Corporate Financial Risk, Macroeconomic Risk, and Tax Avoidance Behavior

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Abstract

Since global financial crisis of 2007-2008, national governments gradually encounter the critical issue on credit crisis because governments had to implement a series of policies to prevent financial institutions from repeating the mistake responsible for the crisis. However, we argue that firms with a higher level of financial risk would likely to encourage them to engage tax avoidance due to more difficulties in obtaining funds. Therefore, this paper empirically investigates the relationship between corporate financial risk and tax avoidance by employing firm-specific financial risk and macroeconomic constraints measures. We use US firm's data over the period of 2005–2016 and then apply regression analysis, robustness test, and sensitivity test to examine our research hypotheses. Our empirical evidences indicate that firms with higher level of firm-specific financial risk would exhibit decreasing tax avoidance, while a market with higher levels of macroeconomic constraints lead firms to engage in tax avoidance.

Keywords: Tax Avoidance; Financial Risk; Macroeconomic Constraints; Cash Taxes.

1. Introduction

During the 2007-2008 global financial crisis, global financial markets had experienced a serious credit crisis causing many firms insolvent. US government hence had implemented a series of policies, including the Dodd–Frank Wall Street Reform and Consumer Protection Act to prevent financial institutions from repeating the mistake responsible for the crisis. Firms then encounter higher levels of financial risk because of the implementation of the Dodd–Frank Act.

In recent, tax disputes have occurred many times in the United States. The issues on firm's tax avoidance behavior has become crucial and timely. This paper aims to understand whether governments or firms are concerned about tax avoidance. We argue that firms take a series of actions to avoid tax in response to own financial risks, but a firm's tax avoidance behavior is not necessarily improper and tax avoidance is defined as firms adopt a series of reduce the cash tax payment behavior (Gallemore and Labro, 2015). Moreover, Edwards, Schwab, and Shevlin (2016) argue that traditional debt and equity financing sources have become more difficult to access when under financial risk, firms look for alternative sources of funds. We claim that when firms face higher levels of financial risk, they typically exhibit higher levels of tax avoidance, and firms with higher levels of financial risk have more difficulty to obtain credit.

Using data from the U.S. and the EU, Thomsen and Watrin (2018) recently investigate systematic changes in tax avoidance over a 12 year period and indicate that firms are increasingly able to reduce their effective tax rate (ETR). Downward trend in the ETRs in nearly all OECD countries shows clear, while the mean ETRs of U.S. firms and of firms in large European countries are similar despite their widely differing statutory tax rate (STR). Furthermore, based on a panel of U.S. firms for the period 1997–2005 and using permanent book-tax difference and cash effective tax rates as proxies for tax avoidance, Jiménez-Angueira1 (2018) empirically explores how the interplay between internal corporate governance and the changes in the tax and corporate governance

environment in the U.S. during the early 2000s affected firms' tax avoidance levels. Empirical results find that relative to other firms firms with weak-governance during the low-regulation period (years 1997–2000) exhibited lower tax-avoidance levels during the high-regulation period (2003–2005) in response to the tighter external monitoring regime. Author adds to the corporate tax avoidance literature by providing evidence regarding the importance of considering external monitoring regimes in the study of the relationship between corporate governance and tax avoidance.

In this view, we empirically investigates the relationship between financial risk and tax avoidance over the period 2005 to 2016 based on US firms. We test our predictions estimating a firm's tax avoidance behavior, while using the cash effective tax rate proposed by McGuire, Wang, and Wilson (2014) and the GAAP effective tax rate proposed by Graham, Hanlon, Shevlin, and Shroff (2014). We examine the association between cash (GAAP) ETR and financial risk and also estimate financial risk by using between firm-specific financial risk and macroeconomic constraints. Firm-specific financial risk are measured by Z-score (Altman, 1968) while we expect that firms with a higher Z-score exhibit increasing cash tax payment. Macroeconomic constraints are defined as higher levels of external financing (Edwards et al., 2016) by using bond spread, credit default swap, Tightening (Edwards et al., 2016), and CBOE volatility index (VIX), while the market with higher levels of macroeconomic risk typically cause firms to engage tax avoidance.

Financial constrained firms would show behavior to obtain funds for several reasons. First, firms may decrease perating or non-operating expenses (e.g. advertisement and research and development) to increase disposable cash inn view of Campello, Graham, and Harvey (2010). Second, firms may use deferred tax planning strategies to increase disposable cash. Third, firms must hold an appropriate amount of funds against unpredictable events.

Based on the regression results, we find that the firm risk of Z-score and tax avoidance

are consistent and this support our hypothesis, which firms with a higher risk (Z-score) exhibit a higher cash (GAAP) ETR (i.e., decreased tax avoidance), and higher levels of macroeconomic risk lead firms to maitain lower cash (GAAP) ETR (i.e., increased tax avoidance). Moreover, we include two interactive dummy variables for the association between the Z-score and macroeconomic risk, which splitted our sample into tow groups, low risk (high Z-score and low level of macroeconomic risk), and high risk (low Z-score and high level of macroeconomic risk). The results are consistent with Hutchens and Rego (2015), arguing positive association between firms risk and tax avoidance.

In order to ensure the credibility of Z-score, we employ a proxy variable used to determine these results. According to Altman et al. (2017), we employ that the proxies variable of Z-score, Z-score model 1-8, instead of Z-score (Altman, 1968). The results support our hypothesis 1, representing firms with higher firm-specific financial risk exhibit a lower cash (GAAP) ETR (i.e., increased tax avoidance).

We employ robustness test and determine whether the firm tax avoidance variable representing cash (GAAP) ETR was reliable. We argue that employing book tax difference rather than cash (GAAP) ETR is much reasonable because book tax difference and tax avoidance have a strong association (Jackson, 2015). The proxy variables proposed by Rego and Wilson (2012) as book tax difference (BTD), Wilson (2009) permanent book tax difference (PBTD), and Desai and Dharmapala (2008) the regression model of book tax difference residual (TS) are used as alternatives cash (GAAP) ETR. The results support our hypothesis 1–4. Moreover, we employ that an additional robustness test is used to confirm our results. A proxy variable—free cash flow volatility—is used as an alternative macroeconomic risk variable. This variable is used to determine the different effect and the results consistent with Kubick et al. (2015) argue firms with lower level of free cash flow engage more tax avoidance. In other words, firms engage in more tax avoidance when they encounter larger volatility of free cash flow.

We propose that a sensitivity test is used to determine the reliability of the firm-specific financial risk variable, Z-score. We then consider credit rating, Tobin's q, and leverage ratio instead of Z-score and argue that Tobin's q is used to measure firm condition (Demsetz and Lehn, 1985). Credit rating, Tobin's q, and leverage are used as alternative firm-specific financial risk as proxies to determine tax avoidance, firm-specific financial risk, and the credibility of the previous results. The results support our hypothesis 1.

The effect of financial risk on tax avoidance is tested as follows: First, firms on the Compustat database over the period 2005 to 2016 were selected. We required firms to provide data to calculate effective tax rate (ETR) based on the United States. Then, the data for macroeconomic risk is obtained from the Datastream database over the period 2005 to 2016. Overall, the results confirm that firms with lower level of financial risk exhibit decreasing tax avoidance. This paper contributes to the literature on tax avoidance by addressing the question of how firms obtain working capital when suffering from firm-specific financial risk and macroeconomic risk.

The remainder of this paper is organized as follows. Section 2 is a literature review with proposed hypotheses, Section 3 presents the research design and methodology, Section 4 presents the empirical results, and Section 5 presents my conclusion and further research suggestions.

2. Hypothesis Decelopment

The effect of a firm's tax avoidance on the firm's financial risk is a crucial issue. Numerous studies have examined tax avoidance in firms (Dyreng, Hanlon, and Maydew, 2010; Edwards et al., 2016; Guenther, Matsunaga, and Williams, 2017). Some evidences suggest that tax avoidance grow each year from the middle 1990s to the early 2000s. During this period, many firms were sued for tax avoidance and tax saving. Specifically, Brown and Caylor (2005) argue that firms were engaged more aggressive tax avoidance

during this period than before.

2.1 Research Framework

Figure 1 illustrates the research framework and summarizes the hypothesis in this paper. We examines the relationship between tax avoidance and corporate financial risk. Financial risk is divided into firm-specific financial risk and macroeconomic risk. Firm-specific financial risk is represented by a firm's Z-score (Altman, 1968), whereas macroeconomic risks are represented by Bond Spread, CDS, Tightening (Edwards et al., 2016), and VIX.

The relationship between firm-specific financial risk (Z-score) and a firm's tax avoidance behavior is postulated in H1. The relationship between macroeconomic risk (Bond Spread, CDS, Tightening, and VIX) and a firm's tax avoidance behavior is postulated in H2–H4. Effective tax rate are used to measure a firm's tax avoidance behavior.

《Insert Figure 1 about here》

Herein, we argue that traditional debt and equity financing sources usually become scarcer in security markets with firm's financial constraints, enforcing firms to serach for alternative sources on external funds. In this view, tax avoidance is considered as an alternative source of financing. For example, Kim, Li, and Li (2010) argue that firms can manipulate depreciation plans and invest in stocks with certain payout policies to reduce cash tax payments. Although income tax is levied at a statutory rate, firms can reduce cash tax payments via various strategies. Hence, we examine the association between financial risk and tax avoidance and employ firm-specific financial risk and macroeconomic constraints to estimate a firm's financial risk. We predict that financial constrained firms use tax avoidance to increase their external funding.

We argue that firms adopt a variety of strategies to reduce effective tax rate over a long period and they may adopt legal or illegal accounting methods to avoid tax based on Dyreng, Hanlon, Maydew, and Thornock (2017); however, this paper does not attempt to measure and estimate tax avoidance. Accordingly, we employ two measures that are widely in the literature. The first measure, cash effective tax rate (McGuire et al., 2014), which is equal to income tax paid divided by pretax income (adjusted for special items) and it is used for a firm's manager worries about reducing the tax that the firm tax pays to reflect the impact of the cash tax rate. The second measure, cash effective tax rate under generally accepted accounting principles (Graham et al., 2014), which is equal to total income tax divided by pretax income (adjusted for special items) and it is used for a firm's manager worries about reducing the firm's tax expenses from financial statements to reflect the impact of account indicator. We use these two measures to quantify a firm's tax avoidance behavior and collectively refer to these two measures as effective tax rate.

Armstrong, Blouin, Jagolinzer, and Larcker (2015) argue that managers create economic benefits by reduce tax payment when corporate governance is poor. Although Guenther et al. (2017) argue that firms risk do not increase when firms engage in tax avoidance, Edwards et al. (2016) argue that firms with higher levels of macroeconomic constraints engage in tax avoidance. Accordingly, we argue that firms with higher levels of financial risk engage in tax avoidance. According to previous studies (Denis and Sibilkov, 2010; Whited and Wu, 2006) argue that firms are more financially constrained when their external financial costs increase, this study considers firm-specific financial risk and macroeconomic constraints. We estimate firm-specific financial risk using a firm's Z-score (Altman, 1968), which is a measure of a firm's financial health. The following four indicator are employ to measure macroeconomic constraints. The first indicator is Bond Spread that it can observe overall environmental risk. The second indicator is credit default swap (CDS), which is a type of financial contract. The third indicator is Tightening (Edwards et al., 2016), which is used in debt financing to assess observe macroeconomic constraints. The fourth indicator is the CBOE volatility index

(hereafter referred to as VIX), which evaluates future risk.

2.2 Firm-specific Financial Risk and Tax Avoidance

Prior study examines that the relationship between cash effective tax rate and tax avoidance based on Gupta and Newberry (1997). It investigates that the relationship of firm size, operation and investment, and financing to tax avoidance. Mills and Newberry (2001) study include consideration income tax rate. The study in recent years, including how the expectation of investors and creditors affect firm behavior. Armstrong et al. (2015) argue that a firm's manager may engage in tax avoidance for various reasons but investors and creditors are not willing to see the result. We argue that a firm's investors and creditors do not have the same goals as the firm's manager. Therefore, a firm's investors and creditors have conflicting interests regarding its financial risk. Hasan, Hoi, Wu, and Zhang (2014) argue that firms with a high tax avoidance exhibit a higher level of bond spread when getting loan. Like other creditors, banks are particularly sensitive to a firm's financial risk because when a manager engages in tax avoidance, the bank may not be able to benefits from the tax avoidance. Banks do not therefore like firms that engage in tax avoidance because they pose a higher risk to banks. Khan, Srinivasan, and Tan (2017) argue that small minority shareholders, investment agency and loan agency are offensive to tax avoidance. Shevlin, Urcan, and Vasvari (2013) argue that credit markets dislike a firm engage in tax avoidance because it create uncertainly about future cash flow. We argue that banks attach great importance to the risk of a firm engage in tax avoidance behavior because a firm's tax avoidance cause more risk in the future. Mahbuba and Dhaka (2015) argue that Although there are many models to predict the financial condition of firms, Z-score (Altman, 1968) has proven is a reliable method. Moreover, Desai, Dyck, and Zingales (2007) argue that emphasizes association between a firm's financial condition and tax avoidance. Accordingly, we examine firms financial condition by Z-score (Altman, 1968) and argue that firms with lower firm-specific financial risk may engage in tax avoidance. This leads to my hypothesis 1:

H1. A firm's Z-score is negatively associated with its tax avoidance behavior.

2.3 Macroeconomic Constraints and Tax Avoidance

Malmendier and Nagel (2011) argue that stock investors do not is optimistic about the return of future stock when macroeconomic is not optimistic. Because investors are not optimistic about the future, investors sell stocks converted into more stable financial products (i.e., certificate of deposit and government bond). Greenwood and Nagel (2009) show that young investors are very sensitive to stock returns and they choice higher risk and return stocks. Therefore, young investors are very sensitive to market volatility. In recent years, the government resorted to a series of policies to limit the economy. Therefore, government tax authorities are concerned that tax avoidance behavior is more prevalent in firms with macroeconomic constraints. Edwards et al. (2016) argue firms facing macroeconomic constraints adopt tax avoidance. We also propose that firms facing higher levels of macroeconomic constraints adopt various strategies to reduce their tax burden. To examines the impact of macroeconomic constraints on tax avoidance. We employ that four indicators (i.e., Bond Spread, CDS, Tightening, and VIX) estimate macroeconomic constraints.

2.3.1 Bond Spread, CDS and Tax Avoidance

We expect to observe that the impact of inflation rate on tax avoidance because we argue that customer purchasing power can decline when inflation rate rises because inflation rate affect the willingness of customer investment to cause firms facing a higher level of financial risk. Inflation is a macroeconomic condition that it means a drop in customer purchasing power. We argue that firms may face losses when declining customer purchasing power. Konchitchki (2011) argue that the impact of inflation rate on the volatility of stock price is crucial. Accordingly, we argue that the impact of inflation on future cash flows cause firms face a high risk and firms with a higher level

of financial risk engage in tax avoidance in the future. We argue that firms generate internal funds for future use by tax avoidance. This view is consistent with Aboody, Barth, and Kasznik (1999) that firms increase cash flow response inflation. Kang and Pflueger (2015) argue that a market with increased inflation rate cause firm liabilities and default risk increase. We argue that firms that have higher operating costs engage in more tax avoidance. Prior study have many methods to predict inflation (e.g., consumer price index) but this focus that the relationship between of financial risk and tax avoidance. Accordingly, we employ bond spread to predict inflation. This leads to my hypothesis 2-1:

H2-1. Bond Spread is positively associated with a firm's tax avoidance behavior.

We expect to observe the impact of market default risk on a firm's financial risk and the relationship between of market default risk and stock returns because I purpose that the relation has important worth for a firm's financial risk. Campbell, Hilscher, and Szilagyi (2008) show that the cost of equity capital decreases with market default risk. This evidence find that has important implications for firms financial policy and we argue that a firm's financial risk decreases with market default risk. Chava and Purnanandam (2010) find an evidence of market inefficiency that a negative association between of market default risk and stock returns. Although Campbell et al. (2008) find that the relation is significantly underperform since 1980 and there is no evidence to prove, Griffin and Lemmon (2002) find that a negative association between of market default risk and stock returns. These evidences show repeatedly that the default risk is negatively correlated with stock returns. To examine my study, we proxy for market default risk using CDS that is widely used in documents. Because we argue that the default risk of a market has a higher level of CDS exhibit the market banks face higher crediting costs, firms face higher crediting cost when the market has a higher level of CDS. This leads to my hypothesis 2-2:

H2-2. CDS is positively associated with a firm's tax avoidance behavior.

2.3.2 Tightening and Tax Avoidance

Since the financial crisis, governments worldwide implemented a series of policies to prevent the lending behavior of financial institutions that cause firms have become more difficult to obtain external funds. Because traditional debt and equity financing sources usually become more difficult to access when under financial constraints, firms look for alternative sources of funds. In this case, tax avoidance is considered an alternative source of funds. I expect to observe that a firm attempts to avoid tax when the standards for bank loans become more stringent. I argue firms as more constrained when firms experience an increased the cost of financing or an increased the difficulty of obtaining funds (Denis and Sibilkov, 2010). Edwards et al. (2016) argue that firms that face a higher level of constraints engage in more tax avoidance. Almeida, Campello, and Weisbach (2004) argue that constrained firms build cash reserves against macroeconomic constraints. I argue that constrained firms retain more funds against possible future uncertainty (Almeida and Campello, 2007). Finally, I argue that constrained firms employ a serious of means (e.g., firms employ research and development to reduce tax payments.) to avoid tax when market have higher levels of financial constraints (Klassen, Pittman, and Reed, 2004). To examine my study, I proxy for a standard of bank loans using Tightening (Edwards et al., 2016). I argue that firms have higher debt costs when markets have a higher level of Tightening. Lending standards are relatively strict in markets during periods of high Tightening. Accordingly, firms are less likely to obtain funds. I argue that firms may engage in tax avoidance during these periods. This leads to my hypothesis 3:

H3. Tightening is positively associated with a firm's tax avoidance behavior.

2.3.3 VIX and Tax Avoidance

Firms employment strategy are affected depend on market environment characteristics

(Gattiker, 2007) and chief executive officer characteristics (Francis, Hasan, Sun, and Wu, 2016). I argue that change in market environment affect a firm's tax avoidance behavior. According to Whaley (2011) argue that VIX is healthy method to provide investor information so manager can employ certain strategy, I employ the widely used VIX index in the literature to forecast at the future risks of the market. Because VIX index is used measure the degree of market volatility in the next thirty days, it may measure firms risk in the future. Baker, Bloom, and Davis (2016) show that VIX index reflects the strong linkages between financial and stock markets. Rauh (2006) argue that firms reduce capital expenditure against future uncertainty when market volatility rises. Almeida and Campello (2007) argue that firms increase cash reserves against possible future risk. I argue that VIX index is reasonable to estimate the future risk of firms and firms increase their cash holdings when market uncertainty rises (Edwards et al., 2016), although firm adopt a variety of strategies to reduce effective tax rate that it is long-term observation (Dyreng et al., 2017). I argue that even though VIX index observe the short-term condition, VIX index is a good method to observe the future volatility of the market. I expect to observe the effect of VIX in tax avoidance and I argue VIX index can observe a firm's tax avoidance behavior. This leads to my hypothesis 4:

H4. VIX is positively associated with a firm's tax avoidance behavior.

Observation of the relationships described in my hypotheses may not be possible for many reasons. There are numerous tax avoidance strategies that cannot be objectively observed. Nonetheless, this study is conducted to explore whether financial risk is related to tax avoidance as I am certain of the relationship.

3. Research Design

This study examines whether financial risk is related to tax avoidance behavior in firms. We use regression analysis to observe how a firm's financial risk affects its tax avoidance behavior. This study employs data from the Compustat and Datastream

databases.

3.1 Data and Sample Selection

To answer the question of how firm obtain working capital when considering firm-specific financial risk and macroeconomic constraints, this study examines the association between a firm's tax avoidance behavior and financial risk. We begin by selecting firms from Compustat database for period 2005–2016. The Compustat database provides details of firm-specific financial risk (Z-score) and other variables. The Datastream database provides details of macroeconomic constraints (Bond Spread, CDS, and VIX). Tightening is determined by using the FRB SLOOS , which report the standards used in the survey of domestic bank audit–credit standards. We include U.S. firms that have provided data for calculation of the firm's effective tax rate and firm's financial risk. Then, the average institutional ownership data from Datastream database for period 2005–2016. After eliminating firms that do not comply with these requirements, the sample includes 13,449 firms, representing 161,388 firm–year observations.

3.2 Definition on Main Variables

This study expects to understand the association between tax avoidance and financial risk. This section discusses how a firm's tax avoidance behavior, financial risk, related control variables are calculated, and regression model.

3.2.1 Measuring Corporate's Tax Avoidance Behavior

A dependent variable, Cash (GAAP)ETR, is used to determine whether a firm engages in tax avoidance. This variable is used because we am interested in how firms respond to financial risk. Based on research by Dyreng, Hanlon, and Maydew (2008), we set Cash(GAAP)ETR between 0 and 1. A firm's tax avoidance behavior is measured by the

equation for calculating the cash effective tax rate is as follows:

$$\text{CashETR} = \frac{\text{income taxes paid}}{\text{pretax income} - \text{special item}} \quad (1)$$

and the equation for calculating the GAAP effective tax rate is as follows:

$$\text{GAAPETR} = \frac{\text{total income taxes}}{\text{pretax income} - \text{special item}} \quad (2)$$

We propose that firms respond to financial risk by creating additional cash. A firm's cash (GAAP) effective tax rate is the most direct method of determining a firm's tax burden because a reduction in a firm's tax burden directly affects its effective tax rate.

Studies have argued that the effective tax rate can changes with profitability; firms face a higher effective tax rate when they are more profitable. It is argued in this study that larger firms typically have a higher level of profitability, giving them higher financial stability than smaller firms. Accordingly, measuring effective tax rate through financial conditions and macroeconomic constraints reflects this relationship. This is pertinent because a firm's financial healthier and financial risk usually relate to tax avoidance behavior.

3.2.2 Corporate Financial Risk

The independent variable examines firm-specific financial risk and macroeconomic constraints. Z-score is the measure of firm-specific financial risk. Z-score is based on the model presented by Altman (1968). The equation for determining a firm's Z-score is as follows:

$$\text{Z-score} = 0.012X_1 + 0.014X_2 + 0.033X_3 + 0.006X_4 + 0.999X_5 \quad (3)$$

Where

$X_1 = \text{working capital} / \text{total assets}$
$X_2 = \text{retained earnings} / \text{total assets}$
$X_3 = (\text{pretax income} + \text{total interest and related expenses}) / \text{total assets}$
$X_4 = \text{common shares outstanding} / \text{total liabilities}$
$X_5 = \text{sales} / \text{total assets}$

Z-score measures firm's default risk. A high Z-score represents low default risk, meaning that a firm is in excellent financial condition; conversely, a low Z-score represents high default risk, meaning that a firm's financial condition is poor. We propose that Z-score to appropriately assess a firm's operating and financial conditions because a firm with high Z-score is less likely to engage in tax avoidance.

We propose that Bond Spread, Tightening, CDS, and VIX be used to measure macroeconomic constraints. When Bond Spread is higher, there is a higher level of default risk. The equation for determining Bond Spread is as follows:

$$\text{Bond Spread} = (\text{ten years treasury bonds})_t - (\text{three months treasury bill})_t \quad (4)$$

We expects that firms that engage in tax avoidance will have higher Bond Spread.

CDS involves a purchaser regularly paying a fee to a seller, and in the event of a default, the seller pays default compensation on behalf of the purchaser. We expect that firms have a high level of CDS when their default risk is high.

Tightening, after Edwards et al. (2016) is an indicator for which debt financing is used to observe macroeconomic constraints. Tightening is defined in the FRB SLOOS, which details the standards for surveying domestic bank audit–credit standard. The equation for determining Tightening is as follows:

$$\text{Tightening} = \frac{\text{CT} + \text{ST}}{\text{SE} + \text{CE}} \tag{5}$$

where

CT = the number of bankers adopting considerably tightened in market.

ST = the number of bankers adopting somewhat tightened in market.

SE = the number of bankers adopting somewhat eased in market.

CE = the number of bankers adopting considerably tightened in market.

Because we expect that the firms lack funds by tax avoidance when Tightening is higher. VIX is usually used to evaluate future risk. To a degree, it reflects the volatility in the S&P500 index. We expect that market investors behave irrationally and panic when a market presents a high level of future risk.

3.3 Empirical Model

The regression model for examining the relationship between a firm's tax avoidance behavior and financial risk is estimated as follows:

$$\begin{aligned}&\text{CashETR}_{i,t}(\text{GAAPETR}_{i,t})\\&= \beta_0 + \beta_1 \text{Financial risk}_{i,t} + \beta_2 \text{ADVERT}_{i,t} + \beta_3 \text{R \& D}_{i,t} + \beta_4 \text{FODOM}_{i,t} + \beta_5 \text{FORINC}_{i,t}\\&+\beta_6 \text{FOSALES}_{i,t} + \beta_7 \text{MARGIN}_{i,t} + \beta_8 \text{PTBI}_{i,t} + \beta_9 \text{Size}_{i,t} + \beta_{10} \text{SALGR}_{i,t} + \beta_{11} \text{NOL}_{i,t}\\&+\beta_{12} \text{MTB}_{i,t} + \beta_{13} \text{Inst\_Own}_{i,t} + \beta_{14} \text{FCF}_{i,t} + \varepsilon_{i,t}\end{aligned} \tag{6}$$

In additional to the major variable, Financial Risk, there are a series of control variables in the regression model. The control variables are as follows.

Two of the variables are related to a firm's operating expenses. ADVERT equals a firm's advertisement expenses. It is calculated as advertisement expenses divided by lagged

total assets, and it is set to 0 when there is a missing. We expect that firms reduce cash tax payments by increasing their advertisement expenses, but previous studies have not shown a relationship between effective tax rate and advertisement expense. We fail to predict the relationship between Cash(GAAP)ETR and ADVERT. R&D equals a firm's research and development expenses. It is calculation as research and development expense divided by lagged total assets, and it is set to 0 when there is a missing. According to Davis, Guenther, Krull, and Williams (2016), firms reduce cash tax payments by increasing their research and development expenses. We predict a negative association between Cash(GAAP)ETR and R&D.

Three of the variables are related to a firm's foreign income. FODOM equals foreign pretax income based on the total pretax income from year t. It is calculated as foreign pretax income divided by pretax income. FORINC equals foreign pretax income based on lagged total assets from year t. It is calculated as foreign pretax income divided by lagged total assets. FOSALES equals foreign pretax income based on lagged total sales from year t. It is calculated as foreign pretax income divided by lagged total sales. Prior studies did not consider this variable but we purpose that a firm's foreign pretax income is related total sales. Accordingly, this study takes FOSALES into consideration. According to Rego (2003), firms have higher effective tax rate when they have more foreign pretax income. We predict a positive association between Cash(GAAP)ETR and FODOM, FORINC, and FOSALES.

Two of the variables are related to a firm's profitability. MARGIN equals net income divided by sales. PTBI equals pretax book income divided by lagged total assets. We argue that firms reduce tax payments when they have higher net income, but they may pay more tax because they have better performance. Prior studies do not consistently support this conclusion. We could not predict the relationship between Cash(GAAP)ETR and MARGIN, and PTBI.

Two of the variables are related to a firm's size. Size equals the natural logarithm of

total assets. Studies generally argue that there is a positive effect between firm size and tax avoidance because a larger firm has more resources with which to engage in tax avoidance. Conversely, it may be that in large firms that have previously been stable, if their investment slows, their tax shield becomes smaller and thus a negative effect exists between firm size and tax avoidance. The relationship between Cash(GAAP)ETR and Size, cannot be predict. Studies have determined a firm's size by its total assets, total sales, number of locations, and number of employees; herein, we examine the relationship between sales and a firm's tax avoidance behavior. Because prior research has not obtained evidence of any relationship, we propose that firms reduce tax payments when their sales increase because they do not wish to pay more tax. We predict a negative association between Cash(GAAP)ETR and SALEGR, which equals sales minus lagged sales, all divided by lagged sales.

NOL is used to observe a firm's net operating loss carried forward. A positive tax loss carried forward equals 1, otherwise equals 0. Consistent with Chen, Chen, Cheng, and Shevlin (2010), we purpose that firms with a net operating loss have a lower tax rate because they are less profitable. We expect a negative association between Cash(GAAP)ETR and NOL.

We also use the variable MTB, which equals the price per share multiplied by the common shares outstanding divided by the book value of shareholder equity. According to Fama and French (1995), firms have sustained earning performance when they have a high market–to–book ratio. The current study argues that the firms engage in tax avoidance when they have high performance, but they may also pay more tax because they have better performance. The relationship between Cash(GAAP)ETR and MTB, cannot be predict.

We also consider the variable Inst_Own, which equals the quarterly average of total institutional ownership. According to Crocker and Slemrod (2005), firms are more likely to engage in tax avoidance as their degree of institutional ownership increases.

We anticipate a positive association between Cash(GAAP)ETR and Inst_Own.

Additionally, the variable FCF, which equals the operating activities net cash flow minus capital expenditures, all divided by lagged assets, is employed. According to Shevlin et al. (2013), there is a relationship between effective tax rate and firm cash flow. We propose that a firm does not engage in tax avoidance when it has a high level of free cash flow. We predict a negative association between Cash(GAAP)ETR and FCF.

3.4 Robustness Test

We argue that Z-score (Altman, 1968) for predicting bankruptcy is not perfect because the coefficient of the equation is too small leading to a firm's default risk too dense. For this reason, we employ new Z-score that Z"-score, Z-score model 1, Z-score model 2, Z-score model 3, Z-score model 4, Z-score model 5, Z-score model 6, Z-score model 7, and Z-score model 8 (Altman et al., 2017) instead of Z-score (Altman, 1968) because we argue that the effect of new Z-score is better than Z-score. The equation for determining a firm's Z"-score is as follows:

$$\text{Z"-score}=3.25X_1+6.56X_2+3.26X_3+6.72X_4+1.05X_5 \quad (7)$$

and the equation for determining a firm's Z-score model 1 is as follows:

$$\text{Z-score model 1}=-1\times(0.042X_1+0.561X_2+0.724X_3+1.791X_4+0.021X_5) \quad (8)$$

and the equation for determining a firm's Z-score model 2 is as follows:

$$\text{Z-score model 2}= 0.035X_1+(0.495X_2+0.862X_3+1.721X_4+0.017X_5)\times\text{-}1 \quad (9)$$

and the equation for determining a firm's Z-score model 3 is as follows:

$$\text{Z-score model } 3 = 0.207X_1 + (0.483X_2 + 0.891X_3 + 1.790X_4 + 0.016X_5) \times \text{-}1 \quad (10)$$

and the equation for determining a firm's Z-score model 4 is as follows:

$$\text{Z-score model } 4 = (13.466X_1 + 0.441X_2 + 1.146X_3 + 1.619X_4 + 0.012X_5) \times \text{-}1 \quad (11)$$

and the equation for determining a firm's Z-score model 5 is as follows:

$$\text{Z-score model } 5 = 0.007X_1 + (0.487X_2 + 0.846X_3 + 1.757X_4 + 0.017X_5) \times \text{-}1 \quad (12)$$

and the equation for determining a firm's Z-score model 6 is as follows:

$$\text{Z-score model } 6 = 0.048X_1 + (0.540X_2 + 0.859X_3 + 1.695X_4 + 0.016X_5) \times \text{-}1 \quad (13)$$

and the equation for determining a firm's Z-score model 7 is as follows:

$$\text{Z-score model } 7 = 0.049X_1 + (0.496X_2 + 0.863X_3 + 1.717X_4 + 0.017X_5) \times \text{-}1 \quad (14)$$

and the equation for determining a firm's Z-score model 8 is as follows:

$$\text{Z-score model } 8 = (13.302X_1 + 0.459X_2 + 1.160X_3 + 1.682X_4 + 0.013X_5) \times \text{-}1 \quad (15)$$

where

$X_1 = \text{working capital / total assets}$
$X_2 = \text{retained earnings / total assets}$
$X_3 = (\text{pretax income} + \text{total interest and related expense}) / \text{total assets}$
$X_4 = \text{common shares outstanding / total liabilities}$
$X_5 = \text{sales / total assets}$

According to Dyreng et al. (2017), we argue that new Z-score for predicting bankruptcy

more accurate.

4.4 Tax Avoidance

We argue that effective tax rate that examines tax avoidance is a good method; however, in order to make study more rigorous. Accordingly, we employ three common method of BTD (Rego and Wilson, 2012), PBTD (Wilson, 2009), and TS (Desai and Dharmapala, 2008) instead of effective tax rate measuring tax avoidance. The equation for determining a firm's BTD is as follows:

$$\text{BTD} = \frac{\text{pretax income} - \left(\frac{\text{federal income taxes - foreign incometaxes}}{\text{statutory max imumfirm tax rate}} \right)}{\text{lagged total assets}} \tag{16}$$

and the equation for calculating the PBTD is as follows:

$$\text{PBTD} = \text{BTD} - \frac{\text{total deferred tax exp ense}}{\text{statutory max imum firm tax rate}} / \text{lagged total assets} \tag{17}$$

and the equation for calculating the TS is as follows:

$$\text{TS}_{i,t} \text{ as the residual of regression of } \text{BTD}_{i,t} = \beta_1 \text{TA}_{i,t} + \mu_i + \varepsilon_{i,t} \tag{18}$$

where

$$\text{TA}_{i,t} = (\text{ACT}_t - \text{ACT}_{t-1}) - (\text{CHE}_t - \text{CHE}_{t-1}) - (\text{LCT}_t - \text{L CT}_{t-1}) + (\text{DLC}_t - \text{DLC}_{t-1}) - (\text{DP}) / (\text{AT}_{t-1})$$

ACT = current assets

CHE = cash and short-term investment

LCT = current liabilities

DLC = debt in current liabilities

DP = depreciation and amortization

Nevertheless, these indicators and the opposite of effective tax rate. For this reason, firms engage in tax avoidance when these indicators higher.

4.5 Free Cash Flow

To make study more rigorous. we employ a firm's endogenous variable of free cash flow volatility instead of macroeconomic constraints. To examines whether there are consistent results. The equation for determining a firm's Vol_FreeCashFlow is as follows:

Vol_FreeCashFlow=the standard deviation of operating cash flow minus capital expenditures, all divided by lagged total assets over a five years period. (19)

Z-score is also consistent result that firms with a higher Z-score do not engage in tax avoidance, representing the result support hypothesis 1. We expect that Vol_FreeCashFlow is negative and significant association with CashETR support our prediction, representing firms with the uncertainty of future free cash flow volatility engage in more tax avoidance. We employ effective tax rate to measure a firm's tax avoidance is feasible. R&D and expect the consistent result, representing firms employ research and development engaging in tax avoidance.

4.6 Sensitivity Test of Macroeconomic constraints

The previous result proved the effect of Z-score. We expect that Credit Rating, Leverage, and Tobin's q instead in Z-score. To examine whether consistent results. Z-score examines that firm financial condition. Credit Rating observe firms credit, Leverage observe firm debt condition, and Tobin's q observe a firm's financial condition. We argue that these four indicators are to examine the firm financial condition.

5. Expected Results

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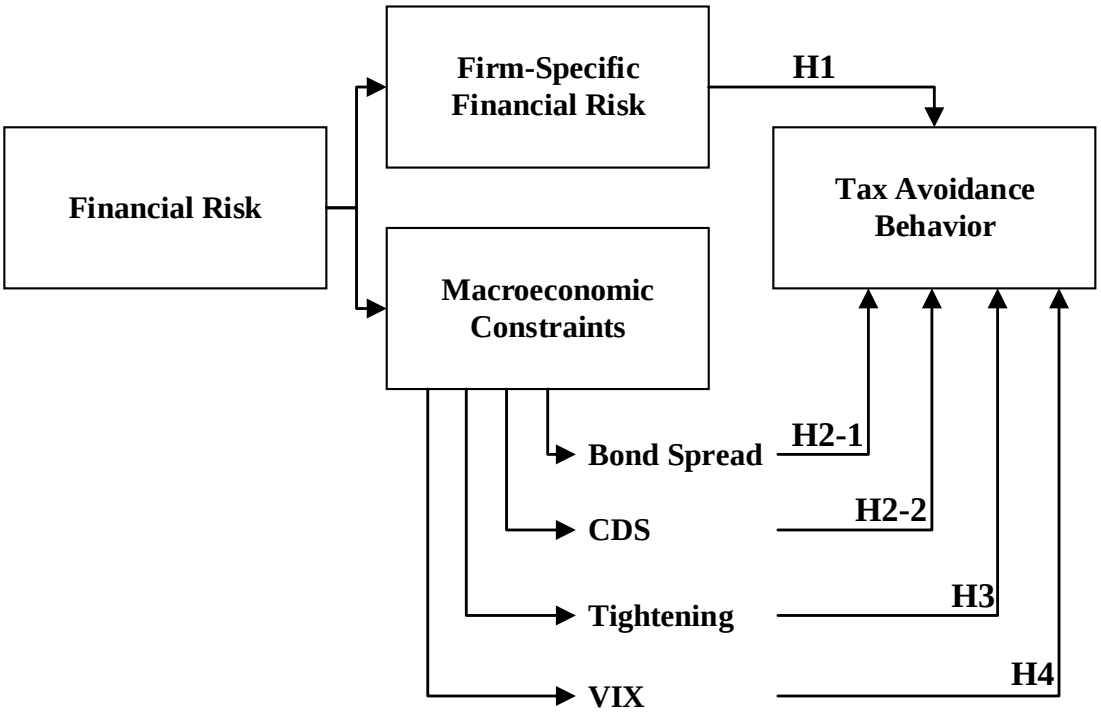

Figure 1 Research framework

Table 1 Distribution of sample by industry

This study includes the data of 13,499 US firms in the Compustat database covering the period 2005–2016. All sample firms are distributed into 10 groups based on SIC codes. The largest represented industry is manufacturing, which accounts for 37.388% of all the firms, followed by the finance, insurance, and real estate industries, which accounts for 24.098% and services industry, which accounts for 14.764%.

Industry	SIC2	N of Obs.	% of sample	Cumulative %
Agriculture	$01 \leq SIC < 10$	33	0.244%	0.244%
Mining	$10 \leq SIC < 15$	364	2.696%	2.941%
Construction	$15 \leq SIC < 18$	125	0.926%	3.867%
Manufacturing	$20 \leq SIC < 40$	5,047	37.388%	41.255%
Transportation & Public Utilities	$40 \leq SIC < 50$	1,163	8.615%	49.870%
Wholesale Trade	$50 \leq SIC < 52$	525	3.889%	53.760%
Retail Trade	$52 \leq SIC < 60$	948	7.023%	60.782%
Finance, Insurance, Real Estate	$60 \leq SIC < 68$	3,253	24.098%	84.880%
Services	$70 \leq SIC < 90$	1,993	14.764%	99.644%
Public Administration	$SIC = 99$	48	0.356%	100.000%
Total		13,499	100.000%	

Notes: *SIC2, N of Obs., % of sample, and Cumulative % represent the SIC code with two digits, number of observation, proportion of industry sample in all samples, and cumulative percentage of industry sample in all samples, respectively.*

Table 2 Descriptive statistics

A firm's tax avoidance is measured by using the cash effective tax rate (Cash ETR) and the GAAP effective tax rate (GAAP ETR). Firm-specific financial risk is measured by using Z-score. The macroeconomic constraints are measured by using Bond Spread, CDS, Tightening, and VIX.

Variable	N	Mean	Std.	P10	Q1	Median	Q3	P90	Min.	Max.
Tax Avoidance measure										
CashETR	13,499	0.245	0.151	0.035	0.139	0.245	0.335	0.417	0.000	0.999
GAAPETR	13,499	0.282	0.119	0.106	0.223	0.307	0.361	0.390	0.000	0.995
Firm-specific financial risk measure										
Z-score	9,218	1.208	0.845	0.433	0.670	1.005	1.509	2.201	0.051	13.184
Macroeconomic constraints measure										
Bond Spread	13,499	0.019	0.011	0.006	0.011	0.020	0.028	0.032	-0.003	0.035
CDS	9,797	646.085	405.066	129.000	356.000	594.000	1003.000	1032.000	129.000	1493.000
Tightening	13,499	0.062	0.243	-0.105	-0.083	0.000	0.140	0.192	-0.105	0.836
VIX	13,499	18.914	7.178	12.070	13.720	18.020	21.680	23.400	11.560	40.000
Control variables										
ADVERT	13,499	0.011	0.038	0.000	0.000	0.000	0.005	0.031	0.000	1.038
R&D	13,499	0.020	0.042	0.000	0.000	0.000	0.019	0.075	0.000	0.660
FODOM	13,499	0.199	0.421	0.000	0.000	0.000	0.275	0.708	0.000	17.181
FORINC	13,499	0.023	0.045	0.000	0.000	0.000	0.028	0.075	0.000	0.956
FOSALES	13,499	0.030	0.066	0.000	0.000	0.000	0.032	0.096	0.000	2.141
MARGIN	13,499	0.121	0.279	0.024	0.046	0.085	0.152	0.233	0.000	25.065
PTBI	13,499	0.114	0.135	0.015	0.041	0.087	0.148	0.231	-0.233	4.084
Size	13,499	7.363	1.973	4.949	6.086	7.293	8.574	9.901	0.586	14.775
SALEGR	13,499	0.096	0.333	-0.071	-0.002	0.066	0.154	0.279	-2.709	29.222
NOL	13,499	0.750	0.433	0.000	0.000	1.000	1.000	1.000	0.000	1.000
MTB	13,499	3.521	17.506	0.966	1.360	2.091	3.401	5.483	0.126	1539.983
Inst_Own	13,499	0.599	0.318	0.134	0.391	0.648	0.823	0.928	0.000	8.279
FCF	13,499	0.071	0.130	-0.012	0.016	0.060	0.110	0.170	-1.202	3.881

(Continued on next page)

Table 2 (Continued)

Notes: *1. Std., Min., and Max. represent standard deviation, minimum and maximum, respectively.*

2. CashETR is income taxes paid divided by (pretax income minus special items). GAAPETR is total income taxes divided by (pretax income minus special items). The Z-score equation is calculated as Z-score = $0.012X_1 + 0.014X_2 + 0.033X_3 + 0.006X_4 + 0.999X_5$ which is proposed by Altman (1968). Bond Spread is the difference in yield between a 10-year treasury bonds and a 3-month treasury bill. CDS involves a purchaser regularly paying a fee to a seller, and in the event of a default, the seller pays default compensation on behalf of the purchaser. The Tightening equation is calculated as Tightening = (CT + ST) / (SE + CE) which refer to Appendix C. VIX is usually used to evaluate future risk. ADVERT is advertisement expenses divided by lagged total assets. R&D is research and development expense divided by lagged total assets. FODOM is foreign pretax income divided by pretax income. FORINC is foreign pretax income divided by lagged total assets. FOSALES is foreign pretax income divided by lagged total sales. MARGIN is net income divided by sales. PTBI is pretax book income divided by lagged total assets. Size is the natural logarithm of total assets. SALEGR is sales minus lagged sales, all divided by lagged sales. NOL is a positive tax loss carried forward equals 1, otherwise equals 0. MTB is the price per share multiplied by the common shares outstanding divided by the book value of shareholder equity. Inst_Own is quarterly average of total institutional ownership. FCF is operating activities net cash flow minus capital expenditures, all divided by lagged assets.

Table 3 Difference in Z-score by overall sample

Variable	Z-score Group (C1= high risk, C10=low risk)																			
	C1		C2		C3		C4		C5		C6		C7		C8		C9		C10	
	Me.	Md.	Me.	Md.	Me.	Md.	Me.	Md.	Me.	Md.	Me.	Md.	Me.	Md.	Me.	Md.	Me.	Md.	Me.	Md.
CashETR	0.19	0.16	0.22	0.21	0.23	0.22	0.25	0.24	0.26	0.25	0.26	0.26	0.25	0.26	0.28	0.28	0.30(-15.73)***	0.31(-17.34)***	0.30(-16.20)***	0.31(-17.90)***
GAAPETR	0.30	0.32	0.27	0.29	0.27	0.27	0.28	0.29	0.29	0.31	0.29	0.31	0.30	0.31	0.31	0.33	0.32(-5.62)***	0.34(-5.38)***	0.34(-9.78)***	0.36(-10.33)***
ADVERT	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.02	0.00	0.02	0.00	0.02(-13.31)***	0.00(-15.87)***	0.03(-11.35)***	0.00(-14.62)***
R&D	0.01	0.00	0.03	0.00	0.04	0.02	0.04	0.02	0.03	0.02	0.03	0.01	0.02	0.00	0.02	0.00	0.01(0.28)	0.00(-2.90)***	0.01(4.06)***	0.00(-4.29)***
FODOM	0.16	0.00	0.33	0.08	0.34	0.15	0.35	0.18	0.35	0.17	0.30	0.12	0.26	0.04	0.22	0.01	0.16(0.22)	0.00(-3.24)***	0.11(3.92)***	0.00(-2.66)***
FORINC	0.02	0.00	0.03	0.01	0.04	0.02	0.04	0.02	0.04	0.02	0.04	0.02	0.03	0.01	0.03	0.00	0.02(-1.56)	0.00(-4.77)***	0.01(3.12)***	0.00(-2.04)**
FOSALES	0.04	0.00	0.06	0.02	0.06	0.03	0.06	0.03	0.05	0.02	0.04	0.02	0.03	0.01	0.02	0.00	0.01(10.12)***	0.00(-0.40)	0.00(12.55)***	0.00(-5.54)***
MARGIN	0.20	0.13	0.14	0.11	0.12	0.10	0.11	0.09	0.10	0.08	0.08	0.07	0.07	0.06	0.07	0.05	0.05(5.16)***	0.04(-27.85)***	0.04(5.54)***	0.03(-31.81)***
PTBI	0.08	0.06	0.11	0.09	0.12	0.10	0.13	0.11	0.13	0.11	0.13	0.12	0.14	0.11	0.15	0.13	0.16(-12.96)***	0.13(-19.83)***	0.17(-9.51)***	0.12(-18.27)***
Size	8.28	8.27	8.00	7.97	7.71	7.78	7.47	7.46	7.28	7.31	6.95	7.02	6.63	6.62	6.52	6.50	6.58(19.58)***	6.65(-18.26)***	6.48(20.32)***	6.56(-18.77)***
SALEGR	0.11	0.07	0.11	0.08	0.09	0.07	0.09	0.08	0.09	0.07	0.10	0.07	0.09	0.06	0.09	0.07	0.09(1.70)*	0.07(-1.30)	0.09(2.36)**	0.07(-0.49)
NOL	0.81	1.00	0.85	1.00	0.87	1.00	0.84	1.00	0.80	1.00	0.76	1.00	0.75	1.00	0.68	1.00	0.66(7.61)***	1.00(-7.51)***	0.64(8.65)***	1.00(-8.47)***
MTB	2.59	1.94	3.08	2.39	3.18	2.63	3.60	2.54	3.57	2.65	5.26	2.46	5.35	2.36	4.21	2.31	3.65(-4.09)***	2.4(-7.87)***	5.36(-3.55)***	2.32(-6.63)***
Inst_Own	0.60	0.64	0.68	0.72	0.66	0.73	0.67	0.75	0.66	0.72	0.65	0.71	0.64	0.68	0.64	0.66	0.66(-4.25)***	0.69(-4.20)***	0.62(-1.51)	0.70(-2.33)**
FCF	0.01	0.02	0.07	0.07	0.08	0.08	0.09	0.08	0.08	0.08	0.09	0.08	0.08	0.08	0.09	0.08	0.09(-13.17)***	0.08(-16.84)***	0.10(-9.84)***	0.07(-14.82)***

Notes: *1.* ***, **, * *represent significance level of the 1%, 5%, and 10%, respectively.*

2. Me., and Md. represent mean and median, respectively.

3. C10 (.) and C9 (.) is the t-value between C1 and C10, C1 and C9, respectively.

4. Detailed variable definitions refer to Table 2.

Table 4 Correlation analysis

Variable	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	[14]	[15]	[16]
[1] ***CashETR***	1															
[2] ***GAAPETR***	0.461**	1														
[3] ***Z-score***	0.187**	0.169**	1													
[4] ***ADVERT***	0.079**	0.085**	0.150**	1												
[5] ***R&D***	-0.090**	-0.130**	-0.168**	-0.015	1											
[6] ***FODOM***	-0.008	-0.148**	-0.106**	0.010	0.246**	1										
[7] ***FORINC***	-0.038**	-0.109**	-0.109**	0.060**	0.292**	0.561**	1									
[8] ***FOSALES***	-0.075**	-0.135**	-0.230**	0.010	0.277**	0.524**	0.833**	1								
[9] ***MARGIN***	-0.096**	-0.122**	-0.118**	-0.044**	-0.005	-0.046**	0.014	0.060**	1							
[10] ***PTBI***	0.048**	0.098**	0.167**	0.132**	0.094**	-0.023**	0.207**	0.143**	0.197**	1						
[11] ***Size***	-0.110**	-0.136**	-0.252**	-0.065**	-0.106**	0.108**	0.100**	0.158**	0.009	-0.232**	1					
[12] ***SALEGR***	-0.061**	-0.005	0.000	0.011	0.041**	0.003	0.055**	0.070**	0.101**	0.125**	-0.030**	1				
[13] ***NOL***	-0.048**	-0.002	-0.164**	-0.020*	0.104**	0.198**	0.177**	0.158**	-0.053**	-0.167**	0.237**	-0.010	1			
[14] ***MTB***	-0.021*	-0.014	0.030**	0.024**	0.018*	0.013	0.035**	0.020*	0.027**	0.221**	-0.014	0.008	-0.018*	1		
[15] ***Inst_Own***	-0.007	0.050**	-0.017	0.096**	0.084**	0.124**	0.132**	0.116**	-0.071**	0.054**	0.207**	0.030**	0.049**	0.016	1	
[16] ***FCF***	-0.025**	-0.056**	0.116**	0.082**	0.154**	0.017*	0.156**	0.110**	0.121**	0.748**	-0.146**	0.035**	-0.092**	0.221**	0.059**	1

Notes: *1.* **, * *represent significance level of the 1%, 5%, respectively.*

2. Detailed variable definitions refer to Table 2.

Table 5 Regression analysis under Bond Spread

Variable	CashETR			GAAPETR		
	Model 1	**Model 2**	**Model 3**	**Model 1**	**Model 2**	**Model 3**
Intercept	0.291***	0.301***	0.301***	0.337***	0.344***	0.344***
	(39.210)	(38.868)	(38.868)	(63.704)	(62.339)	(62.323)
ADVERT	0.122***	0.119***	0.118***	0.042	0.040	0.040
	(3.174)	(3.102)	(3.079)	(1.555)	(1.480)	(1.478)
R&D	-0.296***	-0.297***	-0.300***	-0.396***	-0.397***	-0.397***
	(-8.502)	(-8.553)	(-8.624)	(-15.961)	(-16.022)	(-16.015)
FODOM	0.017***	0.016***	0.016***	-0.030***	-0.031***	-0.031***
	(4.651)	(4.355)	(4.228)	(-11.426)	(-11.714)	(-11.667)
FORINC	0.069	0.071	0.065	0.009	0.011	0.013
	(1.054)	(1.093)	(0.994)	(0.190)	(0.228)	(0.283)
FOSALES	-0.150***	-0.144***	-0.139***	-0.161***	-0.156***	-0.158***
	(-3.213)	(-3.082)	(-2.982)	(-4.829)	(-4.697)	(-4.750)
MARGIN	-0.011**	-0.010**	-0.010**	-0.015***	-0.015***	-0.015***
	(-2.007)	(-1.985)	(-1.970)	(-4.130)	(-4.111)	(-4.115)
PTBI	0.090***	0.082***	0.083***	0.156***	0.150***	0.150***
	(4.958)	(4.546)	(4.563)	(12.096)	(11.657)	(11.645)
Size	-0.003***	-0.003***	-0.003***	-0.004***	-0.004***	-0.004***
	(-3.547)	(-3.310)	(-3.202)	(-6.893)	(-6.650)	(-6.670)
SALEGR	-0.065***	-0.070***	-0.071***	0.001	-0.003	-0.003
	(-8.679)	(-9.283)	(-9.378)	(0.112)	(-0.598)	(-0.551)
NOL	-0.046***	-0.045***	-0.045***	-0.022***	-0.021***	-0.021***
	(-12.424)	(-12.265)	(-12.279)	(-8.26)	(-8.097)	(-8.106)
MTB	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***
	(-2.909)	(-2.934)	(-2.929)	(-3.374)	(-3.400)	(-3.408)
Inst_Own	0.008*	0.008	0.008	0.025***	0.024***	0.024***
	(1.682)	(1.609)	(1.559)	(7.169)	(7.100)	(7.115)
FCF	-0.095***	-0.086***	-0.087***	-0.165***	-0.158***	-0.158***
	(-5.740)	(-5.168)	(-5.238)	(-13.924)	(-13.293)	(-13.26)
Z-score	0.021***	0.020***	0.020***	0.007***	0.007***	0.007***
	(10.835)	(10.768)	(10.409)	(5.398)	(5.325)	(4.962)
Bond Spread		-0.610***	-0.580***		-0.444***	-0.429***
		(-4.587)	(-4.234)		(-4.688)	(-4.391)
Low Risk			-0.010			0.010
			(-0.705)			(1.003)
High Risk			-0.046***			0.004
			(-2.875)			(0.334)
N	9,218	9,218	9,218	9,218	9,218	9,218
Adj. R^2	0.084	0.086	0.086	0.170	0.172	0.172

Notes: *1.* ***, **, * *represent significance level of the 1%, 5%, and 10%, respectively.*

2. (.) represent the value of t-statistics.

3. Low Risk is high Z-score and low level of Bond Spread. High Risk is low Z-score and high level of Bond Spread.

4. Detailed variable definitions refer to Table 2.

Table 6 Regression analysis under CDS

Variable	CashETR			GAAPETR		
	Model 1	**Model 2**	**Model 3**	**Model 1**	**Model 2**	**Model 3**
Intercept	0.291***	0.311***	0.311***	0.337***	0.356***	0.357***
	(39.210)	(33.690)	(33.590)	(63.704)	(53.760)	(53.863)
ADVERT	0.122***	0.107**	0.107**	0.042	0.031	0.029
	(3.174)	(2.262)	(2.254)	(1.555)	(0.897)	(0.861)
R&D	-0.296***	-0.224***	-0.229***	-0.396***	-0.367***	-0.364***
	(-8.502)	(-5.418)	(-5.546)	(-15.961)	(-12.386)	(-12.289)
FODOM	0.017***	0.013***	0.013***	-0.030***	-0.035***	-0.035***
	(4.651)	(2.844)	(2.826)	(-11.426)	(-10.797)	(-10.819)
FORINC	0.069	-0.102	-0.114	0.009	-0.168***	-0.155***
	(1.054)	(-1.287)	(-1.434)	(0.190)	(-2.953)	(-2.713)
FOSALES	-0.150***	0.031	0.037	-0.161***	0.011	0.004
	(-3.213)	(0.570)	(0.682)	(-4.829)	(0.282)	(0.101)
MARGIN	-0.011**	-0.223***	-0.218***	-0.015***	-0.276***	-0.280***
	(-2.007)	(-9.093)	(-8.804)	(-4.130)	(-15.681)	(-15.798)
PTBI	0.090***	0.219***	0.217***	0.156***	0.318***	0.320***
	(4.958)	(8.286)	(8.205)	(12.096)	(16.772)	(16.834)
Size	-0.003***	-0.004***	-0.004***	-0.004***	-0.004***	-0.005***
	(-3.547)	(-4.428)	(-4.366)	(-6.893)	(-6.219)	(-6.358)
SALEGR	-0.065***	-0.082***	-0.082***	0.001	-0.001	-0.001
	(-8.679)	(-8.320)	(-8.330)	(0.112)	(-0.095)	(-0.166)
NOL	-0.046***	-0.042***	-0.042***	-0.022***	-0.020***	-0.020***
	(-12.424)	(-9.065)	(-9.054)	(-8.260)	(-6.057)	(-6.071)
MTB	0.000***	0.000**	0.000**	0.000***	0.000***	0.000**
	(-2.909)	(-2.270)	(-2.262)	(-3.374)	(-2.577)	(-2.556)
Inst_Own	0.008*	0.011*	0.010*	0.025***	0.017***	0.017***
	(1.682)	(1.749)	(1.734)	(7.169)	(3.845)	(3.892)
FCF	-0.095***	-0.120***	-0.121***	-0.165***	-0.226***	-0.225***
	(-5.74)	(-5.733)	(-5.778)	(-13.924)	(-15.014)	(-14.974)
Z-score	0.021***	0.013***	0.012***	0.007***	-0.002	-0.003*
	(10.835)	(5.479)	(4.937)	(5.398)	(-1.011)	(-1.661)
CDS		0.000***	0.000**		0.000	0.000
		(-2.666)	(-2.085)		(0.797)	(0.948)
Low Risk			0.004			0.021**
			(0.315)			(2.442)
High Risk			-0.027**			0.012
			(-2.164)			(1.374)
N	9,218	9,218	9,218	9,218	9,218	9,218
Adj. R^2	0.084	0.094	0.094	0.170	0.207	0.207

Notes: *1.* ***, **, * *represent significance level of the 1%, 5%, and 10%, respectively.*

2. Low Risk is high Z-score and low level of CDS. High Risk is low Z-score and high level of CDS.

3. Detailed variable definitions refer to Table 2.

Table 7 Regression analysis under Tightening

Variable	CashETR			GAAPETR		
	Model 1	**Model 2**	**Model 3**	**Model 1**	**Model 2**	**Model 3**
Intercept	0.291***	0.288***	0.289***	0.337***	0.336***	0.337***
	(39.210)	(38.837)	(38.907)	(63.704)	(63.501)	(63.500)
ADVERT	0.122***	0.124***	0.123***	0.042	0.043	0.042
	(3.174)	(3.242)	(3.203)	(1.555)	(1.566)	(1.551)
R&D	-0.296***	-0.295***	-0.299***	-0.396***	-0.396***	-0.396***
	(-8.502)	(-8.509)	(-8.602)	(-15.961)	(-15.96)	(-15.978)
FODOM	0.017***	0.017***	0.017***	-0.030***	-0.030***	-0.030***
	(4.651)	(4.751)	(4.711)	(-11.426)	(-11.407)	(-11.417)
FORINC	0.069	0.058	0.051	0.009	0.007	0.006
	(1.054)	(0.893)	(0.782)	(0.190)	(0.160)	(0.130)
FOSALES	-0.150***	-0.143***	-0.141***	-0.161***	-0.160***	-0.160***
	(-3.213)	(-3.071)	(-3.017)	(-4.829)	(-4.800)	(-4.785)
MARGIN	-0.011**	-0.010**	-0.010*	-0.015***	-0.015***	-0.015***
	(-2.007)	(-1.970)	(-1.945)	(-4.130)	(-4.123)	(-4.115)
PTBI	0.090***	0.088***	0.090***	0.156***	0.156***	0.156***
	(4.958)	(4.877)	(4.969)	(12.096)	(12.078)	(12.100)
Size	-0.003***	-0.003***	-0.003***	-0.004***	-0.004***	-0.004***
	(-3.547)	(-3.353)	(-3.223)	(-6.893)	(-6.852)	(-6.810)
SALEGR	-0.065***	-0.064***	-0.063***	0.001	0.001	0.001
	(-8.679)	(-8.531)	(-8.441)	(0.112)	(0.141)	(0.166)
NOL	-0.046***	-0.046***	-0.045***	-0.022***	-0.022***	-0.022***
	(-12.424)	(-12.301)	(-12.281)	(-8.26)	(-8.232)	(-8.22)
MTB	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***
	(-2.909)	(-2.796)	(-2.775)	(-3.374)	(-3.352)	(-3.346)
Inst_Own	0.008*	0.006	0.006	0.025***	0.024***	0.024***
	(1.682)	(1.259)	(1.142)	(7.169)	(7.069)	(7.031)
FCF	-0.095***	-0.094***	-0.096***	-0.165***	-0.164***	-0.165***
	(-5.74)	(-5.651)	(-5.817)	(-13.924)	(-13.904)	(-13.935)
Z-score	0.021***	0.021***	0.020***	0.007***	0.007***	0.007***
	(10.835)	(10.810)	(10.484)	(5.398)	(5.391)	(5.290)
Tightening		0.029***	0.034***		0.004	0.005
		(5.186)	(5.946)		(0.948)	(1.175)
Low Risk			0.012			0.019
			(0.090)			(0.197)
High Risk			-0.063***			-0.013
			(-3.608)			(-0.996)
N	9,218	9,218	9,218	9,218	9,218	9,218
Adj. R^2	0.084	0.086	0.087	0.170	0.170	0.170

Notes: *1.* ***, **, * *represent significance level of the 1%, 5%, and 10%, respectively.*

2. Low Risk is high Z-score and low level of Tightening. High Risk is low Z-score and high level of Tightening.

3. Detailed variable definitions refer to Table 2.

Table 8 Regression analysis under VIX

Variable	CashETR			GAAPETR		
	Model 1	**Model 2**	**Model 3**	**Model 1**	**Model 2**	**Model 3**
Intercept	0.291***	0.284***	0.282***	0.337***	0.338***	0.338***
	(39.210)	(34.459)	(34.221)	(63.704)	(57.589)	(57.421)
ADVERT	0.122***	0.123***	0.122***	0.042	0.042	0.042
	(3.174)	(3.218)	(3.191)	(1.555)	(1.544)	(1.525)
R&D	-0.296***	-0.295***	-0.299***	-0.396***	-0.396***	-0.397***
	(-8.502)	(-8.493)	(-8.601)	(-15.961)	(-15.962)	(-16.006)
FODOM	0.017***	0.017***	0.017***	-0.030***	-0.030***	-0.030***
	(4.651)	(4.687)	(4.653)	(-11.426)	(-11.433)	(-11.423)
FORINC	0.069	0.065	0.056	0.009	0.010	0.011
	(1.054)	(0.995)	(0.856)	(0.190)	(0.204)	(0.240)
FOSALES	-0.150***	-0.149***	-0.144***	-0.161***	-0.161***	-0.163***
	(-3.213)	(-3.185)	(-3.082)	(-4.829)	(-4.835)	(-4.877)
MARGIN	-0.011**	-0.011**	-0.010*	-0.015***	-0.015***	-0.015***
	(-2.007)	(-2.003)	(-1.954)	(-4.130)	(-4.131)	(-4.117)
PTBI	0.090***	0.090***	0.090***	0.156***	0.156***	0.155***
	(4.958)	(4.960)	(4.998)	(12.096)	(12.095)	(12.053)
Size	-0.003***	-0.003***	-0.003***	-0.004***	-0.004***	-0.004***
	(-3.547)	(-3.472)	(-3.361)	(-6.893)	(-6.905)	(-6.863)
SALEGR	-0.065***	-0.065***	-0.064***	0.001	0.001	0.001
	(-8.679)	(-8.614)	(-8.541)	(0.112)	(0.097)	(0.138)
NOL	-0.046***	-0.046***	-0.046***	-0.022***	-0.022***	-0.022***
	(-12.424)	(-12.399)	(-12.375)	(-8.260)	(-8.265)	(-8.264)
MTB	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***
	(-2.909)	(-2.857)	(-2.841)	(-3.374)	(-3.385)	(-3.391)
Inst_Own	0.008*	0.007	0.007	0.025***	0.025***	0.025***
	(1.682)	(1.463)	(1.355)	(7.169)	(7.179)	(7.134)
FCF	-0.095***	-0.095***	-0.097***	-0.165***	-0.165***	-0.164***
	(-5.740)	(-5.745)	(-5.833)	(-13.924)	(-13.923)	(-13.853)
Z-score	0.021***	0.021***	0.020***	0.007***	0.007***	0.007***
	(10.835)	(10.827)	(10.124)	(5.398)	(5.400)	(4.708)
VIX		0.000**	0.001***		0.000	0.000
		(2.001)	(2.619)		(-0.473)	(-0.046)
Low Risk			0.006			0.019*
			(0.465)			(1.933)
High Risk			-0.040***			-0.009
			(-2.908)			(-0.924)
N	9,218	9,218	9,218	9,218	9,218	9,218
Adj. R^2	0.084	0.084	0.085	0.170	0.170	0.170

Notes: *1.* ***, **, * *represent significance level of the 1%, 5%, and 10%, respectively.*

2. Low Risk is high Z-score and low level of VIX. High Risk is low Z-score and high level of VIX.

3. Detailed variable definitions refer to Table 2.

Table 9 Descriptive statistics for a proxy Z-score

Panel A: A proxy Z-score

Variable	N	Mean	Std.	P10	Q1	Median	Q3	P90	Min.	Max.
Z-score	9,218	1.208	0.845	0.433	0.670	1.005	1.509	2.201	0.051	13.184
Z"-score	9,218	41.764	149.300	7.970	13.026	22.664	41.882	78.528	0.075	12378.179
Z-score_m1	9,218	10.228	39.743	1.584	2.719	5.091	10.073	19.731	0.143	3299.207
Z-score_m2	9,218	9.814	38.189	1.513	2.602	4.877	9.661	18.926	0.149	3170.227
Z-score_m3	9,218	10.154	39.712	1.549	2.677	5.027	9.973	19.603	0.149	3297.188
Z-score_m4	9,218	12.490	36.596	2.148	4.371	7.763	13.690	23.545	0.001	2995.853
Z-score_m5	9,218	10.016	38.988	1.541	2.653	4.975	9.863	19.318	0.154	3236.586
Z-score_m6	9,218	9.680	37.612	1.495	2.572	4.820	9.533	18.661	0.139	3122.274
Z-score_m7	9,218	9.789	38.100	1.508	2.595	4.866	9.636	18.875	0.148	3162.843
Z-score_m8	9,218	12.808	37.981	2.208	4.444	7.907	13.978	24.170	0.017	3111.741

Panel B: The natural logarithm of a proxy Z-score

Variable	N	Mean	Std.	P10	Q1	Median	Q3	P90	Min.	Max.
lnZ"-score	9,218	3.182	0.940	2.076	2.567	3.121	3.735	4.363	-2.596	9.424
lnZ-score_m1	9,218	1.691	1.010	0.460	1.000	1.627	2.310	2.982	-1.942	8.101
lnZ-score_m2	9,218	1.649	1.010	0.414	0.956	1.584	2.268	2.941	-1.904	8.062
lnZ-score_m3	9,218	1.677	1.016	0.438	0.985	1.615	2.300	2.976	-1.906	8.101
lnZ-score_m4	9,218	2.001	1.025	0.764	1.475	2.049	2.617	3.159	-6.986	8.005
lnZ-score_m5	9,218	1.668	1.011	0.432	0.976	1.604	2.289	2.961	-1.872	8.082
lnZ-score_m6	9,218	1.636	1.010	0.402	0.945	1.573	2.255	2.926	-1.976	8.046
lnZ-score_m7	9,218	1.646	1.011	0.411	0.953	1.582	2.266	2.938	-1.909	8.059
lnZ-score_m8	9,218	2.025	1.016	0.792	1.492	2.068	2.637	3.185	-4.096	8.043

Notes: *1. Z"-score, Z-score_m1, Z-score_m2, Z-score_m3, Z-score_m4, Z-score_m5, Z-score_m6, Z-score_m7, and Z-score_m8 are measured following by* Altman *et al*. (2017)*. lnZ"-score, lnZ-score_m1, lnZ-score_m2, lnZ-score_m3, lnZ-score_m4, lnZ-score_m5, lnZ-score_m6, lnZ-score_m7, lnZ-score_m8 is the natural logarithm of value*.

2. Detailed variable definitions refer to Table 2.

Table 10 Difference in Z-score by overall sample

Variable	Z-score Group (C1= high risk, C10=low risk)																			
	C1		C2		C3		C4		C5		C6		C7		C8		C9		C10	
	Me.	Md.	Me.	Md.	Me.	Md.	Me.	Md.	Me.	Md.	Me.	Md.	Me.	Md.	Me.	Md.	Me.	Md.	Me.	Md.
Z''-score	18.12	10.98	32.54	20.59	40.39	24.80	45.02	23.49	48.94	25.73	41.24	25.06	48.01	23.02	44.67	25.34	41.98(-10.24)***	25.86(-19.99)***	56.78(-2.79)***	22.51(-18.16)***
Z-score_m1	4.45	2.53	8.11	4.95	10.06	5.84	11.18	5.49	12.12	5.91	10.08	5.59	11.82	5.14	10.81	5.70	9.98(-8.99)***	5.74(-16.55)***	13.7(-2.51)**	4.56(-12.09)***
Z-score_m2	4.28	2.43	7.78	4.75	9.65	5.60	10.73	5.29	11.62	5.66	9.67	5.34	11.34	4.92	10.37	5.45	9.57(-8.96)***	5.49(-16.41)***	13.15(-2.50)**	4.36(-11.89)***
Z-score_m3	4.43	2.51	8.06	4.92	9.99	5.80	11.10	5.47	12.03	5.83	9.99	5.54	11.73	5.08	10.72	5.58	9.89(-8.89)***	5.64(-16.17)***	13.61(-2.49)**	4.47(-11.55)***
Z-score_m4	5.02	2.75	9.66	6.39	12.16	8.12	13.60	8.04	14.53	8.65	12.73	8.73	14.38	8.28	13.88	8.96	12.84(-12.93)***	8.81(-23.00)***	16.16(-3.32)***	8.11(-21.20)***
Z-score_m5	4.36	2.47	7.94	4.85	9.85	5.71	10.95	5.39	11.86	5.76	9.86	5.45	11.57	5.01	10.58	5.56	9.77(-8.96)***	5.61(-16.43)***	13.42(-2.50)**	4.45(-11.91)***
Z-score_m6	4.22	2.41	7.68	4.71	9.52	5.53	10.58	5.20	11.47	5.59	9.53	5.28	11.18	4.86	10.23	5.38	9.45(-8.97)***	5.42(-16.42)***	12.96(-2.50)**	4.31(-11.88)***
Z-score_m7	4.27	2.42	7.76	4.74	9.63	5.59	10.70	5.27	11.59	5.64	9.64	5.32	11.31	4.90	10.34	5.43	9.55(-8.95)***	5.47(-16.40)***	13.12(-2.50)**	4.35(-11.87)***
Z-score_m8	5.16	2.83	9.92	6.51	12.47	8.34	13.95	8.17	14.91	8.82	13.03	8.91	14.75	8.37	14.20	9.07	13.14(-12.77)***	8.98(-22.89)***	16.59(-3.29)***	8.24(-21.02)***
ADVERT	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.02	0.00	0.02	0.00	0.02(-13.31)***	0.00(-15.87)***	0.03(-11.35)***	0.00(-14.62)***
R&D	0.08	0.06	0.11	0.09	0.12	0.10	0.13	0.11	0.13	0.11	0.13	0.12	0.14	0.11	0.15	0.13	0.16(-12.96)***	0.13(-19.83)***	0.17(-9.51)***	0.12(-18.27)***
FODOM	0.01	0.00	0.03	0.00	0.04	0.02	0.04	0.02	0.03	0.02	0.03	0.01	0.02	0.00	0.02	0.00	0.01(0.28)	0.00(-2.90)***	0.01(4.06)***	0.00(-4.29)***
FORINC	0.16	0.00	0.33	0.08	0.34	0.15	0.35	0.18	0.35	0.17	0.30	0.12	0.26	0.04	0.22	0.01	0.16(0.22)	0.00(-3.24)***	0.11(3.92)***	0.00(-2.66)***
FOSALES	0.02	0.00	0.03	0.01	0.04	0.02	0.04	0.02	0.04	0.02	0.04	0.02	0.03	0.01	0.03	0.00	0.02(-1.56)	0.00(-4.77)***	0.01(3.12)***	0.00(-2.04)**
MARGIN	0.04	0.00	0.06	0.02	0.06	0.03	0.06	0.03	0.05	0.02	0.04	0.02	0.03	0.01	0.02	0.00	0.01(10.12)***	0.00(-0.40)	0.00(12.55)***	0.00(-5.54)***
PTBI	0.81	1.00	0.85	1.00	0.87	1.00	0.84	1.00	0.80	1.00	0.76	1.00	0.75	1.00	0.68	1.00	0.66(7.61)***	1.00(-7.51)***	0.64(8.65)***	1.00(-8.47)***
Size	0.11	0.07	0.11	0.08	0.09	0.07	0.09	0.08	0.09	0.07	0.10	0.07	0.09	0.06	0.09	0.07	0.09(1.70)*	0.07(-1.30)	0.09(2.36)**	0.07(-0.49)
SALEGR	8.28	8.27	8.00	7.97	7.71	7.78	7.47	7.46	7.28	7.31	6.95	7.02	6.63	6.62	6.52	6.50	6.58(19.58)***	6.65(-18.26)***	6.48(20.32)***	6.56(-18.77)***
NOL	0.60	0.64	0.68	0.72	0.66	0.73	0.67	0.75	0.66	0.72	0.65	0.71	0.64	0.68	0.64	0.66	0.66(-4.25)***	0.69(-4.20)***	0.62(-1.51)	0.70(-2.33)**
MTB	0.20	0.13	0.14	0.11	0.12	0.10	0.11	0.09	0.10	0.08	0.08	0.07	0.07	0.06	0.07	0.05	0.05(5.16)***	0.04(-27.85)***	0.04(5.54)***	0.03(-31.81)***
Inst_Own	2.59	1.94	3.08	2.39	3.18	2.63	3.60	2.54	3.57	2.65	5.26	2.46	5.35	2.36	4.21	2.31	3.65(-4.09)***	2.40(-7.87)***	5.36(-3.55)***	2.32(-6.63)***
FCF	0.01	0.02	0.07	0.07	0.08	0.08	0.09	0.08	0.08	0.08	0.09	0.08	0.08	0.08	0.09	0.08	0.09(-13.17)***	0.08(-16.84)***	0.10(-9.84)***	0.07(-14.82)***

Notes: *1.* ***, **, * *represent significance level of the 1%, 5%, and 10%, respectively.*

2. Detailed variable definitions refer to Table 2 and Table 9.

Table 11 Log-linear regression analysis for CashETR

Variable	lnCashETR									
	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**	**Model 7**	**Model 8**	**Model 9**	**Model 10**
Intercept	-1.649***	-1.996***	-1.649***	-1.638***	-1.633***	-1.895***	-1.641***	-1.639***	-1.638***	-1.902***
	(-36.400)	(-31.868)	(-33.986)	(-33.984)	(-33.840)	(-36.020)	(-33.926)	(-34.081)	(-33.989)	(-35.934)
ADVERT	0.558**	0.734***	0.776***	0.778***	0.781***	0.768***	0.779***	0.777***	0.779***	0.766***
	(2.321)	(3.069)	(3.235)	(3.244)	(3.255)	(3.226)	(3.245)	(3.239)	(3.244)	(3.217)
FODOM	-1.861***	-3.047***	-2.939***	-2.929***	-2.916***	-3.188***	-2.929***	-2.933***	-2.928***	-3.194***
	(-8.434)	(-13.563)	(-12.983)	(-12.936)	(-12.875)	(-14.217)	(-12.935)	(-12.957)	(-12.933)	(-14.236)
FORINC	0.096***	0.126***	0.123***	0.123***	0.123***	0.104***	0.123***	0.123***	0.123***	0.105***
	(4.213)	(5.496)	(5.327)	(5.321)	(5.314)	(4.561)	(5.317)	(5.333)	(5.322)	(4.601)
FOSALES	1.321***	2.168***	2.274***	2.277***	2.282***	1.973***	2.277***	2.276***	2.277***	1.982***
	(3.243)	(5.414)	(5.661)	(5.667)	(5.679)	(4.939)	(5.667)	(5.665)	(5.668)	(4.960)
MARGIN	-1.187***	-2.406***	-2.406***	-2.403***	-2.399***	-2.331***	-2.403***	-2.405***	-2.403***	-2.339***
	(-4.057)	(-8.435)	(-8.389)	(-8.376)	(-8.360)	(-8.216)	(-8.375)	(-8.385)	(-8.376)	(-8.244)
MTB	-0.015	-0.095***	-0.092***	-0.091***	-0.091***	-0.081**	-0.091***	-0.092***	-0.091***	-0.082***
	(-0.473)	(-2.964)	(-2.836)	(-2.829)	(-2.816)	(-2.546)	(-2.826)	(-2.838)	(-2.829)	(-2.577)
R&D	0.009*	0.020***	0.014**	0.014**	0.013**	0.032***	0.014**	0.014**	0.014**	0.032***
	(1.645)	(3.547)	(2.530)	(2.462)	(2.360)	(5.578)	(2.467)	(2.48)	(2.456)	(5.568)
SALEGR	-0.348***	-0.349***	-0.351***	-0.351***	-0.351***	-0.343***	-0.351***	-0.351***	-0.351***	-0.343***
	(-7.530)	(-7.553)	(-7.567)	(-7.570)	(-7.570)	(-7.452)	(-7.569)	(-7.568)	(-7.570)	(-7.458)
Size	-0.293***	-0.267***	-0.280***	-0.281***	-0.282***	-0.276***	-0.281***	-0.280***	-0.281***	-0.275***
	(-12.716)	(-11.495)	(-12.033)	(-12.062)	(-12.096)	(-11.968)	(-12.067)	(-12.042)	(-12.063)	(-11.937)
Inst_Own	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(-0.898)	(-0.852)	(-0.928)	(-0.933)	(-0.937)	(-0.670)	(-0.933)	(-0.931)	(-0.933)	(-0.670)
NOL	0.020	0.013	0.019	0.020	0.020	0.002	0.020	0.020	0.020	0.002
	(0.660)	(0.413)	(0.640)	(0.652)	(0.667)	(0.059)	(0.653)	(0.644)	(0.652)	(0.070)
FCF	0.761***	0.426***	0.522***	0.527***	0.536***	0.400***	0.528***	0.525***	0.528***	0.396***
	(7.664)	(4.062)	(4.954)	(5.007)	(5.087)	(3.867)	(5.010)	(4.980)	(5.011)	(3.819)
Z-score	0.158***									
	(13.105)									
lnZ"-score		0.162***								
		(13.204)								
lnZ-score_m1			0.120***							
			(10.489)							
lnZ-score_m2				0.118***						
				(10.312)						
lnZ-score_m3					0.115***					
					(10.099)					
lnZ-score_m4						0.175***				
						(15.432)				
lnZ-score_m5							0.118***			
							(10.299)			
lnZ-score_m6								0.119***		
								(10.41)		
lnZ-score_m7									0.118***	
									(10.304)	
lnZ-score_m8										0.176***
										(15.419)
N	9,218	9,218	9,218	9,218	9,218	9,218	9,218	9,218	9,218	9,218
Adj. R^2	0.078	0.078	0.072	0.071	0.071	0.084	0.071	0.071	0.071	0.084

Notes: *1.* ***, ** *represent significance level of the 1% and 5%, respectively.*

2. lnCashETR is the natural logarithm of CashETR.

3. Detailed variable definitions refer to Table 2 and Table 9.

Table 12 Log-linear regression analysis for GAAPETR

Variable	lnGAAPETR									
	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**	**Model 7**	**Model 8**	**Model 9**	**Model 10**
Intercept	-1.160***	-1.184***	-1.111***	-1.109***	-1.108***	-1.094***	-1.109***	-1.111***	-1.109***	-1.094***
	(-40.642)	(-30.090)	(-36.350)	(-36.541)	(-36.488)	(-32.900)	(-36.413)	(-36.686)	(-36.565)	(-32.652)
ADVERT	0.163	0.242	0.255*	0.255*	0.255*	0.267*	0.255*	0.254*	0.255*	0.267*
	(1.073)	(1.600)	(1.680)	(1.682)	(1.685)	(1.762)	(1.685)	(1.676)	(1.682)	(1.761)
FODOM	-2.102***	-2.375***	-2.336***	-2.335***	-2.333***	-2.289***	-2.333***	-2.339***	-2.335***	-2.289***
	(-15.107)	(-16.761)	(-16.386)	(-16.376)	(-16.366)	(-16.098)	(-16.364)	(-16.408)	(-16.378)	(-16.09)
FORINC	-0.218***	-0.212***	-0.213***	-0.213***	-0.213***	-0.216***	-0.213***	-0.213***	-0.213***	-0.216***
	(-15.043)	(-14.557)	(-14.633)	(-14.632)	(-14.63)	(-14.903)	(-14.637)	(-14.621)	(-14.631)	(-14.899)
FOSALES	1.147***	1.431***	1.451***	1.452***	1.453***	1.439***	1.452***	1.452***	1.452***	1.440***
	(4.448)	(5.633)	(5.713)	(5.715)	(5.718)	(5.656)	(5.715)	(5.714)	(5.715)	(5.658)
MARGIN	-1.175***	-1.517***	-1.506***	-1.505***	-1.505***	-1.472***	-1.505***	-1.507***	-1.506***	-1.472***
	(-6.345)	(-8.386)	(-8.305)	(-8.303)	(-8.299)	(-8.147)	(-8.298)	(-8.314)	(-8.303)	(-8.149)
MTB	-0.012	-0.033	-0.031	-0.031	-0.031	-0.028	-0.031	-0.032	-0.031	-0.028
	(-0.590)	(-1.636)	(-1.554)	(-1.552)	(-1.550)	(-1.400)	(-1.548)	(-1.562)	(-1.553)	(-1.402)
R&D	-0.013***	-0.013***	-0.015***	-0.015***	-0.015***	-0.016***	-0.015***	-0.015***	-0.015***	-0.016***
	(-3.963)	(-3.756)	(-4.235)	(-4.251)	(-4.277)	(-4.335)	(-4.262)	(-4.220)	(-4.250)	(-4.330)
SALEGR	0.048	0.049*	0.049*	0.049*	0.049*	0.050*	0.049*	0.049*	0.049*	0.050*
	(1.629)	(1.665)	(1.663)	(1.662)	(1.661)	(1.719)	(1.663)	(1.66)	(1.662)	(1.718)
Size	-0.119***	-0.117***	-0.121***	-0.121***	-0.121***	-0.124***	-0.121***	-0.121***	-0.121***	-0.124***
	(-8.155)	(-7.953)	(-8.224)	(-8.231)	(-8.239)	(-8.488)	(-8.239)	(-8.212)	(-8.23)	(-8.483)
Inst_Own	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(-0.276)	(-0.253)	(-0.273)	(-0.275)	(-0.276)	(-0.242)	(-0.274)	(-0.275)	(-0.275)	(-0.242)
NOL	0.146***	0.147***	0.149***	0.149***	0.149***	0.150***	0.149***	0.149***	0.149***	0.150***
	(7.620)	(7.651)	(7.767)	(7.770)	(7.774)	(7.812)	(7.773)	(7.762)	(7.770)	(7.813)
FCF	-0.122*	-0.165**	-0.134**	-0.134**	-0.132**	-0.104	-0.133**	-0.136**	-0.134**	-0.104
	(-1.937)	(-2.472)	(-2.006)	(-1.994)	(-1.979)	(-1.567)	(-1.979)	(-2.032)	(-1.996)	(-1.57)
Z-score	0.050***									
	(6.522)									
lnZ"-score		0.030***								
		(3.832)								
lnZ-score_m1			0.018**							
			(2.446)							
lnZ-score_m2				0.017**						
				(2.409)						
lnZ-score_m3					0.017**					
					(2.368)					
lnZ-score_m4						0.009				
						(1.217)				
lnZ-score_m5							0.017**			
							(2.363)			
lnZ-score_m6								0.018**		
								(2.524)		
lnZ-score_m7									0.017**	
									(2.415)	
lnZ-score_m8										0.009
										(1.217)
N	9,218	9,218	9,218	9,218	9,218	9,218	9,218	9,218	9,218	9,218
Adj. R^2	0.127	0.125	0.124	0.124	0.124	0.123	0.124	0.124	0.124	0.123

Notes: *1.* ***, **, * *represent significance level of the 1%, 5%, and 10%, respectively.*

2. lnGAAPETR is the natural logarithm of GAAPETR.

3. Detailed variable definitions refer to Table 2 and Table 9.

Table 13 Difference in Z-score by overall sample

Variable	Z-score Group (C1= high risk, C10=low risk)																			
	C1		C2		C3		C4		C5		C6		C7		C8		C9		C10	
	Me.	Md.	Me.	Md.	Me.	Md.	Me.	Md.	Me.	Md.	Me.	Md.	Me.	Md.	Me.	Md.	Me.	Md.	Me.	Md.
BTD	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.03	0.02	0.03	0.02	0.03(2.01)**	0.02(-6.23)***	0.04(-0.48)	0.02(-7.34)***
PBTD	0.02	0.01	0.03	0.02	0.03	0.02	0.03	0.02	0.02	0.02	0.03	0.02	0.02	0.02	0.02	0.01	0.02(-0.78)	0.01(-7.83)***	0.04(-1.87)*	0.01(-3.99)***
TS	0.04	0.04	0.06	0.05	0.04	0.04	0.05	0.04	0.04	0.04	0.04	0.04	0.05	0.04	0.02	0.04	0.03(0.86)	0.03(-2.34)**	0.04(0.5)	0.03(-3.48)***
ADVERT	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.02	0.00	0.02	0.00	0.02(-13.31)***	0.00(-15.87)***	0.03(-11.35)***	0.00(-14.62)***
R&D	0.01	0.00	0.03	0.00	0.04	0.02	0.04	0.02	0.03	0.02	0.03	0.01	0.02	0.00	0.02	0.00	0.01(0.28)	0.00(-2.90)***	0.01(4.06)***	0.00(-4.29)***
FODOM	0.16	0.00	0.33	0.08	0.34	0.15	0.35	0.18	0.35	0.17	0.30	0.12	0.26	0.04	0.22	0.01	0.16(0.22)	0.00(-3.24)***	0.11(3.92)***	0.00(-2.66)***
FORINC	0.02	0.00	0.03	0.01	0.04	0.02	0.04	0.02	0.04	0.02	0.04	0.02	0.03	0.01	0.03	0.00	0.02(-1.56)	0.00(-4.77)***	0.01(3.12)***	0.00(-2.04)**
FOSALES	0.04	0.00	0.06	0.02	0.06	0.03	0.06	0.03	0.05	0.02	0.04	0.02	0.03	0.01	0.02	0.00	0.01(10.12)***	0.00(-0.40)	0.00(12.55)***	0.00(-5.54)***
MARGIN	0.20	0.13	0.14	0.11	0.12	0.10	0.11	0.09	0.10	0.08	0.08	0.07	0.07	0.06	0.07	0.05	0.05(5.16)***	0.04(-27.85)***	0.04(5.54)***	0.03(-31.81)***
PTBI	0.08	0.06	0.11	0.09	0.12	0.10	0.13	0.11	0.13	0.11	0.13	0.12	0.14	0.11	0.15	0.13	0.16(-12.96)***	0.13(-19.83)***	0.17(-9.51)***	0.12(-18.27)***
Size	8.28	8.27	8.00	7.97	7.71	7.78	7.47	7.46	7.28	7.31	6.95	7.02	6.63	6.62	6.52	6.50	6.58(19.58)***	6.65(-18.26)***	6.48(20.32)***	6.56(-18.77)***
SALEGR	0.11	0.07	0.11	0.08	0.09	0.07	0.09	0.08	0.09	0.07	0.10	0.07	0.09	0.06	0.09	0.07	0.09(1.70)*	0.07(-1.30)	0.09(2.36)**	0.07(-0.49)
NOL	0.81	1.00	0.85	1.00	0.87	1.00	0.84	1.00	0.80	1.00	0.76	1.00	0.75	1.00	0.68	1.00	0.66(7.61)***	1.00(-7.51)***	0.64(8.65)***	1.00(-8.47)***
MTB	2.59	1.94	3.08	2.39	3.18	2.63	3.60	2.54	3.57	2.65	5.26	2.46	5.35	2.36	4.21	2.31	3.65(-4.09)***	2.40(-7.87)***	5.36(-3.55)***	2.32(-6.63)***
Inst_Own	0.60	0.64	0.68	0.72	0.66	0.73	0.67	0.75	0.66	0.72	0.65	0.71	0.64	0.68	0.64	0.66	0.66(-4.25)***	0.69(-4.20)***	0.62(-1.51)	0.70(-2.33)**
FCF	0.01	0.02	0.07	0.07	0.08	0.08	0.09	0.08	0.08	0.08	0.09	0.08	0.08	0.08	0.09	0.08	0.09(-13.17)***	0.08(-16.84)***	0.10(-9.84)***	0.07(-14.82)***

Notes: *1.* ***, **, * *represent significance level of the 1%, 5%, and 10%, respectively.*

2. BTD is pretax income minus (federal income taxes minus foreign income taxes) divided by statutory maximum firm tax rate, all divided by lagged total assets based on Rego and Wilson (2012). PBTD is BTD minus total deferred tax expense divided by statutory maximum firm tax rate divided by lagged total assets based on Wilson (2009). *TS is the residual of regression as* $BTD_{i,t} = \beta_1 TA_{i,t} + \mu_i + \varepsilon_{i,t}$ *which is proposed by Desai and Dharmapala (2008).*

3. Detailed variable definitions refer to Table 2.

Table 14 Regression analysis by using BTD as dependent variable

Variable	BTD							
	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**	**Model 7**	**Model 8**
Intercept	-0.038***	-0.043***	-0.059***	-0.059***	-0.038***	-0.038***	-0.038***	-0.045***
	(-8.811)	(-9.704)	(-11.572)	(-11.337)	(-8.811)	(-8.868)	(-8.811)	(-9.528)
ADVERT	-0.156***	-0.154***	-0.138***	-0.138***	-0.156***	-0.155***	-0.156***	-0.154***
	(-7.530)	(-7.451)	(-5.447)	(-5.443)	(-7.530)	(-7.511)	(-7.530)	(-7.432)
FODOM	-0.048**	-0.047**	-0.056**	-0.056**	-0.048**	-0.048**	-0.048**	-0.048**
	(-2.424)	(-2.382)	(-2.410)	(-2.405)	(-2.424)	(-2.423)	(-2.424)	(-2.411)
FORINC	0.017***	0.017***	0.023***	0.023***	0.017***	0.017***	0.017***	0.017***
	(8.337)	(8.604)	(9.142)	(9.100)	(8.337)	(8.362)	(8.337)	(8.416)
FOSALES	-0.419***	-0.420***	-0.253***	-0.253***	-0.419***	-0.420***	-0.419***	-0.423***
	(-11.094)	(-11.14)	(-5.476)	(-5.475)	(-11.094)	(-11.127)	(-11.094)	(-11.205)
MARGIN	0.120***	0.117***	-0.060*	-0.060*	0.120***	0.121***	0.120***	0.121***
	(4.351)	(4.237)	(-1.809)	(-1.806)	(4.351)	(4.377)	(4.351)	(4.380)
MTB	-0.035***	-0.035***	0.178***	0.178***	-0.035***	-0.035***	-0.035***	-0.035***
	(-11.981)	(-12.009)	(10.613)	(10.565)	(-11.981)	(-11.974)	(-11.981)	(-11.987)
R&D	0.514***	0.518***	0.443***	0.443***	0.514***	0.514***	0.514***	0.515***
	(50.372)	(50.617)	(28.408)	(28.407)	(50.372)	(50.368)	(50.372)	(50.455)
SALEGR	0.002***	0.001***	0.001**	0.001**	0.002***	0.002***	0.002***	0.002***
	(3.014)	(2.798)	(2.448)	(2.456)	(3.014)	(3.077)	(3.014)	(3.239)
Size	-0.024***	-0.021***	-0.022***	-0.022***	-0.024***	-0.024***	-0.024***	-0.023***
	(-5.389)	(-4.679)	(-3.888)	(-3.893)	(-5.389)	(-5.349)	(-5.389)	(-5.275)
PTBI	0.023***	0.023***	0.023***	0.023***	0.023***	0.023***	0.023***	0.024***
	(11.173)	(10.978)	(8.919)	(8.911)	(11.173)	(11.211)	(11.173)	(11.263)
Inst_Own	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***
	(13.496)	(13.592)	(11.344)	(11.341)	(13.496)	(13.524)	(13.496)	(13.613)
NOL	-0.030***	-0.030***	-0.024***	-0.024***	-0.030***	-0.031***	-0.030***	-0.032***
	(-8.658)	(-8.573)	(-5.695)	(-5.687)	(-8.658)	(-8.736)	(-8.658)	(-9.084)
FCF	0.145***	0.140***	0.165***	0.165***	0.145***	0.145***	0.145***	0.145***
	(15.414)	(14.793)	(13.976)	(13.973)	(15.414)	(15.415)	(15.414)	(15.345)
Z-score	-0.008***	-0.008***						
	(-7.574)	(-7.533)						
Bond Spread		0.332***						
		(4.334)						
Z-score			-0.001	-0.001				
			(-0.998)	(-1.005)				
CDS				0.000				
				(0.241)				
Z-score					-0.008***	-0.008***		
					(-7.574)	(-7.593)		
Tightening						0.004		
						(1.201)		
Z-score							-0.008***	-0.008***
							(-7.574)	(-7.641)
VIX								0.000***
								(3.647)
N	9,218	9,218	9,218	9,218	9,218	9,218	9,218	9,218
Adj. R^2	0.595	0.596	0.595	0.595	0.637	0.637	0.595	0.596

Notes: *1.* ***, **, * *represent significance level of the 1%, 5%, and 10%, respectively.*

2. Detailed variable definitions refer to Table 2.

Table 15 Regression analysis by using PBTD as dependent variable

Variable	PBTD							
	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**	**Model 7**	**Model 8**
Intercept	-0.050***	-0.051***	-0.071***	-0.071***	-0.050***	-0.050***	-0.050***	-0.053***
	(-12.856)	(-12.502)	(-14.993)	(-14.567)	(-12.856)	(-12.884)	(-12.856)	(-12.274)
ADVERT	-0.098***	-0.098***	-0.095***	-0.095***	-0.098***	-0.098***	-0.098***	-0.097***
	(-5.193)	(-5.178)	(-4.018)	(-4.021)	(-5.193)	(-5.18)	(-5.193)	(-5.149)
FODOM	0.030*	0.030*	0.006	0.006	0.030*	0.030*	0.030*	0.030*
	(1.685)	(1.692)	(0.292)	(0.288)	(1.685)	(1.685)	(1.685)	(1.691)
FORINC	0.024***	0.025***	0.032***	0.032***	0.024***	0.024***	0.024***	0.025***
	(13.267)	(13.286)	(13.884)	(13.863)	(13.267)	(13.282)	(13.267)	(13.297)
FOSALES	-0.335***	-0.335***	-0.227***	-0.227***	-0.335***	-0.336***	-0.335***	-0.337***
	(-9.752)	(-9.757)	(-5.276)	(-5.276)	(-9.752)	(-9.774)	(-9.752)	(-9.796)
MARGIN	0.087***	0.087***	-0.044	-0.044	0.087***	0.088***	0.087***	0.088***
	(3.467)	(3.446)	(-1.410)	(-1.412)	(3.467)	(3.486)	(3.467)	(3.479)
MTB	-0.012***	-0.012***	0.179***	0.179***	-0.012***	-0.012***	-0.012***	-0.012***
	(-4.353)	(-4.355)	(11.473)	(11.457)	(-4.353)	(-4.348)	(-4.353)	(-4.352)
R&D	0.443***	0.443***	0.376***	0.376***	0.443***	0.443***	0.443***	0.443***
	(47.501)	(47.393)	(25.887)	(25.882)	(47.501)	(47.496)	(47.501)	(47.522)
SALEGR	0.002***	0.002***	0.001***	0.001***	0.002***	0.002***	0.002***	0.002***
	(3.436)	(3.396)	(2.640)	(2.629)	(3.436)	(3.478)	(3.436)	(3.529)
Size	-0.028***	-0.028***	-0.031***	-0.031***	-0.028***	-0.028***	-0.028***	-0.028***
	(-6.968)	(-6.778)	(-5.941)	(-5.892)	(-6.968)	(-6.939)	(-6.968)	(-6.916)
PTBI	0.018***	0.018***	0.019***	0.019***	0.018***	0.018***	0.018***	0.018***
	(9.453)	(9.410)	(7.899)	(7.901)	(9.453)	(9.479)	(9.453)	(9.489)
Inst_Own	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***
	(15.408)	(15.419)	(11.949)	(11.949)	(15.408)	(15.425)	(15.408)	(15.451)
NOL	-0.029***	-0.029***	-0.024***	-0.024***	-0.029***	-0.029***	-0.029***	-0.030***
	(-9.019)	(-9.000)	(-6.133)	(-6.070)	(-9.019)	(-9.059)	(-9.019)	(-9.151)
FCF	0.196***	0.195***	0.238***	0.238***	0.196***	0.196***	0.196***	0.196***
	(22.710)	(22.451)	(21.665)	(21.637)	(22.710)	(22.710)	(22.710)	(22.673)
Z-score	-0.004***	-0.004***						
	(-3.836)	(-3.827)						
Bond Spread		0.051						
		(0.734)						
Z-score			0.002	0.002				
			(1.336)	(1.342)				
CDS				0.000				
				(-0.228)				
Z-score					-0.004***	-0.004***		
					(-3.836)	(-3.849)		
Tightening						0.003		
						(0.855)		
Z-score							-0.004***	-0.004***
							(-3.836)	(-3.860)
VIX								0.000
								(1.575)
N	9,218	9,218	9,218	9,218	9,218	9,218	9,218	9,218
Adj. R^2	0.627	0.627	0.627	0.627	0.67	0.67	0.627	0.627

Notes: *1.* ***, **, * *represent significance level of the 1%, 5%, and 10%, respectively.*

2. Detailed variable definitions refer to Table 2 and Table 13.

Table 16 Regression analysis by using TS as dependent variable

Variable	TS							
	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**	**Model 7**	**Model 8**
Intercept	-0.031*	-0.033*	-0.052**	-0.051*	-0.031*	-0.036**	-0.031*	-0.066***
	(-1.748)	(-1.804)	(-2.034)	(-1.923)	(-1.748)	(-2.034)	(-1.748)	(-3.447)
ADVERT	0.088	0.088	0.236*	0.236*	0.088	0.093	0.088	0.098
	(1.032)	(1.042)	(1.826)	(1.821)	(1.032)	(1.092)	(1.032)	(1.155)
FODOM	-0.188**	-0.188**	-0.132	-0.133	-0.188**	-0.187**	-0.188**	-0.186**
	(-2.289)	(-2.283)	(-1.099)	(-1.105)	(-2.289)	(-2.283)	(-2.289)	(-2.265)
FORINC	0.018**	0.018**	0.024*	0.024**	0.018**	0.019**	0.018**	0.019**
	(2.207)	(2.232)	(1.955)	(1.973)	(2.207)	(2.304)	(2.207)	(2.302)
FOSALES	-0.273*	-0.274*	-0.063	-0.063	-0.273*	-0.294*	-0.273*	-0.294*
	(-1.776)	(-1.780)	(-0.272)	(-0.272)	(-1.776)	(-1.909)	(-1.776)	(-1.910)
MARGIN	-0.027	-0.028	-0.193	-0.194	-0.027	-0.016	-0.027	-0.023
	(-0.238)	(-0.250)	(-1.155)	(-1.159)	(-0.238)	(-0.145)	(-0.238)	(-0.207)
MTB	-0.005	-0.005	-0.038	-0.036	-0.005	-0.005	-0.005	-0.005
	(-0.426)	(-0.428)	(-0.456)	(-0.431)	(-0.426)	(-0.401)	(-0.426)	(-0.424)
R&D	0.120***	0.122***	0.168**	0.167**	0.120***	0.120***	0.120***	0.123***
	(2.911)	(2.939)	(2.149)	(2.148)	(2.911)	(2.916)	(2.911)	(2.977)
SALEGR	0.003	0.003	0.004	0.004	0.003	0.004*	0.003	0.004*
	(1.563)	(1.534)	(1.323)	(1.309)	(1.563)	(1.822)	(1.563)	(1.848)
Size	-0.055***	-0.054***	-0.066**	-0.065**	-0.055***	-0.053***	-0.055***	-0.052***
	(-3.038)	(-2.919)	(-2.311)	(-2.268)	(-3.038)	(-2.928)	(-3.038)	(-2.901)
PTBI	0.006	0.006	0.002	0.002	0.006	0.008	0.006	0.007
	(0.744)	(0.721)	(0.150)	(0.158)	(0.744)	(0.914)	(0.744)	(0.851)
Inst_Own	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***
	(4.893)	(4.903)	(3.803)	(3.805)	(4.893)	(5.018)	(4.893)	(5.044)
NOL	0.021	0.021	0.044**	0.045**	0.021	0.014	0.021	0.012
	(1.442)	(1.453)	(2.062)	(2.084)	(1.442)	(0.975)	(1.442)	(0.808)
FCF	0.563***	0.561***	0.533***	0.533***	0.563***	0.562***	0.563***	0.559***
	(14.775)	(14.615)	(9.045)	(9.025)	(14.775)	(14.774)	(14.775)	(14.693)
Z-score	-0.021***	-0.021***						
	(-4.713)	(-4.705)						
Bond Spread		0.142						
		(0.449)						
Z-score			-0.023***	-0.023***				
			(-3.489)	(-3.478)				
CDS				0.000				
				(-0.316)				
Z-score					-0.021***	-0.021***		
					(-4.713)	(-4.799)		
Tightening						0.055***		
						(4.177)		
Z-score							-0.021***	-0.021***
							(-4.713)	(-4.793)
VIX								0.002***
								(4.391)
N	9,218	9,218	9,218	9,218	9,218	9,218	9,218	9,218
Adj. R^2	0.099	0.099	0.099	0.101	0.072	0.072	0.099	0.101

Notes: *1.* ***, **, * *represent significance level of the 1%, 5%, and 10%, respectively.*

2. Detailed variable definitions refer to Table 2 and Table 13.

Table 17 Regression analysis by using free cash flow as additional robustness test under CashETR and GAAPETR

Variable	CashETR			GAAPETR		
	Model 1	**Model 2**	**Model 3**	**Model 1**	**Model 2**	**Model 3**
Intercept	0.291***	0.292***	0.291***	0.337***	0.337***	0.337***
	(39.210)	(39.278)	(39.174)	(63.704)	(63.722)	(63.583)
ADVERT	0.122***	0.121***	0.125***	0.042	0.042	0.045
	(3.174)	(3.163)	(3.262)	(1.555)	(1.547)	(1.639)
FODOM	-0.296***	-0.297***	-0.299***	-0.396***	-0.396***	-0.394***
	(-8.502)	(-8.528)	(-8.61)	(-15.961)	(-15.978)	(-15.902)
FORINC	0.017***	0.017***	0.017***	-0.030***	-0.030***	-0.030***
	(4.651)	(4.643)	(4.672)	(-11.426)	(-11.433)	(-11.367)
FOSALES	0.069	0.073	0.053	0.009	0.011	0.006
	(1.054)	(1.108)	(0.808)	(0.190)	(0.226)	(0.138)
MARGIN	-0.150***	-0.150***	-0.140***	-0.161***	-0.161***	-0.158***
	(-3.213)	(-3.203)	(-2.981)	(-4.829)	(-4.822)	(-4.725)
MTB	-0.011**	-0.011**	-0.011**	-0.015***	-0.015***	-0.016***
	(-2.007)	(-2.012)	(-2.017)	(-4.130)	(-4.134)	(-4.195)
R&D	0.090***	0.090***	0.093***	0.156***	0.156***	0.160***
	(4.958)	(5.006)	(5.128)	(12.096)	(12.127)	(12.331)
SALEGR	-0.003***	-0.003***	-0.003***	-0.004***	-0.004***	-0.004***
	(-3.547)	(-3.597)	(-3.464)	(-6.893)	(-6.926)	(-7.17)
Size	-0.065***	-0.065***	-0.065***	0.001	0.001	0.001
	(-8.679)	(-8.673)	(-8.678)	(0.112)	(0.118)	(0.122)
PTBI	-0.046***	-0.046***	-0.046***	-0.022***	-0.022***	-0.022***
	(-12.424)	(-12.461)	(-12.450)	(-8.260)	(-8.284)	(-8.211)
Inst_Own	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***
	(-2.909)	(-2.910)	(-2.867)	(-3.374)	(-3.374)	(-3.333)
NOL	0.008*	0.008	0.007	0.025***	0.024***	0.024***
	(1.682)	(1.629)	(1.424)	(7.169)	(7.131)	(7.107)
FCF	-0.095***	-0.096***	-0.095***	-0.165***	-0.165***	-0.165***
	(-5.740)	(-5.792)	(-5.724)	(-13.924)	(-13.957)	(-14.004)
Z-score	0.021***	0.021***	0.021***	0.007***	0.007***	0.008***
	(10.835)	(10.822)	(10.798)	(5.398)	(5.388)	(5.832)
Vol_FreeCashFlow		-0.002**	-0.002**		-0.001	-0.001
		(-2.287)	(-2.278)		(-1.563)	(-1.554)
Low Risk			-0.025**			-0.017*
			(-1.961)			(-1.874)
High Risk			-0.047***			0.034***
			(-2.569)			(2.625)
N	9,218	9,218	9,218	9,218	9,218	9,218
Adj. R^2	0.084	0.084	0.085	0.170	0.170	0.171

Notes: *1.* ***, **, * *represent significance level of the 1%, 5%, and 10%, respectively.*

2. Vol_FreeCashFlow is the standard deviation of operating cash flow minus capital expenditures, all divided by lagged total assets over a five years period. Low Risk is low Z-score and low level of Vol_FreeCashFlow. High Risk is high Z-score and high level of Vol_FreeCashFlow.

3. Detailed variable definitions refer to Table 2.

Table 18 Regression analysis by using free cash flow as additional robustness test under BTD, PBTD, and TS.

Variable	BTD			PBTD			TS		
	Model 1	**Model 2**	**Model 3**	**Model 1**	**Model 2**	**Model 3**	**Model 1**	**Model 2**	**Model 3**
Intercept	-0.038***	-0.038***	-0.037***	-0.050***	-0.050***	-0.050***	-0.031*	-0.031*	-0.031*
	(-8.811)	(-8.861)	(-8.718)	(-12.856)	(-12.916)	(-12.761)	(-1.748)	(-1.751)	(-1.751)
ADVERT	-0.156***	-0.155***	-0.161***	-0.098***	-0.098***	-0.104***	0.088	0.088	0.091
	(-7.530)	(-7.521)	(-7.811)	(-5.193)	(-5.183)	(-5.521)	(1.032)	(1.033)	(1.069)
FODOM	-0.048**	-0.047**	-0.047**	0.030*	0.031*	0.031*	-0.188**	-0.188**	-0.193**
	(-2.424)	(-2.403)	(-2.378)	(1.685)	(1.710)	(1.731)	(-2.289)	(-2.287)	(-2.351)
FORINC	0.017***	0.017***	0.017***	0.024***	0.024***	0.024***	0.018**	0.018**	0.018**
	(8.337)	(8.342)	(8.209)	(13.267)	(13.274)	(13.117)	(2.207)	(2.207)	(2.205)
FOSALES	-0.419***	-0.420***	-0.399***	-0.335***	-0.337***	-0.315***	-0.273*	-0.274*	-0.296*
	(-11.094)	(-11.131)	(-10.524)	(-9.752)	(-9.798)	(-9.125)	(-1.776)	(-1.778)	(-1.907)
MARGIN	0.120***	0.120***	0.108***	0.087***	0.087***	0.075***	-0.027	-0.027	-0.017
	(4.351)	(4.341)	(3.899)	(3.467)	(3.455)	(2.957)	(-0.238)	(-0.239)	(-0.147)
MTB	-0.035***	-0.035***	-0.035***	-0.012***	-0.012***	-0.011***	-0.005	-0.005	-0.005
	(-11.981)	(-11.979)	(-11.914)	(-4.353)	(-4.350)	(-4.258)	(-0.426)	(-0.425)	(-0.414)
R&D	0.514***	0.514***	0.508***	0.443***	0.443***	0.436***	0.120***	0.120***	0.121***
	(50.372)	(50.331)	(49.531)	(47.501)	(47.457)	(46.567)	(2.911)	(2.908)	(2.895)
SALEGR	0.002***	0.002***	0.002***	0.002***	0.002***	0.002***	0.003	0.003	0.004*
	(3.014)	(3.040)	(3.149)	(3.436)	(3.466)	(3.661)	(1.563)	(1.565)	(1.716)
Size	-0.024***	-0.024***	-0.024***	-0.028***	-0.028***	-0.028***	-0.055***	-0.055***	-0.055***
	(-5.389)	(-5.388)	(-5.441)	(-6.968)	(-6.968)	(-7.045)	(-3.038)	(-3.038)	(-3.035)
PTBI	0.023***	0.023***	0.023***	0.018***	0.018***	0.018***	0.006	0.006	0.006
	(11.173)	(11.202)	(11.148)	(9.453)	(9.489)	(9.415)	(0.744)	(0.746)	(0.737)
Inst_Own	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***
	(13.496)	(13.495)	(13.318)	(15.408)	(15.408)	(15.228)	(4.893)	(4.893)	(4.901)
NOL	-0.030***	-0.030***	-0.029***	-0.029***	-0.029***	-0.028***	0.021	0.021	0.019
	(-8.658)	(-8.621)	(-8.275)	(-9.019)	(-8.976)	(-8.602)	(1.442)	(1.444)	(1.299)
FCF	0.145***	0.146***	0.145***	0.196***	0.196***	0.196***	0.563***	0.563***	0.565***
	(15.414)	(15.448)	(15.435)	(22.710)	(22.750)	(22.746)	(14.775)	(14.773)	(14.812)
Z-score	-0.008***	-0.008***	-0.009***	-0.004***	-0.004***	-0.005***	-0.021***	-0.021***	-0.021***
	(-7.574)	(-7.569)	(-8.529)	(-3.836)	(-3.830)	(-5.162)	(-4.713)	(-4.712)	(-4.562)
Vol_FreeCashFlow		0.001	0.001		0.001*	0.001*		0.000	0.000
		(1.482)	(1.458)		(1.771)	(1.743)		(0.114)	(0.117)
Low Risk			0.037***			0.039***			-0.015
			(5.202)			(6.090)			(-0.509)
High Risk			0.013			0.008			-0.078*
			(1.259)			(0.851)			(-1.927)
N	9,218	9,218	9,218	9,218	9,218	9,218	9,218	9,218	9,218
Adj. R^2	0.595	0.595	0.597	0.627	0.627	0.628	0.099	0.099	0.099

Notes: *1.* ***, **, * *represent significance level of the 1%, 5%, and 10%, respectively.*
2. Detailed variable definitions refer to Table 2 and Table 17.

Table 19 Difference in Credit Rating

Variable	Credit Rating Group (C1= high risk, C10=low risk)																			
	C1		C2		C3		C4		C5		C6		C7		C8		C9		C10	
	Me.	Md.	Me.	Md.	Me.	Md.	Me.	Md.	Me.	Md.	Me.	Md.	Me.	Md.	Me.	Md.	Me.	Md.	Me.	Md.
Cash ETR	0.20	0.17	0.22	0.23	0.22	0.22	0.22	0.22	0.22	0.22	0.21	0.22	0.22	0.22	0.23	0.23	0.24(-4.13)***	0.24(-6.05)***	0.25(-6.09)***	0.24(-8.10)***
GAAP ETR	0.28	0.32	0.29	0.31	0.28	0.30	0.25	0.29	0.26	0.29	0.26	0.29	0.26	0.29	0.26	0.29	0.27(1.88)*	0.28(-4.07)***	0.27(2.03)**	0.27(-4.07)***
BTD	0.03	0.02	0.03	0.02	0.03	0.02	0.02	0.02	0.03	0.02	0.03	0.02	0.03	0.02	0.03	0.03	0.03(-0.80)	0.03(-3.33)***	0.03(-1.69)*	0.03(-3.22)***
PBTD	0.01	0.00	0.01	0.01	0.02	0.01	0.02	0.01	0.02	0.01	0.02	0.01	0.02	0.02	0.02	0.02	0.03(-9.54)***	0.02(-12.75)***	0.03(-9.85)***	0.03(-11.98)***
TS	0.06	0.04	0.03	0.03	0.05	0.04	0.04	0.03	0.05	0.04	0.06	0.04	0.05	0.04	0.05	0.04	0.05(0.40)	0.05(-1.32)	0.06(0.02)	0.06(-2.58)***
ADVERT	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01(0.10)	0.00(-2.00)**	0.02(-1.15)	0.00(-0.62)
FODOM	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.02	0.00	0.02(-5.35)***	0.00(-9.10)***	0.03(-10.77)***	0.01(-12.08)***
FORINC	0.24	0.00	0.27	0.05	0.29	0.09	0.27	0.01	0.25	0.03	0.20	0.01	0.20	0.00	0.25	0.06	0.28(-1.39)	0.17(-6.16)***	0.33(-3.61)***	0.23(-7.50)***
FOSALES	0.02	0.00	0.02	0.01	0.03	0.01	0.03	0.00	0.03	0.00	0.02	0.00	0.02	0.00	0.03	0.00	0.04(-8.67)***	0.02(-9.39)***	0.05(-10.71)***	0.02(-10.14)***
MARGIN	0.02	0.00	0.03	0.01	0.04	0.01	0.04	0.00	0.04	0.00	0.03	0.00	0.03	0.00	0.05	0.01	0.05(-8.73)***	0.02(-9.54)***	0.07(-13.08)***	0.04(-11.36)***
MTB	0.08	0.05	0.08	0.05	0.09	0.06	0.11	0.08	0.11	0.08	0.11	0.09	0.13	0.10	0.14	0.11	0.14(-9.84)***	0.11(-15.03)***	0.15(-11.98)***	0.13(-16.13)***
R&D	0.08	0.06	0.09	0.08	0.09	0.08	0.09	0.07	0.09	0.08	0.09	0.08	0.10	0.08	0.10	0.08	0.11(-6.86)***	0.10(-8.87)***	0.12(-7.58)***	0.10(-8.19)***
SALEGR	7.45	7.38	7.91	7.79	8.25	8.08	8.63	8.59	8.77	8.58	8.91	8.73	9.24	9.11	9.59	9.61	9.92(-31.45)***	9.81(-24.12)***	10.70(-41.9)***	10.6(-26.12)***
Size	0.15	0.08	0.13	0.08	0.10	0.07	0.10	0.07	0.07	0.06	0.05	0.04	0.07	0.05	0.07	0.06	0.05(6.12)***	0.05(-5.44)***	0.06(5.65)***	0.05(-5.64)***
PTBI	0.89	1.00	0.90	1.00	0.87	1.00	0.82	1.00	0.80	1.00	0.81	1.00	0.79	1.00	0.81	1.00	0.79(4.43)***	1.00(-4.43)***	0.81(3.68)***	1.00(-3.65)***
Inst_Own	3.85	1.93	3.60	2.13	5.87	2.13	2.70	1.93	3.54	2.17	3.27	2.29	3.57	2.44	4.92	2.37	4.37(-0.90)	3.06(-6.77)***	3.90(-0.08)	2.70(-5.64)***
NOL	0.72	0.76	0.76	0.82	0.76	0.81	0.75	0.79	0.73	0.76	0.68	0.74	0.68	0.70	0.63	0.70	0.64(4.74)***	0.67(-6.11)***	0.57(5.60)***	0.6(-11.60)***
FCF	0.04	0.04	0.05	0.05	0.05	0.06	0.06	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.08(-6.93)***	0.07(-7.16)***	0.08(-7.93)***	0.08(-8.20)***

Notes: *1.* ***, **, * *represent significance level of the 1%, 5%, and 10%, respectively.*

2. Credit Rating is the Standard & Poor rating that the value of rank is from AAA to D.

3. Detailed variable definitions refer to Table 2.

Table 20 Difference in Leverage

Variable	Leverage Group (C1= high risk, C10=low risk)																			
	C1		C2		C3		C4		C5		C6		C7		C8		C9		C10	
	Me.	Md.	Me.	Md.	Me.	Md.	Me.	Md.	Me.	Md.	Me.	Md.	Me.	Md.	Me.	Md.	Me.	Md.	Me.	Md.
Cash ETR	0.16	0.12	0.20	0.19	0.22	0.22	0.26	0.24	0.25	0.25	0.26	0.26	0.26	0.26	0.27	0.27	0.26(-15.98)***	0.26(-16.10)***	0.25(-14.94)***	0.26(-15.39)***
GAAP ETR	0.21	0.26	0.26	0.30	0.28	0.31	0.29	0.31	0.29	0.31	0.29	0.30	0.29	0.30	0.29	0.31	0.29(-13.45)***	0.3(-9.21)***	0.29(-12.62)***	0.31(-9.61)***
BTD	0.03	0.02	0.03	0.02	0.03	0.02	0.03	0.02	0.03	0.02	0.03	0.02	0.03	0.02	0.02	0.01	0.02(3.54)***	0.01(-3.34)***	0.02(1.54)	0.02(-1.25)
PBTD	0.02	0.01	0.02	0.01	0.02	0.01	0.02	0.01	0.02	0.01	0.02	0.01	0.02	0.01	0.02	0.01	0.02(0.34)	0.01(-2.57)***	0.02(-3.93)***	0.01(-6.05)***
TS	0.02	0.04	0.05	0.04	0.05	0.04	0.04	0.04	0.03	0.04	0.05	0.04	0.04	0.04	0.05	0.04	0.04(-1.12)	0.04(-1.08)	0.03(-0.45)	0.03(-1.48)
ADVERT	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01(-0.06)	0.00(-4.09)***	0.01(-3.48)***	0.00(-6.54)***
FODOM	0.01	0.00	0.01	0.00	0.01	0.00	0.02	0.00	0.02	0.00	0.02	0.00	0.02	0.00	0.01	0.00	0.01(-3.2)***	0.00(-2.86)***	0.02(-7.85)***	0.00(-8.08)***
FORINC	0.14	0.00	0.18	0.00	0.23	0.01	0.27	0.04	0.29	0.04	0.25	0.01	0.21	0.00	0.17	0.00	0.13(1.11)	0.00(-2.11)**	0.16(-1.05)	0.00(-1.83)*
FOSALES	0.01	0.00	0.02	0.00	0.02	0.00	0.03	0.01	0.03	0.01	0.03	0.00	0.02	0.00	0.02	0.00	0.02(-0.65)	0.00(-1.67)*	0.02(-4.18)***	0.00(-3.19)***
MARGIN	0.02	0.00	0.03	0.00	0.03	0.00	0.04	0.01	0.04	0.01	0.03	0.00	0.03	0.00	0.02	0.00	0.02(1.13)	0.00(-2.15)**	0.03(-1.79)*	0.00(-2.02)**
MTB	0.13	0.09	0.12	0.08	0.10	0.08	0.10	0.07	0.09	0.07	0.10	0.07	0.11	0.08	0.12	0.09	0.13(0.46)	0.11(-3.90)***	0.13(0.57)	0.10(-1.39)
R&D	0.09	0.06	0.09	0.07	0.10	0.09	0.10	0.09	0.10	0.09	0.10	0.09	0.10	0.08	0.08	0.06	0.07(3.26)***	0.04(-5.05)***	0.11(-5.68)***	0.09(-5.02)***
SALEGR	7.75	7.68	7.98	8.02	7.93	7.94	7.85	7.76	7.95	7.84	7.93	7.78	7.79	7.55	7.61	7.46	7.59(2.17)**	7.25(-4.10)***	7.01(10.59)***	6.79(-11.57)***
Size	0.19	0.10	0.11	0.07	0.08	0.07	0.08	0.06	0.08	0.06	0.07	0.05	0.08	0.06	0.08	0.06	0.08(4.12)***	0.05(-9.08)***	0.08(3.83)***	0.07(-6.45)***
PTBI	0.67	1.00	0.78	1.00	0.78	1.00	0.80	1.00	0.81	1.00	0.80	1.00	0.82	1.00	0.80	1.00	0.81(-7.47)***	1.00(-7.37)***	0.77(-5.22)***	1.00(-5.19)***
Inst_Own	7.81	2.61	3.88	2.34	3.66	2.33	3.15	2.25	3.03	2.23	3.43	1.99	2.27	1.76	2.06	1.52	1.88(3.92)***	1.46(-18.34)***	2.64(3.41)***	1.95(-9.96)***
NOL	0.67	0.72	0.65	0.69	0.66	0.71	0.66	0.71	0.64	0.68	0.62	0.68	0.56	0.62	0.55	0.58	0.51(13.1)***	0.54(-12.37)***	0.54(10.54)***	0.55(-10.55)***
FCF	0.04	0.06	0.05	0.06	0.05	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.05	0.05	0.04	0.05(-1.23)	0.03(-5.29)***	0.07(-6.04)***	0.06(-2.38)**

Notes: *1.* ***, **, * *represent significance level of the 1%, 5%, and 10%, respectively.*

2. Leverage is total long-term debt divided by lagged total assets.

3. Detailed variable definitions refer to Table 2.

Table 21 Difference in Tobin's q

Variable	Tobin's q Group (C1= high risk, C10=low risk)																			
	C1		C2		C3		C4		C5		C6		C7		C8		C9		C10	
	Me.	Md.	Me.	Md.	Me.	Md.	Me.	Md.	Me.	Md.	Me.	Md.	Me.	Md.	Me.	Md.	Me.	Md.	Me.	Md.
Cash ETR	0.23	0.23	0.23	0.24	0.24	0.24	0.23	0.24	0.25	0.25	0.25	0.24	0.26	0.26	0.27	0.27	0.27(-5.83)***	0.26(-5.35)***	0.27(-5.92)***	0.26(-5.22)***
GAAP ETR	0.28	0.30	0.28	0.31	0.28	0.31	0.28	0.31	0.29	0.31	0.29	0.32	0.31	0.34	0.31	0.33	0.30(-5.68)***	0.32(-6.47)***	0.30(-4.59)***	0.32(-4.40)***
BTD	0.04	0.03	0.04	0.03	0.03	0.02	0.03	0.02	0.03	0.02	0.03	0.02	0.02	0.02	0.03	0.02	0.03(1.22)	0.02(-7.21)***	0.02(2.66)***	0.02(-5.74)***
PBTD	0.03	0.02	0.04	0.02	0.03	0.02	0.03	0.02	0.02	0.01	0.02	0.01	0.02	0.01	0.02	0.01	0.02(2.54)**	0.01(-10.96)***	0.02(3.75)***	0.01(-9.19)***
TS	0.07	0.05	0.05	0.05	0.05	0.04	0.04	0.04	0.03	0.04	0.03	0.03	0.03	0.03	0.04	0.03	0.01(3.64)***	0.03(-5.77)***	0.02(3.22)***	0.04(-3.22)***
ADVERT	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01(5.23)***	0.00(-2.48)**	0.01(6.53)***	0.00(-3.11)***
FODOM	0.03	0.00	0.03	0.00	0.03	0.00	0.02	0.00	0.02	0.00	0.02	0.00	0.02	0.00	0.02	0.00	0.01(10.4)***	0.00(-10.28)***	0.01(12.79)***	0.00(-14.01)***
FORINC	0.33	0.13	0.26	0.07	0.27	0.07	0.25	0.02	0.23	0.00	0.21	0.00	0.19	0.00	0.12	0.00	0.11(9.55)***	0.00(-20.06)***	0.06(12.31)***	0.00(-25.86)***
FOSALES	0.04	0.02	0.04	0.01	0.03	0.01	0.03	0.00	0.02	0.00	0.02	0.00	0.02	0.00	0.01	0.00	0.01(17.20)***	0.00(-21.40)***	0.01(19.27)***	0.00(-26.28)***
MARGIN	0.06	0.02	0.05	0.01	0.04	0.01	0.03	0.00	0.03	0.00	0.02	0.00	0.02	0.00	0.01	0.00	0.01(18.51)***	0.00(-22.25)***	0.00(20.97)***	0.00(-27.00)***
MTB	0.13	0.11	0.12	0.10	0.11	0.09	0.11	0.08	0.11	0.07	0.10	0.07	0.09	0.06	0.10	0.07	0.12(1.57)	0.07(-10.24)***	0.13(-0.10)	0.08(-7.84)***
R&D	0.15	0.12	0.14	0.12	0.14	0.11	0.13	0.10	0.12	0.10	0.11	0.09	0.10	0.08	0.10	0.07	0.09(10.11)***	0.07(-15.80)***	0.07(15.45)***	0.04(-21.96)***
SALEGR	8.95	9.04	8.33	8.29	7.78	7.82	7.43	7.42	7.16	7.19	6.88	6.86	6.57	6.59	6.17	6.09	5.78(52.03)***	5.79(-36.02)***	5.29(59.71)***	5.40(-38.03)***
Size	0.10	0.08	0.10	0.07	0.11	0.08	0.11	0.08	0.10	0.08	0.10	0.07	0.13	0.07	0.08	0.06	0.08(2.23)**	0.05(-4.64)***	0.04(8.04)***	0.02(-11.37)***
PTBI	0.84	1.00	0.83	1.00	0.81	1.00	0.78	1.00	0.75	1.00	0.77	1.00	0.73	1.00	0.68	1.00	0.67(9.86)***	1.00(-9.67)***	0.68(9.38)***	1.00(-9.19)***
Inst_Own	5.59	3.77	4.22	3.34	3.64	2.96	3.02	2.54	2.69	2.23	2.41	2.08	2.10	1.77	1.92	1.62	1.63(8.84)***	1.37(-32.64)***	1.16(9.91)***	1.03(-37.17)***
NOL	0.72	0.75	0.73	0.76	0.72	0.75	0.72	0.75	0.72	0.78	0.70	0.73	0.65	0.69	0.54	0.54	0.42(29.09)***	0.39(-25.11)***	0.23(57.53)***	0.18(-35.79)***
FCF	0.10	0.08	0.09	0.08	0.09	0.08	0.08	0.07	0.07	0.06	0.06	0.06	0.05	0.05	0.05	0.04	0.05(7.99)***	0.03(-14.09)***	0.03(13.21)***	0.01(-19.91)***

Notes: *1.* ***, **, * *represent significance level of the 1%, 5%, and 10%, respectively.*

2. Tobin's q is (total market value plus total liabilities) divided by (book value per share plus total liabilities).

3. Detailed variable definitions refer to Table 2.

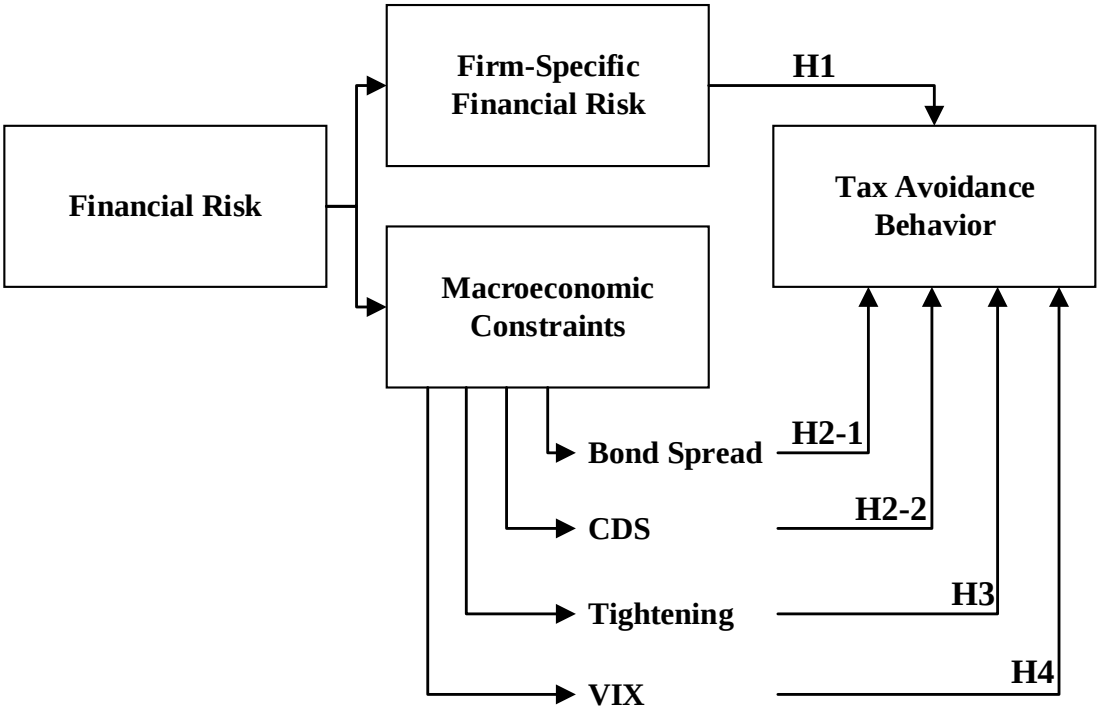

Figure 2 Research framework

APPENDIX

Appendix A Tax avoidance measure

CashETR = income taxes paid / (pretax income - special items).

lnCashETR = the natural logarithm of CashETR.

GAAPETR = total income taxes / (pretax income - special items).

lnGAAPETR = the natural logarithm of GAAPETR.

BTD = (pretax income - (federal income taxes - foreign income taxes) / statutory maximum firm tax rate) / lagged total assets.

PBTD = BTD - total deferred tax expense / statutory maximum firm tax rate / lagged total assets.

TS = the residual of regression of $BTD_{i,t} = \beta_1 TA_{i,t} + \mu_i + \varepsilon_{i,t}$

where

$TA_{i,t} = (ACT_t - ACT_{t-1}) - (CHE_t - CHE_{t-1}) - (LCT_t - LCT_{t-1}) + (DLC_t - DLC_{t-1}) - (DP) / (AT_{t-1})$

where

ACT = current assets.

CHE = cash and short-term investment.

LCT = current liabilities.

DLC = debt in current liabilities.

DP = depreciation and amortization.

Appendix B Firm-specific financial risk measure

Z-score = $0.012X_1 + 0.014X_2 + 0.033X_3 + 0.006X_4 + 0.999X_5$

Z''-score = $3.25X_1 + 6.56X_2 + 3.26X_3 + 6.72X_4 + 1.05X_5$

Z-score_m1 = $-1 \times (0.042X_1 + 0.561X_2 + 0.724X_3 + 1.791X_4 + 0.021X_5)$

Z-score_m2 = $0.035X_1 + (0.495X_2 + 0.862X_3 + 1.721X_4 + 0.017X_5) \times -1$

Z-score_m3 = $0.207X_1 + (0.483X_2 + 0.891X_3 + 1.790X_4 + 0.016X_5) \times -1$

Z-score_m4 = $(13.466X_1 + 0.441X_2 + 1.146X_3 + 1.619X_4 + 0.012X_5) \times -1$

Z-score_m5 = $0.007X_1 + (0.487X_2 + 0.846X_3 + 1.757X_4 + 0.017X_5) \times -1$

Z-score_m6 = $0.048X_1 + (0.540X_2 + 0.859X_3 + 1.695X_4 + 0.016X_5) \times -1$

Z-score_m7 = $0.049X_1 + (0.496X_2 + 0.863X_3 + 1.717X_4 + 0.017X_5) \times -1$

Z-score_m8 = $(13.302X_1 + 0.459X_2 + 1.160X_3 + 1.682X_4 + 0.013X_5) \times -1$

where

X_1 = working capital total assets.

X_2 = retained earnings total assets.

X_3 = (pretax income + total interest and related expenses) / total assets.

X_4 = common shares outstanding × price close total liabilities.

X_5 = sales total assets.

Credit Rating = the Standard & Poor rating, the value of rank is from AAA to D.

Leverage = total long–term debt / lagged total assets.

Tobin's q = (total market value + total liabilities) / (book value per share + total liabilities).

Appendix C Macroeconomic constraints measure

Bond Spread = ten years treasury bonds$_t$ - three months treasury bill$_t$

CDS = a purchaser regularly paying a fee to a seller, and in the event of a default, the seller pays default compensation on behalf of the purchaser.

Tightening = (CT + ST) / (SE + CE)

where

CT = the number of bankers adopting considerably tightened in market.

ST = the number of bankers adopting somewhat tightened in market.

SE = the number of bankers adopting somewhat eased in market.

CE = the number of bankers adopting considerably tightened in market.

VIX = it is usually used to evaluate future risk.

Appendix D Endogenous variable measure

Vol_FreeCashFlow = the standard deviation of (operating cash flow minus capital expenditures) / lagged total assets over a five years period.

Appendix E Control variable measure

ADVERT = advertisement expenses / lagged total assets, and it is set to 0 when there is a missing.

R&D = research and development expense / lagged total assets, and it is set to 0 when there is a missing.

FODOM = foreign pretax income / pretax income.

FORINC = foreign pretax income / lagged total assets.

FOSALES = foreign pretax income / lagged total sales.

MARGIN = net income / sales.

PTBI = pretax book income / lagged total assets.

Size = the natural logarithm of total assets.

SALEGR = (sales - lagged sales) / lagged sales.

NOL = a positive tax loss carried forward equals 1, otherwise equals 0.

MTB = the price per share × the common shares outstanding / the book value of shareholder equity.

Inst_Own = the quarterly average of total institutional ownership.

FCF = (the operating activities net cash flow - capital expenditures) / lagged assets.

APPENDIX

Appendix F Tax avoidance measure

CashETR = income taxes paid / (pretax income - special items).

lnCashETR = the natural logarithm of CashETR.

GAAPETR = total income taxes / (pretax income - special items).

lnGAAPETR = the natural logarithm of GAAPETR.

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PBTD = BTD - total deferred tax expense / statutory maximum firm tax rate / lagged total assets.

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