to be a motive for dividend smoothing, we argue that another way in which the accessibility to the public debt markets may affect the incentives for dividend smoothing is through the

relationship between financial constraints and cash holdings. Unlike Aivazian at al. (2006) focusing on the signaling effects of dividend smoothing, we take into consideration the effects of financing constraints due to opportunistic behaviors of private lenders on dividend smoothing as well.

Effects of financing constraints on dividend smoothing have been discussed in relation with the precautionary savings motives. Authors such as Rajan(1992) and Sharpe(1990) demonstrate that firms with private market debts only will face a higher interest rate than they deserve due to information monopoly of the current lenders. Almeida et al.(2004) argue that firms with external financial constraints have more incentives for cash holdings. Leary and Michaely (2011) point out that firms with financing constraints will be reluctant to increase dividends following a positive earning shock if they have precautionary savings motives. These results imply that firms with private market debts only will smooth dividends as long as they have precautionary savings motives.

In order to analyze whether the limited access to the public debt markets enhances incentives for dividend smoothing, we divide firms with public market debts only into two groups depending on whether they have precautionary savings motives. Precautionary savings are considered to be most valuable for firms with investment opportunities since they may face financial needs in the near future for positive net present value projects[2]. Therefore, we employ investment opportunities as a proxy for precautionary savings motives. We expect that while temporary earnings will increase dividends among firms with private market debts only, this positive effect will be hampered by investment opportunities due to precautionary savings motives.

[2] Blanchard et al. (1993) argue that firms with financing constraints would prefer to hold temporary earnings rather than pay out for fear of having to pay higher costs of capital if they have positive net present value projects to be financed.

H2a. Temporary earnings tend to increase dividends for overall firms with private debts only.

H2b. The positive effect of temporary earnings on dividends among firms with private debts only is less pronounced as investment opportunities increase.

Sample Statistics

For empirical analysis, financial statement information and stock and credit rating data of companies constituting the Korean securities market were obtained from the DataGuide database provided by FnGuide. Only manufacturing companies among all listed companies were included in the analysis, and the estimated period is from 2001 to 2017, and it is an imbalanced panel data with different periods for each company. Cases without asset or stock price information and capital erosion were excluded. In the case of model estimation, dividends occurred more than 10 times during the period, data exists for more than 10 consecutive years, and probabilistic trends in dividends and earnings are determined through unit root test. Only companies that appear in common are considered.

The variables used in the analysis are as follows. Dividends and profits were used by dividing the number of shares, and proxy variables for growth opportunities and financing restrictions were defined. Dividend per share (DPS) was used in consideration of share repurchases, and earnings per share (EPS) were used. For both DPS and EPS, the adjusted weighted average number of outstanding shares was used for the number of shares, adjusted in consideration of capital increase, stock split and reverse split.

DPS and EPS of company i at period t are expressed as D_{it} and E_{it} respectively. By applying the trend cycle decomposition method to individual company EPS, permanent earnings and temporary earnings were divided, and permanent earnings was expressed as PE_{it} and temporary earnings as TE_{it}, respectively. The market value to book value ratio was used as a variable indicating growth opportunities. The growth opportunity of company i at period t is expressed as M_{it}. In addition, for the debt ratio, L_{it}, the total debt ratio of company i at period t, total debt/total assets were used. To control the effect of company size on dividends, the log value S_{it} of asset size is included as an explanatory variable. <Table 1> shows summary statistics of 2,734 listed companies that are analyzed.

<Table 1> Summary statistics of the whole

Variable	Mean	SD	Min	Max
D	0.39790	0.66377	0.00000	6.37712
PE	2.20562	5.40744	-33.14358	59.16825
TE	0.02348	1.29628	-11.40660	18.71073
M	0.83452	0.56859	0.02837	6.48516
L	0.44991	0.18354	0.04825	0.93960
S	19.93937	1.62702	16.81414	26.43287
Sample Size		2,734		

The credit ratings of bonds were used to determine whether there are restrictions in financing. Based on the existence of a valid credit rating as of the fiscal year, each company was classified by year. Of the 2,734 company-year data analyzed, 827 data with a credit rating and 1,907 data without a credit rating were obtained. <Table 2> shows the summary statistics of financial data shown in <Table 1> by classifying the cases with and without credit ratings.

<Table 2> Summary Statistics According to Credit Rating's Existence

Panel A shows summary statistics of financial variables of companies with credit ratings, and panel B shows summary statistics of financial variables of companies without credit ratings. For the credit rating, it was determined whether there was a valid credit rating for the current year by using domestic corporate bond rating information. Out of the total sample of 2,734, the number of data with credit ratings was 827, and the number of companies without credit ratings was 1,907. The definition of each variable is the same as in <Table 1>.

Panel A: Summary Statistics of Firms with Credit Ratings

Variable	Mean	SD	Min	Max
D	0.72481	0.96776	0.00000	6.37712
PE	4.12080	7.85224	-33.14358	59.16825
TE	0.09210	2.13696	-11.40660	18.71073
M	0.91814	0.61752	0.08539	4.08625
L	0.55767	0.14955	0.10838	0.93960
S	21.38284	1.72964	17.69288	25.92611
Sample Size		827		

Panel B: Summary Statistics of Firms without Credit Ratings

Variable	Mean	SD	Min	Max
D	0.25614	0.39926	0.00000	3.00584
PE	1.37508	3.59520	-6.17227	58.55244
TE	-0.00628	0.65380	-4.11274	4.21679
M	0.79826	0.54219	0.02837	6.48516
L	0.40318	0.17717	0.04825	0.90798
S	19.31338	1.09689	16.81414	26.43287
Sample Size		1,907		

Hypothesis Testing

The hypothesis testing model utilizes the Aivazian et al (2006) model, which is an extension of the Lintner (1956) model that considers the control variables.

$$
\begin{aligned}
&D_t - D_{t-1} = \alpha + \gamma\left(\beta_1 PE_t - D_{t-1}\right) + \beta_2 TE_t + \varepsilon_t, \\
&D_t = \alpha + \left(1-\gamma\right) D_{t-1} + \gamma\beta_1 PE_t + \beta_2 TE_t + \varepsilon_t, \\
&D_t = \lambda_0 + \lambda_1 D_{t-1} + \lambda_2 PE_t + \lambda_3 TE_t + \varepsilon_t, \quad \varepsilon_t \sim \mathrm{N}\left(0, \sigma_\varepsilon^2\right).
\end{aligned} \tag{2}
$$

Equation (2) is a formula that adds temporary earnings to the Lintner (1997) model, a different form of Aivazian et al (2006) model.

$$
D_t = \lambda_0 + \lambda_1 D_{t-1} + \lambda_2 PE_t + \lambda_3 TE_t + \lambda_4 MTB_t + \lambda_5 MTB_t TE_t + \varepsilon_t, \varepsilon_t \sim \mathrm{N}\left(0, \sigma_\varepsilon^2\right). \tag{3}
$$

Considering the MTB (Market to Book Prices Ratio) effect and the cross-effect of MTB and TE, equation (3) is obtained. Considering the cross-effect of MTB and TE is an important different point from Aivazian (2008) model. In equation (3), we analyzed the effect of growth opportunities on the dividend sensitivity of temporary earnings by reflecting the fixed effect, debt ratio, and log assets for each company by year.

Model 1

$$
D_{it} = \lambda_1 D_{it-1} + \lambda_2 PE_{it} + \lambda_3 TE_{it} + \lambda_4 M_{it} + \lambda_5 L_{it} + \lambda_6 S_{it} + \mu_i + v_t + \varepsilon_{it} \tag{4}
$$

Model 2

$$
D_{it} = \lambda_1 D_{it-1} + \lambda_2 PE_{it} + \lambda_3 TE_{it} + \lambda_4 M_{it} + \lambda_5 L_{it} + \lambda_6 S_{it} + \lambda_7 M_{it} TE_{it} + \mu_i + v_t + \varepsilon_{it} \tag{5}
$$

where μ_i and v_t indicate the fixed effect of companies and years respectively and ε_{it} is error -term whose expectation is 0 and variances are all equal across times. Equation (4) is based on the Lintner (1956) model and Aivazian et al (2006), an extended form that considers control variables, but is different in two aspects. First, as shown in Equation (4), earnings were divided into permanent earnings and temporary earnings and used as explanatory variables in each model, thereby clearly modeling the effect of permanent earnings and temporary earnings on dividends. Second, by considering the cross-effects of growth opportunities and temporary earnings, it shows how temporary earnings affect dividends according to growth opportunities.

In the existing literature, whether dividends will be smoothed can be judged by the speed of adjustment and the effect of permanent earnings on dividends. It was interpreted that as the actual earnings were used as a proxy for permanent earnings, it immediately reacted to the earnings and that the smoothing was not performed if the adjustment speed was fast. However, if we distinguish permanent earnings from temporary earnings, it can be interpreted that a quick response to permanent earnings is dividend smoothing, whereas if it responds significantly to temporary earnings, it can be interpreted as no dividend smoothing. In particular, it may be meaningful to examine the case where there are restrictions on financing in the capital market.

In general, dividends tend to increase as temporary earnings are high, but if there are restrictions on financing, the sensitivity of temporary earnings to dividends may be affected by financing restrictions. In other words, it can be expected that there will be a tendency not to pay temporary earnings out as dividends to internally raise funds for investment when there are high growth opportunities and temporary profits due to the limitations of the capital market.

In this paper, the results of empirical analysis are presented by classifying the entire sample into companies with and without credit ratings in consideration of the dividend payout ratio.

<Table 3> Estimation Result

Variable \ Model	Total		Rated		Non-rated	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
D_{t-1}	0.437***	0.437***	0.418***	0.418***	0.388***	0.391***
PE_t	0.029***	0.029***	0.025***	0.025***	0.023***	0.022***
TE_t	0.028***	0.030***	0.028***	0.023	0.010	0.042***
MTB_t	0.098***	0.098***	0.227***	0.227***	0.065***	0.068***
DR_t	-0.326***	-0.327***	-1.169***	-1.164***	-0.157***	-0.172***
$SIZE_t$	0.075***	0.075***	0.089	0.090	0.084***	0.085***
$TE_t \times MTB_t$		-0.002		0.006		-0.046***
$Adj.R^2$	0.770	0.770	0.737	0.737	0.745	0.747
# of Obs.	2,734		827		1,907	

*, ** and *** indicates significance at the 10%, 5% and 1%, respectively.

It was found that different patterns exist between companies with financing restrictions and those without financing restrictions when both temporary earnings and growth opportunities are considered at the same time. It was found that most companies reflect permanent earnings when determining the level of dividends. If it is judged that there is a significant relationship between permanent earnings and dividends, it was found that both companies with and without financing restrictions use dividend smoothing policies. However, if dividend smoothing is judged by if they respond significantly to temporary earnings, companies without financing restrictions do not respond to temporary earnings regardless of growth opportunities. On the other hand, in the case of companies with financing restrictions, temporary earnings are paid as dividends, but if there is a growth opportunity, the sensitivity to dividends of temporary earnings decreases because it must secure reinvestment capacity[3].

[3] The estimation result of polled equations is shown in appendix B.

Conclusion

A different pattern exists when both temporary earnings and growth opportunities between companies with financing restrictions and those without financing restrictions are taken into account. Most of the companies were found to use dividend smoothing policies. In the case of a company without financing restrictions, it was found that the relationship with investors is important, so it uses a policy to maintain the dividend level of the previous year, does not respond to temporary earnings, and does not respond to temporary earnings regardless of growth opportunities. In the case of companies with financing constraint, temporary earnings are paid out as dividends, but when there is a growth opportunity, it is necessary to secure reinvestment capacity.

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Appendix A

The parameters of the state space model given are calculated from the estimated parameters of ARIMA(1,1,1) through the equivalent relationship according to Joo & Jun (1997) [4]. The level changes and the other parameters in the state space model are estimated by Chen & Liu (1993) algorithm using ARIMA(1,1,1). The equivalent model with the equation (1), ARIMA(1,1,1) with level changes, reduced form of the equation (1) and is descried as the equation (A-1).

$$(1-\phi B)(1-B)E_t = (1-\theta B)\varepsilon_t + (1-\phi B)\cdot\Delta_i \cdot I_t(t=M_i),\ \varepsilon_t \sim i.i.d\ N(0,\sigma^2) \qquad \text{(A-1)}$$

where B is backshift operator and $BE_t = E_{t-1}$ for $t \geq 2$ and $I_t(\cdot)$ is indicator function where $I_t(t=M_i)=1$ and $I_t(t\neq M_i)=0$.

φ, N and $\Delta_i, i=1,2,\mathrm{L}\ ,N$ are estimated using Chen & Liu (1993) algorithm and φ and $\Delta_i, i=1,2,\mathrm{L}\ ,N$ are the same values and σ_w^2 and σ_v^2 of the state space model are calculated by the equation (3) and (4).

$$\sigma_w^2 = \frac{(1-\theta)^2}{(1-\varphi)^2}\sigma_\varepsilon^2 \qquad (3)$$

$$\sigma_v^2 = \frac{(\theta-\varphi)(1-\theta\varphi)}{(1-\theta)^2}\sigma_w^2 \qquad (4)$$

[4] The detail of the relations between two models is explained in Joo and Jun(1997).

Appendix B

Model 3

$$D_{it} = \lambda_0 R_{it} + \lambda_1 D_{it-1} + \lambda_2 PE_{it} + \lambda_3 TE_{it} + \lambda_3' TE_{it} R_{it} + \lambda_4 M_{it} + \lambda_5 L_{it} + \lambda_6 S_{it} + \mu_i + \nu_t + \varepsilon_{it} \quad (4)$$

Model 4

$$D_{it} = \lambda_0 R_{it} + \lambda_1 D_{it-1} + \lambda_2 PE_{it} + \lambda_3 TE_{it} + \lambda_3' TE_{it} R_{it} + \lambda_4 M_{it} + \lambda_5 L_{it} + \lambda_6 S_{it} + \lambda_7 M_{it} TE_{it} + \lambda_7' M_{it} TE_{it} R_{it} + \mu_i + \nu_t + \varepsilon_{it} \quad (5)$$

where R_{it} indicates the presence or absence of the credit rating of period t of firm i, and 0 is indicated if it does not exist, and 1 is indicated if it exists.

<Table B-1> Estimation result of regression equation – Pooled Equation

Variable \ Model	Total	
	Model 3	Model 4
R_t	-0.029	-0.029
D_{t-1}	0.435***	0.435***
PE_t	0.029***	0.029***
TE_t	0.009	0.042***
$TE_t \times R_t$	0.023*	-0.016
MTB_t	0.100***	0.102***
DR_t	-0.325***	-0.337***
$SIZE_t$	0.079***	0.080***
$TE_t \times MTB_t$		-0.048**
$TE_t \times MTB_t \times R_t$		0.055**
$Adj.R^2$	0.771	0.771
$\#\ of\ Obs.$	2,734	