

The role of country tax environment on the relationship between financial derivatives and tax avoidance

Oktavia Oktavia

Universitas Kristen Krida Wacana, Jakarta, Indonesia, and

Sylvia Veronica Siregar, Ratna Wardhani and Ning Rahayu

Universitas Indonesia, Depok, Indonesia

Abstract

Purpose – The purpose of this paper is to examine the effect of financial derivatives usage and country's tax environment characteristics on the relationship between financial derivatives and tax avoidance.

Design/methodology/approach – This study uses a cross-country analysis with the scope of ASEAN (Association of Southeast Asian Nations) countries which consists of the Philippines, Indonesia, Malaysia, and Singapore.

Findings – The level of financial derivatives usage positively affects the level of tax avoidance. This finding indicates that financial derivatives can be used as tax avoidance tool. Furthermore, the positive effect of the level of financial derivatives usage on the level of tax avoidance is lower in countries with a competitive tax environment than in countries with an uncompetitive tax environment. This finding indicates that in country with a competitive tax environment, the use of financial derivatives as a tax avoidance tool can be replaced by the tax facilities provided by that country.

Research limitations/implications – This study uses four countries in the Association of Southeast Asian Nations region and does not test the sample based on the financial derivative types.

Practical implications – Tax authorities need to establish a clear tax regulation in regard to the tax treatment of financial derivatives transactions, e.g. define the definition of financial derivatives for hedging purposes and financial derivatives for speculative purposes; and define specific criteria to separate financial derivatives for hedging purposes from financial derivatives for speculative purposes. It is necessary to determine whether losses arising from derivative transactions are classified as deductible expenses or non-deductible expenses.

Originality/value – To the best of the authors' knowledge, this study is also the first that provide empirical evidence that the relationship between financial derivatives and tax avoidance activities depends on a country's tax environment.

Keywords Hedging, Tax avoidance, Financial derivatives, Speculative, Tax environment

Paper type Research paper

1. Introduction

Derivative financial instruments are used by companies to reduce cash flow and earnings volatility caused by market risk factors, e.g. fluctuations in interest rates, fluctuations in foreign exchange rates, fluctuations in commodity prices and other risk factors (Barton, 2001; Pincus and Rajgopal, 2002; Huang *et al.*, 2009). Financial derivatives can be used to reduce company earnings volatility as the use of financial derivatives directly affects the company cash flow component, which in turn also affects company earnings (Barton, 2001).

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This occurs as earnings are the sums of cash flow component and accrual component, thus if a company uses financial derivatives to reduce fluctuations of the cash flow component, the use of financial derivatives will in turn also reduce the reported earnings volatility (Barton, 2001). Such use of financial derivatives to reduce cash flow and earnings volatility is a form of real earnings management, which aims to smoothen out company earnings, so that the reported earnings become relatively stable and unfluctuating (Barton, 2001; Pincus and Rajgopal, 2002; Huang *et al.*, 2009; Murwaningsari, 2011).

Aside from its ability to serve as a tool of earnings management, financial derivatives can also be used as a tool of tax avoidance. Financial derivatives are sophisticated tools of tax avoidance and a clever tax planner will take advantage of the complex features of financial derivatives to plan transactions that are beneficial for the company in terms of tax saving (Donohoe, 2011a, b, 2012, 2015). Such inherent complexity in financial derivative instruments provides opportunities for companies to explore ambiguities in tax regulations (Donohoe, 2012). This is what encourages companies to utilize financial derivatives as tax avoidance tool.

Although studies on the use of financial derivatives as a tool of earnings management have been rapidly growing, but studies on the use of financial derivatives as a tool of tax avoidance are still limited. With the rapid development of derivatives markets in the Association of Southeast Asian Nations (ASEAN) region, there is a substantial need to address the limitations of empirical evidence on the use of financial derivatives as a tool of tax avoidance. This study therefore aims to address such limitations. Based on the literature survey carried out to date, studies that examine direct relationship between the use of financial derivatives and tax avoidance activities have only been conducted by Donohoe (2011a, b, 2012, 2015) in the USA, Oktavia and Martani (2013) in Indonesia and Zeng (2014) in Canada.

Donohoe (2011a, b, 2012, 2015) finds empirical evidence that financial derivatives can be used as a tool of tax avoidance. In relation to these findings, Donohoe (2011a) argues that financial derivatives can be used as tax avoidance tools because the features in financial derivatives can be utilized to replicate an economic situation, blur the underlying economic substance, introduces ambiguity and complexity in tax reporting. Furthermore, Donohoe (2011a, b, 2015) also finds that in new corporate financial derivatives users (new users), tax burden reduction is higher in financial derivatives users for speculative purposes than in financial derivatives users for hedging purposes.

Oktavia and Martani (2013) include the level of disclosure of financial derivatives when testing the relationship between the use of financial derivatives and tax avoidance activities. They find empirical evidence that financial derivatives user with a low disclosure level of financial derivatives transactions (low disclosure level user) have more aggressive tax avoidance activities as compared to companies that are categorized as high disclosure level user. These findings indicate that financial derivatives users which tend to conceal information on their derivatives transactions have a more aggressive tax avoidance behavior as compared to companies which explicitly disclose their derivatives transactions information. Furthermore, using a sample of non-financial institutions in Canada, Zeng (2014) also find empirical evidence that companies use financial derivatives to save their tax payment. Zeng (2014) argues that the use of financial derivatives allows companies to take advantage of tax-timing option (i.e. claim losses immediately, but defer gains indefinitely), and thus enables companies to save their tax payment.

This study aims to re-examine the relationship between financial derivatives and tax avoidance activities in companies within the ASEAN region. Moreover, this study also including country's tax environment factor when examine the relationship between financial derivatives and tax avoidance activities. This factor is not included in previous studies conducted by Donohoe (2011a, b, 2012, 2015), Oktavia and Martani (2013) and Zeng (2014). In fact, country's tax environment factors may affect the relationship between the use of financial derivatives and tax avoidance activities. In a country with a competitive tax

environment, companies can enjoy various favorable tax facilities, such as the income from the overseas will not be taxed anymore, the dividend received by the shareholders is not taxable and the company also has flexibility to compensate their fiscal losses (Setyowati, 2014). Thus, this study assumes that in countries with a competitive tax environment, the use of financial derivatives as tax avoidance tools can be replaced by tax facilities that are beneficial for companies.

In addition, this study also includes the purpose of financial derivatives usage factor (both for speculative and hedging purposes) in examining the relationship between the level of financial derivatives usage and tax avoidance activities, which was not included in the previous studies (Oktavia and Martani, 2013; Zeng, 2014). This factor is necessary to be included as there is a difference in the accounting treatment between the use of financial derivatives for speculative purposes (which do not fulfill the criteria for hedge accounting) and the use of financial derivatives for hedging purposes, which certainly will affect both accounting income and taxable income.

This study contributes to the literature in two ways. First, this study extends previous studies on the use of financial derivatives as a tax avoidance tool. We extend the literature by re-examining the effect of the level of financial derivatives, both for speculative and hedging purposes, on the level of tax avoidance. The difference with the prior literature is that they examine the effect of the use of financial derivatives on the level of tax avoidance using the context of one country, while this study uses the context of ASEAN Countries. Second, this study extends previous studies on the use of financial derivatives as tax avoidance tool by linking the role of country's tax environment in to the relationship between financial derivatives and tax avoidance. To the best of our knowledge, this study is also the first to provide empirical evidence that the relationship between financial derivatives and tax avoidance activities depends on a country's tax environment.

This study was conducted using cross-country analysis limited to four countries in ASEAN, i.e. the Philippines, Indonesia, Malaysia and Singapore. ASEAN countries were chosen as the research sample for several reasons. First, there is a diversity in the level of financial derivatives usage among the ASEAN countries. This is shown by the presence of two types of financial derivatives markets in ASEAN, i.e. the advanced derivatives market (such as Singapore) and growing derivatives market (such as the Philippines and Indonesia). Second, ASEAN countries were chosen as there is an ASEAN Economic Community (AEC) program that has been implemented since 2015. With the implementation of AEC, trading activities among the member countries of ASEAN are expected to rise, as AEC relieves the flow of goods, services, investment, capital and labor across the ASEAN region (KPMG, 2014). Such increase in the intra-ASEAN trading activities is in turn expected to raise the needs for companies to carry out hedging against market risks through the use of financial derivatives. Third, there is a diversity in the tax environment characteristics among countries in the ASEAN region. Malaysia and Singapore are countries with a competitive tax environment, while the Philippines and Indonesia are countries with an uncompetitive tax environment. With the presence of these diverse characteristics, the results of this study are expected to provide an interesting overview on the relationship between financial derivatives and tax avoidance in the ASEAN region.

2. Prior research and hypotheses development

2.1 The effect of financial derivatives on tax avoidance

Donohoe (2012) suggests that the use of derivatives in tax avoidance mechanism will be more effective with the presence of ambiguities in tax regulations. In addition to taking advantage of the vagueness of tax regulations on derivatives transactions, companies can also utilize the complexity of the derivatives transactions, as well as the regulators and

practitioners' lack of understanding on derivative instruments as loopholes to carry out tax avoidance practices involving financial derivatives (Donohoe, 2011a, b, 2012, 2015). There are several reasons why financial derivatives can be used as a tool of tax avoidance, i.e.: certain types of financial derivatives not regulated in tax regulations can be used to change the timing of gains/losses recognition arising from the derivatives transactions (Donohoe, 2011a, b, 2012, 2015). For example, certain types of derivatives can be used to defer gains recognition to the upcoming period or expedite losses recognition to the current period; the use of certain financial derivatives can be used to change the character of gains/losses on the derivatives transactions (Donohoe, 2011a, b, 2012, 2015). For example, a swap instrument with periodic payment contract will be categorized as ordinary business, and thus gains arising from this transaction will be categorized as ordinary income and its loss will be categorized as ordinary loss (GAO, 2011). However, if the contract payment from this swap instrument is set to non-periodic payment contract, then the gains arising from this transaction will be considered as capital gains and the loss will be categorized as capital loss; and financial derivatives can be used to modify the source of gains/losses arising from the derivatives transactions (Donohoe, 2011a).

Research conducted by Donohoe (2011a, b, 2012, 2015) using a sample of companies in the USA proves that derivatives are sophisticated tools of tax avoidance, which can work separately or in conjunction with other tax planning strategies. Furthermore, Donohoe (2011b, 2012, 2015) also separate derivatives users for speculative purposes and derivatives users for hedging purposes, and finds that derivatives users for speculative purposes have much higher reduction in tax burden than derivatives users for hedging purposes. Research on the use of financial derivatives as a tax avoidance tool was also carried out by Oktavia and Martani (2013) and Zeng (2014).

Oktavia and Martani (2013) find empirical evidence that financial derivatives users with a low disclosure level of derivatives transactions (low disclosure level user) have more aggressive tax avoidance practices as compared to other companies. Moreover, Zeng (2014) also finds empirical evidence that companies use financial derivatives to save their tax payment. This study will develop the previous research of Donohoe (2011a, b, 2012, 2015), Oktavia and Martani (2013) and Zeng (2014) by using a wider context of countries, which are four countries in ASEAN region. Such development is carried out to understand in a more comprehensive way about the use of financial derivatives as a tax avoidance tools in ASEAN. Based on the above reasoning, the proposed hypothesis is:

H1. The level of financial derivatives usage positively affects the level of tax avoidance.

This study also develops the previous research (Oktavia and Martani, 2013; Zeng, 2014) by classifying financial derivatives usage into two categories, i.e.: financial derivatives usage for hedging purposes and financial derivatives usage for speculative purposes. According to Ensminger (2001), as long as the derivatives instruments are used for tax avoidance purposes, companies will get into derivatives positions that have no (or have minor) relation to risk management. As a result, such companies will have a higher reduction in tax burden as compared to companies that effectively carry out hedging. Based on Ensminger's (2001) argument, this study assumes that the effect of the level of financial derivatives usage on the level of tax avoidance will be higher in companies using financial derivatives for speculative purposes (in this case is financial derivatives that do not fulfill the criteria for hedging accounting) than in companies using financial derivatives for hedging purposes.

In addition, referring to IAS 39 "Financial Instruments: Recognition and Measurement," if companies carry out financial derivatives contracts that do not fulfill the criteria for hedging, then any gains or losses arising for such contracts need to be immediately recognized in the income statement. Hence, only speculative positions or ineffective portions

of hedging that directly affect the income statement. Based on the above arguments, the following hypothesis is proposed:

- H2.* The positive effect of the level of financial derivatives usage on the level of tax avoidance is higher in companies using financial derivatives for speculative purposes than in companies using financial derivatives for hedging purposes.

2.2 The role of country's tax environment on the relationship between financial derivatives and tax avoidance

This study also presumes that a country's tax environment characteristics also affect the relationship between the level of financial derivatives usage and the level of tax avoidance. The more competitive a country's tax environment is, the smaller the role of financial derivatives usage as a tool of tax avoidance. A country is said to have a competitive tax environment if the country adopt territorial and remittance tax basis system, exempt the imposition of income tax on dividends, and set an indefinite period for tax loss carry-forward. In the territorial and remittance tax basis system, the state only collects taxes on income earned within its jurisdiction, therefore allowing more efficient business decisions because income from abroad will no longer be taxed (Setyowati, 2014). In countries that provide income tax exemption facilities for dividends income, shareholders will receive more money from dividend income than shareholders of companies that are domiciled in the country that do not exempt the imposition of income tax on dividends (Setyowati, 2014). Furthermore, in countries that apply indefinite period for tax loss carry-forward, companies also have great flexibility in using their fiscal losses to reduce the company's tax burden, thus attracts the investors to establish companies in this country.

Companies domiciled in countries with a competitive tax environment can enjoy various tax facilities that are beneficial for them, for example: corporate's earnings from overseas will not be double taxed, shareholders' gains in forms of dividends are also not taxed and companies also have great flexibility in using their fiscal losses to offset tax as the country's carry-forward period is indefinite. Thus, this study assumes that in countries with a competitive tax environment, the use of financial derivatives as a tax avoidance tool can be replaced (substituted) by tax facilities that are beneficial for companies. Based on the mentioned arguments, the following hypothesis is developed:

- H3.* The positive effect of the level of financial derivatives usage on the level of tax avoidance is lower in countries with a competitive tax environment than in countries with an uncompetitive tax environment.
- H4.* In countries with uncompetitive (competitive) tax environment, the positive effect of the level of financial derivatives usage on the level of tax avoidance is higher (lower) in companies using financial derivatives for speculative purposes than in companies using financial derivatives for hedging purposes.

3. Research method

3.1 Sample selection and data source

Annual reports and financial statements data were obtained from Thomson Reuters Datastream Pro data center. The period of this study is from year 2009 to 2013. Although in 2008 all sample countries in this study had carried out the IFRS convergence process, year 2008 is excluded as the study period due to the occurrence of global financial crisis that most likely affected the financial condition of the companies during the year.

The population in this study is companies listed on stock exchanges in the ASEAN countries. According to the data from Bank for International Settlements and International

Swaps and Derivatives Association, derivatives markets in the ASEAN region consist of five countries: the Philippines, Indonesia, Malaysia, Singapore and Thailand. This study, however, only uses four countries as sample, i.e. the Philippines, Indonesia, Malaysia and Singapore. Thailand is not included as sample because of two reasons. First, Thai Financial Reporting Standards (TFRS) has not adopted the international accounting standards for financial instruments, namely, IAS 39 (www.iasplus.com). TFRS has no specific accounting standard for derivatives accounting, so the companies do not recognize unrealized gains or unrealized losses arising from derivatives transactions (www.set.or.th). Second, Thai Accounting Standard No. 12, which regulates the accounting treatment of income tax, is effective on January 1, 2013.

The sample selection of companies in this study is conducted using purposive sampling method. The sample criteria used in this study are as follows:

- (1) Companies were detected to carry out foreign exchange and interest rate derivatives transactions, and disclosed the notional amount of their financial derivatives.
- (2) Companies are not part of the financial industry due to the differences in specific industrial accounting practices as well as purposes of financial derivatives usage in relation to the government's special regulations to the industries.
- (3) Companies calculate their taxable income normally on the basis of net income and use normal corporate income tax rates. Companies that calculate their taxable income based on gross revenue or are subjected to special income tax rate were excluded from the sample.

Furthermore, companies which are indicated as financial derivatives users are classified into two categories, i.e. users of financial derivatives for hedging purposes. Companies are classified into this category if they reveal that their financial derivatives meet the criteria for hedge accounting; users of financial derivatives for speculative purposes. Companies are classified into this category if they do not reveal that their financial derivatives meet the criteria for hedge accounting. It is important to categorizes the financial derivative users into two categories, because there is a differences in accounting treatment between the use of financial derivatives for speculative reasons (not meeting the hedge accounting criteria) and the use of financial derivatives for the purpose of hedging (fulfilling the criteria of hedge accounting), which certainly will affect both accounting income and taxable income.

The reasons why the classification of the financial derivative users in this study is based on whether the criteria of hedge accounting were fulfilled or not are: during the hand-collection procedure to find the notional amount and the purposes of financial derivatives usage, this study does not find any company which disclose that its financial derivatives contracts are for speculative purposes; and although there are about 4 percent of the financial derivatives users that do not reveal the purpose of their financial derivative usage, it is not appropriate to judge that their use of the financial derivatives is for speculative purposes simply because they do not state the purpose of the financial derivative instruments clearly.

Table I presents the sample selection process in this study. It shows that the number of full sample (for both financial derivatives users and non-financial derivatives users) is 1,761 companies. Because the level of financial derivatives usage in this study is measured using the notional amount of financial derivatives, the final sample used in this study include companies in the year they used financial derivatives and disclosed the notional amount of their financial derivatives. If in any given year companies have zero derivatives data, data in that year are not used in the test. From Table I, we have the final observations of 1,395 firm years.

Descriptions	The Philippines	Indonesia	Malaysia	Singapore	
Number of listed companies in the stock exchange	241	477	898	716	
Financial services companies	(39)	(69)	(38)	(30)	
Companies that calculate their taxable income based on gross revenue or are subjected to special income tax rates	(45)	(130)	(124)	(96)	
Full sample (financial derivatives users and non-financial derivatives users)	157	278	736	590	
Total full sample		1,761			
<i>The Philippines</i>					
Year	Full sample	Companies not using financial derivatives	Companies using financial derivatives but not disclose the notional amount of financial derivatives	Companies which have no complete data	Final observations
2009	157	(134)	(1)	(10)	12
2010	157	(129)	(1)	(11)	16
2011	157	(124)	(1)	(12)	20
2012	157	(123)	(1)	(14)	19
2013	157	(132)	0	(12)	13
					80
<i>Indonesia</i>					
Year	Full sample	Companies not using financial derivatives	Companies using financial derivatives but not disclose the notional amount of financial derivatives	Companies which have no complete data	Final observations
2009	278	(247)	(3)	(13)	15
2010	278	(244)	(2)	(12)	20
2011	278	(241)	(4)	(10)	23
2012	278	(238)	(2)	(14)	24
2013	278	(236)	(2)	(13)	27
					109
<i>Malaysia</i>					
Year	Full sample	Companies not using financial derivatives	Companies using financial derivatives but not disclose the notional amount of financial derivatives	Companies which have no complete data	Final observations
2009	736	(554)	(2)	(63)	117
2010	736	(537)	(2)	(73)	124
2011	736	(540)	0	(68)	128
2012	736	(530)	(3)	(73)	130
2013	736	(536)	(1)	(65)	134
					633
<i>Singapore</i>					
Year	Full sample	Companies not using financial derivatives	Companies using financial derivatives but not disclose the notional amount of financial derivatives	Companies which have no complete data	Final observations
2009	590	(374)	(6)	(115)	95
2010	590	(372)	(9)	(95)	114
2011	590	(362)	(8)	(94)	126
2012	590	(367)	(9)	(90)	124
2013	590	(374)	(5)	(97)	114
					573
Total final observations					1,395

Table I.
Sample selection process

3.2 Research model

To test *H1*, we use the following research model:

$$\begin{aligned} \text{TAXVOID}_{it} = & \alpha_0 + \alpha_1 \text{DERIV}_{it} + \alpha_2 \text{SIZE}_{it} + \alpha_3 \text{ROA}_{it} + \alpha_4 \text{DTA}_{it} + \alpha_5 \text{CAPINT}_{it} \\ & + \alpha_6 \text{COUNTRY}_{it} + \alpha_7 \text{YEAR}_{it} + \varepsilon_{it}. \end{aligned} \quad (1)$$

H1 is acceptable if $\alpha_1 > 0$, where TAXVOID_{it} is the level of tax avoidance; DERIV_{it} the level of financial derivatives usage; SIZE_{it} the natural logarithm of total assets; ROA_{it} the return on assets; DTA_{it} the total debt to total assets; CAPINT_{it} the capital intensity; COUNTRY_{it} the country dummy variables; YEAR_{it} the year dummy variables.

H2 is tested using the following research model:

$$\begin{aligned} \text{TAXVOID}_{it} = & \alpha_0 + \alpha_1 \text{DERIV}_{it} + \alpha_2 \text{DSPEC}_{it} + \alpha_3 \text{DERIV} \times \text{DSPEC}_{it} \\ & + \alpha_4 \text{SIZE}_{it} + \alpha_5 \text{ROA}_{it} + \alpha_6 \text{DTA}_{it} + \alpha_7 \text{CAPINT}_{it} \\ & + \alpha_8 \text{COUNTRY}_{it} + \alpha_9 \text{YEAR}_{it} + \varepsilon_{it}. \end{aligned} \quad (2)$$

H2 is acceptable if $\alpha_3 > 0$, where DSPEC_{it} is the speculation dummy variable. 1 if the company has a notional amount of financial derivatives for speculative purposes (do not fulfill the criteria for hedge accounting) higher than 50 percent of the total notional amount of its financial derivatives, and 0 if otherwise.

To test *H3*, we use the following research model:

$$\begin{aligned} \text{TAXVOID}_{it} = & \alpha_0 + \alpha_1 \text{DERIV}_{it} + \alpha_2 \text{TAXENVIRON}_{it} + \alpha_3 \text{DERIV} \times \text{TAXENVIRON}_{it} \\ & + \alpha_4 \text{SIZE}_{it} + \alpha_5 \text{ROA}_{it} + \alpha_6 \text{DTA}_{it} + \alpha_7 \text{CAPINT}_{it} \\ & + \alpha_8 \text{TAXRATE}_{it} + \alpha_9 \text{YEAR}_{it} + \varepsilon_{it}. \end{aligned} \quad (3)$$

H3 is acceptable if $\alpha_3 < 0$, where TAXENVIRON_{it} is the tax environment dummy variables; TAXRATE_{it} the statutory corporate tax rate in each country.

H4 is tested using the following research model:

$$\begin{aligned} \text{TAXVOID}_{it} = & \alpha_0 + \alpha_1 \text{DERIV}_{it} + \alpha_2 \text{DSPEC}_{it} + \alpha_3 \text{TAXENVIRON}_{it} \\ & + \alpha_4 \text{DERIV} \times \text{DSPEC}_{it} + \alpha_5 \text{DERIV} \times \text{TAXENVIRON}_{it} \\ & + \alpha_6 \text{DSPEC} \times \text{TAXENVIRON}_{it} + \alpha_7 \text{DERIV} \times \text{DSPEC} \times \text{TAXENVIRON}_{it} \\ & + \alpha_8 \text{SIZE}_{it} + \alpha_9 \text{ROA}_{it} + \alpha_{10} \text{DTA}_{it} + \alpha_{11} \text{CAPINT}_{it} + \alpha_{12} \text{TAXRATE}_{it} \\ & + \alpha_{13} \text{YEAR}_{it} + \varepsilon_{it}. \end{aligned} \quad (4)$$

H4 is acceptable if $\alpha_7 < 0$.

3.3 Definition of variables

DERIV and DSPEC. The level of financial derivatives usage (*DERIV*) is measured using the total notional amount of financial derivatives divided by lagged total assets. This measurement has been used in the studies of Allayannis and Weston (2001), Barton (2001), Huang *et al.* (2009), and Murwaningsari *et al.* (2015). Furthermore, *DSPEC* (speculation dummy variable) in this study is measured using dummy variable. As there are quite a number of companies which simultaneously use financial derivatives for hedging and speculative purposes during the same period, *DSPEC* is thus given a value of 1 if the company has a notional amount of financial derivatives for speculative purposes higher than 50 percent of the total notional amount of its financial derivatives. *DSPEC* is given the value of 0 if the company has a notional amount of financial derivatives for speculative purposes less than 50 percent of the total notional amount of its financial derivatives.

TAXVOID. *TAXVOID* variable is constructed using confirmatory factor analysis (CFA) on three tax avoidance measures, i.e.: book-tax difference (BTD), abnormal BTD (ABTD) and discretionary measures of tax avoidance (DTAX). The use of CFA in formalizing the *TAXVOID* variable is expected to be able to: reduce the errors arising from tax avoidance proxies calculated using data from financial statements, as errors from each proxy will eliminate each other or become smaller when multiple tax avoidance proxies (sourced from the financial statements) are used together or simultaneously in a model (Ariefiara, 2017). The use of CFA allows the three tax avoidance measures (BTD, ABTD and DTAX) to be used in one model simultaneously; simplifies the research model and facilitates the model estimation result analysis (Wijanto, 2008).

According to Hanlon and Heitzman (2010), there are 12 tax avoidance measures most frequently used in tax literatures, i.e.: total effective tax rate (ETR), current ETR, cash ETR, long-run cash ETR, ETR differential, DTAX, BTD, temporary BTD, ABTD, unrecognized tax benefit (UTB), tax shelter activities and marginal tax rates. This study only uses CFA on three tax avoidance measures (i.e. BTD, ABTD and DTAX), without employing the remaining nine measures of tax avoidance (total ETR, current ETR, cash ETR, long-run cash ETR, ETR differential, temporary BTD, UTB, tax shelter activities and marginal tax rate). These nine measures are not used due to the following reasons:

- (1) Total ETR, current ETR, cash ETR, long-run cash ETR as well as ETR differential are not used in this study for reasons as follows:
 - Various types of ETR measures (total ETR, current ETR, cash ETR, long-run cash ETR and ETR differential) do not differentiate between real activities that lead to tax savings, tax avoidance activities purposely designed to reduce taxes, and lobbying activities that result in tax reductions (Hanlon and Heitzman, 2010).
 - Tax avoidance activities causing temporary differences are not reflected in various ETR measures (Hanlon and Heitzman, 2010). Furthermore, Hanlon and Heitzman (2010) also mention that all ETR measures do not capture conforming tax avoidance because they use book income as the denominator.
 - Cash ETR measure can cause a mismatch between the numerator and denominator if the cash paid for tax expense includes tax payment for income of the previous period, while the denominator only covers the current period income (Hanlon and Heitzman, 2010).
 - The use of these measures requires the study to eliminate all companies whose net income before tax is negative. This can reduce the number of samples used.
- (2) As this research exerts CFA to formalize tax avoidance variable (*TAXVOID*) and BTD is one of the tax avoidance measures used in the CFA, temporary BTD is not used in this study. This is because temporary BTD is a component of BTD.
- (3) UTB measure is not utilized in this study because only accounting standards in the USA require financial statements to reveal the UTB figures. As this study uses companies in the ASEAN region as samples, the measure cannot be used.
- (4) Marginal tax rate is also not used in this paper due to the difficulty in determining the present value of the tax paid for each additional taxable income. Financial reports do not disclose this information.
- (5) Tax shelter activity is also not used as it is very difficult to measure the activities, especially by relying solely on data from the notes to the financial statements.

Following is the formula to calculate BTD, ABTD and DTAX.

BTD. The size of BTD can capture both earnings management and tax avoidance activities carried out by companies (Hanlon, 2005; Tang and Firth, 2011, 2012; Hanlon *et al.*, 2012). BTD is measured using the difference between accounting income and taxable income. Taxable income is calculated by dividing the current tax expense by statutory corporate tax rate.

ABTD. In calculating ABTD, this study adopts the model of Tang and Firth (2011, 2012). The model to estimate the value of ABTD is as follows:

$$BTD_{it} = \alpha_0 + \alpha_1 \Delta INV_{it} + \alpha_2 \Delta REV_{it} + \alpha_3 TL_{it} + \alpha_4 TLU_{it} + \alpha_5 BTD_{it-1} + \varepsilon_{it}, \quad (5)$$

where BTD_{it} is the BTD reported by company i in year t ; ΔINV_{it} the change in gross property, plants and equipment from year $t-1$ to year t ; ΔREV_{it} the change in revenue from year $t-1$ to year t ; TL_{it} the operational net loss of company i in year t ; TLU_{it} the tax loss carry-forward value of company i in year t ; BTD_{it-1} the BTD reported by company i in year $t-1$.

DTAX. In calculating DTAX, this study follows the measurement of DTAX developed by Frank *et al.* (2009). The DTAX measurement developed by Frank *et al.* (2009), basically refers to the model of Jones (1991) which was used to separate discretionary accruals component and non-discretionary accruals component. DTAX is a residual from the following model:

$$PERMDIFF_{it} = \alpha_0 + \alpha_1 UNCON_{it} + \alpha_2 MI_{it} + \alpha_3 CSTE_{it} + \alpha_4 \Delta NOL_{it} + \alpha_5 LAGPERM_{it} + \varepsilon_{it}, \quad (6)$$

where PERMDIFF is the permanent difference of company i in year t ; UNCON the income (loss) reported with equity method by company i in year t ; MI the income (loss) distributed to minority shareholders by company i in year t ; CSTE the current tax expense reported in the financial statement by company i in year t ; ΔNOL the change in net operating loss carry forward from year $t-1$ to year t ; LAGPERM the PERMDIFF company i in year $t-1$.

Equations (5) and (6) are estimated per sector and per year using the data of companies population (except financial institutions, real estate company, companies calculating their taxable income based on the gross revenue, as well as companies subject to special income tax rate) from each country observed in this study.

For hypothesis testing in this study, the level of tax avoidance TAXVOID is measured using the absolute value. Such means of turning TAXVOID into absolute value follows the measurement carried out by previous studies (Hanlon, 2005; Tang and Firth, 2011, 2012; Hanlon *et al.*, 2012). Hanlon (2005) and Hanlon *et al.* (2012) justify the use of absolute value of BTD in their research by stating that whatever direction of a large BTD gives indication of a low earnings quality. Moreover, Tang and Firth (2012) also turn the ABTD in their research into absolute value for reasons that large positive ABTD is a result of earnings management practices that increase accounting income (upward earnings management) and aggressive tax reporting. Meanwhile, large negative ABTD is a result of earnings management practices that decrease accounting income (downward earnings management) and taxable income smoothing practices.

TAXENVIRON. TAXENVIRON variable is measured using dummy variable. In determining the dummy value of TAXENVIRON, this study groups four tax environment characteristics of a country, i.e.: tax basis, imposition of income tax on dividends, tax loss carry-forward period and book-tax conformity. The reasons why this study only chooses the aforesaid four characteristics when grouping the tax environment into competitive and uncompetitive tax environment are elaborated as follows: sample countries have the most distinct differences in the four characteristics; tax holidays are not included as a characteristic that determines the nature of tax environment as all sample countries in this study offer equally attractive tax holiday facilities. Therefore, this study is unable to judge

whether a tax holiday in one country is better than another; and the four characteristics are considered to be the most dominant factors affecting the amount of corporate tax burden. For example, most of the derivative users which are the sample companies of this study have overseas operations. Therefore, if income tax is also imposed on income originating from operations abroad, the corporate tax burden will be considerably large. Following is the explanation of tax basis, imposition of income tax on dividends, tax loss carry-forward period and book-tax conformity.

Income tax imposition system (tax basis). The income tax imposition system in the ASEAN region consists of two systems: the worldwide income system and territorial and remittance basis (Setyowati, 2014). Among all ASEAN countries, only Malaysia and Singapore employ territorial and remittance basis system. In the worldwide income system, taxes are imposed on all income of resident companies, including income obtained from abroad (Setyowati, 2014). The worldwide income system is perceived to be uncompetitive, especially for countries with high income tax rates, as the system imposes a higher tax rate on all income regardless of the origin of the income. Companies domiciled in a country employing worldwide income system are unable to benefit from investments in other jurisdictions with low tax rates, since they are always subject to high domestic tax.

In the territorial and remittance basis system, the state only collects taxes on income earned within its jurisdiction, therefore allowing more efficient business decisions as income transferred to the country will no longer be taxed (Setyowati, 2014). The territorial and remittance basis system employed by Malaysia and Singapore is part of their economic growth strategies because it can attract multinational companies to place their headquarters in the two countries (Setyowati, 2014).

Imposition of income tax on dividends. Out of all countries in the ASEAN region, only Malaysia and Singapore grant income tax exemptions for dividends paid by resident companies to all shareholders (both individuals and companies). According to Setyowati (2014), this “income tax exemptions for dividends” facility is part of the double taxation avoidance system, a system that aims to eliminate double taxation for shareholders. The imposition of income tax on dividends can lead to economic double taxation, i.e.: imposition of tax at the corporate level on taxable income; and imposition of tax at the shareholder level for dividends received by the shareholders, although dividends are part of the company income which has been subjected to income tax.

Tax loss carry-forward period. Unlike the Philippines and Indonesia, Malaysia and Singapore offer taxpayers the flexibility to carry forward losses to be compensated indefinitely. Based on this aspect, Malaysia and Singapore seem to provide the taxpayers with freedom to charge the losses forward for an unlimited period of time. Singapore even allows offset through loss carry-back, although only for a year, so it is possible to obtain restitution of taxes paid in the previous year. Thus, in terms of the compensation period for losses, Malaysia and Singapore maintain the upper hand over other ASEAN countries in attracting investment (Setyowati, 2014).

Book-tax conformity. Book-tax conformity in this study consists of two types, i.e.:

- (1) The conformity between tax regulations and financial accounting standards on financial derivative transactions: in Singapore and Malaysia, tax treatment on gains/losses from financial derivative transactions has followed the accounting treatment. On the contrary, tax treatment on gains/losses from financial derivative transactions in the Philippines and Indonesia has not adhered to the accounting treatment.
- (2) The conformity level between tax regulations and financial accounting standards: based on the studies of Atwood *et al.* (2010, 2012), Tang (2015) and Blaylock *et al.* (2015), Malaysia and Singapore are categorized as countries with high level of

book-tax conformity as the average values of book-tax conformity in the two countries are way above the median value. Conversely, as the average value of book-tax conformity in the Philippines and Indonesia are far below the median value, they are categorized as countries with low level of book-tax conformity.

Lee and Swenson (2012) found that the higher the conformity level between accounting standards and tax regulations in a country is, the lower the level of tax avoidance in the country. In line with these findings, Atwood *et al.* (2012) also found that the tax avoidance level is lower in companies domiciled in countries with high level of book-tax conformity.

Table II presents the categorization of the dummy variable of TAXENVIRON. From Table II, it is known that Malaysia and Singapore have the same characteristics of tax basis, imposition of income tax on dividends, tax loss carry-forward period and book-tax conformity. Meanwhile, both the Philippines and Indonesia also have the same characteristics of tax basis, imposition of income tax on dividends, tax loss carry-forward period and book-tax conformity. It is therefore determined that the dummy value of TAXENVIRON for Malaysia and Singapore is 1, while the dummy value of TAXENVIRON for the Philippines and Indonesia is 0. The group of countries which is given the value of 1 (Malaysia and Singapore) represents the group of countries with a competitive tax environment, as they adopt the territorial and remittance basis system, exempt the imposition of income tax on dividends, and have an indefinite tax loss carry-forward period. The group of countries which is given the value of 0 (Indonesia and the Philippines) represent the group of countries with an uncompetitive tax environment.

Control variables. The control variables in this study are as follows: firm size (SIZE), profitability (ROA), leverage (DTA), capital intensity (CAPINT), country dummy variables (COUNTRY) and year dummy variables (YEAR). SIZE is selected to control the effects of company size on the level of tax avoidance activities. The bigger the company, the smaller its tax avoidance activities. This is primarily because large companies tend to get more spotlights from analysts and investor as compared to small companies, which make them to be more cautious in taking action. This study measure SIZE as the natural logarithm of total assets. ROA is used to control the effects of company profitability on the level of tax avoidance. The higher the profit of the company, the higher the level of tax avoidance (Gupta and Newberry, 1997). ROA is measured as net income divided by lagged total assets.

DTA is used to control the effects of the debt level on the level of tax avoidance activities. Frank *et al.* (2009) found a positive relationship between leverage and tax aggressiveness. We measured DTA as total debt divided by total assets. CAPINT is used to control the effects of capital intensity on the level of tax avoidance activities. The greater the value of capital intensity resulting in the depreciation expense (which is the deductible expense) is getting bigger, so in turn it will lead to reduced ETR (Gupta and Newberry, 1997).

Characteristics	Malaysia and Singapore	The Philippines and Indonesia
Tax basis	Territorial and remittance basis	World Wide Income
Imposition of income tax on dividends	Exempted	Not exempted
Tax loss carry-forward period	Indefinite	Definite
Book-tax conformity	Tax treatment for financial derivatives transactions follows the accounting treatment	Tax treatment for financial derivatives transactions does not follow the accounting treatment
Dummy value	High level of book-tax conformity 1	Low level of book-tax conformity 0

Table II.
Categorization of the
dummy value of
TAXENVIRON

CAPINT is measured as net property, plants and equipment divided by lagged total assets. Furthermore, country dummy variable (COUNTRY) and year dummy variable (YEAR) are used to control the effects of country and observation year on the level of tax avoidance activities. Country dummy variable is a dummy variable for each country sample, with Indonesia as the reference country. Meanwhile, year dummy variable is a dummy variable for the observation years, with 2009 as the reference year.

TAXRATE is measured by the statutory corporate tax rate in each country from 2009 to 2013. Table III shows the statutory corporate income tax rates from each country.

4. Empirical results

4.1 Descriptive statistics

Table IV shows that TAXVOID variable has an average of 0.0383 and a standard deviation of 0.0412, which indicates a quite high variance in the level of tax avoidance (TAXVOID) carried out among companies. It is also known that the average of the level of financial derivatives usage is 0.1164, with the lowest value of 0.0001 and the highest value of 1.1342. It can also be seen from Table IV that the SIZE variable has an average of 21.1970, ROA has an average of 0.0688, DTA has an average of 0.4753 and CAPINT has an average of 0.3309. From Table IV, it is also known that out of the total sample, 78.21 percent are financial derivatives users for speculative purposes, and 21.79 percent are financial derivatives users for hedging purposes.

4.2 Correlation matrix

Table V shows that the DERIV variable has a positive and significant correlation with TAXVOID variable, in line with the hypothesis. This result suggests that the higher the level of financial derivatives is, the higher the level of tax avoidance will be. This finding

Table III.
Statutory corporate
income tax rate in
each country

Country	2009 (%)	2010 (%)	Year 2011 (%)	2012 (%)	2013 (%)
The Philippines	30	30	30	30	30
Indonesia	28	25	25	25	25
Malaysia	25	25	25	25	25
Singapore	18	17	17	17	17

Table IV.
Descriptive statistics

Variables	<i>n</i>	Mean	Median	Min.	Max.	SD
DERIV	1,395	0.1164	0.0520	0.0001	1.1342	0.1770
TAXVOID	1,395	0.0383	0.0256	0.0000	0.3364	0.0412
SIZE	1,395	21.1970	20.3397	17.1222	31.4198	3.1455
ROA	1,395	0.0688	0.0567	-0.1901	0.4460	0.0861
DTA	1,395	0.4753	0.4853	0.0641	0.9578	0.1947
CAPINT	1,395	0.3309	0.3013	0.0027	1.0722	0.2132
TAXRATE	1,395	0.2210	0.2500	0.1700	0.3000	0.0429
		Dummy proportion = 1		Dummy proportion = 0		
		<i>(n</i> = 1,091)		<i>(n</i> = 304)		
DSPEC		78.21%		21.79%		

Notes: DERIV, notional amount of financial derivatives, scaled by lagged total assets; TAXVOID, the level of tax avoidance; DSPEC, 1 if the firm use financial derivatives for speculative purposes and 0 if otherwise; SIZE, natural logarithm of total assets; ROA, return on asset; DTA, total debt to total assets; CAPINT, capital intensity; TAXRATE, the statutory corporate tax rate in each country

Table V.
Correlation matrix

	TAXVOID	DERIV	SIZE	ROA	DTA	CAPINT	TAXRATE
TAXVOID	1.0000						
DERIV	0.0748***	1.0000					
SIZE	-0.0320	0.0110	1.0000				
ROA	0.2184***	0.1089***	0.2213***	1.0000			
DTA	-0.0329	0.1626***	0.3183***	-0.0839***	1.0000		
CAPINT	0.0008	0.0572**	0.1859***	0.0413	0.0384	1.0000	
TAXRATE	0.0499*	-0.1366***	0.3669***	0.0951***	-0.0289	0.1812***	1.0000

Notes: DERIV, notional amount of financial derivatives, scaled by lagged total assets; TAXVOID, the level of tax avoidance; SIZE, natural logarithm of total assets; ROA, return on asset; DTA, total debt to total assets; CAPINT, capital intensity; TAXRATE, the statutory corporate tax rate in each country. *, **, ***Significant at 1, 5 and 10 percent levels, respectively, two-tailed test

provides an early indication of the empirical evidence that supports hypothesis *H1*. In addition, Table V also shows that every correlation value between the independent variables is less than 0.8. Therefore, the models used in this research did not have multicollinearity problem.

4.3 Regression results

The effect of financial derivatives on tax avoidance. Table VI shows that the DERIV variable has a positive and significant coefficient. This indicates that the level of financial derivatives usage positively and significantly affects the level of tax avoidance. The higher the level of financial derivatives usage is, the higher the level of tax avoidance will be carried out by companies. This finding indicates that financial derivatives can be used as a tool of tax avoidance. This finding is also consistent with the research findings of Donohoe (2011a, b, 2012, 2015) in the USA, Oktavia and Martani (2013) in Indonesia and Zeng (2014) in Canada. Thus, it is concluded that hypothesis *H1* is accepted.

Variable	Predicted sign	Coefficient	t-statistic
Intercept	?	0.0394	5.34***
DERIV	+	0.0109	1.43*
SIZE	-	-0.0023	-3.11***
ROA	+	0.1159	4.80***
DTA	+	0.0018	0.26
CAPINT	+	0.0030	0.56
COUNTRY		Yes	
YEAR		Yes	
R^2		6.97%	
F-statistic		4.35	
n		1,395	

Notes:

$$\begin{aligned} \text{TAXVOID}_{it} = & \alpha_0 + \alpha_1 \text{DERIV}_{it} + \alpha_2 \text{SIZE}_{it} + \alpha_3 \text{ROA}_{it} + \alpha_4 \text{DTA}_{it} \\ & + \alpha_5 \text{CAPINT}_{it} + \alpha_6 \text{COUNTRY}_{it} + \alpha_7 \text{YEAR}_{it} + \varepsilon_{it}, \end{aligned} \quad (1)$$

TAXVOID, the level of tax avoidance; DERIV, notional amount of financial derivatives, scaled by lagged total assets; SIZE, natural logarithm of total assets; ROA, return on asset; DTA, total debt to total assets; CAPINT, capital intensity; COUNTRY, country dummy variables; YEAR, year dummy variables. *, ***Significant at 10 and 1 percent levels, respectively, one-tailed test

Table VI.
Regression results –
hypothesis *H1*

Table VII shows that the DERIV×DSPEC coefficient has a positive and significant value. This finding suggests that the effect of the financial derivatives usage on the level of tax avoidance is higher in companies using financial derivatives for speculative purposes than in companies using financial derivatives for hedging purposes. This finding is consistent with the findings of Donohoe’s (2011a, b, 2015) study, which find empirical evidence that the reduction in tax burden in financial derivatives users for speculative purposes is greater than in financial derivatives users for hedging purposes. Thus, it is concluded that hypothesis *H2* is accepted.

There are two reasons why companies using financial derivatives for speculative purposes experience a higher reduction in tax burden than companies using financial derivatives for hedging purposes. First, as long as its derivatives instruments are used for tax avoidance, companies will get into derivative positions that have no or particularly minor relations to risk management (Ensminger, 2001). The use of financial derivatives that have no (or have minor) relations to risk management, has the potential to increase the exchange rate risk exposure. If companies fail to reduce the exchange rate risk exposure, they will experience a higher reduction in tax burden than companies using financial derivatives for hedging purposes, as loss arising from such failures need to be immediately recognized in the income statement and be used as an income deduction. Second, only speculative derivatives and ineffective portions of hedging that directly affect reported earnings, as any gains or losses arising from derivative transactions that do not meet the criteria for hedge accounting or the ineffective portions of hedging need to be immediately recognized in the income statement (Donohoe, 2011a, b, 2015).

The role of tax environment on the relationship between financial derivatives and tax avoidance. It is known from Table VIII that the DERIV×TAXENVIRON variable has a

Variable	Predicted Sign	Coefficient	t-statistic
Intercept	?	0.0437	4.59***
DERIV	+	-0.0090	-0.82
DSPEC	?	-0.0047	-1.36*
DERIV×DSPEC	+	0.0256	1.86**
SIZE	-	-0.0024	-3.04***
ROA	+	0.1149	4.77***
DTA	+	0.0021	0.30
CAPINT	+	0.0030	0.55
COUNTRY		Yes	
YEAR		Yes	
R ²		7.20%	
F-statistic		3.91	
n		1,395	

Notes:

$$\begin{aligned}
 \text{TAXVOID}_{it} = & \alpha_0 + \alpha_1\text{DERIV}_{it} + \alpha_2\text{DSPEC}_{it} + \alpha_3\text{DERIV} \times \text{DSPEC}_{it} \\
 & + \alpha_4\text{SIZE}_{it} + \alpha_5\text{ROA}_{it} + \alpha_6\text{DTA}_{it} + \alpha_7\text{CAPINT}_{it} + \alpha_8\text{COUNTRY}_{it} \\
 & + \alpha_9\text{YEAR}_{it} + \epsilon_{it},
 \end{aligned} \tag{2}$$

TAXVOID, the level of tax avoidance; DERIV, notional amount of financial derivatives, scaled by lagged total assets; DSPEC, 1 if the firm uses speculative financial derivatives and disclose the notional amount of financial derivatives and 0 if otherwise; SIZE, natural logarithm of total assets; ROA, return on asset; DTA, total debt to total assets; CAPINT, capital intensity; COUNTRY, country dummy variables; YEAR, year dummy variables. *, **, ***Significant at 1, 5 and 10 percent, respectively, one-tailed test

Table VII.
Regression results –
hypothesis *H2*

Variable	Predicted sign	Coefficient	t-statistic
Intercept	?	0.1126	6.52***
DERIV	+	0.0381	1.78**
TAXENVIRON	?	-0.0173	-3.08***
DERIV×TAXENVIRON	-	-0.0294	-1.32*
SIZE	-	-0.0025	-4.33***
ROA	+	0.1150	8.70***
DTA	+	0.0024	0.40
CAPINT	+	0.0025	0.49
TAXRATE	?	-0.0771	-2.64***
YEAR		Yes	
R ²		6.29%	
F-statistic		8.80	
n		1,395	

Notes:

$$\begin{aligned} \text{TAXVOID}_{it} = & \alpha_0 + \alpha_1 \text{DERIV}_{it} + \alpha_2 \text{TAXENVIRON}_{it} + \alpha_3 \text{DERIV} \times \text{TAXENVIRON}_{it} \\ & + \alpha_4 \text{SIZE}_{it} + \alpha_5 \text{ROA}_{it} + \alpha_6 \text{DTA}_{it} + \alpha_7 \text{CAPINT}_{it} + \alpha_8 \text{TAXRATE}_{it} \\ & + \alpha_9 \text{YEAR}_{it} + \varepsilon_{it}, \end{aligned} \quad (3)$$

TAXVOID, the level of tax avoidance; DERIV, notional amount of financial derivatives, scaled by lagged total assets; TAXENVIRON, 1 if the country has a competitive tax environment and 0 if otherwise; SIZE, natural logarithm of total assets; ROA, return on asset; DTA, total debt to total assets; CAPINT, capital intensity; TAXRATE, the statutory corporate tax rate in each country; YEAR, year dummy variables. *, **, ***Significant at 1, 5 and 10 percent levels, respectively, one-tailed test

Table VIII.
Regression results –
hypothesis H3

negative and significant coefficient. This finding indicates that the positive effect of the level of financial derivatives usage on the level of tax avoidance is lower in countries with a competitive tax environment than in countries with an uncompetitive tax environment. In other words, the more competitive the tax environment in a country is, the lesser the role of the use of financial derivatives as a tools of tax avoidance is. It is concluded that hypothesis H3 is accepted.

Companies based in countries with a competitive tax environment can enjoy various tax facilities that benefit the companies, such as corporate earnings from overseas will not be double taxed, shareholders' gains in forms of dividends are also not taxed, and companies also have great flexibility in using their fiscal losses to offset tax as the country's carry-forward period is indefinite. On the other hand, companies based in countries with an uncompetitive tax environment will put more effort to carry out tax avoidance practices in order to minimize their tax burden, as companies based in such countries do not get any beneficial tax facilities like companies based in countries with a competitive tax environment. Therefore, the level of financial derivatives usage as a tool of tax avoidance is lower in countries with a competitive tax environment than in countries with an uncompetitive tax environment.

Table IX shows that DERIV×DSPEC×TAXENVIRON has a negative and significant coefficient. This result suggests that the more competitive (less competitive) tax environment in a country is, the lower (higher) the positive effect of the use of financial derivatives for speculative purposes on the relationship between the level of financial derivatives usage and the level of tax avoidance. This finding shows that the effect of the purpose of financial derivatives usage on the relationship between the level of financial derivatives and the level of tax avoidance depends on the tax environment of the respective country. Thus, it is concluded that hypothesis H4 is accepted.

Variable	Predicted sign	Coefficient	t-statistic
Intercept	?	0.1524	6.19***
DERIV	+	-0.2312	-2.57***
DSPEC	?	-0.0410	-3.05***
TAXENVIRON	?	-0.0533	-3.87***
DERIV×DSPEC	?	0.2844	2.61***
DERIV×TAXENVIRON	?	0.2285	2.52***
DSPEC×TAXENVIRON	?	0.0392	2.84***
DERIV×DSPEC×TAXENVIRON	-	-0.2694	-2.46***
SIZE	-	-0.0026	-3.40***
ROA	+	0.1130	4.82***
DTA	+	0.0027	0.39
CAPINT	+	0.0041	0.77
TAXRATE	?	-0.0778	-2.61***
YEAR		Yes	
R ²		8.06%	
F-statistic		4.00	
n		1,395	

Notes:

$$\begin{aligned}
\text{TAXVOID}_{it} = & \alpha_0 + \alpha_1 \text{DERIV}_{it} + \alpha_2 \text{DSPEC}_{it} + \alpha_3 \text{TAXENVIRON}_{it} \\
& + \alpha_4 \text{DERIV} \times \text{DSPEC}_{it} + \alpha_5 \text{DERIV} \times \text{TAXENVIRON}_{it} \\
& + \alpha_6 \text{DSPEC} \times \text{TAXENVIRON}_{it} + \alpha_7 \text{DERIV} \times \text{DSPEC} \times \text{TAXENVIRON}_{it} \\
& + \alpha_8 \text{SIZE}_{it} + \alpha_9 \text{ROA}_{it} + \alpha_{10} \text{DTA}_{it} + \alpha_{11} \text{CAPINT}_{it} + \alpha_{12} \text{TAXRATE}_{it} \\
& + \alpha_{13} \text{YEAR}_{it} + \varepsilon_{it},
\end{aligned} \tag{4}$$

TAXVOID, the level of tax avoidance; DERIV, notional amount of financial derivatives, scaled by lagged total assets; DSPEC, 1 if the firm uses speculative financial derivatives and disclose the notional amount of financial derivatives and 0 if otherwise; TAXENVIRON, 1 if the country has a competitive tax environment and 0 if otherwise; SIZE, natural logarithm of total assets; ROA, return on asset; DTA, total debt to total assets; CAPINT, capital intensity; TAXRATE, the statutory corporate tax rate in each country; YEAR, year dummy variables. ***Significant at 1 percent level, respectively, one-tailed test

Table IX.
Regression results –
hypothesis H4

4.4 Sensitivity tests

For sensitivity test, this study conducts two types of tests: re-testing of H3 and H4 hypothesis for each country; and re-testing of all hypotheses using three tax avoidance measures of ABTD, DTAX and BTD. The following are the results of the sensitivity analysis.

The re-testing of H3 and H4 hypotheses for each country. Table X shows that in countries with less competitive tax environment (i.e.: Indonesia and the Philippines), the coefficients of DERIV variable are significant and positive. These results indicate that in the two countries, the level of use of financial derivatives positively and significantly affects the level of tax avoidance. It can also be seen from Table X that in countries with competitive tax environment such as Singapore, the coefficient of the DERIV variable is insignificant. Furthermore, the result of sensitivity analysis also finds that in Malaysia, the coefficient of the DERIV variable is positive and significant. Nevertheless, the t-stat value of Malaysia's DERIV coefficient is lower than the DERIV coefficient in both Indonesia and the Philippines. Based on these findings, we can conclude that the positive effect of the level of financial derivative use on the tax avoidance level is lower in countries with competitive tax environment than in countries with uncompetitive tax environment. The results signify that tax facilities offered by countries with competitive tax environment can substitute or replace the role of using financial derivatives as means of tax avoidance. Hence, it can be concluded

Variable	Predicted sign	Indonesia		Malaysia		The Philippines		Singapore	
		Coef.	t-stat	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat
Intercept	?	0.0465	1.65*	0.0256	3.84***	0.0265	5.29***	0.0308	4.14***
DERIV	+	0.1254	2.27**	0.0112	1.41*	0.0228	2.34**	0.0086	1.07
SIZE	-	-0.0017	-0.47	-0.0040	-4.12***	-0.0049	-0.97	-0.0027	-3.47***
ROA	+	0.0507	1.55*	0.1875	5.21***	0.2386	2.98***	0.1128	4.81***
DTA	+	0.0478	1.38*	0.0056	0.53	0.0258	0.84	0.0091	0.90
CAPINT	+	0.0189	0.80	-0.0153	-1.88**	-0.0209	-0.83	0.0186	2.25**
YEAR		Yes		Yes		Yes		Yes	
<i>n</i>		109		633		80		573	
<i>R</i> ²		6.59%		18.09%		5.24%		8.13%	
<i>F</i> -stat		2.22		5.41		3.63		4.04	
Prob. <i>F</i> (stat)		0.0153**		0.0000***		0.0002***		0.0000***	

Notes:

$$\text{TAXVOID}_{it} = \alpha_0 + \alpha_1 \text{DERIV}_{it} + \alpha_2 \text{SIZE}_{it} + \alpha_3 \text{ROA}_{it} + \alpha_4 \text{DTA}_{it} + \alpha_5 \text{CAPINT}_{it} + \alpha_6 \text{YEAR}_{it} + \varepsilon_{it}$$

TAXVOID, the level of tax avoidance; DERIV, notional amount of financial derivatives, scaled by lagged total assets; SIZE, natural logarithm of total assets; ROA, return on asset; DTA, total debt to total assets; CAPINT, capital intensity; YEAR, year dummy variables. *, **, ***Significant at 1, 5 and 10 percent levels, respectively, one-tailed test

Table X.
Re-testing of *H3*
hypothesis – each
country test

that although the tests are conducted separately for each country, *H3* hypothesis in this study remains proven.

Table XI shows that only in Indonesia and the Philippines the DERIV×DSPEC variable positively and significantly affects TAXVOID, whereas none of the DERIV×DSPEC

Variable	Predicted sign	Indonesia		Malaysia		The Philippines		Singapore	
		Coef.	t-stat	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat
Intercept	?	0.1040	3.89***	0.0238	3.27***	0.3157	5.62***	0.0316	3.19***
DERIV	+/-	-0.2917	-1.04	-0.0232	-1.29*	-0.2179	-1.16	-0.0273	-1.62*
DSPEC	?	-0.0817	-3.61***	0.0020	0.45	-0.0094	-0.43	-0.0022	-0.35
DERIV×DSPEC	+	0.4350	1.54*	0.0007	0.03	0.2362	1.59*	0.0242	1.26
SIZE	-	-0.0017	-0.47	-0.0039	-3.58***	-0.0065	1.68**	-0.0419	-3.79***
ROA	+	0.0510	3.28***	0.1879	5.18***	0.2396	2.99***	0.0519	1.32*
DTA	+	0.0519	1.67**	0.0386	3.99***	0.0318	0.90	0.0110	1.06
CAPINT	+	0.0160	0.68	0.0152	1.87**	-0.0151	-0.53	0.0194	2.31**
YEAR		Yes		Yes		Yes		Yes	
<i>n</i>		109		633		80		573	
<i>R</i> ²		13.47%		18.09%		9.66%		12.78%	
<i>F</i> -stat		2.78		5.41		4.63		6.02	
Prob. <i>F</i> (stat)		0.0035***		0.0000***		0.0000***		0.0000*	

Notes:

$$\text{TAXVOID}_{it} = \alpha_0 + \alpha_1 \text{DERIV}_{it} + \alpha_2 \text{DSPEC}_{it} + \alpha_3 \text{DERIV} \times \text{DSPEC}_{it} + \alpha_4 \text{SIZE}_{it} + \alpha_5 \text{ROA}_{it} + \alpha_6 \text{DTA}_{it} + \alpha_7 \text{CAPINT}_{it} + \alpha_8 \text{YEAR}_{it} + \varepsilon_{it}$$

TAXVOID, the level of tax avoidance; DERIV, notional amount of financial derivatives, scaled by lagged total assets; DSPEC, 1 if the firm uses speculative financial derivatives and disclose the notional amount of financial derivatives and 0 if otherwise; SIZE, natural logarithm of total assets; ROA, return on asset; DTA, total debt to total assets; CAPINT, capital intensity; YEAR, year dummy variables. *, **, ***Significant at 1, 5 and 10 percent levels, respectively, one-tailed test

Table XI.
Re-testing of *H4*
hypothesis – each
country test

variables in Malaysia and Singapore is significant. These indicate that only in countries with uncompetitive tax environment (in this case Indonesia and the Philippines), the positive effect of the level of financial derivative usage on tax avoidance level is higher in companies using derivatives for speculation than in companies using derivatives for the purpose of hedging. The findings prove that the more (less) competitive a tax environment in a country is, the lower (higher) the positive effect of the use of financial derivatives for speculation on the relationship between the level of financial derivative usage and tax avoidance level. As such, it can be concluded that *H4* of this study is acceptable.

The re-testing of all hypotheses using three tax avoidance measures. It can be seen in Table XII that the DERIV variables have positive and significant coefficients when the level of tax avoidance is measured using ABTD, DTAX and BTD. These results are consistent with the results of the main testing. The findings also indicate that the higher the level of the use of financial derivative is, the higher the tax avoidance level of the company. Therefore, we can conclude that *H1* in the study is proven, although the tax avoidance measures are changed to ABTD, DTAX and BTD.

Moreover, Table XIII shows that when the tax avoidance level is measured using ABTD, DTAX and BTB, the DERIV×DSPEC variables have positive and significant coefficients. The results are consistent with the results of the main testing which find that the positive effect of the level of use of financial derivatives on tax avoidance level is higher in companies using derivatives for speculation than in companies using derivatives for the purpose of hedging. It thus can be concluded that *H2* is acceptable, even though the tax avoidance measures are changed to ABTD, DTAX and BTB.

Table XIV presents that when the tax avoidance level is measured using ABTD, DTAX and BTB, the coefficients of DERIV×TAXENVIRON variables have negative and significant values. These results are in line with the main testing of this study. These indicate that the positive effect of the level of use of financial derivatives on tax avoidance level is lower in countries with competitive tax environment than in countries with

Variable	Predicted sign	ABTD		DTAX		BTD	
		Coef.	Sig.	Coef.	Sig.	Coef.	Sig.
Intercept	?	0.0347	0.0000***	0.0093	0.0460**	0.0415	0.0000***
DERIV	+	0.0154	0.0450**	0.0047	0.0965*	0.0167	0.0390**
SIZE	-	-0.0015	0.0030***	-0.0007	0.0820*	-0.0029	0.0005***
ROA	+	0.1027	0.0000***	0.0514	0.0045***	0.1015	0.0010***
DTA	+	-0.0003	0.4770	0.0142	0.0060***	0.0054	0.2710
CAPINT	+	-0.0034	0.2050	0.0185	0.0005***	0.0084	0.1050
COUNTRY			Yes		Yes		Yes
YEAR			Yes		Yes		Yes
<i>n</i>			1,395		1,395		1,395
<i>R</i> ²			8.28%		8.29%		7.97%
<i>F</i> -stat			3.92		5.4		5.22
Prob. <i>F</i> (stat)			0.0000***		0.0000***		0.0000***

Notes:

$$\text{TAXVOID}_{it} = \alpha_0 + \alpha_1 \text{DERIV}_{it} + \alpha_2 \text{SIZE}_{it} + \alpha_3 \text{ROA}_{it} + \alpha_4 \text{DTA}_{it} + \alpha_5 \text{CAPINT}_{it} + \alpha_6 \text{COUNTRY}_{it} + \alpha_7 \text{YEAR}_i + \varepsilon_{it}, \quad (1)$$

Table XII. Re-testing of *H1* hypothesis – three tax avoidance measurement (ABTD, DTAX and BTB)

TAXVOID, the level of tax avoidance (measured by ABTD, DTAX and BTB); DERIV, notional amount of financial derivatives, scaled by lagged total assets; SIZE, natural logarithm of total assets; ROA, return on asset; DTA, total debt to total assets; CAPINT, capital intensity; COUNTRY, country dummy variables; YEAR, year dummy variables. *, **, ***Significant at 1, 5 and 10 percent levels, respectively, one-tailed test

Variable	Predicted sign	ABTD		DTAX		BTD	
		Coef.	Sig.	Coef.	Sig.	Coef.	Sig.
Intercept	?	0.0375	0.0000***	0.0149	0.0025***	0.0471	0.0000***
DERIV	+	-0.0021	0.4000	-0.0091	0.1055	-0.0130	0.1590
DSPEC	?	-0.0025	0.1645	-0.0040	0.0410**	-0.0065	0.0690*
DERIV×DSPEC	+	0.0097	0.0995*	0.0130	0.0905*	0.0382	0.0110***
SIZE	-	-0.0015	0.0150**	-0.0009	0.0150**	-0.0030	0.0005***
ROA	+	0.1022	0.0000***	0.0505	0.0005***	0.1002	0.0010***
DTA	+	-0.0003	0.4745	0.0136	0.0005***	0.0059	0.2505
CAPINT	+	-0.0034	0.2115	0.0183	0.0000***	0.0084	0.1045
COUNTRY		Yes		Yes		Yes	
YEAR		Yes		Yes		Yes	
<i>n</i>		1,395		1,395		1,395	
<i>R</i> ²		8.36%		8.59%		8.04%	
<i>F</i> -stat		4.7		3.42		4.54	
Prob. <i>F</i> (stat)		0.0000***		0.0000***		0.0000***	

Notes:

$$\text{TAXVOID}_{it} = \alpha_0 + \alpha_1 \text{DERIV}_{it} + \alpha_2 \text{DSPEC}_{it} + \alpha_3 \text{DERIV} \times \text{DSPEC}_{it} + \alpha_4 \text{SIZE}_{it} + \alpha_5 \text{ROA}_{it} + \alpha_6 \text{DTA}_{it} + \alpha_7 \text{CAPINT}_{it} + \alpha_8 \text{COUNTRY}_{it} + \alpha_9 \text{YEAR}_{it} + \varepsilon_{it}, \quad (2)$$

TAXVOID, the level of tax avoidance (measured by ABTD, DTAX and BTD); DERIV, notional amount of financial derivatives, scaled by lagged total assets; DSPEC, 1 if the firm uses speculative financial derivatives and disclose the notional amount of financial derivatives and 0 if otherwise; SIZE, natural logarithm of total assets; ROA, return on asset; DTA, total debt to total assets; CAPINT, capital intensity; COUNTRY, country dummy variables; YEAR, year dummy variables. *, **, ***Significant at 1, 5 and 10 percent levels, respectively, one-tailed test

Table XIII.
Re-testing of *H2*
hypothesis – three tax
avoidance
measurement (ABTD,
DTAX and BTD)

uncompetitive tax environment. Therefore, we can conclude that *H3* is acceptable, although the tax avoidance measures are changed to ABTD, DTAX and BTD.

Finally, it can also be noted in Table XV that DERIV×DSPEC×TAXENVIRON variables have negative and significant coefficients when the tax avoidance level is measured using ABTD, DTAX and BTD. These are consistent with the results of the main testing. The findings indicate that the effect of the purpose of using financial derivatives on the relationship between the level of use of financial derivatives and tax avoidance level depends on the tax environment of each country. Hence, this study concludes that *H4* is acceptable when the tax avoidance measures are changed to ABTD, DTAX and BTD.

5. Conclusion

Based on the test results regarding the effect of the level of financial derivative usage on a company's tax avoidance level, it can be concluded that the level of financial derivative usage positively affects a company's tax avoidance level. The higher the usage level of financial derivatives of a company, the higher its tax avoidance level. These findings indicate that financial derivatives can be utilized as a tool of tax avoidance. These results are also consistent with the study results of Donohoe (2011a, b, 2015) in the USA as well as the study results of Oktavia and Martani (2013) in Indonesia.

The test results in this study also show that the positive effect of the level of financial derivatives usage on the tax avoidance level is higher in companies using derivatives for speculation than in companies using derivatives for the purpose of hedging. These are in line with the previous research findings of Donohoe (2011a, b, 2015). Moreover, the findings of this study also demonstrate that a country's tax environment affects the

Variable	Predicted sign	ABTD		DTAX		BTD	
		Coef.	Sig.	Coef.	Sig.	Coef.	Sig.
Intercept	?	0.0446	0.0000***	0.0268	0.0000***	0.04470	0.0000***
DERIV	+	0.0587	0.0005***	0.0101	0.0855*	0.05910	0.0005***
TAXENVIRON	?	-0.0102	0.0115**	-0.0087	0.0020***	-0.01010	0.0115**
DERIV × TAXENVIRON	-	-0.0578	0.0005***	-0.0232	0.0355**	-0.05830	0.0005***
SIZE	-	-0.0016	0.0005***	-0.0006	0.0550*	-0.00150	0.0005***
ROA	+	0.1034	0.0000***	0.0525	0.0000***	0.10050	0.0000***
DTA	+	-0.0001	0.4930	0.0136	0.0005***	0.00000	0.4970
CAPINT	+	-0.0038	0.1785	0.019	0.0000***	-0.00420	0.1545
TAXRATE	?	-0.0533	0.0110**	-0.0685	0.0000***	-0.05210	0.0120**
YEAR			Yes		Yes		Yes
<i>n</i>			1,395		1,395		1,395
<i>R</i> ²			8.22%		8.51%		7.92%
<i>F</i> -stat			5.22		5.06		4.06
Prob. <i>F</i> (stat)			0.0000***		0.0000***		0.0000***

Notes:

$$\begin{aligned} \text{TAXVOID}_{it} = & \alpha_0 + \alpha_1 \text{DERIV}_{it} + \alpha_2 \text{TAXENVIRON}_{it} + \alpha_3 \text{DERIV} \times \text{TAXENVIRON}_{it} \\ & + \alpha_4 \text{SIZE}_{it} + \alpha_5 \text{ROA}_{it} + \alpha_6 \text{DTA}_{it} + \alpha_7 \text{CAPINT}_{it} + \alpha_8 \text{TAXRATE}_{it} \\ & + \alpha_9 \text{YEAR}_i + \varepsilon_{it}, \end{aligned} \quad (3)$$

Table XIV.
Re-testing of *H3*
hypothesis – three
tax avoidance
measurement (ABTD,
DTAX and BTD)

TAXVOID, the level of tax avoidance (measured by ABTD, DTAX and BTD); DERIV, notional amount of financial derivatives, scaled by lagged total assets; TAXENVIRON, 1 if the country has a competitive tax environment and 0 if otherwise; SIZE, natural logarithm of total assets; ROA, return on asset; DTA, total debt to total assets; CAPINT, capital intensity; TAXRATE, the statutory corporate tax rate in each country; YEAR, year dummy variables. *, **, ***Significant at 1, 5 and 10 percent levels, respectively, one-tailed test

relationship between the usage level of financial derivatives and tax avoidance level. The more competitive a country's tax environment is, the lower the role of using financial derivatives as a means of tax avoidance. Companies domiciled in countries with competitive tax environment are able to enjoy various tax facilities benefitting them, for instance: company's income originating from abroad are no longer subject to tax, shareholder's income in the forms of dividends are also not subject to tax, and companies have the flexibility in compensating their fiscal losses as the loss compensation period in those countries are indefinite. Hence, the use of financial derivatives as a measure of tax avoidance can be reduced and replaced by the tax facilities that benefit the companies in terms of tax.

This study has three implications. First, the results of this study reveal that managers use financial derivatives as a tax avoidance tool, especially financial derivatives for speculative purposes. Tax avoidance activities can harm investors when companies carry out overly aggressive tax avoidance activities, as companies will incur losses in terms of tax sanctions and damaged reputation in the future. Therefore, investors need to consider the purpose of financial derivatives usage when making investment decisions in companies using financial derivatives. Second, for tax authorities in each country, this study results prove that financial derivatives, particularly those for speculation, can facilitate corporate tax avoidance activities. The implication of these results is that the tax authorities must establish clear tax regulations regarding the tax treatment for various financial derivative transactions, i.e., specifying the definition of derivatives for the purpose of hedging and derivatives for speculation; determining several criteria to distinguish financial derivatives for hedging purpose and financial derivatives for

Variable	Predicted sign	ABTD		DTAX		BTD	
		Coef.	Sig.	Coef.	Sig.	Coef.	Sig.
Intercept	?	0.0690	0.0000***	0.0685	0.0000***	0.1111	0.0000***
DERIV	+	-0.0879	0.1415	-0.0828	0.156	-0.3539	0.0005***
DSPEC	?	-0.0272	0.0090***	-0.0265	0.0105**	-0.0464	0.0010***
TAXENVIRON	?	-0.0345	0.0015***	-0.0339	0.0015***	-0.0654	0.0000***
DERIV×DSPEC	?	0.1554	0.0785*	0.1503	0.0855*	0.387	0.0005***
DERIV×TAXENVIRON	?	0.0885	0.1415	0.084	0.154	0.3493	0.0005***
DSPEC×TAXENVIRON	?	0.0272	0.0100**	0.0266	0.0115**	0.0416	0.0040***
DERIV×DSPEC×TAXENVIRON	-	-0.1548	0.0805*	-0.1507	0.0860*	-0.3582	0.0005***
SIZE	-	-0.0016	0.0135**	-0.0016	0.0140**	-0.0037	0.0000***
ROA	+	0.1022	0.0000***	0.0993	0.0000***	0.0995	0.0010***
DTA	+	-0.0003	0.4750	-0.0003	0.4805	0.0078	0.1870
CAPINT	+	-0.0026	0.2565	-0.0031	0.2235	0.0096	0.0785*
TAXRATE	?	-0.0542	0.0105**	-0.053	0.0120**	-0.0763	0.0175**
YEAR		Yes		Yes		Yes	
<i>n</i>		1,395		1,395		1,395	
<i>R</i> ²		9.64%		8.80%		9.31%	
<i>F</i> -stat		4.28		3.10		4.14	
Prob. <i>F</i> (stat)		0.0000***		0.0000***		0.0000***	

Notes:

$$\begin{aligned}
 \text{TAXVOID}_{it} = & \alpha_0 + \alpha_1 \text{DERIV}_{it} + \alpha_2 \text{DSPEC}_{it} + \alpha_3 \text{TAXENVIRON}_{it} \\
 & + \alpha_4 \text{DERIV} \times \text{DSPEC}_{it} + \alpha_5 \text{DERIV} \times \text{TAXENVIRON}_{it} \\
 & + \alpha_6 \text{DSPEC} \times \text{TAXENVIRON}_{it} + \alpha_7 \text{DERIV} \times \text{DSPEC} \times \text{TAXENVIRON}_{it} \\
 & + \alpha_8 \text{SIZE}_{it} + \alpha_9 \text{ROA}_{it} + \alpha_{10} \text{DTA}_{it} + \alpha_{11} \text{CAPINT}_{it} + \alpha_{12} \text{TAXRATE}_{it} \\
 & + \alpha_{13} \text{YEAR}_i + \varepsilon_{it},
 \end{aligned} \tag{4}$$

TAXVOID, the level of tax avoidance (measured by ABTD, DTAX and BTD); DERIV, notional amount of financial derivatives, scaled by lagged total assets; DSPEC, 1 if the firm uses speculative financial derivatives and disclose the notional amount of financial derivatives and 0 if otherwise; TAXENVIRON, 1 if the country has a competitive tax environment and 0 if otherwise; SIZE, natural logarithm of total assets; ROA, return on asset; DTA, total debt to total assets; CAPINT, capital intensity; TAXRATE, the statutory corporate tax rate in each country; YEAR, year dummy variables. *, **, *** Significant at 1, 5 and 10 percent levels, respectively, one-tailed test

Table XV.
Re-testing of *H4*
hypothesis – three
tax avoidance
measurement (ABTD,
DTAX and BTD)

speculation purposes. This is especially necessary to determine whether losses arising from derivative transactions are considered deductible expense or non-deductible expense. If the financial derivative transactions are not for the purpose of hedging and do not have any underlying assets, the loss from such derivative transactions shall not be recognized as deductible expense.

The improvements in tax regulations on financial derivative transactions are expected to: minimize the attempts of companies aiming to take advantage of the inconsistency, asymmetry, and indeterminacy in tax regulations as loopholes to avoid taxes by using financial derivatives as means of tax avoidance; minimize the difficulties faced by the tax authorities in understanding, detecting and enforcing the law on tax avoidance involving financial derivatives; minimize the potential loss of state revenues as a result of financial derivative transactions; and minimize disputes between tax officials and taxpayers.

Third, for capital market authorities in each country, the implication is to create a better protection mechanism for investors in the capital market. For example, by

establishing a policy regulating the disclosure of derivative instruments in a format that is easy to understand and identify by investors. Although by far, companies have disclosed the derivative instruments in the notes to financial statements, but the disclosure is hard to understand by the users of the financial statements (Papa and Peters, 2013). The disclosure of derivative instruments in a more understandable and identifiable format is hoped to: assist investors in understanding and identifying the types of derivative instruments used by the company, the purpose of using these derivative instruments, the risk exposures that motivate the use of these instruments, as well as the differences between accounting hedges (derivatives that meet the criteria of hedge accounting), economic hedges (derivatives for the purpose of risk hedging) and derivatives for trading activities; improve the information availability for investors in making investment decisions and reduce the level of market mispricing.

This study has several limitations that should be noted so that the interpretation of the research results can be carried out carefully and such limitations must be considered in future studies. First, this study only uses the criteria of meeting or not meeting the hedge accounting requirement when splitting the users of financial derivatives into two categories. Further research can use other alternative to separate the use of financial derivatives for speculative purposes from the use of financial derivatives for hedging purposes. Second, the types of financial derivatives used by the sample companies in this study consist of forwards, cross currency swaps, interest rate swaps and options. The notional amount used to measure the level of financial derivatives usage in this study is the sum of the notional amount of all this types. This study does not test the sample based on the financial derivative types, so it is unknown which type of derivatives is more dominant in affecting the level of tax avoidance. Further research can broaden the test by classifying sample based on the financial derivatives types. Third, this study only uses four countries in the ASEAN region as sample countries. Further study can expand the research by not only using countries in the ASEAN region but also using countries in the Asia Pacific region.

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Corresponding author

Oktavia Oktavia can be contacted at: oktavia@ukrida.ac.id