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The Effects of the Previous Corporate Internal Reservation on the Current Dividend Rate - Using LEV as a moderating variable & Verification through DRF & GBM model

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법인의 전기 사내유보가 당기 배당률에 미치는 영향 부채비율의 조절변수 효과 및 DRF & GBM 모델을 통한 검증

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Abstract This article has tried to analyse the effect of the corporate earning return tax empirically through analysis on the impact of previous internal reservation on the dividends rate of the current year. In addition to this, this article has tried to the effectiveness of government policies with leverage ratio as a moderating variable. Moreover, DRF and GBM model were used to see the effect again.
As a result of the actual proof analysis, OCF, ROE, FOR have a significance level of 99% in model1, model2, model3. However, ADV and MSE has appeared not to be meaningful in all models. In the result of DRF and GBM model for convergence was higher than GBM in depth and leaves. However, when it comes to a model explaining capability, GBM high than DRF.
The further study will be required to examine the effect of government policy by time series analysis in the period of enforcement of the reflux tax, from 2015 to 2017.

• Key Words : Convergence, Corporate earning return tax, internal reservation, dividend rate, debt to equity ratio(LEV), return on equity(ROE)

요 약 본 논문은 법인의 전기 사내유보가 당기 배당률에 미치는 영향을 분석함으로써 미환류 소득세제가 어느 정도 효과를 거두고 있는지 실증분석 하고자 하였으며 추가로 부채비율을 조절변수로 사용하여 정부정책의 유효성도 알아보고자 하였다. 또한 DRF와 GBM 모델을 이용하여 그 효과를 한 번 더 살펴보았다.
실증분석 결과 모형1, 모형2, 모형3에서 모두 현금흐름비율, 자기자본순이익률, 외국인보유비중 변수가 99% 수준에서 유의미함을 확인할 수 있었던 반면 광고선전비 비율, 대주주지분율 변수는 모든 모형에서 유의미하지 않은 결과를 보여주었다. 융합 차원에서 실시한 DRF와 GBM 모형의 분석 결과를 보면 DRF가 depth와 leaves에서 GBM 보다 더 높게 나타났으나 모형의 설명력에 있어서는 GBM이 DRF보다 더 높았다. 앞으로의 과제는 미환류 소득세제의 시행기간인 3년간(2015~2017)의 시계열 분석을 통하여 정부정책의 효과를 살펴볼 필요가 있다.

• 주제어 : 융합, 기업소득환류세제, 사내유보, 배당률, 부채비율, 자기자본순이익률

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1. Abstract

The government has been introduced 3 packages of laws of 'Household income increasing income tax' such as 'Dividend increasing income tax', 'Salary income increasing tax', 'Corporate earning return tax' following the common opinion that an increased household income is required to activate the economy. Among these laws, since Dividend increasing income tax and Salary income increasing tax is the law which benefits the companies paying more dividend and salary, they are not that different with other tax policies which aim to boost the company. However, 'Corporate earning return tax' partially has the character of punishment to the companies which are not favoured in investing, salary and dividends. Since the punishment character is far different from other tax policies, it has been controversial before it is introduced[1].

This policy which will be employed from 2015, started with the target of conglomerate whose exceeding 50billion Won and the companies mutual investment is limited. However, there has been not many articles written about the performance in boosting the economy which was the original aim of government.

In the past, the tax on the reservation was designed to solve the unfairness of tax caused by improper dividends reservation[2]. However, the tax currently being implemented to the reservation is aimed to activate the economy such as investment increasing and employment expanding. In addition, A critic to the tax also exists. If the dividends exceeding the net earning is not conducted, the high reservation and the reserve rate will increase the investment capability of the company[3], but the conservative management of the companies instead of the investment will just increase its cash and cash equivalents[4].

This article wishes to empirically analyse whether the tax on the internal reservation would have an impact on the investment of the company and boosting the economy. For this, analysis of the impact of the previous earning reservation on the dividend rate of the current year will be the first part. Furthermore, the debt rate used as an adjusting and moderating variable will be examined about its usefulness. Moreover, this article will be focusing on figuring out what variable carry an important impact on the dividend rate through using DRF(Distributed Random Forest) and GBM(Gradient Boosting Machine) model in the convergence.

2. Literature review

The dividend is working in reducing agency costs as a sign of the company's future earning. In the view of investors, dividends and the value of the company has a positive correlation due to the eliminated future uncertainty and the tendency that investors prefer current income[5].

Park et al.(2003) confirmed the fact that the decision about the dividends has a close relationship with the size of the business, debt ratio, operating profit and cash flow. Furthermore, they discovered that the financing scale after the dividend also has a meaningful relationship with the dividend trend and that there is a close connectivity between the financial position of a firm, the dividend decision and the response from investors.

Lang, Ofek and Stulz(1996) researched the relationship of the future growth and debt ratio, figuring out that the relationship is meaningless in the companies which have high investment opportunity, but the relations was a meaningfully negative relationship in the company which have lower invest opportunity[6]. Moreover, Mao(2002) claimed that the optimal leverage ratio has a positive relationship with the marginal variability of investment[7,8].

Choi et al.(2005) researched that the business opportunity has weak correlation with the dividend level, and that the operating and financial risk has strong negative relationship with the dividend level through the analysis of the impact of the agency cost,

the business opportunity, the operating and financial risk on the dividend level.

Choi and You(2012) contended that the debt ratio has a meaningful correlation to ROE in the analysis on the financial structure of the middle and small sized business[9]. In addition to this Kim et al.(2012) has discovered that debt ratio has a significant negative impact on the profitability or the operating profit through analysing the debt ratio and profitability[10,11].

Kim and Choi(2013) analysed the reduced amount of cash outlay and stability of businesses. In the result, current ratio and quick ratio which demonstrate the short-term debt repayment ability has no statistical significance, but Capital ratio which shows middle and long term are carrying negative correlations[12].

Lee and Lim(2011) emphasized that the businesses cut dividends and raise their size and R&D to improve their stability and to make development through the verification about the impact of foreign holdings shares and financial characters on the value of the firm before and after the global financial crisis. The fact that as foreign holding shares rate, Dept ratio, R&D and advocating expenses and its sales gets high and the business scale gets small, the value of the business gets higher[13]. Especially, Mok(2014) conducted the analysis the impact of the foreign holding shares rate in the phases of the business life cycle on the business dividend payout ratio and the dividends on its capital equity. By this analysis, Although foreign holding shares rate of all the respective phases of the business lifecycle affect the amount of dividends, there is the explicit impact of foreign holding shares rate on dividends in the expansion phase, and there is the most week impact in the introductory phase rate[14,15]. Moreover, there have been other research on the impact of foreign investors on the business payout ratio. Park(2004), Sul and Kim(2006), Lee and Rho(2006) reported that the dividends of businesses increases and the invest decrease according to the growing shares of foreign investors. However, Park and Lee(2006), Binh and Cho(2005) reported that the foreign holding shares are not relevant to the dividends and investments. In addition, Sul and Kim(2006), Cho and Sul(2006), Kim et al.(2008) reported the necessity of dividing the foreign holding shares by the characters of foreign investors. Sul and Kim(2006) has discovered that the foreign investors who have more than 5% significantly and strongly affect the dividend yields of the business, not the simple sum of the shares of the foreign investors[16].

Cho and Sul(2006) has discovered through dividing the foreign investors into foreign financial institutions and foreign business investors that foreign financial institutions positively affect capital expenditure and have positive correlation with R&D investment of the business, and that foreign business investors don't show any significant correlation, and they lead to the constricted capital expenditure[17]. Kim et al.(2008) researched the impact of the official presentation of objective change on the value of the business. According to this research, if they are foreign investors, and they have the purpose of management, the higher yield rate has been made[18,19].

Moreover, Lee and Rho(2006) empirically analysed that the dividends payout ratio is positively affected by foreign holding shares, and there is no statistical significance in inclination for dividends[20], Park and Lee(2006) conducted empirical analysis that the total shares of foreign investors affect the inclination for dividends, the more than 5% holding rate has no statistical significance[21].

3. Research hypothesis and Research model

3.1 Research hypothesis

If the tax on internal reservation implemented, companies would reduce the internal reservation so that external earning outlay will increase leading to dividends rate which means dividends cash amount. In addition to this, previous reservation rate will have

more significant impact on the dividends rate for the current year through increased debt ratio.

3.2 Sampling

3.2.1 Data gathering

1) The target is companies listed in KOSPI
2) corporate data has been gained from KIS-VALUE, DART
3) The listed corporate of which fiscal year ends on 31st of Dec.
4) Companies which has carried no deficit forward in recent 5 years.
5) Special industry corporate such as financial business has been excluded.
6) The corporate which has an equity capital higher than 50billion has been targeted(middle and small sized company excluded).
7) Financial statement of 2014 and 2015 has been used.

3.2.2 The number of target companies of the model

SORTATION	THE NUMBER OF ANALYSIS TARGET CORPORATE
KOSPI LISTING	923
THE CORPORATE LESS THAN KRW 50 BILLION IN EQUITY CAPITAL	(-) 318
SMALL & MEDIUM SIZED ENTERPRISES	(-) 56
ECT TARGET CORPORATE (corporate earning return tax)	549
DATA ABSENCE, NEGATIVE RETAINED EARNINGS etc.	(-) 129
THE NUMBER OF ANALYSIS TARGET CORPORATE	420

3.2.3 Set out Variables & Definition of Signs

1) Dependent variables
- Dividend rate (DIV) = Total cash dividends on ordinary stocks / Total Asset

2) Independent & Controlled variables
(1) Reservation rate (RES, reserve ratio) = Earning surplus / Paid capital
(2) Operating cash flow rate (OCF) = Operating Cash Flow / Total Asset
(3) Return on Equity (ROE) = Net earning / Equity
(4) Foreign ownership (FOR) = The number of stocks foreigners have / outstanding share
(5) Advertising expense rate (ADV) = Advertisement expense / turnover
(6) Major shareholder's Equity (MSE) = The number of ordinary shares owned by a major shareholder / The number of outstanding ordinary shares.

3) moderating variable
- Leverage rate (LEV, debt to equity ratio) = Total debt / Total equity

4) Transaction variables
- Interaction (REC) = RESit-1*LEVit

3.3 Research model

[model1]= Normal regression model

$DIVit = \beta0 + \beta1*RESit-1 + \beta2*OCFit + \beta3*ROEit + \beta4*FORit + \beta5*ADVit + \beta6*MSEit + \varepsilon it$

▸Model1 wishes to see the significant impact of previous earning reservation on the dividends rate of the current year.

[model2]= Adding moderating factor to model1 (LEVit)

$DIVit = \beta0 + \beta1*RESit-1 + \beta2*OCFit + \beta3*ROEit + \beta4*FORit + \beta5*ADVit + \beta6*MSEit + \beta7*LEVit + \varepsilon it$

▸Model2 wishes to see if there is a significant impact of the debt ratio on dividends of the current year by adding the debt ratio to model1.

[model3]= adding the interaction variables to model2 (RESit-1*LEVit)

$DIVit = \beta0 + \beta1*RESit-1 + \beta2*OCFit + \beta3*ROEit + \beta4*FORit + \beta5*ADVit + \beta6*MSEit + \beta7*LEVit + \beta8*(RESit-1*LEVit) + \varepsilon it$

▸model3 tries to review the significance of the

adjusting and moderating effect in debt ratio by adding the interaction variables.

[model4]= Applying model2 to DRF & GBM

▸model4 tries to review the degree of the significant impact and the importance of each variable through the result of a regression analysis using DRF and GBM.

4. Empirical analysis and Interpretation of result

4.1 Descriptive statistic quantity and Correlation analysis

<Table 1> Descriptive Statistics

sort	N	MIN	MAX	MEAN	SD	VAR
DIV	420	0.000	.1193	.0099	.0117	.000
RES	420	.0063	2.986	.9350	.3197	.102
OCF	420	-.138	.2801	.0597	.0628	.004
ROE	420	-1.82	.5069	.0464	.1351	.018
FOR	420	0.000	.8069	.1257	.1407	.020
ADV	420	0.000	.3294	.0107	.0283	.001
MSE	420	.0561	1.000	.3008	.1534	.024
LEV	420	.0016	9.037	.8693	.8762	.768
REC	420	-1.96	.7572	-.070	.2501	.063
valid N	420					

In <table 1>, there are basic statistics of the variables used in the research model.

The mean and standard deviation of the dividends rate as a dependent variable were respectively 0.0099, and 0.0117, The mean and standard deviation of the reserve rate which was an independent variable were 0.9350 and 0.3197.

The dispersion of the debt ratio which was the adjustment factor was 0.768 that was the highest result, and the dispersion of the interaction variable was 0.063 that was a low number.

<Table 2> Pearson Correlation

P. C.	DIV	RES	OCF	ROE	FOR	ADV	MSE	LEV	REC
DIV		.197***	.333***	.285***	.295***	.081*	.007	-.288***	.012
RES			.033	.134***	.147***	-.015	-.072	-.251***	-.219***
OCF				.218***	.341***	.003	-.011	-.061	.013
ROE					.198***	.051	.000	-.253***	.091*
FOR						.077	-.050	-.129***	.046
ADV							-.060	-.119**	.094*
MSE								.062	-.015
LEV									-.317***
REC									

* Showing significance in 90%, ** 95%, *** 99%

<Table2> shows the correlation analysis result of variables.

In the result, the dividends rate has significant correlations with the variables of the reserve rate, cash flow, ROE, and foreign holding shares in the degree of 99%, and there is also a significant correlation in 99% with the debt ratio, which is the adjustment factor. However, the result shows the major shareholders' share rates and the interaction variables are irrelevant. Especially the major shareholders' share rates have no significant correlations even with the other variables. Furthermore, the debt ratio and the interaction variables have the significant correlation the degree of 99%.

4.2 Regression Analysis

<Table 3> R^2 & Durbin-Watson

MODEL	R	R^2	adjusted R^2	est_SE	S_C					DW
					R^2_C	F_C	DF1	DF2	SPF_C	
1	.457	.209	.198	.01005	.209	18.2	6	413	.000	
2	.491	.241	.228	.01003	.032	17.2	1	412	.000	
3	.494	.244	.230	.01003	.003	1.81	1	411	.179	2.11

<Table 3> shows the change of R^2 amount and the result of Durbin-Watson.

The adjustment effect of the debt ratio can be perceived as the one having a positive effect because the change of R^2 amount started from 0.209 and got higher to 0.032, 0.003 as the debt ratio and the interaction variables are being added. Moreover, since the data of Durbin-Watson is almost close to 2, we can know the model is quite independent.

<Table 4> ANOVA

MODEL		SS	DF	MS	F	SP
1	R	.012	6	.002	18.212	.000
	r	.046	413	.000		
	T	.058	419			
2	R	.014	7	.002	18.690	.000
	r	.044	412	.000		
	T	.058	419			
3	R	.014	8	.002	16.613	.000
	r	.044	411	.000		
	T	.058	419			

<Table 4> shows the result of the dispersion analysis.

Though this the explaining capability is increasing as the more variables are added to model1, model2, model3.

<Table 5> Regression Analysis Model Summary

MODEL		NON SC		SC	t	VIF
		B	SE	ß		
1	(c)	-.001	.002		-.509	
	RES	.005	.002	.145	3.252***	1.042
	OCF	.044	.009	.236	5.002***	1.165
	ROE	.016	.004	.181	3.961***	1.085
	FOR	.013	.004	.154	3.231***	1.181
	ADV	.026	.018	.064	1.443	1.013
	MSE	.002	.003	.031	.705	1.011
2	(c)	.003	.002		1.265	
	RES	.004	.002	.104	2.324**	1.094
	OCF	.045	.009	.238	5.138***	1.165
	ROE	.012	.004	.140	3.065***	1.137
	FOR	.012	.004	.144	3.092***	1.183
	ADV	.018	.018	.043	.997	1.026
	MSE	.003	.003	.038	.885	1.012
	LEV	-.003	.001	-.191	-4.154***	1.146
3	(c)	.004	.002		1.568	
	RES	.003	.002	.083	1.757*	1.226
	OCF	.044	.009	.237	5.114***	1.166
	ROE	.012	.004	.142	3.112***	1.138
	FOR	.012	.004	.147	3.150***	1.185
	ADV	.019	.018	.046	1.054	1.027
	MSE	.003	.003	.038	.870	1.012
	LEV	-.003	.001	-.215	-4.362***	1.327
	REC	-.003	.002	-.065	-1.347	1.250

* Significance in 90%, ** 95%, *** 99%

<Table 5> shows the result of a regression analysis. We can see the significant mediator effect of the debt ratio as the beta of the reserve rate reduced from 0.104 to 0.083 in model2 and model3.

In all the model1, model2, and model3 the significance of the variables such as the cash flow rate, ROE, foreign holding shares in 99% confidence rate appeared while the variables such as advertising expenses, the shares rate of the major shareholders didn't carry significant result in all models.

Especially, the cash flow rate showed much higher significance compared to other variables.

When we see the impact of the previous reservation rate on the dividends of the current year, we can acknowledge the significance level getting lower to 99%, 95%, 90% as the variables are added in model1, model2, model3.

The debt ratio as an adjustment variable showed the meaningful result in the 99% confidence level; the interaction variables didn't show a significant result. since VIF was quite low as a result of collinearity statistics calculation, it can be interpreted as the one carrying no problem in multicollinearity.

4.3 DRF & GBM Model Analysis

<Table 6> DRF & GBM MODEL SUMMARY

Model Algorithm	DRF	GBM
training frame	75%	75%
validation frame	25%	25%
response column	DIV	DIV
ignored column	STOCK	STOCK
number of trees	50	50
number of internal trees	50	50
min depth	14	5
max depth	20	5
mean depth	17.0400	5.0
min leaves	163	6
max leaves	201	19
mean leaves	183.4400	11.7600

<Table 6> is the table which compares and summarise DRF(Distributed Random Forest) and GBM(Gradient Boosting Machine) model[22].

As presented in <Table 6>, DRF & GBM was applied with 75% division as a 75% training frame; other 25% was applied as a validation frame.

As the result of the analysis, DRF appeared to be higher than GBM in the depth and leaves.

<Table 7> shows TRAINING METRICS and VALIDATION METRICS in comparison.

<Table 7> TRAINING METRICS & VALIDATION METRICS

SORT	TRAINING METRICS		VALIDATION METRICS	
model	DRF	GBM	DRF	GBM
MSE	0.000087	0.000022	0.000152	0.000151
RMSE	0.009305	0.004695	0.012345	0.012280
nobs	307	307	113	113
R2	0.204486	0.797497	0.295450	0.302826
MRD	0.000087	0.000022	0.000152	0.000151
MAE	0.005910	0.003034	0.007183	0.006656
RMSLE	0.009054	0.004555	0.011830	0.011758

As <Table 7> demonstrated, R2 of GBM model training has the more higher explaining capability as the degree of 79.75% in training metrics and 30.28% in the validation metrics than that of DRF.

<Table 8> DRF VARIABLE IMPORTANCES

variable	relative importance	scaled importance	percentage
ROE	0.2894	1.0	0.2466
LEV	0.2329	0.8046	0.1984
FOR	0.1849	0.6388	0.1575
OCF	0.1462	0.5051	0.1245
RES	0.1311	0.4530	0.1117
MSE	0.0983	0.3395	0.0837
ADV	0.0911	0.3147	0.0776

As presented in <Table8>, In DRF, as the important variables affecting the dividends rate, ROE was the highest number with 24.66% and the debt ratio, foreign holding shares, the cash flow rate, the reserve rate, the shares rate of the major shareholders and advertising expenses followed in order. In GBM which is analysed in <Table9>, LEV was the highest with 33.20% and return on equity, foreign holding shares, the cash flow rate, the reserve rate, the shares rate of the major shareholders, advertising expenses followed in order.

<Table 9> GBM VARIABLE IMPORTANCES

variable	relative importance	scaled importance	percentage
LEV	0.0466	1.0	0.3320
ROE	0.0422	0.9062	0.3009
FOR	0.0164	0.3515	0.1167
OCF	0.0131	0.2803	0.0931
RES	0.0105	0.2259	0.0750
MSE	0.0058	0.1245	0.0413
ADV	0.0057	0.1233	0.0409

5. Conclusion

This article has tried to analyse the effect of the corporate earning return tax empirically through analysis on the impact of previous internal reservation on the dividends rate of the current year. In addition to this, this article has tried to the effectiveness of government policies with leverage ratio as a moderating variable. Moreover, DRF and GBM model were used to see the effect again.

As a result of the actual proof analysis, OCF, ROE, FOR have a significance level of 99% in model1, model2, model3. However, ADV and MSE has appeared not to be meaningful in all models.

When we see the impact of previous reservation rate on the dividends of the current year, we can see the decreasing significance level like 99%, 95%, 90% as the variables are being added to model1, model2, and model3. Especially, correlation variables were not meaningful while the adjusting and moderating effect of the leverage ratio are significantly meaningful.

In the result of DRF and GBM model for convergence was higher than GBM in depth and leaves. However, when it comes to a model explaining capability, GBM high than DRF. In addition, the most important variable impacting the dividend rate was that the ROE was the largest factor in the DRF, while the LEV was the largest in GBM.

The further study will be required to examine the effect of government policy by time series analysis in the period of enforcement of the reflux tax, from 2015 to 2017.

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