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Publication Date
2015

DOI
10.2139/ssrn.2604376

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Corporate Tax Aggressiveness and Insider Trading[*]

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October 23, 2017

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***** We thank Thomas Omer (Editor) and two anonymous reviewers for their constructive feedback and suggestions. We also thank Brad Blaylock, Qiang Cheng, and Steve Matsunaga for helpful comments on this paper. Goh and Lee thank the School of Accountancy Research Center (SOAR) at Singapore Management University for financial support as well as generous funding from the Lee Kong Chian Fellowship. Shevlin acknowledges financial support from the Paul Merage School of Business at the University of California, Irvine.

Corporate Tax Aggressiveness and Insider Trading

Abstract: We examine the association between corporate tax aggressiveness and the profitability of insider trading under the assumption that insider trading profits reflect managerial opportunism. We document that insider purchase profitability, but not sales profitability, is significantly higher on average in more tax aggressive firms. We also find that the positive association between tax aggressiveness and insider purchase profitability is attenuated for firms with more effective monitoring and is accentuated for firms with a more opaque information environment. In addition, we provide empirical evidence that tax aggressiveness is significantly associated with greater insider sales volume in the fiscal year prior to a stock price crash. Finally, we find that the association between tax aggressiveness and insider purchase profitability weakens after the introduction of FIN 48, consistent with the increased transparency of tax positions under the new disclosure requirement reducing insiders' information advantage and hence their ability to profit from insider trading. To the extent that insider trading profits reflect managerial opportunism, our results are consistent with managers exploiting the opacity arising from tax aggressive activities to extract rent from shareholders, particularly those who sold their shares to the managers. Our findings are particularly important in light of the number of studies relying on the agency view of tax avoidance to develop arguments or to draw inferences.

Key words: Tax aggressiveness, insider trading, managerial opportunism, corporate opacity

JEL codes: G28, G32, H26, M41

1. Introduction

Recent studies advance the view that complementarities exist between tax avoidance and managerial rent extraction (e.g., Desai 2004; Desai and Dharmapala 2006; Desai et al. 2007). In particular, Desai (2004) provides examples of high-profile cases of tax avoidance – at Enron, Tyco and Xerox – that illustrate how the incentive to increase reported earnings via tax planning are linked to earnings manipulation and managerial malfeasance. Desai and Dharmapala (2006) develop a model that assumes that managers use tax avoidance to mask their rent extraction, partly because of the operational complexity that arises from complex tax avoidance activities. Despite this agency view being widely cited in both the finance and accounting literature (e.g., Chen et al. 2010; Kim et al. 2011), whether managers use tax avoidance activities to extract rents from shareholders and the mechanisms through which they do so are unclear and not well established. As Armstrong et al. (2015, p.3) note, "…the precise channels through which managers extract (or personally benefit from) the rents that are generated from tax avoidance are not clear. Moreover, there is limited empirical evidence that managers do, in fact, extract rents that are generated by tax avoidance." We use the setting of insider trading to examine whether this is an avenue through which managers extract rents associated with corporate tax avoidance activities.

Consistent with Desai and Dharmapala (2009) and Blaylock (2016), we define rent extraction broadly as managerial opportunism. We focus on informed insider trading as a channel for managerial opportunism because when managers use non-public information to trade in their company shares, they personally benefit from these trades and directly reduce shareholders' returns (e.g., Fried 2014). Such transfers of wealth from shareholders to managers can provide evidence of the agency problem associated with tax aggressiveness. Supporting the use of informed insider trading as a proxy for managerial opportunism in our setting, prior studies have

shown that insider trading is associated with various other types of managerial and firm misconduct, such as earnings management, restatements, SEC enforcement actions, shareholder litigation, options backdating and excess executive compensation (Ali and Hirshleifer 2015).[1]

Given our stated objective, we develop a testable hypothesis on the association between tax aggressiveness and the profitability of insider trading. Tax aggressiveness can increase organization complexity and financial reporting opacity as managers intentionally obfuscate financial reporting and disclosure to avoid detection by tax authorities (e.g., Desai 2004; Desai and Dharmapala 2006). The result of the increased complexity and opacity can consequently hinder monitoring by shareholders and exacerbate agency problems between managers and shareholders; managers thus have greater opportunities for self-dealing under the guise of tax avoidance.[2] To the extent that tax aggressiveness is motivated by managerial opportunism and self-serving objectives, we expect insiders to exploit the corporate opacity arising from tax aggressive activities to profit from trading in company shares. This line of reasoning suggests that the profitability of insider trading should increase with a firm's tax aggressiveness.

Following prior studies (e.g., Huddart and Ke 2007; Skaife et al. 2013), we define the profitability of insider trading as the profits earned after purchasing company shares and the losses avoided from selling company shares. If managers trade on their material, non-public information, the average insider trading profitability will be profitable. We utilize three measures of tax aggressiveness that are based on a firm's cash effective tax rate, book-tax differences, and tax shelter prediction scores (Wilson 2009). To more effectively capture tax aggressiveness, we use

[1] From a broader perspective, insider trading can reduce the willingness of outside investors to participate in equity ownership, undermines public confidence in the stock markets, and increases the firm's cost of equity capital (e.g., Ausubel 1990; Bhattacharya and Daouk 2002). Insider trading is also socially undesirable based on the argument that it is unfair for insiders to trade on their private information with those that do not have access to such information.

[2] Examples of how managers can act opportunistically under the guise of tax planning include: 1) shifting income and cash to related parties in the pretext of lowering taxable income; and 2) overstating earnings and thus enabling managers to earn additional bonuses or conceal poor performance in the pretext of lowering effective tax rates.

indicator variables that equal one if the book-tax differences and tax shelter prediction score (cash effective tax rate) are (is) in the top (bottom) quintile of the sample population and zero otherwise.

Using a large sample of firms from fiscal years 1996–2014 and controlling for factors associated with insider trading, we find that insider trading purchase profits are significantly *higher* in more tax aggressive firms. The economic magnitude expressed in dollars is also relatively significant – an increase of $74,245 to $80,185 in insider purchase profitability for an average firm in our sample based on our different measures of tax aggressiveness. We obtain qualitatively similar results when we include firm fixed effects to control for time-invariant firm characteristics. This result is consistent with insiders opportunistically exploiting the information advantage arising from tax aggressive activities to profitably purchase their company shares. In contrast, we do not find that insider trading sales profits are significantly higher in more tax aggressive firms than in other firms.

Next, we examine whether the association between tax aggressiveness and insider trading profitability is weaker for firms that exert more effective monitoring over insiders than for firms with less effective monitoring. In addition, we examine whether a more opaque information environment enhances the ability of insiders to take advantage of the opacity associated with tax aggressiveness (that is, tax related opacity) to benefit from insider trading. We proxy for the effectiveness of monitoring using institutional ownership and proxy for the opacity of the firm's information environment using a comprehensive opacity index developed by Anderson et al. (2009). Consistent with our expectations, we find that the positive association between tax aggressiveness and the profitability of insider purchases is attenuated for firms with higher institutional ownership and is accentuated for firms with a more opaque information environment.

One possible explanation for why insiders of tax aggressive firms do not profit from sales

transactions is that insiders sell for reasons other than private information, such as diversification or portfolio rebalancing and liquidity needs (Ofek and Yermack 2000). To further examine whether insiders of tax aggressive firms are able to trade more profitably from their sales transactions, following Ravina and Sapienza (2010), we explore a setting where insider sales transactions are more likely to be information driven. Kim et al. (2011) find that the probability of stock price crashes increases with tax avoidance, a finding that they interpret as consistent with the opacity surrounding tax avoidance facilitating the accumulation and concealment of bad news; when the accumulated bad news is subsequently released simultaneously, the stock price crashes. Hence, we investigate whether tax aggressiveness is associated with greater insider trading intensity in the period prior to stock price crashes. Consistent with our expectations, we find that tax aggressiveness is significantly associated with greater insider sales volume in the fiscal year prior to the crash.[3] This result provides evidence that insiders of tax aggressive firms trade opportunistically to avoid losses prior to stock price crashes.

Financial Accounting Standards Board (FASB) Interpretation No. 48 ("FIN 48"), which is effective for fiscal years beginning after December 15, 2006, requires public firms to disclose their assessment of the amount of tax reserves recognized in financial statements in relation to those tax positions with an uncertain outcome and those that might not be sustainable upon audit. As a result of this mandatory disclosure, we expect the increased transparency of tax positions to reduce insiders' information advantage and hence their ability to profit from insider trading. In a final

[3] Descriptively, in terms of economic magnitude, the incremental losses avoided by insiders of tax aggressive firms from selling shares in the fiscal year prior to the stock price crash is estimated to be between $80,486 and $125,637 as compared to other firms. These numbers are estimated by multiplying the incremental dollar value of shares sold for a tax aggressive firm (between $381,994 and $596,283) by the average abnormal returns during the week of the stock price crash (-21.07%). A more conservative estimate of the incremental losses avoided is estimated to be between $51,531 and $80,439 based on the average annual abnormal returns during the year of the stock price crash (-13.49%).

analysis, we find that the positive association between tax aggressiveness and insider trading profitability diminishes after the introduction of FIN 48, consistent with our expectations.

Our study adds to the growing literature (e.g., Armstrong et al. 2015; Blaylock 2016; Seidman and Stomberg 2017) that empirically examines Desai and Dharmapala's (2006) theory that decisions on tax aggressiveness and managerial rent extraction are interdependent. Specifically, we provide empirical evidence regarding whether managers do, in fact, benefit from tax aggressiveness (Armstrong et al. 2015), and we report that one mechanism by which they do so is via insider trading. Our finding – that significant insider trading profits via insider purchases result from increasing (rather than decreasing) firm value – is not necessarily at odds with Desai and Dharmapala's (2006) theory. Our finding suggests that while tax aggressive activities effectively transfer wealth from tax authorities to the firm, this wealth is not fully and fairly distributed to shareholders, particularly those who sold their shares to the managers: selling shareholders earn smaller returns from the increase in firm value than they would otherwise earn if managers did not make personal gains from opportunistic insider trades. Although the wealth transfer that is borne~~lost~~ by the selling shareholders may be small relative to firm's overall market value (less than one basis point of average market value), it is nonetheless material to the manager (i.e., about one to two percent of managers' wealth estimates). Hence, we interpret this expropriation of wealth from selling shareholders to managers as an "indirect" form of rent extraction that reflects agency problems between managers and selling shareholders.[4] Our evidence of managerial opportunism associated with tax aggressiveness in the unique setting of insider trading is consistent with Desai and Dharmapala's (2006) theory of complementarities

[4] Whether such agency costs engendered from tax aggressive activities are sufficiently large to lead to an overall reduction in firm value is beyond the scope of this study and has been directly or indirectly addressed by other studies, such as Desai and Dharmapala (2009) and Goh et al. (2016).

between tax aggressiveness and rent extraction and contributes to the ongoing debate on whether managers benefit from the opacity surrounding tax aggressive activities (e.g., Armstrong et al. 2015).

The remainder of our paper proceeds as follows. In the next section, we discuss the findings in the related literature and develop our hypotheses. Section 3 describes the data and our research methodology. We present and discuss the results in Section 4. Section 5 reports additional analyses and sensitivity tests, and Section 6 concludes the paper.

2. Related Literature and Hypothesis Development

Corporate tax aggressiveness and insider trading

Tax avoidance is beneficial because it increases after-tax cash flows, which can be used to fund profitable investment opportunities, pay down debt, or distributed to shareholders. Notwithstanding the cash savings benefit of such activities, tax avoidance can be a potentially costly activity for shareholders. Aggressive tax planning requires the use of complex tax strategies such as employing transfer pricing, allocating debt for the purposes of earnings stripping, establishing offshore intellectual property havens, and consolidating business functions in low-tax jurisdictions. These tax planning arrangements can increase organizational complexity and financial opacity, making it more difficult for outsiders to understand the basis and sustainability of the firm's earnings and cash flows (e.g., Bushman et al. 2004; Balakrishnan et al. 2016). Consistent with tax avoidance increasing organizational complexity and financial opacity, Balakrishnan et al. (2016) find that tax avoidance is associated with higher information uncertainty, higher information asymmetry, and lower earnings quality. Kim et al. (2011) find that tax aggressiveness is positively associated with a firm's stock price crash risk, and Frank et al. (2009) find that aggressive tax reporting is associated with aggressive financial reporting.

Under the agency view of tax avoidance, the increased opacity from complex tax transactions afford opportunities for managerial self-dealing behavior (e.g., Desai 2004; Desai and Dharmapala 2006; Desai et al. 2007). These papers suggest that tax avoidance, especially in its aggressive form, can exacerbate and/or reflect agency problems between the firm and its shareholders.

Although the agency view of tax avoidance is widely cited in the finance and accounting literature (Chen et al. 2010, Kim et al. 2011, Goh et al. 2013), empirical evidence on the managerial self-serving behavior associated with corporate tax aggressiveness is limited (Armstrong et al. 2015). For instance, Blaylock (2016) seeks large sample evidence on whether tax avoidance is associated with economically significant managerial self-serving behavior. However, he is unable to find such evidence based on two proxies for managerial opportunism: low relative future firm performance and overinvestment. Blaylock (2016) concludes that researchers should exercise care when their predictions assume a relation between tax avoidance and managerial opportunism by carefully considering whether this agency theoretic assumption is appropriate and relevant for their sample firms. A recent study by Seidman and Stomberg (2017) also questions Desai and Dharmapala's (2006) theory. In particular, they re-examine Desai and Dharmapala's (2006) empirical finding and find that it can be better explained by tax exhaustion rather than rent extraction. While the authors are cautious in concluding whether their findings disprove Desai and Dharmapala's (2006) theory, they question whether the agency theoretic prediction between tax avoidance and rent extraction is empirically valid in large samples.

Our study extends this literature that empirically examines Desai and Dharmapala's (2006) theory that tax aggressiveness can enable opportunistic managers to extract rents. Tax aggressiveness can increase organizational and transactional complexity and increase financial

reporting opacity as managers intentionally obfuscate financial reporting and disclosure to avoid detection by tax authorities (e.g., Desai 2004; Desai and Dharmapala 2006). The result of the increased complexity and opacity can consequently hinder monitoring by shareholders and exacerbate agency problems between managers and shareholders, offering managers greater opportunities for self-dealing under the guise of saving taxes. To the extent that tax aggressiveness is motivated by managerial opportunism to extract rents from shareholders, we expect rent-seeking insiders to exploit the corporate opacity arising from tax aggressive activities to profit from trading in company shares, as prior studies find that insider trading opportunities become more profitable as the degree of information asymmetry increases (Kyle 1985; Seyhun 1998; Aboody and Lev 2000; Lakonishok and Lee 2001; Huddart and Ke 2007). Consequently, we expect insider trading profitability to increase with a firm's tax aggressiveness. Our first hypothesis is as follows:

HYPOTHESIS 1. *Ceteris paribus, firms' tax aggressiveness is positively associated with the profitability of insider trading.*

Notwithstanding the above arguments, we may not observe tax aggressiveness to be associated with higher insider trading profitability, particularly for insider sales transactions. In particular, managers may not have incentives to sell company shares unless the concealment of the firm's true performance becomes increasingly difficult and unless the stock price is about to crash (e.g., Kim et al. 2011). Moreover, prior literature suggests that insider sales transactions are generally less informative than insider purchase transactions because insiders sell for other reasons, such as diversification or portfolio rebalancing and liquidity needs (Ofek and Yermack 2000).[5] Furthermore, insider sales transactions can impose costs on managers. Johnson et al.

[5] Lakonishok and Lee (2001, p. 98) aptly explain the informativeness of insider purchase and sales transactions as follows: "(t)here can be a variety of reasons for insiders to sell a stock, but the main reason to buy a stock has to be to make money."

(2007) find a significantly greater association between litigation and abnormal insider selling after the adoption of the Private Securities Litigation Reform Act in 1995, which presumably raised the barriers to frivolous lawsuits and in turn led plaintiffs to file lawsuits based on objective evidence such as abnormal insider sales. Therefore, whether insiders of tax aggressive firms earn abnormal profits from insider sales is ultimately an empirical question, and we examine whether tax aggressiveness is related to insider purchases and insider sales separately in our empirical analyses.

Cross-sectional predictions

Exploring the effect of effective monitoring

Desai and Dharmapala (2006) find that the effect of agency problems engendered by tax avoidance is more severe in firms with poor corporate governance and prior studies document that stronger governance is associated with greater firm transparency (e.g., Beyer et al. 2010). Therefore, while the opacity created from/by tax aggressiveness provides more opportunities for managers to engage in insider trading, stronger monitoring can reduce the information advantage of managers and hence the opportunities for profitable insider trading. In addition, we also acknowledge the possibility that stronger monitoring can limit opportunistic insider trading by influencing the firms to adopt insider trading restrictions (e.g., Jagolinzer et al. 2011; Dai et al. 2016) consequently attenuating the relation between tax aggressiveness and insider trading profitability. Hence, our first cross-sectional hypothesis is as follows:

HYPOTHESIS 2a. *Ceteris paribus, the positive association between firms' tax aggressiveness and the profitability of insider trading is weaker for firms that have more effective monitoring.*

Exploring the effect of overall firm opacity

The ability of insiders to trade profitably stems from the information asymmetry between insiders and outsiders (e.g., Aboody and Lev 2000; Frankel and Li 2004; Huddart and Ke 2007). While the opacity created from/by aggressive and complex tax transactions provides managers the opportunity to benefit from insider trades and reduce shareholders' returns, this problem could be exacerbated if the firm's overall information environment, independent of any tax-related opacity, is opaque. This exacerbation is because prior studies suggest that higher (lower) information quality enhances (hinders) investors' ability to assess firms' expected values and uncertainty of future cash flows (e.g., Lambert et al. 2007). Therefore, although tax aggressiveness increase organizational complexity and tax-related opacity, we expect that for firms with greater overall firm opacity, outside investors are even less able to assess the benefits and uncertainty behind tax planning activities, hence increasing the information advantage managers have over the outside investors and increasing the profitability of insider trading.

Note that it is unlikely that the overall opacity of a firm's information environment is driven solely from their complex tax transactions, and substantial variation can exist across firm's information environment as a result of each firm's voluntary and mandatory disclosures as well as disclosures by other information intermediaries such as financial analysts, industry experts and financial press (Healy and Palepu 2001). What we attempt to capture here is the opacity of the firm's information environment that is independent from the opacity created from/by tax aggressiveness, and we examine how this opacity can moderate the relation between tax aggressiveness and insider trading profits. For brevity, we refer to this opacity as "overall firm opacity." In Section 3, we detail how we measure overall firm opacity after isolating the opacity created from/by tax aggressiveness (i.e., tax opacity). Our second cross-sectional hypothesis is as follows:

HYPOTHESIS 2b. *Ceteris paribus, the positive association between firms' tax aggressiveness and the profitability of insider trading is stronger for firms with greater overall firm opacity.*

3. Research Design

Measure of insider trading profitability

We focus on the insider trading transactions of officers and directors following prior insider trading literature (e.g., Ke et al. 2003; Piotroski and Roulstone 2005; Cheng and Lo 2006; Huddart et al. 2007). We then define insider trading profitability as the (unrealized) profits earned after purchases and losses avoided from sales (e.g., Huddart and Ke 2007; Skaife et al. 2013). The profit from insider trading over a particular time period is determined by (1) the stock returns after each transaction, (2) the dollar value of each transaction, and (3) the frequency of these transactions.

To construct our measure, we first aggregate all trading transactions by insiders of the same firm on the same day and treat multiple transactions made on the same firm-day as a single transaction. We then compute the one-year buy-and-hold abnormal returns (size adjusted) for the period beginning one day after the transaction date.[6] The gain from purchases is then computed by multiplying the abnormal return by the dollar value traded. The gain from sales is computed analogously and then multiplied by negative one such that losses avoided on sales are interpreted the same as gains on purchases. Finally, we aggregate individual transactions at the firm-year level to obtain an aggregate profitability measure of all insider trades (sales or purchases) during the fiscal year:

[6] Section 16(b) of the Securities and Exchange Act of 1934 restricts insiders from engaging in short-term opportunistic trading by requiring insiders to pay back profits attributable to offsetting purchases and sales that occur within six months of each other. As a result, prior work generally finds that insiders trade profitably when trading profits are measured over periods of one-year (e.g. Lakonishok and Lee 2001) or even longer (e.g., Ke et al. 2003). Following Skaife et al. (2013), we measure insider trading profitability over a one-year period. Results are qualitatively similar when we examine three-month, six-month, nine-month or eighteen-month period returns.

$$INS\_PROFIT_{it} = \frac{\sum_{j=1}^{n}(ABRET_{itj} \times VALUE\_TRADED_{itj})}{MV_{it-1}}$$

where INS_PROFIT_{it} is either insider sales or purchase profitability (*SALE_PROFIT* and *PURCH_PROFIT* respectively), $ABRET_{itj}$ is equal to the one-year-ahead buy-and-hold abnormal return computed for the period starting one day after transaction date *j*, $VALUE\_TRADED_{itj}$ equals the total dollar value of shares either sold or purchased by all insiders on day *j*, *n* is the total number of firm-days with insider sales or purchase activity during firm-year *it*, and MV_{it-1} is the market value of equity at the end of fiscal year *t*-1.[7] Following Skaife et al. (2013), we multiply the insider trading profitability measure by 100 to express this measure as a percentage of MV_{it-1}.

Finally, as highlighted by Frankel and Li (2004), insiders are unlikely to trade on their private information if they expect the trade to be unprofitable, and hence, they would refrain from trading if they do not possess superior information. Therefore, we follow prior work (Huddart and Ke 2007; Skaife et al. 2013) and set *INS_PROFIT* equal to zero in firm-years with no reported insider trades in our sample. In additional robustness tests, we examine an alternative sample selection excluding firm-years with no reported insider trades (see Section 4).

Measures of tax aggressiveness

Currently, the literature contains no consensus on a single measure that perfectly captures tax aggressiveness. Therefore, we utilize three measures that have been used in various settings in the literature (e.g., Kim et al. 2011; Rego and Wilson 2012). Because we are interested in tax planning activities that are considered aggressive, complex, and hence more likely to be associated with managerial opportunism, we focus on firms with tax avoidance measures in the top quintile of the sample population and classify these firms as tax aggressive. Our first measure is based on

[7] Because the magnitude of insider trade is significantly associated with firm size, we follow Skaife et al. (2013) and scale our measure of insider trading profitability by the market value of equity to alleviate concerns that our results are driven by large firms in our sample.

a firm's cash effective tax rate, which is an indicator that equals one if the firm's one-year cash effective tax rate is in the bottom quintile of the sample population and zero otherwise (*CETR*). The cash effective tax rate is defined as cash taxes paid (TXPD) divided by pre-tax income (PI). Following Chen et al. (2010), we remove observations with negative pre-tax income and those observations with a cash effective tax rate below zero or above one.[8] We use the cash effective tax rate because it reflects both permanent and temporary book-tax differences, it accounts for the income tax benefits of employee stock options, and it is unaffected by adjustments in accounting estimates such as valuation allowance and tax reserves.

Our second measure, *BTDFACTOR*, is an indicator that equals one if the first principal component of the following three book-tax difference-based measures is in the top quintile of the sample population – (1) total book-tax difference (*TBTD*), (2) Frank et al. (2009) discretionary permanent book-tax difference (*DTAX*), and (3) Desai and Dharmapala (2006) residual book-tax difference (*DDBTD*) – and zero otherwise.[9] *TBTD* includes both temporary and permanent book-tax differences, and we utilize this measure as an overall measure of the firm's tax avoidance activities. We employ *DTAX* as a measure of tax aggressiveness because it captures permanent differences that are unrelated to items that are not considered aggressive tax reporting, such as state income taxes and tax credits. Finally, as highlighted by Desai and Dharmapala (2006), book-tax differences could be influenced by both tax planning activities and accrual-based earnings management. Because *DDBTD* is estimated from a firm fixed-effect regression after controlling

[8] We recognize that our measure of *CETR* requires pre-tax income to be positive and hence requires our sample firms for empirical tests using this measure to be profitable leading to possible data truncation bias. However, our other measures of tax avoidance do not require firms to be profitable in order to be included in our sample. This is evidenced by the larger sample size for these other measures.

[9] We choose to combine all three book-tax difference measures into one factor because these three book-tax difference measures are highly correlated with one another (Pearson correlation between 0.27 to 0.69), and a factor analysis of these three measures produces only a single factor that exhibits an Eigenvalue greater than one (Eigenvalue = 2.00), which suggests significant commonality among these three factors.

for total accruals, this measure attempts to isolate the component of book-tax differences and, hence, the tax aggressive activity that is unexplained by earnings management.

Finally, Hanlon and Heitzman (2010) consider a tax shelter to be the most aggressive form of tax avoidance along the continuum of tax planning strategies. Hence, our last measure of tax aggressiveness is based on the tax shelter prediction score that was developed by Wilson (2009) and used in prior literature (e.g., Kim et al. 2011; Rego and Wilson 2012). *SHELTER* is an indicator that equals one if the firm's tax shelter prediction score is in the top quintile of the sample population and zero otherwise. The detailed measurement of these measures of tax aggressiveness is explained in the Appendix.

Empirical models

To test Hypothesis 1, we estimate the following pooled cross-sectional regression:

$$INS\_PROFIT_{it} = \alpha + \beta TAX_{it} + \psi FIRM\_CONTROLS_{it} + IND\_FE + \varepsilon_{it} \quad (1),$$

where *INS_PROFIT* refers to either insider sales or purchase profitability (*SALE_PROFIT* or *PURCH_PROFIT*, respectively), *TAX* refers to the measure of tax aggressiveness (*CETR*, *BTDFACTOR* or *SHELTER*), *FIRM_CONTROLS* refers to a vector of firm-level controls, and *IND_FE* refers to industry fixed effects, which we include to account for unobserved heterogeneity across industries. Hypothesis 1 predicts a positive coefficient on *TAX*. Because we conduct our hypothesis testing on a pooled panel data set, we use firm and year clustered standard errors to control for time series and cross-sectional dependence in the data (Petersen 2009; Gow et al. 2010). The Appendix includes detailed definitions for all variables.

We select an extensive set of *FIRM_CONTROLS* that are associated with insider trading based on prior literature. We control for firm size (*LNMV*) because Seyhun (1986) and Lakonishok and Lee (2001) find that insiders respectively trade more and trade more profitably in small firms.

We control for the book-to-market ratio (*BTM*), prior stock returns (*PRIOR_RET*), the earnings-to-price ratio (*EP*) and past sales growth (*AVG_GROWTH*) because prior studies suggest that insiders trade as contrarians (Rozeff and Zaman 1998; Piotroski and Roulstone 2005; Huddart et al. 2007). Following the findings of prior studies (Aboody and Lev 2000; Frankel and Li 2004; Huddart and Ke 2007), we include various proxies for information asymmetry and the characteristics of the firm's information environment that are known to be associated with insider trading, such as firm age (*AGE*), prior year loss (*LOSS*), R&D expenditure (*RND*), the median absolute abnormal return over past earnings announcements (*MAG_AR*), number of analysts following (*ANALYST*), institutional ownership (*IOHOLD*), financial statement informativeness (*FS_INFORM*), and return volatility (*RET_VOL*).

We also control for the opacity of the firm's information environment using a comprehensive opacity index (*OPACITY*) based on Anderson et al. (2009).[10] By including these various controls for information asymmetry and the characteristics of the firm's information environment, we ensure that the coefficient on *TAX*, β, captures the incremental effect of tax aggressiveness on insider trading profitability over and above these previously documented associations between information asymmetry/environment and insider trading. Following Gao et al. (2014), we include share turnover (*TURNOVER*) to control for investor interest and the market visibility of the firm's stock. We additionally control for insider trading restrictions (*RESTRICT*) because Roulstone (2003) finds that insider trades are less profitable when trading restrictions are in place. Prior work suggests that insiders may manipulate their earnings prior to opportunistic insider trading (e.g., Beneish and Vargus 2002; Bartov and Mohanram 2004) and that tax aggressiveness is associated with aggressive financial reporting (e.g., Frank et al. 2009). Hence,

[10] The detailed description of this measure is explained in the later part of Section 3 and in the Appendix.

we control for accruals management (*ACCEM*) to mitigate concerns that our measure of tax aggressiveness merely captures the effect of the prior documented association between accrual management and insider trading.

Finally, we include a set of control variables that prior literature (e.g., Chen et al. 2010) documented to be associated with tax planning, such as accounting performance (*ROA*), leverage (*LEVERAGE*), tax loss carryforwards (*NOL*), foreign income (*FI*), property, plant and equipment (*PPE*), intangibles (*INTANG*) and equity income in earnings (*EQINC*). By including this set of tax-related control variables that are more associated with benign tax planning, we intend to capture the incremental effect of aggressive and complex tax planning on insider trading profitability, which is more relevant to our research question.

To test Hypothesis 2, we modify equation (1) to include the conditioning variable (*Conditioning_VAR*) and the interaction between *TAX* and *Conditioning_VAR*. Additionally, we include the interaction between firm-level controls and the conditioning variable to allow the effect of the conditioning variable to vary across all other firm attributes:[11]

$$INS\_PROFIT_{it} = \alpha + \beta TAX_{it} + \psi FIRM\_CONTROLS_{it} + \gamma Conditioning\_VAR_{it} + \eta TAX_{it} \times Conditioning\_VAR_{it} + \sum \varphi FIRM\_CONTROLS_{it} \times Conditioning\_VAR_{it} + IND\_FE + \varepsilon_{it} \quad (2)$$

While a proxy for monitoring, *IOHOLD*, is included as a control variable in the main model, in Hypothesis 2a, we examine the moderating effect of monitoring on the relation between tax aggressiveness and insider trading profitability. We use the percentage of shares held by institutional investors (*IOHOLD*) as a proxy for effective monitoring because prior studies suggest

[11] The inclusion of the interaction between firm-level controls and the conditioning variable may result in multicollinearity among the regressors. To alleviate this issue, we mean-center the conditioning variable (*IOHOLD* and *OPACITY*) in our regression analyses.

that institutional shareholders with significant ownership stakes have the incentives and resources to undertake costly monitoring activities and thus play an important role in firm governance (e.g., Grossman and Hart 1980; Shleifer and Vishny 1986; Huddart 1993; Chung et al. 2002; Parrino et al. 2003).[12] Therefore, we expect firms with higher institutional ownership (*IOHOLD*) to have more effective monitoring over opportunistic insider trading in tax aggressive firms, hence weakening the positive association between tax aggressiveness and insider trading profitability.[13]

While a proxy for overall firm opacity, *OPACITY*, is included as a control variable in the main model, in Hypothesis 2b, we examine the moderating effect of an opaque information environment on the relation between tax aggressiveness and insider trading profitability. Following Anderson et al. (2009), we measure the opacity of the firm's information environment using a comprehensive opacity index (*OPACITY*) that comprises four individual proxies for opacity commonly used in prior literature: (1) trading volume, (2) bid-ask spread, (3) analyst following, and (4) analyst forecast errors. The opacity of a firm's information environment is presumed to be increasing in its bid-ask spread and analyst forecast errors and decreasing in its trading volume and analyst following. This index is derived by ranking each of these proxies into deciles of opacity and allocating scores from one (least opaque) to ten (most opaque). The opacity index for each firm is then obtained by summing the scores across these four proxies and then dividing by the maximum possible score of forty, such that the opacity index ranges from 0.1 to 1.0. We expect insiders of tax aggressive firms in more opaque information environments to earn

[12] Chen et al. (2007) find that independent and long-term institutional investors (*ILTI*) exert more effective monitoring relative to other institutional investors. In untabulated analysis, we utilize their measure of *ILTI* as an alternative proxy for monitoring by institutional investors. The results are quantitatively similar using this alternative proxy.

[13] We select institutional ownership out of many other measures of corporate governance because this measure is widely used in the extant literature (e.g., Chen et al. 2010), and this measure results in the least sample restriction. That being said, we explore alternative governance proxies such as 1) E-Index; 2) G-Index; 3) Board independence; 4) Board size; 5) CEO-chair duality. In terms of the sign of the interaction variable between these governance proxies and *TAX*, we find somewhat consistent signs of the coefficients but they are statistically insignificant, possibly due to lower statistical power based on a much smaller sample (untabulated).

higher profits from insider trading.

As we explained earlier in the hypothesis development, we attempt to capture the opacity of the firm's information environment that is independent from the opacity created from/by tax aggressiveness. Empirically, because we control for overall firm opacity (*OPACITY*) in our regression examining the relation between tax aggressiveness (*TAX*) and insider trading profits, *TAX* should capture the incremental effect of the opacity created from/by tax aggressiveness ("tax opacity") and *OPACITY* should pick up the incremental effect of the overall firm opacity that is independent from tax opacity. In an additional robustness test to further isolate firm opacity from tax opacity, we regress *OPACITY* on our measure of tax aggressiveness (*TAX*) and then use the residuals from this regression as a proxy for firm opacity that is orthogonal to the opacity engendered by tax planning. We discuss the results for the main analysis and this additional robustness test in Section 4.

4. Sample and Results

Sample

Our sample period spans the period from 1996 to 2014 because the coverage of insider trading transactions by Thomson Reuter is minimal before 1996. We collect our financial and stock performance data primarily from I/B/E/S, Compustat, and CRSP in computing tax aggressiveness, the hypothesized conditioning variables, and the control variables used in the regression analysis. Following prior insider trading studies (e.g., Lakonishok and Lee 2001; Frankel and Li 2004), to avoid unnecessary noise in estimating returns, we exclude firms whose stock prices are less than $2 at the beginning of each year. We collect insider trading transaction data from Thomson Reuters, which gathers data from Form 4 filings with the SEC.[14] Following prior literature (e.g.,

[14] In the Form 4 filings, insiders include officers, directors and large shareholders of more than 10% of any equity class of securities of an issuing company. We exclude the transactions of "large shareholders" from insiders.

Lakonishok and Lee 2001; Frankel and Li 2004), we examine only open market and private trading transactions and exclude grant and award transactions. In addition, we require firms to report at least three insider purchase and three insider sales transactions over the entire sample period to be included in our sample. In this way, we ensure that the insiders in our sample are active traders with the ability and opportunity to trade based on private information.[15] The sample size varies for each test because of the specific tax measure used in the test. We also winsorize each continuous variable except the insider trading profitability measure at the 1% and 99% levels to mitigate the effect of outliers. We do not winsorize the profitability measure for several reasons. First, prior literature documents that the distribution of stock returns are right-skewed and some studies have cautioned against trimming/winsorizing stock returns (e.g., Kothari et al. 2005; Core 2006; Teoh and Zhang 2011). Because the insider trading profitability measure is calculated based on stock returns, we do not winsorize this measure. Second, by winsorizing the extreme profitability observations where insiders have the greatest information advantage, we are throwing away the best setting to test our hypothesis.[16] The final sample size used in the regression analyses ranges from 20,444 to 28,067 firm-year observations for the 19-year sample period.

Descriptive statistics

Table 1, panel A reports descriptive statistics for the regression variables. The mean dollar amount of insider sales profitability (*SALES_PROFIT$*) is -$250,459, which is consistent with the prior finding that insiders do not generally profit from sales transactions (e.g., Aboody and Lev

[15] With this sample restriction, we drop 25.9% of our initial sample of firms, resulting in a final sample of 28,067 firm-year observations. We use three insider sales and purchases as a cut-off point because requiring this condition reduces the proportion of both zero purchase and sales firm-years in the sample to below 50%. However, our inferences do not change even if we require the sample firms to have at least two or four purchases and sales over the sample period.

[16] That being said, we check the robustness of our results to winsorizing the insider trading profitability measure. We find that the coefficients on the variables of interest are smaller in magnitude (results untabulated) based on the winsorized profitability but our inferences are qualitatively similar to the results using unwinsorized profitability measure.

2000; Huddart and Ke 2007; Jagolinzer et al. 2011; Gao et al. 2014). The mean dollar amount of insider purchase profitability (*PURCHASE_PROFIT$*) is $47,517, which is consistent with the results obtained by Lakonishok and Lee (2001), who find that insiders profit from purchase transactions on average and do not buy if they do not possess superior information (Frankel and Li 2004; Ravina and Sapienza 2010).[17] Insider sales profitability and transaction value are significantly larger in magnitude than insider purchase profitability and transaction value, and the average annual frequency of insider sales (36.2 transactions) is also greater than the average annual frequency of insider purchases (4.1 transactions). This finding reflects the greater propensity for insiders to sell their shares and sell them in larger amounts in order to diversify the large proportion of their wealth held in company stocks received from compensation plans (Ofek and Yermack 2000).

[Insert Table 1 here]

Table 1, panel B provides descriptive statistics partitioned by tax aggressiveness. As observed from this table, the mean insider purchase profitability are generally significantly higher for tax aggressive firms (*TAX* = 1), whereas the mean insider sale profitability are generally significantly lower for tax aggressive firms. Tax aggressive firms are also significantly different from non-tax aggressive firms on many firm characteristics, suggesting it is important to control for these firm characteristics in our empirical specification to avoid spurious findings.

Table 2 reports the Pearson and Spearman correlation table of the variables in our paper. Both the Pearson and Spearman correlations between these three measures of tax aggressiveness (*CETR, BTDFACTOR* and *SHELTER*) are positive, suggesting that all three measures capture

[17] Recall that our measure of insider trading profitability includes firm-year observations for which there are no reported insider trades (e.g., Huddart and Ke 2007; Skaife et al. 2013). If we eliminate firm-years with zero sales (purchase) transactions, the mean unscaled insider sales (purchase) profitability is -$310,099 ($91,435), and the average annual frequency of insider sales (purchase) is 44.9 (7.8) transactions.

aggressive tax planning activities in general. However, the correlations among the three measures range from 0.04 to 0.32, suggesting that each measure likely captures different dimensions of tax aggressiveness and hence support our choice of using three measures in our analyses to triangulate our results and increase the robustness of our findings. The correlations between *SALE_PROFIT* and all three measures of tax aggressiveness are either not significant (Pearson correlation) or negative and significant (Spearman correlation). However, the correlations between *PURCH_PROFIT* and tax aggressiveness measures are generally positive and significant, which is consistent with our prediction in Hypothesis 1. Because these are pairwise univariate correlations, we defer the main analyses and our inferences to our multivariate tests in the later section.[18]

[Insert Table 2 here]

Main analysis – test of Hypothesis 1

In this section, we report our results for the test of Hypothesis 1, which predicts a positive association between tax aggressiveness and insider trading profitability. As shown in Table 3, all three measures of tax aggressiveness are positively and significantly associated with insider purchase profitability (*t*-statistics all greater than 2.10). The effect of tax aggressiveness on insider purchase profitability is also economically significant in percentage terms. Specifically, being classified as tax aggressive based on the cash effective tax rate (*CETR*), book-tax difference factor (*BTDFACTOR*) and tax shelter prediction score (*SHELTER*) is associated with 156%, 169% and

[18] As observed from Table 2, some of the correlations are quite high. The Variance Inflation Factors (VIF) for the analyses without interaction variables (Tables 3 and 6) are less than 10, but the VIF for the analyses with the interaction variables ranges from 10.09 to 21.08, suggesting a multicollinearity problem. To alleviate any multicollinearity problem, we mean-center the conditioning variables in Table 4 (see Footnote 11), and the VIF declines to between 5.92 and 8.96, which suggests that mean-centering significantly mitigates the multicollinearity problem.

156% increases in insider purchase profitability, respectively.[19] Expressed in dollar terms, being classified as tax aggressive translates to an increase of $74,245 to $80,185 in insider purchase profitability for an average firm in our sample with insider purchase profitability of $47,517; this result suggests economically significant rent extraction by insiders of tax aggressive firms.[20,21] The results for insider purchase profitability are thus consistent with Hypothesis 1.

[Insert Table 3 here]

However, we find that none of the tax measures is significantly associated with insider sales profitability (*t*-statistics all below 1.40). The nonsignificant results for insider sales profitability are consistent with prior research that insider purchase transactions are generally more likely to be information driven (e.g., Lakonishok and Lee 2001; Ravina and Sapienza 2010; Jagolinzer et al. 2011) and that insider sales transactions are generally less informative because insiders sell for other reasons, such as diversification or portfolio rebalancing and liquidity needs (Ofek and Yermack 2000). In a later analysis (section 5), we explore a setting (i.e., the period prior to stock price crashes) where insider sales transactions are more likely to be information driven.

[19] The impact of being classified as tax aggressive based on cash effective tax rate (*CETR*) on the insider purchase profitability (*PURCH_PROFIT*) is computed as 0.025 (coefficient on *CETR*) ÷ 0.016 (the sample mean of *PURCH_PROFIT*) = 156.25%. The comparative statics for *BTDFACTOR* and *SHELTER* are computed analogously.

[20] The economic significance in dollar terms of being classified as tax aggressive based on cash effective tax rate (*CETR*) on the insider purchase profitability is computed as 156.25% (the economic significance in percentage terms) × $47,517 (the mean insider purchase profitability) = $74,245. The comparative statics for *BTDFACTOR* and *SHELTER* are computed analogously. As an alternative computation of economic significance in dollar terms, we use the unscaled insider purchase profitability (*PURCHASE_PROFIT$*) as the dependent variable in our empirical model. Based on this specification, being classified as tax aggressive translates to an increase of $57,032 to $102,592 in insider purchase profitability, which is similar in magnitude as those reported above.

[21] The value of the insider trade gain to the manager scaled by the total market value of equity of the firm is relatively small. For an average firm in our sample with a market value of equity of $890m, the wealth transfer is only at most 0.0090% of the market value, which is relatively immaterial to the firm. Hence, we explore whether this wealth transfer is significant or material to the manager. First, we obtain the dollar value of insider holdings prior to the inside trade from Form 4 filings with the SEC. The wealth transfer relative to the managers' insider holdings is about 1.30%. Second, we obtain the dollar amount of salary and bonus of the top five executives from ExecuComp. The wealth transfer relative to the managers' salary and bonus is about 2.24%. Third, we quantify the amount of wealth transfer in percentage terms by dividing the dollar value of the trading profit by the mean purchase value of the inside trades. The one-year insider trading returns computed this way is about 13.54%. Taken together, these statistics suggest that the amount of wealth transfer may not be trivial to the manager.

The coefficients on the other control variables are generally consistent with those in the literature. In particular, we find that insiders purchase less profitably in larger firms (*LNMV*), but they also sell more profitably in larger firms. We also find that insiders trade as contrarians and earn more profits from purchases when book-to-market (*BTM*) is high and prior returns (*PRIOR_RET*) are low. To the extent that sales growth (*AVG_GROWTH*) is associated with future earnings realization, we find that insider sales are less profitable when past sales growth is high. We also find that insiders earn more profits when information asymmetry is high, as proxied by research and development expenditure (*RND*) and return volatility (*RET_VOL*), and they earn lower profits when there is a greater analyst following (*ANALYST*) and institutional ownership (*IOHOLD*). We do not find that insiders earn significantly more profits when overall firm opacity is high (*OPACITY*). Contrary to our expectations, we find that insiders also earn more profit when financial statement informativeness is high (*FSINFORM*). Additionally, we find mixed evidence when we use prior year loss (*LOSS*) as a proxy for information asymmetry in that we find insiders purchase more profitably but also sell less profitably when the firm reports a loss in the prior fiscal year. We also find some evidence that higher accruals management is associated with higher insider sales profitability, which is consistent with the prior finding that insiders manipulate earnings prior to insider trading (e.g., Beneish and Vargus 2002; Bartov and Mohanram 2004). With regard to the tax-related control variables, we find some evidence that insiders purchase more profitably when accounting performance (*ROA*) and leverage (*LEVERAGE*) is high, and when there is no tax loss carryforward (*NOL*) and property, plant and equipment (*PPE*) is low. Finally, the adjusted R^2 from each model is comparable to that reported in prior studies (e.g., Huddart and Ke 2007; Skaife et al. 2013).

In additional robustness tests, we examine the following alternative samples: 1) excluding

firm-year observations with no insider trades; 2) excluding firm-year observations with no insider purchases, which comprises the majority of firm-year observations with no insider trades. Our main inferences remain unchanged, and are even stronger based on these alternative samples. We also consider using an alternative measure of tax aggressiveness based on the bottom quintile of three-year or five-year cash effective tax rates. Results are weaker but qualitatively similar based on these alternative measures.

Cross-sectional analyses – Test of Hypothesis 2

In this section, we explore cross-sectional variation in the relation between tax aggressiveness and insider trading profitability. In Hypothesis 2a we argue that more effective monitoring can reduce the extent of opportunistic insider trading of tax aggressive firms, and hence, the positive association between tax aggressiveness and insider trading profitability should be weaker for firms with more effective monitoring. Panel A of Table 4 presents the results of this analysis using the percentage of institutional ownership (*IOHOLD*) as a proxy for the strength of monitoring.[22] We find that the positive association between tax aggressiveness and insider purchase profitability is significantly weaker for firms with higher institutional ownership. This result is consistent with our prediction in Hypothesis 2a that more effective monitoring mitigates opportunistic trading by insiders of tax aggressive firms and hence limits their ability to trade profitably from insider purchases.[23] Given that we do not find a significant association between tax aggressiveness and insider sales profitability, we do not test the moderating effect of monitoring on this association.

[22] To conserve space, in subsequent tables we do not tabulate the estimated coefficients on the control variables and the control variables interacted with the moderating variable.

[23] Blaylock (2016) fails to find a difference in the relation between tax avoidance and rent extraction for well versus poorly governed firms. We believe that the main difference in our finding is that Blaylock (2016) focuses on the level of managerial entrenchment (proxied using E-index, G-index and a dual class share structure) as the most relevant aspect of corporate governance in his setting, while our study focuses on institutional ownership as the main proxy for monitoring strength.

[Insert Table 4 here]

In Hypothesis 2b we argue that greater overall firm opacity enhances the private information advantage of insiders of tax aggressive firms. In panel B of Table 4, we present the results using the opacity index (*OPACITY*) to proxy for overall firm opacity. We find that the positive association between tax aggressiveness and insider purchase profitability is significantly stronger for firms with a higher opacity index, although the interaction coefficient is positive but not significant when we examine *SHELTER*. Next, when we replace *OPACITY* with the residual from regressing *OPACITY* on *TAX*, we find that the results (untabulated) are qualitatively similar to those in panel B of Table 4. Given that we do not find a significant association between tax aggressiveness and insider sales profitability in Table 3, we do not test the moderating effect of overall firm opacity on this association. Overall, our results suggest that greater overall firm opacity increases the ability of insiders of tax aggressive firms to earn more profits from insider purchases, consistent with our prediction in Hypothesis 2b.

5. Additional Analyses and Sensitivity Checks

Firm fixed effects specification and controlling for alternative explanations

In our main analyses, we include an extensive set of control variables that have been documented in prior literature to be correlated with insider trading profitability as well as our measures of tax aggressiveness. To further mitigate concerns that omitted variables could be driving our results, we include firm fixed effects, as opposed to industry fixed effects in our earlier specifications, to control for time-invariant firm characteristics, and we assume that any potential omitted variables are stable and constant over time. In untabulated analyses, we continue to find that all three measures of tax aggressiveness are positively and significantly associated with insider purchase profitability. Consistent with our earlier results, we do not find that tax aggressiveness is

associated with insider sales profitability. These results suggest that our earlier findings are robust to potential omitted variables that are stationary over time.

Another alternative explanation for our finding that insider purchase profitability is significantly higher for tax aggressive firms is that tax aggressiveness is simply a proxy for future profitability. To mitigate this alternative explanation, we check the robustness of our results by including the one-year-ahead change in ROA (defined as the change in income before extraordinary items scaled by average total assets) as an additional control variable in our main analyses. Our inferences are unchanged (results untabulated). We also use alternative proxies for future profitability, such as (1) the level of ROA, (2) the change in operating income before depreciation, (3) the change in net income, and (4) analysts' long-term growth forecasts. Our results are robust to these alternative specifications (results untabulated).

Insider trading intensity prior to firm-specific stock price crashes

In our earlier analyses, we generally find that insiders of tax aggressive firms are able to trade more profitably in purchases but not in sales, possibly because insiders generally sell for other non-information driven reasons. In this section, we follow Ravina and Sapienza (2010) and explore a setting where insider sales transactions are more likely to be information driven.

As mentioned earlier, Kim et al. (2011) find that stock price crash risk increases with tax avoidance, consistent with the opacity surrounding tax avoidance activities facilitating the accumulation and concealment of bad news, which results in stock price crashes when the accumulated bad news is eventually released simultaneously. If tax avoidance activities are opportunistic, managers are likely to be aware of any "bad news" hidden within the tax avoidance framework and to dispose of their shares before future stock price crashes. Hence, we investigate whether tax aggressiveness is associated with insider trading intensity (lower purchase volume and

higher sale volume) in the period prior to stock price crashes.[24]

Following prior work (Hutton et al. 2009; Kim et al. 2011), we define a crash in a specific year for a particular firm as a week during which the firm experiences firm-specific weekly returns 3.09 standard deviations below the mean firm-specific weekly returns over the entire fiscal year (3.09 standard deviations is chosen so as to generate a frequency of 0.1% in the normal distribution). The firm-specific weekly returns are estimated based on the residual return from the expanded market model.[25] For firms that experience crashes in a particular fiscal year, we examine whether tax aggressiveness is associated with insider trading intensity in the prior fiscal year before the crash year. In particular, we estimate the following pooled cross-sectional regression for firm-year observations that experience crashes during the fiscal year t+1:

$$INS\_VOL_{it} = \alpha + \beta TAX_{it} + \psi FIRM\_CONTROLS_{it} + IND\_FE + \varepsilon_{it} \quad (3),$$

where *INS_VOL* refers to either insider sales volume or purchase volume (*SALE_VOL* or *PURCH_VOL*, respectively), *TAX*, *FIRM_CONTROLS*, and *IND_FE* are similarly defined as before in (1). If insiders of tax aggressive firms are opportunistic and dispose of their shares (or refrain from purchasing shares) before future stock price crashes, we expect a positive (negative) coefficient on *TAX* when *SALE_VOL* (*PURCH_VOL*) is the dependent variable.

The results are presented in Table 5. We find that tax aggressiveness is significantly associated with greater insider sales volume in the fiscal year prior to the crash (with the exception of *CETR*). We do not find that tax aggressiveness is significantly associated with lower insider

[24] We examine insider trading volume instead of trading profit in this set of analysis because of the potential mechanical relationship between future stock price crashes and lower insider trading profitability - recall that our measure of insider trading profitability is the summation of one-year ahead individual trades, which overlaps with the period where the stock price crash occurs.

[25] In particular, the firm-specific weekly return, denoted by W, is defined as the natural log of one plus the residual return from the expanded market model regression, following Kim et al. (2011):

$r_{j,t} = \alpha_j + \beta_{1j} r_{m,t-2} + \beta_{2j} r_{m,t-1} + \beta_{3j} r_{m,t} + \beta_{4j} r_{m,t+1} + \beta_{5j} r_{m,t+2} + \varepsilon_{j,t}$

where $r_{j,t}$ is the return on stock j in week t and $r_{m,t}$ is the return on the CRSP value-weighted market index in week t.

purchase volume in the fiscal year prior to the crash. This result based on the crash sample stands in contrast with the results in the main analyses where we find that tax aggressiveness is associated with higher insider purchase profitability. The overall results suggest that insiders of tax aggressive firms dispose of their shares opportunistically to avoid losses and refrain from purchasing shares prior to stock price crashes.

[Insert Table 5 here]

Post-FIN 48 period

Financial Accounting Standards Board (FASB) Interpretation No. 48 ("FIN 48"), which is effective for fiscal years beginning after December 15, 2006, requires public firms to disclose their assessment of the amount of tax reserves recognized in financial statements in relation to those tax positions with an uncertain outcome and those that might not be sustainable upon audit ("unrecognized tax benefits"). According to the FASB, the purpose of this interpretation is to increase relevance and comparability in the financial reporting of income taxes and to provide more information about the extent of uncertain tax positions that firms undertake. As a result of this mandatory disclosure of uncertain tax positions under FIN 48, we expect an increase in transparency surrounding these tax positions. Therefore, we expect insiders' information advantage to decrease and hence the positive association between tax aggressiveness and insider trading profitability to diminish after the introduction of FIN 48. To test this conjecture, we create an indicator variable that equals one if the firm-year observation is on or after fiscal year 2007 and zero otherwise (*FIN48*), and we interact this variable with our measure of tax aggressiveness. The results of this analysis are presented in Table 6.

[Insert Table 6 here]

As shown in this table, we find that the association between tax aggressiveness and insider

purchase profitability weakens significantly after the introduction of FIN 48. We fail to find evidence that the association between tax aggressiveness and insider sales profitability is weaker in the post-FIN 48 period. The analyses suggest that the increased disclosure of uncertain tax positions under the FIN 48 regime increases the transparency of these uncertain tax positions, which results in a weaker association between tax aggressiveness and insider trading profitability in the post-FIN 48 period.

6. Conclusion

Whether managers use tax aggressive activities to opportunistically seek benefits for themselves and the mechanisms by which they do so remain unclear in the existing literature (Armstrong et al. 2015). We seek to provide evidence on this issue by examining the association between corporate tax aggressiveness and insider trading under the assumption that insider trading profits reflect managerial opportunism. Using a large sample of firms from fiscal years 1996–2014 and controlling for factors associated with insider trading, we document that insider trading purchase profitability is significantly *higher* in more tax aggressive firms. This result is consistent with increases in financial opacity under tax aggressiveness and insiders exploiting the associated information advantage to purchase their company shares and profit from them. We do not find that insider trading sales profitability is significantly higher on average in more tax aggressive firms.

We conduct a series of additional analyses to corroborate our findings and to provide additional insights. First, we find that the positive association between tax aggressiveness and insider trading profitability is weaker for firms with more effective monitoring (proxied by institutional ownership) and is stronger for firms with a more opaque information environment (proxied by an opacity index). Second, we document that tax aggressiveness is significantly associated with greater insider sales volume in the fiscal year prior to stock price crash, providing

evidence that insiders of tax aggressive firms trade opportunistically to avoid losses prior to stock price crashes. Finally, we find that the association between tax aggressiveness and insider purchase profitability weakens after the introduction of FIN 48.

To the extent that insider trading profits reflect managerial opportunism, our results are consistent with Desai and Dharmapala's (2006) theory of complementarities between tax aggressiveness and rent extraction. Our study hence adds to the growing literature that examines Desai and Dharmapala's (2006) theory (e.g., Blaylock 2016; Seidman and Stomberg 2017), which is particularly important in light of the substantial number of studies that rely on the agency view of tax avoidance to develop their hypotheses. Our findings also contribute to the ongoing debate on whether managers benefit from the opacity surrounding tax aggressive activities (e.g., Armstrong et al. 2015). Because managers can benefit from self-serving behavior in other ways, such as investing in pet projects, engaging in perks consumption, and shirking and slacking on performance, future studies can contribute to this debate and explore whether managers benefit from tax aggressive activities through these channels.

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Appendix

Variable Definitions

SALES PROFIT$	=	Aggregate profitability of all insider trades from insider sales transactions during the fiscal year, computed as follows: $\sum_{j=1}^{n} (ABRET_{itj} \times VALUE\_SOLD_{itj})$ where $ABRET_{itj}$ is equal to the one-year ahead buy-and-hold size-adjusted return computed for the period starting one day after transaction date *j*, $VALUE\_SOLD_{itj}$ equals the total dollar value of shares sold by all insiders on day *j*, and *n* is the total number of firm-days with insider sales activity during firm-year *it*. This measure is multiplied by -1 so that losses avoided on sales have the same sign as gains on purchases.
SALES VALUE$	=	Total dollar value of shares sold by all insiders during the fiscal year.
SALES FREQ	=	Number of insider sales transactions during the fiscal year.
PURCHASE PROFIT$	=	Same definition as *SALES PROFITS* except share purchases replaces share sales.
PURCHASE VALUE$	=	Total dollar value of shares purchased by all insiders during the fiscal year.
PURCHASE FREQ	=	Number of insider purchase transactions during the fiscal year.
SALE_PROFIT	=	(*SALES PROFIT$)/MV*$_{it}$ where *MV*$_{it-1}$ is the market value of equity at the end of fiscal year *t*-1.
PURCH_PROFIT	=	(*PURCHASE PROFIT$*)/*MV*$_{it-1}$ where *MV*$_{it-1}$ is the market value of equity at the end of fiscal year *t*-1.
SALE_VOL	=	Log of 1 + Dollar value of shares sold during the fiscal year.
PURCH_VOL	=	Log of 1 + Dollar value of shares purchased during the fiscal year.
CETR	=	An indicator equals one if the firm's one-year cash effective tax rate is in the bottom quintile of the sample population, and zero otherwise. Cash effective tax rate is defined as cash taxes paid (TXPD) divided by pre-tax income (PI). Following Chen et al. (2010), we remove observations with negative pre-tax income, and those observations with cash effective tax rates below zero or above one.
TBTD	=	Total book-tax differences which is computed as TXDI + (STR – ETR) × PI, where TXDI refers to deferred tax expense, STR refers to the statutory tax rate, ETR refers to the effective tax rate (income tax expense divided by pretax income) and PI refers to pretax income. This measure is then scaled by lagged total assets.
DTAX	=	Discretionary component of the permanent book-tax differences, as in Frank et al. (2009).
DDBTD	=	Desai and Dharmapala (2006) residual book-tax difference.

BTDFACTOR	=	An indicator equals one if the first principal component of the following three book-tax difference based measures are in the top quintile of the sample distribution of the principal component: (1) *TBTD*, (2) *DTAX*, and (3) *DDBTD*, and zero otherwise.
SHELTER	=	An indicator equals one if the firm's tax shelter prediction score estimated from the Wilson (2009) model is in the top quintile of the sample population, and zero otherwise..
LNMV	=	Natural log of market capitalization at the end of the prior fiscal year.
BTM	=	Book-to-market ratio at the end of the prior fiscal year, defined as book value of equity (CEQ) divided by market value of equity (CSHO x PRCC_F).
PRIOR_RET	=	Buy-and-hold size-adjusted returns over the one-year period ending one day before the first insider trading transaction during the fiscal year, set to zero for firm-years without any insider trading activity.
EP	=	Earnings to price ratio at the end of the prior fiscal year, defined as income before extraordinary items (IB) divided by market value of equity (CSHO x PRCC_F).
AVG_GROWTH	=	Weighted-average sales growth over the past five years, with year t-1 having a weight of 5, year t-2 having a weight of four, etc. When sales growth is missing for any year during the five-year period, the variable in that year is set equal to sales growth of the prior year.
AGE	=	Firm age at the end of the current fiscal year, measured by the number of years the company has stock price data on CRSP.
LOSS	=	An indicator equals one if the firm reports a negative income before extraordinary item (IB) in the prior fiscal year, and zero otherwise.
RND	=	An indicator variable equals one if the firm reports non-zero research and development expenses (XRD) in the current fiscal year, and zero otherwise.
MAG_AR	=	The median of absolute market reaction to prior quarterly earnings announcements, where market reaction is measured as the cumulative size-adjusted return from two days before to the day of the earnings announcement (Huddart and Ke 2007); the median is measure over the 20-quarter period ending with the fourth quarter of the current fiscal year.
ANALYST	=	Number of analysts following a firm at fiscal year-end.
IOHOLD	=	Percentage of institutional ownership at fiscal year-end.
FSINFORM	=	Financial statement informativeness computed as the adjusted R^2 from a firm-specific time-series regression of price per share (PRCCQ) on book value per share (CEQQ/CSHOQ) and earnings per share (IBQ/CSHOQ) using quarterly data from

		Compustat for the 20-quarter period ending with the fourth quarter of the current fiscal year.
RET_VOL	=	Stock return volatility over the current fiscal year.
OPACITY	=	The opacity index in the current fiscal year, following Anderson et al. (2009). This index encompasses four individual proxies for opacity: (1) trading volume, (2) bid-ask spread, (3) analyst following, and (4) analyst forecast errors. The opacity of a firm's information environment is presumed to be increasing in its bid-ask spread and analyst forecast errors, and decreasing in its trading volume and analyst following. This index is derived by ranking each of these proxies into deciles of opacity and allocating scores from one (least opaque) to ten (most opaque). The opacity index for each firm is then obtained by summing the scores across these four proxies and then dividing by the maximum possible score of forty such that the opacity index ranges from 0.1 to 1.0.
TURNOVER	=	Number of shares traded during the fiscal year divided by the number of shares outstanding (CSHO) at fiscal year-end.
RESTRICT	=	An indicator equals one if 75% or more of insiders' trades during the fiscal year occur in the 30-day window following an earnings announcement, and zero otherwise.
ACCEM	=	Discretionary accruals at fiscal year-end, based on the cross-sectional modified Jones (1991) model for all firms in the Compustat universe, estimated by 2-digit SIC industry and fiscal year.
ROA	=	Operating income before depreciation (OIBDP) in the current fiscal year scaled by lagged total assets (AT).
LEVERAGE	=	Long term debt (DLTT) at the end of the current fiscal year scaled by lagged total assets (AT).
NOL	=	An indicator equals one if the firm reports a positive tax loss carryforward (TLCF) at the beginning of the fiscal year, and zero otherwise.
FI	=	Foreign pre-tax income (PIFO) in the current fiscal year scaled by lagged total assets (AT); set to zero if foreign pre-tax income is missing.
PPE	=	Net property, plant and equipment (PPENT) at the end of the current fiscal year scaled by lagged total assets (AT).
INTANG	=	Intangible assets (INTAN) at the end of the current fiscal year scaled by lagged total assets (AT); set to zero if intangible assets is missing.
EQINC	=	An indicator equals one if the firm reports equity in earnings (ESUB) that is not zero in the current fiscal year, zero otherwise.

TABLE 1
Descriptive Statistics

Panel A: Descriptive Statistics for the Full Sample

Variables	**Obs.**	**Mean**	**Median**	**Std. Dev.**	**Q1**	**Q3**
SALES PROFIT	28,067	-250,459	0	41,647,899	-84,511	371,213
SALES VALUE	28,067	12,683,109	1,365,274	107,605,818	67,650	7,732,898
SALES FREQ	28,067	36.230	9.000	183.825	1.000	27.000
PURCHASE PROFIT	28,067	47,517	0	2,863,888	0	1,514
PURCHASE VALUE	28,067	592,228	4,874	9,151,970	0	130,000
PURCHASE FREQ	28,067	4.076	1.000	19.627	0.000	3.000
SALE_PROFIT	28,067	-0.037	0.000	4.940	-0.007	0.035
PURCH_PROFIT	28,067	0.016	0.000	0.472	0.000	0.000
CETR	20,444	0.200	0.000	0.400	0.000	0.000
BTDFACTOR	27,527	0.200	0.000	0.400	0.000	0.000
SHELTER	28,067	0.200	0.000	0.400	0.000	0.000
LNMV	28,067	6.791	6.625	1.721	5.532	7.921
BTM	28,067	0.507	0.435	0.360	0.260	0.668
PRIOR_RET	28,067	0.095	0.000	0.548	-0.200	0.250
EP	28,067	0.017	0.044	0.118	0.012	0.067
AVG_GROWTH	28,067	0.247	0.119	0.527	0.045	0.248
AGE	28,067	21.095	15.000	18.049	8.000	29.000
LOSS	28,067	0.209	0.000	0.407	0.000	0.000
RND	28,067	0.492	0.000	0.500	0.000	1.000
MAG_AR	28,067	0.034	0.030	0.017	0.021	0.043
ANALYST	28,067	7.663	6.000	6.975	2.000	11.000
IOHOLD	28,067	0.630	0.664	0.248	0.462	0.818
FSINFORM	28,067	0.385	0.379	0.292	0.138	0.629
RET_VOL	28,067	0.030	0.027	0.015	0.019	0.038
OPACITY	28,067	0.393	0.375	0.165	0.275	0.500
TURNOVER	28,067	2.269	1.711	1.939	0.982	2.898
RESTRICT	28,067	0.164	0.000	0.370	0.000	0.000
ACCEM	28,067	-0.005	0.005	0.137	-0.043	0.050
ROA	28,067	0.128	0.134	0.158	0.077	0.203
LEVERAGE	28,067	0.206	0.154	0.223	0.009	0.316
NOL	28,067	0.402	0.000	0.490	0.000	1.000
FI	28,067	0.015	0.000	0.036	0.000	0.019
PPE	28,067	0.303	0.211	0.277	0.091	0.434
INTANG	28,067	0.171	0.086	0.213	0.004	0.263
EQINC	28,067	0.877	1.000	0.329	1.000	1.000

TABLE 1 (Cont'd)

Panel B: Descriptive Statistics Partitioned by Tax Aggressiveness (Means)

Variables	***TAX = CETR***				***TAX = BTDFACTOR***				***TAX = SHELTER***			
	TAX = 0	***TAX = 1***	***t*-test**		***TAX = 0***	***TAX = 1***	***t*-test**		***TAX = 0***	***TAX = 1***	***t*-test**	
SALES PROFIT	-130,580	-2,176,904	-2.42	**	-85,035	-949,771	-1.36		354	-1,254,250	-2.02	**
SALES VALUE	14,868,832	19,128,278	1.94	*	11,938,076	16,197,164	2.60	***	7,272,146	34,338,532	16.94	***
SALES FREQ	41.876	44.519	0.74		34.739	42.766	2.88	***	30.683	58.429	10.13	***
PURCHASE PROFIT	11,983	96,467	2.12	**	38,994	84,745	1.05		43,822	62,304	0.43	
PURCHASE VALUE	525,797	508,175	-0.11		615,372	496,974	-0.85		499,873	961,844	3.38	***
PURCHASE FREQ	3.236	3.570	1.36		4.192	3.568	-2.09	**	4.449	2.584	-6.37	***
SALE_PROFIT	-0.021	-0.266	-2.48	**	-0.023	-0.098	-0.99		-0.041	-0.024	0.23	
PURCH_PROFIT	0.005	0.034	6.07	***	0.010	0.043	4.60	***	0.019	0.005	-1.94	*
LNMV	7.146	6.676	-15.55	***	6.785	6.869	3.25	***	6.271	8.874	127.30	***
BTM	0.463	0.503	7.66	***	0.530	0.418	-20.94	***	0.532	0.407	-23.49	***
PRIOR_RET	0.117	0.221	11.65	***	0.067	0.204	16.78	***	0.090	0.116	3.23	***
EP	0.052	0.031	-22.17	***	0.017	0.020	1.60		0.010	0.045	20.06	***
AVG_GROWTH	0.160	0.231	18.33	***	0.242	0.242	-0.09		0.271	0.148	-15.79	***
AGE	23.779	18.837	-15.26	***	21.648	19.095	-9.39	***	18.161	32.835	57.60	***
LOSS	0.055	0.183	27.41	***	0.212	0.184	-4.58	***	0.241	0.081	-26.68	***
RND	0.447	0.459	1.33		0.489	0.499	1.35		0.464	0.601	18.52	***
MAG_AR	0.031	0.035	12.22	***	0.034	0.035	3.92	***	0.036	0.027	-31.88	***
ANALYST	8.567	7.960	-4.79	***	7.414	8.850	13.60	***	6.036	14.176	88.41	***
IOHOLD	0.653	0.637	-3.73	***	0.627	0.652	6.60	***	0.611	0.706	25.98	***
FSINFORM	0.409	0.378	-6.06	***	0.382	0.403	4.77	***	0.374	0.433	13.61	***
RET_VOL	0.025	0.030	21.69	***	0.030	0.030	1.26		0.032	0.023	-41.18	***
OPACITY	2.033	2.568	17.45	***	2.182	2.613	14.84	***	2.240	2.384	4.97	***
TURNOVER	0.157	0.153	-0.63		0.166	0.155	-1.96	**	0.172	0.131	-7.42	***
RESTRICT	0.011	0.016	2.62	***	-0.005	-0.005	-0.04		-0.007	0.005	5.90	***
ACCEM	0.366	0.386	7.30	***	0.398	0.373	-9.97	***	0.426	0.262	-73.01	***
ROA	0.187	0.168	-10.82	***	0.110	0.208	43.12	***	0.116	0.179	27.06	***
LEVERAGE	0.196	0.238	11.50	***	0.202	0.219	5.10	***	0.209	0.192	-5.13	***

NOL	0.346	0.458	13.33	***	0.394	0.439	6.05	***	0.395	0.431	4.80	***
FI	0.023	0.015	-10.65	***	0.013	0.026	25.19	***	0.008	0.046	78.35	***
PPE	0.301	0.385	17.21	***	0.278	0.399	29.51	***	0.306	0.288	-4.39	***
INTANG	0.195	0.144	-13.56	***	0.171	0.169	-0.62		0.166	0.190	7.75	***
EQINC	0.858	0.882	3.90	***	0.875	0.884	1.71	*	0.903	0.774	-26.59	***
No. of obs.	16,360	4,084			22,025	5,502			22,456	5,611		

The sample period used for the study spans from 1996-2014. The descriptive statistics for all variables are based on the largest sample when tax aggressiveness is measured by *SHELTER*. The detailed definitions of the variables are provided in the Appendix. All continuous variables are winsorized at the 1 and 99 percentiles. *, **, and *** represent significance levels of 0.10, 0.05, and 0.01, respectively (two-tailed test).

TABLE 2
Pearson and Spearman Correlation Table

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	***SALE_PROFIT***		-0.10	-0.01	-0.01	0.00	0.01	0.00	0.02	0.00	-0.01	0.01	0.00	0.00	0.00	0.00
2	***PURCH_PROFIT***	-0.33		0.04	0.03	-0.01	-0.04	0.01	-0.02	-0.03	0.02	-0.02	0.03	0.01	0.03	-0.02
3	***CETR***	-0.02	0.03		0.32	0.04	-0.04	0.07	0.08	-0.13	0.07	-0.05	0.17	0.05	0.06	0.01
4	***BTDFACTOR***	-0.03	0.04	0.32		0.12	0.02	-0.13	0.10	0.01	0.00	-0.06	-0.03	0.01	0.02	0.08
5	***SHELTER***	-0.07	0.01	0.04	0.12		0.61	-0.14	0.02	0.12	-0.09	0.33	-0.16	0.11	-0.19	0.47
6	***LNMV***	-0.05	-0.01	-0.04	0.02	0.57		-0.29	0.01	0.21	-0.10	0.45	-0.27	-0.03	-0.35	0.70
7	***BTM***	-0.06	0.03	0.05	-0.14	-0.15	-0.28		-0.21	-0.08	-0.13	0.02	0.09	-0.22	0.01	-0.23
8	***PRIOR_RET***	0.06	-0.04	0.05	0.10	0.07	0.09	-0.23		0.05	0.03	-0.06	-0.04	0.03	0.12	0.01
9	***EP***	-0.06	0.00	-0.17	-0.01	0.13	0.18	0.19	0.02		-0.15	0.14	-0.69	-0.14	-0.18	0.11
10	***AVG_GROWTH***	0.08	-0.02	0.00	0.05	-0.11	-0.11	-0.19	0.00	-0.06		-0.23	0.20	0.08	0.18	-0.03
11	***AGE***	-0.08	0.01	-0.07	-0.05	0.28	0.39	0.09	0.00	0.23	-0.40		-0.17	0.00	-0.29	0.22
12	***LOSS***	0.02	0.02	0.17	-0.03	-0.16	-0.27	0.03	-0.11	-0.70	0.02	-0.19		0.17	0.20	-0.16
13	***RND***	0.04	0.01	0.05	0.01	0.11	-0.05	-0.24	0.00	-0.24	0.03	-0.02	0.17		0.13	-0.01
14	***MAG_AR***	0.08	0.00	0.06	0.03	-0.19	-0.38	-0.03	0.02	-0.21	0.22	-0.32	0.21	0.13		-0.19
15	***ANALYST***	-0.03	0.02	0.00	0.07	0.41	0.67	-0.25	0.06	0.07	0.04	0.16	-0.17	-0.01	-0.19	
16	***IOHOLD***	-0.01	0.02	0.04	0.04	0.15	0.40	-0.03	0.08	0.06	-0.10	0.11	-0.11	0.02	-0.11	0.33
17	***FSINFORM***	-0.04	0.02	-0.05	0.03	0.08	0.09	-0.07	0.09	0.09	0.01	0.06	-0.10	0.00	-0.07	0.06
18	***RET_VOL***	0.14	-0.02	0.09	0.03	-0.27	-0.49	-0.02	-0.04	-0.33	0.31	-0.43	0.36	0.15	0.54	-0.29
19	***OPACITY***	0.03	-0.02	-0.02	-0.06	-0.42	-0.80	0.30	-0.14	-0.08	0.04	-0.25	0.21	-0.03	0.24	-0.68
20	***TURNOVER***	0.10	0.00	0.12	0.09	0.05	0.23	-0.21	0.15	-0.12	0.21	-0.12	0.07	0.10	0.22	0.29
21	***RESTRICT***	0.00	0.01	-0.02	-0.01	-0.04	-0.06	0.05	-0.06	-0.01	-0.02	0.00	0.03	-0.01	0.03	-0.05
22	***ACCEM***	0.02	0.00	-0.02	-0.04	0.04	-0.04	-0.05	0.07	0.06	-0.02	0.02	-0.08	0.00	0.02	-0.04
23	***ROA***	-0.06	0.05	-0.14	0.29	0.17	0.20	-0.34	0.25	0.31	0.06	0.07	-0.44	-0.09	-0.07	0.22
24	***LEVERAGE***	-0.05	0.01	0.05	0.01	0.04	0.22	0.02	-0.01	0.14	-0.06	0.13	-0.07	-0.24	-0.15	0.14
25	***NOL***	0.01	0.01	0.13	0.04	0.03	0.02	-0.03	0.01	-0.15	-0.03	-0.03	0.15	0.17	0.06	0.01
26	***FI***	-0.04	0.03	0.00	0.08	0.49	0.30	-0.12	0.08	0.10	-0.13	0.20	-0.17	0.22	-0.12	0.19
27	***PPE***	-0.03	-0.01	0.03	0.13	0.00	0.10	0.03	0.01	0.11	-0.06	0.14	-0.12	-0.25	-0.10	0.09
28	***INTANG***	-0.02	0.02	-0.07	-0.03	0.09	0.15	-0.05	0.04	0.03	-0.02	0.05	-0.11	0.12	-0.07	0.10
29	***EQINC***	0.04	-0.01	0.01	0.01	-0.16	-0.18	-0.01	0.00	-0.07	0.08	-0.11	0.07	0.02	0.11	-0.10

TABLE 2 (Cont'd)

		16	17	18	19	20	21	22	23	24	25	26	27	28	29
1	***SALE_PROFIT***	0.01	-0.01	0.00	0.00	-0.02	0.01	0.00	-0.03	0.00	0.00	0.00	-0.01	0.00	0.00
2	***PURCH_PROFIT***	-0.03	0.01	0.04	0.03	0.01	0.00	0.01	0.01	0.00	0.00	-0.01	0.00	-0.02	0.01
3	***CETR***	0.03	-0.05	0.09	-0.02	0.12	-0.02	0.02	-0.12	0.07	0.13	0.02	0.09	-0.06	0.01
4	***BTDFACTOR***	0.04	0.03	0.01	-0.06	0.09	-0.01	0.00	0.25	0.03	0.04	0.15	0.18	0.00	0.01
5	***SHELTER***	0.15	0.08	-0.24	-0.40	0.03	-0.04	0.04	0.16	-0.03	0.03	0.42	-0.03	0.05	-0.16
6	***LNMV***	0.37	0.09	-0.43	-0.78	0.13	-0.06	-0.04	0.21	0.11	0.02	0.29	0.09	0.11	-0.19
7	***BTM***	-0.05	-0.07	0.05	0.31	-0.15	0.04	-0.03	-0.16	-0.07	-0.02	-0.16	0.04	-0.08	-0.01
8	***PRIOR_RET***	0.03	0.06	0.08	-0.09	0.24	-0.04	0.06	0.16	0.01	0.02	0.07	0.01	0.02	0.02
9	***EP***	0.09	0.04	-0.34	-0.15	-0.10	-0.03	0.08	0.36	-0.01	-0.12	0.12	0.08	0.06	-0.05
10	***AVG_GROWTH***	-0.13	-0.04	0.28	0.06	0.17	-0.01	-0.04	-0.25	0.02	0.03	-0.09	-0.03	-0.03	0.05
11	***AGE***	0.09	0.04	-0.37	-0.26	-0.13	-0.01	0.01	0.09	0.05	-0.05	0.16	0.12	-0.02	-0.12
12	***LOSS***	-0.12	-0.10	0.37	0.21	0.09	0.03	-0.09	-0.48	-0.01	0.15	-0.17	-0.10	-0.10	0.07
13	***RND***	0.01	-0.01	0.15	-0.03	0.10	-0.01	-0.03	-0.16	-0.20	0.17	0.17	-0.34	0.08	0.02
14	***MAG_AR***	-0.14	-0.06	0.50	0.22	0.23	0.03	0.00	-0.08	-0.09	0.05	-0.09	-0.12	-0.06	0.10
15	***ANALYST***	0.28	0.06	-0.26	-0.63	0.20	-0.06	-0.02	0.19	0.06	0.01	0.22	0.11	0.06	-0.11
16	***IOHOLD***		0.04	-0.24	-0.54	0.30	-0.01	-0.05	0.16	0.06	0.10	0.15	-0.06	0.19	0.00
17	***FSINFORM***	0.04		-0.10	-0.07	0.00	-0.03	0.01	0.12	-0.01	-0.02	0.07	0.00	0.03	-0.01
18	***RET_VOL***	-0.20	-0.11		0.35	0.36	0.03	-0.06	-0.29	-0.08	0.04	-0.17	-0.12	-0.14	0.11
19	***OPACITY***	-0.51	-0.07	0.38		-0.49	0.06	0.05	-0.21	-0.05	-0.10	-0.25	-0.02	-0.19	0.09
20	***TURNOVER***	0.44	0.00	0.30	-0.37		-0.01	-0.06	0.01	0.02	0.10	0.04	-0.01	0.00	0.05
21	***RESTRICT***	-0.01	-0.03	0.04	0.06	-0.01		-0.01	-0.02	0.00	-0.01	-0.02	0.00	-0.01	0.00
22	***ACCEM***	-0.06	0.01	-0.01	0.04	-0.06	-0.01		0.12	-0.02	-0.05	0.05	0.02	-0.02	-0.01
23	***ROA***	0.12	0.13	-0.22	-0.22	0.04	-0.03	0.08		0.08	-0.13	0.26	0.24	0.14	-0.04
24	***LEVERAGE***	0.09	-0.01	-0.18	-0.10	-0.02	-0.01	-0.02	0.09		0.01	-0.05	0.39	0.22	-0.06
25	***NOL***	0.11	-0.02	0.04	-0.10	0.14	-0.01	-0.03	-0.12	0.00		0.08	-0.12	0.13	0.04
26	***FI***	0.20	0.07	-0.21	-0.28	0.04	-0.01	0.07	0.24	0.00	0.12		-0.04	0.07	-0.06
27	***PPE***	-0.06	-0.01	-0.12	-0.02	-0.05	0.01	0.01	0.32	0.40	-0.12	-0.04		-0.24	-0.04
28	***INTANG***	0.24	0.02	-0.16	-0.22	0.03	0.00	-0.02	0.14	0.16	0.15	0.20	-0.22		-0.02
29	***EQINC***	0.01	-0.01	0.13	0.09	0.06	0.00	-0.01	-0.03	-0.09	0.04	-0.08	-0.04	-0.03	

This table reports the Pearson (Spearman) correlation between the variables used in the regression analysis in the upper (lower) diagonal, based on the largest sample when tax aggressiveness is measured by SHELTER. The detailed definitions of the variables are provided in the Appendix. All correlations (with the exception of those shaded) are statistically significant at the 0.05 level or better (two-tailed)

TABLE 3
Tax Aggressiveness and Profitability of Insider Trades

	TAX = CETR		*TAX = BTDFACTOR*		*TAX = SHELTER*	
	SALE_ PROFIT	*PURCH_ PROFIT*	*SALE_ PROFIT*	*PURCH_ PROFIT*	*SALE_ PROFIT*	*PURCH_ PROFIT*
TAX	-0.240	0.025***	0.052	0.027***	-0.133	0.025**
	(-1.34)	(2.69)	(0.39)	(3.42)	(-1.40)	(2.15)
LNMV	0.062**	-0.006	0.093*	-0.015	0.109*	-0.020*
	(2.18)	(-1.30)	(1.75)	(-1.64)	(1.83)	(-1.85)
BTM	-0.527	0.025**	-0.052	0.007	-0.044	0.003
	(-1.55)	(2.11)	(-1.28)	(0.57)	(-1.09)	(0.24)
PRIOR_RET	0.314	-0.020**	0.255	-0.028***	0.256	-0.027***
	(0.96)	(-2.02)	(1.20)	(-2.89)	(1.21)	(-2.91)
EP	1.608	-0.161	0.250	-0.027	0.226	-0.026
	(0.95)	(-1.61)	(1.05)	(-0.56)	(0.98)	(-0.55)
AVG_GROWTH	-0.181*	-0.021	-0.087*	0.006	-0.084*	0.005
	(-1.82)	(-1.55)	(-1.92)	(0.51)	(-1.92)	(0.48)
AGE	0.001	0.000	0.001	0.000	0.001	0.000
	(0.85)	(0.30)	(0.86)	(1.14)	(1.00)	(0.96)
LOSS	0.149	0.002	-0.105**	0.027**	-0.103**	0.028**
	(0.58)	(0.21)	(-2.40)	(2.00)	(-2.42)	(2.10)
RND	-0.086	0.011**	-0.069	0.006	-0.059	0.006
	(-1.39)	(2.19)	(-1.11)	(0.96)	(-1.03)	(0.83)
MAG_AR	1.835	-0.054	2.254	0.111	2.240	0.090
	(0.69)	(-0.26)	(1.12)	(0.56)	(1.12)	(0.47)
ANALYST	-0.003	-0.000	-0.005	0.000	-0.004	-0.000
	(-0.88)	(-0.37)	(-1.61)	(0.08)	(-1.49)	(-0.11)
IOHOLD	0.479	-0.037***	0.356	-0.044**	0.337	-0.041**
	(0.74)	(-2.58)	(0.89)	(-2.36)	(0.88)	(-2.29)
FSINFORM	-0.294	0.019*	-0.213	0.016*	-0.207	0.016*
	(-1.36)	(1.66)	(-1.27)	(1.73)	(-1.30)	(1.78)
RET_VOL	7.399	0.209	6.209	0.735*	6.268	0.722*
	(1.45)	(0.44)	(1.52)	(1.79)	(1.53)	(1.86)
OPACITY	0.012	-0.009	0.031	-0.097	0.088	-0.106
	(0.03)	(-0.39)	(0.09)	(-1.45)	(0.26)	(-1.55)
TURNOVER	-0.112	0.007	-0.087	0.001	-0.085	0.001
	(-0.70)	(1.59)	(-0.75)	(0.38)	(-0.74)	(0.53)
RESTRICT	0.068	-0.006	0.079	-0.005	0.080	-0.004
	(1.40)	(-1.55)	(1.58)	(-0.54)	(1.52)	(-0.51)
ACCEM	0.358**	0.019	0.112	0.023	0.136	0.017
	(2.49)	(0.66)	(0.62)	(0.86)	(0.77)	(0.63)
ROA	-2.684	0.099***	-1.220	0.119***	-1.154*	0.135***
	(-1.55)	(2.77)	(-1.63)	(5.79)	(-1.75)	(5.97)
LEVERAGE	0.121	0.028**	0.171	0.010	0.156	0.012
	(0.55)	(2.30)	(0.98)	(0.39)	(0.99)	(0.51)
NOL	0.010	-0.014*	-0.013	0.003	-0.008	0.003
	(0.27)	(-1.94)	(-0.45)	(0.35)	(-0.27)	(0.40)
FI	-0.280	0.040	-0.400	0.028	0.038	-0.009
	(-0.40)	(0.52)	(-0.55)	(0.36)	(0.07)	(-0.13)
PPE	-0.155	-0.023**	-0.298	-0.006	-0.278	-0.001

	(-0.92)	(-2.16)	(-1.24)	(-0.27)	(-1.31)	(-0.04)
INTANG	-0.080	-0.018	-0.014	-0.023	-0.003	-0.022
	(-0.31)	(-1.45)	(-0.08)	(-1.06)	(-0.02)	(-1.05)
EQINC	0.056	-0.002	0.039	-0.005	0.033	-0.004
	(0.90)	(-0.73)	(0.90)	(-0.91)	(0.84)	(-0.76)
Constant	0.109	0.035	-0.714*	0.126	-0.581**	0.159**
	(0.18)	(0.98)	(-1.71)	(1.49)	(-2.46)	(1.98)
Industry FE	YES	YES	YES	YES	YES	YES
Observations	20,444	20,444	27,527	27,527	28,067	28,067
Adjusted R^2	0.018	0.009	0.013	0.004	0.012	0.004

This table reports the regression results of the relation between tax aggressiveness and the profitability of insider trades. The detailed definitions of the variables are provided in the Appendix. T-statistics are reported in parentheses below the coefficient estimates. Standard errors are clustered by firm and year to correct for time-series and cross-sectional dependence (Petersen 2009; Gow et al. 2010). *, **, and *** represent significance levels of 0.10, 0.05, and 0.01, respectively (two-tailed test).

TABLE 4
Tax Aggressiveness and Profitability of Insider Trades – Cross-Sectional Analyses

Panel A: The Role of Monitoring

	TAX = CETR		*TAX = BTDFACTOR*		*TAX = SHELTER*	
	SALE_ PROFIT	*PURCH_ PROFIT*	*SALE_ PROFIT*	*PURCH_ PROFIT*	*SALE_ PROFIT*	*PURCH_ PROFIT*
TAX	-0.213	0.025***	0.039	0.029***	-0.137	0.028**
	(-1.40)	(2.78)	(0.29)	(3.48)	(-1.39)	(1.99)
TAX × IOHOLD	1.511	-0.073**	-0.651	-0.107**	0.660	-0.122**
	(1.10)	(-2.47)	(-0.67)	(-2.27)	(0.94)	(-2.25)
IOHOLD	-6.908	-0.015	-0.931	-0.347	-0.674	-0.446
	(-0.95)	(-0.09)	(-0.51)	(-1.18)	(-0.43)	(-1.54)
Constant	0.192	0.017	-0.730*	0.120	-0.580**	0.141*
	(0.26)	(0.53)	(-1.77)	(1.47)	(-2.14)	(1.91)
CONTROLS	YES	YES	YES	YES	YES	YES
CONTROLS × IOHOLD	YES	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES
Observations	20,444	20,444	27,527	27,527	28,067	28,067
Adjusted R^2	0.028	0.012	0.018	0.007	0.017	0.006

Panel B: The Role of Opaque Information Environment

	TAX = CETR		*TAX = BTDFACTOR*		*TAX = SHELTER*	
	SALE_ PROFIT	*PURCH_ PROFIT*	*SALE_ PROFIT*	*PURCH_ PROFIT*	*SALE_ PROFIT*	*PURCH_ PROFIT*
TAX	-0.218	0.024***	0.048	0.029***	-0.101	0.028*
	(-1.36)	(2.71)	(0.35)	(3.49)	(-1.64)	(1.91)
TAX × OPACITY	-1.251	0.108***	0.542	0.167***	-0.433	0.084
	(-1.00)	(3.31)	(0.68)	(3.77)	(-0.95)	(1.35)
OPACITY	0.515	0.072	-2.138	-0.074	-2.064	-0.040
	(0.46)	(0.45)	(-0.78)	(-0.50)	(-0.77)	(-0.28)
Constant	-0.142	0.046	-0.752	0.083	-0.794***	0.121*
	(-0.52)	(1.53)	(-1.47)	(1.25)	(-2.62)	(1.88)
CONTROLS	YES	YES	YES	YES	YES	YES
CONTROLS × OPACITY	YES	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES
Observations	20,444	20,444	27,527	27,527	28,067	28,067
Adjusted R2	0.023	0.016	0.016	0.005	0.015	0.005

This table reports the regression results of the role of moderating (conditioning) variables on the relation between tax aggressiveness and the profitability of insider trades. We mean-center the conditioning variable (*IOHOLD*) in the regression analysis to mitigate multicollinearity problem. The detailed definitions of the variables are provided in the Appendix. T-statistics are reported in parentheses below the coefficient estimates. Standard errors are clustered by firm and year to correct for time-series and cross-sectional dependence (Petersen 2009; Gow et al. 2010). In Panel A the moderating variable is institutional ownership. In Panel B the moderating variable is the opacity index (Anderson et al. 2009). *, **, and *** represent significance levels of 0.10, 0.05, and 0.01, respectively (two-tailed test).

TABLE 5
Tax Aggressiveness and Timing of Insider Trades – Prior to Stock Price Crashes

	TAX = CETR		*TAX = BTDFACTOR*		*TAX = SHELTER*	
	SALE_VOL	*PURCH_VOL*	*SALE_VOL*	*PURCH_VOL*	*SALE_VOL*	*PURCH_VOL*
TAX	-0.026	0.059	0.164***	-0.004	0.256**	-0.026
	(-0.22)	(0.85)	(2.76)	(-0.07)	(2.16)	(-0.32)
Constant	1.044	-0.499	1.660***	-0.708**	7.727***	-1.942***
	(1.59)	(-1.07)	(2.67)	(-2.01)	(14.17)	(-4.05)
CONTROLS	YES	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES
Observations	4,622	4,622	6,019	6,019	6,139	6,139
Adjusted R^2	0.357	0.059	0.390	0.062	0.391	0.063

This table reports the regression results of the relation between tax aggressiveness and the intensity of insider trading during the fiscal year before stock price crashes. The detailed definitions of the variables are provided in the Appendix. T-statistics are reported in parentheses below the coefficient estimates. Standard errors are clustered by firm and year to correct for time-series and cross-sectional dependence (Petersen 2009; Gow et al. 2010). *, **, and *** represent significance levels of 0.10, 0.05, and 0.01, respectively (two-tailed test).

TABLE 6
Tax Aggressiveness and Timing of Insider Trades – Post FIN 48 Period

	TAX = CETR		*TAX = BTDFACTOR*		*TAX = SHELTER*	
	SALE_ PROFIT	*PURCH_ PROFIT*	*SALE_ PROFIT*	*PURCH_ PROFIT*	*SALE_ PROFIT*	*PURCH_ PROFIT*
TAX	-0.389	0.040***	0.067	0.044***	-0.202	0.037**
	(-1.24)	(3.12)	(0.33)	(3.87)	(-1.40)	(2.50)
TAX × FIN48	0.384	-0.036***	-0.068	-0.040***	0.174	-0.037**
	(1.07)	(-2.83)	(-0.34)	(-2.63)	(1.27)	(-2.21)
FIN48	-0.328	-0.000	0.732***	-0.141	0.848***	-0.174
	(-0.48)	(-0.00)	(2.69)	(-1.02)	(2.81)	(-1.21)
Constant	0.114	0.031	-0.837**	0.209	-0.992***	0.241*
	(0.17)	(0.57)	(-2.56)	(1.45)	(-4.04)	(1.68)
CONTROLS	YES	YES	YES	YES	YES	YES
CONTROLS × FIN48	YES	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES
Observations	20,444	20,444	27,527	27,527	28,067	28,067
Adjusted R^2	0.020	0.013	0.014	0.006	0.014	0.005

This table reports the regression results of the effect of FIN 48 on the relation between tax aggressiveness and the profitability of insider trades. The detailed definitions of the variables are provided in the Appendix. T-statistics are reported in parentheses below the coefficient estimates. Standard errors are clustered by firm and year to correct for time-series and cross-sectional dependence (Petersen 2009; Gow et al. 2010). *, **, and *** represent significance levels of 0.10, 0.05, and 0.01, respectively (two-tailed test).