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Corporate tax aggressiveness and managerial rent extraction: Evidence from insider trading

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Abstract

Recent studies argue that aggressive forms of tax avoidance can be used to facilitate managerial rent extraction from shareholders (e.g., Desai 2004; Desai and Dharmapala 2006; Desai et al. 2007). Despite this agency view of tax avoidance receiving increasing attention in the literature, there is limited empirical evidence that managers actually extract rents generated from tax avoidance activities. In this paper, we examine the association between corporate tax aggressiveness and managerial rent extraction in the form of insider trading profitability. We document that, on average, insider purchase profitability, but not sale profitability, is significantly higher in more tax aggressive firms. The positive association between tax aggressiveness and insider purchase profitability is attenuated for firms with more effective monitoring and for firms with better information environments. Finally, we find that tax aggressiveness is significantly associated with greater insider sale volume in the fiscal year prior to a stock price crash. Our study contributes to the literature by providing empirical evidence that managers do, in fact, extract insider trading rents through corporate tax aggressiveness (Armstrong et al. 2015) and the 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.

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1. Introduction

Recent studies argue that aggressive forms of tax avoidance can be used to facilitate managerial rent extraction from shareholders (e.g., Desai 2004; Desai and Dharmapala 2006; Desai et al. 2007). Despite this agency view gaining increasing attention in the literature and many studies relying on it to either develop arguments or draw inferences (e.g., Hanlon and Slemrod 2009; Desai and Dharmapala 2009; Chen et al. 2010; Kim et al. 2011; Goh et al. 2013 etc.), whether managers make use of 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, "their (Desai and Dharmapala 2006) model assumes that managers can extract rents generated by tax avoidance because operational complexity (and the accompanying information asymmetry) results in a more opaque information environment and therefore lowers the cost and expands the scope for rent extraction. However, Gallemore and Labro (2014) find that tax avoidance is associated with higher quality (internal) information environments and 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." The objective of this study is to provide large sample evidence on the association between corporate tax aggressiveness and managerial rent extraction in the form of managerial insider trading profitability.

Although there are many ways in which managers can extract rent from shareholders (e.g., investing in pet projects, perks consumption, shirking, living the quite life, etc.), we focus

on managers' informed insider trading because these are more observable and can be measured easily for a broad sample of U.S. firms, due to SEC requirements that firms report insider trading activities on SEC Forms 3, 4, and 5. Because insiders profit at the expense of shareholders when trading their firms' shares based on their private information, much of the prior literature in accounting, finance and law argue that informed insider trading is undesirable (e.g., Seyhun 1986; Ausubel 1990; Fishman and Hagerty 1992; Fried 1996; Lakonishok and Lee 2001). Specifically, when insiders trade on their privileged information, it redistributes wealth from outsiders to insiders, reduces 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. Furthermore, insider trading is socially undesirable based on the intuition that it is unfair for corporate insiders to trade on their private information with those that do not have access to such information.[1]

In this study, we argue that an association can exist between aggressive tax avoidance and insider trading profitability. On the one hand, firms that aggressively pursue tax savings have incentives to invest in high quality management accounting systems in order to identify tax opportunities, coordinate tax planning across business segments, and reduce uncertainty about the payoffs of tax planning strategies (Gallemore and Labro 2014). On the other hand, the agency view of tax avoidance proposed by Desai and Dharmapala (2006) suggests that the increased opacity from complex tax transactions can provide managers with the tools, masks,

[1] Some studies (e.g., Manne 1966; Carlton and Fischel 1983) however contend that insider trading promotes market efficiency by enabling the market price of the affected security to move toward the price that the security would command if the inside information were publicly available. In addition, Manne (1966) argues that insider trading profits represent the most efficient means of compensating entrepreneurs and incentivizes them to produce more innovations. Consistent with this argument, Roulstone (2003) find that firms that restrict insider trading pay a premium in total compensation relative to firms that do not restrict insider trading.

and justifications for rent extraction and other resource-diverting activities.[2] Hence, self-serving managers can still reduce the quality of the externally reported financial information despite the firm having a high quality internal information environment. To the extent that tax aggressive activities are opportunistic and self-serving, and insiders are able to use complex structured transactions underlying tax planning to inflate reported earnings and stock price for an extended period of time, we expect insiders to exploit the corporate opacity arising from tax avoidance activities to profit from purchasing the company shares. This line of reasoning suggests we should observe the profitability of insider trading purchases to increase with a firm's tax aggressiveness.

It is *ex ante* not clear how the profitability of insider sales is associated with a firm's tax aggressiveness. Managers may not have incentives to sell the company shares unless the concealment of the true performance of the firm becomes impossible and when stock price is about to crash (e.g., Kim et al. 2011). Furthermore, prior literature suggests that insider sale transactions are generally less informative than insider purchase transactions because insiders sell for other reasons such as diversification or portfolio rebalancing and for liquidity needs (Ofek and Yermack 2000). Also, there are costs in the form of higher litigation risk involved in insider sale transactions (Cheng and Lo 2006; Johnson et al. 2007), which may deter insiders in tax aggressive firms from engaging in informed insider sales. Hence, how the profitability of insider sales is associated with a firm's tax aggressiveness is an empirical question.

Following prior studies (e.g., Huddart and Ke 2007; Skaife et al. 2013), we define the profitability of insider trading as the gains after purchases and the losses avoided by selling shares. If insiders' trades reflect information already impounded in stock prices, the average

[2] For example, Desai (2004) provides anecdotal examples of high profile cases of tax avoidance – at Enron, Tyco and Xerox – that reveal how the incentive to improve reported profits fosters tax avoidance activities and how the corresponding drive to avoid taxes gives rise to the manipulation of accounting profits and managerial malfeasance.

insider trading profits should be zero. In contrast, insider trading profits will be positive when managers trade on their private information. Consistent with Frank et al. (2009), we characterize tax aggressiveness as reflecting a broad range of activities that would not necessarily be deemed as inappropriate by the tax authorities, but reflecting increasing degree of tax aggressiveness the more a firm utilizes them (e.g., transfer pricing arrangements, location of intangible property in low-tax locations, utilization of flow-through entities in structured transactions, tax shelter transactions, etc.). Following prior studies (e.g., Kim et al. 2011; Rego and Wilson 2012), we use several measures of tax aggressiveness to triangulate our inferences: (1) cash effective tax rate, (2) total book-tax differences, (3) discretionary book-tax difference based on Frank et al. (2009) and (4) tax shelter prediction score based on Wilson (2009).

Using a large sample of firms from fiscal years 1995–2010 and controlling for factors associated with insider trading, we find that insider trading purchase profits are significantly *higher* in more tax aggressive firms. 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 sale profits are significantly higher in more tax aggressive firms. To further corroborate our analyses we examine whether the association between tax aggressiveness and insider trading profitability is weaker for firms that exert more effective monitoring over insiders. In addition, because Gallemore and Labro (2014) argue that tax aggressive firms have incentives to invest in high quality management accounting systems, we examine whether a better information environment arising from tax avoidance activities limits the ability of insiders to take advantage of the opacity associated with tax aggressiveness to extract rent from insider trading. We proxy for the effectiveness of monitoring using institutional ownership, and proxy for the quality of the firm's information environment

using the number of analyst following and bid-ask spread. Consistent with our expectations, we find that the positive association between tax aggressiveness and the profitability of insider purchases is attenuated for firms with greater institutional ownership, greater analyst following, and lower bid-ask spreads.

Next, we separately examine the profitability of inside trades by insider types: 1) CEOs and CFOs; 2) other officers and; 3) non-officer directors. We find that all insiders, including supposedly less informed non-officer directors, are also able to profitably purchase in firms with higher tax aggressiveness. The result that non-officer directors are also able trade profitably is consistent with that documented by Ravina and Sapienza (2010), who find that independent directors are able to trade almost as profitably as other executives. Overall, the results suggest that the opacity and agency problems surrounding tax aggressiveness permeate the entire firm such that all insiders are able to profit from their purchases.

Prior work (e.g., Bettis et al. 2000; Roulstone 2003; Jagolinzer et al. 2011) highlights that many firms restrict their insiders from trading during periods before quarterly earnings announcements. These periods are where information asymmetry is presumably higher before earnings disclosure and hence the restriction limits insiders' ability to trade on private information about the upcoming earnings news. Despite these restrictions, Jagolinzer et al. (2011) document that about 24% of all insider trades occur within restricted trade windows, and that these trades are more profitable than those outside restricted trade windows. Given the increased complexity and opacity associated with tax aggressive activities, we investigate whether insiders of tax aggressive firms are more likely to time their trades during restricted trading windows (defined as the window beginning with 46 days prior to earnings announcement and ending one-day after announcement following Jagolinzer et al. 2011). We find a positive

association between tax aggressiveness and insider purchase profitability during these restricted trading windows but fail to find such association outside the restricted trading windows. This finding suggests that insiders of tax aggressive firms are able to trade more profitably because they time their trades strategically during periods of high information asymmetry before earnings announcement.

One reason we fail to find that insiders of tax aggressive firms are able to trade more profitably from sales transactions could be that insider sale transactions are generally less informative because insiders sell for other reasons such as diversification or portfolio rebalancing and for liquidity needs (Ofek and Yermack 2000). Following Ravina and Sapienza (2010), we explore a setting where insider sale transactions are more likely to be information-driven to examine whether insiders of tax aggressive firms are able to trade more profitably from their sale transactions. Given Kim et al.'s (2011) finding that tax avoidance facilitates bad news hoarding activities for extended periods, leading to stock price crashes when the accumulated hidden bad news crosses a tipping point, we investigate whether tax aggressiveness is associated with greater trading intensity in the period prior to stock price crashes.[3] Consistent with our expectations, we find that tax aggressiveness is significantly associated with greater insider sale volume in the fiscal year prior to the crash.[4] This result provides some evidence that insiders of tax aggressive firms trade opportunistically to avoid losses prior to stock price crashes.

We conduct several additional analyses to test the robustness of our results. First, we find that our results are robust to using two alternative measures of tax aggressiveness: the long-run

[3] Following prior work (Hutton et al. 2009; Kim et al. 2011), we define a crash in a given specific year for a given 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.

[4] We examine volume instead of profit 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.

cash effective tax rate developed by Dyreng et al. (2008) and the residual book-tax difference based on Desai and Dharmapala (2006). Second, to mitigate the concerns that the association between tax aggressiveness and insider trading profitability is merely driven by previously documented effects of accruals on insiders' trading (e.g., Beneish and Vargus 2002; Bartov and Mohanram 2004), we further control for discretionary accruals based on the cross-sectional Modified Jones (1991) model. Our main results remain unchanged. Finally, Hoi et al. (2013) document that firms with excessive irresponsible corporate social responsibility (CSR) activities are associated with higher tax avoidance and Gao et al. (2014) find that firms that invest in CSR activities are committed to building a positive image of caring for social good and are therefore less likely to engage in profitable insider trading. Hence, we include CSR orientation as an additional control which results in a much reduced sample. We find that our main inferences remain the same.

Our study contributes to the literature by providing direct empirical evidence that managers do, in fact, extract rents through tax aggressiveness (Armstrong et al. 2015) and we document one mechanism through which managers extract rents from tax aggressiveness - that is, via insider trading. However, we caution that we only find evidence of significant insider purchase profits on average, presumably because information-driven insider sales are more difficult to observe generally. Nonetheless, we do find evidence of greater insider sale volume in the period prior to stock price crashes, which is a more powerful setting where insider sale transactions are more likely to be information-driven. Our finding is particularly important in light of the substantial amount of studies that rely on this agency argument to develop their hypothesis (e.g., Chen et al. 2010; Kim et al. 2011; Goh et al. 2013).

The remainder of our paper proceeds as follows. In the next section, we discuss the findings in 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.

2. Related Literature and Hypothesis Development

2.1 Agency view of corporate tax avoidance

Firms have incentives to reduce their tax burden through tax planning because the incurrence of income taxes is a substantial expense for firms and the payment of income taxes can reduce the cash available for reinvestment, growth, and shareholders. Notwithstanding the cash savings benefit of tax avoidance behavior, it can be a potentially costly activity to shareholders. Aggressive tax planning requires complex structuring of transactions such as transfer pricing, allocation of debt and earnings stripping, creating hybrid entities or instruments, setting up offshore intellectual property havens, and centralizing operating activities in tax-friendly jurisdictions to minimize the overall corporate tax burden.[5] These tax planning arrangements are likely to increase organizational complexity and financial opacity, making it more difficult for outsiders to interpret the source and persistence of the firm's earnings and cash flows and thus lead to reduced corporate transparency (e.g., Bushman et al. 2004; Balakrishnan et al. 2013). To the extent that this greater complexity cannot be adequately communicated to outside parties, such as equity investors, creditors, and analysts, transparency problems can arise. Consistent with this line of reasoning, Balakrishnan et al. (2013) find positive associations

[5] For example, some corporations take advantage of tax breaks and/or tax holidays offered in certain countries (such as Ireland, Singapore and Vietnam) to centralize their regional administrative, research and development, manufacturing or logistics function to reduce overall tax burden and to reap economies of scale in these operating activities.

between tax avoidance (proxied by the firm's effective tax rates) and measures of information uncertainty, information asymmetry and earnings quality. Kim et al. (2011) find that a firm's stock price crash risk increases with tax aggressiveness and Frank et al. (2009) find a strong positive relation between aggressive tax and financial reporting.[6]

Under the agency view of tax avoidance, the increased opacity from complex tax transactions can provide managers with the tools, masks, and justifications for rent extraction and other resource-diverting activities (e.g., Desai 2004; Desai and Dharmapala 2006; Desai et al. 2007). Desai and Dharmapala (2006) develop a model that presumes that management can extract rents derived under the guise of tax avoidance, in part, because tax avoidance increases firm operational complexity. In empirical tests, they find that higher incentive compensation is associated with lower tax avoidance, and this negative effect is driven primarily by firms with weaker governance.[7] The authors interpret their evidence as consistent with agency costs diminishing the benefits of corporate tax avoidance to shareholders. Consistent with this notion, Desai et al. (2007) find that firms experience an increase in market value after an increase in targeted tax enforcement in Russia. This result suggests that even though tax avoidance activities save investors cash, investors are aware of the potential managerial self-dealing and react favorably to regulatory actions that prevent managers from transferring corporate resources under the cover of or through tax transactions. Hence, these papers suggest that tax avoidance can exacerbate the agency problems between the firm and its shareholders.

Many studies in finance and accounting motivate hypotheses or develop arguments based on the underlying assumption of this agency view of tax avoidance. For instance, Chen et al.

[6] In contrast, Lennox et al. (2013) find that tax avoidance firms are less likely to commit accounting fraud, an extreme form of earnings management.

[7] Desai and Dharmapala (2006) measure incentive compensation using the value of stock option grants as a fraction of total compensation of all the firm's managers.

(2010) argue that family owners are willing to forgo tax benefits to avoid the non-tax cost of a potential stock price discount, which can arise from minority shareholders' concern with family rent-seeking masked by tax avoidance activities. Consistent with their expectation, they find that family firms are less tax aggressive than their non-family counterparts. Kim et al. (2011) argue that tax avoidance facilitates managerial rent extraction and bad news hoarding activities for extended periods by providing tools, masks, and justifications for these opportunistic behaviors. The hoarding and accumulation of bad news for extended periods lead to stock price crashes when the accumulated hidden bad news crosses a tipping point, and is then released all at once. Consistent with their prediction, they find strong and robust evidence that corporate tax avoidance is positively associated with firm-specific stock price crash risk. Goh et al. (2013) argue that under this agency view of tax aggressiveness, managers have incentives to conceal their opportunistic behavior from the investigations of auditors and investors by maintaining the complexity and opacity of tax avoidance activities.[8] This increased opacity makes it harder for auditors to uncover any accounting irregularities embedded within these tax avoidance activities. Moreover, the agency problems embedded within tax avoidance activities can cause a serious breakdown in auditor-client relationship, making it harder for auditors to peacefully remediate the problems without conflict with managers. Consistent with this line of reasoning, they find a positive relation between tax aggressiveness and the likelihood of auditor resignation.

Despite the agency view of tax avoidance being widely cited in the finance and accounting literature, the mechanism through which managers extract rents from tax aggressive activities remains unclear and there is limited empirical evidence that managers do, in fact, extract rents through tax avoidance (Armstrong et al. 2015). An exception is Blaylock (2014)

[8] Consistent with the arguments in Goh et al. (2013), Donohoe and Knechel (2014) document an audit fee premium attributable to tax aggressiveness that is incremental to premiums relating to an auditor's general concerns about earnings management via the tax accounts.

who tests for large sample evidence whether tax avoidance is associated with economically significant managerial rent extraction from shareholders in the U.S. However, he is unable to find evidence that tax avoidance is related to managerial rent extraction based on three proxies for managerial opportunism: low relative future performance, overinvestment, and low relative payouts to common shareholders. Blaylock (2014) concludes that researchers should exercise care when making predictions that assume a relation between tax avoidance and rent extraction by carefully considering how appropriate this theory is for the firms in their sample.

2.2 Corporate tax aggressiveness and insider trading

In this study, we examine whether tax aggressiveness is associated with managerial rent extraction in the form of insider trading profitability. Prior studies suggest that there can be more profitable insider trading opportunities as the degree of information asymmetry increases. For instance, Kyle (1985) demonstrates the positive relation between insiders' profits and insiders' informational advantage in his analytical model. Consistent with this line of reasoning, Aboody and Lev (2000) find that insider trading profit is higher in firms with greater information asymmetry, captured by greater research and development (R&D) expenditure. Seyhun (1998) and Lakonishok and Lee (2001) document that insider trading in smaller firms predict future returns but that insider trading in large firms do not. Finally, using analyst following as a proxy for information asymmetry, Frankel and Li (2004) find that analyst following is negatively associated with the frequency of insider trading.

Because tax aggressive activities involve complicated structuring of business transactions, operational complexity (and the accompanying information asymmetry) increases, it is harder for outsiders to interpret the source and persistence of the firm's earnings and cash

flows (Balakrishnan et al. 2013). Hence, there is a greater likelihood that insiders possess private information that is not available to outsiders. Furthermore, under the agency view that complex tax avoidance strategies afford opportunities for managerial resource diversion, we expect insiders in tax aggressive firms to be more likely to exploit this information advantage to profitably trade in their firms' shares.

To illustrate, Desai (2004) provides anecdotal examples of three high profile cases of tax avoidance – at Enron, Tyco and Xerox – that reveal how active tax management strategies can serve to advance the private interests of managers in ways that do not serve the shareholders. In the case of Enron, management made use of the tax department to devise transactions that increase financial accounting income. The web of transactions that are embedded within the complex tax arrangements enabled Enron to maintain high reported earnings during 1996-1999, thereby driving up the firm's stock price. Tyco's management employed several tax-minimization efforts such as corporate inversion, using a web of intercompany loans to relocate profits, and a web of affiliates in tax haven countries that served as a destination for pretax profits from around the world. Although such efforts allowed Tyco to manufacture post-tax profits during 1997-2002 and divert funds without damaging the reported operating performance, the same tax haven subsidiaries that shielded Tyco's profits facilitated managerial concealment of insider trading, because of the bank secrecy policies in these jurisdictions.[9] In the case of

[9] The exact vehicles employed to accomplish corporate tax avoidance were directly used by Kozlowski and Swartz to obscure their dealings from shareholders. Specifically, the sales of Tyco stock by CEO Dennis Kozlowski and CFO Mark Swartz during Tyco's 2001 fiscal year amounted to more than $100 million. The link to the corporate tax avoidance strategies employed by Tyco stems from the fact that "Kozlowski and Swartz made a significant portion of those sales to Tyco subsidiaries based in bank secrecy jurisdictions such as the Jersey Islands and the Bahamas. Because of that unusual characteristic of the sales made by Kozlowski and Swartz, they were able to conceal those sales from investors until year-end, a fact that advanced the ability of Kozlowski and Swartz to conceal their fraudulent conduct from investors." The same offshore subsidiaries that shielded Tyco's corporate profits facilitated the concealment of insider sales by managers. But of course we are looking at publicly available records of insider trading (SEC Form 4) and hence our tests are not designed to examine concealed insider trading such as the Tyco case.

Xerox, executives overstated $2.1 billion in revenues and $1.4 billion in net income from 1997 to 2000 by opportunistically recharacterizing the timing of various transactions, particular leasing transactions, and opportunistically recognizing earnings, including a payment from the IRS, when threshold levels of earnings and revenues were within reach. The timing of these mischaracterizations coincided with an acceleration in compensation for the CEO of Xerox, largely through exercises of stock options.

Although the above examples are highly stylized, they illustrate how companies are able to sustain high profits and/or stock price for a relatively extended period of time before the eventual revelation of the true underlying firm performance and corporate malfeasance. To the extent that tax aggressive activities are opportunistic and self-serving, and insiders can continue to use complex structured transactions originating from tax planning to inflate reported earnings and stock price, we expect insiders to exploit the corporate opacity arising from tax aggressive activities to profit from purchasing the company shares. This line of reasoning suggests we should observe the profitability of insider trading purchases to increase with a firm's tax aggressiveness.

On the other hand, it is *ex ante* not clear how the profitability of insider sales is associated with a firm's tax aggressiveness. Managers may not have incentives to sell the company shares unless the concealment of the true performance of the firm becomes increasing difficult and when stock price is about to crash (e.g., Kim et al. 2011). Furthermore, prior literature suggests that insider sale transactions are generally less informative than insider purchase transactions because insiders sell for other reasons such as diversification or portfolio rebalancing and for

liquidity needs (Ofek and Yermack 2000).[10] There are also high costs involved in insider sale transactions. For instance, Cheng and Lo (2006) find that shareholders are more likely hurt when insiders sell shares based on bad news private information rather than when they purchase shares based on good news private information. Johnson et al. (2007) find a significantly greater correlation 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 leads plaintiffs to file lawsuits based on objective evidence such as abnormal insider sales. Thus, insiders in tax aggressive firms could be concerned with the increased organizational complexity and financial opacity induced by aggressive tax planning, which can exacerbate the litigation risks insiders face when they engage in insiders sale transactions.

Based on the above discussion, we thus structure our hypothesis on how tax aggressiveness is linked to the profitability of insider purchases and insider sales separately as follows:

H1: Ceteris paribus, firms' tax aggressiveness is positively (not) associated with the profitability of insider purchases (sales) activities.

2.3 Cross-sectional analyses

2.3.1 Exploring the effect of monitoring

Desai and Dharmapala (2006) find that the effect of tax avoidance-induced agency risk is more severe in firms with poor corporate governance. Accordingly, if insider trading profits are induced in part by the agency problems embedded within the tax avoidance activities, we expect that effective monitoring can reduce the extent of managerial rent extraction and opportunistic

[10] Lakonishok and Lee (2001, p. 98) aptly explain the informativeness of insider purchase and sale 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."

insider trading of tax aggressive firms. Consistent with this notion, Jagolinzer et al. (2011) find that insider trading restrictions imposed and monitored by the corporate general counsel can effectively limit the profitability of insider trading. Chen et al. (2010) find that family firms with effective outside monitoring are more tax aggressive than otherwise, presumably because effective outside monitoring mitigates managerial rent extraction. Therefore, we expect the association between tax aggressiveness and the profitability of insider trading to be weaker for firms that exert more effective monitoring over insiders. Our first cross-sectional hypothesis is presented as follows:

H2a: Ceteris paribus, the positive association between firms' tax aggressiveness and the profitability of insider purchases (profitability of insider sales if any) is weaker for firms that have more effective monitoring over insiders.

2.3.2 Exploring the effect of information environment

Gallemore and Labro (2014) argue that aggressive or complex tax planning requires a high quality internal information environment. Specifically, without good information, tax planning opportunities may not be visible, coordination of tax planning across business or geographic segments may be difficult, and the firm's documentation may not constitute acceptable proof to the IRS. Hence, firms that aggressively pursue tax savings have incentives to invest in high quality management accounting systems which allows a firm to obtain a high quality internal information environment. Consistent with their arguments, the authors document a positive association between tax avoidance and proxies for the firm's internal information environment. To the extent that this better accounting and/or information environment facilitates the flow of credible information from insiders to outsiders, agency problems can be mitigated

and the likelihood of misappropriation by managers declines (Lambert et al. 2007).[11] Under this view, we expect the better information environment arising from tax avoidance activities to mitigate the managerial resource diversion associated with tax aggressiveness. Hence, we predict the positive association between tax aggressiveness and the profitability of insider trades to be weaker for firms with better information environment. Our second cross-sectional hypothesis is presented as follows:

H2b: Ceteris paribus, the positive association between firms' tax aggressiveness and profitability of insider purchases (profitability of insider sales if any) is weaker for firms with better information environment.

3. Research Design

3.1 Measure of insider trading profitability

We define insider trading profitability as the (unrealized) gains after purchases and losses avoided from sales. The profit from insider trading over a particular time period is determined by: 1) the returns after each transaction; 2) the dollar value of each transaction and; 3) the frequency of these transactions. We choose to focus on a measure that incorporates all three determinants of insider trading profitability because examining only a subset of these determinants may ignore the importance of other determinant(s) in contributing to overall profitability of insider trading over the time period. For example, focusing solely on returns ignores the magnitude of the trade, and focusing solely on trading intensity ignores the predictive ability of insider trades with respect to future stock returns. Therefore, we follow prior studies

[11] Consistent with this argument, Skaife et al. (2013) find that the profitability of insider trading is larger for firms with material weaknesses in internal control (i.e., less reliable financial reporting).

(e.g., Huddart and Ke 2007; Skaife et al. 2013) and use a summary measure of insider trading profitability at the firm-year level in our empirical tests.

To construct our measure, we first aggregate all trading transactions made 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.[12] The gain realized from purchases is then computed by multiplying the abnormal return by the dollar value traded. The gain realized from sales is computed analogously and then multiplied by minus one so that losses avoided on sales have the same sign as gains on purchases. Finally, we aggregate individual transactions at the firm-year level to arrive at an aggregate profitability measure of all insider trades (sales or purchases) during the fiscal year:

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

where INS_PROFIT_{it} is either insider sale 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 sale activity during firm-year *it* and MV_{it-1} is the market value of equity at the end of fiscal year *t*-1.[13] Following Skaife et al. (2013), we multiply the

[12] Section 16(b) of the Securities and Exchange Act of 1934 prevents insiders from making short-term opportunistic trading by allowing shareholders to recover 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 or two-year period returns.

[13] Following Skaife et al. (2013), we scale our measure of insider trading profitability by the market value of equity because the magnitude of insider trade is significantly correlated with firm size. Scaling by firm size alleviate concerns that our results are driven by large firms in our sample.

insider trading profitability measure by 100 so that this measure is expressed 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 include firm-years with no reported insider trades and set *INS_PROFIT* equal to zero.

3.2 Measures of tax aggressiveness

There is currently no single measure that perfectly captures tax aggressiveness. Therefore, we utilize four measures that have been used in various settings in the literature (e.g., Kim et al. 2011; Rego and Wilson 2012). Using a variety of measures also increases the robustness of our results and mitigates concerns that our measure of tax aggressiveness is merely capturing some omitted firm-level characteristic that is unrelated to tax aggressiveness but related to insider trading profitability. Our first measure is the cash effective tax rate (*CETR*), 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 *CETR* below zero or above one. We then multiply *CETR* by minus one so that it is increasing in tax aggressiveness. This measure reflects both permanent and temporary book-tax differences. By focusing on cash taxes paid, this measure avoids the overstatement of current tax expense due to the accounting for the income tax benefits of employee stock options during our pre-SFAS 123R sample period (see Hanlon and Shevlin 2002).

Our second measure is the total book-tax difference (*TBTD*):

$$TBTD = \text{TXDI} + (\text{STR} - \text{ETR}) \times \text{PI}$$

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.[14] For cross-sectional aggregation purposes, *TBTD* is scaled by lagged total assets.

The third measure that we utilize is discretionary permanent book-tax differences (*DTAX*) based on Frank et al. (2009), which is defined as the residuals from the regression of permanent differences on several determinants of nondiscretionary permanent differences unrelated to tax planning (estimated by year and two-digit Standard Industrial Classification (SIC) code; firm and time subscripts omitted):

$$\begin{aligned}\text{PERMDIFF} &= \alpha_0 + \alpha_1(1/\text{ATLAG}) + \alpha_2\text{INTANG} + \alpha_3\text{UNCON} + \alpha_4\text{MI} + \alpha_5\text{CSTE} \\ &\quad + \alpha_6\Delta\text{NOL} + \alpha_7\text{LAGPERM} + \varepsilon\end{aligned}$$

where PERMDIFF refers to total book-tax differences (*TBTD*) less temporary book-tax-differences (defined as total deferred tax expense divided by the top statutory tax rate), ATLAG refers to lagged total assets (AT), INTANG refers to goodwill and other intangibles (INTAN), UNCON refers to income/loss reported under the equity method (ESUB), MI refers to income/loss attributable to minority interest (MII), CSTE refers to current state tax expense (TXS), ΔNOL refers to the change in net operating loss carry forwards (TLCF) and LAGPERM is the lagged PERMDIFF. PERMDIFF, INTANG, UNCON, MI, CSTE and ΔNOL are all scaled by lagged total assets.

The advantage of using *DTAX* as a measure of tax aggressiveness is that it captures permanent differences that are unrelated to items that are not considered aggressive tax reporting

[14] The usual way to estimate total book tax differences is *TBTD* = PI – Est TI where PI is pretax book income and Est TI is the estimated taxable income = (TXFED + TXFO)/STR. However this results in measurement error because Est TI should be (TXFED/STR + TXFO/Foreign STR). Thus we estimate *TBTD* = Temp Difference + Perm Difference = Deferred tax expense + (STR-ETR) × PI = TXDI + (STR-ETR) × PI per the text.

such as state income taxes and tax credits. Also, because prior research suggests that temporary book-tax differences reflect pre-tax earnings management via pre-tax accruals (e.g., Philips et al. 2003), we utilize *DTAX* to mitigate concerns that our measure of tax aggressiveness is merely capturing earnings management.

Finally, tax shelters are aggressive tax positions that have little or no business purpose and do not subject the firm to any pre-tax economic risk or loss (Treasury 1999). Tax shelters generate substantial savings for a firm, but also introduce risk because underlying tax positions are unlikely to be sustained upon tax audit. Moreover, tax shelters can involve complicated business structures that lead to rent extraction (Desai et al. 2007) or indicate aggressive financial reporting practices (Frank et al. 2009) that obscure poor performance or risk associated with the firm's business activities. Hence our last measure of tax aggressiveness is the tax shelter prediction score (*SHELTER*) developed by Wilson (2009) and used in prior literature (e.g., Kim et al. 2011; Rego and Wilson 2012), and the specific measurement is described in the Appendix.

3.3 Empirical models

3.3.1 Main analyses

To test H1, 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 sale or purchase profitability (*SALE_PROFIT* or *PURCH_PROFIT* respectively), *TAX* refers to the measure of tax aggressiveness (*CETR, TBTD*, *DTAX* or *SHELTER*), *FIRM_CONTROLS* refers to a vector of firm-level controls and *IND_FE* refers to industry fixed-effects. Hypothesis H1 predicts a positive coefficient on *TAX*. Because we conduct our hypothesis testing on a pooled sample, 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 the detailed definition of all variables.

We select *FIRM_CONTROLS* that are documented in prior literature to be associated with insider trading. We control for firm size (*lnMV*) because Seyhun (1986) and Lakonishok and Lee (2001) find that insiders trade more and trade more profitably in small firms, respectively. We control for book-to-market (*BTM*) and prior stock returns (*Prior_RET*) 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 work (Aboody and Lev 2000; Frankel and Li 2004; Huddart and Ke 2007), we include various proxies for information asymmetry that are known to be associated with insider trading, such as firm age (*AGE*); 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 returns volatility (*RET_VOL*). By including these various controls for information asymmetry, the coefficient β captures the incremental effect of tax aggressiveness on insider trading profitability, over and above these previously documented associations between information asymmetry and insider trading.

3.3.2 Cross-sectional analyses

To test H2, we modify equation (1) to include the conditioning variable (*Conditioning_VAR*) and the interaction between *TAX* and *Conditioning_VAR*:

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

In H2a, we examine the moderating effect of monitoring on the relation between tax aggressiveness and insider trading profitability. We focus on the percentage of shares held by

institutional investors (*IOHOLD*) because previous studies (e.g., Grossman and Hart 1980; Shleifer and Vishny 1986; Huddart 1993) suggest that large shareholders have incentives to undertake monitoring or other costly control activities when the increased returns from such monitoring activities are sufficient to cover their associated costs. Chung et al. (2002) find evidence that the presence of large institutional shareholdings inhibit managers from managing accruals to achieve a desired level of earnings. Parrino et al. (2003) document that institutional investors "vote with their feet" and decrease their equity ownership in the year prior to forced CEO turnover, which suggests that institutional investors exert monitoring over CEO through their ownership. 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.

In H2b, we examine the moderating effect of information environment on the relation between tax aggressiveness and insider trading profitability. We measure the quality of the information environment using the number of analysts following (*ANALYST*) because Frankel and Li (2004) find that information collected and disseminated by security analysts reduces information asymmetry and limits the ability of insiders to trade profitably based on their private information. Analyst following is also interpreted as a measure of information asymmetry by Ho et al. (1997) and D'Mello and Ferris (2000). We also use the effective bid-ask spread (*SPREAD*) as an alternative measure because it captures the compensation that less informed market participants, such as market makers, demand for the perceived information risk that arises when trading with relatively more informed traders such as insiders (Lee et al. 1993, Yohn 1998, Leuz and Verrecchia 2000, and Kalimipalli and Warga 2002). We expect firms with more analyst following (*ANALYST*) and lower bid-ask spread (*SPREAD*) to have better information

environment, which reduces the ability of insiders of tax aggressive firms to profit from insider trading.

4. Results

4.1. Sample

The sample period for the current study spans from 1995-2010.[15] We collect our financial and stock performance data primarily from I/B/E/S, Compustat, and CRSP in computing tax aggressiveness, the hypothesized intervening variables and the control variables used in the regression analysis. Following prior related studies (e.g., Lakonishok and Lee 2001; Frankel and Li 2004), we exclude firms whose stock prices are less than $2 at the beginning of each year to avoid unnecessary noise in estimating returns. We collect insider trading transaction data from Thomson Reuters, which obtains the data from Form 4 filings with the SEC.[16] The sample size varies for each test because of the specific tax measure used in the test. For example, sample size is typically larger when tax aggressiveness is measured by total book-tax-difference (*TBTD*) or discretionary permanent book-tax differences (*DTAX*), compared to cash effective tax rates (*CETR*) because of the more stringent requirement to compute the latter variable.[17] We also winsorize each continuous variable except the insider trading profitability measure at the 1% and 99% level to mitigate the effect of outliers. We do not winsorize the profitability measure because Kim et al. (2011) find that tax avoiding activities likely lead to a stock price crash in the following fiscal year and thus, if we winsorize the profitability measure, we would not be able to

[15] Our sample begins in 1995 because the coverage of insider trading transactions by Thomson Reuter is minimal (less than 100 transactions) before 1995.

[16] Insiders include officers, directors and large shareholders of more than 10% of any equity class of securities of an issuing company. For the purpose of this study, we examine only insider trades made by officers classified by Thomson-Reuters, which includes CEOs, CFOs, officers, presidents, and vice presidents. In an additional analysis, we examine insider trading profitability by insider-type (see section 5.1)

[17] As mentioned earlier, following Chen et al. (2010), we remove observations with negative pre-tax income, and those observations with *CETR* below zero or above one.

capture insiders' extreme profit from avoiding crashes. The final sample size used in the regression analyses ranges from 30,197 to 45,502 firm-year observations for the 18-year sample period.

4.2 Descriptive statistics

Table 1 reports descriptive statistics on the regression variables. The mean unscaled insider sale profitability (*SALE_PROFIT*) is -$33,558, which is consistent with prior literature that generally finds that insiders do not profit from sales transactions (e.g., Aboody and Lev 2000; Huddart and Ke 2007; Jagolinzer et al. 2011; Gao et al. 2014). On the other hand, the mean unscaled insider purchase profitability (*PURCH_PROFIT*) is $9,714, which is consistent with Lakonishok and Lee (2001) who find that insiders purchase profitably on average, and that insiders will not buy if they do not possess superior information (Frankel and Li 2004; Ravina and Sapienza 2010).[18] Insider sale profitability is significantly larger in magnitude as compared to insider purchase profitability, and the average annual frequency of insider sales (19.9 transactions) are also more than the average annual frequency of insider purchases (2.0 transactions). This reflects greater propensity for insiders to sell their shares and in larger amounts in order to diversify the large proportion of their wealth held in their company's stocks received from compensation plans (Ofek and Yermack 2000).

Turning to our various measures of tax aggressiveness, the mean (median) cash effective tax rate (*CETR*) is 25.6% (25.6%), which is comparable to that reported in another large-sample study by Dyreng et al. (2008). The mean (median) total book-tax difference (*TBTD*) is -0.031

[18] 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 sale (purchase) profitability is -$57,681 ($30,179), and the average annual frequency of insider sales (purchase) is 34.2 (6.2) transactions.

(0.001) and the mean (median) discretionary permanent book-tax difference (*DTAX*) is 0.005 (0.004). These values are comparable to those reported in another large sample study by Frank et al. (2009). The mean (median) tax shelter prediction score (*SHELTER*) is -0.119 (-0.029).

Table 3 reports the Pearson and Spearman correlation table of the variables in our paper. Both Pearson and Spearman correlation between these four measures of tax aggressiveness (*CETR, TBTD, DTAX* and *SHELTER*) are positive, which suggest that all four measures capture aggressive tax planning activities in general. However, the correlations among the four measures, between 0.09 to 0.73 for the Pearson correlations, and between 0.08 to 0.61 for the Spearman correlations, suggest that each measure likely captures different dimensions of tax aggressiveness and hence supports our choice of using all four measures in our analyses to triangulate our results and increase the robustness of our findings. The correlation between *SALE_PROFIT* and all four measures of tax aggressiveness are either insignificant (Pearson correlation) or negative and significant (Spearman correlation). On the other hand, the correlation between *PURCH_PROFIT* and measures of tax aggressiveness are mostly positive and significant, which is consistent with our prediction in H1. Because these are pairwise univariate correlations, we defer the main analyses to multivariate tests in section 4.3.

4.3 Main analysis – Test of H1

In this section, we report our results for the test of H1 which examines the association between tax aggressiveness and insider trading profitability. As shown in Table 3, all four measures of tax aggressiveness are positively and significantly associated with insider purchase profitability (*t*-statistic = 4.52, 3.57, 3.18 and 3.83 for *CETR*, *TBTD*, *DTAX* and *SHELTER*, respectively). The effect of tax aggressiveness on insider purchase profitability is also

economically significant. Specifically, a one standard deviation increase in cash effective tax rate (*CETR*), total book-tax difference (*TBTD*), discretionary permanent book-tax difference (*DTAX*) and tax shelter prediction score (*SHELTER*) is associated with a 90.0%, 97.3%, 61.7%, and 157.5% increase in insider purchase profitability, respectively.[19] On the other hand, we find that only one of the tax aggressiveness measures is significantly associated with insider sale profitability at the conventional levels (*t*-statistic = 1.97 for *TBTD*). The results for insider purchase profitability are thus consistent with H1, which predicts that insiders of tax aggressive firms take advantage of the opacity surrounding tax planning to increase their profits from their insider purchase transactions. The relatively insignificant results for insider sale profitability is also consistent with prior literature that finds 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 sale transactions are generally less informative because insiders sell for other reasons such as diversification or portfolio rebalancing and for liquidity needs (Ofek and Yermack 2000). In a later analysis (section 5.3), we explore a setting (that is, the period prior to stock price crashes) where insider sale transactions are more likely to be information-driven to examine whether insiders of tax aggressive firms are able to trade more profitably from their sale transactions.

The coefficients on the other control variables are consistent with prior literature in general. In particular, we find that insiders trade as contrarians and earn more profits from sale (purchases) when prior returns (*Prior_RET*) are high (low). We also find that insiders make more profits when information asymmetry is high, as proxied by returns volatility (*RET_VOL*). Next,

[19] The impact of a one standard deviation increase in cash effective tax rate (*CETR*) on the insider purchase profitability (*PURCH_PROFIT*) is computed as 0.030 (coefficient on *CETR*) × 0.180 (the sample standard deviation of *CETR*) ÷ 0.006 (the sample mean of *PURCH_PROFIT*) = 90.0%. The other comparative statics are computed analogously.

we find that insiders in firms that are older (*AGE*) earn more profits from sales. 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).

4.4 Cross-sectional analyses – Test of H2

In this section, we explore cross-sectional variation in the relation between tax aggressiveness and insider trading profitability. In H2a, we examine the moderating role of monitoring. In particular, we argue that stronger monitoring can reduce the extent of managerial rent extraction and 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 stronger monitoring. Table 4 presents the results of this analysis using the percentage of institutional ownership (*IOHOLD*) as a proxy for the extent of monitoring. We find that the positive association between tax aggressiveness and insider purchase profitability is weaker for firms with higher institutional ownership (*t*-statistic = -4.12, -2.41, -3.33, and -4.02 for *CETR* × *IOHOLD*, *TBTD* × *IOHOLD*, *DTAX* × *IOHOLD*, and *SHELTER* × *IOHOLD*, respectively. This result is consistent with our prediction in H2a and suggests that stronger institutional monitoring mitigate opportunistic trading by insiders of tax aggressive firms and hence limits their ability to trade profitably from insider purchases. We fail to find any evidence that institutional ownership moderates the association between tax aggressiveness and insider sale profitability.

In H2b, we examine the moderating role of information environment. We argue that firms with better information environment are able to mitigate the private information advantage of insiders of tax aggressive firms by reducing the information asymmetry and opacity surrounding the tax planning activities as well as facilitating effective governance over

managerial rent-seeking behavior. In Tables 5 Panel A and B, we present the results using the number of analyst following (*ANALYST*) and bid-ask spread (*SPREAD*), respectively, as proxies for the quality of the information environment. In Panel A, we find evidence that the positive association between tax aggressiveness and insider purchase profitability is weaker for firms with more analyst following (*t*-statistic = -3.92, -2.59, and -2.38 for *CETR* × *ANALYST*, *DTAX* × *ANALYST*, and *SHELTER* × *ANALYST*, respectively), although the interaction coefficient is negative but insignificant when we examine *TBTD*. We fail to find any evidence that analyst following moderates the association between tax aggressiveness and insider sale profitability. In Panel B, we find that the positive association between tax aggressiveness and insider sale profitability is exacerbated for firms with a higher bid-ask spread (*t*-statistic = 4.77, 2.03, 3.62, and 4.69 for *CETR* × *SPREAD*, *TBTD* × *SPREAD*, *DTAX* × *SPREAD*, and *SHELTER* × *SPREAD*, respectively). On the other hand, there is mixed and inconclusive evidence on how the bid-ask spread moderates the association between tax aggressiveness and insider sale profitability (*t*-statistic = 0.78, -2.07, -1.93, and -1.18 for *CETR* × *SPREAD*, *TBTD* × *SPREAD*, *DTAX* × *SPREAD*, and *SHELTER* × *SPREAD*, respectively. Overall, the results in Tables 5 are consistent with a better information environment limiting insiders of tax aggressive firms from making more profits from insider purchases, consistent with our prediction in H2b.

5. Additional Analyses and Sensitivity Checks

5.1 Insider type analysis

In our main analyses, we focused on the profitability of insider trades made by officers because they are presumed to have broad knowledge of the firm's tax positions as well as access to financial information to form their expectations about the firm's future prospects prior to their

inside trades. In this section, we separately examine the profitability of inside trades by insider types: 1) CEOs and CFOs; 2) other officers and; 3) non-officer directors. The purpose of this analysis is to shed light on whether only the CEOs and CFOs who have privy to detailed financial information have the ability to trade opportunistically, or other less informed insiders such as other officers and non-officer directors are able to exploit the opacity and complexity surrounding tax avoidance activities to also benefit from their trades. The result of this analysis is presented in Table 6. As observed from this table, we find that all insiders, including supposedly less informed non-officer directors, are also able to purchase profitably for firms with higher tax aggressiveness. On the other hand, there is some weak evidence that only CEOs and CFOs are able to sell profitably for firms with higher tax aggressiveness. The result that non-officer directors are also able trade profitably is consistent with that documented by Ravina and Sapienza (2010), who find that independent directors are able to trade almost as profitably as other executives. Overall, the results suggest that the opacity and agency problems surrounding tax aggressiveness permeate the entire firm such that all insiders are able to profit from their purchases.

5.2 Timing of insider trading during inferred restricted trading windows

Earlier, we document that tax aggressiveness is associated with higher insider purchase profitability. Here, we investigate the source of insiders' trading advantage. In particular, we examine whether insiders of tax aggressive firms time their trade strategically during periods when information asymmetry between insiders and outsiders is high in order to trade more profitably. As highlighted by prior work (e.g., Bettis et al. 2000; Roulstone 2003; Jagolinzer et al. 2011), many firms restrict their insiders from trading during periods before quarterly earnings

announcements, a period where information asymmetry is presumably higher before earnings disclosure and hence limits insiders' ability to trade on private information about the upcoming earnings news. Despite these restrictions, Jagolinzer et al. (2011) document that about 24% of all insider trades occur within restricted trade windows, and that these trades within restricted trade windows are more profitable than those outside restricted trade windows. This result suggests that insiders exploit periods of heightened information asymmetry during restricted trade windows to trade profitably. We investigate whether insiders of tax aggressive firms are more likely to time their trades during restricted trading windows, which results in the higher trading profitability that we document.

Jagolinzer et al. (2011) find that the average firm in their hand-collected sample with an insider trade policy has restricted trading window beginning with 46 days prior to earnings announcement and ending one-day after announcement. Hence, we re-examine the relation between tax aggressiveness and insider trading profitability during this 48-day restricted trading window, and the results are presented in Table 7 Panel A. As observed from this table, tax aggressiveness is significantly associated with higher insider purchase profitability during the restricted trading windows (with the exception for *DTAX*, which is positive but insignificant), though only *DTAX* is significantly associated with higher insider sale profitability. On the other hand, when we examine the association between tax aggressiveness and insider trading profitability outside this restricted window (Table 7 Panel B), only one of the coefficients of tax aggressiveness is marginally significant (*t*-statistic = 1.86 for *TBTD* when examining insider purchase profitability). Overall, these results suggest that insiders of tax aggressive firms are able to trade more profitably because they time their trades strategically during periods of high information asymmetry before earnings announcement.

5.3 Insider trading intensity prior to firm-specific stock price crashes

In our earlier findings, we generally find that insiders of tax aggressive firms are able to trade more profitably for purchases but not for sales. As discussed earlier, this result is consistent with prior literature that finds that insider purchase transactions are generally more likely to be information driven (e.g., Ravina and Sapienza 2010; Jagolinzer et al. 2011) and that insider sale transactions are generally less informative because insiders sell for other reasons such as diversification or portfolio rebalancing and for liquidity needs (Ofek and Yermack 2000). Therefore, it may explain why we do not find that insiders of tax aggressive firms are able to exploit the opacity and their information advantage to trade more profitably from sales. In this section, we follow Ravina and Sapienza (2010) and explore a setting where insider sale transactions are more likely to be information-driven to examine whether insiders of tax aggressive firms are able to trade more profitably from their sale transactions.

As mentioned earlier, Kim et al. (2011) argue that tax avoidance facilitates managerial rent extraction and bad news hoarding activities for extended periods, leading to stock price crashes when the accumulated hidden bad news crosses a tipping point, and is then released all at once. If tax avoidance activities are opportunistic, managers are likely to be aware of any "bad news" hidden within the tax avoidance framework and dispose of their shares before future stock price crashes. Hence, we investigate whether tax aggressiveness is associated with greater trading intensity (*PURCH_VOL* and *SALE_VOL*) in the period prior to stock price crashes.[20]

Following prior work (Hutton et al. 2009; Kim et al. 2011), we define a crash in a given

[20] 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.

specific year for a given 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,[21] where the firm-specific weekly returns are estimated based on the residual return from the expanded market model.[22] For firms which 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.

The results are presented in Table 8. We find that tax aggressiveness is significantly associated with greater insider sale volume in the fiscal year prior to the crash (with the exception for *DTAX*, which is positive but insignificant). On the other hand, we only find that tax aggressiveness is significantly associated with lower insider purchase volume in the fiscal year prior to the crash when we examine *CETR* as a proxy for tax aggressiveness. The overall results suggest that insiders of tax aggressive firms trade opportunistically to avoid losses prior to stock price crashes.

5.4 Robustness Checks

5.4.1 Alternative measures of tax aggressiveness

We test the robustness of our results using two alternative measures of tax aggressiveness. The first measure is the long-run cash effective tax rate (*CETR5*) developed by Dyreng et al. (2008):

CETR5= -1 × [Five-year sum of cash taxes paid (TXPD)/(five-year sum of pretax income (PI) less special items (SPI))]

[21] 3.09 standard deviations is chosen so that to generate a frequency of 0.1% in the normal distribution.

[22] 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:

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

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.

Using an effective tax rate measured over a five-year long horizon avoids annual volatility in effective tax rates, and mitigates concerns about earnings management through accruals because accruals are likely to reverse over the long run. On the other hand, computing this measure over longer horizons reduces our sample size and hence we use this measure as a robustness test. The second measure that we utilize is based on Desai and Dharmapala (2006) residual book-tax difference (*DDBTD*). *DDBTD* is measured from the sum of the firm-specific fixed effect (μ_i) and the residuals ($\varepsilon_{i,t}$) from the following firm fixed-effect regression:

$$TBTD_{i,t} = \beta_1 TACC_{i,t} + \mu_i + \varepsilon_{i,t}$$

where TBTD is total book-tax difference, TACC is total accruals measured based on the statement of cash flows. Both variables are scaled by lagged total assets and are winsorized at 1% and 99% levels before the regression estimation. As highlighted by Desai and Dharmapala (2006), book-tax difference could be influenced by both tax planning activities and accrual-based earnings management. Hence, by estimating *DDBTD* from this firm fixed-effect regression, this measure attempts to isolate the component of book-tax difference and hence the tax aggressive activity that is unexplained by earnings management. We report the main results of H1 in Table 9. The results indicate that both alternative measures of tax aggressiveness are positively and significantly associated with insider purchase profitability. These results are consistent with our analysis using *CETR*, *TBTD*, *DTAX* and *SHELTER* as our main measures of tax aggressiveness.

5.4.2 Controlling for the effects of accrual management

Prior work suggests that insiders may manipulate their earnings prior to opportunistic insider trading (e.g. Beneish and Vargus 2002; Bartov and Mohanram 2004). Prior research also suggests that tax aggressiveness is associated with aggressive financial reporting (e.g. Frank et al. 2009). Hence, there may be potential concerns that the association between tax aggressiveness

and insider trading profitability that we are documenting is merely a result of the prior documented association between accrual management and insider trading. To alleviate this concern, we include discretionary accruals (*ACCEM*) based on the cross-sectional Modified Jones (1991) model as an additional control.[23] The results are presented in Table 10. As observed from this panel, our main results are virtually unchanged after controlling for accruals management, indicating that the positive association between tax aggressiveness and insider purchase profitability is not merely driven by previously documented effects of accruals on insiders' trading.[24] We also find evidence that higher accruals management are associated with higher insider sales profitability (*t*-statistic = 3.41, 2.58 and 2.49 for the *CETR*, *DTAX* and *SHELTER* regressions, respectively), which is consistent with prior finding that insiders manipulate earnings prior to insider trading.

5.4.3 Controlling for CSR

Hoi et al. (2013) recently document that firms with excessive irresponsible corporate social responsibility (CSR) activities[25] are associated with higher tax avoidance, which suggests that corporate culture that fosters corporate "selfishness" or "irresponsibility" towards its stakeholders also influences firms' inclination to avoid taxes opportunistically. Another related study by Gao et al. (2014) find that firms that invest in CSR activities are committed to building a positive image of caring for social good and are therefore less likely to engage in profitable

[23] In untabulated analyses, we use accrual quality (*AQ*) based on Dechow and Dichev (2002) as an alternative measure of accruals management and our inferences are the same.

[24] We also interact accruals management with tax aggressiveness. If insiders use their discretion to manage earnings in the presence of tax aggressive activities and benefit from buying at deflated prices, we expect a stronger association between tax aggressiveness and insider purchase profitability for firms with more accrual management. In untabulated results, we find that the coefficient on the interaction between tax aggressiveness and accrual management is not significant at conventional levels for all our tax measures.

[25] CSR activities are defined as corporate actions widely regarded as having a significant impact on all of the firm's stakeholders including shareholders, employees, communities, government, customers, etc. CSR is a shared belief within the organization about the "right" course of action that takes into account the economic, social, environmental, and other external impacts of the company's activities (Hoi et al. 2013).

insider trading, which is widely perceived to be self-serving. Hence, there may be a concern that our documented association between tax avoidance and insider trading profitability is driven by firms' CSR orientation (that is, CSR orientation is the omitted correlated variable). To alleviate this concern, we include CSR orientation as an additional control in a much reduced sample where the measure for CSR orientation from MSCI (previously KLD) is available. Following prior studies (e.g., Gao et al. 2014), we measure CSR score as the total number of strengths minus the total number of concerns in all of MSCI's rating categories excluding human rights and corporate governance.[26] Then we classify a firm as CSR-conscious (*CSR*=1) if it's CSR score is positive, and zero otherwise. The results, after controlling for CSR orientation, are presented in Table 11. We continue to find that *CETR* and *DTAX* are positive and significantly associated with higher insider purchase profitability (t-statistic = 3.55 and 1.85, respectively). The coefficient on *SHELTER* is positive and marginally significant (t-statistic = 1.52) and the coefficient on *TBTD* is positive but insignificant (t-statistic = 0.96). However, we do not find that CSR orientation is negatively associated with insider trading profitability in our sample. Overall, our main inferences are robust to including CSR orientation as an additional control.

6. Conclusion

Whether managers make use of tax aggressive activities to extract rents from shareholders and the mechanisms they do so remains unclear in the existing literature (Armstrong et al. 2015). Our study addresses this void by providing direct empirical evidence on managerial rent extraction derived from tax aggressive activities, and we proxy for the extent of

[26] Following Gao et al. (2014), we exclude the human rights dimension due to the lack of variation in the data, and we exclude the corporate governance dimension because it is commonly perceived as a distinct construct from CSR. Therefore, the included dimensions are: community affairs, diversity, employee relations, customer relations, gambling, firearms, tobacco, nuclear power, military and alcohol.

rent extraction by the amount of insider trading profitability. Using a large sample of firms from fiscal years 1995–2010 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 tax aggressiveness increasing financial opacity and insiders exploiting an information advantage to purchase their company shares and profit from it. In contrast, we do not find that insider trading sale profitability is significantly higher in more tax aggressive firms on average, presumably because insider sale transactions are generally less informative because insiders sell for other reasons such as diversification or portfolio rebalancing and for liquidity needs (Ofek and Yermack 2000).

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 weakened for firms with more effective monitoring (proxied by institutional ownership) and for firms with better information environment (proxied by analyst following and bid-ask spread). Second, we separately examine the profitability of inside trades by insider types: 1) CEOs and CFOs; 2) other officers and; 3) non-officer directors, and find that all insiders are able to purchase profitably for firms with higher tax aggressiveness. This result suggests that the opacity and agency problems surrounding tax aggressiveness permeate the entire firm such that all insiders, including supposedly less informed non-officer directors, are able to profit from their purchases. Third, we document higher insider purchase profitability associated with tax aggressiveness during restricted trading windows but fail to document such association outside these restricted windows. This result suggests that insiders of tax aggressive firms are able to trade more profitably because they time their trades strategically during periods of high information asymmetry before earnings announcement. Fourth, we explore a setting

where insider sale transactions are more likely to be information-driven to examine whether insiders of tax aggressive firms are able to trade more profitably from their sale transactions. We document that tax aggressiveness is significantly associated with greater insider sale volume in the fiscal year prior to the crash, providing some evidence that insiders of tax aggressive firms trade opportunistically to avoid losses prior to stock price crashes. Finally, we find that our results are robust to using two alternative measures of tax aggressiveness: the long-run cash effective tax rate developed by Dyreng et al. (2008) and the residual book-tax difference based on Desai and Dharmapala (2006), controlling for the documented effects of accrual management on insiders' trading, and controlling for firm's CSR orientation.

To the best of our knowledge, our study is the first to document direct large sample empirical evidence of managerial rent extraction related to tax aggressiveness. We also provide insights that managers extract rents from tax aggressiveness through insider purchase but not insider sale transactions on average. Our finding is particularly important in light of the substantial amount of studies that rely on this agency argument to develop their hypothesis (e.g., Chen et al. 2010; Kim et al. 2011; Goh et al. 2013). Because there are many ways in which managers can extract rent from shareholders, such as investing in pet projects, engaging in perks consumption, shirking and slack performance, future studies can explore how managers extract rent from tax aggressive activities through these channels.

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APPENDIX
Variables Definition

SALE_PROFIT	=	Aggregate profitability of all insider trades from insider sale transactions during the fiscal year, computed as follows: $\frac{\sum_{j=1}^{n}(ABRET_{itj} \times VALUE\_SOLD_{itj})}{MV_{it-1}}$ where $ABRET_{itj}$ is equal to the one-year ahead buy-and-hold abnormal return computed for the period starting one day after transaction date *j*, $VALUE\_SOLD_{itj}$ 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 sale activity during firm-year *it*, and MV_{it-1} is the market value of equity at the end of fiscal year *t*-1. This measure is multiplied by -1 so that losses avoided on sales have the same sign as gains on purchases.
PURCH_PROFIT	=	Aggregate profitability of all insider trades from insider purchase transactions during the fiscal year, computed as follows: $\frac{\sum_{j=1}^{n}(ABRET_{itj} \times VALUE\_PURCHASED_{itj})}{MV_{it-1}}$ where $ABRET_{itj}$ is equal to the one-year ahead buy-and-hold abnormal return computed for the period starting one day after transaction date *j*, $VALUE\_PURCHASED_{itj}$ equals the total dollar value of shares purchased by all insiders on day *j*, and *n* is the total number of firm-days with insider purchase activity during firm-year *it*, and MV_{it-1} is the market value of equity at the end of fiscal year *t*-1.
SALE_FREQ	=	Number of insider sale transactions during the fiscal year.
PURCH_FREQ	=	Number of insider purchase transactions during the fiscal year.
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	=	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 *CETR* below zero or above one. We then multiply *CETR* by minus one so that it is increasing in tax aggressiveness.
TBTD	=	Total book-to-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-to-tax differences, as in Frank et al. (2009). This variable is the residuals from the following regression (estimated by year and two-digit Standard Industrial Classification (SIC) code): PERMDIFF $= \alpha_0 + \alpha_1(1/ATLAG) + \alpha_2 INTANG + \alpha_3 UNCON + \alpha_4 MI + \alpha_5 CSTE + \alpha_6 \Delta NOL + \alpha_7 LAGPERM + \varepsilon$ where PERMDIFF refers to total book-tax differences (*TBTD*)

		less temporary book-tax-differences (defined as total deferred tax expense divided by statutory marginal tax rate), ATLAG refers to lagged total assets (AT), INTANG refers to goodwill and other intangibles (INTAN), UNCON refers to income/loss reported under the equity method (ESUB), MI refers to income/loss attributable to minority interest (MII), CSTE refers to current state tax expense (TXS), ΔNOL refers to the change in net operating loss carry forwards (TLCF) and LAGPERM is the lagged PERMDIFF. PERMDIFF, INTANG, UNCON, MI, CSTE and ΔNOL are all scaled by lagged total assets.
SHELTER	=	The tax shelter prediction score developed by Wilson (2009), computed as: SHELTER = 4.30 + 6.63 × TBTD - 1.72 × LEV + 0.66 × SIZE + 2.26 × ROA + 1.62 × FI + 1.56 × R&D, where TBTD refers to total book-tax difference scaled by lagged total assets, LEV refers to long term debt divided by total assets, SIZE refers to the log of total assets, ROA refers to pre-tax earnings divided by total assets, FI refers to an indicator variable set equal to 1 for firm observations reporting foreign income, and set to 0 otherwise, and R&D refers to the research and development expenditure divided by lagged total assets.
CETR5	=	Following Dyreng et al. (2008), this measure is computed as five-year sum of cash taxes paid (TXPD)/(five-year sum of pretax income (PI) less special items (SPI)). We then multiply *CETR5* by minus one so that it is increasing in tax aggressiveness.
DDBTD	=	Desai and Dharmapala (2006) residual book-tax difference: $\mu_i + \varepsilon_{i,t}$ from the following firm fixed-effect regression: $BTD_{i,t} = \beta_1 TACC_{i,t} + \mu_i + \varepsilon_{i,t}$ where BTD is total book-tax difference, TACC is total accruals measured based on the statement of cash flows. Both variables are scaled by lagged total assets and are winsorized at 1% and 99% levels before the regression estimation.
lnMV	=	Natural log of market capitalization at fiscal year-end.
BTM	=	Book-to-market ratio at fiscal year-end.
Prior_RET	=	Buy-and-hold abnormal 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.
AGE	=	Firm age measured by the number of years the company has stock price data on CRSP.
RND	=	An indicator variable equals one if the firm report non-zero research and development expenses (XRD), and zero otherwise.
MAG_AR	=	The median of absolute market reaction to prior quarterly earnings announcements, where market reaction is measured as the cumulative abnormal return from two days before to the day of the earnings announcement (Huddart and Ke 2007); the median is measure over the five year period ending the fiscal quarter before

		the end 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 returns volatility over the current fiscal year.
SPREAD	=	Bid-ask spread over the current fiscal year.
ACCEM	=	Discretionary accruals 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.
AQ	=	Accrual quality as in Dechow and Dichev (2002), defined as the standard deviation of the residual over t-2 to t, where the residual is estimated from the following equation by industry (2-digit SIC) and year. $\Delta WC_t = \beta_0 + \beta_1 CFO_{t-1} + \beta_2 CFO_t + \beta_3 CFO_{t+1} + \varepsilon_t$ where ΔWC is changes in working capital, where working capital is Δaccount receivables (RECT)+ Δinventory (INVT)- Δaccount payable (AP) - Δtax payable (TXP)+ Δother current asset (ACO) - Δother current liabilities. CFO is cash flows from operation (OANCF). All variables are scaled by the average total assets.
CSR	=	An indicator equals one if the firm-year's CSR score is positive, and zero otherwise. The CSR score is computed as the total number of strengths minus the total number of concerns in all of MSCI's rating categories excluding human rights and corporate governance.

TABLE 1
Descriptive Statistics

Variables	Obs.	Mean	Median	Std. Dev.	Q1	Q3
SALE_PROFIT	45,502	0.015	0.000	1.724	0.000	0.010
SALE_PROFIT (unscaled)	45,502	-33,558	0.000	11,535,692	0.000	61,142
SALE_FREQ	45,502	19.909	2.000	131.326	0.000	12.000
PURCH_PROFIT	45,502	0.006	0.000	0.272	0.000	0.000
PURCH_PROFIT (unscaled)	45,502	9,714	0.000	1,031,504	0.000	0.000
PURCH_FREQ	45,502	2.009	0.000	8.952	0.000	1.000
CETR	30,197	-0.256	-0.256	0.180	-0.358	-0.115
TBTD	40,015	-0.031	0.001	0.146	-0.039	0.029
DTAX	45,502	0.005	0.004	0.100	-0.016	0.036
SHELTER	39,899	-0.119	-0.029	2.362	-1.306	1.417
lnMV	45,502	6.060	5.977	1.918	4.666	7.299
BTM	45,502	0.564	0.488	4.287	0.286	0.758
Prior_RET	45,502	0.096	0.000	0.804	-0.150	0.160
AGE	45,502	17.551	13.000	15.731	6.000	25.000
RND	45,502	0.408	0.000	0.491	0.000	1.000
MAG_AR	45,502	0.034	0.030	0.019	0.020	0.044
ANALYST	45,502	5.914	4.000	6.619	1.000	9.000
IOHOLD	45,502	0.511	0.523	0.300	0.254	0.754
FSINFORM	45,502	0.381	0.376	0.295	0.133	0.625
RET_VOL	45,502	0.033	0.029	0.019	0.020	0.042

The sample period used for the study spans from 1995-2010. The descriptive statistics for all variables are based on the largest sample when tax avoidance is measured by *DTAX*. The detailed definitions of the variables are provided in the Appendix. All continuous variables are winsorized at the 1 and 99 percentiles.

TABLE 2
Pearson and Spearman Correlation Table

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 *SALE_PROFIT*		-0.05	-0.01	0.00	0.00	-0.01	-0.01	0.00	0.04	0.00	0.00	0.02	-0.01	-0.01	-0.01	0.04
2 *PURCH_PROFIT*	-0.20		0.02	0.01	0.01	-0.01	-0.02	0.02	-0.02	-0.01	0.01	0.02	-0.01	-0.01	0.00	0.02
3 *CETR*	-0.04	0.04		0.49	0.13	0.09	0.00	0.01	0.08	-0.07	0.02	0.02	0.00	0.03	-0.02	0.01
4 *TBTD*	-0.05	0.04	0.61		0.47	0.73	0.15	0.10	0.06	0.17	-0.21	-0.19	0.10	0.16	0.07	-0.37
5 *DTAX*	0.01	0.02	0.09	0.25		0.30	0.00	-0.02	0.06	0.02	0.00	0.00	0.02	0.01	0.00	-0.04
6 *SHELTER*	-0.05	0.06	0.08	0.50	0.12		0.67	-0.06	0.08	0.35	-0.07	-0.31	0.50	0.48	0.10	-0.49
7 *lnMV*	0.01	0.04	0.00	0.16	-0.04	0.75		-0.37	0.07	0.34	0.00	-0.29	0.75	0.59	0.06	-0.38
8 *BTM*	-0.08	0.01	0.01	0.04	-0.03	-0.09	-0.35		-0.17	0.01	-0.23	-0.03	-0.28	-0.16	-0.02	0.09
9 *Prior_RET*	0.06	-0.01	0.06	0.13	0.03	0.15	0.13	-0.18		-0.03	0.05	0.10	0.06	0.09	0.04	0.03
10 *AGE*	-0.05	0.03	-0.09	0.16	0.01	0.32	0.25	0.08	0.03		0.02	-0.24	0.20	0.13	0.04	-0.28
11 *RND*	0.06	0.02	0.03	-0.14	0.08	-0.01	-0.01	-0.27	0.01	-0.02		0.25	0.04	0.05	-0.05	0.20
12 *MAG_AR*	0.07	0.01	0.02	-0.19	0.07	-0.32	-0.29	-0.09	0.01	-0.25	0.27		-0.12	-0.13	-0.07	0.51
13 *ANALYST*	0.03	0.04	-0.04	0.08	0.00	0.57	0.77	-0.32	0.10	0.09	0.05	-0.08		0.46	0.04	-0.21
14 *IOHOLD*	0.02	0.05	0.03	0.13	-0.02	0.53	0.62	-0.14	0.13	0.13	0.05	-0.10	0.57		0.04	-0.25
15 *FSINFORM*	-0.03	0.01	-0.04	0.05	-0.02	0.09	0.06	-0.02	0.06	0.05	-0.04	-0.08	0.04	0.04		-0.07
16 *RET_VOL*	0.10	-0.03	0.01	-0.32	0.07	-0.47	-0.41	-0.01	-0.07	-0.30	0.22	0.57	-0.21	-0.22	-0.08	

This table reports the Pearson (Spearman) correlation between the variables used in the regression analysis in the upper (lower) diagonal, based on the largest possible sample. 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 = TBTD*		*TAX = DTAX*		*TAX = SHELTER*	
	SALE_ PROFIT	*PURCH_ PROFIT*	*SALE_ PROFIT*	*PURCH_ PROFIT*	*SALE_ PROFIT*	*PURCH_ PROFIT*	*SALE_ PROFIT*	*PURCH_ PROFIT*
TAX	-0.108	0.030***	0.193**	0.040***	-0.053	0.037***	0.009	0.004***
	(-1.18)	(4.52)	(1.97)	(3.57)	(-0.58)	(3.18)	(1.07)	(3.83)
lnMV	0.023	-0.001	0.019	-0.002	0.017	-0.002	0.012	-0.005**
	(1.16)	(-0.87)	(1.10)	(-1.43)	(1.10)	(-1.43)	(0.59)	(-2.28)
BTM	-0.011	0.026	-0.017	0.016*	-0.015	0.013	-0.020	0.014
	(-0.30)	(1.63)	(-0.81)	(1.75)	(-0.82)	(1.58)	(-0.80)	(1.50)
Prior_RET	0.164**	-0.010**	0.156***	-0.011***	0.149***	-0.010***	0.158***	-0.011***
	(2.05)	(-2.58)	(2.77)	(-3.42)	(2.84)	(-3.60)	(2.77)	(-3.50)
AGE	0.002**	-0.000	0.002**	-0.000	0.002**	-0.000	0.002**	-0.000
	(2.30)	(-0.08)	(2.37)	(-0.76)	(2.41)	(-0.62)	(2.34)	(-1.13)
RND	-0.062*	0.009	-0.044	0.011*	-0.044	0.009	-0.050*	0.010*
	(-1.80)	(1.19)	(-1.52)	(1.86)	(-1.52)	(1.52)	(-1.67)	(1.73)
MAG_AR	0.683	0.272*	0.545	0.174	0.587	0.188	0.580	0.174
	(1.09)	(1.85)	(0.93)	(1.20)	(1.13)	(1.32)	(1.02)	(1.20)
ANALYST	-0.005	0.000*	-0.005	0.000	-0.004	0.000	-0.005	0.000
	(-1.34)	(1.92)	(-1.51)	(1.53)	(-1.57)	(1.53)	(-1.56)	(1.48)
IOHOLD	-0.057	-0.006	-0.056*	0.001	-0.047*	0.001	-0.053*	-0.000
	(-1.55)	(-1.42)	(-1.77)	(0.12)	(-1.67)	(0.30)	(-1.71)	(-0.00)
FSINFORM	-0.099	0.009***	-0.093	0.002	-0.083	0.002	-0.090	0.002
	(-1.14)	(2.66)	(-1.38)	(0.49)	(-1.41)	(0.61)	(-1.38)	(0.46)
RET_VOL	4.151**	0.390**	4.873***	0.227**	3.934***	0.100	4.561***	0.234**
	(2.46)	(2.15)	(3.54)	(2.13)	(3.21)	(1.07)	(3.32)	(2.14)
Constant	-0.366***	-0.019	-0.179	0.011	-0.158	0.011	-0.134*	0.029***
	(-3.10)	(-0.87)	(-1.50)	(0.68)	(-1.52)	(0.74)	(-1.69)	(2.94)
Industry FE	YES	YES	YES	YES	YES	YES	YES	YES
Observations	30,197	30,197	40,015	40,015	45,502	45,502	39,899	39,899
Adjusted R^2	0.009	0.004	0.009	0.002	0.008	0.002	0.009	0.002

This table reports the regression results of the relation between tax avoidance 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 corrected for cross-sectional and time-series dependence (Petersen 2009; Gow et al. 2010). ***, **, and * indicate statistical significance at the 0.01, 0.05 and 0.10 level or better, respectively (two-tailed test).

TABLE 4
Tax Aggressiveness and Profitability of Insider Trades - The Role of Monitoring

	TAX = CETR		*TAX = TBTD*		*TAX = DTAX*		*TAX = SHELTER*	
	SALE_ PROFIT	*PURCH_ PROFIT*	*SALE_ PROFIT*	*PURCH_ PROFIT*	*SALE_ PROFIT*	*PURCH_ PROFIT*	*SALE_ PROFIT*	*PURCH_ PROFIT*
TAX	-0.086	0.072***	0.195	0.056***	-0.182	0.068***	0.007	0.006***
	(-0.42)	(5.00)	(1.48)	(4.84)	(-1.13)	(3.77)	(0.70)	(4.62)
TAX×IOHOLD	-0.042	-0.083***	-0.008	-0.044**	0.311	-0.076***	0.005	-0.005***
	(-0.16)	(-4.12)	(-0.04)	(-2.41)	(1.51)	(-3.33)	(0.32)	(-4.02)
lnMV	0.023	-0.001	0.019	-0.002	0.016	-0.002	0.012	-0.005**
	(1.16)	(-0.88)	(1.09)	(-1.38)	(1.08)	(-1.39)	(0.58)	(-2.24)
BTM	-0.011	0.026	-0.017	0.016*	-0.015	0.013	-0.020	0.014
	(-0.30)	(1.64)	(-0.81)	(1.71)	(-0.80)	(1.57)	(-0.78)	(1.46)
Prior_RET	0.164**	-0.009**	0.156***	-0.011***	0.148***	-0.010***	0.158***	-0.011***
	(2.05)	(-2.51)	(2.77)	(-3.43)	(2.84)	(-3.58)	(2.76)	(-3.53)
AGE	0.002**	-0.000	0.002**	-0.000	0.002**	-0.000	0.002**	-0.000
	(2.27)	(-0.22)	(2.37)	(-0.76)	(2.42)	(-0.68)	(2.30)	(-0.71)
RND	-0.062*	0.009	-0.044	0.011*	-0.044	0.009	-0.050*	0.010*
	(-1.81)	(1.18)	(-1.52)	(1.86)	(-1.53)	(1.54)	(-1.66)	(1.76)
MAG_AR	0.681	0.268*	0.545	0.174	0.585	0.189	0.577	0.178
	(1.08)	(1.82)	(0.93)	(1.21)	(1.13)	(1.32)	(1.00)	(1.22)
ANALYST	-0.005	0.000*	-0.005	0.000	-0.004	0.000	-0.005	0.000*
	(-1.34)	(1.95)	(-1.51)	(1.48)	(-1.57)	(1.52)	(-1.57)	(1.79)
IOHOLD	-0.068	-0.027***	-0.057*	-0.001	-0.049*	0.002	-0.051*	-0.002
	(-0.78)	(-4.82)	(-1.88)	(-0.15)	(-1.69)	(0.36)	(-1.87)	(-0.39)
FSINFORM	-0.099	0.010***	-0.093	0.002	-0.083	0.002	-0.090	0.002
	(-1.14)	(2.66)	(-1.38)	(0.49)	(-1.41)	(0.61)	(-1.38)	(0.47)
RET_VOL	4.150**	0.389**	4.873***	0.229**	3.924***	0.102	4.544***	0.252**
	(2.46)	(2.16)	(3.55)	(2.14)	(3.23)	(1.09)	(3.39)	(2.24)
Constant	-0.361***	-0.009	-0.179	0.012	-0.156	0.011	-0.134*	0.029***
	(-2.75)	(-0.43)	(-1.50)	(0.70)	(-1.51)	(0.71)	(-1.66)	(3.11)
Industry FE	YES	YES	YES	YES	YES	YES	YES	YES
Observations	30,197	30,197	40,015	40,015	45,502	45,502	39,899	39,899
Adjusted R^2	0.009	0.004	0.009	0.002	0.008	0.002	0.009	0.002

This table reports the regression results of the role of monitoring on the relation between tax avoidance and the profitability of insider trades, where monitoring is proxied by institutional ownership. The detailed definitions of the variables are provided in the Appendix. T-statistics are reported in parentheses below the coefficient estimates. Standard errors are corrected for cross-sectional and time-series dependence (Petersen 2009; Gow et al. 2010). ***, **, and * indicate statistical significance at the 0.01, 0.05 and 0.10 level or better, respectively (two-tailed test).

TABLE 5
Tax Aggressiveness and Profitability of Insider Trades - The Role of Information Environment

Panel A: Analyst Following

	TAX = CETR		*TAX = TBTD*		*TAX = DTAX*		*TAX = SHELTER*	
	SALE_ PROFIT	*PURCH_ PROFIT*	*SALE_ PROFIT*	*PURCH_ PROFIT*	*SALE_ PROFIT*	*PURCH_ PROFIT*	*SALE_ PROFIT*	*PURCH_ PROFIT*
TAX	-0.053	0.045***	0.137	0.045***	-0.184	0.046***	0.004	0.004***
	(-0.38)	(4.48)	(1.10)	(4.43)	(-1.03)	(3.49)	(0.46)	(4.34)
TAX×ANALYST	-0.010	-0.003***	0.013	-0.001	0.030	-0.002***	0.001	-0.000**
	(-0.88)	(-3.92)	(0.88)	(-1.53)	(1.45)	(-2.59)	(1.09)	(-2.38)
lnMV	0.023	-0.001	0.019	-0.002	0.016	-0.002	0.012	-0.005**
	(1.15)	(-0.92)	(1.09)	(-1.43)	(1.06)	(-1.41)	(0.59)	(-2.28)
BTM	-0.011	0.027	-0.016	0.016*	-0.016	0.013	-0.021	0.014
	(-0.28)	(1.64)	(-0.74)	(1.74)	(-0.83)	(1.59)	(-0.83)	(1.51)
Prior_RET	0.165**	-0.009**	0.157***	-0.011***	0.148***	-0.010***	0.158***	-0.011***
	(2.06)	(-2.53)	(2.77)	(-3.42)	(2.84)	(-3.60)	(2.77)	(-3.51)
AGE	0.002**	-0.000	0.002**	-0.000	0.002**	-0.000	0.002**	-0.000
	(2.25)	(-0.20)	(2.34)	(-0.73)	(2.42)	(-0.63)	(2.16)	(-0.79)
RND	-0.062*	0.009	-0.044	0.011*	-0.044	0.009	-0.051*	0.010*
	(-1.78)	(1.20)	(-1.52)	(1.86)	(-1.53)	(1.52)	(-1.66)	(1.76)
MAG_AR	0.679	0.270*	0.556	0.173	0.593	0.188	0.604	0.171
	(1.08)	(1.84)	(0.97)	(1.19)	(1.15)	(1.31)	(1.09)	(1.17)
ANALYST	-0.007**	-0.000	-0.005	0.000	-0.005	0.000	-0.006*	0.001**
	(-2.57)	(-1.42)	(-1.46)	(1.46)	(-1.62)	(1.57)	(-1.72)	(2.17)
IOHOLD	-0.056	-0.006	-0.055*	0.000	-0.047*	0.001	-0.037	-0.002
	(-1.54)	(-1.34)	(-1.75)	(0.09)	(-1.67)	(0.30)	(-1.38)	(-0.44)
FSINFORM	-0.099	0.009***	-0.094	0.002	-0.083	0.002	-0.091	0.002
	(-1.14)	(2.64)	(-1.39)	(0.50)	(-1.41)	(0.61)	(-1.39)	(0.48)
RET_VOL	4.151**	0.390**	4.864***	0.227**	3.917***	0.101	4.524***	0.239**
	(2.46)	(2.16)	(3.55)	(2.13)	(3.23)	(1.08)	(3.36)	(2.18)
Constant	-0.356***	-0.016	-0.182	0.012	-0.154	0.011	-0.137*	0.029***
	(-2.92)	(-0.75)	(-1.53)	(0.69)	(-1.49)	(0.72)	(-1.71)	(2.98)
Industry FE	YES	YES	YES	YES	YES	YES	YES	YES
Observations	30,197	30,197	40,015	40,015	45,502	45,502	39,899	39,899
Adjusted R^2	0.009	0.004	0.009	0.002	0.008	0.002	0.009	0.002

TABLE 5 (Con't)

Panel B: Bid-Ask Spread

	TAX = CETR		*TAX = TBTD*		*TAX = DTAX*		*TAX = SHELTER*	
	SALE_ PROFIT	*PURCH_ PROFIT*	*SALE_ PROFIT*	*PURCH_ PROFIT*	*SALE_ PROFIT*	*PURCH_ PROFIT*	*SALE_ PROFIT*	*PURCH_ PROFIT*
TAX	-0.138	0.004	0.297**	0.031**	0.013	0.016	0.012	0.002**
	(-1.16)	(0.73)	(2.26)	(1.99)	(0.12)	(1.42)	(1.13)	(2.38)
TAX×SPREAD	1.708	1.511***	-4.863**	0.606**	-3.197*	1.195***	-0.150	0.083***
	(0.78)	(4.77)	(-2.07)	(2.03)	(-1.93)	(3.62)	(-1.18)	(4.69)
SPREAD	0.030	0.257	-1.242	-0.335*	-0.846	-0.367**	-1.157	-0.196
	(0.01)	(0.95)	(-1.02)	(-1.73)	(-0.73)	(-2.16)	(-0.81)	(-1.02)
lnMV	0.023	-0.002	0.015	-0.004**	0.013	-0.004**	0.008	-0.007**
	(0.74)	(-1.43)	(0.61)	(-1.99)	(0.61)	(-2.15)	(0.28)	(-2.42)
BTM	-0.009	0.027	-0.013	0.017*	-0.013	0.014	-0.017	0.014
	(-0.24)	(1.62)	(-0.62)	(1.71)	(-0.73)	(1.61)	(-0.74)	(1.46)
Prior_RET	0.163*	-0.010**	0.152***	-0.012***	0.145***	-0.012***	0.154***	-0.012***
	(1.91)	(-2.31)	(2.68)	(-3.35)	(2.74)	(-3.45)	(2.66)	(-3.43)
AGE	0.002**	-0.000	0.002**	-0.000	0.002**	-0.000	0.002**	-0.000
	(2.41)	(-0.15)	(2.43)	(-0.27)	(2.52)	(-0.10)	(2.41)	(-0.33)
RND	-0.063*	0.009	-0.047	0.010*	-0.047*	0.008	-0.053*	0.009*
	(-1.95)	(1.20)	(-1.63)	(1.83)	(-1.65)	(1.45)	(-1.80)	(1.72)
MAG_AR	0.667	0.258*	0.491	0.150	0.538	0.162	0.529	0.156
	(1.20)	(1.86)	(0.86)	(1.08)	(1.08)	(1.18)	(0.95)	(1.12)
ANALYST	-0.005	0.000**	-0.004	0.001**	-0.004	0.001**	-0.005	0.001**
	(-1.01)	(2.02)	(-1.16)	(2.03)	(-1.18)	(2.17)	(-1.24)	(2.16)
IOHOLD	-0.067	-0.009	-0.082**	-0.007	-0.068*	-0.006	-0.077*	-0.007
	(-1.23)	(-1.15)	(-2.01)	(-1.26)	(-1.81)	(-1.15)	(-1.73)	(-1.22)
FSINFORM	-0.100	0.010***	-0.094	0.003	-0.083	0.003	-0.091	0.003
	(-1.12)	(2.70)	(-1.37)	(0.62)	(-1.37)	(0.77)	(-1.36)	(0.60)
RET_VOL	4.309*	0.429*	5.186***	0.341**	4.251***	0.215	4.838***	0.361**
	(1.91)	(1.73)	(3.26)	(2.33)	(2.97)	(1.63)	(2.97)	(2.46)
Constant	-0.254	-0.004	-0.169	0.015	-0.122	0.029**	-0.126	0.028*
	(-0.97)	(-0.33)	(-1.19)	(1.06)	(-0.79)	(2.02)	(-0.72)	(1.69)
Industry FE	YES	YES	YES	YES	YES	YES	YES	YES
Observations	30,058	30,058	39,748	39,748	45,179	45,179	39,632	39,632
Adjusted R^2	0.009	0.004	0.009	0.002	0.008	0.002	0.009	0.002

This table reports the regression results of the role of information environment on the relation between tax avoidance and the profitability of insider trades. In Panel A, we report the results when information environment is proxied by analyst following. In Panel B, we report the results when information environment is proxied by bid-ask spread. The detailed definitions of the variables are provided in the Appendix. T-statistics are reported in parentheses below the coefficient estimates. Standard errors are corrected for cross-sectional and time-series dependence (Petersen 2009; Gow et al. 2010). ***, **, and * indicate statistical significance at the 0.01, 0.05 and 0.10 level or better, respectively (two-tailed test).

TABLE 6
Tax Aggressiveness and Profitability of Insider Trades by Insider Type

Panel A: CEOs/CFOs

	TAX = CETR		*TAX = TBTD*		*TAX = DTAX*		*TAX = SHELTER*	
	SALE_ PROFIT	*PURCH_ PROFIT*	*SALE_ PROFIT*	*PURCH_ PROFIT*	*SALE_ PROFIT*	*PURCH_ PROFIT*	*SALE_ PROFIT*	*PURCH_ PROFIT*
TAX	-0.046	0.022***	0.168***	0.031***	0.005	0.019**	0.008	0.002***
	(-0.79)	(3.42)	(2.67)	(3.81)	(0.10)	(2.55)	(1.37)	(4.24)
Controls	YES	YES	YES	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES	YES	YES
Observations	28,007	28,007	36,912	36,912	41,987	41,987	36,796	36,796
Adjusted R^2	0.009	0.003	0.009	0.001	0.008	0.001	0.009	0.001

Panel B: Other Officers

	TAX = CETR		*TAX = TBTD*		*TAX = DTAX*		*TAX = SHELTER*	
	SALE_ PROFIT	*PURCH_ PROFIT*	*SALE_ PROFIT*	*PURCH_ PROFIT*	*SALE_ PROFIT*	*PURCH_ PROFIT*	*SALE_ PROFIT*	*PURCH_ PROFIT*
TAX	-0.054	0.009***	0.058	0.011**	-0.044	0.021**	0.003	0.001**
	(-1.33)	(3.38)	(1.12)	(2.33)	(-0.76)	(2.55)	(0.76)	(2.25)
Controls	YES	YES	YES	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES	YES	YES
Observations	29,373	29,373	38,619	38,619	43,915	43,915	38,509	38,509
Adjusted R^2	0.009	0.002	0.008	0.001	0.008	0.001	0.008	0.001

Panel C: Non-officer Directors

	TAX = CETR		*TAX = TBTD*		*TAX = DTAX*		*TAX = SHELTER*	
	SALE_ PROFIT	*PURCH_ PROFIT*	*SALE_ PROFIT*	*PURCH_ PROFIT*	*SALE_ PROFIT*	*PURCH_ PROFIT*	*SALE_ PROFIT*	*PURCH_ PROFIT*
TAX	-0.168	0.043**	0.172	0.096***	-0.001	0.146***	0.000	0.009***
	(-1.33)	(2.48)	(0.82)	(4.67)	(-0.00)	(3.26)	(0.04)	(6.66)
Controls	YES	YES	YES	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES	YES	YES
Observations	30,106	30,106	39,740	39,740	45,187	45,187	39,627	39,627
Adjusted R^2	0.010	0.003	0.007	0.002	0.007	0.002	0.007	0.002

This table reports the regression results of the relation between tax avoidance and the profitability of insider trades by insider type. The detailed definitions of the variables are provided in the Appendix. T-statistics are reported in parentheses below the coefficient estimates. Standard errors are corrected for cross-sectional and time-series dependence (Petersen 2009; Gow et al. 2010). ***, **, and * indicate statistical significance at the 0.01, 0.05 and 0.10 level or better, respectively (two-tailed test).

TABLE 7
Tax Aggressiveness and Timing of Insider Trades

Panel A: Restricted trade window

	TAX = CETR		*TAX = TBTD*		*TAX = DTAX*		*TAX = SHELTER*	
	SALE_ PROFIT	*PURCH_ PROFIT*	*SALE_ PROFIT*	*PURCH_ PROFIT*	*SALE_ PROFIT*	*PURCH_ PROFIT*	*SALE_ PROFIT*	*PURCH_ PROFIT*
TAX	-0.022	0.007***	0.044	0.016**	0.054*	0.015	0.003	0.001*
	(-1.39)	(3.20)	(1.46)	(1.98)	(1.76)	(1.54)	(1.32)	(1.76)
lnMV	0.005	0.000	0.001	0.000	0.002	0.001	-0.001	-0.000
	(1.35)	(0.13)	(0.34)	(0.89)	(0.50)	(1.20)	(-0.19)	(-0.44)
BTM	-0.006	0.009**	-0.006	0.005***	-0.005	0.005**	-0.007	0.005**
	(-0.58)	(2.36)	(-0.88)	(2.59)	(-0.83)	(2.48)	(-1.16)	(2.49)
Prior_RET	0.024**	-0.002	0.019**	-0.003**	0.018**	-0.002**	0.019**	-0.003**
	(2.21)	(-1.19)	(2.14)	(-2.05)	(2.15)	(-2.07)	(2.12)	(-1.98)
AGE	0.000	-0.000	0.000	-0.000	0.000	-0.000	0.000	-0.000
	(1.56)	(-1.59)	(1.26)	(-1.48)	(1.35)	(-1.28)	(1.12)	(-1.64)
RND	-0.011	0.004	-0.006	0.003	-0.006	0.002	-0.007	0.003
	(-1.16)	(1.32)	(-0.78)	(1.46)	(-1.00)	(1.21)	(-1.04)	(1.35)
MAG_AR	-0.103	0.025	-0.095	-0.002	-0.112	0.012	-0.093	-0.002
	(-0.50)	(0.57)	(-0.72)	(-0.06)	(-0.78)	(0.33)	(-0.70)	(-0.05)
ANALYST	-0.001	0.000	-0.001	-0.000	-0.001	-0.000	-0.001	-0.000
	(-1.37)	(0.68)	(-0.93)	(-1.09)	(-1.00)	(-1.16)	(-0.95)	(-1.17)
IOHOLD	-0.005	-0.003*	0.000	-0.003*	0.000	-0.002	0.000	-0.003*
	(-0.57)	(-1.96)	(0.07)	(-1.79)	(0.04)	(-1.33)	(0.03)	(-1.88)
FSINFORM	-0.015	0.002	-0.010	0.001	-0.009	0.001	-0.010	0.001
	(-1.49)	(1.28)	(-1.43)	(0.89)	(-1.55)	(0.97)	(-1.43)	(0.90)
RET_VOL	0.658***	-0.004	0.581***	0.035	0.468***	-0.016	0.566***	0.029
	(2.71)	(-0.05)	(3.21)	(0.80)	(2.98)	(-0.52)	(3.12)	(0.62)
Constant	-0.075**	-0.000	-0.011	-0.004	-0.011	-0.004	0.008	0.013
	(-2.05)	(-0.01)	(-0.54)	(-1.03)	(-0.62)	(-1.23)	(0.26)	(1.25)
Industry FE	YES	YES	YES	YES	YES	YES	YES	YES
Observations	29,887	29,887	39,434	39,434	44,828	44,828	39,319	39,319
Adjusted R^2	0.002	0.002	0.002	0.001	0.002	0.001	0.002	0.001

TABLE 7 (Con't)

Panel B: Outside restricted trade window

	TAX = CETR		*TAX = TBTD*		*TAX = DTAX*		*TAX = SHELTER*	
	SALE_ PROFIT	*PURCH_ PROFIT*	*SALE_ PROFIT*	*PURCH_ PROFIT*	*SALE_ PROFIT*	*PURCH_ PROFIT*	*SALE_ PROFIT*	*PURCH_ PROFIT*
TAX	-0.089	-0.118	0.156	0.184*	-0.106	-0.067	0.006	0.008
	(-1.06)	(-1.26)	(1.64)	(1.86)	(-1.58)	(-0.81)	(0.76)	(1.03)
lnMV	0.019	0.024	0.019	0.020	0.016	0.017	0.014	0.014
	(0.89)	(1.11)	(1.08)	(1.10)	(1.04)	(1.09)	(0.67)	(0.65)
BTM	-0.005	-0.020	-0.012	-0.023	-0.011	-0.021	-0.013	-0.025
	(-0.13)	(-0.67)	(-0.46)	(-1.03)	(-0.48)	(-1.05)	(-0.43)	(-0.95)
Prior_RET	0.140	0.165*	0.136**	0.158**	0.130**	0.150**	0.138**	0.159**
	(1.58)	(1.73)	(2.29)	(2.47)	(2.32)	(2.52)	(2.26)	(2.44)
AGE	0.002**	0.002**	0.002**	0.002**	0.002**	0.002**	0.002**	0.002**
	(2.16)	(2.28)	(2.36)	(2.51)	(2.38)	(2.52)	(2.31)	(2.42)
RND	-0.056	-0.071	-0.043	-0.052	-0.041	-0.050	-0.047	-0.057
	(-1.37)	(-1.40)	(-1.39)	(-1.39)	(-1.37)	(-1.40)	(-1.46)	(-1.49)
MAG_AR	0.821	0.693	0.660	0.567	0.729	0.605	0.694	0.603
	(1.57)	(1.29)	(1.24)	(0.95)	(1.53)	(1.12)	(1.30)	(1.00)
ANALYST	-0.004	-0.005	-0.004	-0.005	-0.004	-0.005	-0.004	-0.005
	(-0.98)	(-1.29)	(-1.28)	(-1.42)	(-1.29)	(-1.47)	(-1.34)	(-1.48)
IOHOLD	-0.057*	-0.058	-0.063**	-0.060**	-0.052**	-0.050*	-0.060**	-0.057*
	(-1.72)	(-1.58)	(-2.27)	(-1.98)	(-2.07)	(-1.82)	(-2.22)	(-1.88)
FSINFORM	-0.084	-0.102	-0.084	-0.095	-0.074	-0.084	-0.081	-0.092
	(-1.16)	(-1.24)	(-1.50)	(-1.53)	(-1.53)	(-1.58)	(-1.51)	(-1.54)
RET_VOL	3.548***	4.210***	4.413***	4.959***	3.561***	4.046***	4.116***	4.654***
	(2.81)	(3.02)	(3.78)	(3.88)	(3.51)	(3.64)	(3.66)	(3.75)
Constant	-0.303**	-0.377***	-0.212*	-0.219**	-0.182*	-0.189**	-0.149	-0.154
	(-2.02)	(-2.60)	(-1.91)	(-1.96)	(-1.92)	(-1.98)	(-0.97)	(-1.07)
Industry FE	YES	YES	YES	YES	YES	YES	YES	YES
Observations	29,887	29,887	39,434	39,434	44,828	44,828	39,319	39,319
Adjusted R^2	0.009	0.009	0.009	0.009	0.008	0.008	0.009	0.009

This table panel A (Panel B) reports the regression results of the relation between tax avoidance and the profitability of insider trades within (outside) the restricted trading window, where the restricted trading window is defined as the window starting 46 days prior to the earnings announcement to one day after the earnings announcement. The detailed definitions of the variables are provided in the Appendix. T-statistics are reported in parentheses below the coefficient estimates. Standard errors are corrected for cross-sectional and time-series dependence (Petersen 2009; Gow et al. 2010). ***, **, and * indicate statistical significance at the 0.01, 0.05 and 0.10 level or better, respectively (two-tailed test).

TABLE 8
Tax Aggressiveness and Timing of Insider Trades – Prior to Stock Price Crashes

	TAX = CETR		*TAX = TBTD*		*TAX = DTAX*		*TAX = SHELTER*	
	SALE_ VOL	*PURCH_ VOL*	*SALE_ VOL*	*PURCH_ VOL*	*SALE_ VOL*	*PURCH_ VOL*	*SALE_ VOL*	*PURCH_ VOL*
TAX	0.761***	-0.174*	1.246***	-0.050	0.137	-0.087	0.136***	-0.008
	(3.90)	(-1.85)	(6.41)	(-0.42)	(0.56)	(-0.66)	(6.97)	(-0.81)
lnMV	0.345***	0.057**	0.304***	0.076***	0.311***	0.079***	0.212***	0.083***
	(7.70)	(2.48)	(8.52)	(3.82)	(8.83)	(4.16)	(6.48)	(4.41)
BTM	-1.018***	-0.077	-0.869***	0.027	-0.787***	-0.009	-0.965***	0.034
	(-10.00)	(-1.52)	(-9.96)	(0.63)	(-11.46)	(-0.19)	(-10.46)	(0.76)
Prior_RET	1.291***	-0.120***	1.169***	-0.179***	1.223***	-0.190***	1.172***	-0.181***
	(12.49)	(-2.59)	(14.04)	(-4.91)	(14.26)	(-4.91)	(13.96)	(-4.79)
AGE	-0.006*	-0.001	-0.010***	-0.002*	-0.008***	-0.002*	-0.010***	-0.002*
	(-1.89)	(-0.97)	(-3.69)	(-1.73)	(-3.18)	(-1.65)	(-4.06)	(-1.67)
RND	0.321***	0.048	0.313***	0.024	0.286***	0.008	0.261***	0.025
	(2.63)	(0.74)	(3.06)	(0.43)	(2.81)	(0.14)	(2.61)	(0.45)
MAG_AR	6.102*	-1.408*	6.995***	-0.575	7.707***	-0.280	6.924***	-0.404
	(1.92)	(-1.90)	(3.18)	(-0.67)	(3.69)	(-0.34)	(3.15)	(-0.45)
ANALYST	0.058***	-0.008*	0.076***	-0.009**	0.072***	-0.009***	0.074***	-0.009**
	(6.37)	(-1.68)	(8.26)	(-2.46)	(8.59)	(-2.80)	(8.15)	(-2.48)
IOHOLD	1.850***	-0.124	1.615***	-0.111	1.696***	-0.091	1.577***	-0.103
	(9.85)	(-1.36)	(8.47)	(-1.62)	(8.70)	(-1.19)	(8.19)	(-1.51)
FSINFORM	0.594***	-0.128***	0.511***	-0.069*	0.541***	-0.072*	0.515***	-0.072*
	(3.91)	(-2.63)	(3.13)	(-1.67)	(3.63)	(-1.79)	(3.22)	(-1.71)
RET_VOL	-9.488***	10.414***	-14.761***	10.570***	-17.484***	10.255***	-13.653***	10.516***
	(-2.86)	(5.37)	(-4.86)	(5.09)	(-6.34)	(5.60)	(-4.44)	(5.08)
Constant	-2.998***	-0.509***	0.425	-0.099	0.333	-0.096	1.107	-0.154
	(-7.90)	(-3.37)	(0.36)	(-0.33)	(0.64)	(-0.13)	(0.91)	(-0.48)
Industry FE	YES	YES	YES	YES	YES	YES	YES	YES
Observations	6,725	6,725	8,664	8,664	9,704	9,704	8,624	8,624
Adjusted R^2	0.366	0.026	0.360	0.032	0.363	0.034	0.363	0.032

This table reports the regression results of the relation between tax avoidance 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 corrected for cross-sectional and time-series dependence (Petersen 2009; Gow et al. 2010). ***, **, and * indicate statistical significance at the 0.01, 0.05 and 0.10 level or better, respectively (two-tailed test).

TABLE 9
Tax Aggressiveness and Profitability of Insider Trades – Alternative Tax Measures

	TAX = CETR5		*TAX = DDBTD*	
	SALE_ PROFIT	*PURCH_ PROFIT*	*SALE_ PROFIT*	*PURCH_ PROFIT*
TAX	-0.112	0.018*	0.055	0.038*
	(-0.56)	(1.74)	(0.41)	(1.95)
lnMV	0.030	0.001	0.018	-0.003
	(1.18)	(0.40)	(1.08)	(-1.48)
BTM	0.008	0.031	-0.014	0.016*
	(0.21)	(1.62)	(-0.71)	(1.69)
Prior_RET	0.187**	-0.005	0.160***	-0.010***
	(2.17)	(-1.56)	(2.84)	(-3.27)
AGE	0.002**	-0.000**	0.002**	-0.000
	(2.06)	(-2.35)	(2.43)	(-0.56)
RND	-0.070*	0.010	-0.049*	0.011*
	(-1.83)	(1.21)	(-1.70)	(1.78)
MAG_AR	0.947	0.213	0.580	0.179
	(1.20)	(1.02)	(0.98)	(1.23)
ANALYST	-0.005	0.000	-0.005	0.000
	(-1.34)	(1.20)	(-1.44)	(1.50)
IOHOLD	-0.067	-0.007	-0.053	0.000
	(-1.55)	(-1.19)	(-1.63)	(0.02)
FSINFORM	-0.104	0.010*	-0.091	0.003
	(-1.02)	(1.78)	(-1.35)	(0.54)
RET_VOL	3.682*	0.387*	4.436***	0.179
	(1.72)	(1.80)	(3.36)	(1.56)
Constant	-0.307	-0.020	-0.180	0.011
	(-1.35)	(-0.91)	(-1.50)	(0.65)
Industry FE	YES	YES	YES	YES
Observations	24,811	24,811	39,983	39,983
Adjusted R^2	0.011	0.003	0.009	0.002

This table reports the regression results of the relation between tax avoidance and the profitability of insider trades, using two alternative tax avoidance measures. The detailed definitions of the variables are provided in the Appendix. T-statistics are reported in parentheses below the coefficient estimates. Standard errors are corrected for cross-sectional and time-series dependence (Petersen 2009; Gow et al. 2010). ***, **, and * indicate statistical significance at the 0.01, 0.05 and 0.10 level or better, respectively (two-tailed test).

TABLE 10
Tax Aggressiveness and Profitability of Insider Trades, Controlling for the Effects of Accrual Management

	TAX = CETR		*TAX = TBTD*		*TAX = DTAX*		*TAX = SHELTER*	
	SALE_ PROFIT	*PURCH_ PROFIT*	*SALE_ PROFIT*	*PURCH_ PROFIT*	*SALE_ PROFIT*	*PURCH_ PROFIT*	*SALE_ PROFIT*	*PURCH_ PROFIT*
TAX	-0.173*	0.033***	0.106	0.043***	-0.111	0.043***	-0.003	0.004***
	(-1.90)	(4.29)	(1.13)	(3.20)	(-1.23)	(3.01)	(-0.53)	(3.15)
ACCEM	0.296***	-0.011	0.123	-0.012	0.166**	-0.011	0.180**	-0.012
	(3.41)	(-1.04)	(1.55)	(-0.84)	(2.58)	(-0.80)	(2.49)	(-0.80)
lnMV	0.034	-0.001	0.025	-0.003	0.025	-0.003	0.028	-0.005**
	(1.55)	(-0.57)	(1.42)	(-1.39)	(1.49)	(-1.54)	(1.33)	(-2.16)
BTM	0.009	0.031	-0.005	0.016	-0.001	0.015	0.003	0.013
	(0.21)	(1.59)	(-0.25)	(1.55)	(-0.07)	(1.58)	(0.12)	(1.27)
Prior_RET	0.168**	-0.011**	0.155***	-0.011***	0.151***	-0.011***	0.158***	-0.012***
	(1.99)	(-2.51)	(2.75)	(-3.43)	(2.82)	(-3.79)	(2.77)	(-3.47)
AGE	0.002**	0.000	0.001**	-0.000	0.001**	-0.000	0.001**	-0.000
	(2.10)	(0.11)	(2.15)	(-0.64)	(2.26)	(-0.41)	(2.15)	(-1.02)
RND	-0.057	0.009	-0.042	0.011*	-0.041	0.009	-0.044	0.010*
	(-1.53)	(1.14)	(-1.36)	(1.82)	(-1.30)	(1.53)	(-1.38)	(1.67)
MAG_AR	0.027	0.255*	0.172	0.173	0.112	0.161	0.218	0.175
	(0.05)	(1.69)	(0.36)	(1.13)	(0.23)	(1.05)	(0.47)	(1.14)
ANALYST	-0.006	0.000	-0.005	0.000	-0.005	0.000*	-0.005	0.000
	(-1.41)	(1.56)	(-1.52)	(1.52)	(-1.57)	(1.65)	(-1.53)	(1.51)
IOHOLD	-0.071*	-0.006	-0.065**	-0.001	-0.059*	0.001	-0.056*	-0.002
	(-1.68)	(-1.48)	(-2.04)	(-0.19)	(-1.89)	(0.26)	(-1.75)	(-0.42)
FSINFORM	-0.141	0.012***	-0.116*	0.003	-0.114*	0.004	-0.111*	0.003
	(-1.44)	(2.61)	(-1.69)	(0.56)	(-1.74)	(0.82)	(-1.68)	(0.53)
RET_VOL	3.729**	0.509**	4.653***	0.243**	4.289***	0.172*	4.170***	0.258**
	(2.23)	(2.15)	(3.38)	(2.25)	(3.35)	(1.67)	(3.09)	(2.31)
Constant	-0.260**	-0.004	-0.224**	-0.002	-0.228***	-0.002	-0.242**	0.018
	(-2.31)	(-0.14)	(-2.42)	(-0.10)	(-2.60)	(-0.10)	(-2.30)	(0.70)
Industry FE	YES	YES	YES	YES	YES	YES	YES	YES
Observations	25,258	25,258	36,518	36,518	38,032	38,032	36,403	36,403
Adjusted R^2	0.010	0.004	0.009	0.002	0.009	0.001	0.009	0.002

This table reports the regression results of the relation between tax avoidance and the profitability of insider trades, after controlling for the effects of accrual management. The detailed definitions of the variables are provided in the Appendix. T-statistics are reported in parentheses below the coefficient estimates. Standard errors are corrected for cross-sectional and time-series dependence (Petersen 2009; Gow et al. 2010). ***, **, and * indicate statistical significance at the 0.01, 0.05 and 0.10 level or better, respectively (two-tailed test).

TABLE 11
Tax Aggressiveness and Profitability of Insider Trades, Controlling for Corporate Social Responsibility Orientation

	TAX = CETR		*TAX = TBTD*		*TAX = DTAX*		*TAX = SHELTER*	
	SALE_ PROFIT	*PURCH_ PROFIT*	*SALE_ PROFIT*	*PURCH_ PROFIT*	*SALE_ PROFIT*	*PURCH_ PROFIT*	*SALE_ PROFIT*	*PURCH_ PROFIT*
TAX	-0.081***	0.006***	0.031	0.011	0.098*	0.020*	-0.006	0.001
	(-2.73)	(3.55)	(0.63)	(0.96)	(1.70)	(1.85)	(-1.06)	(1.52)
CSR	0.011	0.000	0.012	0.002	0.010	0.002	0.014	0.002
	(1.17)	(0.29)	(1.32)	(0.76)	(1.23)	(0.78)	(1.53)	(0.72)
lnMV	-0.003	-0.000	0.002	-0.002*	0.001	-0.001*	0.006	-0.003***
	(-0.44)	(-0.73)	(0.23)	(-1.96)	(0.10)	(-1.83)	(0.62)	(-2.64)
BTM	-0.028	0.006***	-0.009	-0.001	-0.011	-0.000	-0.004	-0.002
	(-1.31)	(2.78)	(-0.54)	(-0.15)	(-0.77)	(-0.12)	(-0.21)	(-0.45)
Prior_RET	0.024*	-0.003	0.043**	-0.010**	0.043**	-0.010**	0.045**	-0.010**
	(1.65)	(-1.60)	(2.28)	(-2.14)	(2.48)	(-2.05)	(2.34)	(-2.17)
AGE	0.000	0.000	-0.000	-0.000	0.000	-0.000	0.000	-0.000
	(1.19)	(0.49)	(-0.17)	(-1.28)	(0.01)	(-1.49)	(0.10)	(-1.36)
RND	0.000	-0.001	0.002	-0.002	0.003	-0.002	0.001	-0.003
	(0.01)	(-0.83)	(0.10)	(-0.95)	(0.17)	(-1.08)	(0.08)	(-1.09)
MAG_AR	0.855**	0.006	0.943***	-0.006	0.857***	0.012	0.959***	-0.006
	(2.09)	(0.28)	(2.86)	(-0.06)	(2.72)	(0.13)	(2.93)	(-0.06)
ANALYST	-0.001	0.000	-0.001	0.000	-0.001	0.000	-0.001	0.000
	(-0.75)	(0.85)	(-1.28)	(0.80)	(-1.29)	(0.69)	(-1.24)	(0.78)
IOHOLD	0.011	-0.002	-0.008	-0.012**	-0.007	-0.011**	-0.005	-0.012**
	(0.67)	(-1.29)	(-0.48)	(-2.08)	(-0.48)	(-2.06)	(-0.31)	(-2.06)
FSINFORM	-0.077***	0.002	-0.062***	0.002	-0.057***	0.002	-0.062***	0.002
	(-4.47)	(1.60)	(-4.02)	(0.75)	(-4.24)	(0.75)	(-4.10)	(0.73)
RET_VOL	1.471**	0.163	1.581***	0.469**	1.463***	0.378*	1.351**	0.484**
	(2.53)	(1.43)	(2.65)	(2.04)	(2.76)	(1.76)	(2.28)	(2.11)
Constant	0.004	-0.001	-0.039	0.005	-0.005	0.007	-0.069	0.012
	(0.04)	(-0.25)	(-0.66)	(0.50)	(-0.09)	(0.67)	(-0.91)	(1.05)
Industry FE	YES	YES	YES	YES	YES	YES	YES	YES
Observations	14,921	14,921	17,952	17,952	20,323	20,323	17,884	17,884
Adjusted R^2	0.008	0.006	0.008	0.005	0.009	0.005	0.009	0.005

This table reports the regression results of the relation between tax avoidance and the profitability of insider trades, after controlling for corporate social responsibility orientation (*CSR*). The detailed definitions of the variables are provided in the Appendix. T-statistics are reported in parentheses below the coefficient estimates. Standard errors are corrected for cross-sectional and time-series dependence (Petersen 2009; Gow et al. 2010). ***, **, and * indicate statistical significance at the 0.01, 0.05 and 0.10 level or better, respectively (two-tailed test).