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Essays on Cost of Capital

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Abstract

Essays on Cost of Capital

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This dissertation is comprised of two essays on the cost of capital. The first essay, entitled “*Information Quality, Cost of Capital, and Business Cycle*”, investigates the changes in the risk premium of information quality along the business cycle. Specifically, I examine how the relation between accruals quality and cost of equity capital changes depending on the state of the economy. Also, I attempt to revisit empirical evidence in prior literature that the risk premium associated with accruals quality exists only in economic expansions, but not in economic downturns. Using a monthly implied cost of equity as a proxy for the cost of capital, I find that higher accruals quality leads to lower cost of capital, and the relation is more pronounced during recessions. This result is consistent with traditional asset pricing theory and shows that the risk premium of information quality is countercyclical. Additionally, I provide evidence that the accruals quality-stock returns relation is more salient during recessions after excluding cash flow news of realized stock returns. Collectively, the findings of this study offer an explanation as to how risk premium of information quality changes over time.

The second essay, entitled “*Sustainable Tax Strategy and Cost of Capital*”, investigates whether and how the sustainability of firms’ tax strategy affects firms’ cost of capital. I hypothesize that firms with a sustainable tax strategy have less uncertainty about future tax

cash flows and are less likely to be subject to tax audits by regulators, which results in a lower cost of equity. Using a coefficient of variation of cash effective tax rates (ETR) as a proxy for a sustainable tax strategy, I find that stock investors require less compensation for holding stocks of firms with a more sustainable tax strategy. Also, I provide evidence that firms with a sustainable tax strategy have less volatile future tax cash flows and are less likely to be under the scrutiny of the Internal Revenue Service (IRS). Finally, I document a negative relation between a sustainable tax strategy and the cost of debt. Overall, my findings suggest that not only the level of tax avoidance but the sustainability of tax strategy also matters for investors.

Keywords: information quality; expected returns; cost of capital; business cycle; economic uncertainty; sustainable tax strategy; tax avoidance

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Essay 1
Information Quality, Cost of Capital, and Business Cycle

1. Introduction

In the debate over whether information quality of firms influences investors' perceptions of firm risk, prior studies generally focus on the *average* effect of accruals quality on the cost of capital or equity risk premium (Francis et al. 2004, 2005; Core et al. 2008).¹ However, the conditional capital asset pricing model (CAPM) model posits that investors demand a higher risk premium for poor business conditions, implying that the risk premium of the firms' stocks varies depending on the state of the economy (Fama and French 1989; Paye 2012; Bali et al. 2017). That is, macro-level state variables affect the risk premium of the stocks. Following the conditional CAPM model, several studies have argued that the risk premium of the stocks is countercyclical along the business cycle (Zhang 2005; Imrohoroglu and Tuzel 2014). Despite analyzing the changes in the risk premium of firm characteristics over the business cycles are prevalent, however, accounting researchers are relatively paying less attention to the countercyclical risk premium of *information quality*. This paper aims to fill this void by looking at the changes in the risk premium of information quality along the business cycle.

¹ In this paper, the cost of capital indicates expected returns of stock investors (i.e., cost of equity capital). In this vein, I use the cost of capital and expected returns interchangeably.

When will investors care more about firms' information quality? Intuitively, information quality could matter more during economic downturns. When macroeconomic conditions are favorable, investors may be more focused on growth, rather than the downside risk of firms. Thus, they may not probe discrepancies in the financial statements which contain various firm-specific information (Konchitchki et al. 2016) and may be willing to overlook the low quality of information generated by financial statements. When economic conditions deteriorate and capital becomes limited, however, investors become much more focused on a firm's downside risk and demand a higher risk premium for higher uncertainty (Chen 2010; Gulen and Ion 2016; Kim et al. 2016; Konchitchki et al. 2016; Segal et al. 2015; Bali et al. 2017).² Given that investors' preference to risky assets is varying along the business cycle, I investigate whether and how information quality of firms affects the perception of investors over the business cycle. In short, I examine the cyclical effect of information quality on the cost of capital or equity risk premium.

Unlike the theoretical prediction and anecdotal evidence, prior study finds that the risk premium of information quality exists only in economic expansion periods, but not in contraction periods (Kim and Qi 2010). Using a realized stock return as a proxy

² Anecdotal evidence also suggests that cost-conscious firms may allocate fewer resources for internal audits or accounting control procedures during recessions, which enhances higher information asymmetry between a firm and investors (KPMG 2016).

for the cost of capital, Kim and Qi (2010) provide evidence that the portfolio of firms with poorer accruals quality has higher realized returns compared to the portfolio of the better accruals quality firms after controlling for low-priced stocks. More importantly, they find that the spread between the two extreme accruals quality portfolios become greater during expansion periods. They interpret the results as characteristics of accruals quality risk premium which varies systematically with business cycles and pricing effect of accruals quality is related to fundamental risk. However, because investors demand a higher risk premium during economic downturns (Zhang 2005; Imrohoroglu and Tuzel 2014), the procyclical risk premium of accruals quality is quite puzzling. One possible reason is that realized stock returns are an apparently noisy proxy for the expected returns and the noise in realized stock returns intervene the accruals quality-expected returns relation. Due to significant noise in realized stock returns, prior studies argue that the implied cost of equity (ICC)³ is a better proxy for expected returns in the theoretical model and empirical analyses (see Pastor et al. 2008; Botosan et al. 2011; Lee et al. 2017). Following prior literature, I revisit the evidence of Kim and Qi (2010) by investigating the changes in risk premium of information quality over the different states of the economy with a *less* noisy

³ Implied cost of equity (ICC) is calculated by equating a current price to the discounted value of expected earnings (e.g., Gebhardt et al. 2001; Claus and Thomas 2001; Gode and Mohanram 2003; Ohlson and Juettner-Nauroth 2005; Li et al. 2013).

measure of expected returns. That is, I estimate the cost of capital based on the monthly ICC and examine the fluctuations of the cost of capital when the economy shifts between expansions and recessions.

As a proxy for information quality, I use the inverse measure of accruals quality (AQ), defined as a volatility of residual accruals model suggested by Dechow and Dichev (2002), and augmented by McNichols (2002). With monthly rebalanced panel of AQ and ICC from January 1977 to December 2016, I first conduct portfolio analysis of ICC based on AQ-sorted portfolios followed by Fama and MacBeth (1973) regressions in each state of the economy (i.e., expansions and recessions of National Bureau of Economic Research (NBER)).⁴

Using a large sample of firm-month observations of U.S. firms from January 1977 to December 2016, I first confirm that, *on average*, investors require higher ICC for firms with low-quality accounting information. More importantly, I find the relation between AQ and ICC is more pronounced during recessions. To compensate for additional risk during recessions, the expected return of investors increases by an annualized amount of 20 basis points based on Fama and MacBeth (1973) regressions.

⁴ Unlike prior studies based on the firm-year ICC measures (see Gebhardt et al. 2001; Claus and Thomas 2001; Gode and Mohanram 2003; Ohlson and Juettner-Nauroth 2005), I calculate the firm-month ICC following Li et al. (2013) which estimates the future cash flows based on weighted average of expected earnings forecast (EPS) of fiscal year $t+1$ and fiscal year $t+2$. A more detailed explanation of variable constructions is provided in Section III.

That is, investors require higher expected returns during recessions when they pay more attention to the risk of invested capital.

Next, I demonstrate the source of the AQ risk premium to figure out the underlying mechanism that investors demand a higher compensation for holdings stocks with low-quality accounting information during recessions. More specifically, I conduct four additional tests to examine whether and why low AQ firms are particularly riskier during recession periods. First, I reexamine the countercyclicality of accruals quality risk premium after decomposing accruals quality into “innate” portion and “discretionary” portion of accruals quality. Innate accruals quality reflects the firm’s business condition and environment. On the other hand, discretionary accruals quality is subject to managerial error and accounting choices (Francis et al. 2005; Core et al. 2008). As long as the risk of business environment and firm fundamentals enhances the uncertainty of future cash flows during recessions (Bloom 2014; Decker et al. 2016), the risk premium of the innate portion of accruals quality is more substantial, especially during economic downturns. Consistent with prediction, I document that innate portion of accruals quality affects the ICC differently between expansions and recessions (Dechow and Dichev 2002; Francis et al. 2005). On the other hand, the spread of ICC of the discretionary AQ portfolios does not show a statistical difference between expansion and recession periods.

Second, I reinforce the main findings of this paper with cross-sectional tests in a setting where I expect a specific characteristic of a firm to play a particularly important role in aggravating the relation between information quality and the cost of capital. Yee (2006) and Chen et al. (2008) demonstrate that the effect of accruals quality on the cost of capital increase with fundamental risk. This is consistent with Epstein and Schneider (2008) who suggest that investors disfavor stocks for which information quality is not favorable, especially when the innate fundamentals have higher volatility. If investors seek safer assets due to uncertainty generated from fundamental risk during recessions, the price of low accruals quality firms goes down which results in higher compensation for holding these stocks. I find that the countercyclicality of risk premium of information quality is more pronounced for firms with small market capitalization, firms with higher return volatility, and firms with more volatile cash flows. These results confirm that the relation between information quality and the cost of capital is more salient during economic downturns when a fundamental risk of the firm is particularly important.

Third, I investigate whether there are systematic differences in the sensitivity of low and high AQ firms' earnings to negative macroeconomic shocks in the economy (Imrohoroglu and Tuzel 2014; Konchitchki et al. 2016). Prior studies state that information quality risk stems from "uncertainty about the realized values of

fundamental earnings or future cash flows.” (Yee 2006; Chen et al. 2008). If the earnings of low AQ firms are more sensitive to negative macroeconomic shocks than the earnings of high AQ firms are, it implies a higher uncertainty in the realization of future cash flows stems from macroeconomic conditions (Kim and Qi 2010; Ogneva 2012). The results show that poorer AQ firms are profoundly affected by the unexpected negative shocks in gross domestic product (GDP) growth, especially during recessions.

Lastly, I examine how the risk premium of information quality varies depending on the macro-level uncertainty. As long as the macro-level uncertainty also affects the realization of future cash flows, the risk premium of information quality is highly influenced by macro-level uncertainty (Bali et al. 2017). Operationalizing the economic uncertainty score of Jurado et al. (2015), I find that investors require higher compensation for firms with poorer AQ, especially when macro-level uncertainty is quite high.

In the second part of the paper, I revisit the findings above with realized returns, which is a frequently used proxy of the cost of capital in prior studies. When I use the realized returns, my findings do not hold; Investors do not require higher returns for low accruals quality firms during recessions. This finding is consistent with prior literature that the risk premium associated with information quality (i.e., accruals

quality) does not exist in recession periods (Kim and Qi 2010). To reconcile different results of the ICC and realized returns, I focus on the noise in realized stock returns in two different ways (Elton 1999; Lundblad 2007; Kim and Qi 2010; Ogneva 2012). First, I explore the return trend around the economic transition periods where the economy changes from expansions to recessions and *vice versa*. The difference between the ICC and the realized returns becomes more evident during economic transition periods. When I use the realized returns, I find that low accruals quality firms have higher realized returns when the economy recovers (i.e., transitions from recession to expansion). In contrast, low accruals quality firms have lower realized returns when the economy worsens (i.e., transitions from expansion to recession). This inconsistent trend of the realized returns indicates significant noise in realized returns stems from unexpected shocks in stock returns. More importantly, I borrow the framework of return decomposition analysis to decompose realized returns into cashflow shocks and returns excluding cashflow shocks (Campbell 1991; Vuolteenaho 2002; Ogneva 2012). Utilizing the expected return portion of realized returns (i.e., excluding cash flow shocks), I am able to find consistent results with the ICC. That is, investors require higher expected returns during recessions compared to expansion periods. My findings are consistent with prior literature suggesting that ICC is a more appropriate proxy for

expected returns in the theoretical model and empirical analyses (Pastor et al. 2008; Botosan et al. 2011; Lee et al. 2017).

The findings of my paper are robust to controlling for additional variables known as affecting the cost of capital (McInnis 2010; Ogneva 2012; Lyle 2019). Also, I find robust results with a model-based implied cost of capital (Hou et al. 2012), market-based measure of information quality (Armstrong et al. 2011; Baik et al. 2018) or using a systematic risk (beta) as a proxy for expected returns (Liu and Wysocki 2017).

This study contributes to accounting literature by showing that information quality derived from financial statements explains the behavior of stock investors. While finance researchers have highlighted the importance of cyclicalities of risk premium in different economic states, accounting literature has been relatively silent about a time-varying feature of risk premium except for Kim and Qi (2010). By investigating the countercyclicality of risk premium driven by the quality of accounting information, this paper sheds new light on the importance of accounting information in explaining the time-varying behavior of the investors. When the economy weakens, investors become more uncertain about the realization of future cash flows, which in turn increases the risk premium. Given that uncertainty is originated from the information asymmetry among stock holders and management (Jiang et al. 2005;

Zhang 2006), the availability of more precise accounting information would mitigate the uncertainty of investors, especially during the economic downturns.

Furthermore, my analysis emphasizes the importance of choosing a valid proxy for analyzing the cost of capital. As suggested by prior studies, realized returns contain substantial noise in nature that could alter research findings (Pastor et al. 2008; Botosan et al. 2011). By comparing the different trends of ICC and realized returns over the business cycle and utilizing the expected return portion of realized returns as a proxy for the cost of capital, this study puts emphasis on choosing a valid proxy for analyzing the effect of information quality on the cost of capital.

The remainder of the paper proceeds as follows. Section II discusses the related literature and develops hypothesis. Next, Section III describes my empirical models and sample. Section IV presents the empirical findings, and Section V shows the additional tests. Section VI concludes the paper.

2. Related Literature and Hypothesis Development

2.1. Information Quality and Cost of Capital

In their seminal work, Easley and O'Hara (2004) analyze an model in which public and private information have impact on stock returns as investors demand additional compensation for holding stocks with greater private information. Many subsequent studies have suggested analytical models that investigate how the

information quality affect the cost of capital (Lambert et al. 2007; Lambert et al. 2012). Poor information quality leads to a higher cost of capital in two possible ways: estimation risk and transaction costs. The estimation risk literature suggests that stock with less precise information about future cash flow realizations (i.e., poor quality of information) should earn higher expected returns. Lambert et al. (2007) develop an analytical model where firms with more precise information about future cash flow realizations have *lower* conditional covariance with the stock market, which results in a lower conditional cost of capital through forward-looking beta. On the other hand, the transaction costs literature suggests that, in terms of market microstructure, the expected returns of stocks increase with the size of information asymmetry to compensate for higher transaction costs (Amihud and Mendelson 1986, 1989; Bushee et al. 2019). Either through estimation risk or high transaction costs, theoretical models predict a negative association between the quality of accounting information and the cost of capital.

Despite the consistent theoretical predictions, empirical evidence has been inconclusive on the relation between information quality and the cost of capital. When accounting information quality is measured by accruals quality (i.e., the residual accrual volatility of Dechow and Dichev (2002) model), some studies document a higher realized return for firms with low information quality (Francis et al. 2004,

2005).⁵ For example, Francis et al. (2005) claim that accruals quality is priced as a risk factor for realized returns. However, Core et al. (2008) argue that loadings on the accruals quality factor do not explain the cross-sectional variations in returns after applying the two-stage cross-sectional regression (2SCR). Likewise, Aboody et al. (2005) find that a hedge portfolio strategy that takes a long (short) position in the high (low) accruals quality firms does not generate significant abnormal returns.

As the source of the mixed empirical findings can be attributable to noise in the measure of cost of capital (i.e., realized returns), more recent studies have attempted to resolve these inconsistent findings by adopting *ex post* adjustments in realized returns or observing cross-sectional variation in firm characteristics (Kim and Qi 2010; Ogneva 2012; Lyle 2019). Because the noise in realized returns is more prominent in stocks with low-price (Bhardwaj and Brooks 1992; Baker and Wurgler 2006), Kim and Qi (2010) controls for low-priced stocks worth less than \$5 in their asset-pricing tests and finds results consistent with the theoretical prediction (i.e., investors require higher stock returns for low accrual quality stocks). Ogneva (2012) takes the earnings

⁵ Several studies use different measures of information quality. For example, Francis et al. (2008) finds that firms with more expansive voluntary disclosures have a lower cost of capital. Based on the smoothness of earnings, Francis et al. (2004) finds that earnings smoothness explains more of the cross-sectional variation in cost of equity estimates, while McNinnis (2010) fails to find the negative relation between smoother earnings and cost of capital after controlling for the analysts' bias in long-term earnings forecasts.

response coefficients (ERC) framework and decomposes stock returns into cash flow news and returns excluding cash flow news. After removing cash flow shocks from realized returns, she also finds a *negative* relation between accruals quality and stock returns. More recently, Lyle (2019) examines the cross-sectional difference of the link between accruals quality and stock returns conditioned on firms' growth and finds that a *negative (positive)* relation exists in low (high) growth firms.

In sum, while analytical models describe a *negative* relation between information quality and cost of capital, empirical evidence is inconclusive. In order to shed new light on the empirical relation between information quality and cost of capital, I rely on two empirical constructs: business cycles and *ex ante* measure of expected returns (i.e., implied cost of capital).

First, I build on Kim and Qi (2010) and investigate the impact of economic cycles on the risk premium of information quality. In particular, while prior studies focus on the *average* effect of information quality on the cost of capital, relatively little is known about the *cyclicality* of the risk premium. Kim and Qi (2010) are a rare exception documents that accruals quality is a priced risk factor only in expansions. Though Kim and Qi (2010) provide preliminary evidence of procyclicality of accruals quality risk premium, their conclusion is inconclusive given that investors generally require a higher risk premium for high uncertainty (Bali et al. 2017).

Second, I use the ICC, instead of realized returns, as a proxy for the cost of capital. Due to the inherent noise in realized returns, the ICC is a better empirical proxy to examine the relations between the cost of capital and information quality (Pastor et al. 2008; Frank and Shen 2016; Lee et al. 2017). Prior studies generally find consistent direction when they use expected returns based on analysts' earnings forecast and current stock price (i.e., implied cost of equity) as a proxy for the cost of capital (Francis et al. 2005; Core et al. 2008). In this vein, investigating the changes of the ICC along the business cycle with accruals quality is a novel attempt to examine the cyclicity of risk premium contained in information quality.

2.2. Cyclicity of Risk Premium along the Business Cycle

Traditional CAPM assumes market risk premium to be constant over time (Sharpe 1964; Lintner 1965; Fama and French 1992). However, many researchers argue that the traditional CAPM model does not account for the effect of macro-level state variables on the cross-sectional return distribution. Accordingly, recent researchers utilize the conditional version of the CAPM, which allows the risk premium to vary over time (Bodurtha Jr. and Mark 1991; Jagannathan and Wang 1996; Lettau

and Ludvigson 2001).⁶ The conditional CAPM model estimates the conditional distribution of stock returns as a function of innovation in economic condition (Kumar et al. 2008; Ang and Kristensen 2012)

Theoretically, investors demand a higher risk premium for higher uncertainty, which implies that macro-level state variables affect the cost of capital (French et al. 1987; Fama and French 1989). In this vein, prior studies have also empirically observed the impact of economic conditions on the cost of capital (Segal et al. 2015; Bali et al. 2017). For example, Bali et al. (2017) provide evidence that investors require higher stock returns during periods of high uncertainty to compensate for risk (i.e., uncertainty beta). They find that investors require higher compensation for stocks with negative uncertainty beta, and show that the risk premium of economic uncertainty is more pronounced during economic downturns.

Several studies in the finance literature have capitalized on this concept by examining the countercyclicality of risk premium in different economic states (Ang and Liu 2004; Zhang 2005; Adrian and Franzoni 2009; Imrohoroglu and Tuzel 2014; Lustig et al. 2014). Zhang (2005) develops a model in which high book-to-market stocks are much riskier in recessions when the risk premium is high, leading to a value

⁶ According to Fama and French (2002), the risk premium decreased to about 2% at the beginning of the 21st century from about 7% of 20 years earlier.

premium (the value anomaly). Imrohoroglu and Tuzel (2014) find that while firm-level total factor productivity (TFP) is *negatively* associated with risk premium in general, and the average level of expected returns of lower TFP firms are much higher during recessions. They argue that the risk premium of TFP is *countercyclical* based on the significant variation in the return spread over business cycles.

Accounting literature, however, has been relatively silent about the cyclicity of risk premium, with the exception of Chichernea et al. (2015) and Kim and Qi (2010). Chichernea et al. (2015) use the stock return dispersion as a macroeconomic state variable and find that the firms with a low *level* of accruals are highly exposed to return dispersion risk. Unlike Chichernea et al. (2015), I focus on the *quality* (i.e., unsigned measure) of accounting accruals to capture the cyclicity of risk premium contained in information quality. In other words, I investigate whether and how the quality of accounting information affects the cost of equity capital, and how the relation between the accruals quality and expected returns changes with the aggregate economic conditions.

2.3. Implied Cost of Capital (ICC) as a Proxy for Cost of Capital

Realized returns is frequently used as a proxy for the cost of capital in prior studies. However, realized return is an *ex post* measure and have inherent noise.

Therefore, the effect of information quality on realized returns could be substantially biased due to the severe measurement errors in realized returns (Trueman 1988; Brown 1999; Elton 1999; Easton and Mohana 2005; Lundbald 2007). In this vein, the return decomposition framework separates firm-level stock returns into three components: expected returns, returns due to cash flow news, and returns due to discount rate news (Campbell 1991; Vuolteenaho 2002). Of these three components, only the expected returns reflect the firm's *expected* cost of equity. Traditional asset-pricing tests that use *average* stock returns as a proxy for cost of capital (or expected returns) implicitly assume that realized returns, *on average*, are similar to expected returns in a finite sample. However, if an economy grows faster than people expected and large realized returns materialize, conventional asset-pricing models would not fully incorporate the economic changes and fail to provide consistent empirical evidence.⁷ Likewise, the implicit assumption that realized returns are, *on average*, equal to expected stock returns may not hold in a rapidly changing economy. In addition, while the components of realized returns such as unexpected cash flow and discount rate news are approximately zero in the long run, they may not be zero over a finite sample period

⁷ According to the example of Elton (1999, p.1202), the Japanese stock market had a rise of 20 percent per year from 1980 to 1990 as the Japanese economy continued to grow. In this case, an international portfolio including Japanese stock market fall in trouble due to substantial realized returns of Japanese stocks and relative independence from the world market.

(Elton 1999; Lundblad 2007; Chava and Purnanandam 2010).⁸ To make matters worse, realized returns are plagued by investor sentiment, transaction costs, and measurement errors (Trueman 1988; Brown 1999).

The noise in realized returns has an additional impact on the investigating a cyclical of the risk premium of information quality. Firms with low quality of information experience adverse cash flow shocks and the effect of these shocks may be more severe during recessions because firm-level stock returns have a significant cash flow news component (Ogneva 2012; Chen et al. 2013). If so, using realized returns as a proxy for expected returns would result in significantly biased findings due to the high negative cash flow shocks during economic downturns.

These issues suggest that the proxy for the cost of capital may be the source of the inconclusive empirical findings on the relation between the cost of capital and accounting information quality. In this sense, prior studies that use the ICC instead of realized returns in similar settings find empirical results consistent with theoretical predictions. The ICC for a given asset is the discount rate that equates the stock's price to the present value of expected future earnings. For example, both Francis et al. (2005) and Core et al. (2008) find that firms with higher accruals quality have lower ICC.

⁸ Elton (1999) argues that “realized returns are a very poor measure of expected returns.” *Ex ante* unknown information shocks may not be canceled in the aggregate for the entire but finite sample period (Lundblad 2007).

Using the adjusted probability of informed trading (PIN) purged of a liquidity component as a proxy for information risk, Hwang et al. (2013) show that the adjusted PIN is positively correlated with the ICC.

Therefore, I argue that the ICC is a better proxy for the cost of capital in examining the cyclicity of the risk premium of information quality. The ICC does not rely on noisy *ex post* asset returns, whereas realized returns include components that are not related to expected returns and contain more noise during the difficult times. Prior studies find theoretical and empirical evidence that the ICC is an appropriate proxy for expected returns (Fama and French 1997; Elton 1999; Pastor and Stambaugh 1999; Pastor et al. 2008; Lee et al. 2017). For example, Pastor et al. (2008) theoretically demonstrate that the aggregated ICC is a good proxy for time-varying expected returns. Also, Lee et al. (2017) develop a framework to evaluate firm-level expected return proxies and argue that the ICC is particularly useful in tracking variations in future expected returns. Lastly, Botosan et al. (2011) provide evidence that the ICC is a good measure for tracing firm-level realized returns adjusted for cash flow news. Extending prior studies, this study investigates the cyclicity of risk premium driven by the quality of accounting information by using the ICC as a proxy for expected returns.

2.4. Hypothesis Development

Investors require much higher compensation for holdings stocks with poorer information quality during economic downturns for several reasons. First, information risk stems from uncertainty about future cash flow realizations (Yee 2006; Chen et al. 2008). This uncertainty mainly driven by economic fundamentals which is related to a firm's business model and operating environment. In this vein, prior studies provide evidence that investors higher compensation for innate portion of accruals quality compared to discretionary portion of accruals quality (Francis et al. 2005; Kim and Qi 2010). As the risk from firm fundamentals are highly affected by negative macroeconomic conditions (Bloom 2014; Decker et al. 2016), the risk premium of information quality will be stronger during recessions.

Second, during recessions periods, economic uncertainty is much higher and the uncertainty of future cash flow realization increases. Therefore, uncertainty-averse investors prefer safer stocks which contain more precise information about future cash flow realizations. In this case, during economic downturns, investors would require higher compensation for holdings stocks with less precise accounting information. This is consistent with the view that the risk premium of uncertainty is higher during bad states of the economy (Bali et al. 2017).

Lastly, firms with poorer information quality are inherently riskier than firms with better information quality due to inferior operating performance. As suggested by

Kim and Qi (2010), poorer AQ firms are generally smaller, volatile, and less profitable firms. Also, Konchitchki et al. (2016) find that earnings downside risk shares the commonality with accruals quality which captures the downward trend of operating performance of poorer AQ firms. If these firms are highly affected by negative macroeconomic conditions and experience negative operating performance due to macroeconomic shocks (Imrohoroglu and Tuzel 2014), investors would require higher rewards in the form of higher expected returns.

H1: Investors require higher compensation for holdings stocks with poorer information quality, especially during economic downturns

3. Research Design and Sample Selection

3.1. Research Design

3.1.1. Implied Cost of Equity (ICC)

I follow prior literature to construct the ICC measure (Pastor et al. 2008; Li et al. 2013). More specifically, I calculate the firm-month level ICC by estimating the following simple finite horizon model:

$$P_t = \sum_{k=1}^T \frac{FE_{t+k} \times (1 - b_{t+k})}{(1 + r_e)^k} + \frac{FE_{t+T+1}}{r_e(1 + r_e)^T} \quad (1)$$

where P_t is the stock price of firm i at month t , FE_{t+k} and b_{t+k} are the value of analysts' EPS forecasts and the reinvestment rate forecasts for year $t+k$, respectively,

and T is the forecasting horizon. Following Pastor et al. (2008) and Li et al. (2013), I assume a 15-year horizon for the model ($T=15$). $FE_{t+k} \times (1-b_{t+k})$ is the free cash flow of firm i for year $t+k$. The first component on the right-hand side of Equation (1) is the present value of future free cash flows up to a terminal time period $t+T$. The second component captures the present value of long-term free cash flows beyond the terminal time horizon.

To estimate the firm-month level ICC, I forecast free cash flows up to terminal time period ($t+T$) using the following procedure. First, I extract the earnings forecast of firm i for fiscal year $t+1$ (FY_1) and $t+2$ (FY_2) using analyst EPS forecasts from the I/B/E/S Summary Database. Based on FY_1 and FY_2 , for each firm in the I/B/E/S database, I construct a 12-month-ahead earnings forecasts (FE_1) using weighted average of the median value of FY_1 and FY_2 : $FE_1 = w \cdot FY_1 + (1-w) \cdot FY_2$, where w is the number of months remaining until the next fiscal year-end divided by 12.⁹

Second, I forecast a 24-month-ahead earnings (FE_2) using the growth rate implicit in FY_1 and FY_2 (i.e., $g_2 = (FY_2/FY_1) - 1$).¹⁰ Based on g_2 , the earnings forecast

⁹ To alleviate the effects of extreme forecasts of each analyst, I use median EPS forecasts instead of mean EPS forecasts. The results are qualitatively similar when utilizing the mean analysts' forecasts.

¹⁰ Firms with a growth rate above 100% (below 2%) are fixed to the growth rate of 100% (2%).

of year $t+2$ is given by $FE_2 = FE_1*(1+g_2)$.¹¹ By taking the weighted average of FY_1 and FY_2 to construct FE_1 and FE_2 , I make a smooth transition from FY_1 to FY_2 . This process insures that earnings forecast of a given month t are always 12 months and 24 months ahead of the current month. Lastly, to forecast earnings from year $t+3$ to the terminal time period (i.e., year $t+T+1$), I assume that the growth rate of earnings of year $t+2$ (g_2) mean-reverses exponentially to a steady-state growth rate (g) by year $t+T+2$. The long-run nominal gross domestic product (GDP) growth rate, g , is assumed to be the steady-state growth rate starting in year $t+T+2$, and computed as a rolling average of annual nominal GDP growth rates. In this way, earnings growth rates and earnings forecasts until the terminal time horizon (from years $t+3$ to year $t+T+1$) are computed as follows ($k=3, \dots, T+1$);

$$\begin{aligned} g_{t+k} &= g_{t+k-1} \times \exp \left[\frac{\log(g/g_2)}{T} \right], \\ FE_{t+k} &= FE_{t+k-1} \times (1 + g_{t+k}). \end{aligned} \quad (2)$$

I forecast reinvestment rates b_{t+k} as follows. First, I calculate the reinvestment rate for year $t+1$ (b_1) as one minus the most recent year's payout ratio, which is estimated as dividing actual dividends from the most recent fiscal year by earnings over

¹¹ If one of the information on FY_1 and FY_2 is negative or missing, I fill it with available data from I/B/E/S (Li et al. 2013). For example, if $FY_1 > 0$ and the realized earnings of year t (FY_0) is available and positive, then $FY_2 = FY_1 * (FY_1 / FY_0)$. Likewise, if $FY_2 > 0$ and $FY_0 > 0$, then $FY_1 = FY_0 * (1 + ((FY_2 / FY_0) - 1)^{1/2})$. If the realized earnings of year t (FY_0) is not available or negative, then I utilize the long-term earnings growth rate by analysts forecasts from the I/B/E/S to fill in FY_1 or FY_2 .

the same time period.¹² Next, I assume that the reinvestment rate in fiscal year $t+1$ reverts linearly to a steady-state reinvestment ratio (b) by year $t+T+1$. By this way, the intermediate reinvestment rates from $t+2$ to $t+T$ ($k=2, \dots, T$) are computed as $b_{t+k} = b_{t+1} - (b_1 - b)/T$. To estimate the steady-state value (b), I assume that the product of return on new investments (ROI) and the reinvestment rate (b) is equal to the growth rate in earnings (g). As product market competition drives return on investments down to the cost of capital in the steady-state, I impose an additional condition that ROI equals r_e for new investments. Finally, the steady-state reinvestment rate (b) is obtained by g/r_e .

The long-term terminal value in Equation (1) is computed as the present value of a perpetuity; That is, the ratio of the year $t+T+1$ earnings forecast divided by the cost of equity (FE_{t+T+1}/r_e). The estimated value of r_e from Equation (1) is the firm-month level *ICC* used in the empirical analysis of this paper. I use the term *ICC* to denote excess *ICC* after subtracting the interest rate of the 30-days treasury bill.

3.1.2. Information Quality (*AQ*)

Following prior literature, I estimate accruals quality as the standard deviation of residuals of the model from the Dechow and Dichev (2002) augmented by

¹² If payout ratios are less than zero (higher than one), I assign a value of zero (one) to firm-month observation. Also, if earnings are less than zero, the rate of reinvestment is calculated from the median value across industry-size portfolios which are formed each year by Fama and French 48 industries and market value (Li et al. 2013).

McNichols (2002) (Francis et al. 2005; Core et al. 2008; and Ogneva 2012).¹³ First, I estimate the following cross-sectional regression (Equation (3)) for each year and each of the 48 Fama and French (1997) industries.¹⁴

$$TCA_{it} = \alpha_0 + \beta_1 CFO_{it-1} + \beta_2 CFO_{it} + \beta_3 CFO_{it+1} + \beta_4 \Delta REV_{it} + \beta_5 PPE_{it} + \varepsilon_t, \quad (3)$$

where TCA_{it} is total current accruals for firm i in year t estimated using the following Equation (4):

$$TCA_{it} = \Delta CA_{it} - \Delta CL_{it} - \Delta Cash_{it} + \Delta STDEBT_{it}, \quad (4)$$

where ΔCA_{it} is change in current assets from year $t-1$ to t ; ΔCL_{it} is one-year change in current liabilities; $\Delta Cash_{it}$ is change in cash and cash equivalents from year $t-1$ to t ; and $\Delta STDEBT_{it}$ is one-year change in short-term debts. In Equation (3), CFO is cash flow from operations for year t estimated as the difference between net income before extraordinary items and total accruals, where total accruals is calculated as total current accruals (TCA) minus depreciation and amortization expense in year t . ΔREV_{it} is net change in revenues from year $t-1$ to t ; and PPE_{it} is property, plant, and equipment for year t . All variables are scaled by average total assets over years $t-1$ and t .

¹³ I also use a market-based proxy, *BIDASK*, which is the firm's bid-ask spread in additional analysis (Section V). Bid-ask spreads are commonly used as a proxy for information asymmetry (Armstrong et al. 2011; Baik et al. 2018). The results are qualitatively similar.

¹⁴ I require at least 20 observations for each year and industry.

The accruals quality measure (AQ) for each firm-year observation is calculated as the standard deviation of the residuals from Equation (4) over the past five years.¹⁵ The AQ from the most recent fiscal year that ends before 16 to 4 months of each month are assigned to each stock, and then AQ is converted to decile ranks in each month in all empirical analyses. For example, the ranking for July 2012 is based on the AQ from the latest fiscal year that ended between April 2011 and March 2012.

3.1.3. Empirical Model

To investigate the effect of accruals quality (AQ) on the cyclical change of the ICC, I first perform portfolio analysis for the full sample, for the expansion period sample, and for the recession period sample, respectively.¹⁶ Next, I provide a multivariate analysis based on the following firm-month level empirical specification:

$$\begin{aligned}
 ICC_{i,t+1} = & \beta_0 + \beta_1 AQ_{i,t} + \beta_2 BETA_{i,t} + \beta_3 MTB_{i,t} + \beta_4 SIZE_{i,t} + \beta_5 PREDICTAQ_{i,t} \\
 & + \beta_6 RET_{i,t} + \beta_7 RETVOL_{i,t} + \beta_8 LEVERAGE_{i,t} + \beta_9 SALESVOL_{i,t} \\
 & + \beta_{10} CFVOL_{i,t} + \beta_{11} CFO_{i,t} + \varepsilon_{t+1},
 \end{aligned} \tag{5}$$

where $ICC_{i,t+1}$ is the excess implied cost of equity (ICC) of firm i calculated based on Equation (1) in month $t+1$.¹⁷ The variable of interest, AQ is the decile ranking

¹⁵ Following Ogneva (2012), I use the AQ of year $t-1$ as a proxy for accruals quality to prevent the look-ahead bias (Francis et al. 2005).

¹⁶ The designation of expansion and recession periods are following the National Bureau of Economic Research (NBER).

¹⁷ I use ICC in month $t+1$ as a dependent variable to allow investors to fully access the information of month t before forming their expected rate of return of month $t+1$.

of accruals quality (AQ) where accruals quality is calculated as the standard deviation of residuals of Equation (3) from year $t-5$ to year $t-1$. To allow for easier interpretation of economic effects, I use monthly rebalanced decile rankings of accruals quality (i.e., Dechow and Dichev (2002) measure). Higher AQ implies that firm i has a lower quality of accruals. To control for risk factors that affect future expected returns, I include various control variables such as market beta ($BETA$), market-to-book ratio (MTB), and market capitalization ($SIZE$). Following Hughes et al. (2009) and McInnis (2010), I also add additional control variables to control for firm characteristics such as growth, leverage, and volatility. $RETVOL$ is the standard deviation of stock returns over the past 60 months; $LEVERAGE$ is long-term debt divided by total assets. To control for operating risk, I include five-year historical sales and cash flow volatility ($SALEVOL$ and $CFVOL$) in the model. Following Lyle (2019), I control for several additional variables. $PREDICTAQ$ is the five-year rolling standard deviation of the fitted portion of Equation (3); RET is excess stock returns in month t ; Lastly, I control for operating cash flows (CFO). Equation (5) is estimated monthly using the Fama and MacBeth (1973) approach in the full sample, and for each state of economic conditions (i.e., expansions and recessions), respectively. Standard errors are adjusted based on Newey and West (1987).

3.2. Sample Selection

The sample period starts in January 1977 and ends in December 2016. The sample period starts from January 1977 because of the data availability of I/B/E/S analysts' earnings forecasts. Stock returns data are from CRSP monthly files, and accounting data are from Compustat annual files. Firms must have a positive book and market values of equity to be included in the sample. Following Kim and Qi (2010) and Lyle (2019), I delete all financial (SIC codes 6000 to 6999) and utilities (SIC codes 4900 to 4999) firms. After applying data filters, along with the data requirements for the calculation of ICC and variables used in Equation (5), the final sample consists of 654,686 firm-month observations. As is common in asset pricing studies, all variables used in the analysis aside from stock returns are winsorized at the 1 and 99 percentiles.

4. Empirical Results

4.1. Descriptive Statistics

Table 1 shows the descriptive statistics. The mean value of monthly *ICC* is 0.613%, which is equivalent to an annualized rate of 7.61%. This is comparable to Li et al. (2013)'s mean value of annual excess *ICC* of 7.07%. The average (median) firm in the sample has an *AQ* of 0.048 (0.036), which is comparable to the average value of *AQ* (0.044) in Francis et al. (2005). Among other variables, historical *BETA* has a mean (median) value of 1.206 (1.137), market-to-book ratio (*MTB*) of 2.767 (1.989), and firm

size (*SIZE*) of 6.153 (6.050). The average (median) value of monthly realized excess stock returns is 0.829% (0.412%).

[Insert TABLE 1 here]

4.2. Information Quality and Cyclicalities of Cost of Capital

In Figure 1, I depict the median value of *ICC* of *AQI* (high accruals quality, lower *AQ* value) and *AQ10* (low accruals quality, higher *AQ* value) decile portfolios in each month during the sample period. Generally, *AQ10* portfolios have a higher value of *ICC* than *AQI* portfolios. Interestingly, the difference of *ICC* between *AQ10* and *AQI* portfolios is greater during economic recession periods such as the 2008 Financial Crisis (from January 2008 to June 2009) and the Dot-Com bubble (from April 2001 to November 2001). This trend is consistent with the view that the risk premium of accruals quality is generally higher during economic downturns. That is, the risk premium of accruals quality is countercyclical.

[Insert FIGURE 1 here]

Table 2 provides the main results of this paper. In Table 2, I present the results of portfolio and Fama and MacBeth (1973) analyses which examine the effect of accruals quality on the *ICC* along with the changes in economic conditions. In Panel A,

I first conduct portfolio analysis based on the decile rankings of an accruals quality (AQ) measure. When I compare the mean value of ICC of each portfolio in the full sample, I find that the average cost of capital increases monotonically as accruals quality decreases. For example, the highest accruals quality portfolio ($AQ1$) has an average ICC of 0.495, while the lowest accruals quality portfolio ($AQ10$) has a mean ICC value of 0.901. The difference between the $AQ1$ and $AQ10$ portfolio is statistically significant at 1% level. Economically, the annualized difference between $AQ1$ and $AQ10$ portfolio is about 4.98%. These results are consistent with Francis et al. (2005) and Core et al. (2008) who document a *negative* relation between accruals quality and the cost of capital when the cost of capital is measured as the implied cost of equity.

Next, I divide the sample into two different subsamples conditioning on the state of the economy. As shown in Panel A, the difference between highest ($AQ1$) and lowest ($AQ10$) accruals quality portfolio is 0.404 during economic expansions, while that difference becomes more pronounced during recessions (mean difference = 0.419). Collectively, the results of Panel A of Table 2 show that the risk premium of accruals quality is countercyclical. That is, the risk premium connotated in accruals quality is affected by the state of the economy and shows the countercyclical feature.

In Panel B of Table 2, I conduct Fama and MacBeth (1973) monthly regressions. In Column (1) and (4), I find that the accruals quality measure (AQ) is positively

associated with future *ICC*, which indicates that investors require higher expected returns for firms with low accruals quality to compensate for the additional risk. In Column (2) and Column (3), I repeat the same analysis after dividing the sample into two different economic states (i.e., expansions and recessions). As shown in Columns (2) and (3), the coefficients on *AQ* are positive and significant across the columns, which shows that accruals quality affects the cost of capital, regardless of the state of the economy. However, the coefficient on *AQ* is higher in recession periods than that in expansion periods (Column (2): 0.130 *versus* Column (3): 0.135). In Column (5) and (6), I control for additional variables, which are known as factors that affect the cost of capital. Even after controlling for various characteristics, the coefficients on *AQ* is significant regardless of the state of the economy. Interestingly, the coefficients on *AQ* is much higher in economic downturns than expansion periods (Column (5): 0.037 *versus* Column (6): 0.082). Moreover, their difference of *AQ* between Column (5) and Column (6) is statistically significant (p-value: <0.001). Hence, the results of Table 2 show that risk characteristic of the accruals quality are countercyclical and varies depending on the state of the economy. These results confirm that investors require a higher risk premium for low accruals quality stocks, especially for the periods of economic downturns and consistent with asset pricing theory that investors demand

higher compensation for risk when they face higher uncertainty (Zhang 2005; Imrohoroglu and Tuzel 2014).

Turning to other firm characteristics, I find that the coefficients on historical market beta (*BETA*) have opposite signs depending on the state of the economy. The coefficient on *BETA* is *negative* and marginally significant (t-value = -1.84) during expansion periods (Column (5)), while the coefficient on *BETA* is *positive* and statistically significant (t-value = 4.14) during recession periods (Column (6)). These results are consistent with prior literature that documents the time-varying nature of risk-premium (Jagannathan and Wang 1996; Lettau and Ludvigson 2001; Kumar et al. 2008). Other control variables are generally consistent with prior literature. Additionally, a positive coefficient on *AQ* after controlling for the market risk premium shows that investors require an additional risk premium beyond market risk premium for stocks with low accruals quality, and this is more salient during recession periods.¹⁸

[Insert TABLE 2 here]

4.3. Why Investors Require Higher Compensation during Recession?

¹⁸ It is also possible that recession periods simply reflect the heightened information asymmetry between managers and investors. To parse out the effect of heightened information asymmetry during recession, I conduct several additional analyses in the next section. Additionally, the evidence of prior studies that other firm characteristics which are less likely to related to information asymmetry also shows countercyclical risk premium provide evidence that the business cycle does not simply reflects the information asymmetry (Bali et al. 2017; Imrohoroglu and Tuzel 2014).

An interesting observation described in the previous section is that the risk premium of information quality is countercyclical. My interpretation of this return evidence is that low accruals quality firms are systematically riskier than high accruals quality firms, and this is particularly important in economic downturns. In this section, I provide additional evidence on why investors of low accruals quality firms require higher compensation for the additional risk they bear, especially during recession periods. To understand the underlying mechanism of the countercyclical relation between accruals quality and the cost of capital, I conduct four different sets of additional analyses.

4.3.1. Innate Accruals Quality and Discretionary Accruals Quality

The first empirical analysis relies on the origin of risk connotated in low quality of accounting information. According to Zhang (2006), the quality of information can be described as an ambiguity regarding the effect of new information on the firm value. This ambiguity may stem from two different sources: the volatility of a firm's fundamental characteristics and poor information (Zhang 2006).¹⁹ Francis et al. (2005) distinguish the accruals quality into innate components of accruals quality and

¹⁹ Consistent with Hirshleifer (2001), both sources have impact on the uncertainty of a firm's real value as stock volatility and other constructs incorporate both sources.

discretionary components of accruals quality based on the regression of accruals quality (AQ) on various firm fundamentals (e.g., size, the volatility of sales and cash flows, operating cycle, and performance). The literature documents that the portion of accruals quality related to innate factors, which originated from the firm's business condition and operating environment, is more highly associated with the cost of capital. On the other hand, the discretionary accruals quality is much more diversifiable and less likely to be associated with the cost of capital (Francis et al. 2005; Kim and Qi 2010). If innate accruals quality is more strongly associated with the cost of capital, the risk premium of innate accruals quality also becomes stronger during the recession period where the prospect of a firm's business model and operating environment becomes uncertain. To investigate whether the relation demonstrated in Table 2 is originated from riskier firm fundamentals rather than diversifiable managerial choice, I decompose the total accruals quality (AQ) into innate and discretionary portions following Francis et al. (2005).

$$AQ_{i,t} = \gamma_0 + \gamma_1 LNAT_{i,t} + \gamma_2 CFVOL_{i,t} + \gamma_3 SALESVOL_{i,t} + \gamma_4 OC_{i,t} + \gamma_5 NEGEARN_{i,t} + \varepsilon_{i,t}, \quad (6)$$

where AQ is the estimated accruals quality of firm i in year t using Equation (3). $LNAT$ is the log of total assets; $CFVOL$ is the standard deviation of cash flow from operations in the past ten years; $SALESVOL$ is the standard deviation of sales in the

past ten years; *OC* is operation cycles calculated as the sum of the accounting receivable cycle and the inventory cycle; and *NEGEARN* is the percentage of negative earnings in the past 10 years. The predicted value from Equation (6), *INNATEAQ*, is the innate portion of a firm's *AQ* which is related to firm fundamentals. The residual from Equation (6) is the discretionary portion of a firm's *AQ*, namely *DISCAQ*.

Table 3 shows the results after replacing the independent variable into *INNATEAQ* and *DISCAQ*.²⁰ In Columns (1) to (3), I use *INNATEAQ* as a proxy for information quality, while Columns (4) to (6) use *DISCAQ* as an information quality measure. In Column (7) to (9), I conduct pooled regression after including both *INNATEAQ* and *DISAQ* as variables of interest. Across all columns, I find positive and significant coefficients on both *INNATEAQ* and *DISCAQ*. When I compare the coefficients across the state of the economy, I find that coefficients on *INNATEAQ* in recessions (Column (3) and (9)) are generally greater than the coefficients on *INNATEAQ* in expansions (Column (2) and (8)) and their differences are statistically significant at 10% level. Interestingly, the coefficients on *DISCAQ* are not statistically different across expansions and recession periods regardless of model specification.

²⁰ As Equation (6) requires firms to have the past ten years of cash flow from operations and sales data, sample size reduced to 448,045 firm-month observations.

The results of Table 3 are generally consistent with the theoretical background that innate accruals quality is much more strongly related to the cost of capital (Francis et al. 2005; Kim and Qi 2010). Adding to prior studies, I suggest novel evidence that innate portion of accruals quality (*INNATEAQ*) is more strongly associated with the cost of capital during the recession periods. This result provides new evidence that firms with low quality of accounting information are riskier than higher accruals quality firms during economic downturns due to the risk incorporated in the firm's business model and operating environment.²¹

[Insert TABLE 3 here]

4.3.2. Fundamental Risk and Cyclicity of Accruals Quality Risk Premium

Yee (2006) states that the risk of information quality can be divided into fundamental risk and earnings quality risk (Yee 2006; Chen et al. 2008). Fundamental risk indicates the uncertainty about the realizations of future cash flows. According to Yee (2006), this uncertainty is related to a firm's particular business model and the structure of organization.²² In contrast, earnings quality risk is information risk stems from noise in earnings, due to either earnings management or a weak association

²¹ Additionally, I note that the coefficients on *DISCAQ* is generally comparable to the coefficients on *INNATEAQ* during the expansion periods.

²² In this vein, fundamental risks of Yee (2006) have the commonality with the innate portion of accruals quality suggested by Francis et al. (2005).

between accounting earnings and economic earnings. In the absence of fundamental risk, earnings quality risk does not affect the cost of capital. This theoretical model implies that the relation between accruals quality and the cost of capital is mainly driven by the firm's fundamental risk. Similarly, Epstein and Schneider (2008) argues that in the state where fundamentals do not change much, investors do not incorporate information whether information quality is good or bad, so the risk premium should be small even if quality of information is low. In contrast, when fundamentals are changing rapidly, investors care about information quality more and the premium for low quality of information should be higher. Given that firms with higher fundamental risk are profoundly affected by the business cycle, the countercyclicality of accruals quality risk premium also changes depending on the fundamental risk of the firm.

To investigate whether the countercyclicality of accruals quality risk premium affected by the firm's fundamentals, I examine cross-sectional variation in the main empirical tests. As a proxy for fundamental risk, I choose three different firm characteristics. First, following Zhang (2006), I use the reciprocals of market capitalization as a proxy for fundamental risk. As better information is available for larger firms, and it reduces uncertainty and risk, small firms are assumed to have higher fundamental risk. Next, following Jiang et al. (2005), I identify return volatility and

cashflow volatility as another proxy for fundamental risk based on the stylized fact that more volatility is associated with greater fundamental risk.

More specifically, I estimate the following regression for each month based on Fama and MacBeth (1973) methodology:

$$\begin{aligned}
 ICC_{i,t+1} = & \beta_0 + \beta_1 AQ_{i,t} + \beta_2 AQ_{i,t} * FRISK_{i,t} + \beta_3 FRISK_{i,t} + \beta_4 BETA_{i,t} \\
 & + \beta_5 MTB_{i,t} + \beta_6 SIZE_{i,t} + \beta_7 PREDICTAQ_{i,t} + \beta_8 RET_{i,t} \\
 & + \beta_9 RETVOL_{i,t} + \beta_{10} LEVERAGE_{i,t} + \beta_{11} SALESVOL_{i,t} \\
 & + \beta_{12} CFVOL_{i,t} + \beta_{13} CFO_{i,t} + \varepsilon_{t+1},
 \end{aligned} \tag{7}$$

where *FRISK* is one of three fundamental risk measures (i.e., reciprocals of *SIZE*, *RETVOL*, and *CFVOL*). Other variables are defined in Equation (5).

In Table 4, I first conduct two-way quintile sorts, where firms are first sorted based on one of the fundamental risk variables and then on *AQ*. The results based on two-way sorts are presented in Panel A, B, and C in Table 4. In general, as the firm's fundamental risk increases, the *ICC* of that quintile also increases, which implies that investors require higher compensation for firms with higher fundamental risk. Also, the difference between high (*AQ1*) and low *AQ* (*AQ5*) increases as the fundamental risk increases, which shows that the relation between *AQ* and the cost of capital varies depending on the fundamental risk. More importantly, the difference between high and low *AQ* is more pronounced in recession periods compared to expansion periods (e.g., in Panel A: 0.315 in Expansions; 0.345 in Recessions). The portfolio analysis shows

that the relation between AQ and the cost of capital is more pronounced in high fundamental risk portfolios and recessions period. These results provide evidence that low accruals quality firms are highly affected by the business cycle, especially when their fundamentals are quite weak.

In Panel D, I provide the results of Equation (7). The coefficients on $AQ*FRISK$ is positive and significant across all columns, while that of AQ is negative and significant across all columns. Consistent with Yee (2006) and Chen et al. (2008), the relation between AQ and the cost of capital is pronounced in high fundamental risk firms. More importantly, the difference in $AQ*FRISK$ is positive and significant between the expansions period and recessions periods at 1% level. These results confirm that higher risk of low accruals quality firms is due to higher fundamental risk of low accruals quality firms. Interestingly, the ICC of low fundamental risk firms is generally lower in recession periods across all fundamental risk ($FRISK$) variables despite the low quality of accounting information. This result indicates the endurance of low fundamental risk firms during recession periods. Overall, the results of Table 4 shows that the underlying mechanism of the relation between accruals quality and the cost of capital is the firm's fundamental risk, which becomes more salient during recession periods when investors are paying attention to their limited capital.

[Insert TABLE 4 here]

4.3.3. *Sensitivity to Negative Aggregate shocks in the Economy*

In order to further examine whether the quality of accounting information is systematically related to fundamental risk that stems from macroeconomic conditions, I provide additional evidence on the higher risk of low AQ firms that is not based on *ex ante* returns. In this section, I test whether there are systematic differences in the sensitivity of low and high AQ firms' earnings to *negative* macroeconomic shocks in the economy. I conjecture that earnings of low AQ firms would be more sensitive to negative macroeconomic shocks than the high AQ firms, especially during economic downturns. This is consistent with Ogneva (2012) who argues that low AQ firms are generally experience low cash flow shocks.

To test this conjecture, I examine the link between AQ and the negative shocks in the economy by calculating firm-specific sensitivities (betas) to economic shocks. First, I estimate *Beta_NegShock_IB* (*Beta_NegShock_NI*) by regressing income before extraordinary items (net income) scaled by total assets on quarterly GDP growth shock during negative macro-shock periods using a 60-month rolling window. GDP growth shock is defined as the difference of GDP growth of quarter $t+1$ and t . Also, negative macro-shock is a period where quarter-over-quarter drops in the growth rate of real GDP by 3% or more. After obtaining firm-specific sensitivities to macroeconomic shocks, I perform a correlation analysis of AQ with the set of firm-level macroeconomic

sensitivities, and a portfolio analysis of the firm-level macroeconomic sensitivities based on *AQ* decile portfolios. Low AQ firms are expected to be more sensitive to *negative* macroeconomic shocks than high AQ firms, which constitutes a fundamental risk feature of low AQ firms.

The results are presented in Table 5. In Panel A, I first conduct a correlation analysis. The results show that firms with low AQ are highly correlated with *Beta_NegShock_IB* (*Beta_NegShock_NI*) and statistically significant at 1% level. This result strengthens my conjecture that firms with low AQ are more sensitive to negative macroeconomic shocks. Interestingly, the firm-level sensitivities of low AQ firms to negative macroeconomic conditions increase during recessions. This evidence is consistent with the view that firms with low AQ become riskier during economic downturns because they are highly affected by negative macroeconomic conditions.

In Panel B, I perform portfolio analyses based on different measure of operating performance (i.e., income before extraordinary items and net income). I find that AQ10 firms become highly sensitive to downward macroeconomic states as evidenced by mean of *Beta_NegShock_IB*. In addition, AQ 10 firms' sensitivities to negative macro shocks increase as the economy is in the recessions. These results are robust to different measure of operating performance (i.e., net income). Overall, the results of Table 5 show that low AQ (AQ10) firms are quite sensitive to negative macroeconomic

conditions, especially during recession periods. These results are consistent with earlier findings of this paper based on the *ICC* and imply a higher risk for low accruals quality firms, especially when the economy is doing poorly.

[Insert TABLE 5 here]

4.3.4. Economic Uncertainty and the Countercyclicality of AQ Risk Premium

As the macroeconomy becomes less predictable, investors require higher compensation for risky firms (Bali et al. 2017). This is because of the uncertainty in the realization of future cash flows. In this case, if low quality of accounting information exacerbates the uncertainty of future cash flow realizations, low AQ firms are perceived as much riskier than high AQ firms. Therefore, investors want to compensate their risk with higher expected returns. To test this conjecture, I utilize the one-month ahead economic uncertainty score developed by Jurado et al. (2015).²³ They provide direct econometric estimates of time-varying macroeconomic uncertainty. Instead of dichotomous classification of NBER, I use the economic uncertainty score to classify the state of the economy into low uncertain and high uncertain periods.²⁴

²³ The economic uncertainty score is available at <https://www.sydneyludvigson.com/data-and-appendixes>

²⁴ The correlation between *RECESSION* and *UNCERTAINTY* is 0.65.

The results are presented in Table 6. I first sort each month into uncertainty quintiles based on one-month ahead economic uncertainty scores from Jurado et al. (2015) and divide each firm-month observations into quintiles based on the accruals quality (AQ) measure. In Panel A of Table 6, I find that the ICC monotonically increases as AQ increase across all economic uncertainty quintiles. That is, across all the state of the economy, highest accruals quality firms ($AQ1$) have lower cost of capital compared to lowest accruals quality firms ($AQ5$). Consistent with my findings in Table 2, the difference between two extreme AQ portfolios becomes greater as the economy enters into highly uncertain periods. In a highly uncertain economy (Uncertainty V), the difference in terms of ICC between the highest and lowest accruals quality portfolios translates into an annualized rate of 10%.

Panel B of Table 6 reports the Fama and MacBeth (1973) monthly regression results across economic uncertainty quintiles. The coefficient on AQ shows a positive and significant coefficient across all uncertainty quintiles, and the magnitude of coefficients becomes more significant as economic uncertainty increases. The difference is quite vast between the high uncertain period and low uncertain period. Collectively, the results of Table 6 confirm that in a highly uncertain period, investors require higher expected returns for firms with low accruals quality. This result is consistent with the view that low accruals quality firms are generally riskier than high

accruals quality firms, and this risk becomes more pronounced during economically uncertain periods.

[Insert TABLE 6 here]

4.4. Information Quality and Cyclicalities of Realized Returns

Kim and Qi (2010) argue that “the greater risk premium is given to poorer *AQ* firms but not during contraction periods.” (p.958). Moreover, they show that realized returns on *AQ*-sorted portfolios increase monotonically only in the expansion period.²⁵ To check whether the relation between *AQ*-sorted portfolios and the realized returns in my sample are consistent with Kim and Qi (2010), I repeat the analyses in Table 2 after replacing the dependent variable in Equation (2) from *ICC* in month $t+1$ to realized excess monthly returns (*RET*) in month $t+1$. Figure 2 shows the patterns of the median value of realized returns of highest (*AQ1*) and lowest (*AQ10*) *AQ*-sorted portfolios. Unlike a clear pattern in Figure 1, I cannot observe any distinct difference between realized returns of the highest *AQ* portfolio (*AQ1*) and the lowest *AQ* portfolio (*AQ10*).

[Insert FIGURE 2 here]

²⁵ On the other hand, the mean realized returns on *AQ*-sorted portfolios decrease monotonically during the contraction periods (Kim and Qi 2010, p.959). Though the authors argue that the risk premium on *AQ* is only given during the expansion period, they cannot find any statistical difference in their portfolio analysis (p.959).

Table 7 shows the portfolio analysis and regression analysis conducted with subsequent monthly realized returns (RET_{t+1}). Panel A shows the portfolio analysis. When I compare the difference of realized returns in AQ-sorted portfolios, there is a monotonic increasing trend in returns of AQ portfolios. However, in recession periods, there are no statistical differences between $AQ1$ portfolio and $AQ10$ portfolios. These results are consistent with the argument of Kim and Qi (2010). Consistent with their argument, the risk premium is given to poorer AQ firms only in expansion periods. Though Kim and Qi (2010) do not provide any regression analysis regarding the difference of returns in different AQ groups depending on the state of the economy, I conduct an additional empirical investigation using Fama and MacBeth (1973) monthly regression to provide more corroborating evidence. Panel B of Table 7 shows the results. I find that all the coefficients on AQ are not statistically significant across the columns (Column (1)–Column (6)) except for Column (4) where investors require less risk premium for stock with low accruals quality. Additionally, the difference between expansion periods and recession periods in terms of coefficients on AQ is also statistically insignificant.²⁶

²⁶ Different directions of realized stock returns and implied cost of equity is already discussed by Core et al. (2008). According to Core et al. (2008), it is plausible to adjust the weight to the realized returns which come from large samples, and to the implied cost of equity capital evidence (small sample size). In this paper, I try to reconcile the different directions of ex-post stock returns and ex-ante ICC 1) by

Kim and Qi (2010) argue that noise in stock returns are generally severe for low price stocks and state that after controlling for low price stocks, accruals quality is a priced risk factor. Hence, I additionally exclude low price stocks to check whether the argument of Kim and Qi (2010) is replicable in my sample. The results are reported in Panel C of Table 7. After excluding low priced stocks (i.e., lower than \$5 for two consecutive months), I still find no consistent results with Kim and Qi (2010). Given that realized returns are noisy proxies for expected returns due to contamination by unexpected information shocks, inferences from finite samples may be strongly biased (Elton 1999; Lundbald 2007; Hann et al. 2013). In next section, I provide the evidence of the noise in realized returns which contaminate the relation between accruals quality and cost of capital.²⁷

[Insert TABLE 7 here]

4.5. Comparison of Implied Cost of Equity (ICC) and Realized Returns (RET)

removing cash flow shocks from stock returns and 2) by using model-based implied cost of capital which increase the sample size in the later part.

²⁷ Ogneva (2012) also points out the contamination of realized returns. She suggests that excluding the cash flow shocks from the realized returns is a valid way to test the pricing effect of accruals quality because realized returns contain cash flow shocks.”

As suggested by Elton (1999), the realized returns are contaminated by the information shock affected by the state of the economy (as described in Section II). In a similar vein, prior studies suggest that decomposing realized returns into expected returns and unexpected information shocks is crucial in removing the noise in realized returns (Campbell 1991; Vuolteenaho 2002; Ogneva 2012). In this section, I try to reconcile contradictory evidence of this paper and Kim and Qi (2010) by suggesting some explanations about the noise in realized stock returns.

4.5.1. Rapidly Changing Stock Returns around Transition Period

First, I argue that realized stock returns are rapidly changing around the transition of the economic period. In Figure 3, when I depict the stock return trend of highest (*AQI*) and lowest (*AQI0*) accruals quality portfolios around the changing economic period, I find opposite trends of realized returns depending on the changing statuses.²⁸ For example, In Panel A of Figure 3, I find that around the transition period of economic recovery (2009.4 - 2009.09), realized returns of *AQI0* portfolio are generally higher than that of *AQI*.²⁹ On the other hand, as shown in Panel B of Figure

²⁸ Since the monthly nominal GDP growth is not available on NBER data, in Figures 3 and 4, I provide the monthly industrial production growth rate (Federal Reserve Statistical Release G.17) as a bar shape around the transition periods (Baker and Wurgler 2006).

²⁹ In this paper, the transition period indicates the before and after the three months of changing economy indicator month. That is, as NBER announced expansion period starts from July 2009, before

3, *AQI* portfolios generally show higher returns than *AQI0* portfolios when the economy is changing from expansions to recessions (2007.10 – 2008.03). That is, as Elton (1999) points out, the realized returns are quite volatile during the transition of the state of the economy. Therefore, the test of accruals quality on realized returns based on the dichotomous distinction of the economy, such as NBER recession indicators, may provide biased results. In Figure 3, I also depict the monthly industrial production growth rate. It shows that around the transition period, there is a substantial change in the industrial production growth rate. As stock returns are highly correlated with aggregate growth, comparing the realized returns of expansion and recession periods in terms of risk premium naturally causes higher measurement errors.

[Insert FIGURE 3 here]

Unlike the *RET*, which show the different trend around the transition period with regard to the risk premium of accruals quality, *ICC* shows a relatively clear trend around the change of the economy. In Figure 4, I provide the mean value of *ICC* around the changing economy from the recession (expansion) to expansion (recession) in Panel A (Panel B). I find that the difference in *ICC* between *AQI* and *AQI0* portfolios is smaller (greater) as the economy enters the expansion (recession) periods.

and after three months of July 2009, classified as a transition period (from April 2009 to September 2009).

[Insert FIGURE 4 here]

4.5.2. Excluding Cashflow Shocks from Stock Returns

Prior studies suggest that decomposing realized returns into expected returns and unexpected information shocks are vital to removing the noise in realized returns (Campbell 1991; Vuolteenaho 2002). According to the framework of return decomposition, realized returns could be decomposed into three parts: expected returns, returns due to cash flow news, and returns due to discount rate news. Among the three parts, only expected returns reflect the *true* cost of capital. In a similar vein, Ogneva (2012) takes the earnings-response coefficient (ERC) framework and decomposes realized returns into cash flow shocks and returns excluding cash flow shocks (non-cash flow shocks). In this section, I reexamine the relation between accruals quality and realized returns after removing cash flow shocks from realized returns. Following the framework of Ogneva (2012), I divide the stock returns into cash flow news and non-cash flow shocks. More specifically, I calculate the cash flow shock portion (*CFRET*) as the fitted value from the cross-sectional regression of realized returns on earnings surprises, *SURP*. Earnings surprises (*SURP*) are estimated as the expectation of earnings from a simple statistical earnings model which assumes that earnings generally follow an AR(1) process. The resulting coefficients are used to construct the

next year's predicted earnings. *SURP* is defined as differences between actual earnings minus predicted earnings scaled by the market value of equity at the beginning of the month. With *SURP*, I estimate the cash flow shock portion of the realized returns (*CFRET*) using cross-sectional decomposition. That is, I run monthly cross-sectional regressions of excess stock returns on contemporaneous earnings surprises (*SURP*). The fitted value from this regression represent cash flow shocks (*CFRET*), while the residuals plus the intercept represents returns excluding cash flow shocks (i.e., non-cash flow shocks, *NCFRET*). Following Freeman and Tse (1992) and Cheng et al. (1992), I account for asymmetry in the returns-earnings relation by estimating equation within 5 percent intervals over the earnings surprise (*SURP*) distribution.

In Panel A of Table 8, I sort firms into monthly decile of *AQ* and estimate the mean value of earning surprise (*SURP*), cash flow shocks (*CFRET*), and non-cash flow shocks (*NCFRET*). Consistent with Ogneva (2012), low accruals quality firms generally experience negative earnings surprise, and the degree of negative earnings surprise become larger as the quality of accounting information deteriorated. Also, low accruals quality firms face negative cash flow shocks (*CFRET*). According to Ogneva (2012), these negative cash flow shocks contaminate the relation between accruals quality and stock returns. On the other hand, non-cash flow shocks (*NCFRET*)

monotonically increase as the accruals quality decrease, consistent with the view of Ogneva (2012).

When the economy entered into recessions, I find that the negative effect of *CFRET* is more crucial on the relation between accruals quality and realized returns. The spread of *CFRET* between the highest and lowest *AQ* portfolios is -0.104 in expansions, and -1.102 in recessions, respectively. Only in recession periods, the gap difference shows a statistically significant difference between two portfolios. On the other hand, *NCFRET* shows a totally different trend. The spread between the highest and lowest *AQ* portfolios is 0.321 in expansion periods, while that of the recession period is 0.963. In terms of economic significance, this gap difference translates into 7.98% in annualized rate of returns.

Next, in Panel B of Table 8, I re-estimate the Equation (5) after replacing the dependent variable to non-cash flow shocks (*NCFRET*). The coefficients on *AQ* are generally higher in recession periods compare to that of expansion periods. The difference is statistically significant across the different model specifications at least 10% level. The results of Table 8 confirm that realized returns contain unexpected information shocks in nature, and it is necessary to remove this noise to investigate the countercyclicality of risk premium of accruals quality. Hence, I conclude that the results of a prior study that the risk premium of accruals quality exists only in expansion

periods are due to the noise in realized returns (Kim and Qi 2010). After excluding cash flow shocks and utilizing the expected return portion of realized returns as a proxy for the cost of capital following the framework of Ogneva (2012), I find consistent results with the ICC.

[Insert TABLE 8 here]

5. Additional Tests

5.1. *Economic Uncertainty and the Realized Stock Returns*

In Table 6, I document that the risk premium of accruals quality becomes more pronounced during economically uncertain periods. To test whether insignificant relation between AQ and the cost of capital in Table 7 (i.e., realized returns as a proxy for the cost of capital) is due to dichotomous classification of expansion and recession, I repeat the analysis of Table 6 after replacing dependent variables with realized returns (RET) and non-cash flow shocks ($NCFRET$). Table 9 shows the results. In Panel A, I provide the results of realized returns. Except for Column (2), AQ are not significantly related to realized returns, and the difference between high and low uncertain periods is not statistically different. On the other hand, in Panel B, the coefficients on AQ is monotonically increasing as the economy becomes uncertain. Also, the difference between the high and low uncertain period in terms of coefficients on AQ is statistically

significant. Again, the insignificant results of Table 7 are not due to the dichotomous classification of state of the economy. Instead, after excluding the cash flow shocks from the realized returns, I find that investors require higher stock returns for stocks with low accruals quality, especially during a highly uncertain period.

[Insert TABLE 9 here]

5.2. Controlling for Additional Variables

My findings are robust to controlling for various factors that are known to affect the risk-premium of accruals quality. First, following Ogneva (2012), I control for cash flow news correction in Ogneva (2012). Also, Lyle (2019) provides evidence that the relation between stock returns and information quality is opposite conditioning on the option-like characteristics (growth options) of individual firms. Lastly, McInnis (2010) points out that the error in analyst forecast affects the relation between earnings smoothness and the cost of capital. To ensure that my analysis is not driven by various factors that are known to affect the risk premium of accruals quality, I repeat the analysis of Panel B of Table 2 after controlling for the cash flow news correction (*CFRET*), option-like characteristics (*OPTIONLIKE*), and several characteristics of analysts forecast (i.e., *FCDISPERSION*, *FCHIGHER*, and *FCERROR*).³⁰

³⁰ Definitions of additional control variables are provided in Appendix A.

Panel A of Table 10 presents the results. After controlling for cash flow news (*CFRET*), option-like characteristics of a firm (*OPTIONLIKE*), and characteristics of analyst forecast (*FCDISPERSION*, *FCHIGHER*, and *FCERROR*). I still find positive and statistically significant coefficients on *AQ* across all columns, and the magnitude of coefficients are generally larger during the economic recession periods than during expansion periods. These results demonstrate that my findings are not driven by known factors that affect the relation between information quality and cost of capital.

5.3. Model-Based Measure of Implied Cost of Equity

In previous section, I additionally control for various characteristics of analysts forecast. Hou et al. (2012) provide evidence that the implied cost of capital measures based on analysts' earnings forecasts are subject to sample selection issues. That is, the coverage of implied cost of capital measures are restricted to firms that have at least one earnings forecast from financial analysts. To increase the coverage, Hou et al. (2012) suggest the implied cost of equity estimates using the ROA (return on assets) of prior years to forecast future earnings (model-based ICC). In this section, I construct the firm-month level model-based ICC following Hou et al. (2012). The results are reported in Panel B of Table 10. I find that the results are not changed even after I utilize the model-based ICC as a dependent variable. That is, my findings can be

generalized to the firms without analyst earnings forecast and are not affected by the construction of ICC estimates.

5.4. Market-Based Measure of Information Quality

To test whether main findings of this paper are robust to the different measure of information quality, I utilize a market-based proxy, *BIDASK*, which is the firm's bid-ask spread as an alternative proxy for information quality. Bid-ask spreads are widely used as a proxy for information asymmetry (e.g., Armstrong et al. 2011; Baik et al. 2018) and are theoretically decreasing in information quality. Following Baik et al. (2018), *BIDASK* is measured as the ask price minus the bid price divided by the average of the bid and ask prices. The results are presented in Panel C of Table 10. Consistent with Table 2, the coefficients on *BIDASK* are positive and statistically significant across all columns. Furthermore, the coefficients on *BIDASK* is higher in recession periods compared to expansion periods (0.244 in Column (6) and 0.161 in Column (5)). Also, the difference between Column (6) and (5) is statistically significant at the 1% level. The results confirm that the findings of this paper are robust to the different proxy of information quality.

5.5. Systematic Risk

According to traditional asset pricing theories, only non-diversifiable risk should be priced into the cost of capital because investors may diversify away firm-specific risk (e.g., Lintner 1964; Sharpe 1964; Lambert et al. 2007). In a similar vein, Liu and Wysocki (2017) examine the role of information quality on the CAPM betas and find consistent evidence with theoretical predictions. Thus, to find whether the risk of accruals quality is non-diversifiable, I examine the relation between accruals quality and a firm's systematic risk depending on the state of the economy. Specifically, I regress historical *BETA* on the *AQ* and compare the coefficients across the business cycle.

Panel D of Table 10 reports the results. Generally, the quality of accruals is related to systematic risk. Moreover, the coefficients on *AQ* during recession periods are statistically larger compare to that of expansion periods. The results of Panel C of Table 10 indicate that the countercyclicality of risk premium of information quality is partially through the systematic risk (i.e., CAPM beta), and this relation is stronger during recessions.

[Insert TABLE 10 here]

6. Conclusion

Using the ICC as a proxy for the cost of capital, I provide evidence that investors require higher expected returns for firms with *lower* accruals quality. More importantly, this paper shows that the relation between the ICC and accruals quality varies depending on the state of the economy. During the downturn of the economy, investors require *higher* returns for firms with *lower* accruals quality, and the cost of capital spread between high accruals quality firms and low accruals quality firms widens. Additionally, I provide evidence that higher risk premiums of firms with low accruals quality during recessions are due to a higher risk of low accruals quality firms and mainly come from the firm's fundamentals and business environment. The findings of this paper are consistent with theoretical predictions that higher information quality leads to lower cost of capital, and the risk premium increases during economic downturns. To my best knowledge, this is the first study that is providing detailed evidence of higher risk premiums of information quality during economic downturns and shedding new light on the countercyclicality of risk features of information quality.

Furthermore, I state that the mixed relation between accruals quality and realized returns of prior study with the findings of this paper is due to the rapidly changing realized returns around the periods of economic transition, and inherent noise in realized returns. By providing a more detailed explanation about the higher risk premium of information quality during recessions, this paper highlights the importance

of choosing a valid proxy for expected returns, especially when analyzing the time-varying behavior of investors.

Nonetheless, I acknowledge several caveats. First, as McInnis (2010) points out, the ICC is not a perfect proxy for expected returns due to the optimistic forecasting behavior of analysts. The forecasting behavior of analysts also affected by the state of the economy, which changes the relation between the current stock price and expected future cash flows (i.e., the ICC). Given that the literature cannot pinpoint the perfect proxy for the unobservable cost of capital, this paper provides limited evidence that utilizing the ICC is more consistent with theoretical construction and empirical evidence than utilizing noisy realized returns. Second, the inconsistent trend of the ICC and the realized returns between economic expansions and recessions should be addressed in more detail. Though realized returns are more likely to incorporate noise, particularly when analyzing the effect of time-varying or business cycles, harmonizing the ICC and realized returns could be an equilibrium regarding the relation between information quality and cost of capital. For example, I have an attempt to use the ERC framework of Ogneva (2012) to decompose realized returns into expected returns (returns excluding cash flow shocks) and unexpected information shocks (cash flow shocks). Future studies can provide more detailed empirical evidence in reconciling the

different results of the ICC and realized returns, especially for analyzing the changes in risk premium. I leave these issues for future research.

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APPENDIX A. VARIABLE DEFINITIONS

Variable		Definition
<i>Dependent variables</i>		
<i>ICC</i>	=	Monthly implied cost of equity following Li et al. (2013) excess one-month treasury bills.
<i>RET</i>	=	Monthly realized returns excess one-month treasury bills.
<i>CFRET</i>	=	The fitted value of the Ogneva (2012) return decomposition model. Following Ogneva (2012), I regress excess returns on earnings surprise, where earnings surprise is calculated as the difference between actual earnings and expected earnings.
<i>NCFRET</i>	=	Difference between realized returns and <i>CFRET</i> .
<i>BETA</i>	=	The firm's market beta estimated over the past 60 months and updated each month.
<i>Independent variables</i>		
<i>AQ</i>	=	The five-year rolling standard deviation of the residuals estimated using the Dechow and Dichev (2002) model augmented by McNichols (2002).
<i>INNATEAQ</i>	=	The fitted portion of regressing <i>AQ</i> on various characteristics such as total assets, standard deviations of cashflows, standard deviation of sales, operating cycle, and the percentage of negative earnings incidence during the past 10 years.
<i>DISCAQ</i>	=	The residual value of regressing <i>AQ</i> on various characteristics such as total assets, standard deviations of cashflows, standard deviation of sales, operating cycle, and the percentage of negative earnings incidence during the past 10 years.
<i>BIDASK</i>	=	Measured as the ask price minus the bid price divided by average of the bid and ask prices.
<i>Control variables</i>		
<i>MTB</i>	=	Market-to-book ratio as of the firm's fiscal year-end. Market-to-book ratio is calculated as the ratio between the firm's market value and the book value of equity.
<i>SIZE</i>	=	The natural logarithm of the market value of equity.
<i>PREDICTAQ</i>	=	The five-year rolling standard deviation of the fitted portion of the Dechow and Dichev (2002) model augmented by McNichols (2002).
<i>RETVOL</i>	=	The standard deviation of the stock returns over the past 60 months.

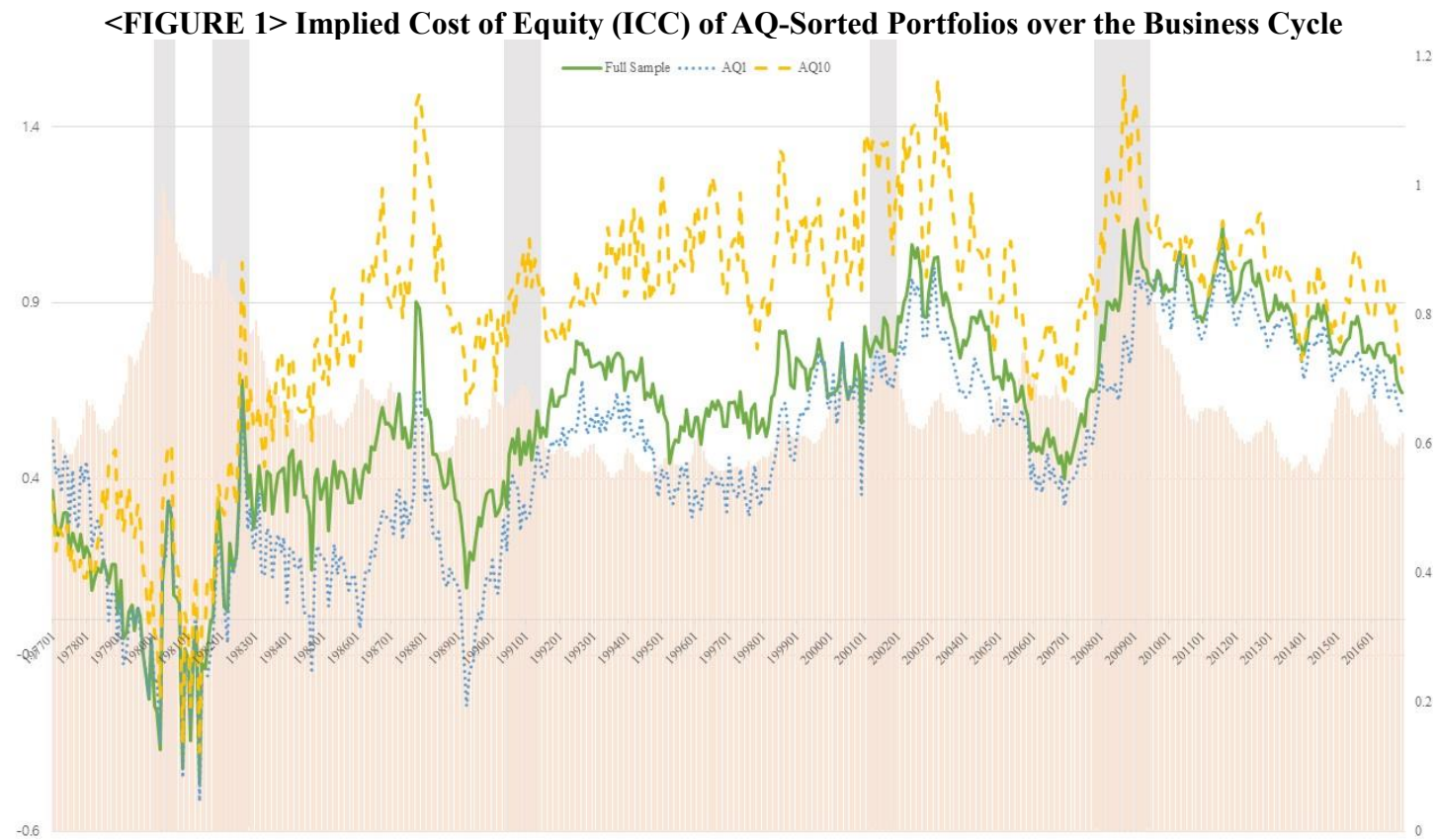
<i>LEVERAGE</i>	=	Asset leverage, which is calculated as long-term debt over total assets.
<i>SALESVOL</i>	=	Five-year rolling standard deviations of sales deflated by average total assets.
<i>CFVOL</i>	=	Five-year rolling standard deviations of cash flows deflated by average total assets.
<i>CFO</i>	=	Operating cash flows, calculated as income before extraordinary items less accruals deflated by average total assets.
<i>OPTIONLIKE</i>	=	Decile ranking of firms' option-like characteristics. Option-like characteristics are calculated based on the first principal component of Tobin's Q (market value to book value of assets), the debt-to-equity ratio, the ratio of capital expenditures to fixed assets, and the market-to-book ratio.
<i>FCDISPERSSION</i>	=	Analyst forecast dispersion calculated as the natural logarithm of the standard deviation of analyst earnings estimates for the fiscal year t+1 divided by the median of the same estimates following Johnson (2004).
<i>FCHIGHER</i>	=	Difference between mean of individual analyst' earnings forecast for year t+1 and actual earnings in year t, divided by the stock price at the beginning of month t.
<i>FCERROR</i>	=	Difference between mean of individual analysts' earnings forecast for year t+1 and actual earnings in year t+1, divided by the stock price at the beginning of month t.
<i>State variables</i>		
<i>RECESSION</i>	=	An indicator variable equals to one for the periods of recessions from the National Bureau of Economic Research (NBER), and zero otherwise.
<i>TRANSITION</i>	=	An indicator variable equals to one for the periods around before and after the three-months when the state of economy changing from expansions to recessions, or from recessions to expansions, and zero otherwise.
<i>UNCERTAINTY</i>	=	Economic uncertainty score from Jurado et al. (2015).
<i>Variables used in Additional Tests</i>		
<i>LNAT</i>	=	Natural logarithm of total assets.
<i>OC</i>	=	Operating cycle, calculated as the sum of the accounting receivable cycle and the inventory cycle.
<i>NEG EARN</i>	=	The percentage of negative annual earnings during the past ten years.

Beta_NegShock_IB

The sensitivity of a firm's income before extraordinary items scaled by total assets to future negative GDP changes defined as quarter-over-quarter drops in the growth of real GDP by 3% or more, estimated by regressing scaled earnings on subsequent quarter real GDP growth during periods of negative macro changes using a 60-month rolling window.

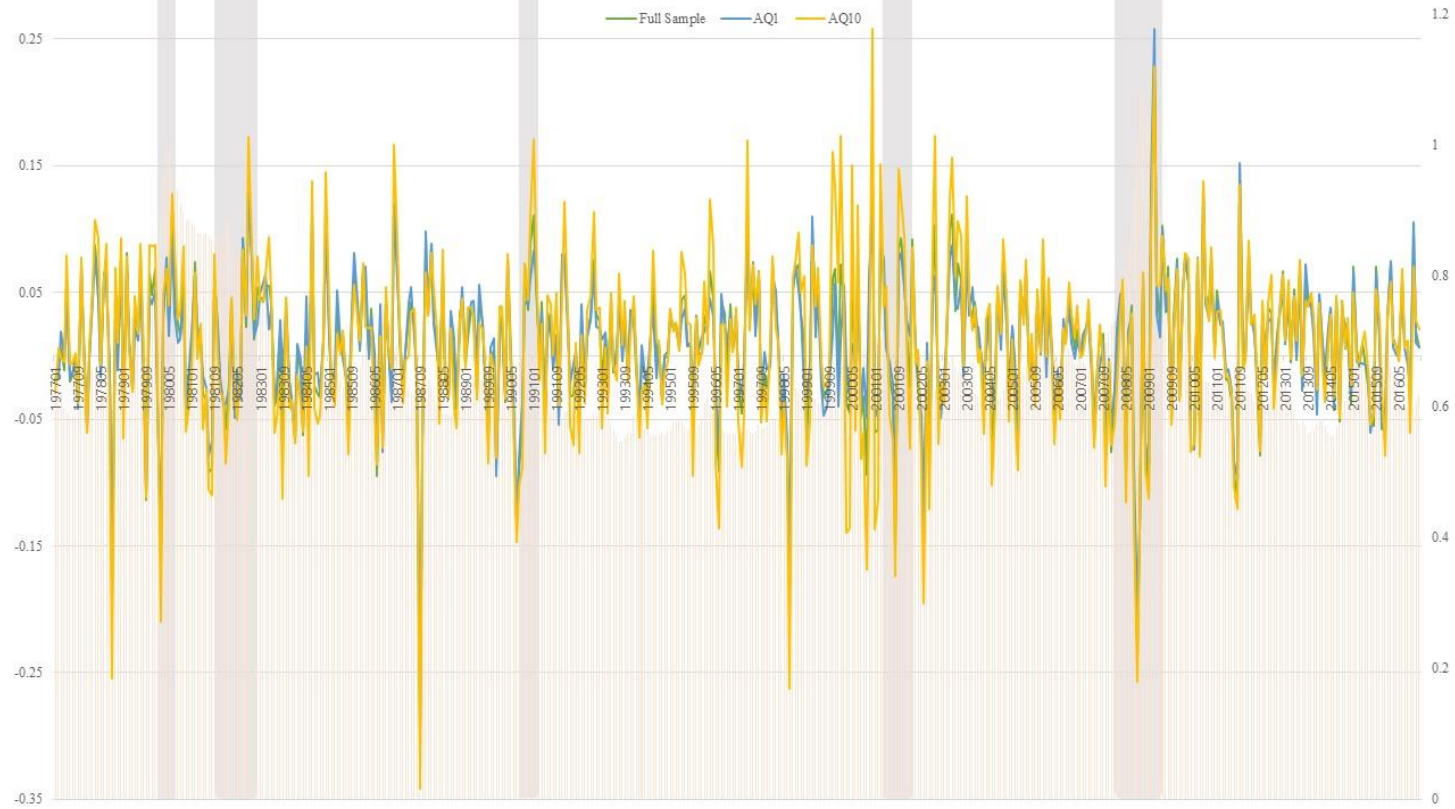
Beta_NegShock_NI =

The sensitivity of a firm's net income scaled by total assets to future negative GDP changes defined as quarter-over-quarter drops in the growth of real GDP by 3% or more, estimated by regressing scaled earnings on subsequent quarter real GDP growth during periods of negative macro changes using a 60-month rolling window.



Notes: This figure depicts the median value of the ICC of full sample, highest accruals quality (*AQ1*) firms and lowest accruals quality (*AQ10*) firms during the sample period. The bar graph at the bottom of the figure shows economic uncertainty score of Jurado et al. (2015).

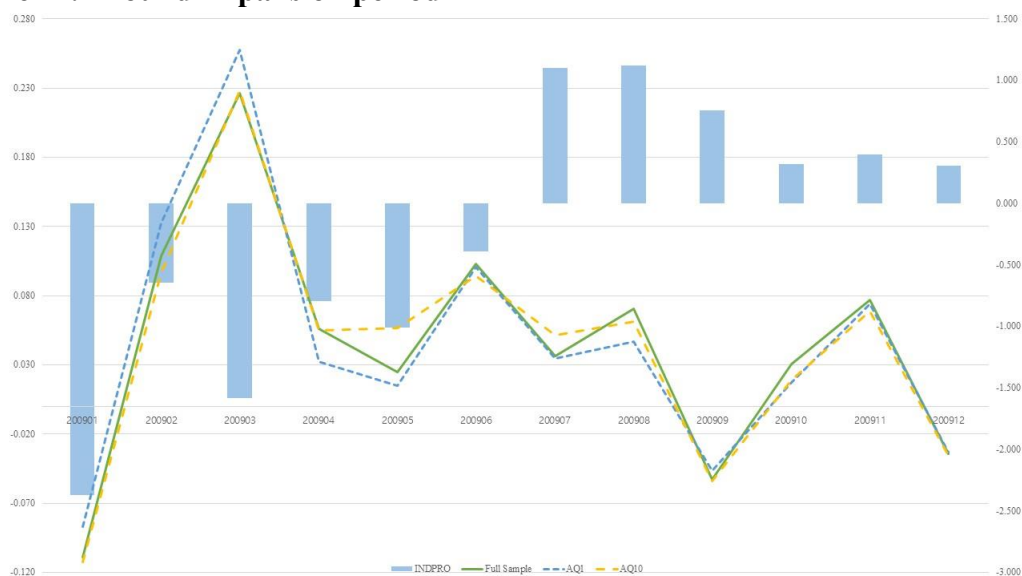
<FIGURE 2> Realized Returns of AQ-Sorted Portfolios over the Business Cycle



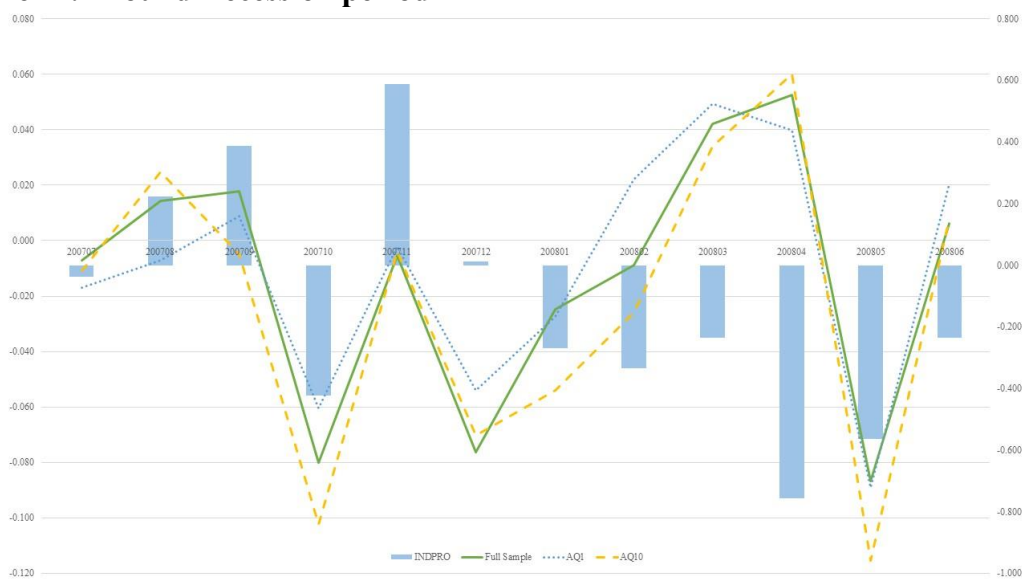
Notes: This figure depicts the median value of *RET* of full sample, highest accruals quality (*AQ1*) firms and lowest accruals quality (*AQ10*) firms during the sample period. The bar graph at the bottom of the figure shows economic uncertainty score of Jurado et al. (2015).

<FIGURE 3> Realized Returns of AQ-Sorted Portfolios around Changing Business Cycle

Panel A: Around Expansion period

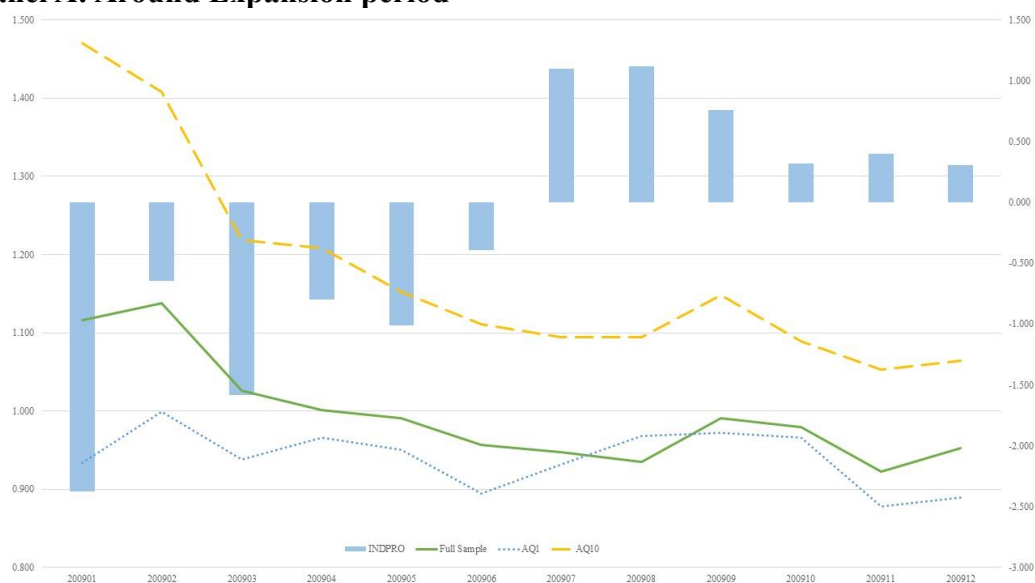


Panel B: Around Recession period

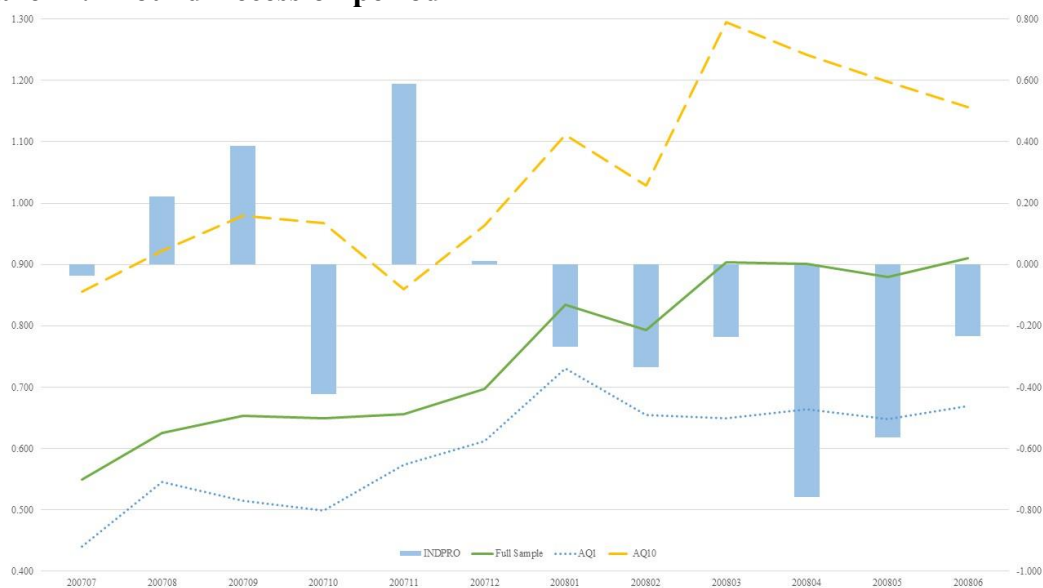


Notes: This figure shows the mean value of time-trend of *AQ1* portfolio firms and *AQ10* portfolio firms around the changing economic cycle. The bar of each month indicates the industrial production growth rate.

<FIGURE 4> ICC of AQ-Sorted Portfolios around Changing Business Cycle
Panel A: Around Expansion period



Panel B: Around Recession period



Notes: This figure shows the mean value of time-trend of *AQI* portfolio firms and *AQI0* portfolio firms around the changing economic cycle. The bar of each month indicates the industrial production growth rate.

TABLE 1. Descriptive Statistics

Panel A: Implied Cost of Capital (ICC) Sample

Variables	N	Mean	Std	10P	Q1	Median	Q3	90P
Dependent Variables								
<i>ICC_{it+1}</i> (%)	654,686	0.613	0.939	-0.272	0.069	0.456	0.856	1.618
Information Quality								
<i>AQ_{it}</i>	654,686	0.048	0.042	0.013	0.021	0.036	0.059	0.096
<i>INNATEAQ_{it}</i>	448,045	0.046	0.037	0.016	0.024	0.036	0.056	0.085
<i>DISCAQ_{it}</i>	448,045	-0.001	0.027	-0.028	-0.013	-0.002	0.009	0.027
<i>BIDASK_{it}</i>	654,686	0.150	0.100	0.058	0.083	0.123	0.185	0.272
Control Variables								
<i>BETA</i>	654,686	1.206	0.615	0.499	0.798	1.137	1.528	1.989
<i>MTB</i>	654,686	2.767	2.644	0.878	1.277	1.989	3.197	5.242
<i>SIZE</i>	654,686	6.153	1.840	3.833	4.791	6.050	7.362	8.608
<i>PREDICTAQ</i>	654,686	0.050	0.043	0.015	0.023	0.038	0.063	0.098
<i>RET_{it}</i> (%)	654,686	0.829	11.921	-13.008	-5.992	0.412	7.142	15.043
<i>RETVOL</i>	654,686	0.128	0.054	0.072	0.089	0.116	0.153	0.198
<i>LEVERAGE</i>	654,686	0.170	0.152	0.000	0.024	0.148	0.267	0.382
<i>SALESVOL</i>	654,686	0.174	0.151	0.044	0.074	0.129	0.220	0.359
<i>CFVOL</i>	654,686	0.075	0.063	0.022	0.034	0.056	0.093	0.148
<i>CFO</i>	654,686	0.089	0.098	-0.022	0.042	0.094	0.144	0.200
<i>OPTIONLIKE</i>	654,686	-0.007	0.075	-0.064	-0.051	-0.030	0.009	0.074
<i>FCDISPERSSION</i>	453,239	0.135	0.162	0.014	0.035	0.083	0.183	0.324
<i>FCHIGHER</i>	453,239	0.048	0.218	-0.061	-0.017	0.024	0.194	0.724
<i>FCERROR</i>	453,239	0.048	0.229	-0.013	-0.002	0.003	0.027	0.086
State Variables								
<i>RECESSION</i>	654,686	0.116	0.320	0.000	0.000	0.000	0.000	1.000
<i>TRANSITION</i>	654,686	0.122	0.328	0.000	0.000	0.000	0.000	1.000
<i>UNCERTAINTY</i>	654,686	0.664	0.096	0.569	0.602	0.643	0.687	0.790
Variables used in additional analyses								
<i>Beta_NegShock_IB</i>	622,154	0.051	10.671	-4.913	-0.649	0.000	0.857	5.162
<i>Beta_NegShock_NI</i>	622,154	-0.030	11.603	-5.432	-0.702	0.000	0.891	5.365

Panel B: Realized Returns (RET) Sample

Variable	N	Mean	Std	10P	Q1	Median	Q3	90P
Dependent Variables								
<i>RET_{it+1}</i>	1,122,512	1.056	17.030	-14.968	-6.921	-0.247	7.355	17.003
<i>SURP_{it+1}</i>	1,122,512	1.166	0.692	0.364	0.715	1.099	1.531	2.040
<i>CFRET_{it+1}</i>	1,122,512	-0.029	0.318	-0.263	-0.064	0.021	0.077	0.180

$NCFRET_{it+l}$	1,122,512	0.404	18.155	-14.240	-5.299	-0.030	5.502	15.550
$BETA_{it+l}$	1,122,512	0.652	24.449	-22.755	-11.016	-0.136	11.250	24.729
Information Quality								
AQ_{it}	1,122,512	0.057	0.051	0.015	0.024	0.041	0.071	0.117
Control Variables								
$BETA$	1,122,512	1.167	0.692	0.364	0.716	1.100	1.533	2.042
MTB	1,122,512	2.734	3.309	0.666	1.039	1.737	3.024	5.389
$SIZE$	1,122,512	5.055	2.191	2.263	3.370	4.908	6.598	8.023
$PREDICTAQ$	1,122,512	0.059	0.050	0.016	0.026	0.044	0.074	0.117
RET_{it}	1,122,512	0.830	14.203	-14.953	-6.927	-0.249	7.365	17.022
$RETVOL$	1,122,512	0.149	0.073	0.076	0.098	0.132	0.181	0.243
$LEVERAGE$	1,122,512	0.163	0.158	0.000	0.011	0.130	0.262	0.388
$SALESVOL$	1,122,512	0.197	0.174	0.046	0.082	0.145	0.251	0.406
$CFVOL$	1,122,512	0.096	0.089	0.025	0.040	0.068	0.117	0.196
CFO	1,122,512	0.046	0.162	-0.117	0.005	0.075	0.132	0.192
	1,122,512	1.209	0.629	0.500	0.799	1.138	1.529	1.989
State Variables								
$RECESSION$	1,122,512	0.119	0.323	0.000	0.000	0.000	0.000	1.000
$TRANSITION$	1,122,512	0.128	0.334	0.000	0.000	0.000	0.000	1.000
$UNCERTAINTY$	1,122,512	0.664	0.096	0.569	0.600	0.643	0.687	0.792

Notes: This table presents the descriptive statistics of variables used in analyses. In Panel A, I report the statistics of the implied cost of equity (*ICC*) sample. Panel B shows the statistics of realized return samples. Appendix A provides detailed definitions of variables.

TABLE 2. Accruals Quality and Cyclicalities of Monthly ICC

Panel A: Portfolio Analysis (Monthly, %)

AQ Portfolios	All states	Expansions	Recessions
1 (Low)	0.495	0.495	0.487
2	0.496	0.496	0.501
3	0.515	0.516	0.509
4	0.538	0.545	0.481
5	0.552	0.560	0.493
6	0.599	0.600	0.590
7	0.621	0.619	0.633
8	0.681	0.683	0.672
9	0.738	0.744	0.688
10 (High)	0.901	0.900	0.907
High-Low	0.406***	0.404***	0.419***
t-value	(71.36)	(67.79)	(22.73)

Panel B: Fama and MacBeth (1973) Monthly Regression

Dep. Variable =	All states ICC_{it+1}	Expansions ICC_{it+1}	Recessions ICC_{it+1}	All states ICC_{it+1}	Expansions ICC_{it+1}	Recessions ICC_{it+1}
	(1)	(2)	(3)	(4)	(5)	(6)
AQ_{it}	0.131*** (23.88)	0.130*** (22.49)	0.135*** (8.00)	0.042*** (9.22)	0.037*** (7.56)	0.082*** (6.93)
$BETA_{it}$	0.166*** (31.70)	0.156*** (28.56)	0.240*** (17.28)	-0.002 (-0.43)	-0.010* (-1.84)	0.058*** (4.14)
MTB_{it}	-0.033*** (-14.78)	-0.031*** (-13.19)	-0.044*** (-7.23)	-0.036*** (-18.95)	-0.035*** (-17.29)	-0.049*** (-8.05)

$SIZE_{it}$	-0.109*** (-54.63)	-0.111*** (-53.07)	-0.096*** (-15.14)	-0.057*** (-39.70)	-0.057*** (-39.49)	-0.052*** (-9.65)
$PREDICTAQ_{it}$				-0.413*** (-8.87)	-0.413*** (-8.31)	-0.410*** (-3.07)
RET_{it}				-0.006*** (-31.57)	-0.006*** (-28.96)	-0.007*** (-13.05)
$RETVOL_{it}$				2.840*** (33.17)	2.880*** (31.52)	2.534*** (10.43)
$LEVERAGE_{it}$				0.609*** (48.76)	0.592*** (46.08)	0.741*** (18.02)
$SALESVOL_{it}$				0.032*** (3.09)	0.028*** (2.58)	0.058* (1.97)
$CFVOL_{it}$				0.963*** (23.96)	0.980*** (22.80)	0.835*** (7.39)
CFO_{it}				-1.127*** (-53.64)	-1.123*** (-49.95)	-1.156*** (-19.57)
Test for Difference of AQ_{it}						
Coeff. Difference		0.005			0.045***	
p-value		(0.388)			(0.000)	
Observations	654,686	578,821	75,865	654,686	578,821	75,865
Average R^2	0.0896	0.0909	0.0795	0.148	0.151	0.131

Notes: This table presents the results of countercyclicality of the relation between accruals quality and the cost of capital. Cost of capital is proxied by the implied cost of equity (*ICC*). In Panel A, I provide evidence of portfolio analysis. In Panel B, I conduct Fama and French (1973) two-stage regressions. The coefficients and t-statistics in parentheses are average of cross-sectional monthly regressions, respectively. I report the average R^2 of each cross-sectional monthly regression. Appendix A provides detailed definitions of variables.

TABLE 3. Innate Accruals Quality and Discretionary Accruals Quality

Dep. Variable = ICC_{it+1}	<i>Innate AQ</i>			<i>Discretionary AQ</i>			<i>Pooled Regression</i>		
Economic States	<i>All</i>	<i>Expansion</i> <i>s</i>	<i>Recession</i> <i>s</i>	<i>All</i>	<i>Expansion</i> <i>s</i>	<i>Recession</i> <i>s</i>	<i>All</i>	<i>Expansion</i> <i>s</i>	<i>Recession</i> <i>s</i>
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
<i>INNATEAQ_{it}</i>	0.020*** (2.81)	0.017** (2.24)	0.039** (2.60)				0.030*** (3.72)	0.026*** (3.04)	0.053*** (3.14)
<i>DISCAQ_{it}</i>				0.021*** (5.41)	0.021*** (4.90)	0.025** (2.39)	0.027*** (5.83)	0.026*** (5.10)	0.039*** (3.19)
<i>BETA_{it}</i>	0.011* (1.80)	0.004 (0.61)	0.068*** (3.64)	0.015** (2.45)	0.008 (1.27)	0.069*** (3.65)	0.013** (1.99)	0.005 (0.80)	0.067*** (3.62)
<i>MTB_{it}</i>	-0.040*** (-17.38)	-0.039*** (-15.74)	-0.050*** (-7.71)	-0.040*** (-17.44)	-0.039*** (-15.81)	-0.050*** (-7.72)	-0.040*** (-17.41)	-0.039*** (-15.77)	-0.050*** (-7.72)
<i>SIZE_{it}</i>	-0.052*** (-35.41)	-0.053*** (-35.22)	-0.046*** (-8.49)	-0.053*** (-37.64)	-0.054*** (-37.33)	-0.048*** (-9.21)	-0.052*** (-35.92)	-0.053*** (-35.78)	-0.046*** (-8.56)
<i>PREDICTAQ_{it}</i>	-0.527*** (-9.26)	-0.504*** (-8.23)	-0.695*** (-4.66)	-0.499*** (-9.27)	-0.479*** (-8.25)	-0.647*** (-4.62)	-0.533*** (-9.23)	-0.508*** (-8.18)	-0.725*** (-4.69)
<i>RET_{it}</i>	-0.006*** (-27.44)	-0.006*** (-25.33)	-0.006*** (-10.71)	-0.006*** (-27.41)	-0.006*** (-25.30)	-0.006*** (-10.73)	-0.006*** (-27.51)	-0.006*** (-25.39)	-0.006*** (-10.74)
<i>RETVOL_{it}</i>	2.858*** (26.69)	2.914*** (25.49)	2.434*** (8.06)	2.909*** (25.50)	2.962*** (24.27)	2.512*** (7.90)	2.835*** (26.58)	2.890*** (25.38)	2.419*** (8.03)
<i>LEVERAGE_{it}</i>	0.628*** (42.58)	0.600*** (40.98)	0.838*** (15.73)	0.626*** (43.54)	0.599*** (41.87)	0.830*** (16.13)	0.631*** (42.59)	0.603*** (41.02)	0.841*** (15.70)

<i>SALESVOL_{it}</i>	0.168*** (12.53)	0.159*** (11.48)	0.234*** (5.08)	0.162*** (12.15)	0.152*** (10.96)	0.240*** (5.38)	0.162*** (11.76)	0.154*** (10.74)	0.227*** (4.83)
<i>CFVOL_{it}</i>	0.808*** (18.16)	0.818*** (17.08)	0.733*** (6.17)	0.814*** (17.70)	0.822*** (16.72)	0.749*** (5.79)	0.768*** (16.29)	0.782*** (15.36)	0.661*** (5.44)
<i>CFO_{it}</i>	-1.017*** (-44.65)	-1.015*** (-42.63)	-1.031*** (-13.66)	-1.025*** (-45.16)	-1.022*** (-43.03)	-1.049*** (-14.01)	-1.019*** (-44.56)	-1.017*** (-42.48)	-1.034*** (-13.75)

Difference in *INNATEAQ_{it}*

Coeff. Difference	0.021*	0.027*
p-value	(0.099)	(0.080)

Difference in *DISCAQ_{it}*

Coeff. Difference	0.005	0.013
p-value	(0.344)	(0.162)

Observations	448,045	394,479	53,566	448,045	394,479	53,566	448,045	394,479	53,566
Average R ²	0.149	0.151	0.129	0.148	0.151	0.129	0.150	0.153	0.130

Notes: Table 3 shows the relation between accruals quality and the cost of capital. In this table, I divide the accruals quality (*AQ*) into innate (*INNATEAQ*) and discretionary components of accruals quality (*DISCAQ*), respectively. Innate portion of accruals quality is the predicted value of Equation (6), while discretionary portion of accruals quality represents the residual of Equation (6). I conduct Fama and MacBeth (1973) two-stage regression analysis. The coefficients and t-statistics in parentheses are average of cross-sectional monthly regressions, respectively. I report the average R² of each cross-sectional monthly regression. Appendix A provides detailed definitions of variables.

TABLE 4. Fundamental Risk and Countercyclical Risk Premium of Accruals Quality

Panel A. Reciprocals of Firm Size

$AQ(\rightarrow)$	All states				Expansions				Recessions			
$FRISK(\downarrow)$	P1	P5	P5-P1	t-value	P1	P5	P5-P1	t-value	P1	P5	P5-P1	t-value
P1	0.324	0.344	0.02***	(3.15)	0.324	0.348	0.025***	(3.62)	0.327	0.314	-0.012	(-0.61)
P2	0.442	0.466	0.024***	(3.28)	0.440	0.469	0.029***	(3.88)	0.457	0.439	-0.018	(-0.70)
P3	0.516	0.626	0.110***	(14.46)	0.521	0.627	0.106***	(13.12)	0.477	0.618	0.141***	(5.82)
P4	0.631	0.818	0.187***	(21.76)	0.636	0.831	0.195***	(21.38)	0.596	0.724	0.128***	(5.01)
P5	0.887	1.205	0.318***	(27.98)	0.887	1.201	0.315***	(26.34)	0.887	1.233	0.345***	(9.54)

Panel B. Return Volatility

$AQ(\rightarrow)$	All states				Expansions				Recessions			
$FRISK(\downarrow)$	P1	P5	P5-P1	t-value	P1	P5	P5-P1	t-value	P1	P5	P5-P1	t-value
P1	0.327	0.434	0.107***	(14.77)	0.326	0.434	0.108***	(14.38)	0.334	0.435	0.101***	(3.92)
P2	0.490	0.504	0.014*	(1.73)	0.487	0.508	0.021***	(2.59)	0.517	0.470	0.047*	(1.86)
P3	0.563	0.678	0.115***	(13.67)	0.573	0.685	0.112***	(12.66)	0.488	0.625	0.137***	(5.27)
P4	0.663	0.759	0.096***	(10.39)	0.660	0.760	0.100***	(10.42)	0.681	0.750	0.069**	(2.15)
P5	0.813	1.058	0.245***	(20.20)	0.812	1.061	0.249***	(19.58)	0.823	1.036	0.213***	(5.45)

Panel C. Cashflow Volatility

$AQ(\rightarrow)$	All states				Expansions				Recessions			
$FRISK(\downarrow)$	P1	P5	P5-P1	t-value	P1	P5	P5-P1	t-value	P1	P5	P5-P1	t-value
P1	0.413	0.648	0.235***	(20.19)	0.412	0.650	0.238***	(19.60)	0.416	0.627	0.211***	(5.07)

P2	0.484	0.653	0.169***	(15.93)	0.490	0.655	0.165***	(14.57)	0.435	0.643	0.209***	(6.54)
P3	0.566	0.694	0.128***	(12.80)	0.560	0.698	0.138***	(13.19)	0.611	0.668	0.058*	(1.71)
P4	0.626	0.762	0.136***	(12.82)	0.618	0.765	0.147***	(13.40)	0.691	0.741	0.05	(1.37)
P5	0.830	0.913	0.083***	(5.49)	0.838	0.916	0.078***	(4.81)	0.762	0.891	0.128***	(2.92)

Panel D. Fama and MacBeth (1973) Regression

Dep. Variable = ICC_{it+1}	<i>FRISK = Inverse Size</i>			<i>FRISK = RETVOL</i>			<i>FRISK = CFVOL</i>		
Economic States	<i>All</i>	<i>Expansions</i>	<i>Recessions</i>	<i>All</i>	<i>Expansions</i>	<i>Recessions</i>	<i>All</i>	<i>Expansions</i>	<i>Recessions</i>
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
AQ_{it}	-0.179***	-0.174***	-0.215***	-0.131***	-0.130***	-0.141***	-0.019***	-0.016**	-0.041***
	(-31.80)	(-28.15)	(-20.78)	(-20.29)	(-18.04)	(-13.88)	(-2.61)	(-2.01)	(-2.89)
$AQ_{it} * FRISK_{it}$	0.426***	0.406***	0.576***	0.039***	0.038***	0.050***	0.136***	0.123***	0.231***
	(39.89)	(36.98)	(17.95)	(30.72)	(27.61)	(15.71)	(12.31)	(10.40)	(8.54)
$FRISK_{it}$	0.214***	0.225***	0.132***	0.013***	0.014***	0.004	0.005	0.006	0.001
	(22.33)	(22.21)	(4.82)	(11.22)	(12.17)	(0.98)	(0.69)	(0.71)	(0.05)

Difference in AQ_{it}

Coeff. Difference

p-value

-0.041***

(0.000)

-0.012

(0.171)

-0.024*

(0.067)

Difference in $AQ_{it} * FRISK_{it}$

Coeff. Difference

p-value

0.169***

(0.000)

0.013***

(0.000)

0.108***

(0.000)

Factor Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Other Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	654,686	578,821	75,865	654,686	578,821	75,865	654,686	578,821	75,865
Average R ²	0.158	0.160	0.142	0.147	0.148	0.132	0.148	0.150	0.131

Notes: This tables shows the cross-sectional variation between accruals quality and the cost of capital based on three different fundamental risk proxies. In Panel A, I use inverse measure of firm size (market capitalization) as a proxy for fundamental risk. Panel B and C utilize return volatility and cashflow volatility as a proxy for fundamental risk, respectively. In Panel D, I conduct Fama and MacBeth (1973) two-stage regression analysis. The coefficients and t-statistics in parentheses are average of cross-sectional monthly regressions, respectively. I report the average R² of each cross-sectional monthly regression. Appendix A provides detailed definitions of variables.

TABLE 5. Sensitivity to Negative Macroeconomic Shocks for AQ Portfolio

Panel A. Correlation of AQ with Firm-Specific Sensitivities to Macroeconomic Shocks

All States		
	<i>Beta_NegShock_IB</i>	<i>Beta_NegShock_NI</i>
correlation	0.014	0.015
p-value	<0.001	<0.001
Expansions		
	<i>Beta_NegShock_IB</i>	<i>Beta_NegShock_NI</i>
correlation	0.014	0.015
p-value	<0.001	<0.001
Recessions		
	<i>Beta_NegShock_IB</i>	<i>Beta_NegShock_NI</i>
correlation	0.021	0.018
p-value	<0.001	<0.001

Panel B. Sensitivities to Negative Macroeconomic Shocks

<i>Beta_NegShock_IB</i>				<i>Beta_NegShock_NI</i>			
AQ1	AQ10	10-1	t-stat	AQ1	AQ10	10-1	t-stat
All States				All States			
-0.060	0.341	0.401***	(5.37)	-0.135	0.295	0.430***	(5.29)
Expansions				Expansions			
-0.085	0.266	0.351***	(4.21)	-0.173	0.226	0.399***	(4.40)
Recessions				Recessions			
0.116	0.877	0.761***	(5.83)	0.139	0.791	0.652***	(4.63)

Notes: Table 5 reports the sensitivity of each AQ-Sorted portfolios to macroeconomic shocks to the economy. In Panel A, I report the Pearson correlations between AQ and sensitivities to macroeconomic shocks (*Beta_NegShock_IB* and *Beta_NegShocks_NI*). Panel B reports portfolio means and differences in means of firm-specific sensitivities for firms in top and bottom AQ decile portfolios. To estimate earning sensitivities to the macroeconomy, I proxy for earnings using either income before extraordinary items or net income, both scaled by total assets. Appendix A provides detailed definitions of variables.

TABLE 6. Accruals Quality, Cost of Capital, and Economic Uncertainty

Panel A: Portfolio Analysis

Economic Uncertainty (\rightarrow)							
IQ (\downarrow)	I	II	III	IV	V	(V-I)	t-value
1 (Low)	0.500	0.466	0.379	0.383	0.203	-0.297***	(-38.11)
2	0.549	0.557	0.501	0.472	0.322	-0.227***	(-29.29)
3	0.635	0.669	0.611	0.560	0.448	-0.187***	(-23.69)
4	0.678	0.772	0.704	0.659	0.629	-0.049***	(-6.35)
5 (High)	0.899	0.982	0.927	0.855	0.976	0.077***	(8.13)
(5 - 1)	0.399***	0.516***	0.548***	0.472***	0.773***		
t-value	(48.56)	(63.15)	(67.30)	(55.29)	(85.17)		

Panel B: Fama and MacBeth (1973) Regression

UNCERTAINTY (quintile) =	Low	2	3	4	High
Dep. Variable =	ICC_{it+1}	ICC_{it+1}	ICC_{it+1}	ICC_{it+1}	ICC_{it+1}
	(1)	(2)	(3)	(4)	(5)
AQ_{it}	0.016** (2.00)	0.023** (2.10)	0.037*** (3.41)	0.071*** (6.32)	0.065*** (7.35)
$BETA_{it}$	0.002 (0.33)	-0.035** (-2.47)	-0.001 (-0.10)	-0.014 (-1.27)	0.037*** (3.62)
MTB_{it}	-0.020*** (-7.34)	-0.032*** (-7.68)	-0.036*** (-9.25)	-0.038*** (-8.73)	-0.054*** (-10.69)
$SIZE_{it}$	-0.070*** (-27.95)	-0.061*** (-17.86)	-0.051*** (-18.26)	-0.058*** (-20.33)	-0.045*** (-12.22)
$PREDICTAQ_{it}$	0.023 (0.24)	-0.666*** (-6.48)	-0.635*** (-6.21)	-0.622*** (-5.71)	-0.140 (-1.52)
RET_{it}	-0.006*** (-17.67)	-0.006*** (-13.59)	-0.006*** (-13.69)	-0.006*** (-13.41)	-0.006*** (-13.18)
$RETVOL_{it}$	0.030*** (25.69)	0.028*** (13.22)	0.033*** (14.02)	0.031*** (15.20)	0.020*** (15.43)
$LEVERAGE_{it}$	0.658*** (36.29)	0.526*** (21.01)	0.594*** (20.21)	0.545*** (24.83)	0.725*** (20.16)
$SALESVOL_{it}$	-0.066*** (-3.75)	0.048* (1.73)	0.070*** (2.78)	0.036 (1.61)	0.065*** (3.72)
$CFVOL_{it}$	0.716***	1.131***	1.217***	1.179***	0.558***

	(13.42)	(12.39)	(11.59)	(13.07)	(7.22)
CFO_{it}	-1.066***	-1.172***	-1.173***	-1.227***	-0.993***
	(-23.33)	(-24.60)	(-26.96)	(-29.49)	(-19.00)

Test for difference of AQ_{it} (*High* – *Low*)

Coeff. Difference	0.049***
p-value	(0.000)

Observations	130,789	131,525	130,336	130,596	131,440
Average R^2	0.161	0.162	0.153	0.154	0.111

Notes: In Table 6, I compare the average implied cost of equity (ICC) across the economic uncertainty quintiles. In Panel A, I provide evidence of portfolio analysis. In Panel B, I conduct Fama and MacBeth (1973) two-stage regression analysis. The coefficients and t-statistics in parentheses are average of cross-sectional monthly regressions, respectively. I report the average R^2 of each cross-sectional monthly regression. Appendix A provides detailed definitions of variables.

TABLE 7. Accruals Quality and Cyclicity of Future Stock Returns
Panel A: Portfolio Analysis (Monthly, %)

AQ Portfolios	All states	Expansions	Recessions
1 (Low)	1.029	1.012	1.149
2	0.933	0.934	0.926
3	0.961	0.966	0.929
4	0.989	0.990	0.981
5	1.082	1.101	0.943
6	1.017	1.030	0.915
7	1.055	1.062	1.000
8	1.110	1.134	0.934
9	1.179	1.183	1.151
10 (High)	1.203	1.229	1.011
High-Low	0.175**	0.217***	-0.139
t-value	(2.18)	(2.60)	(-0.52)

Panel B: Fama and MacBeth (1973) Regression

Dep. Variable =	All states	Expansions	Recessions	All states	Expansions	Recessions
	RET_{it+1}	RET_{it+1}	RET_{it+1}	RET_{it+1}	RET_{it+1}	RET_{it+1}
	(1)	(2)	(3)	(4)	(5)	(6)
AQ_{it}	-0.111 (-1.22)	-0.081 (-0.85)	-0.339 (-1.17)	-0.142* (-1.69)	-0.102 (-1.20)	-0.448 (-1.36)
$BETA_{it}$	0.083 (0.62)	-0.020 (-0.15)	0.860 (1.59)	0.043 (0.39)	-0.079 (-0.77)	0.963* (1.85)
MTB_{it}	-0.042*** (-3.19)	-0.040*** (-2.84)	-0.057 (-1.54)	-0.046*** (-4.21)	-0.046*** (-3.93)	-0.053 (-1.50)
$SIZE_{it}$	-0.175*** (-4.33)	-0.176*** (-4.10)	-0.171 (-1.37)	-0.165*** (-5.40)	-0.166*** (-5.22)	-0.161 (-1.52)
$PREDICTAQ_{it}$				-0.879 (-1.45)	-1.219* (-1.94)	1.697 (0.82)
RET_{it}				-0.060*** (-14.81)	-0.056*** (-13.14)	-0.087*** (-7.43)
$RETVOL_{it}$				0.012 (1.23)	0.017 (1.58)	-0.023 (-0.84)
$LEVERAGE_{it}$				-0.320 (-1.49)	-0.166 (-0.76)	-1.486* (-1.85)

$SALESVOL_{it}$				-0.159 (-1.09)	-0.246 (-1.58)	0.503 (1.29)
$CFVOL_{it}$				0.420 (1.04)	0.639 (1.53)	-1.244 (-0.87)
CFO_{it}				1.094*** (4.45)	1.253*** (4.81)	-0.111 (-0.15)
Test for Difference of AQ_{it}						
Coeff. Difference				-0.257		-0.346
p-value				(0.199)		(0.155)
Observations	1,122,512	989,291	133,221	1,122,512	989,291	133,221
Average R^2	0.0283	0.0277	0.0333	0.0468	0.0460	0.0522

Panel C: Excluding Low Price Stocks

	All states	Expansions	Recessions	All states	Expansions	Recessions
Dep. Variable =	RET_{it+1}	RET_{it+1}	RET_{it+1}	RET_{it+1}	RET_{it+1}	RET_{it+1}
	(1)	(2)	(3)	(4)	(5)	(6)
AQ_{it}	-0.156** (-2.03)	-0.144* (-1.77)	-0.248 (-1.07)	-0.064 (-0.90)	-0.022 (-0.31)	-0.377 (-1.41)

Test for Difference of AQ_{it}						
Coeff. Difference				-0.104		-0.354*
p-value				(0.177)		(0.099)

Factor Controls	Yes	Yes	Yes	Yes	Yes	Yes
Other Controls	No	No	No	Yes	Yes	Yes
Observations	865,216	766,683	98,533	865,216	766,683	98,533
Average R^2	0.0352	0.0341	0.0434	0.0558	0.0543	0.0670

Notes: This table presents the results of countercyclicality of the relation between accruals quality and the cost of capital when cost of capital is measured by the realized returns (RET). In Panel A, I provide evidence of portfolio analysis. In Panel B, I conduct Fama and French (1973) two-stage regressions. Panel C shows the results after excluding low price stocks (less than \$5). The coefficients and t-statistics in parentheses are average value of cross-sectional monthly regressions, respectively. I report the average R^2 of each cross-sectional monthly regression. Appendix A provides detailed definitions of variables.

**TABLE 8. Accruals Quality and Cyclicalities of Future Stock Returns:
Controlling for Cash Flow Shocks**

Panel A: Portfolio Analysis (Monthly, %)

Economic States	All states			Expansions			Recessions		
AQ Portfolios	SURP	CFRET	NCFRET	SURP	CFRET	NCFRET	SURP	CFRET	NCFRET
1 (Low)	0.011	0.599	0.430	0.014	0.504	0.508	-0.010	1.300	-0.151
2	0.004	0.448	0.486	0.008	0.396	0.538	-0.022	0.830	0.095
3	-0.006	0.419	0.542	-0.002	0.375	0.591	-0.035	0.746	0.183
4	-0.010	0.390	0.599	-0.007	0.358	0.632	-0.035	0.626	0.355
5	-0.018	0.310	0.773	-0.014	0.261	0.840	-0.047	0.674	0.269
6	-0.030	0.434	0.582	-0.026	0.377	0.653	-0.056	0.857	0.058
7	-0.042	0.331	0.724	-0.037	0.304	0.758	-0.076	0.530	0.471
8	-0.049	0.439	0.671	-0.046	0.428	0.706	-0.077	0.525	0.409
9	-0.064	0.295	0.884	-0.059	0.259	0.924	-0.099	0.564	0.587
10 (High)	-0.086	0.376	0.827	-0.082	0.400	0.829	-0.117	0.199	0.812
High-Low	-0.097***	-0.023***	0.397***	-0.096***	-0.104	0.321***	-0.106***	-1.102***	0.963***
t-value	(-98.18)	(-2.66)	(3.51)	(-93.99)	(-1.14)	(2.66)	(-30.72)	(-5.50)	(2.89)

Panel B: Fama and MacBeth (1973) Regression

Dep. Variable =	All states	Expansions	Recessions	All states	Expansions	Recessions
	$NCFRET_{it+1}$	$NCFRET_{it+1}$	$NCFRET_{it+1}$	$NCFRET_{it+1}$	$NCFRET_{it+1}$	$NCFRET_{it+1}$
	(1)	(2)	(3)	(4)	(5)	(6)
AQ_{it}	0.001**	0.001	0.004***	0.009***	0.008***	0.011***
	(2.43)	(1.33)	(3.12)	(18.23)	(16.68)	(7.51)

$BETA_{it}$	-0.058*** (-11.59)	-0.071*** (-14.00)	0.040*** (2.97)	0.019*** (4.58)	0.005 (1.35)	0.124*** (9.03)
MTB_{it}	-0.141*** (-97.84)	-0.141*** (-94.87)	-0.142*** (-27.51)	-0.129*** (-80.99)	-0.129*** (-78.06)	-0.130*** (-23.51)
$SIZE_{it}$	0.027*** (20.83)	0.027*** (19.17)	0.027*** (8.48)	-0.018*** (-17.21)	-0.018*** (-16.22)	-0.020*** (-5.78)
$PREDICTAQ_{it}$				-0.236*** (-7.91)	-0.246*** (-7.74)	-0.155* (-1.84)
RET_{it}				-0.004*** (-34.83)	-0.004*** (-33.13)	-0.004*** (-10.91)
$RETVOL_{it}$				-0.589*** (-16.02)	-0.539*** (-14.17)	-0.964*** (-8.27)
$LEVERAGE_{it}$				-0.235*** (-22.51)	-0.248*** (-22.06)	-0.134*** (-5.75)
$SALESVOL_{it}$				-0.026*** (-4.25)	-0.029*** (-4.53)	-0.000 (-0.03)
$CFVOL_{it}$				-0.142*** (-5.64)	-0.132*** (-4.95)	-0.219*** (-2.85)
CFO_{it}				1.568*** (54.15)	1.593*** (51.94)	1.384*** (16.36)
Test for Difference of AQ_{it}						
Coeff. Difference			0.003***		0.003*	
p-value			(0.005)		(0.067)	

Observations	1,122,512	989,291	133,221	1,122,512	989,291	133,221
Average R ²	0.149	0.150	0.143	0.245	0.248	0.225

Notes: This table presents the results of countercyclicality of the relation between accruals quality and the cost of capital when cost of capital is measured by the realized returns (*RET*). In Panel A, I provide evidence of portfolio analysis. In Panel B, I conduct Fama and French (1973) two-stage regressions. The coefficients and t-statistics in parentheses are average of cross-sectional monthly regressions, respectively. I report the average R² of each cross-sectional monthly regression. Appendix A provides detailed definitions of variables.

TABLE 9. Accruals Quality, Future Stock Returns, and Economic Uncertainty

Panel A: Realized Returns (RET)

UNCERTAINTY (quintile) =	Low	2	3	4	High
Dep. Variable =	RET_{it+1}	RET_{it+1}	RET_{it+1}	RET_{it+1}	RET_{it+1}
	(1)	(2)	(3)	(4)	(5)
AQ_{it}	-0.046 (-0.27)	-0.336* (-1.82)	-0.056 (-0.36)	-0.015 (-0.08)	-0.255 (-1.12)
Test for difference of AQ_{it} ($High - Low$)					
Coeff. Difference			-0.210		
p-value			(0.232)		
Other Controls	Yes	Yes	Yes	Yes	Yes
Observations	225,432	223,140	225,278	222,985	225,677
Average R^2	0.0353	0.0448	0.0467	0.0541	0.0525

Panel B: Controlling for Cash Flow Shocks ($NCFRET$)

UNCERTAINTY (quintile) =	Low	2	3	4	High
Dep. Variable =	$NCFRET_{it+1}$	$NCFRET_{it+1}$	$NCFRET_{it+1}$	$NCFRET_{it+1}$	$NCFRET_{it+1}$
	(1)	(2)	(3)	(4)	(5)
AQ_{it}	0.007*** (8.80)	0.010*** (8.63)	0.008*** (6.89)	0.009*** (7.90)	0.010*** (9.31)
Test for difference of AQ_{it} ($High - Low$)					
Coeff. Difference			0.003**		
p-value			(0.010)		
Other Controls	Yes	Yes	Yes	Yes	Yes
Observations	225,432	223,140	225,278	222,985	225,677
Average R^2	0.262	0.243	0.247	0.245	0.229

Notes: In Table 9, I compare the average future stock returns across the economic uncertainty quintiles. In Panel A, I provide evidence of realized returns. In Panel B, I use non-cash flow returns as a dependent variable. The coefficients and t-statistics in parentheses are average of cross-sectional monthly regressions, respectively. I report the average R^2 of each cross-sectional monthly regression. Appendix A provides detailed definitions of variables.

TABLE 10. Robustness Tests

Panel A. Controlling for Growth Options, Cash Flow Shocks, and Forecast Dispersion

Dep. Variable =	All states <i>ICC_{it+1}</i>	Expansions <i>ICC_{it+1}</i>	Recessions <i>ICC_{it+1}</i>
	(1)	(2)	(3)
<i>AQ_{it}</i>	0.028*** (5.07)	0.026*** (4.29)	0.047*** (3.28)
<i>OPTIONLIKE</i>	-0.059*** (-32.73)	-0.058*** (-30.89)	-0.067*** (-11.12)
<i>CFRET</i>	0.009 (0.66)	0.021 (1.57)	-0.086* (-1.92)
<i>FCDISPERSION</i>	-0.074*** (-7.79)	-0.077*** (-8.20)	-0.053 (-1.32)
<i>FCHIGHER</i>	-0.041*** (-2.88)	-0.030** (-2.05)	-0.125** (-2.46)
<i>FCERROR</i>	1.023*** (53.88)	0.988*** (53.22)	1.289*** (17.56)
Test for Difference of <i>AQ_{it}</i> Coeff. Difference p-value		0.021* (0.088)	
Other Controls	Yes	Yes	Yes
Observations	453,239	399,661	53,578
Average R ²	0.243	0.242	0.248

Panel B. Model-Based Implied Cost of Capital Measure

Dep. Variable =	All states <i>MICC_{it+1}</i>	Expansions <i>MICC_{it+1}</i>	Recessions <i>MICC_{it+1}</i>
	(1)	(2)	(3)
<i>AQ_{it}</i>	0.041*** (10.62)	0.039*** (9.43)	0.058*** (5.22)

Test for Difference of *AQ_{it}*

Coeff. Difference		0.019*	
p-value		(0.051)	
Other Controls	Yes	Yes	Yes
Observations	864,151	761,829	102,322
Average R ²	0.329	0.329	0.326

Panel C. Market-Based Measure of Information Quality

	All states	Expansions	Recessions	All states	Expansions	Recessions
Dep. Variable =	ICC_{it+1}	ICC_{it+1}	ICC_{it+1}	ICC_{it+1}	ICC_{it+1}	ICC_{it+1}
	(1)	(2)	(3)	(4)	(5)	(6)
$BIDASK_{it}$	0.256***	0.249***	0.317***	0.171***	0.161***	0.244***
	(37.94)	(35.91)	(13.54)	(30.23)	(28.12)	(12.83)

Test for Difference of AQ_{it}

Coeff. Difference	0.068***	0.082***
p-value	(0.003)	(0.000)

Factor Controls	Yes	Yes	Yes	Yes	Yes	Yes
Other Controls	No	No	No	Yes	Yes	Yes
Observations	654,686	578,821	75,865	654,686	578,821	75,865
Average R ²	0.0949	0.0961	0.0862	0.151	0.153	0.135

Panel C. Systematic Risk

	All states	Expansions	Recessions	All states	Expansions	Recessions
Dep. Variable =	$BETA_{it+1}$	$BETA_{it+1}$	$BETA_{it+1}$	$BETA_{it+1}$	$BETA_{it+1}$	$BETA_{it+1}$
	(1)	(2)	(3)	(4)	(5)	(6)
AQ_{it}	0.277***	0.274***	0.301***	0.003	0.001	0.020**
	(35.42)	(32.33)	(15.47)	(1.08)	(0.32)	(2.52)

Test for Difference of AQ_{it}

Coeff. Difference	0.027*	0.019**
p-value	(0.099)	(0.013)

Factor Controls	Yes	Yes	Yes	Yes	Yes	Yes
Other Controls	No	No	No	Yes	Yes	Yes

Observations	654,686	578,821	75,865	654,686	578,821	75,865
Average R ²	0.0750	0.0692	0.119	0.479	0.470	0.546

Notes: In this table, I provide robustness of empirical results. In Panel A, I additionally control for growth options (*OPTIONLIKE*), cashflow news (*CFRET*), and the characteristics of analyst forecast (i.e., *FCDISPERSION*, *FCOPTIMISM*, and *FCERROR*) in Equation (5). In Panel B, I estimate the implied cost of equity based on historical ROA (Hou et al. 2012). In Panel C, I utilize bid-ask spread (*BIDASK*) as a proxy for information quality. In Panel D, I replace dependent variable to systematic risk (*BETA*). The coefficients and t-statistics in parentheses are average of cross-sectional monthly regressions, respectively. I report the average R² of each cross-sectional monthly regression. Appendix A provides detailed definitions of variables.

Essay 2
Sustainable Tax Strategy and Cost of Capital

1. Introduction

Corporate tax strategy is a multi-dimensional decision (Scholes et al. 2014). While minimizing tax is known as the primary objective of corporate tax strategies, the ultimate goal of a firm's tax strategy is to maximize after-tax returns, which is not necessarily achieved by higher-level tax avoidance (Scholes et al. 2014). In other words, to maximize after-tax returns, managers should consider tax savings from tax minimization and non-tax costs which also affect after-tax returns.³¹ Therefore, an effective tax strategy constitutes of a balance between tax benefits (e.g., cash savings) and other costs that affect managerial decisions and firm value (e.g., non-tax costs). Though balancing the benefits and costs of tax strategy is very important in enhancing firm value (i.e., after-tax returns), prior studies mostly focus only on one dimension of tax strategy (e.g., tax avoidance) and implicitly assume that the primary objective a tax strategy is to minimize taxes (Shackelford and Shevlin 2001). To better understand the effect of different tax strategies on firm value, this paper focuses on the sustainability of tax strategy and investigates whether and how the sustainability of a tax strategy influences cost of capital.³²

³¹ For example, reputational costs limit the tax-motivated behavior of managers by incurring forced CEO turnover (Chyz and Gaertner 2018). Also, while tax-motivated reorganizations play a role in reducing a firm's tax liability, these reorganizations cause substantial restructuring expenses which might outweigh the tax benefits of organizational structure transactions (Scholes and Wolfson 1990).

³² In this paper, I use the term "tax policy" and "tax strategy" interchangeably.

Anecdotal evidence suggests that tax strategy consist of two different dimensions; tax minimization and sustainable tax outcome (e.g., TEI 2005; Deloitte 2013). The tax minimization strategy seeks to reduce the firm's tax burden and to achieve the lowest possible tax outcome (i.e., a low effective tax rate). On the other hand, the dimension of a company's sustainability-focused tax strategy aims to obtain a consistent tax outcome over time (i.e., a limited range of effective tax rates), with less consideration of the extent of tax avoidance (McGuire et al. 2013). For instance, if a tax manager develops a tax model, their low effective tax rates may rely on a number of transactions that are susceptible to changes in tax law and the review of tax authorities (Deloitte 2013). In this context, a sustainable tax strategy can be described as a tax strategy aimed at maintaining consistent tax outcomes over time.³³ The concept of sustainability in corporate tax strategy is widely used in tax planning. For example, the Tax Executive Institute (2005) documents about 70 percent of firms utilize the ability to avoid tax-related earnings surprises as one of the evaluation criteria for tax executives. Furthermore, many accounting firms are committed to supplying their

³³ Apple is an example of a company with a sustainable tax strategy. The company took advantage of the Irish and U.S. tax law to avoid income tax (Linbaugh et al. 2013). This is desirable to manage a corporate structure in a tax-efficient manner as tax benefits can occur until the tax law changes or the company decides to change its structure. By comparison, Wilson (2009) several examples of an unsustainable tax policy by highlighting many companies engaged in tax shelters for a short period of time (one to two years).

clients with sustainable tax approaches to achieve their clients' goals of tax planning (Deloitte 2013; Ernst & Young 2014; KPMG 2016; PwC 2015). Despite the importance of sustainable tax strategy in practice, however, accounting researchers have paid little attention to the capital market implication of a sustainable tax strategy (e.g., cost of capital). In this paper, I explore this relatively uncovered dimension of tax strategy by looking at the association between the sustainability of tax strategy and cost of capital.

In terms of the association between tax minimization strategy (i.e., tax avoidance) and cost of capital, prior studies typically conclude that tax avoidance behavior increases not only the future cash flows from cash savings but also the uncertainty of potential future cash flow realizations (Desai and Dharmapala 2006; Hanlon and Slemrod 2009; Kim et al. 2011; Goh et al. 2016). While tax avoidance behavior increases the future cash flows in the form of cash tax savings (Goh et al. 2016), more aggressive tax planning can hurt shareholders' wealth (Hanlon and Slemrod 2009; Kim et al. 2011). In particular, Goh et al. (2016) borrow the framework of Lambert et al. (2007) and provide comprehensive evidence that the effect of tax avoidance on cost of capital is determined by the relative weights of the upside potential of increased expected cash flows from tax savings and the incremental risk exposure due to tax avoidance activities. According to Goh et al. (2016), tax avoidance behavior is, in general, *negatively* related to the cost of capital. Consequently, Goh et al. (2016)

conclude that, on average, the positive benefits of tax avoidance outweigh the potential costs of tax avoidance.

In addition to tax avoidance strategy, investors may prefer a sustainable tax strategy to mitigate the costs of tax avoidance (i.e., incremental risk exposure). First, a sustainable tax strategy exhibits a long-term tax avoidance behavior that maintains a consistent level of tax outcomes over time. Unlike the extreme cases of tax avoidance (i.e., tax shelters) which are difficult to maintain for a long time, firms with a sustainable tax strategy maintains a low level of volatility for their tax avoidance behavior (Wilson 2009). In this case, unlike aggressive tax strategies that increase the variance of a firm's overall cash flows, more sustainable tax strategies mitigate the uncertainty of investors by reducing the variability of a firm's cash flows. Also, investors can be informed that managers have expectations about future earnings to implement a long-term tax strategy. This is consistent with the view that managers signal information contents of future expected returns through earnings smoothness which results in a lower cost of capital (Francis et al. 2005; Baik et al. 2019).

Secondly, as the company's tax payment accounts for a large portion of its earnings (Ljungqvist et al. 2017), the uncertainty in tax strategy is a crucial component that affects the volatility of overall future earnings. In this regard, Guenther et al. (2017) document that, on average, corporate tax avoidance does not necessarily increase firm

risk in general, but the volatility of cash ETR is linked with future stock volatility suggesting that the tax strategy variability is related to overall future performance. As long as the sustainable tax strategy decreases the volatility of future earnings (i.e., future cash flows), investors demand less compensation for owning stocks of a firm with such a strategy.

Lastly, a sustainable tax strategy can mitigate the uncertainty in future tax payments by reducing the possibility of heightened scrutiny by the tax authorities (i.e., the Internal Revenue Service [IRS]). Unlike the extreme case of tax avoidance which is subject to a higher likelihood of tax audits (Kubick et al. 2017), adopting sustainable tax strategy mainly focuses on relatively safer tax investment ranging from benign tax-advantaged investment (e.g., tax-exempt municipal bonds) to investment that is not challenged in a court of law. Hence, these types of safer tax investments mitigate investors' anxiety regarding potential cash tax payments in the future. Consequently, investors expect a lower expected return for holding stocks of firms with a more sustainable tax strategy.

To estimate the sustainability of a tax strategy (*SUSTAX*), I utilize the coefficient of variation of annual cash ETRs over the previous five years. The coefficient of variation of cash ETRs measures the volatility in the outcomes of a firm's

tax avoidance strategy regardless of the level of tax avoidance.³⁴ To proxy for the cost of equity capital, I estimate the *ex ante* cost of equity using the mean value of four different implied cost of capital measures which use current stock prices and analysts' forecast of future earnings (Claus and Thomas 2001; Easton 2004; Gode and Mohanram 2003; Ohlson and Juttner-Nauroth 2005). Using a large sample of firm-year observations of U.S. firms from 1994 to 2018, I first find that firms with a sustainable tax strategy have a lower cost of equity (*COE*). In terms of economic significance, moving from the lowest *SUSTAX* decile to the highest *SUSTAX* decile results in a decrease of a cost of equity about 0.423 percent (i.e., 42.3 basis points).³⁵ The main findings of this paper are generally robust to using individual measures of *ex ante* cost of equity, propensity-score-matched sample, to estimating the cost of equity based on historical return on assets (Hou et al. 2012), and to utilizing expected returns from the market model (CAPM), Fama and French (1993) three-factor model, and the four-factor model (Carhart 1997). Also, the results are qualitatively similar when I use a different measure of tax avoidance (i.e., generally accepted accounting principles [GAAP] effective tax rate), when I additionally control for the coefficient of variation of pre-tax earnings, and when I exclude loss firms from the sample (Henry and Sansing

³⁴ More detailed measurement of sustainable tax strategy is described in Section III.

³⁵ I estimate the economic significance of my results by calculating the difference between the lowest decile and the highest decile of *SUSTAX* on the cost of equity (Lyle 2019).

2018). In addition, I find that the findings of prior studies (e.g., Goh et al. (2016)) that higher tax avoidance is related to lower cost of equity only exists for firms with a highly sustainable corporate tax strategy. These findings indicate that it is necessary not only to avoid taxes but also to reduce risk exposure by risky investments (i.e., aggressive tax avoidance) in order to minimize the uncertainty that investors face. Collectively, this paper finds that equity investors incorporate not only the positive cash flow effects of corporate tax avoidance but also the viability of the strategy.

To find the mechanism that investors require a lower expected return for firms with a sustainable tax strategy, I further investigate the different influence of innate portion of the sustainable tax strategy and discretionary portion of the sustainable tax strategy on the cost of capital. Prior studies suggest that the innate component of volatility comes from the firm's operating environment and describe the true underlying characteristics of the company (Francis et al. 2004; Lang et al. 2012; Mayberry et al. 2015). Therefore, I expect that greater innate component of sustainability of tax strategy is highly related to lower cost of capital. On the other hand, if managers use their discretion to their own benefits, greater portion of discretionary sustainability is less likely to associated with cost of capital. After decomposing the sustainability of tax strategy into innate component and discretionary component of tax strategy, I find that innate component of sustainable tax strategy influences cost of

capital more. This finding suggests that investors view innate component of tax strategy which is associated with a firm's business fundamentals and operating characteristics as more favorable and sustainable in the future which result in lower cost of capital.

Next, I test whether there are cross-sectional differences in terms of future cash flow volatility between firms with tax strategies that have high and low sustainability. To the degree that a sustainable tax strategy demonstrates a long-term tax avoidance practice and reduces future earnings volatility, I expect firms with a highly sustainable tax strategy to experience less volatile future cash tax outflows and operating cash flows. Consistent with this prediction, I find that firms with a highly sustainable tax strategy face less volatile future cash tax outflows and operating cash flows which confirms that investors expect more predictable cash flows for firms with sustainable tax strategy. Also, I test whether firms with sustainable tax strategies receive less attention from the tax authorities (i.e., IRS). Using a novel data set of IRS acquisition of firms' public financial disclosure (Bozanic et al. 2017), I find that firms with a sustainable tax strategy receive less attention from the IRS, while firms with more aggressive tax avoidance activities face more attention from the authorities. These results indicate that equity holders are exposed to the risk that the IRS may not approve some of the more aggressive tax avoidance activities of the firm, which could distort the predictability of future cash flows. On the other hand, investors may not be exposed

to additional risk from stronger scrutiny when firms engage in a more sustainable tax strategy, which mitigates the uncertainty of additional future tax payments.

Finally, I examine whether the *negative* association between the sustainable tax strategy and the cost of equity varies depending on external monitoring and firm complexity. I predict that if there is a strong external monitoring mechanism, the negative association between a sustainable tax strategy and cost of equity will be mitigated because effective monitoring can reduce the uncertainty of future cash flows generated by a more aggressive tax strategy. On the other hand, when a firm has a numerous business segments that increases the complexity and uncertainty of future cash flows, I expect the effect of a sustainable tax strategy on the cost of capital to be stronger because shareholders are more appreciative of the lower risk from sustainable tax strategy. Consistent with these predictions, I find that investors demand a lower expected return for firms with a more sustainable tax strategy only when firms are subject to *less* effective external monitoring and when firms have *more* business segments.

This paper contributes to the accounting literature in several ways. First, it provides new evidence on how stock investors evaluate firms' corporate tax strategies. While prior studies mostly focus on the investors' perception of the aggressiveness of tax avoidance, there is little evidence of investors' valuation of sustainable tax strategy.

By investigating the investors' reaction to a sustainable tax strategy, this paper sheds new light on the capital market consequences of tax planning.

Second, my study adds to the debate on the optimization of benefits and costs of tax avoidance. Though prior studies argue that the goal of corporate tax strategy is not just tax minimization, there are few prior studies on the benefits and costs of different tax strategies. My finding that investors require a lower expected return for firms simultaneously engaging in both tax avoidance and a sustainable tax strategy suggests that the optimization of benefits and costs of different tax strategies relies on the effective use of the two different tax strategies.

Lastly, my paper contributes to the debate on the role of corporate governance in tax strategy. While prior studies state that aggressive tax avoidance facilitates managerial rent extraction (Desai and Dharmapala 2006; Desai et al. 2007), Blaylock (2016) fails to find the results of supporting this conjecture.³⁶ The cross-sectional difference between effective (ineffective) external monitoring suggests that strong (weak) corporate governance mechanisms can mitigate (amplify) the risk associated with an aggressive tax strategy which results in a weaker (stronger) emphasis on the predictability of corporate tax outcomes.

³⁶ Desai and Dharmapala (2006) and Desai et al. (2007) provide evidence that aggressive tax avoidance is associated with managerial rent extraction using Russian firms. On the other hand, using U.S. firms Blaylock (2016) cannot find evidence of such an association.

The remainder of the paper proceeds as follows. Section II discusses the related literature and develops a hypothesis. Next, Section III describes the empirical models and sample selection procedures. Section IV presents the empirical findings, and Section V shows the additional analyses and robustness tests. Section VI concludes the paper.

2. Prior Literature and Hypothesis Development

2.1. Tax Strategy

Scholes et al. (2014) develop a framework which suggests that the ultimate goal of a firm's tax strategy is to maximize after-tax returns, which is not necessarily accomplished by minimizing tax payments. Under this framework, an effective tax strategy is a strategy that maximize after-tax returns and firm value (Scholes et al. 2014). To maximize the after-tax returns and firm value, managers should consider tax benefits and non-tax costs of tax strategy. Among various tax strategies, one distinctive dimension of tax strategy is the sustainability of tax avoidance outcomes over time (i.e., the sustainable tax strategy). In definition, sustainability is distinct from tax minimization, because sustainability focuses on the continuity of a firm's tax-reduction result over time without taking into account the extent of tax avoidance. Tax minimization, by comparison, focuses on the amount of tax liability for a company for a given period of time and overlooks how the company can continue to maintain the

level of tax avoidance into the future. Therefore, there is a heterogeneity in the degree of sustainability depending on the tax strategy though companies that display similar rates of tax avoidance (i.e., tax minimization).

In a practical manner, the sustainability of tax strategy is a primary goal for many tax departments. For example, the Rio Tinto Group, one of the leading mining firms operates in various countries, documents in the annual report of tax payment that the company “pursues a tax strategy that is sustainable in the long term” and that they “assess the risk before entering into any tax planning strategy to conduct a tax strategy that is aligned with the firm’s business strategy” (Rio Tinto 2011). Also, a survey of tax departments reports that about 70 percent of tax executives are assessed on the basis of their ability to avoid tax-related surprises (TEI 2005).³⁷

Though the tax strategy of a firm is multi-faceted, prior studies are generally focused on the single dimension of tax strategy: the tax minimization (Shackelford and Shevlin 2001; Hanlon and Heitzman 2010). For example, Desai and Dharmapala (2009) test whether corporate tax avoidance activities advance shareholder interests and find that the effect of tax minimization on firm value varies systematically with the strength of corporate governance. Likewise, several studies focus on the tax minimization

³⁷ On the other hand, sustainable tax planning is disadvantageous because investment in tax planning that results in better predictabilities could lead to paying more tax than is legally necessary (Deloitte 2013; TEI 2005).

benefit from the increased cash flow of lower explicit tax liabilities (Phillips 2003; Hanlon and Heitzman 2010; Goh et al. 2016). While it is important to analyze the effect of various tax strategies on the wealth of shareholders to maximize the after-tax return of tax strategies, accounting researchers paid little attention to the different tax strategies: the sustainability of tax outcomes. In this paper, I explore this relatively uncovered aspect of tax strategy by analyzing the association between sustainability of tax strategy and the cost of capital.

2.2. Tax Avoidance and Cost of Capital

An important area of tax research is whether and how investors incorporate tax avoidance behavior of a firm into its pricing decision. Risk-neutral investors are known to expect managers to behave in such a way that corporate profits are maximized (Hanlon and Heitzman 2010). This return-maximization assumption provides incentives to reduce tax liabilities when the incremental expected benefits are greater than the incremental costs. Therefore, managers must balance the potential tax savings benefits of more aggressive tax planning against the potential loss of increased uncertainty over future tax cash savings from the increased risk of regulators' attention and other non-tax costs suggested by the Scholes et al. (2014) framework.

The potential benefits of tax savings from tax avoidance activities can be derived from Lambert et al. (2007) framework.³⁸ According to the model of Lambert et al. (2007), adding a new risk-free or low-risk asset (e.g., cash tax savings) to the current cash flow of a company decreases the risk of future cash flow. If cash tax savings from tax-related activities are used as an internal fund to invest in riskless or low-risk assets, investors expect a positive effect on future cash flows created by tax avoidance behavior which results in a lower cost of capital. In this vein, Goh et al. (2016) show that general tax avoidance can influence the cost of capital through its effect on the firm's expected future cash flow and find that general tax avoidance is *negatively* linked to *ex ante* cost of capital.

Meanwhile, it is important to note that an increase in expected cash flows from tax avoidance activities may also increase the risk of the company's cash flows, and therefore the firm's cost of equity capital. Henry (2018) investigates the information content of income tax expense and shows that tax expense should also be informative about discount rates of future cash flow. Desai and Dharmapala (2006) also argue that, rather than growing shareholders' wealth, elaborating tax shelter schemes may encourage dishonesty on the management team. Similarly, Hanlon and Slemrod (2009)

³⁸ Although Lambert et al. (2007) develop the model for evaluating the effect of information quality on a firm's expected returns or risk, the derivation of the cost of capital from anticipated cash flows can also be used to evaluate behavior of a firm that have cash flow effects (e.g., tax avoidance).

observe a negative stock price reaction when the news about its involvement in tax shelters are released. Kim et al. (2011) also provide evidence that more aggressive tax avoidance is related to a higher likelihood of a substantial future negative stock price shock (i.e., stock price crashes). In a different way, Balakrishnan et al. (2019) examine whether aggressive tax planning firms have a less transparent information environment. They find that tax aggressiveness is associated with higher bid-ask spread, higher analyst forecast errors, and lower earnings quality, indicating that the benefits of tax planning (i.e., cash tax savings) may come at the expense of lower financial transparency.

On the other hand, prior studies on the effect of tax avoidance on the cost of debt generally show the *positive* association between tax avoidance and cost of debt. For example, Hasan et al. (2014) document that firms with greater tax avoidance have higher spreads on bank loans. Also, Shevlin et al. (2013) demonstrate that firms with greater tax avoidance incur higher public bond yield spreads at issuance. Likewise, Ayers et al. (2010) provide evidence that credit rating agencies integrate negative information into their rating decisions on large book-tax discrepancies. The findings of literature are consistent with debt holders being exposed to tax avoidance risks, but not sharing in the corresponding compensations from tax savings.

Collectively, the findings of previous studies suggest that while tax avoidance activity can affect the cost of capital through expected future cash flow, investors also assess the riskiness of tax avoidance in their pricing decisions.³⁹

2.3. Sustainable Tax Strategy and Cost of Capital

The risk of aggressive tax avoidance can be summarized as follows. First, the firm risk could increase as a result of transactions or underlying business fundamentals, such as international operations, R&D activities, and investments in intangibles. For example, transfer pricing or the use of foreign tax havens requires complex transaction structuring to reduce the overall tax burden. Such transaction or structuring may amplify the risk and therefore the variance of the company's total cash flows. Secondly, as firms get progressively adopt a more aggressive tax strategy in reducing tax liabilities, they are more likely to stretch the boundaries of legal interpretations of tax laws (Hanlon and Heitzman 2010). In this case, the possibility of challenging and audits by the IRS could be increased (Mills 1998; Wilson 2009). To the extent that the IRS and tax courts find some of the company's aggressive tax avoidance practices to be non-compliant, they may be disallowed and the firm may be subject to additional taxes,

³⁹ Drake et al. (2019) examine the cross-sectional heterogeneity in the relation between tax avoidance and firm value (Tobin's Q). They find that while investors regard tax avoidance positively, increased tax risk reduces the positive tax avoidance assessment.

fines, interest, and penalties (Mills 1998; Hanlon and Slemrod 2009). Finally, the benefits of corporate tax avoidance to shareholders are subject to agency costs of managers. For example, Chen et al. (2010) find that family firms have a lower degree of tax avoidance which is in line with the assumption that family owners are willing to neglect tax benefits in order to prevent a potential stock price discount from the reputational damages. The discount may arise from the concern of minority shareholders to pursue a rent-seeking behavior of managers by tax avoidance activities. This possibility of wealth expropriation raises the risk to shareholders of the company's cash flows and thereby raises the cost of capital.

One possible way to mitigate the riskiness of tax avoidance is to increase the feasibility of tax avoidance outcomes. If managers retain the volatility of their tax strategy at a low level, investors can be informed that managers have expectations about future earnings to implement a long-term tax strategy. In this vein, while aggressive tax strategies increase the variance of the firm's overall cash flows, more sustainable tax strategies play a role to mitigate the uncertainty of investors. This is consistent with the view that smoothness of earnings is a sign of information about managers' future expected returns resulting in a lower cost of capital (Francis et al. 2005; Baik et al. 2019). Prior studies also provide evidence that the sustainability of tax outcomes is related to several characteristics that mitigate the uncertainty of

investors. For example, McGuire et al. (2013) argue that the sustainability of a firm's tax strategy provides information about the persistence of a firm's pre-tax earnings and earnings component (i.e., accruals and cash flows). They also provide evidence that investors are able to determine the sustainability of a firm's tax strategy and use it as a signal to correctly price the persistence of a firm's pre-tax earnings. Likewise, Neuman et al. (2013) find a positive association between the sustainability of firms' tax strategies and corporate transparency. Collectively, maintaining a consistent level of tax outcomes may reduce the uncertainty of investors in terms of their pricing decision.

Second, Dichev and Tang (2009) document that more volatile current earnings are associated with less predictable future earnings. If the prediction of future earnings is an intrinsic part of equity valuation, considering earnings volatility is very important for estimating the cost of capital (Graham et al. 2005). As long as the company's tax expenses take up a large proportion of its earnings (Ljungqvist et al. 2017), the sustainability of tax strategy remains a central component impacting overall future earnings fluctuations. In this regard, several studies examine whether tax avoidance strategies are associated with future volatility of firm performance (Hutchens and Rego 2015; Guenther et al. 2017). In particular, Guenther et al. (2017) document that, on average, corporate tax avoidance does not necessarily increase firm risk, but find that the volatility of cash tax rates is associated with future stock volatility which suggests

that the variability of tax strategy is related to overall firm risk. If the sustainable tax strategy reduces the uncertainty of future earnings (i.e., future cash flows), I expect that investors demand lower returns on stocks with such a strategy.

Lastly, a more sustainable tax strategy can reduce the uncertainty of future tax payments through decreasing the uncertainty regarding challenges by tax authorities (i.e., the IRS). The IRS will conduct information acquisition activities based on their private information and consider information signals that are more informative for their own audit process (Sansing 1993). Also, as the IRS is subject to budget and resource constraints, they will find financial information that is more relevant and useful for their audit decision (Bozanic et al. 2017).^{40,41} In this vein, Kubick et al. (2017) find that the probability of IRS audits is higher for firms with a higher level of cash tax avoidance. I expect that the IRS pays less attention to the firms with a more sustainable tax strategy. Unlike the extreme case of tax avoidance (e.g., tax shelters), implementing a sustainable tax strategy would focus on relatively safer investment ranging from benign tax-advantaged investment (e.g., tax-exempt municipal bonds) to investment

⁴⁰ Empirical evidence also supports that firms far from the IRS are less subject to the IRS audit probability (Kubick et al. 2017).

⁴¹ It is also possible that given the level of detail and granularity in their own private information set, the IRS would not need public financial disclosure. Whether information acquisition activities of the IRS are focused on publicly or privately disclosed information is beyond the scope of this paper. For more detailed discussion, see Bozanic et al. (2017).

that is not challenged in a court of law. Therefore, these types of tax strategies mitigate the uncertainty of investors about future cash tax payments. In this case, investors require a lower expected return for holding stocks with a more sustainable tax strategy.

On the other hand, it is also possible that market participants have difficulty interpreting tax-related information in their pricing decisions. For example, Plumlee (2003) finds that financial analysts are able to predict the effect of simple changes to tax law, but are unable to forecast the effects of more complex changes to tax law. In addition, Weber (2009) finds that both investors and analysts have not correctly incorporated the information in the book-tax differences into their expectations of earnings. These results suggest that investors are potentially unable to determine the sustainability of a firm's tax strategy and use these pieces of information when evaluating the firm's risk. Moreover, as long as the potential benefits of tax avoidance outweigh the potential costs of aggressive tax planning, the effect of a sustainable tax strategy on the cost of capital would be trivial. Based on the above discussion, I hypothesize the association between the sustainable tax strategy and the cost of capital in a null form:

H1: There is no association between the sustainable tax strategy and cost of capital

3. Variable Measurement, Research Design and Sample Selection

3.1. Variable Measurement

3.1.1. Sustainable Tax Strategy

Following prior studies, I define a sustainable tax strategy as a tax planning that retain a consistent tax outcome over time, regardless of the level of effective tax rate (e.g., McGuire et al. 2013). A tax minimization strategy, on the other hand, is a tax strategy that focuses on achieving the lowest possible tax outcomes (e.g., Dyreng et al. 2008). I use the cash ETR to proxy for a firm's annual level of tax outcome for two reasons. First, cash ETR is a comprehensive measure of tax avoidance that describes tax avoidance practices that defer cash taxes paid (i.e., temporary differences), as well as those that explicitly affect net income (i.e., permanent differences) (Dyreng et al. 2008; Goh et al. 2016). In comparison, the GAAP ETR only represents tax avoidance activities that directly impact net income. Furthermore, the cash ETR is not affected by adjustments in tax accounting accruals (Dyreng et al. 2008). Thus, cash ETR is a more reliable indicator of the sustainability of a firm's tax strategy in the absence of tax accrual manipulations.⁴² In line with prior studies, I define the cash ETR as cash taxes paid divided by pre-tax income less special items (Dyreng et al. 2008, 2010).

⁴² The results are robust to using GAAP ETR based measure of sustainable tax strategy (*SUSTAX_GAAP*).

I measure the sustainability of a firm's tax strategy by using the coefficient of variation of annual cash ETRs over a five-year period because it measures the variability in the results of a firm's tax avoidance strategy over time. The coefficient of variation for cash ETRs (*SUSTAX*) is defined as the standard deviation of annual cash ETRs over the past five years divided by the absolute value of the average of annual cash ETRs over the same five-year period. This measure implies a volatility of annual cash ETRs regardless of level of the cash ETRs and conforms to the definition of a sustainable tax strategy.

$$SUSTAX_{i,t} = (-1) * \frac{\sqrt{\frac{\sum_{t=1}^N (Cash\ ETR_{i,t} - Avg.\ Cash\ ETR_{i,t})^2}{N}}}{abs(\frac{1}{N}(\sum_{t=1}^N Cash\ ETR_{i,t}))} \quad (1)$$

The coefficient of variation has been used in prior literature as a measure of the volatility of income and cash flows (Albrecht and Richardson 1990; Michelson et al. 1995; Minton et al. 2002). To indicate that a higher value of *SUSTAX* implies a highly sustainable tax strategy, I multiply a negative one (-1) to Equation (1). I use annual decile rank of *SUSTAX* to ease the interpretation of the results.⁴³

3.1.2. Cost of Equity Capital

⁴³ I also find consistent results when the raw value of *SUSTAX* is used in regressions.

In this paper, I empirically utilize the cost of equity estimates that are implied in current stock prices and analysts' earnings forecasts using I/B/E/S data four months after the fiscal year-end. Implied cost of equity contains less noise compare to realized stock returns and widely used in accounting literature (Elton 1999; Lee et al. 2020). To estimate the cost of equity, I follow four different cost of equity models introduced in accounting literature (Claus and Thomas 2001; Gebhardt et al. 2001; Gode and Mohanram 2003; Easton 2004; and Ohlson and Juettner-Nauroth 2005). As the literature is not established on which models perform best or how the models should be evaluated (Botosan and Plumlee 2005; Gode and Mohanram 2003; Guay et al. 2011; Lee et al. 2020), I follow prior literature and use the average of four different estimates as a proxy of the cost of equity to mitigate the effects of measurement errors associated with one particular model (Hail and Leuz 2006; Li 2010).^{44,45} Appendix B provides the detailed construction procedures of four different cost of equity estimates.

3.2. Research Design

3.2.1. Determinants of Tax Strategy

⁴⁴ To maximize sample size, I only require a firm-year observation to have at least one non-missing individual estimate to compute its composite implied cost of equity.

⁴⁵ In a later part, I use expected returns based on market-based model as an alternative proxy for cost of capital and find similar results.

To examine whether there are systematic differences in adopting different tax strategies (i.e., a sustainability and a minimization), I estimate the following equation:

$$\begin{aligned}
SUSTAX_{i,t} \text{ or } TAXAVOID_{i,t} = & \beta_0 + \beta_1 LEV_{i,t} + \beta_2 WWINDEX_{i,t} + \beta_3 COVERAGE_{i,t} \\
& + \beta_4 INSTOWN_{i,t} + \beta_5 AQ_{i,t} + \beta_6 BETA_{i,t} + \beta_7 SIZE_{i,t} \\
& + \beta_8 BTM_{i,t} + \beta_9 RET_{i,t} + \beta_{10} CFO_{i,t} + \beta_{11} ROA_{i,t} \\
& + \beta_{12} RETVOL_{i,t} + \beta_{13} CFVOL_{i,t} + \beta_{14} ROAVOL_{i,t} \\
& + \beta_{15} SALEVOL_{i,t} + \beta_{16} FOREIGN_{i,t} + \beta_{17} TLCF_{i,t} \\
& + \beta_{18} TXBCO_{i,t} + YEAR\ FE + INDUSTRY\ FE + \varepsilon_{t+1}, \quad (2)
\end{aligned}$$

, where *SUSTAX* is the annual decile ranking of a coefficient of variation of cash ETRs past five years multiplied by negative one (-1) and *TAXAVOID* is the one of three different tax avoidance measures frequently used in prior studies (i.e., annual cash ETR multiplied by (-1), book-tax differences, and permanent book-tax differences).⁴⁶ To understand various firm characteristics that are related to choices of different tax strategies, I include various firm-level variables into the determinants model. For example, financially constrained firms are known to be engaged in tax avoidance to save cash (Edwards et al. 2016). Therefore, I include the firm leverage (*LEV*), the Whited-Wu index (*WWINDEX*) into the model (Whited and Wu 2006). Also, to test whether external monitoring mechanisms play a role in implementing a specific type of tax strategy, I include the analyst following (*COVERAGE*) and institutional

⁴⁶ Detailed definition of variables is defined in Appendix A.

ownership (*INSTWON*) (Allen et al. 2016; Khan et al. 2017). In addition, I examine how performance such as stock returns (*RET*), operating cash flows (*CFO*), and earnings (*ROA*) and volatility of performance (*RETVOL*, *CFVOL*, *ROAVOL*, *SALEVOL*) affect the adoption of specific tax policy. Lastly, I include various firm characteristics that is known as the degree of tax avoidance such as accruals quality (*AQ*), historical beta (*BETA*), firm size (*SIZE*), book-to-market ratio (*MTB*), a foreign operation dummy (*FOREIGN*), tax loss carryforwards (*TLCF*), and a tax benefit of stock options (*TXBCO*) (Goh et al. 2016).

3.2.2. Empirical Model

Next, I provide a multivariate analysis based on the following firm-year level empirical specification:

$$\begin{aligned}
COE_{i,t+1} = & \beta_0 + \beta_1 SUSTAX_{i,t} + \beta_2 BETA_{i,t} + \beta_3 SIZE_{i,t} + \beta_4 BTM_{i,t} \\
& + \beta_5 LEV_{i,t} + \beta_6 RET_{i,t} + \beta_7 RETVOL_{i,t} + \beta_8 CFO_{i,t} \\
& + \beta_9 CFVOL_{i,t} + \beta_{10} LOSS_{i,t} + \beta_{11} AQ_{i,t} + \beta_{11} CAPEX_{i,t} \\
& + \beta_{12} RD_{i,t} + \beta_{14} SGA_{i,t} + \beta_{15} FOREIGN_{i,t} + \beta_{16} TLCF_{i,t} \\
& + \beta_{17} TXBCO_{i,t} + YEAR\ FE + INDUSTRY\ FE + \varepsilon_{t+1}, (3)
\end{aligned}$$

where *COE* is the average of four different implied cost of equity proxies of firm *i* in year *t+1*.⁴⁷ The variable of interest, *SUSTAX* is the coefficient of variation of cash ETRs during the past five years (year *t-4* to *t*) multiplied by negative one (-1) to indicate that higher value of *SUSTAX* implies more sustainable tax strategy. To allow for easier interpretation of economic effects, I use yearly decile rankings of *SUSTAX*. In the later part of the paper, I utilize the degree of tax avoidance to compare the effect of different corporate tax strategies on the cost of capital. I use cash effective tax rates (ETR) multiplied by negative one (-1) as a measure of tax avoidance (*TAXAVOID*). I include various control variables that are known to affect the cost of capital. For example, I include stock beta (*BETA*), firm size (*SIZE*), book-to-market ratio (*BTM*), firm leverage (*LEV*), stock returns (*RET*), and volatility of stock returns (*RETVOL*). I also control for various firm characteristics including cash flows from operations (*CFO*), volatility of cash flows (*CFVOL*), accruals quality (*AQ*), and the indicator for reporting losses (*LOSS*). In addition, I control for firm investment behaviors such as capital investment (*CAPEX*), R&D expenses (*RD*), and selling and general, and administrative expenses (*SGA*) (Frank and Shen 2016). Lastly, I include a numerous firm characteristic that are related to incentives for the tax strategy in the model (i.e.,

⁴⁷ Four different implied cost of capital proxies are calculated following Gode and Mohanram (2003), Easton (2004), Gebhardt et al. (2001), and Claus and Thomas (2001). I also report the results of each individual cost of equity estimates in Table 4.

the existence of foreign operation (*FOREIGN*), tax loss carryforwards (*TLCF*), and a tax benefit of stock options (*TXBCO*)) (Goh et al. 2016). Appendix A provides detailed definitions of variables.

3.3. Sample Selection

The sample period starts in 1994 and ends in 2018. For the analysis of a sample subject to consistent financial reporting standards for income tax (Financial Accounting Standards [FAS] 109; Accounting Standards Codification [ASC] 740), the sample period begins in 1994. I calculate the implied cost of equity based on I/B/E/S analysts' earnings forecasts and a stock price of firm i from CRSP monthly files. Financial data are from Compustat annual files. In order to be included in the sample, firms must have a non-missing and positive book value of equity and total assets. Following prior studies, I exclude all financial (SIC codes 6000 to 6999) and utilities (SIC codes 4900 to 4999) firms. After excluding all firm-year observations without sufficient data requirements used in Equation (3), the final sample consists of 37,759 firm-year observations. All continuous variables are winsorized at the top and bottom 1 percent distributions to mitigate the effect of outliers.

4. Empirical Results

4.1. Descriptive Statistics

Table 1 shows the descriptive statistics. The average cost of equity (*COE*) is 9.98% per year. For the individual cost of equity measures, the average value of each individual measure is 11.94% (*R_{GM}*), 12.36% (*R_{EST}*), 6.49% (*R_{GLS}*), and 8.55% (*R_{CT}*), respectively. The value of each individual estimates is similar to those reported in prior studies (e.g., Botosan et al. 2011; Dhaliwal et al. 2016). The variable of interest, the sustainability of corporate tax strategy (*SUSTAX*) has a mean (median) value of -0.818 (-0.710). Among other variables, historical *BETA* has a mean (median) value of 1.238 (1.129), book-to-market ratio (*BTM*) of 0.519 (0.428), and firm size (*SIZE*) of 6.740 (6.612). The distribution of variables is generally consistent with prior studies (Goh et al. 2016).

[Insert TABLE 1 here]

Figure 1 shows the annual trends of sustainable tax strategy (*SUSTAX*) and inverse cash ETR (*CETR*) using yearly median values. Consistent with Dyreng et al. (2017), the effective tax rate (ETR) trend is decreasing (i.e., a rise in tax avoidance levels). In terms of the trend in *SUSTAX*, the degree of sustainability of tax strategy decreases until around 2004 and increases after 2004.

[Insert FIGURE 1 here]

Table 2 provides the correlation matrix between dependent variables and independent variables used for analyses. The correlation between the sustainable tax strategy (*SUSTAX*) and the cost of equity is significantly negative, indicating that investors require lower expected returns for firms with a more sustainable tax strategy. In addition, the sustainable tax strategy (*SUSTAX*) is negatively correlated with future cash outflows volatility (*CFVOL*).

[Insert TABLE 2 here]

4.2. Determinants of Different Tax Strategy

To provide evidence of the determinants of different tax strategies (i.e., *SUSTAX* and *TAXAVOID*), I first regress *SUSTAX* and *TAXAVOID* on various firm characteristics. Table 3 shows the results. I find that firms with lower leverage (*LEV*), financially healthy firms (*WWINDEX*), and firms with higher analyst following (*COVERAGE*) focus on the sustainability of tax strategy. In comparison, firms with higher institutional ownership (*INSTOWN*), firms with low information quality (*AQ*), smaller firms (*SIZE*) are engaging in less sustainable tax strategy. In Column (2) to Column (4), the results show that highly levered firms (*LEV*), financially constrained firms (*WWINDEX*), and less profitable firms (*ROA*) are generally implementing tax avoidance strategy (*TAXAVOID*). These results are consistent with the view that financially constrained

firms are benefited from tax avoidance strategy which increases the cash savings from tax avoidance (Edwards et al. 2016).

The results of Table 3 show that implementing tax strategy is not a one-sided decision to save the cash or increase the expected future cash flows. Instead, depending on the status of a firm, managers engage in different tax strategies considering the benefits and costs of different tax strategies.⁴⁸

[Insert TABLE 3 here]

4.3. Main Results – Sustainable Tax Strategy and Cost of Capital

In Figure 2, I show the results of univariate analyses with annual decile of *SUSTAX* and *CETR* rankings. In general, the mean value of the cost of equity (*COE*) decreases with the rise in *SUSTAX*'s decile rankings. This is consistent with my hypothesis that the relation between a sustainable tax strategy and cost of capital is negative. That is, equity investors require lower expected returns for firms with a sustainable tax strategy. On the other hand, when I replace the variable of interest to the level of tax avoidance (*CETR*), I find a non-linear relation between tax avoidance and the cost of equity capital. When firms reduce their effective tax rate through the

⁴⁸ From Panel B of Table 5, I use an annual cash ETRs (*CETR*) as a representative proxy for tax avoidance (*TAXAVOID*).

introduction of a tax avoidance strategy, investors require lower expected returns to some extent. However, when firms more aggressively engage in extreme tax avoidance strategy, investors require higher expected returns (increasing trends after rank 5). This finding is consistent with the view that while tax avoidance enhances the future cash flows by saving cash which could be invested in riskless investment opportunities, a more extremely aggressive tax avoidance strategy increases the risk of the firm face (Goh et al. 2016). Figure 2 confirms that the tax avoidance strategy is related to lower cost of capital, but a sustainable corporate tax strategy also could be an effective way to reduce cost of capital by mitigating the uncertainty of stock investors.

[Insert FIGURE 2 here]

Table 4 shows the main results of this paper. In Table 4, when I use the mean value of four different cost of equity estimates as a dependent variable (*COE*), I find a significant and negative coefficient on *SUSTAX* (coefficient = -0.047, t-value = -2.60). Furthermore, the association between sustainable tax strategy and the cost of equity capital is economically meaningful. The estimated coefficient on *SUSTAX* implies that moving from the lowest *SUSTAX* decile to the highest *SUSTAX* decile results in a decrease of the future cost of equity capital by 0.423 ($= 0.047 \times (10-1)$) percent per year

(i.e., a 42.3 basis points).⁴⁹ In Column (2) to (5), I analyze the relation between sustainable tax strategy and cost of capital on the basis of four different individual proxies (R_{GM} , R_{EST} , R_{GLS} , and R_{CT}). The results are consistent with Column (1). That is, there is a *negative* correlation between sustainable tax strategy ($SUSTAX$) and the cost of equity capital. These results provide evidence that when firms engage in a more sustainable tax strategy, investors demand a lower compensation for holding these stocks.

With regard to other control variables, I find that higher past returns (RET), higher accruals quality (AQ), high performance (CFO) firms are related to lower cost of equity while high leverage (LEV), more volatile stock returns ($RETVOL$) and cash flows ($CFVOL$), and reporting loss during the past years ($LOSSPTR$) are positively associated with the cost of equity. Overall, the results of Table 4 are consistent with my hypothesis that investors require a lower cost of capital for stocks with a more sustainable corporate tax strategy.⁵⁰

[Insert TABLE 4 here]

⁴⁹ I evaluate the economic significance by calculating the difference of a lowest decile and a highest decile of a sustainable tax strategy on the cost of equity.

⁵⁰ The results are robust to using current-period cost of capital measures, instead of the cost of capital for year $t+1$.

4.4. Incremental to Tax Avoidance Strategy

In this section, I examine whether the influence of a sustainable tax strategy on the cost of capital after controlling for tax avoidance strategy. Panel A of Table 5 shows the results. In Column (1), (3), and (5), I include three different tax avoidance variables (*TAXAVOID*) and exclude the sustainability of tax strategy (*SUSTAX*) to replicate the main finding of Goh et al. (2016), which shows that investors require lower expected returns for tax-avoided firms. For example, in Column (1), I find the negative and significant coefficient on *TAXAVOID* which shows that when firms engage in tax avoidance, the cost of capital decreases (coefficient = -0.029, t-value = -2.17). This result is in accordance with Goh et al. (2016). In Column (2), (4), and (6), I include both the strategy of tax avoidance and the sustainable tax strategy in the model and find that even after controlling for tax avoidance, investors require a lower expected return in addition to the effect of tax avoidance. There is no statistical difference between *SUSTAX* and *TAXAVOID* (untabulated). These results show that while tax avoidance affects the cost of equity by increasing the expected future cash flows, investors also consider the risk generated from a risky form of investment (i.e., tax avoidance). These results are consistent with the view that tax strategy is not just minimization, but the

multi-faceted dimension of strategy considering tax costs and non-tax costs (Scholes et al. 2014).⁵¹

In Panel B, I divide the sample into three different subgroups based on the degree of a sustainability of a firm's tax strategy and examine how the effect of tax avoidance on the cost of equity capital varies. In Column (1), I do not find a statistically significant association between tax avoidance (*CETR*) and cost of equity capital. On the other hand, in Column (3), I find that investors require lower expected returns for firms engaging in tax avoidance strategy. The difference between Column (1) and (3) is statistically significant at 5% level (Difference = 0.061, p-value = 0.034). The findings imply that investors favorably evaluate tax avoidance strategy only when the strategy is consistently executed. However, when firms engage in avoiding taxes without a sustainability, the benefits of tax avoidance are offset by the cost of tax avoidance (e.g., additional future cash tax payment). Collectively, I find evidence that in addition to the tax avoidance strategy, sustainability of the tax strategy plays a role in reducing the investors' risk of the firm. Also, the effect of tax avoidance on the cost of equity is heterogeneity depending on the degree of sustainability of corporate tax outcomes.

⁵¹ I acknowledge that a sustainability of tax strategy does not include all the dimension of tax strategy in addition to the tax avoidance. It is also possible that political cost of tax avoidance is another dimension of tax strategy (Mills et al. 2013).

[Insert TABLE 5 here]

4.5. Innate and Discretionary Components of Tax Strategy

In this section, I test the different influence of innate component and discretionary component of a sustainable tax strategy. The innate component of a sustainable tax strategy reflects economic fundamentals and a firm's operating environment. On the other hand, the discretionary component of the strategy may be the result of managers' intention of the tax strategy through their reporting choices (Francis et al. 2005; Mayberry et al. 2015). To examine the different effect of innate and discretionary components of a sustainable tax strategy, I use two different models of decomposing the sustainability of tax strategy into its innate and discretionary components (Dechow and Dichev 2002; Mayberry et al. 2015; Demere et al. 2019). First, following Francis et al. (2005) and Mayberry et al. (2015), I utilize the predicted value from the below regression as my measure of non-discretionary components of the sustainable tax strategy (*INN_SUSTAXI*), and the residuals as a measure of discretionary component of the sustainable tax strategy (*DISC_SUSTAXI*).

$$\begin{aligned} SUSTAX_{i,t} = & \beta_0 + \beta_1 CAPINTEN_{i,t} + \beta_2 INTANINTEN_{i,t} + \beta_3 DUMINTAN_{i,t} \\ & + \beta_4 NEGTI_{i,t} + \beta_5 OPCYCLE_{i,t} + \beta_6 SIZE_{i,t} + \beta_7 SALEVOL_{i,t} \\ & + \beta_8 CFVOL_{i,t} + \varepsilon_{i,t}, \end{aligned} \quad (4)$$

I choose eight characteristics such as capital intensity (*CAPINTEN*), intangible intensity (*INTANINTEN*), an indicator for intangible assets (*DUMINTAN*), negative taxable income (*NEGTI*), firm size (*SIZE*), volatility of sales (*SALEVOL*), and cash flow volatility (*CFVOL*). Detailed definitions of variables are defined in Appendix A.

I use the fitted value of equation (4) to estimate the innate component of the sustainable tax strategy (*INN_SUSTAX1*) and the residuals as a measure of discretionary part of the sustainable tax strategy (*DISC_SUSTAX1*). Next, I use the simple mean of a firm's SUSTAX over its own time-series as an estimate of innate component of sustainable tax strategy (*INN_SUSTAX2*) and deviations from this mean as discretionary component of sustainable tax strategy (*DISC_SUSTAX2*). After estimating the innate and discretionary components of the sustainable tax strategy, I replace the variable of interest to *INN_SUSTAX1* (*INN_SUSTAX2*) and *DISC_SUSTAX1* (*DISC_SUSTAX2*). The results are reported in Table 6. In Column (1) and (3), I do not include *CETR*, while Column (2) and (4) use a tax avoidance strategy as an additional control variable. Across all columns, I find that the effect of the sustainable tax strategy is more pronounced for innate component of the sustainable tax strategy. The difference between *INN_SUSTAX1* (*INN_SUSTAX2*) and *DISC_SUSTAX1* (*DISC_SUSTAX2*) is significant at least 10% level across all columns.

Overall, the results indicate that investors put greater weight to a sustainable tax strategy that reflect innate characteristics of the firm's business model, relative to the discretionary components of tax strategy which contain managerial opportunistic choices.

[Insert TABLE 6 here]

4.6. Consequences of Different Tax Strategy

In order to further examine whether different tax strategies are systematically related to the uncertainty of future cash flow outcomes, I provide additional evidence on the consequences of different strategies. In this section, I test whether there are systematic differences in future cash flow outcomes depending on different tax strategies. To examine this possibility, I test the following estimation:

$$\begin{aligned}
 &STD(TAXAVOID)_{i,t+1\sim t+5} \text{ or } CFVOL_{i,t+1\sim t+5} \\
 &= \beta_0 + \beta_1 SUSTAX_{i,t} + \beta_2 CETR_{i,t} + \beta_3 BETA_{i,t} + \beta_4 SIZE_{i,t} \\
 &\quad + \beta_5 BTM_{i,t} + \beta_6 LEV_{i,t} + \beta_7 RET_{i,t} + \beta_8 RETVOL_{i,t} + \beta_9 CFO_{i,t} \\
 &\quad + \beta_{10} CFVOL_{i,t} + \beta_{11} LOSS_{i,t} + \beta_{12} AQ_{i,t} + \beta_{13} CAPEX_{i,t} + \beta_{14} RD_{i,t} \\
 &\quad + \beta_{15} SGA_{i,t} + \beta_{16} FOREIGN_{i,t} + \beta_{17} TLCF_{i,t} + \beta_{18} TXBCO_{i,t} \\
 &\quad + YEAR\ FE + INDUSTRY\ FE + \varepsilon_{t+1}, \tag{5}
 \end{aligned}$$

where $STD(TAXAVOID)$ is the standard deviation of tax avoidance from year $t+1$ to $t+5$. $STD(TAXAVOID)$ represents the volatility of cash tax outflows over the next five years. I also utilize the volatility of operating cash flows ($CFVOL$) over the next five years as a general proxy for volatile expected future cash flows.

Table 7 shows the future consequences of the different tax strategies. In Column (1), I find that both the sustainable tax strategy ($SUSTAX$) and the tax minimization strategy ($CETR$) show negative coefficient.⁵² Interestingly, the tax minimization strategy also reduces the volatility of future cash tax outflows. The negative coefficient on $CETR$ is consistent with Guenther et al. (2017) who suggests that firms can maintain those tax saving strategy in the future. In Column (2), the coefficient on $SUSTAX$ is negative and statistically significant, while that of $CETR$ is positive and marginally significant. These results indicate that a sustainable tax strategy is associated with a lower volatility of future cash tax paid and cash flows in general. If firms effectively implement a sustainable tax strategy, equity investors can easily predict future cash flows which mitigate the uncertainty of investors and reduce the cost of equity capital.

[Insert TABLE 7 here]

⁵² The spearman correlation between $SUSTAX$ and $STD(TAXAVOID)$ is 0.04 which shows that the results of Table 7 is not just a mechanical relation.

4.7. Regulators' Attention to Different Tax Strategy

One potential risk associated with a more aggressive tax strategy is the possibility of compliance by regulators (i.e., the tax audit from the IRS). For example, firms' aggressive tax strategy may not be approved by the IRS in the future and they are subject to additional taxes, fines, interest, and penalties (Mills 1998; Hanlon and Slemrod 2009). These types of additional cash outflows reduce the expected cash flows from the perspective of equity investors (Goh et al. 2016). A recent study by Bozanic et al. (2017) develops a novel data set that captures part of the IRS's acquisition of publicly available financial accounting reports. This data set captures the IRS's downloads of firms' annual financial reports from EDGAR and allows researchers to observe which firms are generally paid attention from the IRS. In this section, I test whether there are systematic differences in terms of the IRS attention between two different tax strategies. I expect regulators to pay less attention to firms with a sustainable tax strategy which mitigate the uncertainty of equity investors regarding additional future cash outflows due to the IRS compliance. To investigate the relation between different tax strategy and the IRS's acquisition of publicly available financial accounting reports, I estimate the following regression model:

$$\begin{aligned} LN_{10K_{IRS}i,t} = & \beta_0 + \beta_1 SUSTAX_{i,t} + \beta_2 CETR_{i,t} + \beta_3 LNMV_{i,t} \\ & + \beta_4 MTB_{i,t} + \beta_5 LEV_{i,t} + \beta_6 RET_{i,t} + \beta_7 RETVOL_{i,t} \\ & + \beta_8 CFO_{i,t} + \beta_9 CFVOL_{i,t} + \beta_{10} LOSS_{i,t} + \beta_{11} AQ_{i,t} \end{aligned}$$

$$\begin{aligned}
& + \beta_{12}CAPEX_{i,t} + \beta_{13}RD_{i,t} + \beta_{14}FOREIGN_{i,t} + \beta_{15}SGA_{i,t} \\
& + \beta_{16}MNE_{i,t} + \beta_{17}INTANGIBLE_{INTEN_{i,t}} \\
& + \beta_{18}CAPITAL_{INTEN_{i,t}} + \beta_{19}CH_{NOL_{i,t}} \\
& + \beta_{20}CASH_{i,t} + \beta_{21}SG_{i,t} + YEAR\ FE \\
& + INDUSTRY\ FE + \varepsilon_{i,t},
\end{aligned} \tag{6}$$

where LN_10K_IRS is a log of the number of downloads by the IRS of 10-K of firm i . I add several variables following Bozanic et al. (2017). I include a market value of equity ($LNMV$), an indicator of multinational corporations (MNE), intangible intensity ($INTANGIBLE_INTEN$), capital intensity ($CAPITAL_INTEN$), profitability (ROA), change in the tax loss carryforward (CH_NOL), the amount of cash and cash equivalent ($CASH$), and sales growth (SG).

Table 8 shows the effect of different tax strategies on the IRS's information acquisition behavior. Consistent with Bozanic et al. (2017), I find that the IRS is paying more attention to larger firms, firms with foreign revenues, firms with a higher level of SG&A expenditure. On the other hand, the IRS does not pay attention to firms with higher leverage, fast-growing firms in terms of revenue. More importantly, the IRS is less likely to access 10-K of firms with a sustainable tax strategy ($SUSTAX$). On the other hand, as firms participate in a high-tax minimization strategy ($CETR$), they are more likely to be caught by the IRS.

[Insert TABLE 8 here]

Overall, I find that the regulators pay less attention to firms with a sustainable tax strategy which mitigate the uncertainty of equity investors who holding stocks with a highly sustainable tax strategy.⁵³

4.8. Cross-Sectional Analyses

4.8.1. External Monitoring

Goh et al. (2016) show that strong external monitoring mechanisms minimize managers' opportunistic behavior associated with tax avoidance and as a result, the negative correlation between firms' tax avoidance and the cost of equity will be greater for firms with better outside monitoring. In a similar vein, when external monitoring mechanisms operate successfully, investors are less worried about the risk presented by risky tax avoidance behavior. Therefore, the advantage of adopting a sustainable tax strategy would be mitigated and the negative relation between a sustainable tax strategy and cost of equity should be less pronounced when firms are monitored by effective external monitoring mechanisms. To examine this prediction, I utilize analyst following

⁵³ On the other hand, it is also possible that, considering the degree of extensive detail and granularity in its private information set, the IRS does not require public financial disclosure (Bozanic et al. 2017). However, if the IRS uses public financial information in addition to their private information, information acquisition should be more active to firms with implementing aggressive tax strategy (*TAXAVOID*), instead of firms with predictable tax outcome (*SUSTAX*).

(*COVERAGE*) and institutional ownership (*INSTOWN*) as proxies for external monitoring mechanisms. I divide the sample into two groups based on the sample median value of analyst following (*COVERAGE*) and institutional ownership (*INSTOWN*). Panel A of Table 9 show the results of analyst following, while Panel B of Table 9 display the results of institutional ownership. In general, the negative association between sustainable tax strategy and cost of equity estimates is observed only in less effective outside monitoring groups. For firms with better outside monitoring, I generally fail to find evidence of a negative relation between *SUSTAX* and *COE*. The difference between two subsamples in terms of the coefficients on *SUSTAX* is statistically significant at least 5% level. Collectively, the results Panel A and Panel B of Table 9 suggest that investors do not require lower expected returns for firms with a sustainable tax strategy when better outside monitoring mechanisms perform well because effective monitoring mechanisms are more likely to mitigate benefit from predictable tax outcomes.

4.8.2. Complexity of Firm Environment

Implementation of a tax strategy accompanies complex transactions or business fundamentals (Balakrishnan et al. 2019).⁵⁴ When firms are exposed to a complex structure of business environment or implement complex transactions, investors have difficulty in understanding the riskiness of the firm's overall cash flows. Considering that the sustainability of tax strategy is related to less volatile future cash flows and future tax outcomes, investors put more emphasis on a sustainable tax strategy when firms are operating in more complex environments. To test this prediction, I divide the sample into two different groups based on the level of diversification using the sample median of a number of business (*NBS*). Hope et al. (2013) demonstrate that tax-avoiding firms cease to report segment earnings in order to conceal their tax avoidance behavior. This finding implies that investors prefer the disclosure of segment earnings disclosure to incorporate complex information of a business environment. Furthermore, multi-segment firms experience a substantial increase in their forward earnings response coefficient (FERC) following the introduction of SFAS No. 131, which demonstrate the complex nature of multi-segment firms (Ettredge et al. 2005). The results are reported in Panel C of Table 9. In line with prediction, I find that the negative relation between the sustainable tax strategy and cost of equity estimates is more

⁵⁴ Balakrishnan et al. (2019) argue that tax planning strategies can alter the capital flows within a firm. As a result, it is more difficult to interpret the persistence of the firm's earnings in the perspective of outsiders.

pronounced for firms operating in different market segments. Overall, the results of Panel C of Table 9 provide evidence that there is a heterogeneity in the effect of sustainable tax strategy on the cost of capital depending on the complexity of a firm environment.

[Insert TABLE 9 here]

5. Additional Analyses and Robustness Checks

5.1. Additional Analysis

5.1.1. Cost of Debt

The findings of this paper that a sustainable corporate tax strategy reduces the firm risk and results in a lower cost of equity capital are also applicable to the relation between the sustainable tax strategy and the required returns of debtholders (Francis et al. 2005; Hasan et al. 2014). To test this prediction, I additionally investigate the effect of a sustainable tax strategy on two different measures of borrowing costs: (1) the credit rating of a firm and (2) the cost of debt based on interest expenses. I obtain the Standard & Poor's (S&P) credit rating data from the Compustat database. I match the first issued credit rating of each firm four months after fiscal year-end to year t of firm i . I convert rating letters into numbers, with a higher number indicating a better rating (Francis et al. 2005). Also, I utilize the dummy variable that indicates the investment-grade rating

(i.e., higher than BB+). Lastly, following Francis et al. (2005), I use the cost of debt measure based on interest expense.

The results are reported in Table 10. In Column (1), (3), and (5), I find a *negative* relation between the sustainable tax strategy and three different cost of debt estimates. For example, in Column (1), the coefficient on *SUSTAX* is 0.210 and statistically significant at 1% level. The effect of a sustainable tax strategy on credit rating is also economically significant. The estimated coefficient on *SUSTAX* indicates that moving from the lowest *SUSTAX* decile to the highest *SUSTAX* decile results in an increase of credit rating of about 1.890 grade ($=0.210 \times (10-1)$). Meanwhile, unlike the cost of equity estimates, the sustainable tax strategy (*SUSTAX*) and the tax avoidance strategy (*CETR*) have different impacts on debt costs. While the sustainable tax strategy is *negatively* related to the cost of debt estimates, the tax avoidance strategy is *positively* related to the cost of debt. The positive relation between tax avoidance and cost of debt is consistent with Hasan et al. (2014) who argue that firms with greater tax avoidance incur higher spreads when obtaining bank loans. On the other hand, the sustainable tax strategy reduces the risk of debtholders which results in a lower cost of debt.

Overall, the findings in Table 10 provide evidence that firms with a sustainable tax strategy have not only a lower cost of equity but also a lower cost of debt. Given that managers finance their investment with both the cost of equity and the cost of debt,

it is beneficial to pursue a sustainable tax strategy to lower two different cost of capital estimates.

[Insert TABLE 10 here]

5.1.2. Propensity-Score-Matching (PSM) Analysis

One of the potential endogeneity concerns is that the findings of this paper suffer from an omitted variable that is correlated with both the tax strategies of the firm and the cost of equity estimates (Kennedy 2008). In particular, specific firm characteristics (e.g., the uncertainty of a firm's operation) influence both the decision to pursue predictable tax outcomes and the level of cost of equity estimates. Therefore, in order to address such endogeneity concerns, I use a propensity-score-matched sample to remove differences on observed variables (Dehejia and Wahba 2002; Rosenbaum and Rubin 1983).

In the first stage of the regression model, I regress the indicator variable for whether a firm pursues a sustainable tax strategy based on sample median (*HIGH_SUSTAX*) on various firm characteristics used as control variables in Equation (3) and estimate the probability that a firm retains a highly sustainable tax strategy. And then, I match firm-year observations into matched pairs without replacement and require the propensity scores for each matched pair to have caliper distance lower than

5% of the standard deviation of the predicted value of the first stage regression. After the matching procedure, the sample size is reduced to 10,162 firm-year observations.⁵⁵

Table 11 shows the second stage regression of propensity-score-matching (PSM) analysis. Consistent with Table 4 and 5, I find a negative and marginally significant relation between the sustainable tax strategy (*SUSTAX*) and the cost of equity (*COE*) (coefficient = -0.055, t-value = -1.93 in Column (1)). Also, even after controlling for tax avoidance strategy (*CETR*), I still find a robust relation between *SUSTAX* and *COE*. Taken together, the results of Table 11 confirm that my main findings are robust after addressing the correlated omitted variable problems.

[Insert TABLE 11 here]

5.2. Robustness Checks

In this section, I perform sensitivity checks to provide evidence that the findings of this paper are robust to alternative metric for the cost of capital, to the alternative measure of a sustainable tax strategy, and to the exclusion of loss firms from the sample.

5.2.1. Market-based Measure of Cost of Capital

⁵⁵ I fail to find statistical difference of mean value of control variables within matched firms (Shipman et al. 2017).

First, I calculate the expected returns using the actual stock returns instead of implied cost of capital estimates. Following the methodology used in Kothari et al. (2009) and Barth et al. (2013), I use the expected returns from the market model, the three-factor model (market factor, size factor, and book-to-market factor), and the four-factor model (market factor, size factor, book-to-market factor, and momentum factor) as alternative measures of cost of capital (Sharpe 1964; Fama and French 1993; Carhart 1997). The details of estimating the expected returns are described in Appendix C.⁵⁶

The results are reported in Table 12. Across all columns, I find a *negative* relation between a sustainable tax strategy and market-based expected returns. For example, in Column (5) and (6), where expected returns are estimated from four-factor model (*FF4*), the coefficients on *SUSTAX* are negative and significant regardless of inclusion of *CETR* strategy (in Column (5): coefficient = -0.089, t-value = -2.12; in Column (6): coefficient = -0.111, t-value = -2.61). Taken together, my inferences are unchanged using alternative cost of equity measures based on market-based expected returns.

[Insert TABLE 12 here]

⁵⁶ The sample size is increased to 51,256 firm-year observations as the calculation of market-based expected returns does not require the existence of analyst earnings forecasts.

5.2.2. Model-Based Implied Cost of Capital Measure

Hou et al. (2012) suggest that implied cost of capital measures based on analysts' earnings forecasts are suffering from sample selection bias. To address the sample selection issues, Hou et al. (2012) utilize historical ROA to predict future earnings (i.e., model-based implied cost of equity capital). Following Hou et al. (2012), I construct alternative measures of cost of equity capital using historical ROA and four different methodologies of prior studies. Then, I take the average of four different measures from historical ROA to construct the alternative measure of cost of equity capital.⁵⁷ The results based on model-based implied cost of equity is reported in Panel A of Table 13. I find that the results remain unchanged even after controlling for the level of tax avoidance. My findings are robust after replacing the cost of equity measures using the historical ROA.

5.2.3. GAAP-Based Measure of Tax Strategy

In this section, I calculate the tax strategy measures (i.e., *SUSTAX* and *CETR*) based on GAAP ETR instead of cash ETR to triangulate my inference. GAAP ETR is calculated as total tax expense divided by the pre-tax income less special items. The

⁵⁷ Consistent with implied cost of equity capital based on analysts' earnings forecasts, I require firms to have at least one non-missing implied cost of equity capital. The sample size is increased to 57,032 firm-year observations as the construction of model-based cost of capital measures does not require analysts' forecast data.

coefficient of variation of GAAP ETR (*SUSTAX_GAAP*) is defined as the standard deviation of annual GAAP ETR for the five-year period divided by the absolute value of the mean of annual GAAP ETR over the same five-year period.⁵⁸ *TAXAVOID_GAAP* is analogous to *TAXAVOID*, but utilizes the GAAP ETR measure to indicate the level of tax avoidance. Panel B of Table 13 shows the result. The results provide evidence that a sustainable tax strategy based on GAAP ETR measure (*SUSTAX_GAAP*) still has a *negative* relation with cost of equity estimates.

5.2.4. Controlling for the Coefficient of Variation of Earnings

Given that earnings volatility is part of the sustainability of tax strategy, it is conceivable that the sustainability of tax strategy is simply a proxy for earnings volatility. To address this concern, I construct a coefficient of variation of pre-tax book income (*CV_PTIB*) analogous to the sustainability of tax strategy (*SUSTAX*) and multiply negative one (-1). After including the *CV_PTIB* into the Equation (3), I repeat the main analysis of this paper. The results show that even after controlling for the effect of the coefficient of variation of earnings, there is still a *negative* relation between

⁵⁸ The coefficient of variation of GAAP ETR is also multiplied by negative one (-1) to indicate that higher value of *SUSTAX_GAAP* is associated with a sustainable tax strategy.

the sustainability of tax strategy (*SUSTAX*) and the cost of equity capital estimates (Panel C of Table 13).

5.2.5. Exclude Loss Firms

Firms with *negative* taxable income are less likely to participate in tax planning (Manzon and Plesko 2002). However, as Henry and Sansing (2018) suggested, excluding loss firms from the sample possibly incur data truncation problem in tax-related studies. For this reason, this paper includes loss firms in the sample. As a final robustness check, I exclude loss firms from the sample to parse out the different tax incentives of loss firms. Panel D of Table 13 reveals that, after excluding loss firms, I still find a *negative* relation between the sustainable tax strategy and the cost of equity capital. The coefficients on *SUSTAX* become even more statistically significant compared to Table 4.

[Insert TABLE 13 here]

6. Conclusion

The goal of effective tax planning is to maximize after-tax returns (Scholes et al. 2014). In this sense, tax planning is not just minimization which strives to achieve the lowest possible tax outcome. Though tax strategy is multi-faceted dimension and

more related to maximizing after-tax returns, researchers generally focus on whether and how tax avoidance (i.e., tax minimization strategy) affects firm value. This study examines whether and how different perspectives of tax strategy (i.e., the sustainability of tax strategy) affect the cost of capital to provide evidence that investors not only care about tax savings from tax minimization but consider the sustainability of tax strategy to incorporate into their pricing decisions.

Using the coefficient of variation of cash ETR as a proxy for sustainable tax strategy, I show that investors require lower expected returns for firms with a higher sustainable tax strategy. Additionally, this paper provides evidence that the relation between tax avoidance and cost of equity is depending on the level of sustainability of that tax strategy. That is, the negative relation between tax avoidance and the cost of equity disappears when a sustainable tax strategy is not accompanied. Though tax avoidance can produce substantial cash tax savings, which increases expected future cash flows (Dyreng et al. 2008; Goh et al. 2016), this type of tax strategy can increase the risk firm face such as complexity of business fundamentals and scrutiny risk from the regulators (i.e., IRS). In this vein, the findings of this paper are consistent with the argument of Scholes et al. (2014) that effective tax planning should consider tax costs and non-tax costs.

This paper makes several contributions to accounting literature. First, to my best knowledge, this is the first study that investigates how the sustainability of tax strategy affects the investors' perception of firm risk. While prior studies examine how investors price corporate tax avoidance behavior (Hanlon and Slemrod 2009; Wilson 2009; Koester 2013; Gallemore et al. 2014; Hutchens and Rego 2015; Goh et al. 2016), these prior studies generally focus on the level of tax avoidance behavior. My study extends prior studies on corporate tax strategy by investigating how investors value not only the level of tax avoidance but the sustainability of tax strategy.

Second, this paper explains the mechanisms why investors require lower expected returns for firms with a sustainable tax strategy. Prior studies focus on cross-sectional variation to find an incentive that engages in tax planning (Goh et al. 2016). My findings suggest that investors require a lower cost of capital for firms with sustainable tax strategy due to less volatile future cash flows which mitigate the uncertainty of investors when forecasting expected future cash flows and less scrutiny risk by regulators which reduce the risk of additional cash outflows in the future (Bozanic et al. 2017; Drake et al. 2019).

Nonetheless, I acknowledge that both sustainability and minimization of tax strategy do not fully explain the effective tax planning. Though this paper extends prior research by showing that the sustainability of a firm's tax strategy is another dimension

of tax strategy, the alternative dimension of tax strategy should be investigated in the future. Providing a comprehensive picture of a firm's tax planning can be another fruitful area for future research.

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APPENDIX A. VARIABLE DEFINITIONS

Variable		Definition
<i>Dependent variables</i>		
COE	=	Estimated implied cost of equity calculated by taking the mean of R_{GM} , R_{EST} , R_{GLS} and R_{CT} .
R_{GM}	=	Implied cost of equity estimates calculated following the methodology outlined in Ohlson and Juttner-Nauroth(2005), Gode and Mohanram(2003). Appendix B provides more details about the construction of R_{GM} .
R_{EST}	=	Implied cost of equity estimates calculated following the methodology outlined in Easton (2004). Appendix B provides more details about the construction of R_{EST} .
R_{GLS}	=	Implied cost of equity estimates calculated following the methodology outlined in Gebhardt et al. (2001). Appendix B provides more details about the construction of R_{GLS} .
R_{CT}	=	Implied cost of equity estimates calculated following the methodology outlined in Claus and Thomas (2001). Appendix B provides more details about the construction of R_{CT} .
$TAXAVOID_{(t+1 \sim t+5)}$	=	Future 5-year cash effective tax rate (ETR) multiplied by negative one (-1). Future 5-year cash ETR is calculated as total cash tax expense (TXPD) over the period t+1 to t+5 scaled by total pre-tax income (PI) less special items (SPI) over the sample period.
$STD_TAXAVOID_{(t+1 \sim t+5)}$	=	Standard deviation of annual cash ETR over the period t+1 to t+5.
$CFVOL_{(t+1 \sim t+5)}$	=	Standard deviation of operating cash flows divided by lagged total assets during the period t+1 to t+5.
LN_10K_IRS	=	The number of times during year t that an individual with an IRS IP address downloaded a 10-K from EDGAR for firm i . This measure is logged when used as a dependent variable.
$RATING$	=	Standard & Poor's credit rating. I translate ratings letters into numbers, with a larger number indicating a better rating.

<i>INVGRATE</i>	=	A dummy variable equals to one if firm <i>i</i> 's credit rating is investment-grade, and zero otherwise.
<i>COD</i>	=	Cost of debt, calculated as interest expense (INTPN) divided by the sum of short-term debt (DLC) and long-term debt (DLTT).
<i>CAPM</i>	=	Expected returns based on market model.
<i>FF3</i>	=	Expected returns based on Fama and French (1993) three-factor model.
<i>FF4</i>	=	Expected returns based on four-factor model (Jegadeesh and Titman 1993; Carhart 1997).
<i>Tax Strategy Variables</i>		
<i>SUSTAX</i>	=	The coefficient of variation for cash ETRs. Cash ETR is defined as current cash tax paid (TXPD) divided by pre-tax income (PI) less special items (SPI). The coefficient of variation for cash ETRs is calculated as the standard deviation of annual cash ETR for the five-year period divided by the absolute value of the mean of annual cash ETR over the same five-year period. I use the yearly decile ranks of the coefficient of variation for cash ETRs to ease the interpretation.
<i>TAXAVOID</i>	=	One of the following three different tax avoidance measures. 1) <i>CETR</i> : cash ETR computed as the cash taxes paid (TXPD) divided by pre-tax income (PI) less special items (SPI). The variable is multiplied by negative one (-1) so that it is increasing in tax avoidance. 2) <i>BTD</i> : total book-to-tax differences, computed as $PI - (TXFED + TXFO) / STR$, where PI refers to pre-tax income; TXFED refers to current federal tax expense; TXFO refers to current foreign tax expense; and STR refers to the statutory tax rate. The total book-tax difference is then scaled by lagged total assets. 3) <i>PBTD</i> : total-book-tax differences (BTD) less temporary book-tax differences (TXDI/STR), where TXDI is total deferred tax expense and STR is statutory tax rate. The permanent book-tax difference is then scaled by lagged total assets.

<i>INN_SUSTAX1</i>	=	Innate component of a sustainable tax strategy. Innate portion of a sustainable tax strategy is defined as a predicted value of following equation (Mayberry et al. 2015): $SUSTAX_{i,t} = \beta_0 + \beta_1 CAPINTEN_{i,t} + \beta_2 INTANINTEN_{i,t} + \beta_3 DUMINTEN_{i,t} + \beta_4 NEGTI_{i,t} + \beta_5 OPCYCLE_{i,t} + \beta_6 SIZE_{i,t} + \beta_7 SALE_{VOL_{i,t}} + \beta_8 CFVOL_{i,t} + \varepsilon_{i,t}, \quad (5)$
		where <i>DUM_INTAN</i> is an indicator variable for firms with zero or missing intangible values, <i>NEGTI</i> is the percentage of years with negative taxable income over the prior five years. <i>OPCYCLE</i> is the natural logarithm of a firm's operating cycle, measured as the sum of a firm's days accounts receivable (RECT/SALE) and days inventory (INVT/COGS). <i>SALE_VOL</i> (<i>CFVOL</i>) is the standard deviation of sales (operating cash flows) scaled by total assets over the prior five years.
<i>DISC_SUSTAX1</i>	=	The residual value of Equation (7) for each firm-year observation.
<i>INN_SUSTAX2</i>	=	The sample average of <i>SUSTAX</i> , estimated over time for each firm with at least 3 <i>SUSTAX</i> observations.
<i>DISC_SUSTAX2</i>	=	Deviation from <i>INN_SUSTAX2</i> .
<i>SUSTAX_GAAP</i>	=	The coefficient of variation for GAAP ETRs. GAAP ETR is defined as total tax expense (TXT) divided by the pre-tax income (PI) less special items (SPI). The coefficient of variation for GAAP ETRs is calculated as the standard deviation of annual GAAP ETR for the five-year period divided by the absolute value of the mean of annual GAAP ETR over the same five-year period. I use the yearly decile ranks to ease the interpretation.
<i>TAXAVOID_GAAP</i>	=	GAAP ETR multiplied by negative one (-1).
Control variables		
<i>BETA</i>	=	Historical beta estimated from CAPM model over the fiscal year.
<i>SIZE</i>	=	Natural logarithm of total assets (AT) at fiscal year-end.

<i>MTB</i>	=	Market-to-book ratio, defined as market value of equity (PRCC_F*CSHO) divided by book value of equity (CEQ).
<i>LEV</i>	=	Total debt-to-asset ratio at fiscal year-end.
<i>RET</i>	=	Stock returns over the fiscal year.
<i>RETVOL</i>	=	Standard deviation of monthly stock returns measured over the fiscal year.
<i>CFO</i>	=	Cash flows from operation (OANCF) divided by lagged total assets (AT).
<i>CFVOL</i>	=	Standard deviation of <i>CFO</i> during the past five years.
<i>AQ</i>	=	The five-year rolling standard deviation of the residuals estimated using the Dechow and Dichev (2002) model augmented by McNichols (2002).
<i>CAPEX</i>	=	Capital expenditure (CAPX) scaled by lagged total assets (AT).
<i>RD</i>	=	Research and development expenditure (XRD) divided by lagged total assets (AT).
<i>LOSS</i>	=	The indicator variable of reporting losses.
<i>SGA</i>	=	Selling and general expenses (XSGA) scaled by lagged total assets (AT).
<i>FOREIGN</i>	=	An indicator variable that equals one if the firm reports positive foreign pre-tax earnings, and zero otherwise.
<i>TLCF</i>	=	An indicator variable that equals one if the firm reports net operating loss carryforwards, and zero otherwise.
<i>TXBCO</i>	=	An indicator variable that equals to one if the excess tax benefit of stock options (TXBCOF) is non-zero, and zero otherwise.

Variables used in Additional Tests

<i>INTANINTEN</i>	=	Intangibles (INTAN) divided by sales (SALE).
<i>CAPINTEN</i>	=	Property, Plant and Equipment (PPEGT) divided by total assets (AT).
<i>DUMINTAN</i>	=	An indicator variable for firms with zero or missing intangible values.
<i>NEGTI</i>	=	The percentage of fiscal years with negative taxable income over the prior five years.
<i>OPCYCLE</i>	=	The natural log of a firm's operating cycle, measured as the sum of a firm's days accounts receivable (RECT/SALE) and days inventory (INVT/COGS).

<i>SALEVOL</i>	=	The standard deviation of sales (SALE), scaled by total assets (AT), over the prior five years.
<i>WWINDEX</i>	=	Whited and Wu (2006) index, measured by: $WWINDEX = (-0.091)*CFO + (-0.062)*DIVPOS + (0.021)*TLTD + (-0.044)*SIZE + (0.102)*ISG + (-0.035)*SG,$ where <i>CFO</i> is the operating cash flows; <i>DIVPOS</i> is an indicator variable that equals to one if the firm pays cash dividends, and zero otherwise; <i>TLTD</i> is the ratio of long-term debt to total assets; <i>SIZE</i> is the natural log of total assets; <i>ISG</i> is the firm's three-digit industry sales growth; and <i>SG</i> is the firm's sales growth.
<i>COVERAGE</i>	=	The natural logarithm of the number of analysts following.
<i>INSTOWN</i>	=	The percentage of stocks held by institutional investors.
<i>MNE</i>	=	An indicator variable that equals to one for multinational firms (i.e., firms with any foreign pre-tax income (PIFO) not missing).
<i>ROA</i>	=	Income before extraordinary items (IB) scaled by lagged total assets (AT).
<i>CH_NOL</i>	=	Change in the tax loss carryforward (TLCF) scaled by lagged total assets.
<i>CASH</i>	=	Cash and cash equivalent (CHE) divided by total assets (AT).
<i>SG</i>	=	Sales growth, calculated as change in sales (SALE) scaled by lagged sales (SALE).
<i>NBS</i>	=	The number of business segment.
<i>(-1)*CV_PTIB</i>	=	The coefficient of variation for pre-tax book income (PI). The coefficient of variation for pre-tax book income is calculated as the standard deviation of annual pre-tax book income for the five-year period divided by the absolute value of the mean of annual pre-tax book income over the same five-year period.

APPENDIX B. CONSTRUCTION OF COST OF CAPITAL ESTIMATES

To estimate the cost of equity, I follow several prior studies in the implied cost of equity literature. I first describe the common variables used in the following four models.

P_t^* = Stock price of a firm' at time t . I use the price four month after the latest fiscal year-end to compute P_t^* .

B_t = Book value of equity from the most recent financial statements at time t .

$FEPS_{t+i}$ = Analyst' forecast of earnings per share (EPS) from I/B/E/S at time t . I use median value of EPS forecasts.

$POUT$ = Dividends payout ratio. If $FEPS_{t+1}$ is negative, I assume a return on assets (ROA) of 6% to calculate earnings. $POUT$ is set to be within 0 and 1.

B.1. Ohlson and Juettner-Nauroth (2005) and implemented by Gode and Mohanram (2003)

$$R_{GM} = A + \sqrt{A^2 + \left(\frac{E_t(EPS_{t+1})}{P_t^*}\right)(g_2 - g_{lt})}, \quad (B-1)$$

where

$$A = 0.5 \times \left(g_{lt} + \frac{DPS_{t+1}}{P_t^*}\right).$$

g_2 is the average of the short-term earnings growth rate implied in EPS_{t+1} and EPS_{t+2} . The estimation requires that both $EPS_{t+1} > 0$ and $EPS_{t+2} > 0$. g_{lt} is calculated using the contemporaneous risk-free rate (the yield on 10-year Treasury bonds) minus 3%. The future dividend payout DPS_{t+i} is estimated as the product of EPS_{t+i} and $POUT$.

B.2. The modified PEG ratio model by Easton (2004)

$$P_t^* = \frac{E_t(EPS_{t+1})}{R_{EST}} + \frac{E_t(EPS_{t+1})E_t[g_{st} - R_{EST}^*(1 - POUT)]}{R_{EST}^2}. \quad (B-2)$$

To solve for R_{EST} that equates the right- and left-hand sides of Equation (B-2) within a difference of \$0.001, I use a numerical approximation. This model requires that $EPS_{t+2} \geq EPS_{t+1} > 0$.

B.3. Gebhardt et al. (2001)

$$P_t^* = B_t + \sum_{i=1}^{T-1} \frac{[FROE_{t+i} - R_{GLS}] \times B_{t+i-1}}{(1 + R_{GLS})^i} + \frac{[FROE_{t+T} - R_{GLS}] \times B_{t+T-1}}{(1 + R_{GLS})^{T-1} \times R_{GLS}}. \quad (B-3)$$

To proxy for the market expectation of future earnings for the next 3 years, I use I/B/E/S analysts' forecasts are used. I assume that the future return on equity ($FROE$) declines linearly to a stable return on equity (ROE) from the 4th year to the T th year. I assume that $T=12$. The ROE after T th year is estimated by a 10-year, industry-level

median ROE. Return on equity is calculated as income (IBC) scaled by lagged book value of equity (CEQ). Industry classification is defined following Fama and French (1997). I include all firms to compute the industry ROE (i.e., including firms with negative ROEs). If the industry-level ROE is lower than the risk-free rate, I set the industry-level ROE to be the risk-free rate (Liu et al. 2000). Thereafter, the future book value of equity is estimated by the clean surplus relation (i.e., $B_{t+1} = B_t + EPS_{t+1} - DPS_{t+1}$). Similar to Easton (2004), I use a numerical approximation to solve for R_{GLS} that equates the right- and left-hand sides of Equation (B-3) within a difference of \$0.001.

B.4. Claus and Thomas (2001)

$$P_t^* = B_t + \sum_{i=1}^5 \frac{[FEPS_{t+i} - R_{CT} \times B_{t+i-1}]}{(1+R_{CT})^i} + \frac{[FEPS_{t+5} - R_{CT} \times B_{t+4}] \times (1+g_{lt})}{(1+R_{CT})^5 \times (R_{CT} - g_{lt})}. \quad (B-4)$$

In this model, I estimate the abnormal earnings for the next five years based on I/B/E/S analysts' earnings forecasts. Future abnormal earnings for the 4th and 5th years are estimated from earnings forecasts for the 3rd year and long-term earnings growth rate. If the long-term earnings growth rate is missing from I/B/E/S, an implied earnings growth rate from EPS_{t+2} and EPS_{t+3} is used. The long-term abnormal earnings growth rate is calculated using the contemporaneous risk-free rate (the yield on 10-year Treasury bonds) minus 3%. The future book value of equity is also estimated by

assuming the clean surplus relation). The future dividend, DPS_{t+i} is calculated by multiplying EPS_{t+i} by $POUT$. I use a numerical approximation program to solve for R_{CT} that equates the right- and left-hand sides of Equation (B-4) within a difference of \$0.001.

APPENDIX C. ESTIMATING COST OF CAPITAL FROM STOCK RETURNS

I estimate the expected returns for year $t+1$ at the end of year t based on following equations:

$$CAPM_{i,t} = \bar{R}_{f,t} + \hat{\beta}_{RMRF,i,t} \times \overline{(R_M - R_f)}_t \quad (C-1)$$

$$FF3_{i,t} = \bar{R}_{f,t} + \hat{\beta}_{RMRF,i,t} \times \overline{(R_M - R_f)}_t + \hat{\beta}_{SMB,i,t} \times \overline{SMB}_t + \hat{\beta}_{HML,i,t} \times \overline{HML}_t \quad (C-2)$$

$$FF4_{i,t} = \bar{R}_{f,t} + \hat{\beta}_{RMRF,i,t} \times \overline{(R_M - R_f)}_t + \hat{\beta}_{SMB,i,t} \times \overline{SMB}_t + \hat{\beta}_{HML,i,t} \times \overline{HML}_t + \hat{\beta}_{MOM,i,t} \times \overline{MOM}_t, \quad (C-3)$$

where $\hat{\beta}_{RMRF,i,t}$, $\hat{\beta}_{SMB,i,t}$, $\hat{\beta}_{HML,i,t}$, and $\hat{\beta}_{MOM,i,t}$ are firm-level coefficients estimated from Equation (C-4) to (C-6). $\overline{(R_M - R_f)}_t$, \overline{SMB}_t , \overline{HML}_t , and \overline{MOM}_t are the expected value of annual Fama-French and momentum factor returns for year $t+1$ (Fama and French 1993; Carhart 1997). The expected value of factor returns is calculated by first estimating each factor's mean value of monthly return over the 60 months before month m , and then compounded the average monthly returns over the year prior to the beginning of firm i 's fiscal year.⁵⁹

⁵⁹ I estimated the expected value of monthly risk-free rate based on a 1-year rolling risk-free rate. The expected value of annual risk-free rate, $\bar{R}_{f,t}$, is then obtained by compounding the expected value of monthly risk-free rate.

Next, I estimate the betas for each firm associated with each of the factors by estimating the following monthly time-series regressions:

$$RET_{i,m} - R_{f,m} = \alpha_i + \beta_{RMRF,i}(R_{M,m} - R_{f,m}) \quad (C-4)$$

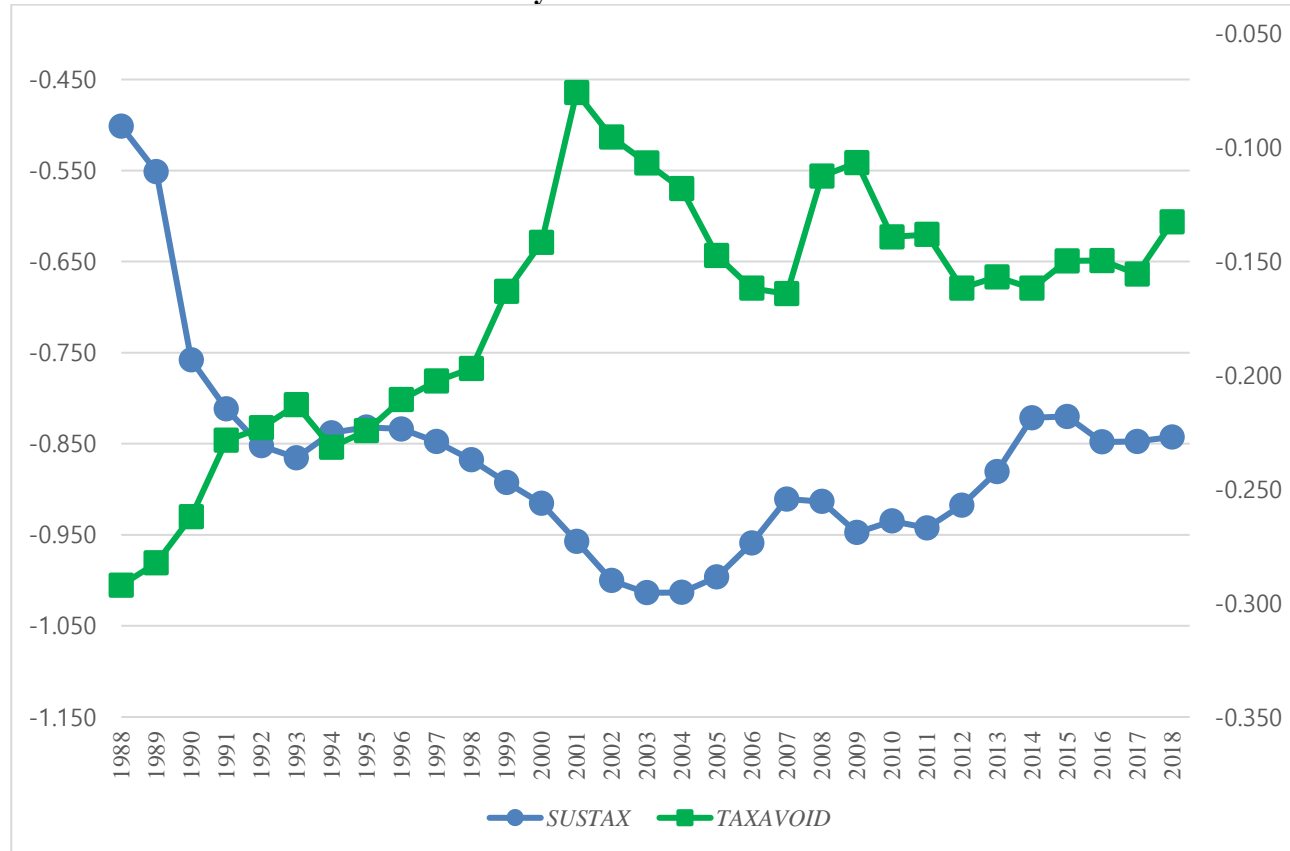
$$RET_{i,m} - R_{f,m} = \alpha_i + \beta_{RMRF,i}(R_{M,m} - R_{f,m}) + \beta_{SMB,i}SMB_m + \beta_{HML,i}HML_m \quad (C-5)$$

$$RET_{i,m} - R_{f,m} = \alpha_i + \beta_{RMRF,i}(R_{M,m} - R_{f,m}) + \beta_{SMB,i}SMB_m + \beta_{HML,i}HML_m + \beta_{MOM,i}MOM_m, \quad (C-6)$$

$RET_{i,m} - R_{f,m}$ is the firm's excess monthly return. $R_{M,m} - R_{f,m}$ is the monthly return of the market portfolio in excess of the risk-free rate, SMB_m and HML_m are the monthly returns to the size and book-to-market factor mimicking portfolios following Fama and French (1993), and MOM_m is the monthly return to the momentum factor mimicking portfolio (Jegadeesh and Titman 1993; Carhart 1997).⁶⁰ I estimate the Equation (C-4) to (C-6) using the 60 months returns prior to the beginning of firm i 's fiscal year t . That is, the coefficients ($\hat{\beta}_{RMRF,i,t}$, $\hat{\beta}_{SMB,i,t}$, $\hat{\beta}_{HML,i,t}$) are updated annually.

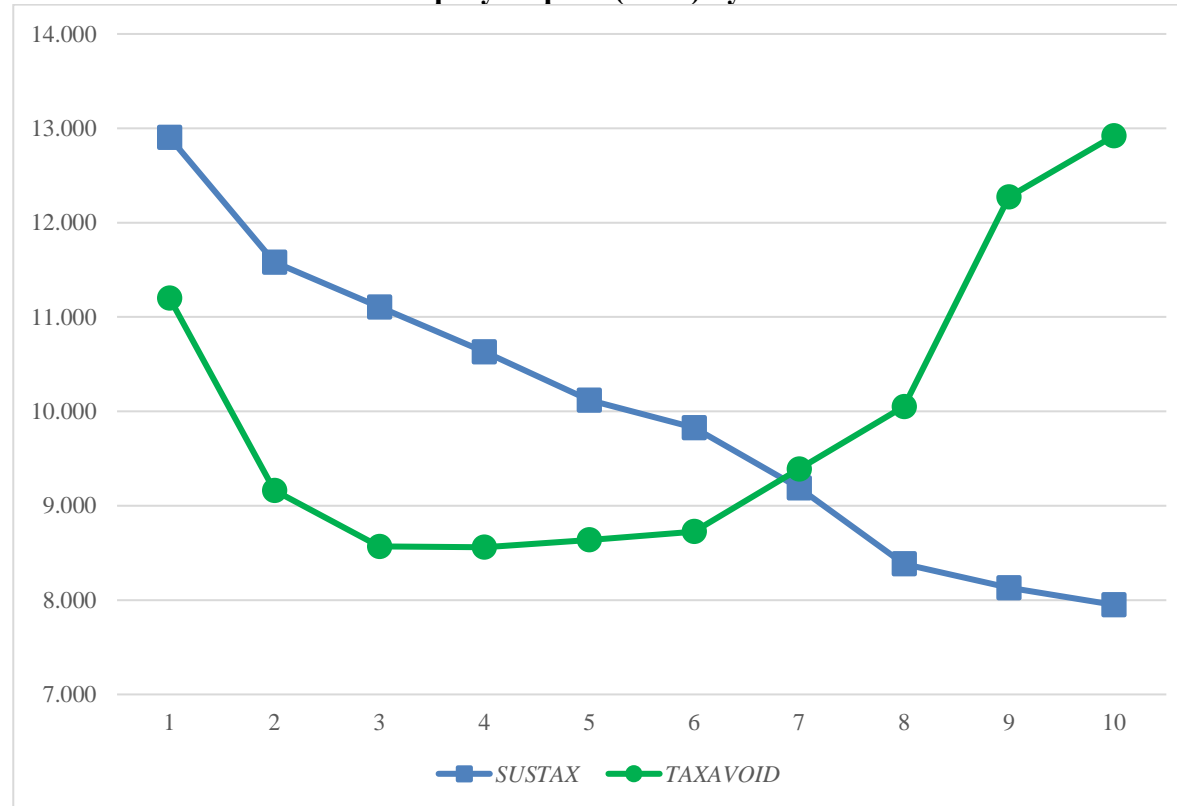
⁶⁰ I obtain factor returns from Kenneth R. French's website (https://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html).

<FIGURE 1> Yearly Trends of *SUSTAX* and *TAXAVOID*



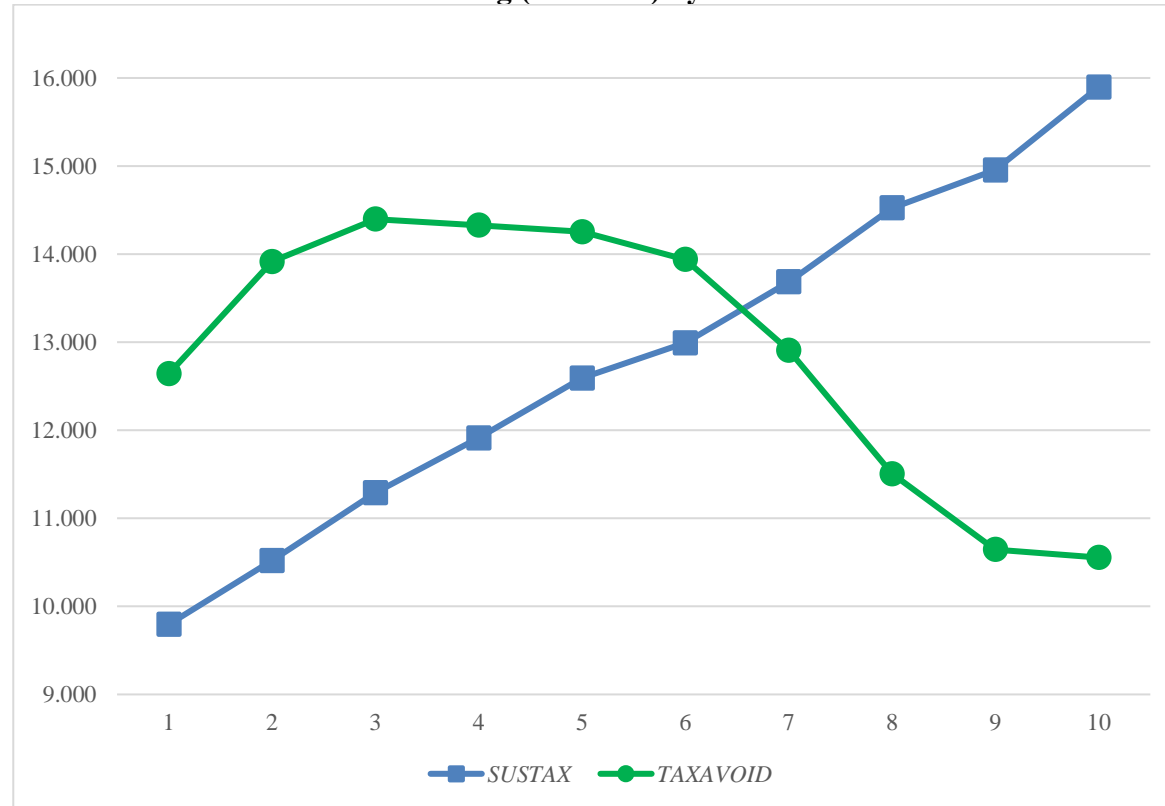
Notes: This figure depicts the median value of time trend of *SUSTAX* and *TAXAVOID*. *SUSTAX* and *TAXAVOID* are defined in Appendix A.

<FIGURE 2> Mean value of Cost of Equity Capital (COE) by Decile Rank of *SUSTAX* and *TAXAVOID*



Notes: This figure shows the mean value of implied cost equity (COE) of each *SUSTAX* and *TAXAVOID* decile. For variable definitions, refer to Appendix A.

<FIGURE 3> Mean value of Credit Rating (*RATING*) by Decile Rank of *SUSTAX* and *TAXAVOID*



Notes: This figure shows the mean value of credit rating (*RATING*) of each *SUSTAX* and *TAXAVOID* decile. For variable definitions, refer to Appendix A.

TABLE 1. Descriptive Statistics

Variables	N	Mean	Std	10P	Q1	Median	Q3	90P
<i>Dependent Variables</i>								
<i>COE</i>	37,759	9.982	7.105	4.321	6.500	8.641	11.293	15.609
<i>R_{GM}</i>	31,723	11.935	5.731	6.549	8.340	10.541	13.881	18.760
<i>R_{EST}</i>	33,869	12.356	6.874	6.121	8.188	10.532	14.358	20.663
<i>R_{GLS}</i>	34,812	6.493	3.837	2.677	4.000	5.850	8.042	10.363
<i>R_{CT}</i>	35,709	8.545	5.545	3.281	5.423	7.629	10.053	13.505
<i>STD_TAXAVOID_(t+1~t+5)</i>	34,621	0.146	0.130	0.015	0.049	0.105	0.203	0.371
<i>CFVOL_(t+1~t+5)</i>	31,425	0.053	0.042	0.015	0.025	0.041	0.068	0.106
<i>LN_10K_IRS</i>	16,539	1.311	1.141	0	0	1.099	1.946	2.890
<i>RATING</i>	12,595	12.986	3.337	9	10	13	15	17
<i>INVGRATE</i>	12,595	0.614	0.487	0	0	1	1	1
<i>COD</i>	31,188	0.089	0.164	0.022	0.038	0.058	0.082	0.122
<i>CAPM</i>	51,256	11.756	11.769	-1.051	2.239	10.600	18.956	27.331
<i>FF3</i>	51,256	12.929	12.020	-0.640	4.977	12.272	20.081	28.183
<i>FF4</i>	51,256	11.546	13.316	-2.958	3.413	11.071	19.191	27.965
<i>Tax Strategy Measures</i>								
<i>SUSTAX</i>	37,759	-0.818	0.565	-1.646	-1.163	-0.710	-0.340	-0.172
<i>INN_SUSTAX1</i>	20,956	-0.779	0.427	-1.413	-1.014	-0.666	-0.474	-0.332
<i>DISC_SUSTAX1</i>	20,956	0.032	0.351	-0.422	-0.155	0.053	0.265	0.439
<i>INN_SUSTAX2</i>	37,759	-0.787	0.456	-1.414	-1.073	-0.717	-0.413	-0.242
<i>DISC_SUSTAX2</i>	37,759	-0.029	0.368	-0.509	-0.202	0.000	0.175	0.399
<i>CETR</i>	37,759	-0.238	0.223	-0.471	-0.344	-0.220	-0.042	0.000
<i>BTD</i>	37,759	0.007	0.078	-0.069	-0.014	0.015	0.042	0.079
<i>PBTD</i>	37,759	0.007	0.074	-0.039	-0.004	0.008	0.027	0.062
<i>SUSTAX_GAAP</i>	37,759	-0.516	0.554	-1.353	-0.775	-0.308	-0.072	-0.028
<i>TAXAVOID_GAAP</i>	37,759	-0.303	0.184	-0.427	-0.383	-0.338	-0.216	0
<i>Control Variables</i>								
<i>BETA</i>	37,759	1.238	0.733	0.415	0.737	1.129	1.619	2.200
<i>SIZE</i>	37,759	6.740	1.694	4.618	5.522	6.612	7.822	9.050
<i>BTM</i>	37,759	0.519	0.375	0.160	0.265	0.428	0.664	0.974
<i>LEV</i>	37,759	0.198	0.173	0.000	0.025	0.180	0.315	0.442
<i>RET</i>	37,759	0.132	0.536	-0.451	-0.195	0.071	0.347	0.714
<i>RETVOL</i>	37,759	0.133	0.059	0.069	0.090	0.120	0.163	0.214
<i>CFO</i>	37,759	0.116	0.099	0.010	0.061	0.109	0.167	0.236
<i>CFVOL</i>	37,759	0.071	0.070	0.018	0.029	0.049	0.086	0.143
<i>LOSS</i>	37,759	0.175	0.380	0	0	0	0	1
<i>AQ</i>	37,759	0.057	0.050	0.016	0.026	0.043	0.070	0.110
<i>CAPEX</i>	37,759	0.068	0.073	0.012	0.023	0.044	0.082	0.147
<i>RD</i>	37,759	0.039	0.064	0.000	0.000	0.004	0.055	0.129
<i>SGA</i>	37,759	0.309	0.233	0.064	0.135	0.254	0.424	0.627

<i>FOREIGN</i>	37,759	0.470	0.499	0	0	0	1	1
<i>TLCF</i>	37,759	0.721	0.448	0	0	1	1	1
<i>TXBCO</i>	37,759	0.252	0.434	0	0	0	1	1
<i>Variables used in additional analyses</i>								
<i>WWINDEX</i>	37,759	-0.309	0.095	-0.439	-0.375	-0.304	-0.240	-0.188
<i>COVERAGE</i>	37,759	2.036	0.747	1.099	1.386	2.079	2.639	3.045
<i>INSTOWN</i>	30,394	0.645	0.237	0.298	0.495	0.682	0.819	0.921
<i>LMNV</i>	37,759	6.875	1.760	4.666	5.632	6.756	7.984	9.273
<i>MNE</i>	37,759	0.680	0.467	0.000	0.000	1.000	1.000	1.000
<i>CAPINTEN</i>	37,759	0.499	0.365	0.113	0.211	0.403	0.705	1.036
<i>INTANINTEN</i>	37,754	0.057	0.081	0	0	0.021	0.079	0.174
<i>DUMINTEN</i>	37,759	0.792	0.406	0	1	1	1	1
<i>NEGTI</i>	24,922	0.165	0.250	0	0	0	0.250	0.600
<i>OC</i>	31,625	-3.637	0.897	-4.390	-4.171	-3.906	-3.493	-2.268
<i>SALEVOL</i>	37,759	0.301	0.359	0.056	0.098	0.181	0.346	0.659
<i>CH_NOL</i>	37,759	-0.001	0.298	0	0	0	0	0
<i>CASH</i>	37,759	0.162	0.172	0.009	0.028	0.096	0.242	0.428
<i>SG</i>	37,759	0.139	0.260	-0.099	0.007	0.093	0.218	0.421
<i>NBS</i>	33,660	5.200	4.703	1	2	3	9	12
<i>COE_MODEL</i>	57,032	8.826	7.714	2.776	4.148	6.211	9.725	16.473
<i>(-1)*CV_PTIB</i>	37,759	-2.086	5.120	-4.056	-1.558	-0.615	-0.282	-0.150

Notes: This table presents the descriptive statistics of variables used in analyses.

TABLE 2. Correlation Matrix

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
		0.040	0.138	-0.025	-0.283	-0.242	0.019	-0.209	-0.230	-0.063	0.044
(1) COE		<0.001	<0.001	0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001
	0.075		0.038	-0.032	-0.061	-0.028	0.009	0.045	0.052	-0.034	-0.133
(2) STD_TAXAVOID _(t+1~t+5)	<0.001		<0.001	<0.001	<0.001	0.002	0.126	<0.001	<0.001	<0.001	<0.001
	0.110	0.064		-0.177	-0.197	-0.179	0.110	-0.196	-0.209	-0.016	0.085
(3) CFVOL _(t+1~t+5)	<0.001	<0.001		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.035	<0.001
	-0.007	-0.018	-0.201		0.341	0.294	-0.075	0.158	0.152	-0.015	-0.046
(4) LN_10K_IRS	0.376	0.029	<0.001		<0.001	<0.001	<0.001	<0.001	<0.001	0.178	<0.001
	-0.335	-0.010	-0.192	0.332		0.805	-0.069	0.549	0.553	0.167	-0.205
(5) RATING	<0.001	0.263	<0.001	<0.001		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	-0.280	0.022	-0.165	0.291	0.847		-0.058	0.480	0.472	0.136	-0.185
(6) INVGRATE	<0.001	0.016	<0.001	<0.001	<0.001		<0.001	<0.001	<0.001	<0.001	<0.001
	0.089	0.045	0.137	-0.120	-0.201	-0.155		-0.056	-0.069	-0.010	0.016
(7) COD	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		<0.001	<0.001	0.205	0.004
	-0.225	0.062	-0.197	0.157	0.567	0.476	-0.120		0.770	0.628	-0.338
(8) SUSTAX	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		<0.001	<0.001	<0.001
	-0.235	0.059	-0.215	0.151	0.552	0.453	-0.072	0.739		-0.012	-0.334
(9) INN_SUSTAX	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		0.074	<0.001
(10) DISC_SUSTAX	-0.084	-0.027	-0.007	-0.020	0.167	0.129	-0.059	0.606	-0.018		-0.130

	<0.001	0.000	0.374	0.070	<0.001	<0.001	<0.001	<0.001	0.010	<0.001
	0.101	-0.175	0.100	-0.060	-0.323	-0.282	0.028	-0.499	-0.441	-0.220
(11) CETR	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

Notes: This table presents the correlation matrix among variables used in main analyses. Pearson (Spearman) correlation are reported in above (below) diagonal.

TABLE 3. Determinants of Different Tax Strategy

Dep. Variable = <i>TAXAVOID</i> =	<i>SUSTAX_{it}</i>	<i>CETR</i>	<i>TAXAVOID_{it}</i> <i>BTD</i>	<i>PBTD</i>
	(1)	(2)	(3)	(4)
<i>LEV_{it}</i>	-0.213*** (-6.65)	0.050*** (4.57)	0.037*** (11.94)	0.032*** (11.20)
<i>WWINDEX_{it}</i>	-1.437*** (-11.20)	0.307*** (6.62)	0.076*** (5.31)	0.034*** (2.88)
<i>COVERAGE_{it}</i>	0.041*** (4.34)	0.004 (1.23)	-0.006*** (-5.95)	-0.004*** (-4.63)
<i>INSTOWN_{it}</i>	-0.071*** (-2.95)	0.003 (0.40)	0.001 (0.22)	0.002 (0.74)
<i>AQ_{it}</i>	-0.440*** (-4.34)	-0.010 (-0.27)	-0.013 (-1.35)	0.001 (0.10)
<i>BETA_{it}</i>	0.039*** (4.48)	-0.008** (-2.42)	-0.001 (-0.98)	-0.001 (-0.90)
<i>SIZE_{it}</i>	-0.059*** (-7.27)	0.013*** (4.28)	0.006*** (6.01)	0.004*** (5.22)
<i>BTM_{it}</i>	-0.042*** (-3.08)	-0.003 (-0.53)	0.019*** (15.26)	0.022*** (16.68)
<i>RET_{it}</i>	0.011** (2.03)	-0.003 (-1.23)	-0.002*** (-3.04)	-0.001 (-1.38)
<i>CFO_{it}</i>	0.145*** (2.98)	0.216*** (10.56)	-0.072*** (-8.96)	-0.097*** (-13.36)
<i>ROA_{it}</i>	1.233*** (23.04)	-0.373*** (-21.14)	0.674*** (76.86)	0.659*** (61.84)
<i>RETVOL_{it}</i>	-3.192*** (-22.56)	0.485*** (9.88)	-0.004 (-0.27)	0.067*** (4.94)
<i>CFVOL_{it}</i>	-0.007 (-0.07)	-0.053 (-1.43)	-0.027** (-2.30)	-0.016 (-1.47)
<i>ROAVOL_{it}</i>	-1.489*** (-17.43)	0.367*** (13.51)	-0.011 (-1.13)	0.014* (1.77)
<i>SALEVOL_{it}</i>	0.172*** (10.07)	-0.048*** (-7.13)	-0.005** (-2.51)	-0.005*** (-2.77)
<i>FOREIGN_{it}</i>	-0.009 (-0.88)	-0.011*** (-3.05)	0.003*** (2.80)	0.006*** (6.59)
<i>TLCF_{it}</i>	0.055*** (5.76)	-0.011*** (-3.19)	-0.004*** (-4.16)	-0.003*** (-3.84)
<i>TXBCO_{it}</i>	0.157*** (11.70)	-0.035*** (-7.24)	-0.003** (-2.56)	-0.003*** (-2.71)

Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Observations	30,394	30,394	30,394	30,394
Adjusted R ²	0.444	0.114	0.577	0.581

Notes: This table shows the results of estimating the determinants of different tax strategy. Detailed variable definitions are provided in Appendix A. Industry fixed effects are based on 2-digit SIC codes. Reported in parentheses are t-statistics based on standard errors adjusted for clustering by firm (Petersen 2009). ***, ** and * denote significance at 1 percent, 5 percent, and 10 percent, respectively, using two-tailed t-tests.

TABLE 4. Sustainable Tax Strategy and Cost of Equity Capital

Dep. Variable =	COE_{it+1}	R_{GMit+1}	$R_{ESTit+1}$	$R_{GLSit+1}$	R_{CTit+1}
	(1)	(2)	(3)	(4)	(5)
$SUSTAX_{it}$	-0.047*** (-2.60)	-0.136*** (-7.06)	-0.103*** (-4.88)	-0.050*** (-3.76)	-0.034* (-1.78)
$BETA_{it}$	-0.124 (-1.54)	0.060 (0.71)	0.034 (0.36)	-0.180*** (-3.02)	-0.341*** (-3.89)
$SIZE_{it}$	-0.390*** (-8.64)	-0.191*** (-4.11)	-0.198*** (-3.90)	-0.127*** (-4.02)	-0.353*** (-6.91)
BTM_{it}	2.342*** (17.09)	3.358*** (20.85)	4.006*** (23.88)	2.677*** (25.19)	1.662*** (10.05)
LEV_{it}	3.690*** (12.06)	3.684*** (11.83)	3.676*** (10.62)	2.797*** (12.43)	3.866*** (11.26)
RET_{it}	-1.045*** (-16.93)	-1.237*** (-16.37)	-1.138*** (-13.69)	-0.681*** (-15.89)	-1.150*** (-16.35)
$RETVOL_{it}$	13.753*** (10.27)	13.591*** (9.30)	16.534*** (10.41)	8.795*** (8.59)	13.624*** (9.01)
CFO_{it}	-6.377*** (-13.69)	-7.672*** (-15.45)	-10.260*** (-18.82)	-1.639*** (-4.80)	-3.260*** (-6.18)
$CFVOL_{it}$	4.080*** (5.29)	5.624*** (6.76)	7.255*** (8.00)	1.245** (2.05)	3.791*** (4.22)
$LOSS_{it}$	1.483*** (14.24)	2.024*** (15.91)	3.459*** (24.96)	-0.345*** (-4.78)	-0.057 (-0.46)
AQ_{it}	1.894** (1.96)	4.052*** (3.93)	4.993*** (4.38)	1.275* (1.82)	1.560 (1.45)
$CAPEX_{it}$	1.751** (2.22)	3.654*** (4.56)	4.222*** (4.89)	-0.177 (-0.27)	0.146 (0.16)
RD_{it}	-1.095 (-1.01)	-0.061 (-0.06)	2.267* (1.83)	-1.014 (-1.25)	-5.048*** (-3.75)
SGA_{it}	0.897*** (3.00)	1.004*** (3.31)	1.050*** (3.21)	-0.139 (-0.61)	1.323*** (3.91)
$FOREIGN_{it}$	0.189* (1.86)	-0.039 (-0.38)	-0.160 (-1.40)	0.097 (1.28)	0.323*** (3.05)
$TLCF_{it}$	-0.162 (-1.53)	-0.252** (-2.30)	-0.256** (-2.14)	-0.206*** (-2.64)	-0.146 (-1.32)
$TXBCO_{it}$	-0.561***	-0.718***	-0.894***	-0.132	-0.682***

	(-5.03)	(-6.03)	(-6.88)	(-1.55)	(-5.27)
Year FE	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
Observations	37,759	31,723	33,869	34,812	35,709
Adjusted R ²	0.233	0.277	0.336	0.314	0.151

Notes: This table shows the results of estimating the relation between sustainable tax strategy and cost of equity. Detailed variable definitions are provided in Appendix A. Industry fixed effects are based on 2-digit SIC codes. Reported in parentheses are t-statistics based on standard errors adjusted for clustering by firm (Petersen 2009). ***, ** and * denote significance at 1 percent, 5 percent, and 10 percent, respectively, using two-tailed t-tests.

TABLE 5. Incremental to Tax Avoidance

Panel A: Controlling for Tax Avoidance

Dep. Variable =	COE_{it+1}	COE_{it+1}	COE_{it+1}	COE_{it+1}	COE_{it+1}	COE_{it+1}
$TAXAVOID =$	$CETR$		BTD		$PBTD$	
	(1)	(2)	(3)	(4)	(5)	(6)
$SUSTAX_{it}$		-0.063*** (-3.46)		-0.052*** (-2.89)		-0.047** (-2.57)
$TAXAVOID_{it}$	-0.029** (-2.17)	-0.047*** (-3.55)	-0.043*** (-3.12)	-0.048*** (-3.53)	-0.029** (-2.06)	-0.029** (-2.01)
$BETA_{it}$	-0.133* (-1.65)	-0.127 (-1.58)	-0.133* (-1.65)	-0.127 (-1.58)	-0.130 (-1.61)	-0.124 (-1.54)
$SIZE_{it}$	-0.397*** (-8.89)	-0.389*** (-8.61)	-0.399*** (-8.94)	-0.393*** (-8.70)	-0.396*** (-8.85)	-0.389*** (-8.62)
BTM_{it}	2.379*** (17.43)	2.339*** (17.08)	2.360*** (17.28)	2.323*** (16.94)	2.360*** (17.27)	2.328*** (16.97)
LEV_{it}	3.813*** (12.53)	3.707*** (12.11)	3.788*** (12.50)	3.686*** (12.06)	3.750*** (12.34)	3.658*** (11.94)
RET_{it}	-1.050*** (-17.00)	-1.046*** (-16.96)	-1.051*** (-17.03)	-1.048*** (-16.97)	-1.048*** (-16.99)	-1.045*** (-16.93)
$RETVOL_{it}$	14.735** *	13.856** *	14.573** *	13.744** *	14.545** *	13.793** *
	(11.07)	(10.34)	(10.92)	(10.25)	(10.90)	(10.30)
CFO_{it}	-6.467*** (-13.88)	-6.268*** (-13.38)	-6.324*** (-13.43)	-6.159*** (-13.05)	-6.383*** (-13.56)	-6.257*** (-13.26)
$CFVOL_{it}$	4.197*** (5.46)	4.050*** (5.25)	4.216*** (5.48)	4.095*** (5.30)	4.206*** (5.47)	4.095*** (5.30)
$LOSS_{it}$	1.642*** (14.79)	1.605*** (14.42)	1.386*** (11.91)	1.291*** (11.29)	1.459*** (12.98)	1.393*** (12.44)
AQ_{it}	2.053** (2.13)	1.887* (1.96)	2.080** (2.16)	1.937** (2.01)	2.063** (2.14)	1.928** (2.00)
$CAPEX_{it}$	1.830** (2.32)	1.800** (2.28)	1.890** (2.39)	1.858** (2.35)	1.790** (2.27)	1.751** (2.22)
RD_{it}	-0.619 (-0.58)	-0.904 (-0.84)	-0.795 (-0.74)	-1.120 (-1.03)	-0.735 (-0.69)	-1.028 (-0.95)
SGA_{it}	0.840*** (2.80)	0.853*** (2.85)	0.823*** (2.75)	0.845*** (2.82)	0.868*** (2.90)	0.892*** (2.98)
$FOREIGN_{it}$	0.193* (1.89)	0.187* (1.83)	0.199* (1.95)	0.195* (1.91)	0.207** (2.04)	0.202** (1.99)
$TLCF_{it}$	-0.187* (-1.89)	-0.167 (-1.65)	-0.184* (-1.89)	-0.165 (-1.65)	-0.179* (-1.89)	-0.162 (-1.62)

<i>TXBCO_{it}</i>	(-1.75) -0.607*** (-5.44)	(-1.57) -0.575*** (-5.15)	(-1.73) -0.602*** (-5.40)	(-1.55) -0.568*** (-5.09)	(-1.68) -0.591*** (-5.31)	(-1.52) -0.560*** (-5.03)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	37,759	37,759	37,759	37,759	37,759	37,759
Adjusted R ²	0.233	0.234	0.233	0.234	0.233	0.233

Panel B: Subsample Analysis

Dep. Variable =	<i>COE_{it+1}</i>	<i>COE_{it+1}</i>	<i>COE_{it+1}</i>
<i>SUSTAX</i> Tercile =	<i>Low</i>	<i>Middle</i>	<i>High</i>
	(1)	(2)	(3)
<i>CETR_{it}</i>	-0.014	-0.063***	-0.074***
	(-0.66)	(-3.17)	(-2.83)
<i>BETA_{it}</i>	-0.153	0.030	-0.058
	(-1.28)	(0.25)	(-0.46)
<i>SIZE_{it}</i>	-0.672***	-0.289***	-0.234***
	(-9.29)	(-4.47)	(-4.37)
<i>BTM_{it}</i>	1.925***	2.731***	3.309***
	(9.48)	(13.80)	(13.10)
<i>LEV_{it}</i>	4.359***	3.458***	3.624***
	(9.10)	(7.83)	(8.08)
<i>RET_{it}</i>	-0.770***	-1.233***	-1.461***
	(-7.39)	(-12.56)	(-14.00)
<i>RETVOL_{it}</i>	15.393***	10.090***	12.928***
	(8.21)	(4.91)	(4.79)
<i>CFO_{it}</i>	-8.590***	-6.047***	-1.437*
	(-11.40)	(-9.15)	(-1.79)
<i>CFVOL_{it}</i>	3.039***	5.165***	6.254***
	(3.03)	(4.19)	(3.78)
<i>LOSS_{it}</i>	1.403***	1.466***	2.320***
	(9.45)	(8.68)	(3.71)
<i>AQ_{it}</i>	1.824	2.386*	-0.986

	(1.15)	(1.66)	(-0.76)
$CAPEX_{it}$	1.719	2.035**	1.113
	(1.50)	(1.96)	(0.85)
RD_{it}	-2.835*	-0.086	-0.880
	(-1.80)	(-0.06)	(-0.49)
SGA_{it}	1.493***	0.718*	0.443
	(3.02)	(1.68)	(1.10)
$FOREIGN_{it}$	0.235	0.123	0.219
	(1.56)	(0.81)	(1.64)
$TLCF_{it}$	-0.198	-0.235	-0.013
	(-1.18)	(-1.61)	(-0.09)
$TXBCO_{it}$	-0.530***	-0.569***	-0.339***
	(-2.85)	(-3.22)	(-2.66)
<i>Test for differences (TAXAVOID) (1) = (3)</i>			
<i>diff</i> =		0.061**	
<i>p-value</i> =		(0.034)	
Year FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Observations	12,586	12,587	12,586
Adjusted R ²	0.209	0.213	0.197

Notes: This table shows the results of estimating the relation between sustainable tax strategy and cost of equity. Detailed variable definitions are provided in Appendix A. Industry fixed effects are based on 2-digit SIC codes. Reported in parentheses are t-statistics based on standard errors adjusted for clustering by firm (Petersen 2009). ***, ** and * denote significance at 1 percent, 5 percent, and 10 percent, respectively, using two-tailed t-tests.

TABLE 6. Innate and Discretionary Portion of Tax Strategy

Dep. Variable =	COE_{it+1}	COE_{it+1}	COE_{it+1}	COE_{it+1}
$INN_SUSTAX =$	$INN_SUSTAX1$		$INN_SUSTAX2$	
$DISC_SUSTAX =$	$DISC_SUSTAX1$		$DISC_SUSTAX2$	
	(1)	(2)	(3)	(4)
INN_SUSTAX_{it}	-0.053*** (-3.55)	-0.064*** (-4.13)	-0.133*** (-5.55)	-0.150*** (-6.14)
$DISC_SUSTAX_{it}$	-0.022* (-1.89)	-0.028** (-2.37)	0.051*** (4.27)	0.042*** (3.53)
$CETR_{it}$		-0.037*** (-2.71)		-0.054*** (-4.01)
$BETA_{it}$	-0.027 (-0.42)	-0.031 (-0.48)	-0.114 (-1.43)	-0.117 (-1.46)
$SIZE_{it}$	-0.373*** (-13.45)	-0.370*** (-13.33)	-0.354*** (-7.64)	-0.352*** (-7.58)
BTM_{it}	2.390*** (23.25)	2.387*** (23.23)	2.269*** (16.48)	2.265*** (16.46)
LEV_{it}	3.415*** (15.31)	3.436*** (15.40)	3.519*** (11.42)	3.538*** (11.48)
RET_{it}	-1.133*** (-16.78)	-1.135*** (-16.80)	-0.991*** (-16.09)	-0.992*** (-16.10)
$RETVOL_{it}$	13.736*** (13.18)	13.826*** (13.27)	12.760*** (9.52)	12.866*** (9.61)
CFO_{it}	-6.001*** (-15.11)	-5.925*** (-14.88)	-6.075*** (-13.10)	-5.946*** (-12.73)
$CFVOL_{it}$	4.772*** (7.75)	4.747*** (7.71)	3.782*** (4.92)	3.752*** (4.89)
$LOSS_{it}$	1.344*** (13.22)	1.445*** (13.35)	1.508*** (14.41)	1.650*** (14.75)
AQ_{it}	0.752 (0.99)	0.771 (1.02)	1.798* (1.87)	1.790* (1.86)
$CAPEX_{it}$	1.413** (2.43)	1.443** (2.48)	1.143 (1.44)	1.185 (1.50)
RD_{it}	0.332 (0.44)	0.465 (0.61)	-2.103* (-1.92)	-1.910* (-1.75)
SGA_{it}	0.765*** (3.75)	0.735*** (3.60)	1.085*** (3.62)	1.042*** (3.47)
$FOREIGN_{it}$	0.073 (0.97)	0.074 (1.00)	0.220** (2.17)	0.218** (2.15)
$TLCF_{it}$	-0.181	-0.187	-0.146	-0.152

<i>TXBCO_{it}</i>	(-1.59) -0.444*** (-4.37)	(-1.64) -0.453*** (-4.45)	(-1.37) -0.570*** (-5.09)	(-1.43) -0.587*** (-5.24)
<i>Test for differences (INN_SUSTAX = DISC_SUSTAX)</i>				
<i>F value</i>	3.23*	4.27**	49.82***	53.21***
<i>Prob > F</i>	0.072	0.034	0.000	0.000
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Observations	20,956	20,956	37,759	37,759
Adjusted R ²	0.251	0.252	0.237	0.237

Notes: This table shows the results of estimating the relation between sustainable tax strategy and future cash outflows. Detailed variable definitions are provided in Appendix A. Industry fixed effects are based on 2-digit SIC codes. Reported in parentheses are t-statistics based on standard errors adjusted for clustering by firm (Petersen 2009). ***, ** and * denote significance at 1 percent, 5 percent, and 10 percent, respectively, using two-tailed t-tests.

TABLE 7. Consequences of Different Tax Strategy

Dep. Variable =	$STD(TAXAVOID)_{it+1-t+5}$	$CFVOL_{it+1-t+5}$
	(1)	(2)
<i>SUSTAX_{it}</i>	-0.002*** (-3.04)	-0.000** (-2.02)
<i>CETR_{it}</i>	-0.006*** (-17.64)	0.000* (1.84)
<i>BETA_{it}</i>	0.001 (0.60)	-0.004*** (-5.23)
<i>SIZE_{it}</i>	0.001 (0.51)	-0.004*** (-14.37)
<i>BTM_{it}</i>	0.035*** (9.64)	-0.007*** (-6.40)
<i>LEV_{it}</i>	0.013 (1.56)	-0.016*** (-6.57)
<i>RET_{it}</i>	-0.016*** (-11.42)	0.004*** (7.21)
<i>RETVOL_{it}</i>	0.053 (1.45)	0.081*** (7.24)
<i>CFO_{it}</i>	-0.008 (-0.69)	0.003 (0.56)
<i>CFVOL_{it}</i>	-0.009 (-0.46)	0.086*** (11.47)
<i>LOSS_{it}</i>	0.002 (0.69)	0.005*** (5.47)
<i>AQ_{it}</i>	0.037 (1.41)	0.080*** (8.81)
<i>CAPEX_{it}</i>	-0.051*** (-2.85)	0.022*** (3.65)
<i>RD_{it}</i>	-0.088*** (-3.06)	0.065*** (6.36)
<i>SGA_{it}</i>	0.009 (1.20)	0.016*** (6.19)
<i>FOREIGN_{it}</i>	0.007*** (2.70)	-0.004*** (-5.23)
<i>TLCF_{it}</i>	-0.003 (-1.10)	-0.000 (-0.10)
<i>TXBCO_{it}</i>	0.010*** (2.71)	-0.002** (-2.24)

Year FE	Yes	Yes
Industry FE	Yes	Yes
Observations	34,621	31,425
Adjusted R ²	0.050	0.331

Notes: This table shows the results of estimating the relation between sustainable tax strategy and future cash outflows. Detailed variable definitions are provided in Appendix A. Industry fixed effects are based on 2-digit SIC codes. Reported in parentheses are t-statistics based on standard errors adjusted for clustering by firm (Petersen 2009). ***, ** and * denote significance at 1 percent, 5 percent, and 10 percent, respectively, using two-tailed t-tests.

TABLE 8. IRS Attention to Different Tax Strategy

Dep. Variable =	<i>LN_10K_IRS</i>		
	(1)	(2)	(3)
<i>SUSTAX_{it}</i>	-0.011*** (-2.69)		-0.009** (-2.05)
<i>CETR_{it}</i>		0.010*** (3.47)	0.008*** (2.88)
<i>LNMV_{it}</i>	0.289*** (28.46)	0.288*** (28.56)	0.289*** (28.52)
<i>MTB_{it}</i>	-0.015*** (-4.29)	-0.015*** (-4.36)	-0.015*** (-4.29)
<i>LEV_{it}</i>	0.079 (1.18)	0.082 (1.22)	0.072 (1.08)
<i>RET_{it}</i>	0.028* (1.91)	0.027* (1.85)	0.028* (1.86)
<i>RETVOL_{it}</i>	0.435** (2.18)	0.478** (2.41)	0.426** (2.13)
<i>CFO_{it}</i>	-0.689*** (-6.21)	-0.695*** (-6.25)	-0.685*** (-6.18)
<i>CFVOL_{it}</i>	0.224 (1.55)	0.243* (1.69)	0.229 (1.59)
<i>LOSS_{it}</i>	-0.074 (-1.59)	-0.046 (-1.09)	-0.091* (-1.93)
<i>AQ_{it}</i>	0.219 (1.18)	0.230 (1.24)	0.222 (1.20)
<i>CAPEX_{it}</i>	-0.770*** (-4.68)	-0.767*** (-4.63)	-0.783*** (-4.74)
<i>RD_{it}</i>	-0.734** (-2.28)	-0.744** (-2.31)	-0.759** (-2.36)
<i>FOREIGN_{it}</i>	0.075*** (3.59)	0.078*** (3.74)	0.077*** (3.73)
<i>SGA_{it}</i>	0.136** (2.17)	0.137** (2.17)	0.142** (2.26)
<i>MNE</i>	-0.036 (-1.39)	-0.037 (-1.45)	-0.036 (-1.40)
<i>INTANINTEN</i>	0.188 (0.83)	0.190 (0.83)	0.178 (0.78)
<i>CAPINTEN</i>	0.147*** (3.52)	0.145*** (3.46)	0.145*** (3.46)
<i>CH_NOL</i>	-0.016	-0.016	-0.016

	(-0.73)	(-0.73)	(-0.73)
<i>CASH</i>	-0.125*	-0.129*	-0.129*
	(-1.86)	(-1.92)	(-1.91)
<i>SG</i>	-0.271***	-0.269***	-0.272***
	(-7.82)	(-7.78)	(-7.85)
Year FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Observations	16,536	16,536	16,536
Adjusted R ²	0.465	0.465	0.465

Notes: This table shows the results of estimating the relation between sustainable tax strategy and the log of 10-K downloads by IRS. Detailed variable definitions are provided in Appendix A. Industry fixed effects are based on 2-digit SIC codes. Reported in parentheses are t-statistics based on standard errors adjusted for clustering by firm (Petersen 2009). ***, ** and * denote significance at 1 percent, 5 percent, and 10 percent, respectively, using two-tailed t-tests.

TABLE 9. Cross-Sectional Analysis

Panel A: Analyst Coverage

Dep. Variable =	COE_{it+1}	COE_{it+1}	COE_{it+1}	COE_{it+1}
<i>Analyst Coverage</i>	<i>High</i>	<i>Low</i>	<i>High</i>	<i>Low</i>
	(1)	(2)	(3)	(4)
<i>SUSTAX_{it}</i>	-0.019	-0.109***	-0.042	-0.128***
	(-0.61)	(-3.27)	(-1.36)	(-3.72)
<i>CETR_{it}</i>			-0.079***	-0.049*
			(-3.46)	(-1.78)
<i>Test for differences (SUSTAX)</i>				
<i>diff</i> =	0.090**		0.085**	
<i>p-value</i> =	(0.020)		(0.032)	
Other Controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Observations	19,153	18,606	19,153	18,606
Adjusted R ²	0.145	0.191	0.146	0.191

Panel B: Institutional Ownership

Dep. Variable =	COE_{it+1}	COE_{it+1}	COE_{it+1}	COE_{it+1}
<i>Institutional Ownership</i>	<i>High</i>	<i>Low</i>	<i>High</i>	<i>Low</i>
	(1)	(2)	(3)	(4)
<i>SUSTAX_{it}</i>	-0.058*	-0.125***	-0.078**	-0.148***
	(-1.81)	(-3.22)	(-2.45)	(-3.70)
<i>CETR_{it}</i>			-0.063**	-0.060*
			(-2.56)	(-1.90)
<i>Test for differences (SUSTAX)</i>				
<i>diff</i> =	0.067*		0.069*	
<i>p-value</i> =	(0.092)		(0.088)	
Other Controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Observations	15,197	15,197	15,197	15,197
Adjusted R ²	0.174	0.181	0.175	0.181

Panel C: Number of Business Segments

Dep. Variable =	COE_{it+1}	COE_{it+1}	COE_{it+1}	COE_{it+1}
# of Business Segments	High	Low	High	Low
	(1)	(2)	(3)	(4)
$SUSTAX_{it}$	-0.160***	-0.077**	-0.174***	-0.099***
	(-4.70)	(-2.35)	(-5.06)	(-3.01)
$CETR_{it}$			-0.047*	-0.064**
			(-1.80)	(-2.24)
<i>Test for differences ($SUSTAX$)</i>				
<i>diff =</i>	-0.083**		-0.075**	
<i>p-value</i>	(0.039)		(0.058)	
Other Controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Observations	13,348	16,201	13,348	16,201
Adjusted R ²	0.210	0.212	0.210	0.212

Notes: This table shows the results of estimating the relation between sustainable tax strategy and cost of equity. Detailed variable definitions are provided in Appendix A. Industry fixed effects are based on 2-digit SIC codes. Reported in parentheses are t-statistics based on standard errors adjusted for clustering by firm (Petersen 2009). ***, ** and * denote significance at 1 percent, 5 percent, and 10 percent, respectively, using two-tailed t-tests.

TABLE 10. Sustainable Tax Strategy and Cost of Debt

Dep. Variable =	$RATING_{it+1}$	$RATING_{it+1}$	$INVGRATE_{it+1}$	$INVGRATE_{it+1}$	COD_{it+1}	COD_{it+1}
	(1)	(2)	(3)	(4)	(5)	(6)
<i>SUSTAX_{it}</i>	0.210*** (15.29)	0.200*** (14.70)	0.114*** (9.16)	0.106*** (8.42)	-0.308*** (-6.23)	-0.285*** (-5.53)
<i>CETR_{it}</i>		-0.028*** (-3.20)		-0.026*** (-3.07)		0.069* (1.76)
<i>BETA_{it}</i>	0.099 (1.54)	0.094 (1.47)	0.271*** (4.17)	0.267*** (4.10)	0.256 (0.98)	0.263 (1.00)
<i>SIZE_{it}</i>	1.072*** (27.84)	1.072*** (27.81)	0.807*** (17.80)	0.809*** (17.90)	-0.625*** (-6.56)	-0.626*** (-6.58)
<i>MTB_{it}</i>	-1.146*** (-13.85)	-1.144*** (-13.83)	-0.740*** (-7.88)	-0.738*** (-7.85)	-0.992*** (-3.19)	-0.990*** (-3.19)
<i>LEV_{it}</i>	-4.167*** (-15.46)	-4.147*** (-15.41)	-3.747*** (-13.83)	-3.746*** (-13.82)	-25.747*** (-23.06)	-25.778*** (-23.11)
<i>RET_{it}</i>	0.114*** (3.30)	0.113*** (3.28)	0.040 (0.90)	0.038 (0.86)	0.036 (0.18)	0.038 (0.19)
<i>RETVOL_{it}</i>	-17.117*** (-14.52)	-17.031*** (-14.47)	-17.628*** (-13.88)	-17.590*** (-13.85)	12.014*** (3.05)	11.858*** (3.01)
<i>CFO_{it}</i>	3.618*** (9.05)	3.710*** (9.27)	2.475*** (6.29)	2.567*** (6.47)	8.363*** (4.63)	8.206*** (4.54)
<i>CFVOL_{it}</i>	-3.527*** (-5.55)	-3.583*** (-5.64)	-2.888*** (-3.25)	-2.984*** (-3.35)	4.636 (1.62)	4.690 (1.64)

<i>LOSS_PTR_{it}</i>	-0.206*** (-3.28)	-0.141** (-2.07)	-0.242*** (-3.76)	-0.178** (-2.53)	0.401 (1.34)	0.224 (0.71)
<i>AQ_{it}</i>	-0.790 (-1.19)	-0.825 (-1.24)	-0.496 (-0.64)	-0.539 (-0.69)	3.186 (1.10)	3.189 (1.10)
<i>CAPEX_{it}</i>	-1.786*** (-3.75)	-1.737*** (-3.65)	-2.079*** (-4.15)	-2.024*** (-4.02)	-17.653*** (-10.47)	-17.732*** (-10.52)
<i>RD_{it}</i>	-0.104 (-0.10)	0.035 (0.03)	-2.238** (-2.23)	-2.069** (-2.07)	-3.218 (-0.80)	-3.504 (-0.87)
<i>SGA_{it}</i>	0.444 (1.61)	0.411 (1.49)	0.039 (0.15)	-0.015 (-0.06)	0.297 (0.30)	0.358 (0.36)
<i>FOREIGN_{it}</i>	0.065 (0.87)	0.063 (0.83)	0.106 (1.47)	0.106 (1.47)	-0.590** (-2.06)	-0.583** (-2.04)
<i>TLCF_{it}</i>	0.069 (1.04)	0.069 (1.05)	0.097 (1.33)	0.099 (1.37)	-0.115 (-0.43)	-0.109 (-0.41)
<i>TXBCO_{it}</i>	0.044 (0.51)	0.039 (0.45)	0.137 (1.49)	0.130 (1.42)	-0.978*** (-2.64)	-0.961*** (-2.59)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	12,595	12,595	12,580	12,580	31,188	31,188
Adjusted R ² or Pseudo R ²	0.757	0.757	0.616	0.616	0.105	0.105

Notes: This table shows the results of estimating the relation between sustainable tax strategy and cost of debt. Detailed variable definitions are provided in Appendix A. Industry fixed effects are based on 2-digit SIC codes. Reported in parentheses are t-statistics based on standard errors adjusted for clustering by firm (Petersen 2009). ***, ** and * denote significance at 1 percent, 5 percent, and 10 percent, respectively, using two-tailed t-tests.

TABLE 11. Propensity Score Matching Analysis

Dep. Variable =	COE_{it+1}	COE_{it+1}
	(1)	(2)
$SUSTAX_{it}$	-0.055* (-1.93)	-0.085*** (-2.83)
$CETR_{it}$		-0.087*** (-3.47)
$BETA_{it}$	0.095 (0.63)	0.087 (0.58)
$SIZE_{it}$	-0.193** (-2.44)	-0.193** (-2.43)
MTB_{it}	3.070*** (11.77)	3.067*** (11.78)
LEV_{it}	4.290*** (6.76)	4.327*** (6.81)
RET_{it}	-0.988*** (-8.34)	-0.998*** (-8.43)
$RETVOL_{it}$	12.497*** (4.99)	12.709*** (5.07)
CFO_{it}	-6.584*** (-8.05)	-6.319*** (-7.67)
$CFVOL_{it}$	5.171*** (3.04)	5.097*** (3.00)
$LOSS_{it}$	1.148*** (5.67)	1.379*** (6.39)
AQ_{it}	2.071 (1.20)	1.994 (1.16)
$CAPEX_{it}$	1.380 (1.03)	1.439 (1.07)
RD_{it}	-0.746 (-0.40)	-0.416 (-0.23)
SGA_{it}	0.678 (1.30)	0.587 (1.12)
$FOREIGN_{it}$	-0.039 (-0.22)	-0.046 (-0.27)
$TLCF_{it}$	-0.303* (-1.86)	-0.314* (-1.92)
$TXBCO_{it}$	-0.685*** (-3.38)	-0.713*** (-3.53)

Year FE	Yes	Yes
Industry FE	Yes	Yes
Observations	14,230	14,230
Adjusted R ²	0.184	0.185

Notes: This table shows the results of estimating the relation between sustainable tax strategy and cost of equity using matched sample based on propensity-score-matching analysis. Detailed variable definitions are provided in Appendix A. Industry fixed effects are based on 2-digit SIC codes. Reported in parentheses are t-statistics based on standard errors adjusted for clustering by firm (Petersen 2009). ***, ** and * denote significance at 1 percent, 5 percent, and 10 percent, respectively, using two-tailed t-tests.

TABLE 12. Sustainable Tax Strategy and Market-Based Expected Returns

Dep. Variable =	$CAPM_{it+1}$		$FF3_{it+1}$		$FF4_{it+1}$	
	(1)	(2)	(3)	(4)	(5)	(6)
$SUSTAX_{it}$	-0.100*** (-4.40)	-0.095*** (-4.13)	-0.087** (-2.44)	-0.093** (-2.57)	-0.089** (-2.12)	-0.111*** (-2.61)
$CETR_{it}$		0.014 (0.96)		-0.017 (-0.76)		-0.066** (-2.54)
$BETA_{it}$	6.339*** (61.34)	6.340*** (61.35)	4.712*** (29.60)	4.711*** (29.60)	4.948*** (27.78)	4.943*** (27.76)
$SIZE_{it}$	0.003 (0.11)	0.003 (0.09)	-0.044 (-0.82)	-0.044 (-0.81)	-0.285*** (-4.54)	-0.282*** (-4.50)
MTB_{it}	-0.381*** (-4.00)	-0.384*** (-4.03)	0.059 (0.41)	0.063 (0.44)	-1.074*** (-6.07)	-1.060*** (-5.97)
LEV_{it}	1.242*** (4.60)	1.235*** (4.57)	4.048*** (9.00)	4.056*** (9.02)	3.049*** (5.68)	3.084*** (5.74)
RET_{it}	-0.255*** (-3.84)	-0.256*** (-3.85)	-0.746*** (-7.78)	-0.745*** (-7.78)	-0.601*** (-5.40)	-0.599*** (-5.38)
$RETVOL_{it}$	-12.966*** (-9.64)	-12.993*** (-9.65)	-14.763*** (-6.20)	-14.731*** (-6.19)	-22.524*** (-7.92)	-22.398*** (-7.88)
CFO_{it}	-0.298 (-0.63)	-0.294 (-0.62)	1.913*** (2.67)	1.908*** (2.67)	1.810** (2.08)	1.789** (2.06)
$CFVOL_{it}$	-0.090 (-0.09)	-0.087 (-0.09)	-7.298*** (-5.34)	-7.302*** (-5.34)	-8.423*** (-5.14)	-8.437*** (-5.15)

<i>LOSS_{it}</i>	-1.409*** (-5.17)	-1.433*** (-5.23)	-0.019 (-0.04)	0.010 (0.02)	-0.583 (-1.14)	-0.469 (-0.91)
<i>AQ_{it}</i>	4.373*** (4.13)	4.363*** (4.12)	4.117** (2.57)	4.128** (2.57)	3.332* (1.81)	3.376* (1.83)
<i>CAPEX_{it}</i>	4.820*** (6.56)	4.808*** (6.55)	3.963*** (3.54)	3.978*** (3.55)	5.091*** (3.72)	5.148*** (3.76)
<i>RD_{it}</i>	2.924*** (2.78)	2.864*** (2.72)	-9.900*** (-6.05)	-9.829*** (-5.98)	-10.669*** (-5.42)	-10.388*** (-5.26)
<i>SGA_{it}</i>	0.964*** (4.04)	0.973*** (4.07)	0.848** (2.12)	0.837** (2.09)	0.562 (1.21)	0.521 (1.12)
<i>FOREIGN_{it}</i>	-0.193** (-2.05)	-0.190** (-2.02)	-0.087 (-0.58)	-0.091 (-0.61)	-0.146 (-0.83)	-0.161 (-0.91)
<i>TLCF_{it}</i>	-0.251*** (-2.71)	-0.250*** (-2.69)	-0.101 (-0.68)	-0.103 (-0.70)	-0.221 (-1.24)	-0.229 (-1.29)
<i>TXBCO_{it}</i>	-0.106 (-0.94)	-0.103 (-0.92)	0.360** (2.24)	0.357** (2.22)	-0.007 (-0.04)	-0.019 (-0.11)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	51,256	51,256	51,256	51,256	51,256	51,256
Adjusted R ²	0.682	0.682	0.322	0.322	0.242	0.243

Notes: This table shows the results of estimating the relation between sustainable tax strategy and cost of equity using expected returns based on market model, Fama and French (1993) three-factor model, and Carhart (1997) four-factor model. Detailed variable definitions are provided in Appendix A. Industry fixed effects are based on 2-digit SIC codes. Reported in parentheses are t-statistics based on standard errors adjusted for clustering by firm (Petersen 2009). ***, ** and * denote significance at 1 percent, 5 percent, and 10 percent, respectively, using two-tailed t-tests.

TABLE 13. Robustness Checks

Panel A. Model-Based Cost of Capital

Dep. Variable =	COE_MODEL_{it+1}	COE_MODEL_{it+1}
	(1)	(2)
$SUSTAX_{it}$	-0.029**	-0.028**
	(-2.15)	(-2.09)
$CETR_{it}$		-0.150***
		(-13.14)
Other Controls	Yes	Yes
Year FE	Yes	Yes
Industry FE	Yes	Yes
Observations	57,032	57,032
Adjusted R ²	0.442	0.444

Panel B. GAAP-Based ETR Measure

Dep. Variable =	COE_{it+1}	COE_{it+1}
	(1)	(2)
$SUSTAX_GAAP_{it}$	-0.040*	-0.048*
	(-1.65)	(-1.91)
$CETR_GAAP_{it}$		-0.040**
		(-2.02)
Other Controls	Yes	Yes
Year FE	Yes	Yes
Industry FE	Yes	Yes
Observations	37,759	37,759
Adjusted R ²	0.182	0.182

Panel C. Controlling for the Coefficient of Variation of Earnings

Dep. Variable =	COE_{it+1}	COE_{it+1}
	(1)	(2)
$SUSTAX_{it}$	-0.040**	-0.053***
	(-2.24)	(-2.96)
$CETR_{it}$		-0.041***
		(-3.20)
$(-1)*CV_PTIB$	-0.011*	-0.012*
	(-1.66)	(-1.74)

Other Controls	Yes	Yes
Year FE	Yes	Yes
Industry FE	Yes	Yes
Observations	37,759	37,759
Adjusted R ²	0.254	0.254

Panel D. Exclude Loss Firms

Dep. Variable =	COE_{it+1}	COE_{it+1}
	(1)	(2)
<i>SUSTAX_{it}</i>	-0.072***	-0.104***
	(-3.09)	(-4.36)
<i>CETR_{it}</i>		-0.095***
		(-4.39)
Other Controls	Yes	Yes
Year FE	Yes	Yes
Industry FE	Yes	Yes
Observations	31,454	31,454
Adjusted R ²	0.149	0.150

Notes: This table shows the results of estimating the relation between sustainable tax strategy and cost of equity. In Panel A, I utilize model-based implied cost of capital measure developed by Hou et al. (2012). In Panel B, I use GAAP-based measure of sustainable tax strategy. In Panel B, I control for the coefficient of variation of pre-tax book income (*CV_PTIB*). In Panel C, I exclude loss firms from the sample. Detailed variable definitions are provided in Appendix A. Industry fixed effects are based on 2-digit SIC codes. Reported in parentheses are t-statistics based on standard errors adjusted for clustering by firm (Petersen 2009). ***, ** and * denote significance at 1 percent, 5 percent, and 10 percent, respectively, using two-tailed t-tests.

국문초록

자본비용에 관한 연구

본 논문은 기업의 자본비용에 대한 두 개의 독립적인 논문으로 구성되어 있다. 첫 번째 논문은 기업의 회계정보의 품질이 내재자본비용에 미치는 영향이 경기순환에 따라 어떻게 달라지는지에 대하여 연구하였다. 또한 회계정보의 품질이 실현수익률에 미치는 영향이 호경기에 더 커진다는 선행연구의 결과를 내재자본비용을 활용하여 다시 분석하였다. 1977년부터 2016년까지 미국 상장기업을 대상으로 분석한 결과, 기업 회계정보의 품질이 향상되는 경우, 내재자본비용은 낮아지는 것으로 나타났으며 이러한 관계는 불경기에 더 강한 것으로 나타났다. 본 연구의 결과는 전통적인 자산가격결정이론에 부합하며, 회계정보품질의 위험프리미엄이 경기순환과 음의 상관관계를 갖는다는 것을 보여준다. 이와 더불어 회계정보품질의 위험프리미엄이 실현수익률에 미치는 영향이 호경기에 더 커진다는 선행연구의 결과가 실현수익률에서 현금흐름정보를 제거하는 경우 반대로 나타난다는 점을 확인하였다. 즉, 실현수익률에서 현금흐름정보를 제거하는 경우, 내재자본비용을 자본비용의 대용치로 사용하는 경우와 마찬가지로 회계정보품질의 위험프리미엄이 경기순환과 음의 상관관계를 갖는다는 점을 보여준다. 본 연구는 회계정보의 위험프리미엄이 경기변동에 따라 어떻게 달라지는지를 보여준다는 점에서 의미가 있다.

두 번째 논문은 지속가능한 조세전략이 자본비용에 미치는 영향에 대해 분석하였다. 기업의 경영자가 지속가능한 조세전략을 취하는 경우, 조세와 관련된 미래 현금흐름의 불확실성이 낮아지며, 또한 국세청 등 규제기관으로부터의 세무감사위험이 적을 것으로 기대된다. 이에 따라 지속가능한 조세전략을 취하는 기업의 경우 자본비용이 낮아질 수 있다. 1994년부터 2018년까지 미국의 상장기업을 대상으로 유효세율의 변동계수를 지속가능한 조세전략의 대용치로 사용하여 분석한 결과, 지속가능한 조세전략을 활용하는 경우 기업의 내재자본비용이 낮아지는 것으로 나타났다. 또한 지속가능한 조세전략을 활용하는 경우, 미래의 조세 관련 현금흐름의 변동성이 낮아지며 규제기관의 관심을 덜 받게 된다는 점을 확인하였다. 이와 더불어 지속가능한

조세전략을 취하는 경우 타인자본비용 역시 낮아지는 것으로 나타났다. 본 연구는 조세회피의 수준 외에도 조세전략의 지속가능성 역시 자본비용에 중요한 영향을 미친다는 점에서 그 의의가 있다고 할 것이다.

주요어: 회계정보의 품질, 기대수익률, 자본조달비용, 경기순환, 경기 불확실성, 지속가능한 조세전략, 조세회피

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