

The Effect of the Tax Subsidy on the Trading Volume*

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— <Abstract> —

The purpose of this study is to analyze the hypothesis that trading volume will decrease as tax subsidy increases. This study conducted a hypothesis and empirical analysis based on the expectation that if the tax subsidies act as an incentive for downward earnings management and conservatism accounting, the different beliefs among investors about the intrinsic value of the investment target firm will decrease.

As a result of the tests, the regression coefficient of the measure of tax subsidy is a negative value. It can be interpreted that the trading volume decreases as the tax subsidy increases. In addition, this suggests that the tax subsidy is improving the information environment by acting as a factor in downward earnings management.

This study will contribute to the analysis of how individual investors understand tax subsidies. The results of this study provide implications that national tax subsidies may also affect firms' accounting information.

<Key words> Tax Subsidy, Trading Volume, Downward Earnings Management, Conservatism Accounting

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I . Introduction

The purpose of this study is to analyze the hypothesis that trading volume will decrease as tax subsidy increases. In this study, hypothesis is set and empirical analysis is conducted based on the expectation that different belief among investors about the intrinsic value of invested firms will decrease if tax subsidy serves as an incentive to improve the information environment.

According to Sun et al.(2015), tax subsidies are caused by tax exemptions or tax credits for policy purposes. tax subsidies can reduce taxes that firms actually have to pay, which in turn can increase net income. In this regard, studies on tax subsidies report that as tax subsidies increase, managerial downward earnings management and conservatism accounting increases(Sun et al. 2015 ; Nam et al. 2013). Management's downward earnings management and conservative accounting can have the effect of deferring some of the reported income of the current period to future net income.

Bamber(1987) reports that there is a positive relationship between unexpected earnings and volume. Similarly, Kim and Verrecchia(1994) explained that announcement periods may have higher information asymmetry levels than non-announcement periods. This can be interpreted as the result of various interpretations of information contained in unexpected earnings(Jeong 1990 ; Morse 1981).

In the previous studies on trading volume, there is a study that analyzes the relationship between the unexpected earnings(the quality of earnings, the related party trading and the industry professional auditor) and the trading volume. However, no study has analyzed the effect of the tax characteristics of the individual firm on the trading volume. Therefore, in this study, we analyze the effect of tax subsidies on trading volume by measuring the tax characteristics of individual firms as tax subsidies.

The tax subsidy of this study is measured based on the methodology of Nam et al.(2013), Sun et al.(2015) and Jung and Byun(2016). The trading volume is measured by daily average trading volume and daily excess trading volume. As a result of the analysis, the regression coefficient of the measure of tax subsidy showed a significant negative value. According to these results, it can be interpreted that the trading volume decreases as the tax subsidy increases. This suggests that tax incentives are an incentive to improve the information environment and reduce the different belief among investors about the intrinsic value of the investee.

This study is composed as follows. In chapter II, we review previous studies and present research hypotheses. In Chapter III, research model, variable measurement and sample selection

are described by research methodology. In Chapter IV, empirical analysis result is presented. Finally, Section V presents the results and implications of the study.

II. Preliminary Research and Hypothesis Setting

1. Factors affecting stock volume

The trading volume increases when investors have differing beliefs about the intrinsic value of the investee (Karpoff 1986 ; Bamber 1987 ; Ajinkya et al. 1991). Therefore, in previous studies related to trading volume, trading volume is measured as a proxy for heterogeneous beliefs among investors, and the relationship between various firm characteristics and trading volume is analyzed (Karpoff 1986 ; Bamber 1987 ; Ajinkya et al. 1991 ; Ziebart 1990 ; Jeong 1990 ; Choi and Shin 1997). This study summarizes previous studies focusing on the effect of unexpected earnings, the quality of earnings and information environment on trading volume.

Choi and Shin(1997) report that the unexpected earnings show information that investors do not recognize beforehand, so there is a positive correlation between unexpected earnings and trading volume. This is consistent with the results of Bamber(1987) analysis of US firms. According to these results, the information contained in unexpected earnings is considered to induce investors various interpretations of future cash flows(Jeong 1990). These results also suggest that the trading volume may increase if the information environment is not good(information risk is high).

Ajinkya et al.(1991) analyzed the relationship between analysts' forecast variance and trading volume. As a result, there is a positive relation between the variance of analysts' forecasts and the trading volume. Ziebart(1990) analyzed the relationship between the variance(the revision) of analyst earnings forecasts and abnormal trading volume. As a result, the variance of analyst earnings forecasts and the revision of analyst earnings forecasts are found to be positively related to abnormal trading volume.

Similarly, Choi and Shin(1997) analyzed the relationship between analysts' earnings forecast variance and trading volume for Korean firms. As a result, the trading volume increases as the analyst's earnings forecast variance increases. Jeong(1990) measured the firm size and age as a proxy for information environment, and analyzed the effect of each information environment proxies on trading volume. As a result of the analysis, it is found that the trading volume decreases as the size of the firm is large and the age of the firm is high. According to these

results, it can be interpreted that the trading volume decreases as the information environment (information risk) is superior(lower).

On the other hand, according to Bhattacharya et al.(2012), information risk is reduced when the quality of earnings is high. According to this logic, high quality of earnings can act as an incentive to reduce trading volume. In this respect, Sohn et al.(2009) report that when the accrual quality is high, the positive relation between the unexpected earnings and the trading volume decreases. In other words, Sohn et al.(2009) explain that different interpretations among investors about unexpected earnings can be mitigated if firms provide high quality of accounting information.

Jung and Kim(2017) analyzed the relationship between earnings persistence and trading volume by measuring earnings' quality as earnings persistence. As a result, the trading volume decreased as the earnings persistence increased. This is consistent with Jung and Lee(2016) who measured the quality of earnings by earnings smoothing. In particular, Beak(2011) suggests that high matching levels lead to high-earnings quality. This suggests that the trading volume may decrease as the matching level increases. Therefore, Jung and Moon(2017) explain that the high level of matching is the incentive to reduce the trading volume.

In addition, Jung and Lee(2016) suggest that the trading volume increases as the related party tradings increase, and Jung(2016) suggests that the trading volume decreases when industry professional auditors conduct audits. And Jung and Kim(2017) suggest that firms with higher competition in the industry tend to decrease their trading volume.

2. Prior research related to tax subsidies

The tax subsidy reduces the tax(effective tax or income tax expense) actually paid by the enterprise. If the tax burden on the corporation is to be reduced, this will result in an increase in net income. In this respect, previous studies related to tax subsidies analyze how tax subsidies are related to managers' earnings management, accounting methods, and earnings persistence(Park et al. 2002 ; Sun et al. 2005 ; Nam et al. 2013).

Nam et al.(2013) and Sun et al.(2015) explain that if tax subsidies occur, the management may reduce the pressure on reported earnings. This suggests that there may be a negative relation between tax subsidies and the level of earnings management. Due to these factors, Park et al.(2002) and Sun et al.(2015) report that the higher the tax subsidies, the higher the incentive for managers to carry out downward earnings management.

Nam et al.(2013) analyzed the relationship between tax subsidies and conservative accounting. The analysis shows that tax subsidies have a positive relationship with conservative accounting. Management's downward earnings management and conservative accounting act as an incentive to lower reported earnings as a source of dividends. In this regard, Jung and Lee(2017) report that foreign investors who prefer high reported net income do not prefer tax subsidies.

Management's downward earnings management and high conservatism defer part of the current reported net income to future net income. This suggests that tax subsidies may have a positive relationship with earnings persistence in proxies of earnings quality. In this regard, Sun et al. (2015) suggest that the greater the tax subsidy, the greater the earnings persistence. These results are also found in the study of Choi and Kim(2010). Specifically, Choi and Kim(2010) suggest that firms with positive tax subsidies have higher earnings persistence than firms with negative tax subsidies.

Das et al.(1998) reported that analysts analyzing firms with low earnings predictability performed optimistic earnings forecasts in order to increase accessibility to private information (managers' liking). Based on this, Jung et al.(2016) reported that tax subsidies are negatively correlated with analysts' earnings forecast bias, as firms with higher tax subsidies have higher earnings persistence. This implies that the information environment(information risk) may be higher(lower) for firms with higher tax subsidies.

3. Hypotheses

Sun et al.(2015) explain that high tax subsidies act as a factor in increasing net income, so managers of firms with high tax subsidies may have low pressure on current reporting income. When the pressure on net income is low, managers perform downward earnings management that defer current earnings to the future.

Bamber(1987) reports that there is a positive relationship between unexpected earnings and volume. Similarly, Kim and Verrecchia(1994) explained that announcement periods may have higher information asymmetry levels than non-announcement periods. This can be interpreted as the result of various interpretations of information contained in unexpected earnings(Jeong 1990 ; Morse 1981).

Sun et al.(2015) report that managers of firms with high tax subsidies lower the pressure on reporting income and therefore make downward earnings management that defer current earnings to the future. Similarly, Nam et al.(2013) explained that firms with higher tax subsidies generate

more conservative accounting.

Nam et al.(2013) analyze the relationship between tax subsidies and conservative accounting. The analysis shows that tax subsidies have a positive relationship with conservative accounting. Management's downward earnings management and conservative accounting act as an incentive to lower reported earnings as a source of dividends.

Also, Jung and Lee(2017) report that domestic foreign investors prefer high reported net income, so the foreign equity ratio has a negative relationship with tax subsidies. This means tax subsidies serve as an incentive to lower reporting income. In other words, it suggests that managers have a high incentive to perform downward earnings management when tax subsidies are high.

Jung et al.(2016) report that tax subsidies act as incentives to increase earnings persistence, as high tax subsidies enable downward earnings management. Therefore, they report that tax subsidies have a negative relationship with financial analysts' earnings forecasting bias. This suggests that high tax subsidies can reduce information asymmetry.

As tax subsidies increase, the heterogeneous interpretation among investors of investment firms is expected to decrease. Based on these expectations, this study established the following hypotheses.

Research hypothesis : Tax subsidies will have a negative relation with trading volume.

III. Research Design

1. Variable measurement

A. Measuring trading volume(TV, different beliefs between investors)

In this study, different beliefs among investors are measured by trading volume(TV). Specifically, the trading volume used in this study is measured as follows(Morse 1981 ; Beaver 1968 ; Bamber 1987 ; Ziebart 1990). However, these researchers are measuring trading volume by limiting the window to a certain point(disclosure date).

Kim and Verrecchia(1994) explain that the information asymmetry level of earnings disclosure period may be higher than that of non-earnings disclosure period. In this study, we applied the law of large numbers to extend the period to one year to measure the trading volume of individual firms.

First, the following equation(1) is the daily average trading volume(TV1) and the average daily stock trading volume of the individual firm for one year. The larger the firm's different beliefs among investors, the greater the average daily trading volume(TV1).

$$TV1_{i,NF} = \left[\sum_{t=1}^n V_{it} \right] \times \frac{1}{T_{NF}} \quad \text{Equation(1)}$$

TV1 : average daily trading volume

V_{it} : trading volume of i-firm in t-day / total stocks of i-firm in t-day

T_{NF} : the number of trading volume per year

The above equation(1) has a limit that does not indicate whether abnormal trading volume has occurred. In this study, we measured the daily abnormal trading volume(TV2) additionally. If the value of the daily abnormal trading volume(TV2) of the individual firm in the equation(2) is larger or smaller than zero, then the individual firm has positive abnormal trading volume or negative abnormal trading volume. It can be interpreted that abnormal trading volume occurred.

Specifically, Jung and Kim(2017) measure the daily trading volume estimate based on the market model to measure TV2. Then, after summing the difference between the actual daily trading volume and the daily trading volume estimate, they divide this value by the number of trading volume per year. When measuring the daily trading volume estimate, V_{mt} is measured as 'the total trading volume of the market on the t day of the transaction / the total number of listed stocks on the t of the trading day'.

$$TV2 = \left[\sum_{t=1}^n \epsilon_{it} \right] \times \frac{1}{T_{NF}} \quad \text{Equation(2)}$$

TV2 : daily abnormal trading volume

$\epsilon_{i,t}$: $V_{it} - (\hat{\alpha}_i + \hat{\beta}_1 V_{mt})$ (actual volume – estimate($\hat{\alpha}_i + \hat{\beta}_1 V_{mt}$))

B. Measuring tax subsidies(TS)

In this study, the tax subsidy is measured based on the methodology of Nam et al.(2013), Sun et al.(2015) and Jung and Byun(2016). The following equation(3) is a formula for the tax subsidies defined by these researchers. The following equation(3) is the difference between the marginal tax rate(the highest tax rate for each fiscal year) and the effective tax rate(actual tax rate) for net income before tax(NIBT).¹⁾ In this study, tax subsidy 1(TS1) and tax subsidy 2(TS2)

1) Sun et al.(2015) explain that the tax burden(or tax burden) can be measured as shown in equation(a)

are measured based on equation(3).

$$\begin{aligned}\text{Tax Subsidy(TS)} &= (\text{NIBT} \times \text{marginal tax rate}) - (\text{NIBT} \times \text{effective tax rate}) \\ &= \text{NIBT}(\text{marginal tax rate} - \text{effective tax rate})\end{aligned}\quad \text{Equation(3)}$$

The following equation(4) is tax subsidy 1(TS1). Tax subsidy 1(TS1) in Equation(4) is measured by multiplying the net income before tax by the difference between marginal tax rate and effective tax rate.

Nam et al.(2013) and Sun et al.(2015) measure the marginal tax rate as the legal maximum tax rate. This study measured the marginal tax rate as the legal maximum tax rate based on the methodology of Nam et al.(2013) and Sun et al.(2015).

As managers' earnings management increases, net income before tax will increase. In other words, if the management makes earnings management, the net income before income tax of

below. However, there is a problem that the items constituting equation(a) are not disclosed.

$$\begin{aligned}\text{Tax subsidy(or tax burden)} &= \text{tax deduction} \cdot \text{exemption} + (\text{permanent difference in gains and losses} \\ &\quad - \text{impairment loss for depreciation} + \text{deferred assets unused carry-over loss} \\ &\quad - \text{carry-over of previous deferred assets carried forward}) \\ &\quad \times \text{marginal tax rate}\end{aligned}\quad \text{Equation(a)}$$

Due to measurement problems, this study measured the tax burden(or tax burden) through equations(b), (c), (d) and (e). In the following equation(b), if the income tax is measured as '(income before tax $\times$ effective tax rate)', equation(b) can be transformed into equation(c). Equation(c) is added to and subtracted '(income before tax $\times$ marginal tax rate)', and equation(c) can be expressed as equation(d). Equation(d) may be expressed as Equation(e). In equation(e), '(income before tax $-(\text{income before tax} \times \text{marginal tax rate})$ ' can be expressed as unadjusted net income as shown in equation(f), '(income before tax $\times (\text{marginal tax rate} - \text{effective tax rate})$ ' can be expressed as tax subsidies or tax burden. In this case, if '(income before tax $\times (\text{marginal tax rate} - \text{effective tax rate})$ ' has a positive value, it can be interpreted as having tax subsidies, and '(income before tax $\times (\text{marginal tax rate} - \text{effective tax rate})$ ' has a negative value, indicating a tax burden. In this regard, Wilkie(1992) defines tax subsidy as the difference between the income before tax multiplied by the tax rate and the income tax expense in the income statement.

$$\text{Net Income} = \text{Income Before Taxes} - \text{Income Taxes} \quad \text{Equation(b)}$$

$$\text{Net Income} = \text{Income Before Taxes} - (\text{Income Before Taxes} \times \text{Effective tax rate}) \quad \text{Equation(c)}$$

$$\begin{aligned}\text{Net Income} &= \text{Income Before Taxes} + (\text{Income Before Taxes} \times \text{Marginal tax rate}) \\ &\quad - (\text{Income Before Taxes} \times \text{Marginal tax rate}) \\ &\quad - (\text{Income Before Taxes} \times \text{Effective tax rate})\end{aligned}\quad \text{Equation(d)}$$

$$\begin{aligned}\text{Net Income} &= \text{Income Before Taxes} - (\text{Income Before Taxes} \times \text{Marginal tax rate}) \\ &\quad + (\text{Income Before Taxes} \times (\text{Marginal tax rate} - \text{Effective tax rate}))\end{aligned}\quad \text{Equation(e)}$$

$$\text{Net Income} = \text{Unadjusted Net Income} \pm \text{Tax burden(or Tax burden)} \quad \text{Equation(f)}$$

equation(4) increases, which in turn increases the value of tax subsidy 1(TS1). To solve this problem, Nam et al.(2013) and Jung and Byun(2016) use the calculated residuals to control the effect of total accruals based on Desai and Dharmapala(2006) as shown in Equation(5). In this regard, Nam et al.(2013) and Jung and Byun(2016) explain that tax subsidy 2(TS2) is a tax subsidy proxy in which management's earnings management effect is eliminated.

$$TS1 = \{(\text{net income before tax} \times \text{legal maximum tax rate}) - (\text{Income tax expense on income statement}(\text{net income before tax} \times \text{effective tax rate}))\} / \text{Current total capital amount} \quad \text{Equation(4)}$$

$$TS_{i,t} = \beta_1 TAC_{i,t} + \beta_2 YD_{i,t} + \beta_3 IND_{i,t} + \epsilon_{i,t} (TS2) \quad \text{Equation(5)}^2$$

NIBT : net income before tax
 TS1 : tax subsidy 1
 TAC : total accruals(net income—cash flow from operating activities)
 YD : year dummy
 IND : industry dummy
 ϵ : tax subsidy 2(TS2)

2. Research model

In order to analyze the effect of tax subsidies on trading volume, this study set up a model as shown in Equation(6) below.

$$TV_{i,t+1} = \beta_0 + \beta_1 TS_{i,t} + \beta_2 VD_{i,t} + \beta_3 EQ_{i,t} + \beta_4 BOD_{i,t} + \beta_5 UE_{i,t} + \beta_6 AGE_{i,t} + \beta_7 CFS_{i,t} + \beta_8 HI_{i,t} + \beta_9 BIG_{i,t} + \beta_{10} LEV_{i,t} + \beta_{11} SIZE_{i,t} + \beta_{12} YD_{i,t} + \beta_{13} IND_{i,t} + \epsilon_{i,t} \quad \text{Equation(6)}$$

TV : trading volume
 TV1 : trading volume 1
 TV2 : trading volume 2
 TS : tax subsidies(see section 3. Measuring tax subsidies(TS))
 TS1 : tax subsidies 1
 TS2 : tax subsidies 2

2) This study additionally analyzes the relationship between tax subsidies and trading volume by measuring tax subsidies, including discretionary occurrence in the Eq.(5). The analysis results are consistent with <Table 4>.

VD	: voluntary disclosure level(the number of voluntary disclosure/total assets _{t-1})
EQ	: quality of earnings (absolute value of the residuals($ \epsilon_{i,t} $) $\times(-1)$ calculated from the model of Dechow and Dichev(2002))
BOD	: excess outside directors ratio (the number of outside directors-(the number of registered directors $\times$ legal minimum number of outside directors [*])/the number of outside directors)) * Legal minimum number of outside directors : 50%(25)% of listed directors if assets are over 2 trillion won(less)
UE	: unexpected earnings((EPS _t -EPS _{t-1})/revised price in fiscal day)
AGE	: firm age(ln(listed months))
CFS	: disclosure of consolidated financial statements (1 if the firm discloses t consolidated financial statements, 0 otherwise)
IC	: the degree of competition in the industry(Herfindahl-Hirschman Index(HHI $\times(-1)$) ³⁾
BIG	: auditor size(1 if big firm, 0 otherwise)
LEV	: debt ratio(total liabilities _t /total assets _{t-1})
SIZE	: size(ln(total assets _t))
YD	: Year dummy
IND	: Industry dummy

The fact that the value of the trading volume(TV) is large indicates that the investors interpret the inherent value of the invested firm heterogeneously. In this regard, β_1 in Equation(6) should present a significant negative value. If β_1 of Equation(6) shows a significant negative value, it can be interpreted that the heterogeneous interpretation of investors' intrinsic value of the investee firm decreases as the tax subsidy is higher.

In addition to tax subsidies, this study included the following control variables in the model. Diamond and Verrecchia(1991) report that the liquidity of stocks increases as the level of disclosure increases. In addition, Jung and Moon(2017) reported that the trading volume increases

3) In this study, the degree of competition in the industry is measured by the Herfindahl-Hirschman Index(hereinafter referred to as "HHI"). HHI can be measured as shown in the following equation. Specifically, the HHI is calculated by dividing the sales of individual firms by the total sales of the industry, based on the same industry(sub-category of industry classification), and then summing them by industry(Jung and Kim 2017). In this way, when the degree of competition in the industry is measured, it can be interpreted that as the value of HHI increases, the degree of competition within the industry decreases. In this study, the degree of competition(IC) in industry is measured by multiplying HHI by '(-1)' in order to solve the discomfort of interpretation. Therefore, it can be interpreted that the degree of competition in the industry(IC, ((HHI) $\times(-1)$))

$$HHI = \sum_{i=1}^N S_{ijt}^2, \text{ S is the share of i-firm in j industry based on current sales by industry}$$

as the amount of information disclosed increases. In this study, the disclosure level of individual firms is measured as the voluntary disclosure level(VD), and the influence of disclosure levels of individual firms on trading volume is controlled.

Sohn et al.(2009) explain that the quality of accruals(quality of accounting information) is an incentive to reduce trading volume. Jung and Kim(2017) reported that the trading volume decreases as the earnings persistence(quality of earnings) increases. High quality of accounting information and high earnings quality is expected to serve as an incentive to reduce the different belief among investors. In this study, the quality of accruals is measured as a proxy for the quality of earnings(EQ) and included in the model.

Specifically, the quality of accruals used in this study is measured by taking the absolute value of the residuals calculated by the model of Dechow and Dichev(2002) and multiplying by ‘-1(one)’. In this case, the higher the quality of accruals, the better the quality of earnings. The quality of earnings(EQ) of this study is expected to be related to trading volume and negative.

Ko et al.(2012) argue that superior corporate governance serves as an incentive to reduce information risk. In this study, corporate governance is measured by the ratio of excess outside directors(BOD), and the ratio of excess outside directors(BOD) is expected to have a negative relationship with the trading volume. Han(2001) explains that unexpected earnings include much of the financial variables. As a result of this incentive, Beaver(1968) and Choi abd Shin(1997) reported that there is a positive relationship between unexpected earnings and trading volume. In this study, the effect of unexpected earnings on trading volume is included by including the unexpected earnings(UE) in the model.

In this study, the age of the firm is included in the model to control the trading volume. According to Jeong(1990), the higher the firm age, the better the information environment. In this regard, AGE is expected to have a negative relationship with trading volume. Consolidated financial statement disclosure(CFS) is included in the model to control the effect of the disclosure of consolidated financial statements on trading volume. According to Hwang(1995), consolidated financial statements provide additional information that individual financial statements do not provide. If the consolidated financial statements provide additional information that is not provided by the individual financial statements, the consolidated financial statement disclosure (CFS) is expected to have a positive relationship with the trading volume.

In this study, the degree of competition in the industry(IC) is included in the model to control the effect of the degree of competition in the industry on the trading volume. Jung and Kim(2017) report that the degree of competition in the industry plays a role of external governance and has effect of market discipline, so it has a negative relation with trading volume. In this respect, it

is expected that the regression coefficient of the degree of competition in the industry(IC) will give a negative value.

Becker et al.(1998) reported that big six auditors provide higher audit quality to audited firms than non-big six auditors. Therefore, in this study, the audit size(BIG) is included in the model to control the effect of audit quality on trading volume.

In this study, the debt ratio(LEV) is included in the model to control the effect of financial(bankruptcy) risk on trading volume. The regression of the debt ratio(LEV) is expected to provide a negative value. The size of the firm(SIZE) is included in the model to control the effect of the size of the firm on the trading volume.

Bhushan(1989) reports that as the size of the firm increases, the number of analysts following increases. This suggests that the larger the size of the firm, the better the information environment. Therefore, the regression coefficient of SIZE is expected to be negative. Finally, the year dummy(YD) and the industry dummy(IND) are included in the model to control year and industry effects.

3. Selection of samples

In order to analyze the relationship between tax subsidy and trading volume, this study selected a sample that satisfies the following conditions.

- (1) Listed securities firms whose closing date is December 2002 through 2013
(excluding financial firms and impairment of capital)
- (2) Firms that can collect trading volume, financial statement
and audit firm data from Kis-Value of NICE Co.
- (3) Firms that are able to collect the number of voluntary disclosures
and registered(outside) executives officer data from DART
- (4) Firms with unmodified audit opinions

<Table 1> shows the yearly distribution of firms satisfying the above conditions. <Table 1> does not show the industrial classification. However, the specific industry exceeded 31%. Therefore, in this study, the industry dummy is included in equation(6).

<Table 1> Distribution of sample by year

	02	03	04	05	06	07	08	09	10	11	12	13	total
Total	400	436	468	482	492	511	523	519	563	582	582	607	6,165

IV. Empirical Results

1. Descriptive statistics and correlation analysis

<Table 2> presents descriptive statistics for each of the 6,165 final samples used in the empirical analysis. <Table 2> shows that the median(median) of trading volume 1(TV1) is 0.0131(0.0061) and the median(median) of trading volume 2(TV2) is $-0.0031(-0.0077)$. In the study of Jung(2016), the mean(median) of trading volume 1 is reported as 0.0133(0.0064) and the mean(median) of trading volume 2 is reported as $-0.0030(-0.0074)$. The trading volume proxy(TV) of this study is similar to the mean and median numbers reported by Jung(2016). In particular, the median of trading volume 2(TV2), which represents the abnormal trading volume, is negative, and it is judged that more than half of the sample is negative trading volume.

The mean and median of tax subsidy 1(TS1) are -0.0054 and -0.0007 , respectively, and the mean and median of tax subsidy 2(TS2) are -0.0061 and -0.0003 , respectively. In the study of Jung and Byun(2016), the mean(median) of tax subsidy 1 and tax subsidy 2 are reported as $-0.0033(-0.0015)$ and $-0.0094(-0.0005)$, respectively. The mean and median of the tax subsidy proxies(TS) of this study are somewhat smaller than those reported by Jung and Byun(2016), but the distribution is considered to be similar.⁴⁾

As for the descriptive statistics of other control variables, the mean(median) of the voluntary disclosure level(VD) is 0.0417(0.0000). In the study of Sohn et al.(2008), the voluntary disclosure level and the median are reported as 0.031 and 0.000, respectively, and the voluntary disclosure level(VD) of this study is similar to Sohn et al.(2008).

The mean and median of the quality of earnings(EQ) are -0.0658 and -0.0448 , respectively, which are similar to those reported by Sohn et al.(2009). Specifically, Sohn et al.(2009) report that the mean and median are 0.067 and 0.049, respectively. In this study, to solve the

4) The <Table> below presents the size of the tax subsidy for a sample company by section. Looking at the results of <Table> below, it is shown that TS1 and TS2 equally present a negative(−) value up to the median(50%), and have a positive(+) value above the median. Sun et al.(2015) interprets that a tax burden appears when TS is a negative(−) value, and interprets that a tax subsidy appears when TS is a positive(+) value. In this case, more than half of the sample suggests that a tax burden is present. Conversely, less than half of the sample suggests that a tax subsidy is present.

<Table> Distribution of tax subsidy of sample

	1%	5%	10%	25%	50%	75%	90%	95%	99%
TS1	−0.2020	−0.0595	−0.0273	−0.0074	−0.0007	0.0056	0.0177	0.0323	0.1009
TS2	−0.1502	−0.0573	−0.0342	−0.0109	−0.0003	0.0015	0.0195	0.0353	0.0822

inconvenience of interpretation, we measure the quality of earnings(EQ) by multiplying the absolute value of residuals in the model of Dechow and Dichev(2002) by ‘-1(one)’. In this sense, the mean and median of the quality of earnings(EQ) are negative.

The mean(median) of excess outside directors’ ratio(BOD) is 0.0034(0.0000), indicating that more than half of the sample firms meet the statutory minimum number of outside directors. The mean(median) of unexpected earnings(UE) is 0.0034(0.0000) and the mean(median) of age(AGE) is 5.1251(5.3519). The mean(median) of competition in the industry(IC) is -0.1333(-0.0873), and the mean(median) of the auditor size(BIG) is 0.6295(1.0000). The mean(median) of debt ratio(LEV) and firm size(SIZE) are 0.4672(0.4676) and 26.4376(26.1488), respectively.

<Table 2> Descriptive statistics of variables

		Mean	Standard Deviation	Minimum	25%	Median	75%	Max
	TV1	0.0131	0.0231	0.0000	0.0025	0.0061	0.0135	0.3442
	TV2	-0.0031	0.0231	-0.0376	-0.0124	-0.0077	-0.0011	0.3296
TS	TS1	-0.0054	0.0461	-0.4805	-0.0074	-0.0007	0.0056	0.3018
	TS2	-0.0061	0.0387	-0.4933	-0.0109	-0.0003	0.0015	0.3966
	VD	0.0417	0.0903	0.0000	0.0000	0.0000	0.0395	1.6822
	EQ	-0.0658	0.0712	-0.7988	-0.0857	-0.0448	-0.0197	0.0000
	BOD	0.0034	0.1306	-0.5000	-0.0500	0.0000	0.0833	0.5500
	UE	0.0241	1.4742	-73.4696	-0.0428	0.0000	0.0666	20.5672
	AGE	5.1251	0.9478	0.0000	4.7449	5.3519	5.8230	6.5236
	CFS	0.5797	0.4936	0.0000	0.0000	1.0000	1.0000	1.0000
	IC	-0.1333	0.1478	-1.0000	-0.1596	-0.0873	-0.0417	-0.0049
	BIG	0.6295	0.4830	0.0000	0.0000	1.0000	1.0000	1.0000
	LEV	0.4672	0.2089	0.0005	0.3080	0.4676	0.6189	0.9979
	SIZE	26.4376	1.4943	22.7122	25.3954	26.1488	27.2197	32.3983

Variable definitions : TV : trading volume(TV1(trading volume 1) and TV2(trading volume 2)), TS : tax subsidies(TS1(tax subsidies 1) and TS2(tax subsidies 2)), VD : voluntary disclosure level((the number of voluntary disclosure/total assets_{t-1}), EQ : Quality of earnings(absolute value of the residuals($|\epsilon_{i,t}|$) $\times(-1)$ calculated from the model of Dechow and Dichev(2002)), BOD : excess outside directors ratio(the number of outside directors-(the number of registered directors $\times$ legal minimum number of outside directors)/the number of outside directors)), UE : unexpected earnings((EPS_t-EPS_{t-1})/revised price in fiscal day), AGE : firm age(ln(listed months)), CFS : disclosure of consolidated financial statements(1 if the firm discloses t consolidated financial statements, 0 otherwise), IC : the degree of competition in the industry(Herfindahl-Hirschman Index(HHI $\times(-1)$)) BIG : auditor size(1 if big firm, 0 otherwise), LEV : debt ratio(total liabilities/total assets_{t-1}), SIZE : Size(ln(total assets_t)).

<Table 3> Correlation between variables

	TV1	TV2	TS1	TS2	VD	EQ	BOD	UE	AGE	CFS	IC	BIG	LEV
TV2	0.9471***												
TS1	-0.1505***	-0.1553***											
TS2	-0.0459***	-0.0359***	0.3669***										
VD	0.0236*	0.0686***	-0.0187***	0.0124									
EQ	-0.1147***	-0.1171***	0.0993***	0.0451***	-0.0315***								
BOD	-0.0467***	-0.0017	-0.0115	-0.0593***	0.0440***	0.0539***							
UE	0.0208	0.0163	0.1173***	0.0616***	0.0072	-0.0241*	0.0079						
AGE	-0.0242*	-0.0122	-0.0258**	-0.0287	0.0033	0.1067***	0.0202	0.0015					
CFS	-0.0578***	-0.0604***	0.0371***	-0.0060	0.0562***	0.0954***	0.0824***	0.0169	0.1107***				
IC	0.0149	0.0125	-0.0085	0.0427***	-0.0480***	-0.0345***	-0.0722***	-0.0031	0.0219*	-0.1314***			
BIG	-0.1298***	-0.0816***	0.0366***	-0.0101	0.0613***	0.0642***	0.0976***	-0.0265**	-0.0383***	0.1171***	-0.1441***		
LEV	0.0991***	0.0979***	-0.0560***	-0.0909***	0.1314***	0.0022	-0.0114	-0.0004	0.0010	0.0388***	-0.0223*	0.0607***	
SIZE	-0.2314***	-0.2197***	0.0791***	-0.0302***	0.1892***	0.1704***	0.1503***	0.0080	0.1107*	0.3606***	-0.3083***	0.3472***	0.1712***

1) ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

2) Variable definitions are shown in <Table 2>.

<Table 3> presents the correlation analysis(Pearson correlation coefficient) between the main variables used in the empirical analysis of this study. Trading volume proxies(TV) are negatively correlated with tax subsidy proxies(TS). The result of this correlation analysis is consistent with the hypothesis of this study, but it does not include the control variables.

The results of the analysis of the correlation between the trading volume proxies(TV) and the control variables show that the trading volume proxy(TV) has a positive correlation with the voluntary disclosure level(VD) and the debt ratio(LEV).

On the other hand, the trading volume proxy(TV) is significantly negative with respect to the quality of earnings(EQ), consolidated financial statement disclosure(CFS), auditor size(BIG). In addition, the trading volume 1(TV1) of the trading volume proxy(TV) shows a significant negative correlation with the excess outside director ratio(BOD) and firm age(AGE).

2. The effect of tax subsidies on trading volume

<Table 4> shows the analysis of the effect of tax subsidies on trading volume. <Table 4> shows the results of measuring tax subsidy 1(TS1) for Model 1 and Model 2 and tax subsidy 2(TS2) for Model 3 and Model 4, respectively. In addition, Model 1 and Model 3 are the result of setting the trading volume 1(TV1) as the dependent variable, and Model 2 and Model 4 are the results of setting the trading volume 2(TV2) as the dependent variable.

<Table 4> shows that the regression coefficients for the tax subsidy proxies(TV1 and TV2) are negative for both Model 1, Model 2, Model 3 and Model 4. This is consistent with the hypothesis, and it can be interpreted that the trading volume decreases as the tax subsidy increases.⁵⁾

Regression coefficients of voluntary disclosure level(VD) are significantly positive in each of the models(Model 1, Model 2, Model 3 and Model 4). This is consistent with the results of Jung and Moon(2017), and it can be interpreted that the trading volume increases as the amount of information increases. The regression coefficient of the quality of earnings(EQ) suggests a negative value in each model. These results suggest that firms with higher quality of earnings are less likely to have different beliefs among investors.

5) In this study, we measured and analyzed tax subsidy as an average of 10 years(rolling 10 years). Consistent with <Table 4>, the analysis shows that tax subsidy of rolling 10 years are negatively related to trading volume.

<Table 4> Regressions for the effect of tax subsidy on trading volume

Hypothesis : Tax subsidies will have a positive relation with trading volume.

$$TV_{i,t+1} = \beta_0 + \beta_1 TS_{i,t} + \beta_2 VD_{i,t} + \beta_3 EQ_{i,t} + \beta_4 BOD_{i,t} + \beta_5 UE_{i,t} + \beta_6 AGE_{i,t} + \beta_7 CFS_{i,t} + \beta_8 HI_{i,t} + \beta_9 BIG_{i,t} + \beta_{10} LEV_{i,t} + \beta_{11} SIZE_{i,t} + \beta_{12} YD_{i,t} + \beta_{13} IND_{i,t} + \epsilon_{i,t}$$

Independent Variables	MODEL 1 : TV1		MODEL 2 : TV2		MODEL 3 : TV1		MODEL 4 : TV2	
	Coef.	t-value	Coef.	t-value	Coef.	t-value	Coef.	t-value
Intercept	0.1229	18.50***	0.0848	12.75***	0.1265	18.92***	0.0883	13.20***
TS1	-0.0564	-9.32***	-0.0563	-9.31***				
TS2					-0.0178	-2.44**	-0.0178	-2.44**
VD	0.0168	5.10***	0.0167	5.09***	0.0175	5.30***	0.0175	5.29***
EQ	-0.0189	-4.78***	-0.0190	-4.81***	-0.0215	-5.41***	-0.0216	-5.45***
BOD	-0.0003	-0.12	-0.0003	-0.12	-0.0002	-0.08	-0.0002	-0.07
UE	0.0005	2.74***	0.0005	2.74***	0.0003	1.79*	0.0003	1.79*
AGE	0.0003	1.08	0.0003	0.98	0.0004	1.32	0.0004	1.22
CFS	0.0008	1.15	0.0008	1.14	0.0008	1.15	0.0008	1.14
IC	-0.0091	-3.74***	-0.0091	-3.72***	-0.0090	-3.66***	-0.0089	-3.64***
BIG	-0.0019	-3.02***	-0.0019	-3.03***	-0.0020	-3.08***	-0.0020	-3.09***
LEV	0.0143	9.95***	0.0143	9.96***	0.0148	10.26***	0.0148	10.27***
SIZE	-0.0038	-15.50***	-0.0038	-15.47***	-0.0039	-15.94***	-0.0039	-15.92***
YD	Included		Included		Included		Included	
IND	Included		Included		Included		Included	
F-value	17.85***		17.90***		16.45***		16.50***	
Adj.R ²	0.1568		0.1571		0.1456		0.1460	

1) ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

2) Variable definitions are shown in <Table 2>.

The regression coefficient of unexpected earnings(UE) shows a significant positive value in each model. This is consistent with Beaver's(1968) study, which can be interpreted as an increase in trading volume as the unexpected earnings increases. The degree of competition in the industry(IC) and the regression coefficient of the auditor size(BIG) are negative in both models. Jung and Kim(2017) explain that high degree of competition in the industry has the effect of market discipline, and Becker et al.(1998) explain that big audit firms provide higher audit quality than non-large audit firms. According to these results, it can be interpreted that the degree of competition in the industry and the big auditor have a negative relation with the trading volume.

The regression coefficient of the debt ratio(LEV) is a positive value for each model, and the firm size(SIZE) is a negative value for both models. This implies that the trading volume increases as the debt ratio increases, but the trading volume decreases as the size of the firm increases. However, The regression coefficient of the excess outside directors ratio(BOD), firm age(AGE), and disclosure in consolidated financial statements(CFS) are not significant.

<Table 4> summarizes the results. As the tax subsidy increases, the trading volume decreases. Tax subsidies are the incentive to improve the information environment, and consequently, the greater the tax subsidy, the less trust among investors.

3. Additional analysis

The information effect of tax subsidies can be analyzed using the stock price response. Specifically, this study additionally analyzes the information effects of tax subsidies by using stock price changes.

The change in the stock returns used in the additional analysis was measured as the standard deviation of the daily stock returns. In order for the result of the additional analysis to be consistent with <Table 4>, the regression sign of the tax subsidy(TS) should give a negative value. In this case, high tax subsidies can be interpreted as reducing stock price volatility.

In the results of <Table 5>, the regression coefficients of TS1 and TS2 show significant negative values in each model. This suggests that there is a negative relationship between tax subsidies and the standard deviation of the daily stock returns. In this sense, high tax subsidies can be interpreted as diminishing different beliefs among investors.

<Table 5> Additional test : Regressions for the effect of tax subsidy on standard deviation of annual stock returns

$$VOL_{i,t+1} = \beta_0 + \beta_1 TS_{i,t} + \beta_2 VD_{i,t} + \beta_3 EQ_{i,t} + \beta_4 BOD_{i,t} + \beta_5 UE_{i,t} + \beta_6 AGE_{i,t} + \beta_7 CFS_{i,t} + \beta_8 HI_{i,t} \\ + \beta_9 BIG_{i,t} + \beta_{10} LEV_{i,t} + \beta_{11} SIZE_{i,t} + \beta_{12} YD_{i,t} + \beta_{13} IND_{i,t} + \epsilon_{i,t}$$

Independent Variables	MODEL 1 : TV1(n=5,326)		MODEL 2 : TV2(n=5,326)	
	Coef.	t-value	Coef.	t-value
Intercept	0.0985	18.36 ***	0.1006	18.74 ***
TS1	-0.0318	-6.52 ***		
TS2			-0.0298	-4.67 ***
VD	0.1050	3.92 ***	0.1100	4.10 ***
EQ	-0.0199	-6.30 ***	-0.0021	-6.64 ***
BOD	0.0009	0.49	0.0008	0.44
UE	0.0004	3.49 ***	0.0004	3.04 ***
AGE	0.0006	2.48 **	0.0007	2.52 **
CFS	-0.0017	-3.11 ***	-0.0017	-3.10 ***
IC	-0.0043	-2.21 **	-0.0042	-2.13 **
BIG	-0.0008	-1.72 *	-0.0009	-1.80 *
LEV	0.0123	10.54 ***	0.0123	10.52 ***
SIZE	-0.0026	-13.27 ***	-0.0027	-13.63 ***
YD	Included		Included	
IND	Included		Included	
F-value	13.99 ***		13.62 ***	
Adj.R ²	0.1387		0.1353	

1) ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

2) Variable definitions : VOL is the standard deviation of annual stock returns, and other variables are shown in <Table 2>.

V. Conclusion

This study examines the effects of tax subsidies on trading volume of 6,165 firms(firms-years) listed on the securities market from 2002 to 2013. As a result of the analysis, the regression coefficient of the tax subsidy measure is a significant negative value.

In the study on tax subsidies, managers' downward earnings management and conservatism accounting treatment increases as the tax subsidy increases. Management's downward earnings management and conservative accounting can have the effect of deferring some of the reported earnings of the current period to future earnings. In this respect, tax subsidies are negative factor on unexpected earnings.

If the tax subsidy serves as an incentive to decrease the net income, the trading volume will decrease as the tax subsidy increases. However, there are no studies that analyzed the effect of tax subsidies on trading volume. Therefore, this study empirically analyzed the effect of tax subsidies on trading volume.

As a result of the analysis, the regression coefficient of the tax subsidy proxy is a significant negative value. According to these results, it can be interpreted that the trading volume decreases as the tax subsidy increases. In addition, this suggests that the tax subsidy is an incentive to improve the information environment, reducing the different belief among investors about the intrinsic value of the investee.

In the previous study related to tax subsidies, there are no studies that measure the information effect of tax subsidies using various firm characteristics. In this respect, this study will contribute to the analysis of how individual investors understand tax subsidies. However, this study has limitations in using estimates of tax subsidies.

In addition, the results of this study provide implications that national tax subsidies may also affect firms' accounting information. Specifically, this study contributes in that it provides data that the quality of financial reporting can be improved if there are tax subsidies. However, this study has limitations in using estimates of tax subsidy measures.

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조세혜택이 거래량에 미치는 영향*

정현욱**

〈요 약〉

본 연구는 조세혜택이 커질수록 거래량은 감소할 것이라는 가설을 실증분석하는데 목적이 있다. 본 연구는 조세혜택이 하향이익조정 및 보수주의 회계를 높이는 유인으로 작용할 경우 투자대상기업의 내재가치에 대한 투자자들 간의 상이한 믿음은 감소할 것이라는 기대에 근거하여 가설을 설정하고 실증분석을 수행하였다.

분석결과, 조세혜택 측정치의 회귀계수는 유의한 음(-)의 값으로 나타났다. 이러한 결과에 따르면, 조세혜택이 커질수록 거래량은 감소하는 것으로 해석할 수 있을 것이다. 또한, 이는 조세혜택이 높은 기업일수록 투자대상기업의 내재가치에 대한 투자자들 간의 상이한 믿음이 감소하는 것으로 판단된다.

조세혜택과 관련된 선행연구에서는 조세혜택의 정보효과를 다양한 기업특성변수를 이용하고 측정하고 있지만 거래량을 이용하여 정보효과를 분석한 연구는 없는 실정이다. 이러한 점에서 본 연구는 개별투자자들이 조세혜택을 어떻게 이해하고 있는 지를 분석하였다는 점에서 공헌점이 있을 것으로 판단된다.

또한, 본 연구의 결과는 국가의 세제혜택이 기업의 회계정보에도 영향을 미칠 수 있다는 시사점을 제공한다. 구체적으로 본 연구는 조세혜택이 있을 경우 기업의 재무보고의 질이 개선시킬 수 있다는 자료를 제공한다는 점에서 공헌점이 있다. 하지만, 본 연구에서는 조세혜택의 측정치를 사용함에 있어 실제값을 이용하지 못한 한계점이 있다.

〈주제어〉 조세혜택, 거래량, 하향이익조정, 보수주의 회계

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