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Corporate Tax Avoidance and Fraud Risk

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Abstract

There is mixed evidence on whether corporate tax avoidance (CTA) is positively or negatively related to aggressive financial reporting. The Public Company Accounting Oversight Board (PCAOB) requires that auditors assess fraud risks that are related to aggressive financial reporting. In this study I extend the research of CTA by examining the relationship between CTA and fraud risk. I use accrual quality related variables, performance variables, and non-financial measures (NFMs) to measure fraud risk. Drawing on agency theory and fraud risk triangle theory, I find that CTA is positively related to fraud risk. However, I do not find that the effect of CTA on fraud risk differs significantly between fraud and non-fraud companies. In addition, my results that fraud risk variables are associated with accounting frauds suggest that fraud risk can be used to predict accounting frauds.

Keywords: corporate tax avoidance; tax aggressiveness; aggressive financial reporting; fraud; fraud risk.

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Chapter 1: Introduction

There are no universal definitions of tax avoidance or tax aggressiveness in the accounting research literature (Hanlon and Heitzman 2010; Frank et al. 2009). Rego (2003) describes tax avoidance as the application of legal methods to minimize the amount of tax owed to the government. Frank et al. (2009) characterizes tax aggressiveness as the manipulation of taxable income through tax avoidance strategies that may or may not be considered tax evasion. Similar to Hanlon and Heitzman (2010), I define corporate tax avoidance (CTA) as a continuum of tax planning strategies, from perfectly legal activities (e.g., municipal bond investments) to more aggressive activities (e.g., abusive tax shelter) that may fall into grey areas.

Corporate taxes are compulsory contributions collected from firms by the government and represent a significant cost to companies and shareholders. Before the Tax Cuts and Jobs Act of 2017 (TCJA), companies could contribute more than one-third of pre-tax income to the government (Chen at al. 2010). Therefore, CTA may be desired for shareholders because, based on traditional view of wealth transfer, CTA increases cash flow to companies and provides additional value to shareholders (Cook et al. 2008; Dhaliwal et al. 2004). However, the agency theory view of aggressive CTA suggests that managers may use complex CTA strategies for their own benefits at the expense of shareholders, including aggressive financial reporting and related party transactions (Chen et al. 2010; Desai and Dharmapala 2009). The relationship between tax avoidance and aggressive financial reporting has been well explored (Desai and Dharmapala 2009; Erickson et al. 2004; Frank et al. 2009; Lennox et al. 2012). However, few researchers

have explored the relationship between tax avoidance and fraud risk[1]. Audit standard 2401 requires audit procedures should be performed to assess fraud risks relative to aggressive financial reporting (PCAOB AS2401). In addition, prior studies find that tax avoidance is associated with accounting fraud (Erickson et al. 2004; Lennox et al. 2012). Prior studies use the sample of accounting fraud firms[2] that were caught and formally charged by the SEC. In this study, I examine the relationship between tax avoidance and fraud risk. Unlike accounting fraud, fraud risk can be assessed for all companies.

Accounting fraud (fraudulent financial reporting) is defined as the deliberate manipulation of financial statements by company's managers to build a distorted picture of financial condition, results of operation, and cash flow to deceive creditors and shareholders (Nicholas 2021). Managers can manipulate financial statements by overstating revenues or understating expenses, and misrepresenting assets and liabilities. Fraud risk is defined as the auditors' assessment of client's incentives, pressures, and opportunities to commit fraud. Brazel et al. (2009) examine the relationship between accounting fraud and fraud risk and find that companies that are committing fraud exhibit higher levels of fraud risk.

In this study, I explore the relationship between CTA and fraud risk. Prior studies find that aggressive tax avoidance is associated with accounting fraud (Erickson et al. 2004; Lennox et al. 2012). I use various measures to assess fraud risk, including accrual quality, performance variables, and non-financial measures (NFMs) (Dechow et al. 2011). Dechow et al. (2011) find that fraud companies show unusually high accruals in

[1] In this study, fraud refers to accounting fraud and fraud risk refers to the risk that the entity will commit accounting fraud.
[2] Similar to Dechow et al. (2011) and Lennox et al. (2012), I define fraud companies as those committing accounting fraud on the AAER list.

fraud years. NFMs are additional proxies I use to measure fraud risk. The PCAOB (2004) notes that analytical procedures with financial information are not sufficient in detecting fraud due to managers' manipulation of financial statements and suggests financial and NFMs be combined in detecting accounting fraud. Brazel et al. (2009) find that fraud companies show larger difference between financial and NFMs than non-fraud companies, suggesting that NFMs can be used to assess fraud risk. Market incentives are focused on financing from debt securities (Dechow et al. 1995). Dechow et al. (2011) argue that fraud companies raise more capital through debt securities in fraud years than non-fraud companies.

Prior studies also provide arguments and evidence on how tax aggressiveness[3] is related to aggressive financial reporting (Frank et al. 2009; Lennox et al. 2012). Some studies argue that there is a strong and positive relationship between CTA and aggressive financial reporting (Desai 2005; Desai and Dharmapala 2006; Frank et al. 2009). According to this view, managers may report different amounts of income to the public (higher) and the IRS (lower) (Desai 2005; Hanlon et al. 2012). Desai (2005) and Frank et al. (2009) suggest that areas of nonconformity between financial and tax reporting provide more opportunities for companies to maximize book income in the financial statements and minimize the taxable income simultaneously. However, Erickson et al. (2004) find that aggressive financial reporting is negatively related to tax aggressiveness because companies intentionally overpaid their taxes in order to validate the fraudulent financial income. The evidence indicates that some companies overstate their tax obligations to cover the aggressive accounting reporting. Similar to Erickson et al.

[3] Frank et al. (2009) define tax aggressiveness as aggressive tax avoidance, which may be legal or illegal.

(2004), Lennox et al. (2012) argue that companies could not manipulate taxable income and book income in the opposite directions without being noticed by external auditors and the IRS. Lennox et al. (2012) examine the relationship between tax reporting aggressiveness and accounting fraud and find that companies engaging in aggressive tax reporting are less likely to commit accounting fraud. However, I expect that CTA is positively related to fraud risk since the agency theory view of CTA suggests that managers can exploit financial information to conceal rent extraction[4] by applying various tax strategies (Desai 2005; Desai and Dharmapala 2006). According to the fraud risk triangle framework, fraud risk is greater when managers have more opportunities to manipulate financial statements. Therefore, I predict there is a positive relationship between CTA and fraud risk.

Furthermore, I examine whether the relationship between aggressive CTA and fraud risk, is different for fraud and non-fraud companies. Specifically, I explore whether fraud companies really overpay taxes to conceal their frauds (Erickson et al. 2004). Drawing on fraud triangle framework, I expect that both fraud and non-fraud companies show a positive relationship between aggressive CTA and fraud risk. However, I expect that the magnitude of the effect of aggressive CTA on assessed fraud risk is greater for fraud companies than for non-fraud companies because managers that commit fraud have more opportunities and incentives to manipulate financial statements, and they have more justifications for their fraud behaviors.

[4] Rent extraction refers to managers' effort to increase their own wealth without creating additional values for firms and shareholders.

This study investigates the relationship between CTA and fraud risk using a sample spanning the 2000-2017 timeframe. Similar to Armstrong et al. 2015; Dyreng et al. 2008; and Robinson et al. 2010, I use the GAAP effective tax rate (GAAPETR), the Cash effective tax rate (CashETR) and permanent book tax difference (PBTD) to measure CTA. Lower ETR and higher PBTD indicate more aggressive CTA. Fraud risk is measured from perspectives that include accrual quality, performance variables, and NFMs. I examine accrual quality by using changes in receivables and inventory because these two accruals are related to revenue recognition and cost of goods sold that affect gross profit. Financial data are collected from Compustat. Similar to Brazel et al. (2009) and Dechow et al. (2011), I collect revenue related NFMs, such as the number of employees and the amount of order backlogs from Compustat. I calculate the average change in NFMs and subtract the change in NFMs from change in sales or total assets to determine abnormal changes in NFMs. Consistent with Brazel et al. (2009), I define abnormal changes in NFMs of more than 20% as high fraud risk. Then I use ordinary least square (OLS) regression to test whether CTA is positively or negatively related to fraud risk.

Generally, I find that CTA is positively related to fraud risk when I use financial and non-financial variables to measure fraud risk. My results are consistent with fraud triangle theory and agency theory such that complex tax planning strategies provide more opportunities for managers to conduct rent extraction. However, I do not find a significant difference between fraud and non-fraud companies. Due to the considerations of potential penalties from the IRS, reputational damage from the public, and other costs

associated with CTA, fraud companies may overpay taxes to cover up their manipulation of financial reporting.

This study contributes to the CTA and fraud risk literature in several ways. First, while prior studies provide competing arguments regarding whether CTA is positively or negatively associated with financial reporting aggressiveness, I conduct an empirical analysis to explore the relationship between CTA and fraud risk. I find that CTA is positively related to fraud risk because managers may use complex CTA activities to conduct rent extraction. Auditors and regulators should focus on aggressive CTA since it may indicate higher fraud risk. Second, this study contributes to the literature relating to fraud risk. I use accrual quality, performance variables, and NFMs to measure fraud risk. Managers, auditors, and regulators may evaluate the effect of CTA on fraud risk from different perspectives. Third, this study contributes to the literature on agency problems related to CTA. Little is known about whether the relationship between CTA and fraud risk is different for fraud and non-fraud companies. Fraud companies may incur higher agency costs than non-fraud companies. Finally, this study provides real-world tools for business and regulators. Aggressive CTA may be considered a red flag for fraudulent financial reporting since a higher level of CTA is positively related to higher fraud risk.

The remainder of the paper is organized as follows. In section II, I present the conceptual framework, literature review and hypothesis development. In section III, I discuss the research method and data collection. In section IV, I present the research results. In section V, I discuss the contributions, limitations, and future research opportunities.

Chapter 2. Literature Review

2.1 Conceptual Framework

2.1.1 Corporate Tax Avoidance (CTA)

According to the key terms on the Internal Revenue Service (IRS) website, tax avoidance is defined as a perfectly legal method to reduce tax liability and increase after-tax income. Taxpayers are allowed to use deductions and adjustments to reduce taxable income and credits to reduce tax liability owed to the government. However, tax research provides various definitions of corporate tax avoidance and tax aggressiveness (Hanlon and Heitzman 2010; Frank et al. 2009). Rego (2003) defines tax avoidance as a legal application to minimize taxes owed to the government. Frank et al. (2009) describes tax aggressiveness as manipulation of taxable income through tax avoidance strategies that may or may not be considered tax evasion. Consistent with Hanlon and Heitzman (2010), I broadly define CTA as a continuum of tax planning strategies, from perfectly legal activities (e.g., municipal bond investments) to more aggressive activities that fall into grey areas.

CTA activities are traditionally considered tax saving tools that transfer wealth from the state to corporations, thus increasing net cash flows and firm performance (Cook et al. 2008; Dhaliwal et al. 2004; Wilson 2009). From this point of view, CTA provides benefits to companies and shareholders. However, the agency theory view of CTA argues that managers may use opaque CTA to hide rent extraction and work for their own benefits. The total costs from CTA planning activities, compliance, and non-tax activities

(e.g., agency cost) may exceed the tax benefits from CTA. Therefore, CTA activities may reduce firm performance.

Slemrod (2004) provides some background information for understanding the agency theory of CTA. He states that separation of ownership and control in large publicly held companies causes an agency problem between owners and agents. Unlike private companies in which owners make decisions on tax reporting, large companies assign decision making on tax reporting to their agents. Therefore, shareholders in large companies need to create appropriate compensation packages to match shareholders' interests with managers' interests. To encourage managers to choose the value enhancing tax reporting strategies, companies need to link compensation packages to after-tax income.

Desai and Dharmapala (2006) examined how high-powered incentives affect CTA. Their model is based on the agency theory that states that managers who make CTA decisions also gain personal benefits through rent extraction. Managers make decisions on CTA and rent extraction at the same time. So, CTA and rent extraction are complements. The level of CTA may affect the cost of rent extraction for managers. For instance, managers who make tax sheltering decisions may experience low costs of rent extraction since complex tax sheltering activities can hide managerial rent extraction. Desai and Daharmapala (2006) argue that the effect of high-powered incentives on CTA is dependent on the relationship between CTA and rent extraction. Generally, high-powered incentives that are related to after-tax profits stimulate managers to conduct more aggressive CTA and reduce rent extraction. Higher incentive compensation is helpful in aligning the interests of shareholders and managers and causes managers to be

more willing to create additional firm value through CTA activities. However, the complementary relationship between CTA and rent extraction may reverse this result. Particularly, the direct effect of high-powered incentives on CTA (e.g., higher incentive compensation causes more aggressive CTA) could be offset by the positive feedback effect between CTA and rent extraction (e.g., a reduction of managerial rent extraction is accompanied by a reduction in CTA). Desai and Dharmapala (2006) also predict the role of corporate governance in moderating the relationship between high-powered incentives and CTA. Companies with poor corporate governance provide more opportunities for managerial rent extraction than well-governed companies. Therefore, for poorly governed companies, high-powered incentives are negatively related to CTA since the tendency toward more aggressive CTA is offset by the positive feedback effect between CTA and rent extraction (e.g., a reduction in rent extraction and a reduction in CTA exist at the same time).

In addition, Desai and Dharmapala (2006) argue the extent to which CTA and rent extraction are complementary may vary in different information environments. Transparent companies may engage in less aggressive CTA activities than opaque companies. Furthermore, they suggest CTA may have greater effect on firm value for transparent companies than opaque companies. In this study, I examine the relationship between CTA and fraud risk for fraud and non-fraud companies. Fraud companies may conduct more aggressive CTA activities than non-fraud companies because managers in fraud companies may use more complex activities to hide rent extraction. Therefore, I predict that the effect of CTA on fraud risk is greater in magnitude for fraud companies than for non-fraud companies.

2.1.2 Accounting Fraud and Fraud Risk

Accounting fraud is defined as the deliberate manipulation of financial statements by a company's managers to build a distorted financial condition to deceive creditors and shareholders (Nicholas 2021). Managers can manipulate financial statements by overstating revenues, understating expenses, or misrepresenting assets and liabilities. The auditors' assessment of fraud risk includes the assessment of a client's incentives, pressures and opportunities to commit fraud. A prior study examines the positive relationship between accounting fraud and fraud risk and finds fraud companies exhibit higher fraud risk (larger difference between financial measures and NFMs) (Brazel et al. 2009). The PCAOB (2004) suggests that auditors combine financial data and NFMs in detecting accounting fraud. The PCAOB indicates that analytical procedures with only financial data are not suitable to detect fraud because managers can create false financial information to reach their objectives. Moreover, Brazel et al. (2009) find that NFMs can be used to assess fraud risk. They define fraud risk as difference between the financial and NFMs growth rate.

A prior study provides different methods to identify material misstatements (Dechow et al. 2011), which are the primary indicators of fraud risk. First, Dechow et al. (2011) investigates accrual quality related variables, such as working capital accruals and discretionary accruals. For working capital accruals, they analyze two specific accruals that impact firm performance (change in receivables and change in inventory) since these two accounts are related to revenue recognition and cost of goods sold. They find that all fraud companies have unusually high levels of abnormal accruals and have greater ability to manipulate short-term earnings. For discretionary accruals, they examine various

models of discretionary accruals developed in prior studies (Dechow et al. 1995; DeFond and Jiambalvo 1994; Kothari et al. 2005). Dechow et al. (2011) notes that the residuals from the discretionary accruals have less power to detect earnings manipulation than working capital accruals. Second, they explore firm performance variables for fraud companies, including returns on assets and cash sales. They find that returns on assets (ROA) are generally increasing in fraud companies, suggesting that fraud companies attempt to increase earnings through manipulation. However, they find that cash sales are increasing. This could be caused by the increasing capital investments and the expanding business operations.

Third, Dechow et al. (2011) use NFMs to detect material misstatements. One NFM is defined as the percentage change in the number of employees minus the percentage change in total assets. A reduction in employees compared to total assets could indicate manipulated asset balances. Also, they describe another NFM as the difference between the percentage change of order backlog and the percentage change of revenues. They find that the NFM of the abnormal change in the number of employees is helpful in detecting material misstatements. Finally, they investigate stock and debt market related variables. They notice that fraud companies more actively raise capital through debt securities than non-fraud companies during fraud periods. However, for the same fraud companies, they find that the extent of financing during fraud periods is not significantly different from early years in the company's life. Furthermore, they examine price to earnings and market to book ratios and note that these two ratios are extremely high for fraud companies relative to non-fraud companies.

2.1.3 Agency Theory

The economic theory of Agency was first developed by Ross (1973) to interpret and solve problems in the relationship between principals (shareholders) and agents (managers). Principals have employed agents to operate business on their behalf. There are many different opinions, priorities and interests between principals and agents because agents are delegated to make decisions that may financially affect principals. Principal-agent problems exist when the interests of owners are not aligned with those of managers. Based on the definition of agency theory, principals provide resources but do not have daily input in business operations. Agents use the resources to make business decisions and take little or at least less risk because all losses are shared by principals (Kopp 2020). Regarding tax avoidance, risk neutral shareholders hire managers to maximize profits through efficient tax planning tools. But opportunistic managers may conduct aggressive tax avoidance actions for their own benefits (Desai and Dharmapala 2009) and can utilize opaque CTA activities to mask rent extraction behaviors and unfavorable information. Rent extraction is defined as non-value maximizing activities that managers conduct at the expense of shareholders, including aggressive financial reporting and related-party transactions (Chen et al. 2010). Some CTA activities, such as seeking offshore tax havens and creating related-party transactions, are complex and easy for managers to conceal rent extraction (Desai and Dharmapala 2006). One of the examples of related-party transactions in rent extraction is Enron's CFO, Andrew Fastow, creating special purpose entities (SPEs) to transfer resources from Enron to SPEs (McLean and Elkind, 2003). To generate benefits for themselves, managers can buy assets at higher prices than the market dictates, pay higher consulting fees, and borrow

money at higher interest rates from SPEs (Chen et al. 2010). Managers in Dynegy Company overstated operating cash flows by three hundred million dollars by misclassifying cash flows produced from CTA activities as operating cash flows. Enron Company's management inflated its earnings until 2001 by using twelve large tax shelters to hide its poor performance from operations. Tyco International Company utilized the complex CTA activities to hide its rent extraction behaviors, resulting in the company's stock price crash after rent extraction being disclosed in 2002. Therefore, opportunistic managers may use CTA strategies to reduce companies' cash flows and firm performance and increase managers' opportunities to commit fraud.

2.1.4 Fraud Risk Triangle Framework

The fraud risk triangle (Cressey 1953) is a framework used by auditors to explain the characteristics that must be present for a fraud to take place. It includes three elements: opportunity, incentive, and rationalization that contribute to increasing fraud risk. Opportunity is described as conditions under which people are more able to commit fraud. For instance, weak internal control such as lack of separation of duties gives employees more opportunities to perpetrate fraud. Incentive is defined as employees' motivation towards committing fraud. Incentive-based compensation and meeting investors' expectations may create pressure to conduct fraudulent activities. Rationalization is represented as employees' justification for perpetrating fraud. Managers that feel unfairly treated may commit fraud to get payback. Some CTA activities such as tax-free municipal bonds investment and employees' 401(K) and pension plans are simple and straight forward. But other CTA activities are complicated

and obscure, including contested liability acceleration strategies, cross-border dividend capture, and intellectual property havens (Graham and Tucker, 2006). Managers can take advantage of the obscure nature of aggressive CTA to conceal rent extraction. Therefore, complex CTA creates more opportunities and provides incentives and rationalization for managers to commit fraud.

2.2 Literature Review

2.2.1 Determinants of CTA

Tax research has drawn significant attention in the last five decades. A number of studies examine what factors cause companies to engage different tax avoidance strategies. Some studies indicate that CTA is associated with a number of firm and executive characteristics. Zimmerman (1983) examines the effect of firm size on effective tax rate (ETR). Since large companies are subject to more scrutiny, their CTA strategies are less aggressive than small companies. In addition, Zimmerman (1983) argues that political cost plays an important role in determining CTA. He finds that firm size is positively related to effective tax rate. Large companies are less aggressive in engaging CTA. A prior study finds that firm size is not significantly related to fraud risk (Lawrence et al. 2011). In this study, I control for firm size when I examine the relationship between CTA and fraud risk. Gupta and Newberry (1997) explore the relationship between ETR and firm characteristics other than firm size, such as capital structure, asset mix, and firm performance. Using longitudinal data covering the Tax Reform Act of 1986, they find that ETRs are not related to firm size when examining

firms with longer histories. However, their results indicate ETRs are related to capital structure, asset mix and firm performance. Since prior studies show the mixed results on the relationship between firm size and CTA, I include firm size as a control variable to see how firm size affects CTA and fraud risk. Rego (2003) examines the effect of economies of scale on companies' tax planning strategies. She finds that companies with higher profits and more foreign transactions have lower ETRs. Therefore, economies of scale have significant effect on CTA activities. In short, to illustrate different CTA strategies adopted by companies, these studies explore research opportunities from firm characteristics.

Some studies extend the CTA research to incentive compensation, ownership structure, and organization structure. Phillips et al. (2003) examine the relationship between incentive compensation (e.g., the link of after-tax profits in CEO and managers' bonus plan) and CTA activities. Compensation plans that are linked to after-tax profits motivate CEOs and managers to make aggressive tax avoidance decisions. Phillips et al. (2003) find that incentive compensation is positively related to CTA activities. Higher incentive compensation that is linked to after-tax profits causes managers to engage in more aggressive CTA activities. However, Phillips et al. (2003) don't find a positive relationship between compensation plans and after-tax profits for CEOs.

In addition, Desai and Dharmapala (2006) examine how high-powered incentive, option-based executive compensation, is related to corporate tax sheltering. They suggest the relationship between incentive compensation and tax sheltering depends on corporate governance. They argue that managers in poorly governed companies have more opportunities to conduct rent extraction than those in well-governed companies. For

poorly governed companies, high-powered incentives are negatively related to tax sheltering because the trend toward aggressive CTA is offset by the positive feedback between CTA and rent extraction. Therefore, Desai and Dharmapala (2006) note that both incentive compensation and corporate governance play a significant role in determining CTA activities.

Furthermore, Armstrong et al. (2010) investigate how the incentives of tax directors affect tax planning. By using proprietary data with executives' compensation information, they examine the relationship between tax directors' incentives and proxies for CTA. They find that tax directors' incentives are strongly and negatively related to GAAP ETR. However, there is little relationship between tax directors' incentives and either cash ETR or book-tax differences. They illustrate that tax directors are motivated to reduce tax expenses in the financial statements, not to save cash flows.

Unlike Phillips et al. (2003), Desai and Dharmapala (2006), and Armstrong et al. (2010), Rego and Wilson (2008) examine how tax planning strategies affect executive compensation. They find that executives are motivated to be aggressive in tax avoidance. They argue that the positive relationship between tax aggressiveness and executive compensation indicates efficient contracting, instead of rent extraction. Robinson et al. (2010) investigate how tax department structure is related to CTA strategies. Corporate tax departments can be structured as profit centers or cost centers. Robinson et al. (2010) find that tax departments that are structured as profit centers can more effectively reduce GAAP ETR, but not cash ETR.

The studies cited above examine how incentive compensation affects CTA from different perspectives. Incentive compensation may also relate to aggressive financial

reporting. Managers with incentive compensation are motivated to manipulate financial statements. Based on the fraud triangle concept, managers with incentive compensation have more incentives to commit fraud. In this study, I include CEOs' incentive compensation as one of control variables to explore how incentive compensation affects CTA and fraud risk.

Chen et al. (2010) examines the role of ownership structure in determining CTA activities. Particularly, they investigate how the agency issues between dominant shareholders (family members) and minority shareholders (non-family members) affect CTA in family-owned businesses. Using multiple proxies to measure tax aggressiveness, they find that family-owned companies engage in less aggressive CTA activities than non-family-owned companies. They argue that to avoid non-tax costs from CTA, family-owned companies are willing to sacrifice the tax benefits by taking less aggressive CTA activities. Non-tax costs from tax avoidance in family-owned businesses include potential penalties from the IRS, reputational damage from the public, and a loss of value from a minority stake. Their results also indicate that family-owned companies care about non-tax costs more than non-family-owned companies. Since family-owned companies are more concerned about non-tax costs, I expect family-owned companies are more conservative in financial reporting. Therefore, family-owned companies are less likely to commit fraudulent financial reporting.

In addition to studies that examine CTA determinants from a company's perspective, a number of studies investigate the determinants of CTA from the executive, audit committee, and board of director's perspectives. Gaertner (2014) examines the relationship between the CEOs' after-tax incentives and CTA. He finds that the use of

after-tax incentives is negatively related to ETRs. After-tax incentives motivate CEOs to engage in more aggressive CTA. He also finds that CEOs' cash compensation is positively related to after-tax incentives. The result suggests that CEOs are rewarded for engaging in more aggressive CTA. Goldman et al. (2017) investigate how CEOs tenure affects corporate tax planning. They find that GAAP ETR decreases from the early years to the later years of CEOs' tenure and is the lowest during the CEOs' final year. However, cash ETR does not change during CEOs' tenure. Their results indicate that CEOs are more aggressive in financial reporting of income taxes than in corporate tax planning and are more aggressive in the final tenure year. In addition, they find that CEOs reinvest earnings permanently and use discretion for uncertain tax benefits. Liang (2019) examines the relationship between CEOs' age and CTA. He finds that CEOs' age plays a significant role in determining CTA policies. Particularly, he finds a positive relationship between CEOs' age and GAAP and Cash ETRs, and a negative relationship between CEOs' age and permanent book-tax differences. The results indicate that older CEOs are less aggressive in tax avoidance. Older CEOs may also be conservative in financial reporting. In this study, I add CEOs' tenure and age to my model to examine the impact of CEOs' tenure and age on fraud risk.

Olson and Stekelberg (2016) examine how CEO narcissism affects corporate tax sheltering. Narcissism is a personality trait that is linked to a feeling of dominance. Narcissists don't have moral awareness and are aggressive in chasing their goals. Olson and Stekelberg (2016) find that CEO narcissism is positively related to tax sheltering. They also find that CEO narcissism is positively related to uncertain tax benefits and negatively related to cash ETR. A prior study finds that CEO narcissism is related to

earnings management (Capalbo et al. 2018). Narcissistic CEOs are more likely to manipulate financial statements by overstating earnings, thus raising fraud risk. Chen et al. (2019) investigate how CFO's accounting expertise affects CTA. Accounting expertise is highly related to CTA since managers use accounting knowledge in determining taxable income and making adjustments based on book-tax differences in preparing tax returns. Thus, CFOs' accounting expertise is helpful in managing income taxes and accounting for the effect of CTA on financial statements. Chen et al. (2019) find that CFO's accounting expertise is negatively related to ETRs. In addition, they find that CFOs' abnormal variable compensation is negatively related to ETRs. The results indicate that CFOs' accounting expertise and compensation plan play a significant role in determining CTA activities. CFOs' accounting expertise is also related to aggressive financial reporting. CFOs with accounting expertise understand better how to manipulate financial statements, thus increasing fraud risk.

Lanis and Richardson (2011) examine how the composition of the board of directors affects tax aggressiveness. They find that the proportion of external members on the board is negatively related to tax aggressiveness. This result suggests that external board members are more independent so that they are more likely to prevent tax aggressiveness through better governance. In addition, Lanis et al. (2017) extends the research on the composition of the board of directors to investigate the effect of gender diversity in the board of directors on tax aggressiveness. They find that female representation on the board is negatively related to tax aggressiveness. The result indicates that female board members are more risk-averse and more likely to deter tax aggressiveness through better monitoring. Since female board members are more risk-

averse and conservative than their male counterparts, they are more concerned about aggressive financial reporting. Female board members are more likely to reduce fraud risk. In this study, I include female board members as one of control variables.

Robinson et al. (2012) examine the role of the audit committee in advising and monitoring tax planning strategies. More specifically, they examine the effect of accounting expertise on the audit committee on CTA. They find that the level of accounting expertise on the audit committee is negatively related to CTA. The result suggests that audit committee with accounting expertise may advise and monitor firm tax planning, thus reducing firm's aggressive tax avoidance. One prior study, Cohen et al. (2014), indicates that audit committee accounting expertise is very valuable in detecting and preventing fraudulent financial reporting.

2.2.2 Consequences of CTA

There are several possible consequences of CTA, which may be direct, such as increasing a firm's cash flow and shareholders' wealth (Cook et al. 2008; Dhaliwal et al. 2004), or indirect, such as affecting a firm's capital structure (Graham and Tucker, 2006). One of the direct consequences of CTA is that a firm's illegal tax activities may be detected by the IRS or other authorities. Firms and managers may face penalties and litigation, which may negatively affect a firm's cash flow, stock price, and reputation. The literature explaining the consequences of CTA is primarily focused on earnings management, stock market reaction, firm risk, and accounting and auditing issues.

Prior studies show mixed results on whether CTA increases or decreases firm earnings. Dhaliwal et al. (2004) examines the effect of tax expenses on earnings management. They find that firms may manipulate tax planning to reduce ETR in the last two quarters if pre-tax accruals earnings management does not meet the target. The results indicate that CTA can be used as a tool to increase earnings. Cook et al. (2008) investigate how the amount of tax fees paid to auditors is related to the change of ETR in the last two quarters of the year. Consistent with Dhaliwal et al. (2004), Cook et al. (2008) find that firms can change tax expenses to manage earnings and that the amount of tax fees paid to auditors is positively associated with the change in ETR from the third to the fourth quarter. However, building on the agency theory, Desai and Dharmapala (2009) argue that CTA may not be positively related to firm value because managers may use complex CTA for their own benefits. Chen et al. (2010) examines the effect of ownership structure on CTA and argue that agency costs incurred as a result of CTA may exceed the benefits, thus decreasing firm performance.

Hanlon and Slemrod (2009) investigate how the stock market reacts to the announcement of news about companies' participation in tax sheltering. They find that stock price is negatively related to the first announcement of companies' tax sheltering behavior. They also document that consumer-related companies show a more negative relationship between stock price and the announcement of tax sheltering. Frischmann et al. (2008) analyzes how the stock market responds to the implementation of FIN 48, which is an interpretation of the rules requiring all business entities to disclose the tax-related risks. They find that the stock market reacted very little to the passage of the rule. However, companies with the first disclosures under the rule show a small positive

return. The results suggest that the stock market's reaction to the rule depends on investors' expectations. If investors anticipate an increase in tax costs, the stock market responds negatively. In contrast, if investors expect an improvement by implementing FIN48, the market reacts positively.

Guenther et al. (2017) examine the effect of CTA on firm risk by using several measures of CTA. They find that CTA is not related to future tax rate volatility or overall firm risk. The result indicates that companies use consistent strategies in engaging in CTA, which does not increase firm risk. They also find that the volatility of cash ETR is negatively related to the volatility of stock price. Companies may use complex CTA activities to conceal managerial rent extraction, which increases firm risk. Kim et al. (2011) investigate the relationship between CTA and a stock price crash and find that CTA increases the risk of stock price crashes at the firm level. The result suggests that CTA is accompanied by managerial rent extraction. The accumulation of managerial rent extraction for the long term may cause a stock price to crash. They also find that the positive relationship between CTA and stock price crash is reduced when companies have strong governance and monitoring systems.

Aggressive CTA may have accounting and auditing consequences. Managers may use complex CTA activities to manipulate firm's earnings, thus reducing financial reporting quality. Frank et al. (2009) examine the relationship between aggressive tax reporting and aggressive financial reporting. They find that managers can use the areas of nonconformity between tax and financial reporting to conduct tax avoidance and earnings management. Therefore, aggressive CTA is positively related to aggressive financial reporting. Donohoe and Knechel (2014) examine whether tax aggressiveness affects audit

pricing. Aggressive tax reporting increases auditors' efforts in tax research and in performing additional audit procedure. Auditors are exposed to the risk of litigation, regulation, and reputation loss. Donohoe and Knechel (2014) find a positive relationship between tax aggressiveness and audit fees.

In sum, the literature on the consequences of CTA examines the effects of CTA on earnings management, stock market reaction, firm risk, and accounting and auditing issues. Most of the studies explore the consequences of CTA using financial measures. Little research explores the consequences of CTA using non-financial measures. In this study, I extend the literature on consequences of CTA to fraud risk. I use different proxies to measure fraud risk, including financial, and non-financial measures. Fraud risk is the auditor's assessment of their clients' risk of committing accounting fraud. The level of fraud risk may or may not be indicative of accounting fraud. The PCAOB suggests that auditors assess fraud risks that are related to aggressive financial reporting. Therefore, this study bridges the gap between aggressive financial reporting and accounting fraud.

2.2.3 Using NFMs to Measure Fraud Risk

Prior studies find that financial and nonfinancial measures of firm performance are highly correlated (Brazel et al. 2009; Dechow et al. 2011). Companies that report an increase in NFMs will likely exhibit a similar increase in revenues and net income. Some airline companies use NFMs (such as the number of passengers) to predict financial numbers such as total revenues and profits (Behn et al, 1999). Along with serving as leading indicators for future financial performance, NFMs may be useful in detecting

fraudulent financial reporting. The PCAOB (2004) states that NFMs should be used as a powerful benchmark to evaluate financial statement reliability and to detect fraud in financial statements and internal control reports. Brazel et al. (2009) report that the revenue growth rate is greater than the average NFMs growth rate in those companies that have committed fraud. Specifically, Brazel et al. (2009) define high fraud risk as a revenue growth rate exceeding NFMs growth rate by 20%. Unlike fraud companies, non-fraud companies usually have better consistency between financial and nonfinancial growth rates. Brazel et al. (2019) indicate that audit committee members can reduce fraud risk by detecting inconsistencies between financial and non-financial measures. Audit committee members with greater tenure and financial and industrial expertise are more likely to detect large inconsistencies (fraud risk). Brazel et al. (2019) document that audit committee members with greater tenure have better background information for evaluating business operations. Cohen et al. (2014) find that audit committee industry expertise is very valuable in monitoring external auditors and management in a specific industry. They use financial restatements and discretionary accruals as two measures for financial reporting quality. They report that audit committees with accounting and industry expertise are associated with higher reporting quality than those with only industry expertise.

2.2.4 The Relationship Between Aggressive Tax Reporting and Aggressive Financial Reporting

There is mixed evidence on whether tax aggressiveness is positively or negatively related to financial reporting aggressiveness. Shackelford and Shevlin, (2001) document the trade-off that companies confront when they make decisions about financial and tax

reporting. Specifically, companies attempting to raise book income in financial statements may experience higher tax cost when reporting a higher amount of book income. Similarly, companies attempting to lower taxable income in the tax return may report lower income in financial statements. Therefore, there is a negative relationship between aggressive financial reporting and aggressive tax reporting (Ericson et al. 2004; Lennox et al. 2012). In contrast, other studies find that companies do not always trade-off financial and taxable income (Hanlon et al. 2012; Phillips et al. 2003). Management may report different amounts of income to investors and creditors (higher) and the IRS (lower). Desai (2005) suggests that areas of nonconformity between financial and tax reporting provide more opportunities for companies to maximize book income in the financial statements and minimize the taxable income simultaneously. Thus, there is a strong and positive association between aggressive financial reporting and tax reporting (Frank et al. 2009). Frank et al. (2009) develops permanent book-tax differences (BTDs) as a proxy to measure tax reporting aggressiveness. Temporary BTDs represent pre-tax accruals earnings management (Phillips et al. 2003). Measures of tax aggressiveness with temporary BTDs may be falsely associated with proxy for aggressive financial reporting since the relation is driven by pre-tax accruals earnings management, instead of tax planning. Therefore, permanent book-tax differences are a better proxy for tax aggressiveness (Frank et al. 2009).

Erickson et al. (2004) argue that companies may intentionally overpay their taxes in order to validate fraudulent financial income. They choose a sample of accounting fraud companies to analyze the taxes paid on the overstated earnings. They create a proxy for accounting fraud from the issuance of Accounting and Auditing Enforcement

Releases (AAER) by the Securities and Exchange Commission (SEC), which describes the SEC's actions to enforce fairness in financial statement reporting through civil litigation and administrative proceedings. The evidence suggests that some companies overstate their tax obligations to cover the aggressive financial reporting. Furthermore, Lennox et al. (2012) examine the relationship between tax reporting aggressiveness and the incidence of accounting fraud and find managers cannot manipulate book income and taxable income simultaneously. Aligned with Erickson et al. (2004), Lennox et al. (2012) find that aggressive tax reporting is negatively related to aggressive financial reporting. To cover up fraudulent financial reporting, companies may purposely overpay taxes. In addition, Lennox et al. (2012) find that not all proxies (four of five proxies for ETR and two of three proxies for BTD) for tax reporting aggressiveness are negatively related to accounting fraud.

2.3 Hypothesis Development

According to the traditional view of wealth transfer, CTA may be used as a tax saving tool to increase cash flows and create additional values for the firm and its shareholders. Based on the traditional view, CTA has a positive effect on firm performance and is not significantly associated with fraud risk. However, the agency theory view of CTA suggests that aggressive CTA is accompanied by managerial rent extraction and that managers can hide rent extraction by using various CTA strategies (Desai and Dharmapala 2006; Chen et al. 2010). In addition, the fraud triangle framework suggests that some complex CTA strategies may be used as one type of opportunity (which is one corner of the fraud risk triangle) to commit fraud, as would other types of

opportunities. Therefore, I predict that CTA is positively related to fraud risk. I develop my hypothesis as the following:

H1: CTA is positively related to fraud risk.

In addition, I examine whether the relationship between CTA and fraud risk is different for fraud and non-fraud companies. Drawing on fraud risk triangle theory, I expect that both fraud and non-fraud companies show a positive relationship between CTA and fraud risk. But for fraud companies, the effect of CTA on fraud risk is greater in magnitude than for non-fraud companies because managers have more opportunities and incentives to manipulate financial statements. My second hypothesis is developed as the following:

H2: The effect of CTA on fraud risk is greater in magnitude for fraud companies than for non-fraud companies

Chapter 3. Research method

1. Sample Selection

I use a sample of all companies from 2000 to 2017. Similar to Brazel et al. (2009) and Dechow et al. (2011), I collect revenue related NFMs, such as number of employees and the amount of order backlogs. Previous research indicates the number of employees and order backlog are highly associated with revenue and are recorded by most

companies as common NFMs (Brazil et al. 2009; Dechow et al. 2011). The number of employees and order backlog are collected from Compustat. Financial data such as revenues, accounts receivable, ETRs, and PBTD are also collected from Compustat. Auditors' tenure and audit fees are obtained from the Audit Analytics. Audit committee's tenure and chair's gender are collected from BoardEx. Accounting fraud information is collected from the SEC website and Lexis-Nexis AAER, a resource that contains the results of the SEC's investigation into accounting violations. A single fraud can cause several AAERs as the SEC challenges and investigates different individuals implicated in the fraud. I remove non-accounting frauds as they are not related to the research question.

Multivariate Model 1

To test my hypotheses whether CTA is positively or negatively related to fraud risk, I develop the following regression model:

$$FRAUDRISK=\beta_0+\beta_1 CTA+ \beta_2 AuditTenure + \beta_3 AuditFees + \beta_4 ChairGender+\beta_5 ChairTenure+ \beta_6 LnTA+ \beta_7 Lev+ \beta_8 Loss+ \beta_9 ICME+ \beta_{10} BM + \beta_{11} Restate+ \beta_{12} Big4 + \beta_{13} PCHGSales+ \beta_{14} PA+ Year\ Dummies + Industry\ Dummies +\varepsilon$$

Dependent Variables

My dependent variable for the model is fraud risk (FRAUDRISK). I measure fraud risk by using the following three proxies: accrual quality, NFMs, and performance variables. Percentage change in receivables (PCHGREC), percentage change in inventory (PCHGINV), and discretionary accrual (DISCACC) are used to measure accrual quality. PCHGREC is the difference of current year's accounts receivable and prior year's

accounts receivable divided by prior year's accounts receivable. PCHGINV is the difference of current year's inventory and prior year's inventory divided by prior year's inventory. PCHGREC and PCHGINV are the two metrics that are closely evaluated by investors because managers misstate these two accounts to increase revenues and gross margin. NFMs are measured by two variables: DIFFBSE and DIFFBSO. DIFFBSE is the difference between the percentage change of revenues and the percentage change of employees. DIFFBSO is the difference between the percentage change of revenues and the percentage change of order backlogs. Prior studies find that financial and nonfinancial measures of firm performance are highly correlated (Brazel et al. 2009; Dechow et al. 2011). Inconsistency between financial and NFM performance indicates fraud risk. Performance variables are measured by the percentage change of cash sales (PCHGCASHSALES) and change of return on assets (CHGROA). PCHGCASHSALES is the difference between the percentage change of total sales and the percentage change in credit sales. CHGROA is net income divided by total assets minus prior period net income divided by prior period total assets. The reason why PCHGCASHSALES and CHGROA are used as proxies for fraud risk is fraud companies may increase sales and earnings in fraud years. Therefore, I predict that PCHGCASHSALES decreases and CHGROA increases during fraud periods.

Independent Variables

In this study, I focus on the relationship between CTA and fraud risk. The independent variable of interest in this study is CTA. My goal is to examine the relationships between CTA and fraud risk. Similar to Armstrong et al. 2015; Dyreng et al. 2008; and Robinson et al. 2010, I use GAAP ETR, Cash ETR and PBTD as proxies for

CTA. These CTA proxies are used to measure the effects of nonconforming transactions, which have different impacts on financial and tax reporting (Lennox et al. 2012). Hanlon and Heitzman (2010) define CTA as a continuum of tax planning activities. Conceptually, GAAP ETR, Cash ETR and PBTD are connected to the continuum because CTA strategies that produce PBTD decrease GAAP ETR and Cash ETR and increase book income.[5] I define GAAP ETR as the ratio of the total tax expenses to the total pretax income minus special items for the same periods. I compute Cash ETR as a ratio of the total cash tax expenses to the total pretax income minus special items. Since lower ETR indicates high lever CTA, I predict the coefficient for GAAP ETR and Cash ETR to be negative. PBTD is another proxy for aggressive tax reporting. PBTD is defined as the total book-tax difference minus temporary book-tax difference, divided by total assets. Total book-tax difference is equal to pretax income minus taxable income. The temporary book-tax difference is equal to total deferred tax expense divided by the statutory tax rate. Since large PBTD indicates a higher level of CTA, I expect the coefficient for PBTD to be positive.

Next, I control for the characteristics of auditors and audit committee members. First, I control for the tenure of auditors as an independent variable (AuditTenure) and the tenure of the audit committee as an independent (ChairTenure). I expect the coefficient for auditors' tenure and audit committee tenure to be negative. Second, I control for auditors' effort (AuditFees) as the natural logarithm of the total audit fees billed in year t (DeFond et al. 2005). I predict a negative coefficient for auditors' effort.

[5] BTDs and ETRs are relevant since BTDs refer to the difference between financial income and tax income and ETRs reflect the ratio of taxes to income. In other words, BTDs represent the income effects of CTA activities whereas ETRs represent the tax effects.

Last, I control for gender of audit committee chair (Chairgender) as an indicator variable of 1 if the gender of the chair is male and 0 otherwise. I predict a positive coefficient for gender of audit committee chair since a female chair may be considered more conservative in monitoring the audit engagement.

I also control for several variables associated with financial reporting quality (Reichelt et al. 2010). First, I control for company size by using log of market value of total assets (LnTA) because size is an important predictor of fraud risk (Lawrence et. al. 2011). Since large companies are subject to more strict scrutiny, I expect large companies are more conservative with financial reporting. I predict a negative coefficient for company size. Second, I control for financial leverage (Lev), which is measured by total debts divided by total assets. High leverage value means great financial distress, increasing fraud risk. I predict a positive coefficient for financial leverage. Third, I control for operating loss as a dummy variable equal to 1 if there is an operating loss and 0 otherwise. Since companies with operating losses are more aggressive with financial reporting, I predict a positive coefficient for operating loss. Fourth, I control for internal control material effectiveness (ICME). The Sarbanes-Oxley Act section 404 (a) requires the management to maintain an effective internal control system over financial reporting. An ineffective internal control provides more opportunities for managers to commit fraudulent financial reporting. Also, an ineffective internal control system represents an organization environment that does not emphasize the integrity of financial reporting. Therefore, I predict a negative relationship between internal control effectiveness and fraud risk. Fifth, I control for operating growth measured by the market value of equity divided by the book value of equity. Abbott et al. (2004) find that there is a negative

relationship between the growth rate of a company and financial reporting quality because a growth company is likely to have a less effective internal control system. I predict a positive coefficient for operating growth. Next, I control for financial restatement (*Restate*) as an indicator variable equal to 1 if a financial restatement has been reported during the last three years and 0 otherwise. I predict a positive coefficient for financial restatement. Next, I control for sales growth rate (*PCHGSALES*), which is defined as the difference between current year's sales and previous year's sales divided by previous year's sales. Since companies with rapid sales growth are more aggressive in earnings management, I predict a positive coefficient for sales growth rate. Plant assets (*PA*) is calculated as the net value of plant assets divided by total assets.

Multivariate Model 2

To test my hypotheses whether the effect of CTA on fraud risk is greater in magnitude for fraud companies than for non-fraud companies, I develop the following regression model:

$$FRAUDRISK=\beta_0+\beta_1 Fraud*CTA+ \beta_2 Fraud+ \beta_3 CTA+\beta_4 AuditTenure + \beta_5 AuditFees + \beta_6 ChairGender+\beta_7 ChairTenure+ \beta_8 LnTA+ \beta_9 Lev+ \beta_{10} Loss+ \beta_{11} ICME+ \beta_{12} BM + \beta_{13} Restate+ \beta_{14} Big4 + \beta_{15} PCHGSales+ \beta_{16} PA+ Year\ Dummies + Industry\ Dummies +\varepsilon$$

In model 2, I use an interaction term, Fraud*CTA, to examine whether CTA is more significantly related to fraud risk for fraud companies than non-fraud companies. I use Fraud as an indicator variable equal to 1 if a company is reported as an accounting violation on the AAER website by the SEC and 0 otherwise. A company is defined as Fraud when it is disclosed by the SEC for the current year. I don't consider the pre or

post fraud period in this research. Since fraud companies have more incentives and opportunities to use complex tax planning strategies to manipulate financial reporting, I predict a positive coefficient for the interaction term Fraud*CTA. All other variables are the same as those in model 1.

Chapter 4: Empirical Results

4.1 Descriptive statistics

The sample selection procedures are described in Table 1, Panel A. I searched the entire Compustat database from 2000 to 2017 and start with 240,683 firm-year observations. 136,889 firm-year observations are lost because they have either negative or missing pre-tax income. Another 30,599 firm-year observations are excluded because they do not have enough data to compute CashETR, GAAP ETR and PBTD. I deleted 25,726 firm-year observations to exclude financial and utility companies. I lost 22,636 firm-year observations when I merge Compustat, with Audit Analytics for auditors' tenure and fees, and with BoardEx for audit committee chair's tenure and gender. 449 firm-year observations are lost because they are foreign companies based on the foreign incorporation code (FIC). I deleted 703 firm-year observations because of outliers for the key variables. I define outliers as Z-score greater than 3 or less than -3. My final sample includes 23,681 firm-year observations.

I report the industry distribution of firm-year observations in Table 1, Panel B. I illustrate industry membership according to the classification scheme in Dechow et al.

(2011). There are 13 industries included in the 23,681 firm-year observations. My sample is concentrated in the industries of transportation, computers, durable manufactures, retail, services, and pharmaceuticals, with more than 1,500 or 5% of the firm-year observations from each industry.

I report the distribution of the key variables of interest (CashETR, GAAPETR, PBTD, and fraud risk) by industry in Table 2. Companies in the computers and transportation industries show the lowest CashETR (e.g., <0.23). The agriculture, retail, and textiles and apparel industries indicate the highest CashETR (e.g., >0.30). Companies in the computers industries show the lowest GAAPETR (e.g., <0.28). Companies in the transportation, retail, and service industries indicate the highest GAAPETR (e.g., >0.35). Companies in the textiles and apparel industries show the lowest PBTD (e.g., <0.025). Companies in the refining and extractive industries indicate the highest PBTD (e.g., >0.08). Companies in the lumber, furniture, and printing industries show the lowest fraud risk (e.g., PCHGREC and PCHGINV<10%, DISCACC<0.03). The mining and construction, and pharmaceutical industries exhibit the highest fraud risk (e.g., PCHGREC and PCHGINV>16%, DISCACC >0.02). The results of the key variables of interest are comparable to those in Frank et al. (2009), Chen et al. (2010), and Lennox et al. (2012).

I report the descriptive statistics for CashETR, GAAPETR, PBTD, fraud risk, and other control variables in Table 3. The values of mean and median for CashETR are 0.250 and 0.248, respectively. The values of mean and median for GAAP ETR are 0.319 and 0.342, respectively. Both the mean and median values of CashETR and GAAPETR are similar to those in Chen et al. (2010) and Lennox et al. (2012). The values of mean

and median for PBTD are 0.046 and 0.032, respectively, which are comparable to those in Frank et al. (2009) and Lennox et al. (2012). The values of mean and median for the percentage change of accounts receivable are 0.203 and 0.085, respectively. The values of mean and median for the percentage change of inventory are 0.117 and 0.074, respectively. The values of mean and median for discretionary accruals are -0.032 and -0.034, respectively, which are consistent with those in Dechow et al. (2011) and Frank et al. (2009). The mean and median values for the difference between the sales growth rate and the number of employees growth rate are -0.027 and 0.036, respectively. The values of mean and median for the percentage of cash sales are 0.107 and 0.070, respectively. The values of mean and median for the return on assets are 0.085 and 0.069, respectively. These values are consistent with those reported in Dechow et al. (2011).

Table 3 also includes descriptive statistics for other control variables. The average annual audit fees for the sample are $2,354,010 with the natural logarithm of 13.87. The average auditor's tenure for the sample is 23.76 years, which is higher than auditor's tenure of 18 years in Brazel et al. (2019). One of the explanations is that my sample includes longer periods and more variables than those in Brazel et al. (2019). The average audit committee chair's tenure is 8.07 years, which is similar to that in Brazel et al. (2019). 90.92% of audit committee chairs are male. The average annual total assets for the sample are $5,869 million with the natural logarithm of 6.80. The average percentage change of sales is 12.60%. The average leverage of the sample is 17.93%. The average book to market value ratio is 0.473. In addition, around 1.05% of companies report loss and 80.85% of companies are audited by big four CPA firms. 11.97% of companies report restatement. The average value for plant assets lagged by total assets is 0.246.

I report the correlations of the key variables in Table 4. GAAPETR, CashETR, and PBTD are significantly correlated at 0.001 level. More specifically, GAAPETR and CashETR are positively correlated, and the coefficient of correlation is 0.268. GAAPETR and CashETR are negatively correlated to PBTD with the coefficient of correlation of -0.064 and -0.456, respectively. The negative correlations indicate that GAAPETR, CashETR and PBTD measure CTA from different perspectives of tax avoidance strategies, which I explain in section 3.2. In addition, the proxies of fraud risk are significantly correlated. PCHGREC is positively correlated to PCHGINV, DISCACC, PCHGCASHSALES, and CHGROA with the coefficients of correlation of 0.197, 0.124, 0.156, and 0.129, respectively. However, NFM for fraud risk is not significantly correlated to other financial measures. The main reason is that most companies do not disclose the amount of order backlog in their financial statements.

Furthermore, Table 4 shows that the percentage change of accounts receivable is negatively correlated to CashETR, and positively correlated to GAAPETR and PBTD with the coefficient of correlation of -0.026, 0.007, and 0.04, respectively, indicating higher level of CTA increases fraud risk. The percentage change of inventory is also negatively correlated to CashETR, and positively correlated to GAAPETR and PBTD with the coefficient of correlation of -0.052, 0.004, and 0.053, respectively. Discretionary accrual is negatively correlated to GAAPETR and PBTD, and positively correlated to CashETR. The percentage of cash sales is positively correlated to GAAPETR and PBTD, and negatively correlated to CashETR with the coefficient of correlation of 0.075, 0.039, and -0.048, respectively, suggesting high percentage of cash sales decreases fraud risk. Return on assets is negatively correlated to GAAPETR, and positively correlated to

CashETR and PBTD with the coefficient of correlation of -0.096, 0.038, and 0.196, respectively. The difference between percentage change of sales and percentage change of employee's headcount is negatively correlated to CashETR, and positively correlated to GAAPETR and PBTD with the coefficient of correlation of -0.012, 0.024, and 0.003, respectively. These correlations suggest that the proxies of CTA are positively correlated to the proxies of fraud risk.

4. 2 Empirical Results

Table 5 describes the estimates of the relationship between CTA and fraud risk. In panel A, dependent variable is percentage change of accounts receivable (PCHGREC). In models 1A to 1C, CTA proxies are NEGCASHETR, NEGGAAPETR and PBTD, respectively. In panel B, dependent variable is percentage change of inventory (PCHGINV). In models 1D to 1F, CTA proxies are NEGCASHETR, NEGGAAPETR and PBTD, respectively. In panel C, dependent variable is discretionary accruals (DISCACC). In models 1G to 1I, CTA proxies are NEGCASHETR, NEGGAAPETR and PBTD, respectively. For the remaining tables, I explain the detailed information in the notes of the tables.

In my regression analysis, I use seven proxies to capture fraud risk from three perspectives: percentage change of accounts receivable (PCHGREC), percentage change of inventory (PCHGINV), and discretionary accrual from accrual quality variables (DISCACC), percentage of cash sales (PCHGCASHSALES) and change of return on assets (CHGROA) from performance variables, and difference between sales growth rate and employee growth rate from NFM (DIFFBSE). To interpret the results consistently, I use the converted effective tax rate to capture CTA in the regression analysis.

Specifically, I multiply effective tax rates by -1 (e.g. NEGCASHETR= - CashETR and NEGGAAPETR = - GAAPETR) so that the large values of NEGCASHETR, NEGGAAPETR and PBTD represent higher level of tax avoidance. I control for firm characteristics, auditors, and audit committee chair in all my models.

In all my models, I find that generally higher levels of tax avoidance are significantly related to higher fraud risk. In model 1A, where fraud risk is measured by percentage change in accounts receivable (PCHGREC), the coefficient of NEGCASHETR indicates that assuming everything else remains constant, a one percent increase in NEGCASHETR implies a 0.232 percent increase in percentage change in accounts receivable. This result supports hypothesis 1 such that CTA is positively related to fraud risk. According to agency theory, a higher level of CTA provides more opportunities for managers to conduct rent extraction. The coefficient of the natural logarithm of audit fees (Lnauditfees) describes that a one percent increase in Lnauditfees suggests a 0.104 decrease in percentage change of accounts receivable. This is consistent with Brazel et al. (2019) that finds an increase in auditor efforts reduce fraud risk because auditors understand their client's business better and can apply more appropriate audit procedures to alleviate fraud risk. The coefficient of auditor tenure indicates that one percent increase in auditor tenure implies a 0.001 percent increase in percentage change of accounts receivable. This is aligned with the results from Brazel et al. (2019) that state long auditor-client relationships help auditors understand the nature of client's business and industry that may affect the risk of business operation and the risk of fraudulent financial reporting. Auditors may use the knowledge of these risks to determine the appropriate audit procedures. Therefore, long auditor tenure increases audit quality and

reduces fraud risk. Similar to the coefficient of auditor tenure, the coefficient (-0.007) of audit committee chair's tenure suggests that longer audit committee chair's tenure decreases fraud risk because audit committee chair with long tenure can better understand client's business and internal control so that they can oversee the entire audit engagement. The coefficient of audit committee chair's gender indicates that male audit committee chair increases fraud risk. This is consistent with the literature on gender diversity because my results support that female chairs are more conservative and better at monitoring audit engagement.

The coefficient of natural log value of total assets suggests that a one percent increase in log value of total assets is associated with a 0.043 percent increase in percentage change in accounts receivable. This result indicates that large companies have more complex transactions and managers may use those transactions to conduct rent extraction, thus increasing fraud risk. The coefficient of percentage of sales growth rate shows that a one percent increase in percentage of sales growth rate is associated with a 0.747 percent increase in percentage change in accounts receivable. This is consistent with the literature that high growth companies are more likely to commit accounting fraud. The coefficient for percentage of plant assets and the coefficient for big four CPA firms do not show significant results. The coefficient of leverage shows an insignificant relationship between leverage and percentage change in accounts receivable.

In model 1B, the coefficient of NEGGAAPETR suggests that a one percent increase in NEGGAAPETR is associated with 0.420 percent increase in percentage change in accounts receivable. All other variables in model 2 have the same signs as those in model 1 and are statistically significant. In model 1C, the coefficient (0.017) of

permanent book-tax difference (PBTD) indicates that CTA is positively and significantly related to fraud risk. All other variables have the expected signs and are statistically significant.

In models 1D to 1F, 1G to 1I, and 1J to 1L, I examine the relationship between CTA and percentage change in inventory, the relationship between CTA and discretionary accrual, and the relationship between CTA and return on assets, respectively. These results are consistent with those in models 1 to 3. I find that CTA is positively related to fraud risk and other control variables.

In models 1M to 1O, fraud risk is measured by percentage of cash sales. According to Dechow et al. (2011), percentage of cash sales is negatively related to fraud risk because managers may use accruals management for accrual-based sales such as credit sales. The coefficient of NEGCASHETR suggests that a one percent increase in NEGCASHETR is associated with 0.080 percent increase in percentage of cash sales, indicating a negative relationship between CTA and fraud risk. One of the explanations is that some companies front-load earnings and make unusual transitions later, thus increasing cash sales. Another explanation is that managers may overpay taxes to cover their fraudulent financial reporting. Therefore, CashETR is negatively related to percentage change in cash sales.

In models 1P to 1R, I use the difference between sales growth rate and employee growth rate to measure fraud risk (DIFFBSE). Consistent with Brazel et al. (2009), I define LargeRisk as an indicator variable equal to 1 if DIFFBSE is greater than 20% and 0 otherwise. In model 16, the coefficient (1.507) of CTA indicates that a higher level of CTA is more likely to relate to large fraud risk. This result is significant with Z value of

3.85. Specifically, a one percent increase in CTA is associated with 1.507 increase in log(P/1-P). If log(P/1-P) increases by 1.507. That means that P/(1-P) increases by exp (1.507) =4.51. This is a 351% increase in the odds of increasing fraud risk (assuming all other variables remain constant). In models 17 and 18, the coefficients of CTA show a significant relationship between CTA and LargeRisk as well.

In models 2A to 2F, I examine whether the effect of CTA on fraud risk is greater in magnitude for fraud companies than for non-fraud companies. The coefficients of the interaction term, Fraud*CTA, in all models do not show a significantly difference between fraud companies and non-fraud companies. Specifically, in model 2A, the proxies for fraud risk and CTA are PCHGREC and NEGCASHETR, respectively. The coefficient and t-stat for the interaction term are 0.149 and 0.26, respectively. In model 2B, the proxies for fraud risk and CTA are PCHGREC and NEGGAAPETR, respectively. The coefficient and t-stat for the interaction term are 0.163 and 0.34, respectively. In model 2C, the proxies for fraud risk and CTA are PCHGREC and PBTD, respectively. The coefficient and t-stat for the interaction term are 0.19 and 0.51, respectively. In models 2D to 2F, the proxy for fraud risk is PCHGINV. The coefficient and t-stat show insignificant relationship between the interaction term and fraud risk as well. Therefore, my results do not support hypotheses 2. One of the explanations is that some fraud companies are not more aggressive in tax reporting when they are aggressive in financial reporting. They may overpay taxes to cover up their fraudulent financial reporting.

Overall, my results support hypothesis 1, indicating that CTA is positively related to fraud risk. Generally, I find CTA is positively and significantly related to fraud risk

when financial variables are used to measure fraud risk. In addition, my results show a significant relationship between CTA and fraud risk when I use NFM proxies to measure fraud risk. Similar to Brazel et al. (2009), I define large fraud risk (LargeRisk) as an indicator variable equal to 1 and o otherwise if the difference between financial and non-financial performance is greater than 20%. I find that all three CTA proxies are significantly related to LargeRisk. The results from above are consistent with agency theory in CTA such that opportunistic managers may use complex CTA strategies to conduct managerial rent extraction, thus increasing fraud risk. However, I do not find a significantly different effect of CTA on fraud risk between fraud and non-fraud companies when I test hypotheses 2. According to the findings at Erickson et al. (2004), some fraud companies may overpay taxes to cover up their fraudulent financial reporting. They may worry about the potential penalties from the IRS, reputational damage from the public, and some other costs associated with aggressive tax avoidance. Therefore, they are less aggressive in tax reporting when they are more aggressive in financial reporting.

4.3 Supplemental Analysis: Using Fraud risk to Predict Fraud

From the above results, I find that higher level of CTA is related to higher fraud risk. In this part, I analyze whether fraud risk proxies can be used to predict fraud. According to the fraud triangle theory, managers in higher fraud risk companies have more incentives and opportunities to commit accounting fraud. Prior studies find that fraud companies are associated with higher fraud risk when different proxies are used to measure fraud risk. Brazel et al. (2009) find that fraud companies have larger difference between financial and non-financial performance. Dechow et al. (1996) note that fraud

companies are more likely to have a weak corporate governance system. Bell and Carcello (2000) find that weak internal control system increases the fraud risk. Therefore, I predict that fraud risk proxies in this study can be used to predict accounting fraud.

To examine whether fraud risk can predict actual fraud, I use financial variables to measure fraud risk. I select the same number of non-fraud companies based on SIC and size to match fraud companies. My sample includes 292 fraud companies listed on AAER website from 2000 to 2017 and 292 non-fraud companies. I collect fraud companies from the current year that the SEC disclose the violations. I do not consider the pre or post fraud periods in this study. I use logistic regression to test whether fraud risk is associated with fraud. My dependent variable is FRAUD, a dummy variable. The value of 1 is for fraud companies and 0 otherwise. Independent variable is fraud risk. I also include some control variables that are associated with accounting fraud. For instance, I control for internal control material effectiveness (ICME). The Sarbanes-Oxley Act section 404 (a) requires the management to maintain an effective internal control system over financial reporting. An ineffective internal control provides more opportunities for managers to commit fraudulent financial reporting. Also, an ineffective internal control system represents an organization environment that does not emphasize the integrity of financial reporting. Therefore, I predict a positive relationship between internal control effectiveness and accounting fraud. Also, I control for financial restatement (Restate) as an indicator variable equal to 1 if a financial restatement has been reported during the last three years and 0 otherwise. I predict a positive coefficient for financial restatement. Next, I control for sales growth rate (PCHGSALES), which is defined as the difference between current year's sales and previous year's sales divided by previous year's sales.

Since companies with rapid sales growth are more aggressive in earnings management, I predict a positive coefficient for sales growth rate.

In model 3A, I examine the relationship between discretionary accrual and fraud. The coefficient of percentage change in accounts receivable (PCHGREC) suggests that a one percent increase in PCHGREC is associated with 15.90 increase in odds ratio, indicating a very strong association between PCHGREC and accounting fraud. In model 3B, I examine the relationship between discretionary accruals (DISCACC) and fraud. The coefficient of DISCACC indicates that a one percent increase in DISCACC is associated with 8.82 increase in odds ratio. In model 3C, I examine the relationship between percentage change of cash sales (PCHGCASHSALES) and fraud. The coefficient shows that one percent of increase in PCHGCASHSALES is associated with 0.063 decrease in odds ratio, indicating a negative association between PCHGCASHSALES and fraud. In model 3D, I examine the relationship between percentage change of soft assets (PCHGSOFTASSET) and fraud. The coefficient shows that one percent of increase in PCHGSOFTASSET is associated with 1.53 increase in odds ratio. Therefore, fraud risk can successfully predict accounting fraud. The results indicate that higher level of tax avoidance may increase regulators and external auditors' attention since higher level of tax avoidance could be considered a red flag for accounting fraud.

Chapter 5: Discussion

Prior studies provide mixed evidence on whether tax avoidance is positively or negatively related to aggressive financial reporting. Some studies state that CTA is positively related to aggressive financial reporting because managers may use the areas of nonconformity between tax reporting and financial reporting to increase book income and decrease tax income simultaneously. Other studies argue that managers could not control book income and tax income in the opposite directions without being perceived by external auditors and the IRS. In addition, some study finds that managers may intentionally overpay taxes to cover up their aggressive financial reporting. Therefore, there is a negative relationship between CTA and aggressive financial reporting. In this study, I extend the research on CTA by exploring the relationship between CTA and fraud risk because very small number of fraud companies are disclosed by the SEC on AAER's website and fraud risk is easier to measure for all companies. Also, I examine the relationship between fraud risk and fraud to see if fraud risk can be used to predict fraud. This study bridges the gap between CTA and accounting fraud through fraud risk. I measure fraud risk from different perspectives: accrual quality, financial performance, and NFMs.

The relationship between CTA and fraud risk

In hypothesis 1, I predict that there is a positive relationship between CTA and fraud risk. According to the agency theory and fraud triangle concept, opportunistic managers may use complex tax avoidance strategies to conduct rent extraction, thus increasing fraud risk. I use different proxies to measure fraud risk. Dechow et al. (2011) note that actual accruals are more powerful than discretionary accrual in predicting material misstatement. Therefore, I use both the abnormal accrual and the actual accruals

to test the relationship between CTA and fraud risk. My results from discretionary accruals are consistent with those from actual accruals. Discretionary accruals are positively and significantly related to PBTD and negatively and significantly related to GAAPETR and CashETR, indicating that CTA is positively related to fraud risk. In addition, CTA is positively and significantly related to percentage change of accounts receivable and percentage change of inventory. Furthermore, CTA is also positively and significantly related to performance variables (e.g. percentage change of cash sales and return on assets).

In addition, I use the difference between financial and non-financial performance to measure fraud risk. Similar to Brazel et al. (2009), I define large fraud risk (LargeRisk) as an indicator variable equal to 1 and 0 otherwise if the difference between financial and non-financial performance is greater than 20%. I find that NECASHETR, NEGGAAPETR, and PBTD are significantly related to LargeRisk. My results show a significant relationship between CTA and fraud risk when I use NFM proxies to measure fraud risk.

Fraud and non-fraud companies

In hypothesis 2, I predict that for both fraud and non-fraud companies, CTA is positively related to fraud risk. However, I predict that the effect of CTA on fraud risk for fraud companies will be greater in magnitude than for non-fraud companies because according to agency theory and fraud triangle theory, fraud companies have more incentives and opportunities to manipulate financial statements. I use FRAUD as an indicator variable to separate fraud and non-fraud companies. I use the interaction term, CTA*Fraud, to catch the effect of CTA on fraud risk for fraud companies and non-fraud

companies. The coefficients of the interaction term in all models do not show a significant difference between fraud and non-fraud companies. My results do not support hypothesis 2 such that the effect of CTA on fraud risk is greater in magnitude for fraud companies than for non-fraud companies. According to the fraud triangle theory and agency theory, fraud companies should have more incentives and opportunities to use complex tax planning strategies to commit accounting fraud. However, some fraud companies may overpay taxes to cover up their fraudulent financial reporting. The positive relationship between CTA and fraud risk may be offset by the intentionally overpaid tax. My findings in hypotheses 2 suggest that agency theory and intentionally overpaid taxes both exist in corporate tax avoidance.

Implications for research

This study has several contributions to the literature exploring CTA, fraud risk, and accounting fraud. First, while prior studies provide mixed evidence on whether CTA is positively or negatively associated with aggressive financial reporting, this study examines the relationship between CTA and fraud risk and the relationship between fraud risk and accounting fraud. To my knowledge, this study is the first one to examine the relationship between CTA and fraud risk. While few accounting frauds are disclosed by the SEC, fraud risk can be assessed for all companies. Also, fraud risk can be used to predict accounting fraud. Therefore, this study bridges the gap between CTA and accounting fraud through fraud risk. Second, while prior studies use financial data to assess aggressive financial reporting, this study evaluates fraud risk by using accrual quality, performance variables, and NFMs, which provide different perspectives for auditors and regulators to assess the effect of CTA on fraud risk. Third, this study

contributes to the literature on agency problems related to CTA. Little is known about whether the relationship between CTA and fraud risk is different for fraud and non-fraud companies. Agency theory and fraud triangle theory indicate that fraud companies have more incentives and opportunities to commit fraud. However, managers may overpay taxes to conceal fraudulent financial reporting. Therefore, higher level of CTA should be considered a warning light for fraudulent financial reporting.

Implications for practice

This study is also meaningful to practitioners. My findings suggest that regulators and external auditors should assess fraud risk from different perspectives. Higher fraud risk can be used to predict accounting fraud. In addition, higher levels of CTA should draw more attention from regulators and external auditors since a high level of CTA is positively related to high fraud risk, which could be an indicator for actual accounting fraud.

Limitations

Even though this study provides some insight into the relationships among CTA, fraud risk, and accounting fraud to researchers and practitioners, it still has several limitations. First, CTA and fraud risk are measured by various proxies, which may not catch all of the features of CTA and fraud risk. Also, CTA is defined as a continuum of tax avoidance strategies. It is difficult to separate CTA strategies into different levels. Future study should examine the relationship between the specific tax avoidance strategies such as tax shelter and the accounting fraud. Second, this study investigates the relationship between CTA and fraud risk for publicly traded companies. The results may

not be generalized to private companies since private companies may have different considerations when they conduct CTA. Third, CashETR, GAAPETR and PBTD are used to measure the non-conformity between book and tax income. Future research should consider different proxies to measure the conformity between book and tax income for tax planning strategies. Third, only two NFM variables (number of employees and order backlog) are collected from Compustat. Many companies do not disclose their NFM information. The two NFM variables may not be able to measure fraud risk for all companies. Different industries have different NFMs. Future studies should use more NFM variables from each industry to measure fraud risk. Finally, the sample size for fraud companies and non-fraud companies are imbalanced. I match non-fraud companies to fraud companies based on SIC and size. Future studies may use some other techniques to solve the issues of the data imbalance.

General conclusions

While prior studies provide mixed results on whether CTA is positively or negatively related to aggressive financial reporting, I extend the literature on the consequences of CTA by examining the relationship between CTA and fraud risk. Using different proxies for CTA and fraud risk, I find that CTA is positively related to fraud risk. However, I do not find a significantly different effect of CTA on fraud risk between fraud and non-fraud companies. Fraud companies may be less aggressive in tax reporting when they are more aggressive in financial reporting. Fraud companies may overpay taxes to conceal their fraudulent financial reporting. Furthermore, my results indicate that fraud risk proxies can be used to predict actual accounting fraud. Therefore, higher level of CTA could be considered a red flag for fraudulent financial reporting.

Table 1: Sample Description

Panel A Sample selection

Sample Requirement	**# of Obs.**
Firm-years for the entire database, 2000-2017	240,683
Less: firm-years with negative and missing pretax income	136,889
Less: firm-years with missing tax avoidance measures	30,599
Less: firm-years with utility and finance industries	25,726
Less: firm-years with foreign companies	449
Less: firm-years with missing fraud data	11,785
Less: firm-years with missing audit data	4,266
Less: firm-years with missing BoardEx data	6,585
Less: firm-years with outliers in CTA and fraud risk variables	703
Firm-years in the final sample	23,681

Table 1: Sample Description (Continued)

Panel B Industry distribution of sample firm-years

Industry	# of observations	% of sample	Cumulative %
Agriculture	89	0.38%	0.38%
Mining & Construction	659	2.78%	3.16%
Food & Tobacco	896	3.78%	6.94%
Textiles & Apparel	376	1.59%	8.53%
Lumber, Furniture & Printing	906	3.83%	12.36%
Chemicals	1034	4.37%	16.73%
Refining & Extractive	985	4.16%	20.89%
Durable Manufacturers	4995	21.09%	41.98%
Computers	3747	15.82%	57.8%
Transportation	1503	6.35%	64.15%
Retail	3593	15.17%	79.32%
Services	2992	12.63%	91.95%
Pharmaceuticals	1906	8.05%	100%

Table 2: Sample Description – Main Variables by Industry

	Mean					
Industry	GAAPETR	CashETR	PBTD	PCHGREC	PCHGINV	DISCACC
Agriculture	0.341	0.303	0.048	0.098	0.132	0.022
Mining & Construction	0.312	0.266	0.049	0.185	0.167	0.010
Food & Tobacco	0.331	0.296	0.036	0.102	0.104	0.021
Textiles & Apparel	0.339	0.304	0.021	0.123	0.127	0.026
Lumber, Furniture & Printing	0.329	0.288	0.035	0.082	0.089	0.035
Chemicals	0.307	0.278	0.043	0.098	0.100	0.020
Refining & Extractive	0.342	0.249	0.081	0.186	0.169	0.064
Durable Manufacturers	0.303	0.262	0.036	0.126	0.127	0.020
Computers	0.278	0.224	0.045	0.152	0.125	0.043
Transportation	0.353	0.205	0.074	0.094	0.087	0.049
Retail	0.354	0.303	0.031	0.172	0.106	0.036
Services	0.354	0.274	0.043	0.151	0.073	0.041
Pharmaceuticals	0.303	0.258	0.034	0.165	0.161	0.026

Table 3: Descriptive Statistics of CTA, Fraud Risk and Other Firm Characteristics

Variable	N	Mean	Median	Std. Dev.	Min.	Max.
GAAPETR	23,681	0.319	0.342	0.125	0	0.996
CashETR	23,681	0.25	0.248	0.168	0	1
PBTD	20,748	0.046	0.032	0.099	-1.239	2.138
PCHGREC	22,757	0.203	0.085	2.336	-1	194.818
PCHGINV	15,614	0.117	0.074	0.299	-1	2.696
DISCACC	22,976	0.032	0.034	0.084	-0.632	2.972
PCHGCASHSALE	23,028	0.107	0.07	0.205	-1	1.252
CHGROA	17,250	-0.001	0.001	0.071	-0.788	0.566
LnTA	23,681	6.8	6.76	1.884	-0.58	13.59
DIFFBSE	22,599	-0.027	0.036	5.281	-10.23	2.109
DIFFBSO	6,120	-0.084	0.006	1.703	-11.2	1.75
Lev	23,588	0.179	0.139	0.201	0	3.73
BM	18,564	0.473	0.408	0.481	-9.854	27.199
Loss	23,681	0.01	0	0.102	0	1
PA	23,659	0.246	0.177	0.217	0	0.971
PCHGSALES	23,094	0.126	0.083	0.226	-1.125	2.038
Big4	23,681	0.808	1	0.201	0	3.73
LnAuditfees	23609	13.866	13.901	1.282	7.45	18.362
AuditTenure	23,644	23.756	19.93	19.086	0.23	105.47
Chair_tenure	22580	8.067	6.7	6.14	0	34.8
ChairGender	22,582	0.909	1	0.287	0	1

Table 4: Coefficient of Correlation:

	gaapetr	cashetr	pbtd	pchgrec	pchginv	discacc	psoftasset	pchcashsales	roa	diffbse	leverage
gaapetr	1										
cashetr	**0.268*** **	1									
pbtd	**-0.064*** **	**-0.456*** **	1								
pchgrec	0.007	**-0.026*** **	**0.04*** **	1							
pchginv	0.004	**-0.052*** **	**0.053*** **	**0.197*** **	1						
discacc	**-0.099*** **	**0.065*** **	-0.013	**0.124*** **	**0.194*** **	1					
psoftasset	**-0.026*** **	**0.075*** **	**-0.125*** **	**0.014***	**0.057*** **	**0.262*** **	1				
pcashsales	**0.075*** **	**-0.048*** **	**0.039*** **	**0.156*** **	**0.327*** **	**0.058*** **	**0.035*** **	1			
chgroa	**-0.096*** **	**0.038*** **	**0.196*** **	**0.129*** **	**0.147*** **	**0.083*** **	**-0.08*** **	**0.301*** **	1		
diffbse	**0.024*** **	-0.012	0.003	**-0.019** **	**-0.028*** **	**0.030*** **	0.007	**0.194*** **	**0.057*** **	1	
leverage	0.01	**-0.065*** **	**0.058*** **	0.003	**-0.021** **	**-0.061*** **	-0.004	**-0.09*** **	**-0.2*** **	**-0.043*** **	1

Note: *, **, *** represent significance at 10%, 5%, and 1% levels, respectively.

Table 5: CTA and fraud risk-OLS regression

Panel A:

fraudrisk=PCHGREC	**Model 1A**			**Model 1B**			**Model 1C**		
	CTA= NEGCASHETR			**CTA= NEGGAAPETR**			**CTA= PBTD**		
	Coeff.		**T-Stat**	**Coeff.**		**T-Stat**	**Coeff.**		**T-Stat**
β0 (Intercept)	2.212	***	6.95	2.342	***	7.28	1.717	***	6.52
β1 (CTA)	0.232	***	2.48	0.42	***	3.41	0.017	***	3.76
β2 (lnauditfees)	-0.104	***	-3.9	-0.113	***	4.1	-0.002	***	-2.76
β3 (audittenure)	-0.001		-0.79	-0.001		-0.78	-0.0006	***	-2.89
β4 (chairtenure)	-0.007	***	-2.76	-0.007	***	-2.77	-0.0005	***	-7.05
β5 (chairgender)	-0.066		-1.24	-0.066		-1.24	0.004	***	2.9
β6 (lnta)	0.043	**	2.36	0.044	**	2.43	-0.0003		-0.67
β7 (bm)	-0.078	**	-1.89	-0.071	**	-1.72	-0.007	***	-7.59
β8 (pchgsales)	0.747	***	8.65	0.768	***	8.9	0.116	***	7.48
β9 (loss)	-0.056		-0.29	-0.021		-0.14	-0.024	***	-5.2
β10 (restatement)	-0.035		-0.59	-0.008		-0.16	0.001		1
β11 (PA)	-0.106		-1.16	-0.064		-0.74	-0.026	***	-12.33
β12 (big4)	0.049		1.04	0.051		1.08	-0.004	***	-3.13
β13 (leverage)	0.023		0.28	0.033		0.4	0.002		1.15
β14 (ICME)	-0.005		-0.1	0.001		0.02			
Industry effect	Yes			Yes			Yes		
Year effect	Yes			Yes			Yes		
N	21,517			21,517			19,363		
Adjusted R^2 %	1.19			1.22			1.43		

Notes to table 5 panel A:
a. Fraud risk = PCHGREC. The regression model is
$FRAUDRISK=\beta_0+\beta_1 CTA+ \beta_2 AuditTenure + \beta_3 AuditFees + \beta_4 ChairGender+\beta_5 ChairTenure+ \beta_6 LnTA+ \beta_7 Lev+ \beta_8 Loss+ \beta_9 ICME+ \beta_{10} BM + \beta_{11} Restate+ \beta_{12} Big4 + \beta_{13} PCHGSales+ \beta_{14} PA+ Year\ Dummies + Industry\ Dummies +\varepsilon$
b. Model 1A: CTA = NEGCASHETR; Model 1B: CTA = NEGGAAPETR; Model 1C:
CTA = PBTD. Variable measurement is in Appendix.
c. *, **, and *** indicate significance at 10%, 5%, and 1%,

Table 5: CTA and Fraud risk

Panel B: fraud risk=pchginv	**Model 1D**		**Model 1E**		**Model 1F**	
	CTA= NEGCASHETR		**CTA= NEGGAAPETR**		**CTA= PBTD**	
	Coeff.	**T-Stat**	**Coeff.**	**T-Stat**	**Coeff.**	**T-Stat**
β0 (Intercept)	0.358 ***	7.55	0.344 ***	7.15	0.309 ***	6.52
β1 (CTA)	0.058 ***	3.87	0.048 **	2.52	0.129 ***	4.42
β2 (lnauditfees)	-0.026 **	-6.45	-0.011 ***	-2.71	-0.028 ***	-6.6
β3 (auditтenure)	-0.0004 ***	-3.9	-0.0004 ***	-3.93	-0.0004 ***	-3.78
β4 (chairtenure)	-0.002 ***	-4.31	-0.002 ***	-4.38	-0.002 ***	-4.01
β5 (chairgender)	0.009	1.15	0.012	1.55	0.008	1.03
β6 (lnta)	0.017 ***	6.05	0.012 ***	4.56	0.018 ***	6.38
β7 (bm)	0.013 *	1.85	0.012 *	1.81	0.019 **	2.55
β8 (pchgsales)	0.509 ***	42.98	0.499 ***	43.31	0.481 ***	39.66
β9 (loss)	-0.059 *	-2.26	-0.06 **	-2.31	-0.067 **	-2.3
β10 (restatement)	0.007	0.95	0.003	0.38	0.006	0.72
β11 (PA)	-0.027 ***	-2.64	-0.029 **	-2.29	-0.045 ***	-3.33
β12 (big4)	-0.009	-1.18	-0.009	-1.18	-0.008	-1.01
β13 (leverage)	0.041 ***	3.22	0.044 ***	3.45	0.052 ***	3.5
β14 (ICME)	0.017 **	2.24	0.017 **	2.24	0.014 *	1.71
Industry effect	Yes		Yes		Yes	
Year effect	Yes		Yes		Yes	
N	14,824		14,824		13,394	
Adjusted R^2 %	16.4		16.3		15.9	

Notes to table 5 panel B:
a. Fraud risk = PCHGINV. The regression model is
$FRAUDRISK=\beta_0+\beta_1 CTA+ \beta_2 AuditTenure + \beta_3 AuditFees + \beta_4 ChairGender+\beta_5 ChairTenure+ \beta_6 LnTA+ \beta_7 Lev+ \beta_8 Loss+ \beta_9 ICME+ \beta_{10} BM + \beta_{11} Restate+ \beta_{12} Big4 + \beta_{13} PCHGSales+ \beta_{14} PA+ Year\ Dummies + Industry\ Dummies +\varepsilon$
b. Model 1D: CTA = NEGCASHETR; Model 1E: CTA = NEGGAAPETR; Model 1F: CTA = PBTD. Variable measurement is in Appendix.
c. *, **, and *** indicate significance at 10%, 5%, and 1%,

Table 5: CTA and fraud risk-OLS regression

Panel C: fraud risk=DISCACC	**Model 1G**			**Model 1H**			**Model 1I**		
	CTA= NEGCASHETR			**CTA= NEGGAAPETR**			**CTA= PBTD**		
	Coeff.		**T-Stat**	**Coeff.**		**T-Stat**	**Coeff.**		**T-Stat**
β0 (Intercept)	0.05	***	4.58	0.089	***	8.17	0.036	***	3.09
β1 (CTA)	0.004		1.34	0.099	**	23.54	0.045	***	7.71
β2 (lnauditfees)	-0.002	**	-2.18	-0.003	***	-3.09	-0.0009		-0.98
β3 (audittenure)	0.0001	***	4.65	0.0001	***	4.8	0.0001	***	4.43
β4 (chairtenure)	0.0003	***	4.23	0.0004	***	4.86	0.0003	***	3.84
β5 (chairgender)	-0.002		-1.27	-0.002		-1.06	-0.003		-1.58
β6 (lnta)	-0.002	***	-3.77	-0.002	***	-3.53	-0.003	***	-3.96
β7 (bm)	0.007	***	7.12	0.008	***	7.83	0.007	**	6.35
β8 (pchgsales)	0.01	***	4.2	0.01	***	4.14	0.008	***	3.22
β9 (loss)	-0.006		-1.2	0.004		0.87	-0.007	**	-1.25
β10 (restatement)	0.003	*	0.95	0.003		1.78	0.003		1.62
β11 (PA)	-0.062	***	-20.44	-0.066	***	-22.31	-0.066	***	-20.65
β12 (big4)	-0.016		-9.5	-0.014		-8.83	-0.016	***	-9.07
β13 (leverage)	0.02	***	7.14	0.019	***	6.59	0.022	***	6.77
β14 (ICME)	-0.013	***	-7.83	-0.012	**	-6.96	0.014	*	1.71
Industry effect	Yes			Yes			Yes		
Year effect	Yes			Yes			Yes		
N	21,731			21,731			19,566		
Adjusted R^2 %	9.38			11.63			9.69		

Table 5: CTA and fraud risk-OLS regression

Panel D: fraud risk=pchgcashsales	**Model 1J**			**Model 1K**			**Model 1L**		
	CTA= NEGCASHETR			**CTA= NEGGAAPETR**			**CTA= PBTD**		
	Coeff.		**T-Stat**	**Coeff.**		**T-Stat**	**Coeff.**		**T-Stat**
β0 (Intercept)	0.307	***	11.24	0.3	***	10.71	0.275	***	9.54
β1 (CTA)	0.08	***	10.01	0.0002		0.01	0.115	***	7.88
β2 (lnauditfees)	-0.004	*	-1.65	-0.004	*	-1.91	-0.004	*	-1.75
β3 (auditтenure)	-0.0004	***	-5.04	-0.0004	***	-5.04	-0.0004	***	-4.84
β4 (chairtenure)	-0.002	***	-7.92	-0.0018	***	-8.31	-0.0017	***	-7.37
β5 (chairgender)	0.01	**	2.23	0.0097	**	2.12	0.01	**	2.18
β6 (lnta)	-0.007	***	-4.17	-0.006	***	-4.11	-0.0063	***	-3.83
β7 (bm)	-0.041	***	-15.81	-0.041	***	-15.81	-0.04	**	-15.08
β8 (pchgsales)	0.01	***	4.2	0.01	***	4.14	0.008	***	3.22
β9 (loss)	-0.095	***	-7.39	-0.099	***	-7.63	-0.082	***	-5.72
β10 (restatement)	-0.01	**	-2.37	-0.0098	**	-2.42	-0.01	**	-2.38
β11 (PA)	-0.074	***	-9.88	-0.068	***	-9.14	-0.066	***	-8.27
β12 (big4)	-0.003		-0.68	-0.004		-1.01	-0.002		-0.37
β13 (leverage)	-0.07	***	-9.76	-0.064	***	-8.98	-0.071	***	-8.98
β14 (ICME)	-0.017	***	-4.07	-0.017	***	-4.15	-0.018	***	-4.14
Industry effect	Yes			Yes			Yes		
Year effect	Yes			Yes			Yes		
N	21,764			21,764			19,599		
Adjusted R^2 %	12.07			11.66			12.01		

Table 5: CTA and fraud risk-OLS regression

Panel E: fraud risk=CHGROA	**Model 1M**			**Model 1N**			**Model 1O**		
	CTA= NEGCASHETR			**CTA= NEGGAAPETR**			**CTA= PBTD**		
	Coeff.		**T-Stat**	**Coeff.**		**T-Stat**	**Coeff.**		**T-Stat**
β0 (Intercept)	0.236	***	26.26	0.262	***	29.09	0.212	***	23.26
β1 (CTA)	0.007	***	2.73	0.069	***	19.87	0.185	***	40.25
β2 (lnauditfees)	-0.0086	***	-11.46	-0.009	***	-12.43	-0.008	***	-10.75
β3 (auditтenure)	0.0001	***	4.93	0.0001	***	5.04	-0.0001	***	5.23
β4 (chairtenure)	-0.0001		-1.46	-0.0001		-1.12	-0.0017		-0.11
β5 (chairgender)	-0.003	*	-1.85	-0.003	*	-1.72	-0.0026	*	-1.72
β6 (lnta)	0.0015	***	3	0.0017	***	3.33	0.002	***	4.76
β7 (bm)	-0.032	***	-38.08	-0.032	***	-37.86	-0.03	***	-35.31
β8 (pchgsales)	0.08	***	39.51	0.08	***	40.13	0.076	***	37.14
β9 (loss)	-0.098	***	-23.16	-0.091	***	-21.63	-0.096	***	-21.12
β10 (restatement)	-0.003	**	-2.31	-0.003	**	-2.29	-0.0025	***	-21.12
β11 (PA)	-0.0079	***	-3.23	-0.011	***	-4.33	-0.016	***	-6.56
β12 (big4)	-0.004		-0.32	0.0003		0.22	0.0019		1.37
β13 (leverage)	-0.044	***	-18.84	-0.045	***	-19.31	-0.059	***	-23.6
β14 (ICME)	0.014	***	9.8	0.015	***	10.66	0.013	***	9.18
Industry effect	Yes			Yes			Yes		
Year effect	Yes			Yes			Yes		
N	21,815			21,815			19,639		
Adjusted R^2 %	21.15			22.53			27.22		

Table 5: CTA and fraud risk-Logistic regression

Panel F: fraud risk=largenfm		**Model 1P**			**Model 1Q**			**Model 1R**	
		CTA= NEGCASHETR			**CTA= NEGGAAPETR**			**CTA= PBTD**	
	Odds ratio		**Z-Stat**	**Odds ratio**		**Z-Stat**	**Odds ratio**		**Z-Stat**
β0 (Intercept)	2.735	***	3.4	2.973	***	3.6	0.8111	***	-0.62
β1(CTA)	1.507	***	3.85	1.419	***	2.48	2.792	***	5.48
β2 (lnauditfees)	0.879	***	-4.77	0.873	***	-5	0.985	***	-5.03
β3 (auditтenure)	0.998		-1.02	0.998		-1.05	0.997	***	-2.08
β4 (chairtenure)	0.976	***	-7.88	0.976	***	-8.01	0.974	***	-7.75
β5 (chairgender)	1.327	***	4.12	1.328	***	4.15	1.305	***	3.51
β6 (lnta)	0.976		-1.31	0.908		-1.18	0.868		-1.23
β7 (bm)	0.904	***	-2.91	0.904	***	-2.9	0.905	***	-2.63
β8 (pchgsales)	5.141	***	15.81	5.172	***	15.94	5.338	***	15.21
β9 (loss)	0.979		-0.12	0.995		-0.03	0.996		-0.13
β10 (restatement)	1.052		0.87	1.053		0.88	1.028		0.45
β11 (PA)	1.111		1.21	1.136		1.46	1.155		1.43
β12 (big4)	1.019		0.37	1.019		0.39	0.941		-0.95
β13 (leverage)	1.61	***	3.99	1.619	***	4.03	1.63	***	4.08
β14 (ICME)	0.514	***	-16	0.512	***	-16.07	0.703	***	-7.41
Industry effect	Yes			Yes			Yes		
Year effect	Yes			Yes			Yes		
N	22,271			22,271			19,648		
Pseudo R^2	0.0394			0.039			0.034		

Table 6: fraud and non-fraud -OLS regression

Panel A: fraud risk=PCHGREC		**Model 2A**			**Model 2B**			**Model 2C**	
		CTA= NEGCASHETR			**CTA= NEGGAAPETR**			**CTA= PBTD**	
	Coeff.		**T-Stat**	**Coeff.**		**T-Stat**	**Coeff.**		**T-Stat**
β0 (Intercept)	1.256	***	4.72	1.44	***	5.32	1.089	***	4.7
β1 (fraudCTA)	0.149		0.26	0.163		0.34	0.19		0.51
B2 (fraud)	-0.089		-0.29	-0.062		-0.13	0.007		-0.04
B3(CTA)	0.288	***	3.15	0.51	***	4.22	0.01	***	2.89
B4 (lnauditfees)	-0.084	***	-3.39	-0.09	***	-3.79	-0.086	***	-3.55
B5 (audittenure)	-0.001		-1.56	-0.001		-1.55	-0.001		-1.54
B6 (chairtenure)	-0.007	***	-2.96	-0.008	***	-3.01	-0.007	***	-2.97
B7 (chairgender)	-0.07		-1.33	-0.07		-1.31	-0.06		-1.32
B8 (lev)	0.003		0.04	0.019		0.24	0.03		1.26
B9 (lnta)	0.0304	***	2.11	0.039	***	2.35	0.06	***	2.36
B10 (bm)	-0.045	***	-1.52	-0.041	***	-1.38	-0.046	***	-1.56
β11 (pchgsales)	0.74	***	10.75	0.76	***	11.06	0.75	***	11.6
β12 (loss)	-0.075		-0.51	-0.03		-0.2	-0.06		-0.6
β13 (restatement)	-0.02		-0.44	-0.018		-0.4	-0.03		-0.4
β14 (PA)	-0.09		-1.21	-0.079		-1.05	-0.08		-1.16
β15 (big4)	0.11		0.24	0.016		0.36	-0.03		0.26
β16 (ICME)	0.057		1.48	0.057		1.48	0.006		1.48
Industry effect	Yes			Yes			Yes		
Year effect	Yes			Yes			Yes		
N	21,517			21,517			19,599		
Adjusted R^2 %	19.8			19.31			20.54		

Notes to table 6
Panel A:

a. Regression analysis for fraud and non-fraud companies. The interaction term is fraud*CTA.

b. The regression model is $FRAUDRISK=\beta_0+\beta_1 Fraud*CTA+\beta_2 Fraud+\beta_3 CTA+\beta_4 AuditTenure+\beta_5 AuditFees+\beta_6 ChairGender+\beta_7 ChairTenure+\beta_8 LnTA+\beta_9 Lev+\beta_{10} Loss+\beta_{11} ICME+\beta_{12} BM+\beta_{13} Restate+\beta_{14} Big4+\beta_{15} PCHGSales+\beta_{16} PA+ Year\ Dummies + Industry\ Dummies +\varepsilon$

c. Fraud risk = PCHGREC. Model 2A: CTA = NEGCASHETR; Model 2B: CTA = NEGGAAPETR; Model 2C: CTA = PBTD. Variable measurement is in Appendix.

d. *, **, and *** indicate significance at 10%, 5%, and 1%.

Table 6: fraud and non-fraud -OLS regression

Panel B: fraud risk=PCHGINV		**Model2D**			**Model2E**			**Model2F**	
		CTA= NEGCASHETR			**CTA= NEGGAAPETR**			**CTA= PBTD**	
	Coeff.		**T-Stat**	**Coeff.**		**T-Stat**	**Coeff.**		**T-Stat**
β0 (Intercept)	0.213	***	5.29	0.216	***	5.25	0.189	***	4.49
β1 (fraudCTA)	-0.054		-0.69	-0.007		-0.1	-0.756	**	-2.21
B2 (fraud)	0.002		0.04	0.109		1.35	0.064		2.06
B3(CTA)	0.082	***	5.58	0.0546	***	2.55	0.151	***	5.21
B4 (lnauditfees)	-0.014	***	-3.59	-0.014	***	-3.87	-0.014	***	-3.6
B5 (audittenure)	-0.0004	***	-3.53	-0.0004	***	-3.54	-0.0004	***	-3.36
B6 (chairtenure)	-0.002	***	-4.68	-0.0017	***	-4.76	-0.0017	***	-4.38
B7 (chairgender)	0.014	*	1.79	0.014	*	1.78	0.013		1.63
B8 (lev)	0.018		1.42	0.021		1.7	0.029	**	1.98
B9 (lnta)	0.008	***	3.49	0.009	***	3.75	0.0095	***	3.64
B10(bm)	0.0056	***	0.77	0.005	***	0.68	0.01		1.4
β11 (pchgsales)	0.51	***	4.74	0.516	***	4.75	0.502	***	4.4
β12(loss)	-0.064	**	-2.47	-0.062	**	-2.35	-0.072	**	-2.46
β13 (restatement)	0.005		0.77	0.0053		0.77	0.0093		1.29
β14 (PA)	-0.046	***	-3.9	-0.043	***	-3.59	-0.058	***	-4.55
β15 (big4)	-0.008		-1.19	-0.008		-1.17	-0.011		-1.5
β16 (ICME)	0.025	***	4.26	0.024	***	4.1	0.025	***	3.99
Industry effect	Yes			Yes			Yes		
Year effect	Yes			Yes			Yes		
N	14,824			14,824			13,394		
Adjusted R^2 %	0.2727			0.273			0.2714		

Notes to table 6
Panel b:

a. Regression analysis for fraud and non-fraud companies. The interaction term is fraud*CTA.

b. The regression model is $FRAUDRISK=\beta_0+\beta_1 Fraud*CTA+ \beta_2 Fraud+ \beta_3 CTA+\beta_4 AuditTenure + \beta_5 AuditFees + \beta_6 ChairGender + \beta_7 ChairTenure+ \beta_8 LnTA+ \beta_9 Lev+ \beta_{10} Loss+ \beta_{11} ICME+ \beta_{12} BM + \beta_{13} Restate+ \beta_{14} Big4 + \beta_{15} PCHGSales+ \beta_{16} PA+ Year\ Dummies + Industry\ Dummies +\varepsilon$

c. Fraud risk = PCHGINV. Model 2A: CTA = NEGCASHETR; Model 2B: CTA = NEGGAAPETR; Model 2C: CTA = PBTD. Variable measurement is in Appendix.

d. *, **, and *** indicate significance at 10%, 5%, and 1%.

Table 7: fraud risk and fraud-Logistic regression

FRAUD =1	Model 3A (PCHGREC)			Model 3B (DISCACC)			Model 3C (pchgcashsales)			Model 3D(psoftasset)		
	Odds ratio		Z-Stat	Odds ratio		Z-Stat	Odds ratio		Z-Stat	Odds ratio		Z-Stat
β0 (Intercept)	381.61	***	4.52	630.05	***	4.75	381.61	***	4.52	147.89	***	4.26
β1 (fraudrisk)	15.9	**	2.25	8.82	**	2.37	0.063	**	-2.25	1.53	**	1.84
β2 (pchgsales)	0.749		-1.36	0.997		-0.02	11.917	**	2.23	0.707	*	-1.7
β3 (lnta)	1.383	***	3.68	1.428	***	3.91	1.383	***	3.68	1.272	***	2.9
β4 (lnauditfees)	0.549	***	-4.8	0.526	***	-4.97	0.549	***	-4.8	0.59	***	-4.56
β5 (audittenure)	1		0.35	0.999		-0.21	1		0.35	1		0.61
β6 (loss)	0.914		-0.11	0.849		-0.19	0.914		-0.11	0.773		-0.31
β7 (PA)	0.364	**	-2.11	0.284	**	-2.55	0.364	**	-2.11	0.364	**	-2.11
β8 (restatement)	1.295		0.94	1.438		1.3	1.295		0.94	1.373		1.17
β9 (big4)	1.168		0.61	1.308		1.03	1.168		0.61	1.17		0.62
β10 (icmw)	2.387	**	2.41	2.454	**	2.49	2.387	**	2.41	2.446	**	2.54
N	532			527			532			536		
Pseudo R^2	0.0512			0.0607			0.0512			0.0392		

Notes to table 7:

a. Using fraud risk to predict fraud. The logistic regression model is

$$Logit\ (FRAUD)=\beta_0+\beta_1 CTA+\beta_2 PCHGSales+\beta_3 LnTA+\beta_4 Auditfees+\beta_5 AuditTenure+\beta_6 Loss+\beta_7 PA+\beta_8 Restat+\beta_9 Big4+B_{10} ICMW$$

b. Model 3A: fraud risk = PCHGREC; Model 3B: fraud risk = DISCACC; Model 3C: fraud risk = PCHGCASHSALES.

Model 3D: fraud risk=PSOFTASSET.

c. *, **, and *** indicate significant at 10%, 5%, and 1%.

Appendix A: Definitions of Main Variables and Control Variables.

Variable	Definition
Cash effective tax rate (CashETR)	=Cash taxes paid/pretax income. =#317/#170 CashETR is considered missing if pretax income <=0; CashETR is shortened to the range [0,1]
GAAP effective tax rate (GAAPETR)	=Total income taxes/pretax income. =#16/#170 GAAPETR is considered missing if pretax income <=0; GAAPETR is shortened to the range [0,1]
Permanent book-tax difference (PBTD)	= (total book-tax difference - temporary book-tax difference)/lagged assets. = {#170 – (#63+#64)/STR – (#50/STR)}/lag #6;
Negative CashETR (NEGCASHETR)	= - CashETR
Negative GAAPETR (NEGGAAPETR)	= - GAAPETR
Percentage change of accounts receivable (PCHGREC)	= (current receivable – prior receivable) / prior receivable = (#2 – lag #2)/lag #2
Percentage change of inventory (PCHGINV)	= (current inventory – prior inventory)/prior inventory = (#3 – lag #3)/lag #3
Discretionary accrual (DiscAcc)	See Appendix B
Percentage change of sales (PCHGSALES)	= (current sales – prior sales)/prior sales = (#12 – lag #12)/lag #12
Percentage change of cash sales (PCHGCASHSALES)	= (current cash sales – prior cash sales)/prior cash sales = {#12 - #2 – (lag#12 – lag#2)}/lag#12 – lag#2

Percentage of soft assets (PCHGSOFTASSET)	= (total assets – PPE – cash) / total assets = (#6 - #8 - #1)/#6
Employee growth rate (PCHGEMPL)	= (current employee # - prior year employee #)/prior year employee # = (#29 – lag #29)/lag #29
Difference between sales growth rate and employee growth rate (DIFFBSE)	= PCHGSALES – PCHGEMPL = (#12 – lag #12)/lag #12 - (#29 – lag #29)/lag #29
Large fraud risk from NFM (LargeRisk)	= 1 if DIFFBSE is greater than 20% and 0 otherwise
Change of Return on Assets (CHGROA)	= net income / total assets – prior year net income/prior year total assets = #172/#6 – lag #172/lag#6
Leverage (Lev)	=long-term debt/total assets =#9/#6
Book to market value (BM)	= book value of total equity/market value of total equity = #60/#199*#25
Plant assets (PA)	= Property, plant, Equipment/total assets = #8/#6

Appendix B: Discretionary Accrual

The modified Jones model (Jones 1991) by Dechow et al. (1995) is used to estimate discretionary accrual**.**

First, I use the following model to estimate the values of α_0, β_1, and β_2.

$$ACC_{j,t}/ Assets_{j,t-1} = \alpha_0 * 1/Assets_{j,t-1} + \beta_1 * \Delta Sales_{j,t}/ Assets_{j,t-1} + \beta_2 * GPPE_{j,t}/ Assets_{j,t-1} + \varepsilon_{j,t}$$

Total accruals (ACC) are calculated as (Income before extraordinary items and discontinued operations– operating cash flows).

Next, I estimate discretionary accrual by using the following model.

$$Discacc_{j,t} = ACC_{j,t}/ Assets_{j,t-1} – \{\alpha_0 * 1/Assets_{j,t-1} + \beta_1 * (\Delta Sales_{j,t} – \Delta receivables_{j,t}) / Assets_{j,t-1} + \beta_2 * GPPE_{j,t}/ Assets_{j,t-1}\}$$

The variables are defined as the following:

Total accruals (ACC) = {#123 – (#308 - #124)}/ lag #6

Percentage change in sales ($\Delta Sales_{j,t}$) = (#12 – lag #12) / lag #6

Gross property, plant and equipment = #7 /lag #6

Percentage change in receivables = (#2 – lag #2) / lag #6

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