Executive Compensation, Individual-Level Tax Rates, and Insider Trading Aggressiveness[*]

Nathan Goldman[#]

and

Naim Bugra Ozel[##]

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[#] Poole College of Management, North Carolina State University. Email: ncgoldma@ncsu.edu
[##] The Wharton School, University of Pennsylvania and N. Jindal School of Management, University of Texas at Dallas. Email: naim.ozel@utdallas.edu

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Abstract

We consider insider trading aggressiveness as a means for executives to shift the impact of changes in individual-level tax rates to shareholders. Consistent with predictions from a simple model, we find a positive association between abnormal insider trading profits and changes in tax rates around the enactments of two recent tax acts in the U.S. The changes in insider trading profits offset between 12% and 17% of the effect of changes in tax rates for an average executive. Using a difference-in-differences analysis, we show that our findings apply to executives who are subject to taxation in the U.S. and not to executives in foreign firms, who are not subject to U.S. tax laws. We conclude that executives pass a portion of the tax effects onto shareholders through insider trading aggressiveness.

JEL Codes: H24; H31; J33; M12.

Keywords: Insider trading; executive compensation; individual-level taxes.

1. *Introduction*

Changes in individual-level tax rates represent exogenous shocks to the net compensation of executives. The costs or benefits of these shocks are typically borne by executives, because firms make, at best, modest adjustments to compensation plans following tax rate changes. For example, Frydman and Molloy (2011) examine changes in individual-level tax rates over the 1946-2005 period and report no relation between changes in these tax rates and changes in executive compensation over the short term and a marginally significant association over five to ten year periods (See also Goolsbee, 2000; Hall and Liebman, 2000). While these findings suggest that shareholders are shielded from the effects of individual tax rates on executive compensation, executives may still pass on some of these effects to the shareholders through share transactions. In particular, when changes in tax rates alter an executive's net compensation, the executive can respond to these deviations by adjusting his insider trading aggressiveness through his use of private information in trades. Such implicit adjustment of the compensation would be consistent with studies that suggest that the expected profits from insider trading are a substitute for other forms of compensation (e.g., Roulstone, 2003; Henderson, 2011; Denis and Xu, 2013).

In this paper, we evaluate the effect of changes in individual-level tax rates on insider trading aggressiveness by comparing the abnormal profitability of insider sales transactions around two recent tax acts, the Jobs and Growth Tax Relief Reconciliation Act of 2003 (hereafter JGTRRA), and the American Taxpayer Relief Act of 2012 (hereafter ATRA). JGTRRA reduced the overall tax burden on individuals, whereas ATRA primarily reversed the tax reductions afforded by JGTRRA and hence led to an increase in the tax burden on individuals.[1] We first

[1] Appendix A provides a summary of these tax acts.

demonstrate in a simple model that, under certain assumptions, changes in tax rates can affect executives' incentives for using private information in insider trades and that these incentives would vary in the cross-section based on the level of executives' private information and compensation. Based on the predictions from the model, we conjecture more aggressive insider trades after ATRA and less aggressive trades after JGTRRA.[2] We measure insider trading aggressiveness as the abnormal profitability of insider sales, which is the alpha from the four-factor Fama and French (1993) and Carhart (1997) model over the 180 days following each insider sale.[3]

We find a significant implicit compensation adjustment effect following both of the tax acts we examine. For U.S. firms, the insider trading aggressiveness is significantly higher following the enactment of ATRA and significantly lower following the enactment of JGTRRA, relative to the pre-enactment periods. In terms of economic magnitude, we estimate that changes in insider trading aggressiveness following enactments of JGTRRA, and ATRA offset between 12% and 17% of the effect of tax rate changes on net compensation for the median executive. Thus, our findings suggest that insiders pass on a portion of the change in their net compensation due to changes in tax rates to shareholders.

We also conduct a matched sample analysis and compare pre- and post-enactment insider trades at U.S. firms with those at foreign firms that are listed in the U.S. Income and stock compensation of non-U.S. citizen insiders at foreign firms are not subject to taxation in the U.S.

[2] The optimal amount of private information used to boost insider trading profitability depends on utility from these profits and the penalties insiders may face. To give an analogy, whether and by how much one drives over the speed limit depends on the urgency of the situation as well as the risk of having an accident or getting ticketed. When running late for a meeting, one will be more willing to accept the risks and drive above the speed limit, whereas when going too early the same person may drive slower than usual. In Section 2, we formally develop our hypotheses and highlight the underlying assumptions using a simple model.

[3] We focus our analyses on insider sales because for purchase transactions, which are limited in number over our event windows, we cannot observe the holding period, which is necessary to calculate the aggressiveness and identify the applicable tax regime. Our inferences remain similar when we use net insider trades instead.

Therefore, we expect the tax rate changes to have little impact on the insider trading aggressiveness at foreign firms, insiders of which are typically non-U.S. citizens.[4] Consistent with this prediction, we find significant changes in insider trading aggressiveness of executives that are subject to U.S. tax rates relative to the matched sample of insiders in foreign firms, for whom we find no change in insider trading aggressiveness, around the enactments of the tax acts.

In additional analyses, consistent with the predictions from the model, we document stronger results when insiders likely have a greater information advantage over investors and hence have more flexibility in altering their use of private information following changes in tax rates. In particular, we document stronger results for insiders of firms with greater information asymmetry, as proxied by low analyst following, and high bid-ask spreads. We also predict and find stronger results for insiders with relatively low compensation. This result is consistent with greater sensitivity of insider trading aggressiveness to changes in tax rates when the marginal utility of compensation is higher.

Optimal taxation and its effect on equity markets have long been a topic of much political debate and academic research. A standard tenet of these discussions is that these taxes distort investor behavior (e.g., Odean, 1998; Ivkovic, Poterba, and Weisbenner 2005; Grinblatt and Moskowitz 2004; Sialm, 2009). We contribute to these discussions by providing evidence on an unintended consequence of taxation on insider trading aggressiveness. Our research suggests that policies that effectively lead to a decrease in individual-level taxes reduce the incentives of executives to trade on their private information and extract larger profits at the expense of less informed shareholders. In these respects, our study adds to the work examining optimal taxation

[4] To the extent that we include some of the insiders at foreign firms are subject to U.S. taxation, our results may be biased against finding a difference between the two groups. As we explain later, a search of background information for a random selection of insiders at foreign firms suggests that these insiders are indeed typically non-U.S. citizens who are residing in a foreign country.

of executives by highlighting spillover effects of such taxes on capital markets (e.g., Diamond and Saez, 2011; Ales and Sleet, 2016). Our study also contributes to the literature on the sensitivity of executive compensation to changes in individual-level tax rates. Our findings suggest that executives' ability to adjust opaque components of their pay, such as insider trading profitability, is one factor that helps explain the observed unresponsiveness of executive compensation components to changes in individual-level tax rates documented in this literature. [5]

2. *Hypothesis Development and Background on Taxation of Executive Compensation*

Hypothesis Development

Exogenous shocks to executive compensation can distort executives' incentives and hence can prompt a renegotiation of compensation contracts (e.g., Gox 2008; Benabou and Tirole 2016). If a renegotiation is not feasible or too costly, then, possibly at the firm's discretion, executives can "implicitly" adjust their compensation through hidden pay (Seyhun 1992). Alternatively, in the absence of a renegotiation, executives can adjust their efforts to match the new level of net compensation.

A change in individual-level tax rates is one such exogenous shock to executive compensation that, based on findings in prior research, does not lead to widespread renegotiations in executive compensation contracts. Frydman and Molloy (2011) examine a sample of top executives from 1946 to 2005 and find little response of salaries, stock options, and bonuses to increases or decreases in individual-level tax rates. Similarly, Goolsbee (2000) finds no permanent effect of 1993 individual income tax rate changes on total executive

[5] Our findings should not be interpreted as evidence that insider trading aggressiveness is the only, or even the most prominent, tool for executives to adjust their compensation when faced with an exogenous shock to their net compensation. Executives can have other means to adjust net compensation following tax rate changes such as improving personal tax planning strategies or increasing empire building, which have their own costs and benefits. Presence of such activities would not induce a bias for our findings but rather may lead us to find more modest effects on insider trading aggressiveness.

compensation. Rather he finds an intertemporal shift in executive income driven by an acceleration of stock option exercises closer to the effective date of the new tax rates to avoid higher tax rates.[6] After studying various events, Hall and Liebman (2000) also conclude that executive compensation decisions are relatively insulated from changes in the individual-level tax rates. Thus, the general conclusion in the literature is that the level of executive compensation is insensitive to the changes in individual-level tax rates.

If compensation contacts are not renegotiated in response to a change in tax rates, then, possibly at their firm's discretion, executives may implicitly adjust their compensation through hidden pay, or they may adjust their efforts. Hidden pay refers to the aspects of compensation that are opaque or unknown to shareholders, such as perks, pet projects, and insider trading profits. In many firms, hidden pay compromises a large fraction of total compensation for executives in part because certain practices, such as backdating (Yermack, 1997; Heron and Lie, 2006) or agreements for repricing options (Carter and Lynch, 2001), make parts of compensation packages more valuable than what is disclosed.

Our study focuses on the tax responsiveness of a specific form of hidden pay, namely abnormal profits from insider trading. Prior research provides evidence on the substitutability of insider trading profits and other forms of remuneration. Roulstone (2003) finds that firms with more self-imposed insider trading restrictions exhibit higher levels of compensation, and Henderson (2011) finds that firms that relax insider trading restrictions also reduce compensation. Denis and Xu (2013) examine compensation around the enactment of insider trading laws and find a significant increase in compensation and equity pay following initial

[6] Relatedly, Dai, Maydew, Shackelford, and Zhang, (2008) suggest that in the two weeks right around a decrease (increase) to capital gains taxes, asset prices can be influenced by a capitalization effect that decreases (increases) demand, or a lock-in effect that decreases (increases) supply. As we explain in our research design, we omit the six months surrounding the tax rate change from our analyses, and hence we do not believe that either of these effects significantly affect our inferences.

enforcement of insider trading laws. These studies suggest that firms use insider trading as a substitute for other forms of compensation. Along these lines, we conjecture that insiders could alter their insider trading aggressiveness in response to changes in individual-level tax rates, which are exogenous shocks to their compensation.

To formalize our conjecture and highlight the underlying assumptions, we consider a simple model where a manager needs to make a decision regarding his use of private information in his trade. The manager owns N shares of his company, and the current market price of the stock is $\$P^0$. The manager privately observes that the true value of the firm is lower than the current market value ($0 \leq \$P^T < \$P^0$). For the sake of simplicity, we assume that N=1, $\$P^0=1$, and $P^T=0$. The manager can choose to disclose none, part, or all of his private information to the public prior to his trade, at which point the stock prices incorporate the information, and the new stock price becomes $P^t \in [0, 1]$. The manager then conducts a trade at the new price level P^t and earns net abnormal profits of $\beta_t P^0(1-\tau_t)$, where $\beta_t = (P^t - P^T)/P^0$ is the rate of abnormal return that is associated with the amount of private information the manager does not disclose (i.e., insider trading aggressiveness) and $\tau_t \in [0,1)$ represents the applicable tax rate (i.e., tax rate on capital gains). The manager is risk-averse, and his utility from compensation is assumed to be $ln\ ((\alpha(1-\tau_i)+\beta_t P^0(1-\tau_t))$, i.e., increasing at a decreasing rate, where α is total compensation of the manager before insider trading profits (e.g., salary, and bonuses) and $\tau_i \in [0,1)$ is the tax rate applicable to the other components of the executive compensation (e.g., income tax rate). To keep the model simple, we focus on the impact of τ_i on the optimal level of insider trading aggressiveness and ignore the capital gains taxes (i.e., $\tau_t=0$).[7] Replacing $\$P^0=1$ the manager's utility function becomes $ln\ (\alpha\ (1-\tau_i) + \beta_t)$.

[7] We note that income taxes has unambiguous "encouragement effect" on insider trading profitability whereas capital gains taxes have two opposing effects in our model. First is the "deterrence effect" where capital gains taxes decrease the benefit of insider

In our setting, shareholders and regulators oversee the manager's trade, and with probability $1-e^{-\beta\{t\},}$ these parties can identify whether a trade is based on private information. The manager's disutility from facing shareholder scrutiny (e.g., reputational costs and decreases in job security) or being prosecuted by a regulator (e.g., fines or jail time) is increasing in the amount of profits he makes through his use of private information and is equal to $q\beta_t$ where $q>0$ is the manager's disutility cost of getting caught. The manager's objective is then to maximize his expected utility:

$$E[U(\beta)] = ln\ \left(\alpha\left(1-\tau_i\right)+\beta\right) - \ \left(1-e^{-\beta}\right)q\beta$$

Maximizing the utility function w.r.t. β_t and simplifying yields the first-order condition:[8]

$$-q\beta e^{-\beta} - q(1-e^{-\beta}) + \frac{1}{\beta+\alpha(1-\tau_i)} = 0 \quad .$$

Using the implicit function theorem, it is clear that the higher (lower) the tax rate (i.e., τ_i), the more (less) aggressively the manager trades on private information (i.e., β):

$$\frac{d\beta}{d\tau} = \frac{\alpha}{1-(\alpha(1-\tau_i)+\beta)^2 qe^{-\beta}(\beta-2)} > 0 \text{ given } 1\geq\beta\geq 0 \text{ and } 1> \tau_i \geq 0$$

In this model, an increase in tax rates prompt an increase in insider trading aggressiveness because insiders become more willing to take risks to make up for part of the reduction in their net compensation. A decrease in tax rates has the opposite effect. The risks can take different forms, such as the probability of facing criminal penalties, regulatory actions,

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trading profitability. Second is their indirect effect on disutility (e.g., $\tau_t = \tau_i = \tau$, $E[U(\beta)] = ln\ \left((\alpha+\beta)(1-\tau)\right) - \ \left(1-e^{-\beta}\right)q\beta(1-\tau)$).

There is a region where the deterrence effect can dominate and the association between taxes and insider trading aggressiveness becomes negative. This region covers the cases where the effect of capital gains tax rates on net compensation dwarfs that of income tax rates and the indirect effect of capital gains taxes on disutility is not large. Since the majority of a typical executive's compensation, including the equity compensation, is subject to income tax rates rather than capital gains tax rates, these cases are unlikely to be common in practice. We discuss the tax treatment of different components of executive compensation in the next subsection in detail.

[8] This point is the maximum since $\frac{d^2E[U]}{d\beta^2} = (\beta-2)qe^{-\beta} - \frac{1}{(\beta+\alpha(1-\tau_i))^2} < 0$ given $1\geq\beta\geq 0$ and $1> \tau_i \geq 0$.

or scrutiny from stakeholders. For example, Skaife, Veenman, and Wagnerin (2013) and Dai, Fu, Kang, and Lee (2016) find that the likelihood of CEO/CFO turnover increases in insider selling profitability. Notice that given a plausible range of parameters, the model predicts that the change in insiders' optimal aggressiveness will be modest relative to the change in income tax rates. For example, consider an insider who earns $1 million in compensation that is subject to income taxes (salary plus bonuses and equity-based compensation), has inside information to earn up to an additional $1 million in abnormal profits through share sales and faces a disutility multiplier of q=5 around the adoption of JGTRRA. The model implies that the optimal abnormal profits will decline from $141,418 when his effective income tax rates are 35.6% before the JGTRRA to $136,386 when his effective income tax rate drops to 32.5%.[9] Thus, due to the tax rate change, the executive will enjoy a $33,100 increase in its net earnings before abnormal profits, and he will reduce his aggressiveness and abnormal profits by $5,032 (=~15.2% of $33,100). We note that the lower bound in our model is when an insider chooses to not use any private information and earns "normal" insider trading profits and no abnormal profits.

This simple model demonstrates the following necessary conditions for our predictions to hold. First, executives should possess private information and not face stringent insider trading restrictions. This assumption would likely hold since findings in prior research suggest that insiders usually possess private information, and the restrictions they face are not binding (e.g., Seyhun, 1992; Ryan, Tucker, and Zhou, 2016; Ahern, 2017). Second, the executives are risk-averse, such that utility from compensation is increasing at a decreasing rate -- a common

[9] The insiders effective income tax rates are computed using the income tax brackets for before and after JGTRRA based on an income level of $1,000,000.

assumption in principal-agent models.[10] Third, the expected costs of private information use in insider trading increase at a greater rate than the expected benefits. For example, a modest increase in insider trading aggressiveness may go unnoticed or may not be enough to prompt any action by shareholders and regulators when the abnormal insider trading profits are low, but the same increase may be the trigger a shareholder or regulatory action when the abnormal insider trading profits are high. Fourth, in our model, executives do not have major behavioral biases, such as a complete aversion to reducing aggressiveness when tax rates decline. The violation of this assumption would not necessarily invalidate our prediction but rather would lead insider trading aggressiveness to react asymmetrically to tax rate increases and decreases. Last, no other income adjustment mechanism by itself or in combination with other mechanisms, *strictly dominates* insider trading aggressiveness for an average executive. In particular, there can be other mechanisms for insiders to respond to changes in tax rates, such as adjusting effort, adjusting other perks they receive from the firm, or changing their willingness to employ uncertain tax breaks, each of which has its own costs and benefits. The presence of such activities would reduce the use of insider trading aggressiveness but would not eliminate its use as long as these activities do not strictly dominate insider trading aggressiveness.[11]

[10] In Section 5, we build on this assumption and document cross-sectional variation in our findings based on the level of compensation. Specifically, we find weaker effects of tax rate changes on highly compensated insiders.

[11] An empirical assessment of the validity of this assumption is challenging because these mechanisms can be rather complex and outputs from them are often not observable or difficult to quantify. For example, whether a manager adjusts his efforts in response to a change in net compensation and in which direction the adjustment occurs depends on the existence and weight of a performance-based component in their compensation, the sensitivity of a firm's performance to the executive's effort and the executive's cost of effort among other things. An executive who only receives a fixed cash amount as a salary may find it optimal to reduce effort in response to a decrease in net compensation due to changes in taxes, whereas an executive whose compensation is completely tied to his firm's performance may find it optimal to not change or even increase performance following an increase in tax rates. While we are unaware of any empirical study focusing on executives' effort in response to changes in tax rates, prior research suggests that work hours have little association with tax rates for rank-and-file employees (e.g., Mroz, 1987; Heckman, 1993).

Taxation of Executive Compensation

Executive compensation packages typically include a base salary, performance-based bonuses, and a substantial equity-based component. According to Equilar's CEO Pay Trends 2014-2016 report, among S&P 500 firms, stocks and options account for 59% of the CEO pay. From the executives' perspective, cash compensation is taxed at the ordinary income tax rates. Taxation of equity-based compensation depends on the form of compensation.

There are two common forms of equity-based compensation: stock grants and stock options. For stock grants, the recipient is taxed on the fair market value of the stock at the ordinary income tax rate. Stated differently, the IRS treats the receipt of stock as income and taxes the recipient as though the firm paid the executive the amount, and then the shares were purchased on the open market. Upon the sale of these shares, any realized gain or loss receives capital treatment for tax purposes.[12] Even more common than stock grants are stock option grants, often referred to as non-qualifying stock options (NQSOs).[13] On the date the firm grants the NQSO, the recipient receives the options without facing any tax consequences. When the executive exercises these options, he realizes income in the amount of the difference between the market value and the strike price, and this income is subject to the ordinary income taxation. At the time the recipient sells the stocks, any difference between the sales price and the market value of the stock at the exercise date is subject to capital gains taxation.[14] Hence, along with the salary and cash bonuses, most of an executive's equity-based income is subject to ordinary income tax rates. Any gains or losses beyond fair value are subject to capital gains taxes.

[12] This treatment also relies on the assumption that the recipient holds the shares for at least 12 months. Failure to hold the shares for an entire year results in any gain or loss receiving ordinary income treatment.
[13] A third form of equity-based compensation is Incentive Stock Options (ISO). ISO are typically not a large component of the total executive compensation because the maximum value of shares exercised under ISO cannot exceed $100,000. ISO are non-taxable to the recipient when granted and when exercised. Instead, the recipient recognizes capital gains tax rates at the time of the sale of the shares.
[14] See Scholes, Wolfson, Erickson, Hanlon, Maydew, and Shevlin (2014, pp.201-227) for a more detailed discussion.

3. *Research Design*

We measure insider trading aggressiveness using abnormal insider trading profits. Specifically, for each trading day with an insider transaction, we estimate the trade profitability as the intercept from the Fama and French (1993) and Carhart (1997) four-factor model over the 180 days following each day:

$$(R_{i,t} - R_{f,t}) = \alpha + \beta_1(R_{mkt,t} - R_{f,t}) + \beta_2 SMB_t + \beta_3 HML_t + \beta_4 UMD_t + \varepsilon_{i,t} \quad (1)$$

where R_i is the daily return on firm i's stock, which we obtain from CRSP; R_{mkt} is the value-weighted market return also obtained from CRSP; R_f is the daily risk-free interest rate; *SMB*, and *HML*, are the size and book-to-market factors, respectively (Fama and French, 1993); and *UMD* is the Carhart's (1997) momentum factor. In this model, α captures the average daily risk-adjusted return to purchases and $-\alpha$ captures the benefits received by insiders for not holding the shares. Insider trading profits (*Abn_TradingProfits*) are defined as α for days where net insider transactions are positive, and as $-\alpha$ for days where net insider transactions are negative, such that higher values of *Abn_TradingProfits* always indicate higher profits.[15]

In our analyses, we focus our attention on insider sales transactions. For insider purchases, we cannot observe the applicable tax regime or the holding period, which is necessary to calculate the aggressiveness as a stock purchased prior to tax rate change may be sold after the change. Purchase transactions are also rather limited in number over the event windows. Therefore, both the identification and the statistical power are weaker for these transactions. Our inferences remain unchanged when we use net insider transactions instead of sales transactions.

[15] Our approach for measuring insider trading profits follows that in prior studies (e.g., Jagolinzer, Larcker, and Taylor, 2011). Following their research design, if more than one insider from a firm trades on a date, we aggregate the trades to a single observation.

To test the relationship between *Abn_TradingProfits* and changes in individual-level tax rates, we estimate the following model:

$$TradingProfits_{i,t} = \alpha + \beta_1 Post_{i,t} + \beta_2 ResWin_{i,t} + \beta_3 GC_{i,t} + \beta_4 TradeSize_{i,t} + \beta_5 FirmFE_{i,t} + \varepsilon_{i,t} \quad (2)$$

where $Post_i$ is an indicator variable that is equal to one if the insider trade occurs in the post-enactment period of a given tax act and zero if it occurs in the pre-enactment period. As we discuss in the previous section, if managers use insider trades to implicitly adjust their net compensation, we would observe a positive association between insider trading profitability and changes in individual-level tax rates. Hence, we predict β_1 to be positive and significant in the analysis of ATRA and negative and significant in the analysis of JGTRRA.

We define the pre-enactment period as the six months ending three months prior to the enactment of a given tax act. Similarly, we define the post-enactment period as the six months starting three months after the enactment of a given tax act. Appendix A presents the exact definition of pre- and post-enactment periods for each tax act. We exclude the six month period centered on the enactment date because insiders may delay or accelerate their trades upon learning about the new tax rules. Our inferences are not sensitive to this definition and remain identical when we define the pre-enactment (post-enactment) periods as the nine-months ending (starting) with the enactment dates.

Equation (2) includes several control variables. First, following Jagolinzer, Larcker, and Taylor (2011) and Cao, Dhaliwal, Li, and Yang (2014), we control for whether the transaction occurs during a firm-imposed restricted trade window. Specifically, we include an indicator variable (*ResWin*) that is equal to one if the transaction occurs during the 48 days starting 46

days before and ending a day after an earnings announcement and zero otherwise.[16] We expect *ResWin* to be negatively associated with *Abn_TradingProfits* because these trades are generally made with greater scrutiny, and thus with more limited opportunities to extract rents using private information. Second, we control for the presence of a general counsel. Jagolinzer, Larcker, and Taylor (2011) report that in firms where general counsel approval is needed for insider trading, the average insider trading profits are lower. We proxy for the presence of a general counsel using an indicator variable (*GC*) that is equal to one if a general counsel is on the board of directors, and zero otherwise. We obtain data for this variable from the BoardEx database.[17] Third, we include *TradeSize,* which controls for the total trade size and is calculated as the natural log of the total shares traded by insiders on a given day multiplied by the closing price per share.[18] Appendix B provides detailed definitions of all variables.

4. Sample Selection and Summary Statistics

We obtain insider trading data from the Thomson Reuters Insiders Data database. For foreign-domiciled firms listed in the U.S., we obtain data from 2IQ database. We obtain data on stock returns from CRSP. For each of the tax acts we analyze, our sample selection begins with all firms with at least one insider trading activity and with return data availability around the enactment. We then exclude observations that lack data on insider trade date or size, and observations with studentized residuals greater than three in the estimation of α following

[16] Armstrong, Jagolinzer, and Larcker (2011) examine 260 firms and hand collect the restricted insider trading windows for each firm in their sample. The authors note that the average size of these restricted windows is 48, starting 46 days before and ending a day after the earnings announcement date. We follow Cao, Dhaliwal, Li, and Yang (2014) and approximate the restricted window as these 48 days for the large sample analysis.

[17] We note that while GC variable is an imperfect proxy for the manually identified general counsel approval requirement in Jagolinzer, Larcker, and Taylor (2011), both the GC presence and approval requirements are rather stable over time (see also Jagolinzer, Larcker, and Taylor, 2011). Therefore, firm fixed effects that we use in our analyses would also substantially account for the effect of GC approval requirements.

[18] By construction, *Abn_TradingProfits* are not driven by changes in market returns or common factors. Hence, similar to Jagolinzer, Larcker, and Taylor (2011) we do not include these as control variables in (2).

Belsley, Kuh, and Welsch (1980). The final sample sizes for JGTRRA and ATRA are 17,463, and 23,178, respectively.

In Table 1, we present estimates of insider trading profitability (i.e., *Abn_TradingProfits*) based on Equation (1). We report estimates for sales transactions in the first column, which are the transactions that we focus on in our main analyses. We find that α (*Abn_TradingProfits*) from the insider sales transactions is 0.009 (-0.009) with a t-statistic of 2.10. This figure compares to 0.02 (t-stat=1.57) reported by Jagolinzer, Larcker, and Taylor (2011) and suggests that, on average, executives' selling decisions are not driven by their private information but rather by other reasons such as liquidity. For net insider transactions, similar to Jagolinzer, Larcker, and Taylor (2011), we find that α is insignificant.

(Insert Table 1 about here)

Table 2 reports the summary statistics for variables around each event.[19] Across the two events, we find that both the mean and the median *Abn_TradingProfits* is negative and is around -0.011. The majority of trades take place during the estimated restricted trading window, as *ResWin* ranges between 77.8% and 83.9%. The percentage of observations where the firm has a general counsel on board of directors is 59.0%, and 45.1% for JGTRRA and ATRA, respectively. Lastly, the size of the insider sales increases from $367,075 for the JGTRRA test sample to $389,223 for the ATRA test sample. This increase is consistent with an increase in stock-based compensation to managers over time and with inflation.

(Insert Table 2 about here)

[19] One potential factor that may affect our inferences is changes in the enforcement of insider trading. We observe little evidence to that effect around ATRA, as the inputs to the SEC's enforcement (e.g. budget and FTE) slightly increased following ATRA (see https://www.sec.gov/about/reports/secfy15congbudgjust.pdf). We observe a significant increase in budget around JGTRRA, driven in part by the enactment of the Sarbanes-Oxley Act, but this increase does not appear to have an immediate effect on enforcement as the agency struggled to fill the available FTE positions in enforcement through mid-2004 and there was, if anything, a decline in the total insider trading actions the agency took (see https://www.gao.gov/new.items/d04818.pdf).

5. *Empirical Analyses*

Individual-Level Tax Rates and Insider Trading Aggressiveness

We present the results from estimating the model specified in Equation (2) in Table 3, which examines whether the insider trading aggressiveness is associated with changes to tax rates. We report three specifications in the analyses of each event, a model without any control variables, a model with control variables but without firm fixed effects, and a model that includes both control variables and firm fixed effects. The last three columns present results for the combined sample, where we multiply the *Post* dummy with minus one for JGTRRA to make the expected sign on the coefficient consistent across the two events. In all models, we cluster the standard errors by the firm and transaction date.

(Insert Table 3 about here)

Table 3 shows that following JGTRRA, which reduced tax rates, the insider trading aggressiveness significantly lowers. In contrast, following ATRA, which increased tax rates, the aggressiveness increases. In particular, the coefficient on *Post* in Columns (1) and (2) are -0.034 and -0.034 ($p < 0.01$), respectively. When firm-fixed effects are included, the coefficient decreases to -0.029 but remains statistically significant.[20] In terms of economic magnitude, the coefficient on *Post* suggests that after the enactment of JGTRRA, which reduced the ordinary income tax rate on the highest-income taxpayers from 38.6% to 35%, the abnormal profitability of insider sales declined by 290 basis points. To put it into perspective, a back-of-the-envelope calculation ignoring the effects of state taxes and contribution indicates that in the median firm in

[20] When firm fixed effects are added, the intercept measures the abnormal insider profits in the pre-enactment after demeaning the abnormal insider trading profits over the transactions of all of the firm's insiders. Hence, a negative or positive intercept cannot be interpreted as negative or positive abnormal profits in these models. The coefficient on *Post* still measures the difference between pre- and post-enactment periods in percentage terms given the baseline reported by the intercept, after controlling for firm specific time-invariant factors.

our sample, the decline in insiders' trading profits ($12,346 for the average insider) was 12.0% of the estimated increase in the net compensation ($103,049 for the average insider) due to changes in the tax rates. This finding suggests that executives become less willing to bear the risks that insider trading entails, and thus become less aggressive with their insider trading activities when a reduction in tax burden increases their net compensation.

Consistent with the results for JGTRRA, in Columns (4)-(6), we find that the *Abn_TradingProfits* increased following the enactment of ATRA, which increased the top ordinary income tax rate bracket from 35% to 39.6%. Specifically, the coefficient on *Post* in Column (4) is 0.014, and when we include control variables in Columns (5) and (6), it becomes 0.013 ($p < 0.10$) and 0.024 ($p < 0.01$), respectively. A back-of-the-envelope calculation suggests that based on the estimate in column (6) the increase in insiders' trading profits ($18,467 for the average insider) offset 17.1% of the estimated decrease in net compensation ($107,967 for the average insider) due to changes in tax rates. These results suggest that insiders increase their use of private information in their trades as a means to compensate for the decrease in their net compensation.

Columns (7)-(9) present the results from the two events combined. In these columns, we replace *Post* with *PostAdj*, which is equal to *Post* for ATRA and -1 x *Post* for the JGTRRA to align the predicted signs on coefficients across the events. The combined analyses show that the average effect of these tax changes on *Abn_TradingProfits* is between 150 and 200 basis points. Overall, our findings in Table 3 indicate that changes in tax rates are followed by significant changes in insider trading aggressiveness in the same direction.[21]

[21] In untabulated analysis, we examine investor reactions to Form 4 filings of insider sales. Consistent with Lakonishok and Lee (2001) and Brochet's (2010) findings that investors do not significantly react to Form 4 filings of insider sales, we document an insignificant association between changes to investor level taxes and both cumulative abnormal returns and abnormal trading volume on the Form 4 filing dates.

Comparison with Insider Trading Aggressiveness at Foreign Firms- DiD Analysis

The two tax acts we examine represent exogenous shocks to insiders' net compensation and apply to all insiders who are subject to taxation in the U.S. While consistency of our findings across both events reduces the likelihood that a correlated event might be driving the results, to more directly address such a possibility, we conduct a difference-in-differences analysis where our first difference is whether the insider's stock compensation is subject to U.S. tax laws, and our second difference is the tax law change.

For this analysis, we examine insider trading aggressiveness of executives at foreign firms that are listed in the U.S. Under the U.S. tax laws, U.S. citizens are taxed on global income. However, non-U.S. citizens are only taxed on income earned in the U.S. Moreover, if a foreign-domiciled firm uses equity-based compensation to compensate its non-U.S. citizen insiders, that is also not subject to taxation in the U.S.[22]

First, we identify foreign firms that are listed in the U.S. and have data on insider trading around the tax acts we examine. We then match these firms with the U.S. firms in our main sample based on one-digit SIC industry, size, and book-to-market ratio in the last fiscal year ended before the tax act.[23] We perform this procedure separately across both events and generate a matched-sample of 332 firms (1,054 insider trades). t-tests (untabulated) confirm that differences in size and book-to-market of the treatment and control firms are insignificant across the two samples. The size of the matched sample is relatively small because there is a limited

[22] See the rules regarding taxation of foreign persons and nonresident aliens (https://www.irs.gov/individuals/international-taxpayers/taxation-of-nonresident-aliens).

[23] It is possible that a foreign-domiciled firm has executives that are U.S. citizens. To alleviate this concern we looked at a random group of executives that are part of this sample and found that most of them are foreign citizens who are born and are living in a foreign country, and therefore are likely not subject to taxation in the U.S.. One example is, John Charman, the CEO and chairman of Bermuda-based Endurance Specialty Insurance Ltd., who is an English citizen born in England, and resides in the City of London. To the extent that we include some insiders who are subject to U.S. taxation, we would expect it to induce a bias against finding any differences between the treatment and control samples.

number of foreign firms that are both listed on the U.S. stock exchanges and have insider trading data. Thus, the difference-in-differences approach improves the identification at the cost of a reduced sample size.

We estimate the following equation to test whether our findings apply to insiders at foreign firms and those at U.S. firms differently:

$$TradingProfits_{i,t} = \alpha + \beta_1 Post_{i,t} xUSFirm_{i,t} + \beta_2 Post_{i,t} + \beta_3 USFirm_{i,t} + \beta_3 ResWin_{i,t} + \beta_4 GC_{i,t} + \beta_5 TradeSize_{i,t} + \beta_6 FirmFE_{i,t} + \varepsilon_{i,t} \quad (3)$$

where $USFirm_i$ is an indicator variable that is equal to one if the firm the insider works for is a U.S. domiciled firm and zero otherwise, and the remaining variables are defined as previously. Our variable of interest in (3) is the interaction term *Post x USFirm*, which captures the incremental effect of being a US-domiciled firm following a tax rate change, relative to a foreign-domiciled control firm. Given the small sample size, we conduct this analysis only using the combined sample.[24] Therefore, as in Table 3 columns (7)-(9), we multiply Post by -1 for JGTRRA so that the interpretations of that coefficient are consistent.

We estimate Equation (3) and present the results in Table 4. Consistent with our primary analysis, we document a positive and significant β_1. Specifically, when we do not include any control variables the coefficient on the interaction term is 0.079 ($p < 0.10$), which suggests that following a significant decrease (increase) to the tax rates, the insider trading aggressiveness significantly decreases (increases) for insiders who are subject to the tax rate changes. When we include control variables without and with firm fixed effects, the coefficient on the interaction term is 0.073 ($p < 0.10$) and 0.112 ($p < 0.05$), respectively. Overall, the evidence in Table 4

[24] We combine the samples in order to improve the statistical power. When we conduct the analysis separately for JGTRRA and ATRA, we find a negative and marginally significant coefficient on *Post x USFirm* in the former (t=-1.8) and a positive and marginally insignificant coefficient in the latter sample (t=1.6).

indicates that our findings are unlikely to be driven by an event that is correlated with the enactment of these tax acts.

(Insert Table 4 about here)

Individual-Level Tax Rates and Probability of Abnormally Profitable Insider Sales

In this section, we extend our analyses by examining whether the probability that an insider sale is abnormally profitable changes following changes in tax rates. Specifically, we estimate the following logistic regression model:

$$\Pr(TradingProfits_{i,t} > 0) = \alpha + \beta_1 Post_{i,t} + \beta_2 ResWin_{i,t} + \beta_3 GC_{i,t} + \beta_4 TradeSize_{i,t} + \varepsilon_{i,t} \quad (4)$$

where the dependent variable takes the value of one if *Abn_TradingProfits* is positive and zero otherwise. The remaining variables are as previously defined. In the estimation of Equation (4), we cluster standard errors by firm and transaction date. We do not include firm fixed effects because their inclusion leads to the exclusion of a large number of firms for which abnormal trading profitability is consistently negative or positive. As an alternative, we estimate an OLS model with the same set of variables that also includes firm fixed effects.

We present estimates from Equation (4) in Table 5. Specifically, for JGTRRA, the results for which are reported in Columns (1)-(3), the coefficients of interest are negative and statistically significant. In terms of economic significance, the marginal effects of coefficients reported in Column (2) suggest that following a decrease in tax rates, the percentage of insider trades that earn abnormal profits declines by 7.3 percent following the enactment of JGTRRA. Similarly, we find that following ATRA, which led to an increase in the tax rates, insider sales are significantly more likely to earn abnormal profits. In terms of economic significance, based on the marginal effects of the coefficient on *Post* in Column (5), we estimate that the percentage

of insider trades that earn abnormal profits increase by 6.8 percent following the enactment of ATRA. This evidence is consistent with our results from Table 3 and supports our inferences that the insider trading aggressiveness is positively associated with changes in individual-level tax rates.

(Insert Table 5 about here)

An Alternative Measure of Insider Trading Aggressiveness

To examine whether our findings are sensitive to the choice of insider trading aggressiveness measure, in this section, we employ an alternative measure of insider trading aggressiveness. In particular, we replicate our main analysis using the insider trading aggressiveness measure used in Huddart and Ke (2007) and Skaife, Veenman, and Wangerin (2013). This measure defines insider trading profitability as the aggregate profits of all executives' trades over the pre- or post-enactment periods scaled by the beginning market value of the firm:

$$TradingProfitsAlt_{ft} = \frac{\sum_{j=1}^{n}(BHRet_{ftj} x ValueBought_{ftj} - BHRet_{ftj} x ValueSold_{ftj})}{MV_{ft-1}} \quad (5)$$

where $BHRET_{ftj}$ is equal to the one-year buy-and-hold market-adjusted return calculated for the period starting one day after transaction date j; $VALUEBOUGHT_{ftj}$ ($VALUESOLD_{ftj}$) equals to the total dollar value of shares bought (sold) by all insiders on day *j, n* is the total number of firm-days with insider trading activity during the pre or post-enactment periods; and MV_{ft-1} equals the market value of equity at the end of the last fiscal year prior to the pre or post-enactment periods.

We then estimate the following model that includes variables from our main model as well as the additional control variables from Skaife, Veenman, and Wangerin (2013):

$$
\begin{aligned}
TradingProfitsAlt_{i,t} = {} & \alpha + \beta_1 Post_{i,t} + \beta_2 ResWin_{i,t} + \beta_3 GC_{i,t} + \beta_4 TradeSize_{i,t} + \beta_5 Inform_{i,t} \\
& + \beta_6 Size_{i,t} + \beta_7 BM_{i,t} + \beta_8 BHRet_{i,t} + \beta_9 NAnalyst_{i,t} + \beta_{10} RD_{i,t} \\
& + \beta_{11} InstHold_{i,t} + \beta_{12} Age_{i,t} + \beta_{13} Vol_{i,t} + \beta_{14} ReAct_{i,t} + \beta_{15} FirmFE_{i,t} + \varepsilon_{i,t}
\end{aligned} \tag{6}
$$

where *TradingProfitsAlt* is as defined by Equation (5). We determine *Post* consistent with Equations (2) and (3) in that it takes the value of one when the insider trades take place in months t+3 through t+9 where t is the date of enactment and zero otherwise. Because the insider trading profits are defined at an aggregated level rather than at the transaction-level, each firm has only one pre-enactment or one post-enactment observation per event date. We include the following control variables: financial statement informativeness measured as the adjusted R-squared from a firm-specific regression of price per share on book value per share and earnings per share over the last 20-quarters (*Inform*); firm size measured as the natural log of the market value of equity (number of shares outstanding multiplied by price-per-share) (*Size*); book-to-market ratio calculated as the book value of equity scaled by the market value of equity (*BM*); prior year buy-and-hold abnormal returns for each firm-year observation calculated as the CRSP raw buy-and-hold abnormal returns minus the average buy-and-hold return for the value-weighted index (*BHRet*); the number of analysts following the firm (*NAnalyst*); an indicator variable equal to one if the observation has R&D expenditures, and zero otherwise (*RD*); institutional holdings calculated as the percentage of common shares outstanding owned by institutional holders scaled by the total number of outstanding shares (*InstHold*); firm age calculated as the difference between the year of observation and a firm's first year appearance in CRSP (*Age*); return volatility calculated as the standard deviation of daily stock returns during the fiscal year (*Vol*); and the median absolute market reactions from prior year quarterly returns announcements where the market reaction is measured as the cumulative abnormal return from two days before to the day of the earnings announcement (*ReAct*). All controls are computed as

of the last fiscal year before (after) the event date for firm-year observations that occur during the pre (post) period. We cluster standard errors by firm.

Table 6 reports the results from the estimation of Equation (6). Similar to the main analyses, in these tests, we find that insider trading aggressiveness changes significantly following each of the tax acts. Based on the estimates from the full model, the average profitability of insider trades declines by 390 basis points following JGTRRA and increases by 180 basis points following ATRA according to this alternative measure. In terms of the control variables, our findings are largely similar to Skaife, Veenman, and Wangerin (2013), and we find negative and usually significant coefficients on *Inform*, *Size*, *BM*, and *Age*, and insignificant coefficients on *RD* and *InstHold*. The coefficients on the remaining four control variables (*BHRet*, *NAnalyst*, *ReAct*, and *Vol*) are largely not statistically significant in our analyses. Because of the large number of control variables, for brevity's sake, we suppress the estimates for the control variables in Table 6.

(Insert Table 6 about here)

The Role of Private Information

As discussed in Section 2, a binding constraint for an implicit compensation adjustment through the use of private information is the amount of private information the insiders have. That is, insiders can change their insider trading aggressiveness only to the extent they have private information. Therefore, we expect our findings to be stronger in settings where insiders are more likely to possess superior information compared to the public. We test this prediction by examining how our findings differ for firms with varying levels of information asymmetry.

We use two proxies to measure the information asymmetry between insiders and public following prior studies: number of analysts following (e.g., Hong, Lim, and Stein 2000; Frankel

and Li, 2004) and average bid-ask spread (e.g., Copeland and Galai, 1983). For each event separately, we rank firms based on each information asymmetry proxy. We then classify those firms at the bottom tercile of the number of analysts following (*LowAF*) and top tercile of bid-ask spread (*HighBA*) as high information asymmetry firms. We measure the number of analysts following as the total number of analysts issuing an earnings forecast for the firm for the fiscal year prior to the enactment of a tax rate change. We gather data on analyst following from I/B/E/S. We measure bid-ask spread as the average spread between the closing ask and bid values as reported in CRSP over the pre-enactment period.

We report results from the cross-sectional tests on the role of information asymmetry in Table 7. For brevity, we report results only for the combined sample.[25] We require data availability for both of the information asymmetry proxies, which leads to a small reduction in sample size.

(Insert Table 7 about here)

In Table 7, Columns (1) – (3) and (4) – (6) report results where the information asymmetry proxy is low analyst following and high average bid-ask spread, respectively. For each proxy, we find that the interaction between the proxy and the *PostAdj* dummy is statistically significant and positive. In particular, the interaction term in Columns (3) and (6) are 0.012 ($p < 0.10$) and 0.023 ($p < 0.10$), respectively. These results suggest that a change in tax rates is more strongly associated with insider trading aggressiveness in firms that have higher information asymmetry, consistent with insiders in such firms having greater ability to adjust the amount of private information they use in their trades.

[25] Our inferences hold for individual events with the exception that the coefficient on HighBA is insignificant in the analyses of ATRA. Our inferences for HighBA, but not for number of analysts following, is also sensitive to the use of quintiles instead of terciles.

The Role of the Level of Compensation

As we demonstrate in Section 2, if insiders' marginal utility from compensation is increasing at a decreasing rate (i.e., insiders are risk-averse), we expect the effect of tax rate changes on the insider trading aggressiveness to be stronger for insiders with low compensation. In other words, as the compensation increases, the impact of changes in tax rates on insider trading aggressiveness should diminish.

To test this prediction, we use the average total compensation of top executives as a proxy for the level of compensation of insiders. We gather executive compensation data from Execucomp and restrict our sample to firms with non-missing compensation data for at least three of the top five executives.[26] For each event separately, we rank firms based on the average total compensation of the top executives in the year prior to the tax act. We classify those insiders who work at firms that are at the bottom tercile as insiders with relatively low compensation (*LowComp*=1). We predict that the insider trading aggressiveness in this category is more responsive to the changes in tax rates. Similar to Table 7, we interact the indicator variable for relatively low compensation insiders (*LowComp*) with *PostAdj* and report the results from this analysis in Table 8.[27]

(Insert Table 8 about here)

The estimates reported in Table 8 show that the changes in insider trading aggressiveness are more strongly associated with changes in individual-level tax rates when insiders have relatively lower compensation. The coefficient on the interaction term in the model with control variables is 0.016 ($p < 0.10$). This finding is consistent with the assumption underlying our

[26] Our results are generally statistically stronger when we require data availability for four or five executives rather than three.

[27] We find that the interaction term is statistically significant at the 10% significance-level and negative (positive) in the analysis of JGTRRA (ATRA).

discussions in Section 2 and suggests that to what extent an insider implicitly adjusts his compensation through insider trading profits in response to changes in individual-level tax rates depends on the insider's level of compensation.

6. Summary and Conclusions

We examine the effect of changes in individual-level tax rates on insider trading aggressiveness. Prior research finds that executives bear the consequences of changes in individual-level tax rates as there is little adjustment to their compensation following changes in tax rates. We conjecture that one mechanism through which executives can counteract these tax effects is by altering their use of private information in their trades. We examine changes in insider trading aggressiveness around two recent changes in tax rates and find that insider trading aggressiveness is positively associated with the changes in tax rates. We conclude that executives pass a portion of the change in tax rates onto shareholders through insider trading profits.

The positive association between tax rates and insider trading aggressiveness suggests that the use of private information in insider trades is more prevalent in high tax regimes. In light of the recent Tax Cuts and Jobs Act of 2017 and the dynamic nature of tax laws, our findings highlight an unintended consequence of taxes on executive behavior. In this respect, our study suggests a spillover effect of individual-level taxes and adds to the literature on optimal taxation. We caveat that our study focuses on tax rates in a certain range. The relation between individual-level taxes and insider trading profitability can be different, especially at higher ranges of tax rates because the probability of discovery and, therefore, risks associated with insider trading may be non-linear in the amount of private information an executive uses.

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Appendix A: Summary of Tax Acts

Tax Act	Effect on Individual-Level Taxes		Enactment Date	Effective Date	Pre-Period	Post-Period
	Income Tax	Capital Gains Tax (Top Bracket)				
Jobs and Growth Tax Relief Reconciliation Act (JGTRRA)	Lowered 27%, 30%, 35% and 38.6% brackets to 25%, 28%, 33%, and 35%.	Lowered from 20% to 15%	May 23, 2003	May 23, 2003	August 26, 2002 through February 22, 2003	August 21, 2003 through February 17, 2004
American Taxpayer Relief Act (ATRA)	Created a new top marginal tax rate bracket at 39.6%	Increased from 15% to 20%	January 2, 2013	January 1, 2013	April 7, 2012 through October 4, 2012	April 2, 2013 through September 29, 2013

Appendix B: Variable Definitions

Variable Name	Description
Abn_TradingProfits	The average daily risk-adjusted return to insider transactions calculated as the intercept from the Fama and French (1993) and Carhart (1997) four-factor model. For each trading day, we net the transactions of all insiders at the firm and calculate the trade profitability as the intercept from the four-factor model estimated over the 180 days following the transaction.
TradingProfitsAlt	Insider trading profitability measure calculated following Huddart and Ke (2007) and Skaife, Veenman, and Wangerin (2013).
Post	Indicator variable equal to one if the insider trade occurs in the post-enactment period of a given tax act and zero if it occurs in the pre-enactment period. Post (Pre)-enactment period is the six months starting (ending) three months after (before) the enactment of a given tax act (see Appendix A)).
PostAdj	Indicator variable equal to the value of *Post* for ATRA and *-1 x Post* for JGTRRA.
ResWin	Indicator variable equal to one if a trade occurred during the 48 days starting 46 days before and ending a day after the earnings announcement date, and zero otherwise.
GC	Indicator variable equal to one if the firm has a general council on its board of directors in a year, and zero otherwise.
TradeSize	The natural log of the trade size for insider sale transactions, calculated as the number of shares traded times daily closing price.
USFirm	Indicator variable equal to one if the firm is U.S. domiciled (Compustat FIC="USA") and zero otherwise.
LowAF	Indicator variable equal to one if the firm is in the bottom tercile of analyst following, and zero otherwise. Analyst following is determined based on the number of analyst following during the last fiscal year end of the pre-enactment period. Terciles are calculated separately for JGTRRA and ATRA samples.
HighBA	Indicator variable equal to one if the firm is in the top tercile of bid-ask spread, and zero otherwise. Bid-ask spread is calculated as the average daily bid-ask spread over the six-month pre-enactment period for each event date. Terciles are calculated separately for JGTRRA and ATRA samples.
LowComp	Indicator variable equal to one if the firm is in the bottom tercile of average executive compensation, and zero otherwise. Average compensation is calculated as the average of the top five executives' total compensation in the fiscal year prior to the enactment date as reported in Execucomp. We require data availability on at least three of the top five executives. Terciles are calculated separately for JGTRRA and ATRA samples.

Table 1: Estimation of Insider Trading Profitability

This table presents coefficients from the estimation of transaction-day specific regressions of daily returns (R_i-R_f) on the market (R_{mkt}-R_f), size (*SMB*), book-to-market (*HML*), and momentum factors (*UMD*) over 180 days following each transaction. t-statistics are in parentheses and are based on standard errors that are clustered by firm and transaction date. ***, **, and * indicate statistical significance at a two-sided 1%, 5% and 10% level, respectively.

	Insider Sales	Net Trades
Intercept	0.009**	0.004
	(2.10)	(1.22)
$R_{mkt} - R_f$	0.972***	0.991***
	(39.79)	(42.11)
SMB	0.421***	0.458***
	(19.82)	(21.02)
HML	0.011	-0.018
	(0.68)	(-1.44)
UMD	0.126***	0.060**
	(7.28)	(2.48)
N	40,641	46,191
Adjusted R^2	0.200	0.218

Table 2: Summary Statistics

This table presents summary statistics for the variables used in our analyses. Panels A and B present summary statistics for observations around enactments of JGTRRA and ATRA, respectively. Detailed definition of each variable is available in Appendix B. All continuous variables are winsorized at the top and bottom one percentile.

Panel A: Job and Growth Tax Relief Reconciliation Act

	No of Obs.	Mean	St. Dev.	25%	50%	75%
Abn_TradingProfits	17,463	-0.007	0.173	-0.102	-0.011	0.087
TradingProfitsAlt	17,463	0.468	0.499	0.000	0.000	1.000
Post	17,463	0.692	0.461	0.000	1.000	1.000
ResWin	17,463	0.778	0.416	1.000	1.000	1.000
GC	17,463	0.590	0.492	0.000	1.000	1.000
TradeSize	17,463	12.813	1.728	11.661	12.849	13.964

Panel B: American Taxpayer Relief Act

	No of Obs.	Mean	St. Dev.	25%	50%	75%
Abn_TradingProfits	23,178	-0.011	0.142	-0.090	-0.010	0.071
TradingProfitsAlt	23,178	0.459	0.498	0.000	0.000	1.000
Post	23,178	0.643	0.479	0.000	1.000	1.000
ResWin	23,178	0.839	0.367	1.000	1.000	1.000
GC	23,178	0.451	0.498	0.000	0.000	1.000
TradeSize	23,178	12.872	1.741	11.773	12.904	13.980

Table 3: Individual-Level Tax Rate Changes and Insider Trading Aggressiveness

This table presents the coefficients from the estimation of regressions of *Abn_TradingProfits* on *Post*, *ResWin*, *GC,* and *TradeSize*. In Columns (1)-(6) results are presented for each event separately, and Columns (7)-(9) present results for both events. In Columns (7)-(9) we multiply *Post* by negative 1 (*PostAdj*) for JGTRRA. Detailed definition of each variable is available in Appendix B. All continuous variables are winsorized at the top and bottom one percentile. t-statistics are reported in parentheses and are based on standard errors that are clustered by firm and transaction date. ***, **, and * indicate statistical significance at a two-sided 1%, 5% and 10% level, respectively.

	JGTRRA			ATRA			Combined		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Intercept	0.017**	0.141***	-0.017	-0.019***	0.022	-0.027	-0.016***	0.064***	-0.031**
	(0.84)	(4.51)	(-0.77)	(-3.23)	(0.94)	(-1.44)	(-3.92)	(3.31)	(-2.52)
Post	**-0.034*****	**-0.034*****	**-0.029*****	**0.014***	**0.013***	**0.024*****			
	(-3.40)	**(-3.36)**	**(-2.70)**	**(1.81)**	**(1.84)**	**(3.54)**			
PostAdj							**0.015*****	**0.016*****	**0.020*****
							(2.66)	**(2.94)**	**(3.94)**
ResWin		-0.022**	0.023**		-0.018***	-0.009		-0.020***	0.005
		(-2.36)	(2.03)		(-2.59)	(-0.83)		(-3.48)	(0.77)
GC		0.007	0.016		0.011	-0.024		0.010*	-0.000
		(0.69)	(0.57)		(1.39)	(-1.10)		(1.69)	(-0.04)
TradeSize		-0.009***	0.000		-0.002	0.001**		-0.005***	0.001
		(-3.89)	(0.25)		(-1.52)	(2.03)		(-4.03)	(0.89)
N	17,463	17,463	17,463	23,178	23,178	23,178	40,641	40,641	40,641
Adj. R^2	0.008	0.018	0.583	0.002	0.006	0.529	0.002	0.009	0.437
Fixed Eff.	None	None	Firm	None	None	Firm	None	None	Firm

Table 4: Comparison of U.S. and Foreign Firms

This table presents the coefficients from the estimation of regressions of *Abn_TradingProfits* on *US*, *PostAdj*, *US x PostAdj*, *ResWin*, *GC,* and *TradeSize*. *PostAdj* is defined the same as *Post* for ATRA, and *Post* multiplied by negative 1 for JGTRRA. Detailed definition of each variable is available in Appendix B. All continuous variables are winsorized at the top and bottom one percentile. t-statistics are reported in parentheses and are based on standard errors that are clustered by firm and transaction date. ***, **, and * indicate statistical significance at a two-sided 1%, 5% and 10% level, respectively.

	(1)	(2)	(3)
Intercept	-0.010	0.139	0.006
	(-0.31)	(1.63)	(0.06)
PostAdj	-0.016	-0.015	-0.039
	(-0.41)	(0.37)	(-1.24)
USFirm	0.033	0.018	
	(0.88)	(0.50)	
PostAdj x USFirm	**0.079***	**0.073***	**0.112****
	(1.79)	**(1.70)**	**(2.23)**
ResWin		-0.011	-0.053
		(-0.45)	(-0.97)
GC		0.024	0.018
		(1.14)	(0.35)
TradeSize		-0.011*	0.003
		(-1.75)	(0.53)
N	1,054	1,054	1,054
Adj. R^2	0.029	0.046	0.404
Fixed Eff.	No	No	Firm

Table 5: Probability of Abnormally Profitable Trading

This table presents the coefficients from the estimation of regressions of *Pr(Abn_TradingProfits>0)* on *Post*, *ResWin*, *GC,* and *TradeSize*. In Columns (1)-(6), results are presented for each event separately, and Columns (7)-(9) present results for both events together. In Columns (7)-(9) we multiply *Post* by negative 1 for JGTRRA (*PostAdj*). In all columns, except those that include firm fixed effects, models are estimated using a logistic regression model. In Columns (3), (6), and (9), where firm fixed effects are included, we present estimates from an OLS regression model. Detailed definition of each variable is available in Appendix B. All continuous variables are winsorized at the top and bottom one percentile. z-statistics (t-statistics for OLS models) are reported in parentheses and are based on standard errors that are clustered by firm and transaction date. ***, **, and * indicate statistical significance at a two-sided 1%, 5% and 10% level, respectively.

	JGTRRA			ATRA			Combined		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Intercept	0.083	1.209***	0.445***	-0.300***	0.441	0.376***	-0.223***	0.556**	0.428***
	(1.02)	(4.41)	(6.68)	(-4.40)	(1.60)	(5.85)	(-5.23)	(2.38)	(4.59)
Post	**-0.308*****	**-0.278*****	**-0.071****	**0.208****	**0.213****	**0.069*****			
	(-3.12)	**(-2.77)**	**(-2.53)**	**(2.46)**	**(2.48)**	**(3.26)**			
PostAdj							**0.175*****	**0.189*****	**0.057*****
							(2.80)	**(3.02)**	**(3.51)**
ResWin		-0.115	0.062**		-0.270***	0.008		-0.183***	0.038*
		(-1.24)	(2.19)		(-3.03)	(0.20)		(-2.88)	(1.77)
GC		-0.039	0.025		0.112	-0.063		0.059	-0.004
		(-0.39)	(0.33)		(1.27)	(-0.82)		(0.88)	(-0.12)
TradeSize		-0.081***	0.001		-0.044**	0.005*		-0.062***	0.002
		(-3.76)	(0.20)		(-2.19)	(1.72)		(-4.17)	(0.68)
N	17,463	17,463	17,463	23,178	23,178	23,178	40,641	40,641	40,641
Pseudo/Adj. R^2	0.004	0.008	0.241	0.002	0.005	0224	0.002	0.007	0.294
Fixed Eff.	None	None	Firm	None	None	Firm	None	None	Firm

Table 6: Alternative Measure of Insider Trading Aggressiveness

This table presents the coefficients from the estimation of regressions of *TradingProfitsAlt* on *Post* and the set of control variables listed in Equation (6). In Columns (7)-(9), we multiply *Post* by negative 1 for JGTRRA (*PostAdj*). Detailed definition of each variable is available in Appendix B. All continuous variables are winsorized at the top and bottom one percentile. t-statistics are reported in parentheses and are based on standard errors that are clustered by firm and transaction date. ***, **, and * indicate statistical significance at a two-sided 1%, 5% and 10% level, respectively.

	JGTRRA			ATRA			Combined		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Intercept	0.043***	0.043*	0.506***	-0.019***	0.052	-0.137	0.019***	0.013	0.017
	(11.69)	(1.83)	(2.84)	(-6.51)	(1.14)	(-0.51)	(8.88)	(1.57)	(0.83)
Post	**-0.072*****	**-0.073*****	**-0.039*****	**0.012*****	**0.011*****	**0.018*****			
	(-14.94)	**(-14.79)**	**(-4.72)**	**(3.02)**	**(2.83)**	**(2.66)**			
PostAdj							**0.032*****	**0.032*****	**0.027*****
							(10.39)	**(10.33)**	**(8.34)**
Control vars	Incl.	Incl.	Incl.	Incl.	Incl.	Incl.	Incl.	Incl.	Incl.
N	5,350	5,350	5,350	4,665	4,665	4,665	10,015	10,015	10,015
Adj. R^2	0.040	0.057	0.409	0.002	0.034	0.429	0.010	0.025	0.352
Fixed Eff.	None	None	Firm	None	None	Firm	None	None	Firm

Table 7: Information Asymmetry and Insider Trading Aggressiveness around Individual-Level Tax Rate Changes

This table presents the coefficients from the estimation of regressions of *Abn_TradingProfits* on *PostAdj*, its interaction with proxies for information asymmetry, and control variables. Information asymmetry is measured using analyst following in Columns (1), (2), and (3), and bid-ask spread in Columns (4), (5), and (6). These variables are measured in the year prior to each tax rate change, and high information asymmetry firms are defined as those that are in the bottom(top) tercile for each event in terms of analyst following (bid-ask spread). The table reports results using the combined sample for each event. Detailed definition of each variable is available in Appendix B. All continuous variables are winsorized at the top and bottom one percentile. t-statistics are reported in parentheses and are based on standard errors that are clustered by firm and transaction date. ***, **, and * indicate statistical significance at a two-sided 1%, 5% and 10% level, respectively.

Proxy for HighIA:	Low Analyst Following			High Bid Ask Spread		
	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	-0.013**	0.043**	-0.042***	-0.015***	0.036**	-0.030**
	(-2.20)	(2.39)	(-3.56)	(-3.26)	(2.19)	(-2.53)
HighIA	-0.007	-0.008	-0.008	-0.007	-0.007	-0.003
	(-0.88)	(-0.98)	(-1.15)	(-1.24)	(-1.18)	(-0.45)
PostAdj	-0.009	-0.010		-0.004	-0.005	-0.011
	(-1.31)	(-1.37)		(-0.46)	(-0.59)	(-1.28)
PostAdj x HighIA	**0.015***	**0.015***	**0.012***	**0.018***	**0.018***	**0.023****
	(1.81)	**(1.83)**	**(1.67)**	**(1.66)**	**(1.83)**	**(1.98)**
ResWin		-0.015***	0.005		-0.016***	0.006
		(-3.25)	(0.81)		(-3.21)	(1.02)
GC		0.009	0.000		0.006	-0.008
		(1.58)	(0.05)		(1.08)	(-1.06)
TradeSize		-0.004***	0.001*		-0.003***	0.001
		(-3.04)	(1.69)		(-2.66)	(1.28)
N	40,530	40,530	40,530	40,530	40,530	40,530
Adj. R^2	0.004	0.009	0.416	0.010	0.003	0.008
Fixed Eff.	None	None	Firm	None	None	Firm

Table 8: Level of Compensation and Insider Trading Aggressiveness around Individual-Level Tax Rate Changes

This table presents the coefficients from the estimation of regressions of *Abn_TradingProfits* on *PostAdj*, its interaction with *PostAdj*, *LowComp*, *LowComp x PostAdj,* and control variables. *LowComp* is an indicator variable equal to one if the average top executive total compensation of the firm is at the bottom tercile of all the firms in the year prior to a given tax rate change, and zero otherwise. The table reports results using the combined sample. Detailed definition of each variable is available in Appendix B. All continuous variables are winsorized at the top and bottom one percentile. t-statistics are reported in parentheses and are based on standard errors that are clustered by firm and transaction date. ***, **, and * indicate statistical significance at a two-sided 1%, 5% and 10% level, respectively.

	(1)	(2)	(3)
Intercept	-0.003	0.084***	-0.011
	(-0.81)	(4.65)	(-0.95)
LowComp	0.008	0.008	0.016***
	(1.63)	(1.63)	(3.28)
PostAdj	0.001	-0.002	-0.010
	(0.20)	(-0.30)	(-1.06)
PostAdj x LowComp	**0.017***	**0.018***	**0.016***
	(1.76)	**(1.86)**	**(1.71)**
ResWin		-0.013***	0.007
		(-2.74)	(1.15)
GC		0.006	-0.001
		(1.27)	(-0.13)
TradeSize		-0.006***	0.000
		(-4.92)	(0.37)
N	37,435	37,435	37,435
Adj. R^2	0.006	0.013	0.409
Fixed Eff.	None	None	Firm