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PII: S0165-4101(12)00058-4
DOI: http://dx.doi.org/10.1016/j.jacceco.2012.07.005
Reference: JAE959

To appear in: *Journal of Accounting and Economics*

Received date: 24 November 2010
Revised date: 20 July 2012
Accepted date: 31 July 2012

Cite this article as: Hollis A. Skaife, David Veenman and Daniel Wangerin, Internal control over financial reporting and managerial rent extraction: Evidence from the profitability of insider trading, *Journal of Accounting and Economics,* http://dx.doi.org/10.1016/j.jacceco.2012.07.005

# Internal Control over Financial Reporting and Managerial Rent Extraction: Evidence from the Profitability of Insider Trading

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July 2012

**Abstract**: This paper examines the association between ineffective internal control over financial reporting and the profitability of insider trading. We predict and find that the profitability of insider trading is significantly greater in firms disclosing material weaknesses in internal control relative to firms with effective control. The positive association is present in the years leading up to the disclosure of material weaknesses, but disappears after remediation of the internal control problems. We find insider trading profitability is even greater when insiders are more likely to act in their own self-interest as indicated by auditors' weak "tone at the top" adverse internal control opinions and this incremental profitability is driven by insider selling. Our research identifies a

We appreciate the helpful comments from the editor Michelle Hanlon, an anonymous reviewer, Steve Lin, Stefan Veith, participants at the 2010 AAA Annual Meeting and 2011 EAA Congress, and workshop participants at Erasmus University Rotterdam.

new setting where shareholders are most at risk for wealth transfers via insider trading and highlights market consequences of weak "tone at the top".

**Keywords:** Insider trading; SOX 404; Internal control; Tone at the top; Management integrity; Management turnover

# Internal Control over Financial Reporting and Managerial Rent Extraction: Evidence from the Profitability of Insider Trading

## 1. Introduction

This study examines whether the effectiveness of internal control over financial reporting (ICFR) is related to the profitability of insider trading. ICFR are the policies, processes, and procedures intended to ensure financial statements are reliable. It is well documented in the prior literature that reliable financial reporting is an important mechanism used by firms to communicate credible information to outsiders for their use in resource allocation decisions and in evaluating management's performance (see e.g., Beyer et al. 2010). When firms have ineffective ICFR, managers have more discretion over accounting estimates and methods due to the lack of formal policies and procedures that restrict managers' accounting choices (Hogan and Wilkins 2008). Prior research provides evidence that firms with ineffective ICFR disseminate less reliable financial information (Doyle et al. 2007a; Ashbaugh-Skaife et al. 2008; Feng et al. 2009). Prior research also demonstrates less reliable financial information enhances insiders' information advantage (Lambert et al. 2007). When insiders trade their firms' shares based on private information, they are more likely to profit, i.e., extract rents from current shareholders.

We define the profitability of insider trading as the capital gains after purchases and the losses avoided by selling shares. If insiders' trades reflect information already impounded in stock prices, average insider trading profitability should be zero. In contrast, insider trading profitability will be greater than zero when managers trade on their private information. Using a large sample of firms disclosing auditor-attested evaluations of ICFR effectiveness during 2004-2008 in accordance with Section 404 of the Sarbanes Oxley Act (SOX), we find evidence consistent with our main prediction: insider trading profitability is significantly higher in firms disclosing material weaknesses in ICFR. This finding holds after controlling for factors

associated with insider trading and determinants of ineffective ICFR, as well as firms' prior buy-and-hold abnormal returns and market reactions to material weakness in ICFR disclosures.

To provide further evidence on the link between insider trading profitability and ineffective ICFR, we also examine insider trading profitability over time. Prior research suggests that information asymmetry declines once firms remediate their ICFR problems and financial reporting quality improves (see e.g., Ashbaugh-Skaife 2009). If insiders hold less private information because financial reporting is more transparent, then we do not expect to find significant differences in insider profitability once internal control problems are remediated. The results of our over-time analysis indicate that the incremental profitability of insider trading in weak internal control firms is present in the years prior to firms receiving an adverse internal control opinion from their auditors, but disappears in the years after remediation of ineffective ICFR. These results support our main findings and rule out the potential alternative explanation that the greater profitability of insider trading for firms with ineffective ICFR is driven by the negative stock price impact of ineffective internal control disclosures.

Recent research suggests that the attitude of top management partially explains the variation in firms' reporting practices and strategic outcomes (Bamber et al. 2010; Dyreng et al. 2010). We explore whether the attitude of top management is associated with the profitability of insider trading by utilizing auditors' weak "tone at the top" internal control opinions required under Section 404 of SOX. Specifically, a material weakness related to "tone at the top" refers to top management's attitude towards creating and maintaining an ethical culture in the workplace. "Tone at the top" is viewed as the foundation of effective internal control (Committee of Sponsoring Organizations (COSO) 1992) and if there is weak "tone at the top", it is unlikely that even the most comprehensive system of internal control will be effective in constraining self-

serving management behavior (Kizirian et al. 2005).[1] If top managers lack integrity, we expect them to be more likely to take advantage of their private information due to weak internal control by engaging in more profitable insider trading.

Based on auditors' internal control opinions, we identify 125 firm-years for which the auditor identified and publicly disclosed a material weakness in ICFR related to weak "tone at the top". Consistent with our prediction, trading profitability is significantly higher when there is weak "tone at the top" relative to other internal control problems. Further tests indicate that the profitability of insider sales, rather than purchases, drives the higher insider trading profitability results for weak "tone at the top" and other internal control problems.

Prior literature documents insider sales transactions are associated with abnormal accruals (Bartov and Mohanram 2004; Cheng and Warfield 2005; McVay et al. 2006). To determine whether ineffective ICFR and weak "tone at the top" are incrementally more informative about insider sales profitability beyond abnormal accruals, we add signed abnormal accruals to our insider sales profitability model. The results indicate *i)* the relation between ineffective ICFR and insider sales profitability is distinct from previously documented associations between insider sales and positive abnormal accruals, and *ii)* positive abnormal accruals further contribute to insiders' incremental selling gains when there is weak "tone at the top". The latter finding supports the notion that disclosures of weak "tone at the top" identify a subset of firms where manager-specific "styles" contribute to more information asymmetry via low financial reporting quality thereby allowing greater rent extraction.

In our last analysis, we explore whether insider selling profitability and weak "tone at the top" are associated with executive turnover in the C-suite. Consistent with Johnstone et al.

[1] Characteristics of weak "tone at the top" include unethical behavior, lack of compliance with policies and procedures, incompetency, and irresponsibility (COSO 1992).

(2010), we find CEO and CFO turnover is more likely when firms have ineffective ICFR. More importantly for our study, we document that the magnitude of CEO and CFO insider selling profitability increases the likelihood of them leaving their firms' employment. Furthermore, we document that the profitability of insider selling combined with weak "tone at the top" incrementally increases the likelihood of CEO and CFO turnover.

Our study makes several contributions. Prior research examining the consequences of material weaknesses in ICFR has focused on earnings quality (Doyle et al. 2007a; Ashbaugh-Skaife et al. 2008; Gong et al. 2009; Altamuro and Beatty 2010), cost of equity (Beneish et al. 2008; Ashbaugh-Skaife et al. 2009), cost of public and private debt (Costello and Wittenberg-Moerman 2011; Dhaliwal et al. 2011; Kim et al. 2011) the market reaction to internal control reports (Hammersley et al. 2008), the effect on audit firms (Hogan and Wilkins 2008; Hoitash et al. 2008) and CEO/CFO turnover (Johnstone et al. 2010). We advance the ICFR literature in three ways. First, we provide evidence on another market consequence of weak ICFR by documenting a positive relation between ineffective ICFR and the profitability of insider trading. Second, our study highlights that the internal control problem of weak "tone at the top" has a positive incremental effect on the profitability of insider trading. Third, we provide evidence that the profitability of insider selling by CEOs and CFOs, and this profitability combined with a lack of integrity by the CEO/CFO as signaled by weak "tone at the top", increases the likelihood of CEO/CFO turnover. Overall, we identify and document new market consequences of ineffective ICFR.

We also contribute to the insider trading literature focused on factors that contribute to information asymmetry and insiders' trading profitability (Aboody and Lev 2000; Frankel and Li 2004). As Huddart and Ke (2007, p.197) posit, "[i]dentifying the characteristics of firms where insiders' trades are most profitable may prove useful to regulators who design enhanced

disclosures or other remedies to limit insiders' trading advantage." We provide evidence that ineffective ICFR is an important factor that relates to insider trading profitability. We also provide evidence of increased profitability of insiders' selling in the presence of top management who lack integrity as signaled by weak "top at the top", thereby contributing to our understanding of the settings where shareholders are most at risk for wealth transfers via insider trading.

The rest of the paper proceeds as follows. Section 2 provides a summary of related literature and our predictions regarding the relation between insider trading profitability and ineffective ICFR. In Section 3, we present the sample selection and research design. Section 4 discusses our results, Section 5 presents additional tests, and Section 6 concludes the paper.

## 2. Background and predictions

### *2.1. Ineffective internal control and insider trading*

With the separation of ownership and control, incentives arise for self-interested managers to extract rents from shareholders (Jensen and Meckling 1976), and insider trading is one mechanism by which managers can do so (e.g., Baiman and Verrecchia 1996). Much of the prior insider trading literature suggests insiders profit at the expense of shareholders when trading their firms' shares. Specifically, insider trades are associated with changes in future stock price (Jaffe 1974; Finnerty 1976; Seyhun 1986; Seyhun 1998; Lakonishok and Lee 2001) and future earnings (Ke et al. 2003; Piotroski and Roulstone 2005). These findings are driven primarily by insiders' share purchases, given that average share sales are more likely driven by managers' portfolio diversification needs (Carpenter and Remmers 2001; Jeng et al. 2003). However, when focusing on more specific settings, prior research indicates that share sales are informative for future firm performance around seasoned equity offerings (Karpoff and Lee 1991), bankruptcy petition filings (Seyhun and Bradley 1997), CEO home purchases (Liu and Yermack 2007), and in

situations where trades are allowed to be reported with a delay (Cheng et al. 2007) or are formally preannounced (Jagolinzer 2009).

While many argue insider trading is harmful (e.g., Ausubel 1990; Fishman and Hagerty 1992), others argue insider trades are an efficient contracting mechanism (e.g., Roulstone 2003) and potentially reveal private information that enhances market efficiency (e.g., Manne 1966; Carlton and Fischel 1983). Some studies focus on the benefits associated with the disclosures of insider share purchases, such as enhanced credibility of voluntary disclosure (Gu and Li 2007), reduced analyst forecast error and dispersion (Lustgarten and Mande 1998), or the resolution of information uncertainty (Veenman 2012). However, compared to insider purchases associated with subsequent price increases, sales executed before price drops are more harmful and more likely trigger litigation due to the losses suffered by shareholders (e.g., Cheng and Lo 2006).

Theoretical models of informed trading suggest the profitability of insider trading increases with the magnitude of information asymmetries existing between insiders, i.e., informed traders, and outsiders, i.e., uninformed traders (Grossman and Stiglitz 1980; Glosten and Milgrom 1985; Kyle 1985). Theoretical models of disclosure suggest low quality financial reporting results in greater information asymmetry between insiders and external users of financial statements (e.g., Diamond and Verrecchia 1991; Easley and O'Hara 2004). Empirical studies confirm that noise in reported financial numbers, such as earnings, affects information asymmetry and information risk (Rajgopal and Venkatachalam 2011; Bhattacharya et al. 2012).

To the extent reliable financial reporting 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). The risk for managerial rent extraction is accentuated when financial reporting is unreliable and managers trade their firms' shares based on superior private information. Effective ICFR provides reasonable assurance that financial statements do

not contain any material misstatements thereby enhancing the reliability of firms' financial reporting. When a material weakness in ICFR exists, there is more than a remote likelihood that material misstatements in financial reports will not be prevented or detected by a firm's internal control system (Hogan and Wilkins 2008).

Material misstatements can be driven by unintentional errors as well as the systematic misuse of accounting discretion. Unintentional errors, e.g., inconsistent applications of accounting standards or inaccurate collection and processing of financial data, introduce noise in the financial statements. As managers have access to superior information about *future* firm performance, noise in *contemporaneous* financial disclosures contributes to insiders' asymmetric information advantage and hence expected trading profits. Systematic misuse of accounting discretion e.g., not booking sufficient warranty reserves or failing to record goodwill impairments, creates biased financial statements. Biased financial statements increase information asymmetry that can be used advantageously by managers. For example, prior research suggests managers sell shares at inflated prices when discretionary accruals are used to increase earnings (e.g., Beneish and Vargus 2002; Bartov and Mohanram 2004).

Regardless of noise or bias, ineffective ICFR results in less reliable financial information.[2] Thus, we posit ineffective ICFR is an important factor contributing to insiders' asymmetric information advantage and ability to extract rents from shareholders via insider trading.



*2.2. "Tone at the top" and insider trading profitability*

Prior literature suggests ethical decision making is an influential factor underlying insider trading behavior (e.g., Cleek and Leonard 1998; Werhane 1989). However, there is limited

[2] While ineffective internal control can lead to an increased likelihood of both noise and bias in financial reports, there is limited evidence disentangling the two. The work of Feng et al. (2009) supports the notion that ineffective ICFR results in more noise in internal reports that ultimately contributes to less reliable financial statements. Still, the likelihood of management override and deliberate misrepresentation is greater in firms with weak internal control relative to firms with effective internal control (e.g., Altamuro and Beatty 2010).

empirical evidence supporting this claim because prior to SOX 404 reporting, poor ethical behavior or lack of integrity by managers, in the absence of fraud, was difficult, if not impossible to detect.[3]

Under SOX 404 auditors are required to assess management's integrity and issue an adverse internal control report noting a material weakness in internal control due to weak "tone at the top" if the actions and policies of management contribute to an unethical work environment (Kizirian et al. 2005). While senior management is ultimately responsible for maintaining effective ICFR, the "tone at the top" set by management can be viewed as the foundation of effective internal control (COSO 1992). If there is weak "tone at the top", it is unlikely that other policies and procedures under ICFR will curtail inappropriate management behavior (Kizirian et al. 2005; Hermanson et al. 2008).

Below, we provide excerpts from auditors' SOX 404 internal control reports for three firms in our sample having weak "tone at the top". In each disclosure, the auditor makes explicit reference to senior management, their actions, and attitudes towards compliance and ethical behavior. The third disclosure also specifically refers to the private gains reaped by senior management.

"Senior management did not establish and maintain a proper tone as to internal control over financial reporting. Specifically, senior management did not emphasize, through consistent communication, the importance of internal control over financial reporting and adherence to the code of business conduct and ethics."

(*Bearingpoint Inc., Form 10-K, 1/31/2006*)

[3] Beams et al. (2003) demonstrate in an experimental setting that subjects' ethical values affected their propensity to trade on inside information. Summers and Sweeney (1998) argue that individuals that are more likely to commit fraud are also more likely to pursue illegal insider trading and attribute these behaviors to individual characteristics such as low personal ethics, low risk aversion, and overconfidence that illegal actions will go undetected. We leave the exploration of the relation between internal control and fraudulent insider trading to future research.

"Former senior management and other personnel failed to establish or adhere to appropriate internal controls related to the control environment of the Company. Specifically, former management failed to establish and act with appropriate integrity and ethical values…"
(*Offshore Logistics Inc., Form 10-K, 12/16/2005*)

"[…] the Company did not maintain controls adequate to prevent or detect instances of intentional override or intervention of their controls or intentional misconduct by certain former members of senior management. […]. This […] permitted certain former members of senior management […] to deliberately override certain controls […] resulting in certain transactions not being properly accounted for […]. Each of these former members of their senior management appears to have also personally benefited from these practices. […] Furthermore, the Company did not […] demonstrate a commitment to integrity and objectivity and foster a consistent and open flow of information and communication between those initiating transactions and those responsible for their financial reporting. Certain former members of senior management intentionally exploited this environment […]"
(*Mercury Interactive Inc., Form 10-K/A, 7/03/2006*)

We interpret material weaknesses in ICFR relating to "tone at the top" as a signal of an environment in which the potential for rent extraction is at its highest. We expect insiders that lack integrity, ignore policies and procedures, or take other actions in their own self-interest, are more likely to trade on their information advantage at the expense of outside shareholders and earn higher profits.

In summary, our study explores whether insiders are able to extract greater rents from shareholders when their firms have ineffective ICFR. We argue the rent extraction occurs because insiders hold more private information in the presence of weak ICFR. In our initial analysis, we hold constant the type or "style" of managers in firms with ineffective versus effective ICFR. That is, the effect of weak ICFR on insider trading profitability is predicted to exist regardless of managers' styles. In contrast, our second analysis where we focus on "tone at the top" allows us to directly examine the association between managers' styles and the profitability of insider trading. Specifically, we investigate whether top managers identified as

lacking integrity by the external auditor exploit their private information advantage by engaging in more profitable insider trading.

## 3. Research design

### *3.1. Sample and data*

The sample used in our empirical tests is reported in Panel A of Table 1 and is constructed as follows. We begin by collecting all firm-year observations with an audit opinion on ICFR effectiveness under Section 404 of SOX (n=20,518) from Audit Analytics for the period 2004-2008, representing 5,951 unique firms. Audit Analytics covers all SEC registrants filing on EDGAR, which allows us to examine the most comprehensive sample of Section 404 audit opinions possible. The sample begins in 2004 as accelerated filers were required to comply with Section 404 for fiscal years ending on November 15, 2004 and beyond, and runs through fiscal years ending in December 2008. We eliminate 1,887 (642) firm-year observations (firms) that could not be matched with the CRSP/Compustat merged database. Next, we drop 907 firm-year observations missing data from Compustat's Fundamentals Annual Table necessary to construct the control variables used in our empirical analyses. Finally, we eliminate 2,057 observations missing stock return data on CRSP which are necessary for calculating buy-and-hold stock returns, resulting in a sample of 15,667 firm-year observations comprised of 4,505 unique firms.

Of the 15,667 firm-year observations, 1,455 (9.3%) relate to firms having at least one material weakness in their ICFR. For our main analysis, we create an indicator variable (*MWIC*) equal to one for material weakness firm-years, zero otherwise. [4]

[4]Specific details related to the detection and reporting on material weaknesses in ICFR are as follows. Section 302 establishes that CEOs and CFOs are responsible for the effectiveness of a firm's system of internal control and reliability of external financial reporting. These officers are required to provide certifications that each quarterly and annual report does not contain untrue or omitted material facts, that the financial statements fairly present the company's financial condition, and that they have evaluated the effectiveness of the company's system of internal controls. Section 302, effective August 29, 2002, applies to all firms. Section 404 requires management to evaluate

*- Insert Table 1 about here –*

Next, we identify the firm-year observations that have insider transactions as indicated by Form 4 filings with the SEC.[5] Our study focuses on the insider trading transactions of the C-suite (CEOs/CFOs) and other officers (e.g. Chief Operating Officer, Chief Investment Officer, etc.) as these insiders are responsible for maintaining effective ICFR and for making the estimates and accounting choices that impact their firms' financial statements.[6] We obtain insider trades from Thomson Reuters' Insiders Data Feed and collect open market purchases and sales by officers.[7] Next, we eliminate observations with missing CUSIP identifier or other missing fields such as transaction price or number of shares traded. Lastly, we retain only those transactions that can be matched with CRSP.

Panel B of Table 1 reports summary statistics on insider trading activities reported on Form 4. Consistent with prior literature, insider share sales occur more often and are more material than insider purchases (e.g., Lakonishok and Lee 2001; Brochet 2010). Insider purchases are identified in 4,552 firm-years with a median dollar amount traded of $94,819 (0.016% of opening market value), while insider sales are identified in 10,603 firm-years with a median dollar amount traded equal to $2,701,191 (0.216% of opening market value).



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and report on the effectiveness of internal control over financial reporting (ICFR) in the annual 10-K filing. The independent auditor is required to express a separate opinion and attest to management's evaluation. Section 404 is effective for all "accelerated filers" with fiscal years ending on or after November 15, 2004. The requirement for non-accelerated filers to comply with Section 404 has been postponed multiple times, and now has been eliminated with the passing of the Dodd-Frank Act of 2010. http://www.govtrack.us/congress/bill.xpd?bill=h111-4173

[5] Insider trading in the U.S. is regulated under the Securities and Exchange Act of 1934 (1934 Act) and the Sarbanes-Oxley (SOX) Act of 2002. Insiders', i.e., officers, directors, and large shareholders of more than ten percent of any equity class of securities of an issuing company (Section 16(a) of the 1934 Act), trades are required to be publicly disclosed via the filing of Form 4 to the SEC.

[6] In contrast, non-officer directors have less extensive access to private information of the firms that they govern. We examine the trading profitability of non-officer directors in a sensitivity test.

[7] Consistent with the literature (e.g., Cheng and Lo 2006; Gu and Li 2007; Rogers 2008), we focus only on open market transactions and exclude transactions relating to stock options from our analysis. We exclude stock option grants because the awards are not solely at the discretion of the manager, and purchases through option exercises to avoid double counting because option exercises are often associated with immediate share sales (Ofek and Yermack 2000).

Panel C of Table 1 provides some insights into the over-time variation in insider trading activity and material weakness in ICFR disclosures. While insider trading activity is relatively constant over the sample period 2004-2008, we observe a monotonic decline in the percentage of accelerated filers disclosing a material weakness in ICFR. The peak in material weakness disclosures in 2004 of 17.3% gradually declines to 3.2% in 2008. This pattern is consistent with recent studies (Cheffers et al. 2010; Kinney and Shepardson 2011).

*3.2. Measuring insider trading profitability*

We define the profitability of insider trades as the (unrealized) capital gains after purchases and the losses avoided by selling shares. If insiders' trades only reflect information already impounded in stock prices, average insider trading profitability should be zero. Aggregate trading profitability is determined by *i)* the difference between the market price of the stock and its value based on private information, *ii)* the amount traded, and *iii)* the frequency of trading (Huddart and Ke 2007; Huddart et al. 2007). Focusing only on the returns after insider trades as a proxy for profitability ignores the materiality of individual trades, whereas focusing on trading intensity ignores the predictive ability of insider trades with respect to future stock price performance. Therefore, following the work of Huddart and Ke (2007), we consider all three factors in developing one aggregate measure of insider trading profitability at the firm-year level.

Specifically, we construct our empirical measure of insider trading profitability as follows. First, when multiple trades by different insiders of the same firm occur on the same day, these trades are aggregated at the firm-day level and duplicate firm-days are eliminated. Next, the difference between the market price and value based on private information is determined by the predictive ability of the trades. That is, we compute the one-year buy-and-hold abnormal (size-

adjusted) return after each individual trade using daily stock returns from CRSP.[8] The gain realized from purchases is then calculated by multiplying the abnormal return by the dollar value traded. For sales, we take the negative of the product of abnormal return and value traded, as the gain for the insider is determined by the loss avoided when selling shares. Lastly, we aggregate individual transactions at the firm-year level:

$$PROFIT\%_{it} = \frac{\sum_{j=1}^{n} ABRET_{itj} * VALUE\_BOUGHT_{itj} - ABRET_{itj} * VALUE\_SOLD_{itj}}{MV_{it-1}} \quad (1)$$

where $ABRET_{it}$ is equal to the one-year buy-and-hold abnormal return computed for the period starting one day after transaction date $j$, $VALUE\_BOUGHT_{itj}$ ($VALUE\_SOLD_{itj}$) equals 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 firm-year $it$, and $MV_{it-1}$ equals the market value of equity at the end of fiscal year $t-1$. The outcome of equation (1) is multiplied by 100 to denote *PROFIT%* as a percentage of market value at the beginning of the year.[9]

Lastly, as pointed out by Frankel and Li (2004), insiders will not trade on their private information when doing so would be unprofitable. Recognizing that insiders' private information



[8] Section 16(b) of the Securities and Exchange Act of 1934 prevents short-term trading opportunities to insiders by allowing shareholders to recover the profits made by an insider from purchasing and selling (or selling and purchasing) within a period of six months. As a result, the insider trading literature generally finds that insider trades are associated with abnormal stock returns over periods of one year (Lakonishok and Lee 2001) or even longer (Ke et al. 2003) after the trade. Our main conclusions regarding the association between ineffective internal control and insider trading profitability are qualitatively unaffected by the use of alternative return measurement windows of 6, 12, 18, or 24 months.

[9] We scale our measure of insider trading profitability by market value of equity because we find the magnitude of insiders' trades is significantly correlated with firm size. Scaling by firm size helps alleviate concerns that our results are driven by a small subset of large firms. We obtain qualitatively similar results when using beginning-of-the-year total assets as a deflator or when we use the unscaled dollar magnitude of insider trading profitability. For a subset of observations with available data, we also reran our analyses when deflating profitability by the value of insiders' share holdings (shares held plus options exercisable during year $t$) at the beginning of the year. Our inferences remain the same.

affects the opportunity to trade profitability, we include firm-years for which there are no reported insider trades and set *PROFIT%* equal to zero (Huddart and Ke 2007).[10]

*3.3. Control variables*

In our multivariate analyses, we control for factors associated with insider trading profitability, material weakness disclosures and market reactions to MWIC-related disclosures.[11] First, we control for firm size using the market value of equity at the beginning of the year over which trading is measured (*MV*). Seyhun (1986) finds that insiders buy more in smaller firms and sell more in larger firms, while Lakonishok and Lee (2001) report that insiders trade more profitably in smaller firms. Next, we control for the book-to-market ratio (*BTM*) at the beginning of the year because prior research suggests insiders trade as contrarians (Rozeff and Zaman 1998; Piotroski and Roulstone 2005). We also control for the buy-and-hold abnormal returns over the one-year period ending one day before the first insider transaction (*BHARPRE*) to diminish the concern that finding a positive relation between insider trading profitability and *MWIC* is due to returns momentum.

We control for analyst following (*NUMEST*) since Frankel and Li (2004) show that insider profitability is inversely related to analyst following. In addition, Frankel and Li (2004) find some evidence of a negative association between financial statement informativeness and the extent to which insider trades are predictive of future stock returns. Financial statement informativeness (*FSINFORM*) is measured by the adjusted $R^2$ from a firm-specific time-series

[10] Of the 15,667 firm-years in the sample, the vast majority of firm-years (13,572 or 87%) have reported trading activity over the fiscal year. Over the period 2004-2008, insiders trade in 4,092 of the 4,505 firms included in the sample. See footnotes 16 and 20 for more details related to analyses where the sample is comprised of only firms reporting trading activity (i.e., "active firms").

[11] All variables introduced in this section are defined more explicitly in Appendix A.

regression of price per share on book value and earnings per share.[12] In addition, variables capturing institutional ownership (*INST*) and firm age (*AGE*) are added to further control for variation in information asymmetry. Following Frankel and Li (2004), we control for return volatility (*RETVOL*). As Huddart and Ke (2007) demonstrate that their measure of information asymmetry based on absolute market reactions to earnings announcements is most strongly related to insider trading profitability, we also control for this measure (*MAG_AR*).

Turning to the determinants of internal control problems, we control for a firm's financial performance by including a variable capturing recent losses (*%LOSS*) defined as the percentage of the most recent three years in which the firm reports a loss. The ratio of inventory to assets is used to control for accounting application measurement risk (*INV*). *BIG4* is an indicator variable for firms hiring a dominant audit firm. *SEGMENTS* and *FSALES* capture the number of reported business segments and whether a firm has foreign sales activities, respectively, and proxy for business complexity. *M&A* and *RESTRUCT* are indicator variables for merger and acquisition and restructuring activities, respectively. Lastly, *ΔAUDITOR* captures auditor change during the year.

We also control for the stock price effect of material weakness disclosures.[13] Prior research suggests disclosures of internal control weaknesses are perceived negatively by capital market participants, resulting in a negative shock to the firm's stock price (e.g., Beneish et al. 2008; Hammersley et al. 2008). Given that in our sample, on average, insiders sell more shares than they buy (see Panel B of Table 1), sorting firms on a characteristic associated with negative

[12] We construct our measure of financial statement informativeness (*FSINFORM*) using quarterly data over a 20-quarter period ending with the fourth quarter of fiscal year *t*, requiring a minimum of 8 quarterly observations. Frankel and Li (2004) use annual data requiring at least five years. Because using annual data requires a longer time series of firm data, this significantly reduces our sample size and introduces a potential survivorship bias into our data. We therefore choose to use quarterly data, however note that our results are robust to using annual data requiring a minimum of five years to construct *FSINFORM*.

[13] We thank the reviewer for alerting us to this important set of controls.

future stock returns can induce a mechanical relation between the characteristic (here: internal control ineffectiveness) and insider trading profitability.[14] To rule out this potential alternative explanation, we also control for the disclosure effect by including variables capturing the market reaction to weak ICFR disclosures in our analyses.

As the opinion on internal control effectiveness under Section 404 is annually disclosed in the 10-K, we create a variable capturing the market reaction to the 10-K filing, *BHAR_10K*, computed as the five day buy-and-hold abnormal (size-adjusted) return centered on the filing date. However, investors may infer internal control problems earlier than the 10-K filing through other disclosures. Impink et al. (2012) show that about half of all accelerated filers with a material weakness in ICFR are "late filers" and notify the SEC of late filing on Form 12b-25 prior to the 10-K filing. Given *i)* firms often disclose internal control problems in these late filing notifications, and *ii)* the inability to file on time itself signals weak internal control, we additionally create a variable *BHAR_NT* equal to the market reaction to late filing notifications obtained through Audit Analytics' Non-timely Filer Information and Analysis database.[15]

As internal control problems are associated with restatements (Ashbaugh-Skaife et al. 2007; Leone 2007), investors may also learn about the effectiveness of ICFR prior to the 10-K filing through a restatement announcement. Therefore, we collect restatements from non-reliance disclosures in 8-K filings through Audit Analytics' Non-Reliance Restatements database for the period between fiscal year end and the 10-K filing. We find 26.0% of our material weakness firms announce a restatement during this period. *BHAR_RESTATE* equals the market reaction around these restatement announcements. Lastly, for our material weakness firms we collect all

[14] In addition, insiders could be trading on the forthcoming disclosure of internal control weaknesses. Although this scenario is consistent with opportunistic insider trading, it is inconsistent with our prediction that ineffective internal control affects insider trading profitability through noise and bias in financial reporting.

[15] Consistent with Impink et al. (2012), we find 47.4% of our material weakness firms file a notification of late filing with the SEC. Of firms with effective ICFR, only 3.8% are late filers.

8-K filings from EDGAR that occurred during the window starting at fiscal year-end through the 10-K filing date. We search these filings for the keywords "material weakness" and identify 30.4% of our material weakness firm-year observations have such an 8-K filing. When multiple 8-K filings are identified, we retain only the earliest and create the variable *BHAR_8K* equal to the market reaction around 8-K filings containing the phrase "material weakness".

*3.4. Descriptive statistics*

Panel A of Table 2 presents descriptive statistics on insider trading profitability. Mean *PROFIT%* for material weakness firms (0.0462%) is significantly greater than for firms with effective ICFR (0.0044%). Additional distributional characteristics suggest that the differences in means are not driven by a handful of opportunistic insiders. The Wilcoxon rank-sum test indicates the distribution of trading profitability for ineffective firms is significantly different from that for effective firms even though the median trading profitability is zero for both ineffective and effective ICFR firms. Also, we find firms with ineffective internal control are significantly more likely to end up in the top deciles of yearly trading profitability. Moreover, the relative number of firms with positive trading profitability is significantly greater for firms with ineffective internal control.

In order to provide additional evidence on the economic significance of insiders' trading profits, we also present statistics on the unscaled profitability measure. On average, trading profitability of $273,390 for ineffective ICFR firms is significantly greater than the trading profitability of $51,263 for effective ICFR firms.[16] Overall, statistics in Panel A provide initial

[16] Recall that we include in our measure of *PROFIT%* firm-year observations for which there are no reported insider trades (Huddart and Ke 2007). If we eliminate these observations from the descriptive statistics and calculate trading profitability using only "active" firms, we see stronger differences in the profitability of insider trading across ineffective and effective internal control samples. Specifically, "active" ineffective internal control firms gain, on average, $445,661 (0.0914% of market value) versus the profitability of insider trading by "active" firms with no internal control problems is only $64,377 (0.0057% of market value). Median trading profitability is also

evidence on our prediction that managers have greater ability to extract rents via insider trading in firms with ineffective internal control.[17]

*- Insert Table 2 about here -*

Panel B of Table 2 displays the descriptive statistics for the control variables. Firms with ineffective internal control are smaller (*ln(MV)*), younger (*AGE*), and have more volatile stock returns (*RETVOL*). In addition, material weakness firms have higher book-to-market ratios (*BTM*), lower analyst following (*NUMEST*), and lower institutional ownership (*INST*). The descriptive statistics also indicate that firms having ineffective internal control are more likely to report research and development expenses (*RND*). Consistent with the notion that ineffective ICFR results in greater information asymmetry, we find earnings and book value to be less price-informative (*FSINFORM*) and stronger market reactions around earnings announcements (*MAG_AR*) for firms with ineffective internal control. The differences in firm characteristics between ineffective and effective ICFR firms are consistent with prior research examining firms with internal control problems (e.g., see Doyle et al. 2007a; Ashbaugh-Skaife et al. 2007).

Panel C of Table 2 presents average market reactions to MWIC-related events. The average market reaction to 10-K filings containing the official material weakness disclosure is negative and marginally significant (-0.35%; p-value: 0.070). The market reaction to late filing notifications by material weakness firms is significantly negative (-1.98%; p-value<0.01). Similarly, market reactions to restatement announcements by material weakness firms are

significantly greater in firms with ineffective internal control ($35,880; 0.0070%) versus firms with effective internal control ($23,024; 0.0028%).

[17] To gain further insights into insider trading behavior in the presence of ineffective ICFR, we test whether the frequency and magnitude of trading differs between firms with weak versus effective internal control. Results indicate trading frequency (as measured by the filing of Form 4) and magnitude (as measured by the dollar value of trades) is not different between the two types of firms. Therefore, it appears that our measure of insider trading profitability, developed by Huddart and Ke (2007), better captures the rent-extraction associated with insider trading by including an estimate of profits as a function of future changes in share price.

negative and significant (-2.30%; p-value<0.01), while average market reactions to 8-K filings containing the phrase "material weakness" are slightly less negative (-1.04%; p-value: 0.049). We control for these market reactions to diminish the concern that declines in share prices of ineffective ICFR firms drive a positive relation between ICFR ineffectiveness and insider trading profitability.

In Table 3, we present correlations among insider trading profitability (*PROFIT%*), internal control effectiveness (*MWIC*), and control variables related to insider trading profitability. Pearson product-moment correlations are presented in the upper-right, and Spearman rank order correlations in the lower-left portion of the table. As predicted, the correlation between *PROFIT%* and *MWIC* is positive and significant. The vast majority of insider profitability control variables are significantly correlated with *PROFIT%*. Variance inflation factors (untabulated) suggest our multivariate analyses are not subject to multicollinearity concerns.

*- Insert Table 3 about here -*

## 4. Empirical findings

### *4.1. Insider trading profitability and ineffective ICFR*

To examine the association between ICFR effectiveness and insider trading profitability, we estimate the following OLS regression (firm and time subscripts omitted for brevity):

$$PROFIT\% = \beta_0 + \beta_1 MWIC + Insider\ trading\ determinants + MWIC\ determinants + Market\ reaction\ variables + \varepsilon \quad (2)$$

All insider trading determinants, *MWIC* determinants, and market reaction variables are as previously defined and detailed in Appendix A. Continuous variables are winsorized to the 1st and 99th percentiles of their distributions and standard errors are adjusted for heteroskedasticity and clustering at the firm-level (Petersen 2009). In addition, we include year- and industry-fixed

effects. We expect $\beta_1$ to be positive and significant as it indicates the difference in insider trading profitability between firms with ineffective versus effective ICFR.

Table 4 reports regression results. Each specification of our regression model is significant and the adjusted $R^2$ is comparable to prior research (Huddart and Ke 2007). The base model presents the results of estimating equation (2) including only the set of insider trading controls. Coefficient estimates for the insider trading controls suggest insider trading profitability is less for value firms (*BTM*) and declines with financial statement informativeness (*FSINFORM*). Profits are greater for firms with better prior performance (*BHARPRE*) and greater return volatility (*RETVOL*). After controlling for these factors, we find a significantly positive coefficient on *MWIC*.

Our second estimation of equation (2) includes controls for the determinants of material weaknesses in ICFR. We find the signs and significance levels of the coefficient estimates for the insider trading controls to be similar to the base model. Moreover, we continue to document a significantly positive coefficient on *MWIC*. In the last columns of Table 4, we report the results of the model controlling for the market reactions to MWIC-related events. We find these information events contribute to insiders' trading profitability. Trading gains increase as the market reacts more negatively to 10-K filings, late filing notifications, and restatement announcements. However, the coefficient on *MWIC* remains positive and significant allowing us to conclude that insiders trade more profitably, and hence extract greater rents, in firms with ineffective internal control.

*- Insert Table 4 about here -*

*4.2. Insider trading profitability over time*

Our main findings are consistent with the conjecture that ineffective ICFR contributes to the profitability of insider trading because internal control problems create greater information asymmetry between managers and outsiders due to noise and/or bias in the financial statements. Under the assumption that internal control problems exist in years prior to the assessment and disclosure of weak ICFR under SOX Section 404 (e.g., Doyle et al. 2007a), our main result of increased trading profits in the presence of weak ICFR should also hold for prior years. Furthermore, if ineffective internal control allows insiders to enhance their private information, then the increased trading profits associated with ineffective ICFR should disappear once firms remediate their ICFR problems and financial reporting quality improves, which reduces information asymmetry between insiders and shareholders. Specifically, we expect no significant difference in insider trading profitability between firms that have always had effective ICFR and firms that remediate their internal control problems. To test these conjectures, we add fiscal years 2002-2003 to our sample of accelerated filers reporting under SOX Section 404 during the 2004-2008 period and introduce indicator variables that capture the pre-disclosure and post-remediation periods.

Extending the sample back to fiscal years ending in or after December 2002, we obtain a sample of 23,535 firm-year observations with data necessary to estimate equation (2), where *MWIC* is replaced by *PRE* and *POST*. *PRE* is set equal to one for firm-years before the year of the adverse internal control opinion and zero otherwise. If ineffective ICFR due to improper accounting standard application, lack of policies or procedures, or any other weakness facilitates insiders' trading profitability by increasing information asymmetry, we expect a positive and significant relation between *PRE* and *PROFIT%*. The indicator variable *POST* is set equal to one for firm-years after the disclosure of the remediation of previous material weaknesses occurs,

zero otherwise.[18] We predict the coefficient on *POST* to be insignificant, indicating no differential insider trading profitability compared with firms receiving clean opinions.

*- Insert Table 5 about here -*

Table 5 displays results on the temporal variation in insider trading profitability. Focusing on the *PRE* variable, the significantly positive coefficients indicate the trading profitability of the C-suite and other officers to be present in the years leading up to the fiscal year of the adverse SOX 404 opinion. In contrast, the coefficients on *POST* are not statistically different from zero. That is, insiders' incremental private information advantage manifesting in insider trading profitability disappears once material ICFR problems are resolved.

Given that the abnormal returns on insider trades in the *PRE* period do not overlap with the disclosure of internal control problems, our over time tests further alleviate the concern that profits on insider trading are driven by the disclosure of ICFR, rather than incremental private information due to poor internal control. Collectively, the above analysis strengthens our main findings and conclusions regarding the association between ineffective ICFR and the ability of insiders to extract private rents at the expense of shareholders.

*4.3. Weak "tone at the top"*

To assess the association between top management integrity and insider trading profitability, we estimate the following regression:

$$PROFIT\% = \beta_0 + \beta_1 MWIC + \beta_2 TONE + Insider\ trading\ determinants + MWIC\ determinants + Market\ reaction\ variables + \varepsilon \quad (3)$$

*TONE* is coded one if a firm has a material weakness that is related to "tone at the top" and zero otherwise. Weak "tone at the top" control problems are based on the reason key fields provided

[18] For example, *POST* is equal to one for fiscal years 2006-2008 if the firm discloses a material weakness for fiscal-year 2004 and a clean opinion for fiscal-year 2005.

by Audit Analytics describing the nature of the material weakness(es) contributing to ineffective control. Specifically, *TONE* equals one when Audit Analytics classifies a material weakness as "Senior management competency, tone, reliability issues" (reason key #13) or "Ethical or compliance issues with personnel" (reason key #21), zero otherwise. Based on this classification, we identify 125 firm-year observations as having weak "tone at the top" (0.8%).[19] *TONE* captures the incremental aggregate trading profitability for firms that have been identified by their auditors as having top managers who lack integrity, relative to firms with other types of internal control problems.

Panel A of Table 6 presents summary statistics on insider trading profitability in firms with weak "tone at the top" versus firms with other types of material weaknesses. We find initial evidence supporting our prediction that top managers identified by auditors as lacking integrity engage in more profitable insider trading relative to managers of firms with other internal control problems. The descriptive statistics indicate that the average trading profitability of 0.1053% for weak "tone at the top" insiders is significantly greater than the 0.0406% for insiders in firms with other internal control weaknesses. Average unscaled insider trading profitability of $1,008,288 for weak "tone at the top" is significantly greater than the $204,321 for other ineffective ICFR.[20]

Panel B of Table 6 presents the results of our weak "tone at the top" tests. Coefficients on all control variables are not reported for brevity. Consistent with our prediction, we find a positive and significant coefficient on *TONE*. This suggests managers lacking ethics or integrity gain even more from trading their firms' shares than managers in firms with other types of internal control

[19] 44 firm-year observations are identified as having problems with "senior management competency, tone, reliability issues", 34 firm-year observations are identified as having problems with "Ethical or compliance issues with personnel", and 47 firm-year observations are identified as having both types of problems.

[20] Similar to our primary analysis, if we limit the sample to active firms we find even stronger evidence of differences between *TONE* and *MWIC* firms. Specifically, insider trading profitability of *TONE* firms (mean=$2,060,343 (0.3022%); median=$277,930 (0.0227%)) is significantly greater than the insider trading profitability of firms with other types of internal control problems (mean=$308,694 (0.0735%); median=$30,821 (0.0065%)).

problems. Moreover, after adding *TONE* to the model, the positive coefficient on *MWIC* is still significant (p-value: 0.014). These results indicate that insiders of firms with internal control problems trade more profitably, and trading profitability is even greater when managers are tagged as lacking integrity or ethical behavior. [21]

*- Insert Table 6 about here -*

To explore whether the type of trade by insiders affects the rents extracted from ineffective ICFR and, more specifically, weak "tone at the top", we disaggregate insider trading profitability by purchases versus sales. Prior literature finds the average predictive ability of insider trading for future returns to be greater for purchases than sales, which is attributed to differing insider incentives and risks (e.g., Jeng et al. 2003). On the other hand, shareholders are more likely hurt when insiders sell shares based on bad news private information rather than when they buy shares based on good news private information (e.g., Cheng and Lo 2006).

We re-estimate equation (3) using the profitability of purchase transactions (*PURCHASEPROFIT%*) and the profitability of sales transactions (*SALESPROFIT%*) as the dependent variable, and report the results in the second and third columns in Panel B of Table 6, respectively. When we estimate the model using *PURCHASEPROFIT%* as the dependent variable, the coefficients on *MWIC* and *TONE* are insignificant. Hence, we find no evidence suggesting that insider purchases are more profitable in firms with ineffective ICFR nor more profitable when managers lack effective "tone at the top" compared to firms with no material weaknesses in internal control.

[21] Our distributional statistics in Tables 2 and 6 indicate that insider trading profitability is positively skewed raising the concern that extreme observations potentially drive our results. To alleviate this concern, we conduct a robustness check using rank values of *PROFIT%.* When replacing *PROFIT%* with *DPROFIT* (defined as the annual decile rank of *PROFIT%*) and running an ordered probit regression, the coefficient on *MWIC* remains positive and significant (p-value=0.044). The coefficient on *TONE* confirms a significant incremental positive association between insider trading profitability and managers lacking effective "tone at the top" (p-value=0.045).

Turning to the profitability of insiders' sales, we find significantly positive coefficients on *MWIC* and *TONE* indicating that insiders of firms with material weaknesses in ICFR and weak "tone at the top", respectively, extract incrementally greater rents selling ahead of price declines than firms with effective ICFR. [22] Interestingly, when we re-estimate our primary model (equation 2) substituting *PURCHASEPROFIT%* for *PROFIT%* (not tabled), we find a significantly negative coefficient on *MWIC* (p-value <0.05) suggesting that insiders of firms with ineffective ICFR are not acquiring their firms' shares at favorable prices relative to insiders of firms with effective internal control. In contrast, we find a significantly positive coefficient on *MWIC* (p-value < 0.01) when using *SALESPROFIT%* as the dependent variable (not tabled), indicating that insiders' of firms with material weaknesses in ICFR are selling their shares prior to share price declines. Overall, these findings suggest our main results documenting a positive association between insider trading profitability and ineffective ICFR are driven by insider selling.[23]

*4.4. Propensity score matched samples*

Our tests thus far are based on pooled cross-sectional regressions. In this sub-section, we test the robustness of our findings to using propensity score matched samples (results not tabulated). Specifically, instead of comparing "treatment" firms (*MWIC*=1 or *TONE*=1) to all other firms in the sample, we match each treatment firm to a control firm that is *dissimilar* with regard to the treatment effect (*MWIC*=0 or *TONE*=0) but *similar* along other observable dimensions. The advantage of this approach is that it does not specify a (linear) functional form for confounding

[22] Our results are qualitatively similar when we exclude sales of shares acquired through stock option exercises.

[23] To provide corroborating evidence supporting this inference, we repeat the over-time analysis substituting *PURCHASEPROFIT%* (*SALESPROFIT%*) for *PROFIT%* (not tabled). The coefficients on *PRE* and *POST* when using *PURCHASEPROFIT%* as the dependent variable are insignificant. However, we continue to find a positive and significant coefficient on *PRE* and an insignificant coefficient on *POST* when using *SALESPROFIT%* as the dependent variable.

effects and thereby potentially better controls for determinants of ineffective ICFR (e.g., Armstrong et al. 2010).

We first estimate a logit regression with *MWIC* as the dependent variable and including internal control determinants, insider trading controls, and year fixed effects. Based on the regression estimates for the sample of 15,667 firm-year observations, we compute the conditional probability of having ineffective ICFR given the set of observable firm characteristics ("propensity score"). We similarly compute the conditional probability of having weak "tone at the top" given the set of firm characteristics using logit regression with *TONE* as the dependent variable for the sample of 1,455 ineffective ICFR observations. We then match each firm identified as having ineffective ICFR (weak "tone at the top") with a control firm having effective ICFR (ineffective ICFR but no problems with "tone at the top") and the closest propensity score.[24]

Our results are robust to using propensity score matched samples. Average insider trading profitability in 1,455 firms with ineffective ICFR (mean *PROFIT%*=0.0723) remains significantly greater compared to 1,455 effective ICFR firms (mean *PROFIT%*=-0.0001) with similar observable characteristics (p-value<0.001). Similarly, we find that average insider trading profitability in the 125 firms with weak "tone at the top" is significantly higher compared to 125 matched firms with other types of ineffective ICFR and similar characteristics (0.2176 versus 0.0662; p-value=0.031). The significance of these differences increases when focusing only on insider sales. Based on these results, we conclude that our main findings are robust to using a matched-pair rather than a pooled sample research design.

[24] An evaluation of the covariate balances after these matching procedures suggests both procedures identified firms with similar characteristics on observable dimensions (i.e., we cannot reject the null hypothesis that the mean (median) of a variable is similar between the two groups of firms for all variables and both matching procedures using a t-test (Wilcoxon rank-sum test)). Because this suggests that the matched control firms are similar to treatment firms along observable dimensions, differences between treatment and control firms can be attributed to the treatment effect.

## 5. Additional tests

### *5.1. The effect of abnormal accruals*

Prior research provides evidence that accruals management by firms is associated with subsequent opportunistic insider trading (e.g., Beneish and Vargus 2002; Bartov and Mohanram 2004). To show that our results are not merely driven by previously documented effects of accruals on insiders' trading, we replicate our earlier analysis for insider sales and control for the level of positive and negative abnormal accruals. Abnormal accruals are measured using the performance-adjustment method introduced by Kothari et al. (2005) and we split abnormal accruals into signed variables reflecting their positive and negative values. *POS_AACADJ* equals performance-adjusted abnormal accruals when positive (zero otherwise), while *NEG_AACADJ* equals performance-adjusted abnormal accruals when negative (zero otherwise). The sample size is 11,956 firm-year observations after eliminating firms missing data necessary to calculate abnormal accruals and financial services firms (2-digit SIC codes 60-69) to be consistent with prior literature (see. e.g., Francis et al. 2005)

Panel A of Table 7 reports results controlling for abnormal accruals. In the first column, we report the main effect and in the last column we include interaction terms. We continue to find significantly positive coefficients on *MWIC* and *TONE* after controlling for abnormal accruals. Moreover, we find a marginally significant positive association between trading profitability and the positive values of abnormal accruals. The coefficient on negative abnormal accruals is insignificant. These findings are consistent with managers profiting from selling shares in periods of inflated earnings.

*- Insert Table 7 about here -*

Next, we analyze interactions between internal control effectiveness and positive abnormal accruals. If managers use their discretion to manage earnings in the presence of ineffective internal control and benefit from selling shares at inflated prices, we expect a stronger association between positive accruals and trading profitability for *TONE* firms. The coefficient on *MWIC* remains positive and significant and, as expected, we find a positive coefficient on the interaction of *TONE* and positive abnormal accruals. This finding is consistent with the conjecture that upwards earnings management by managers that lack integrity contributes to insider's incremental trading profitability.

To summarize, we document *i)* the internal control effect on insider trading profitability is distinctly different from previously documented associations between insider sales and income-increasing earnings management, and *ii)* income-increasing abnormal accruals contribute to insiders incremental selling profits when there is weak "tone at the top". This last finding suggests managers lacking integrity increase their private information via the booking of extensive positive accruals and are able to engage in more profitable selling as a result. This finding adds to a growing body of literature examining the consequences of manager-specific styles (e.g., Ge et al. 2011).[25]

*5.2. Insider type analysis*

Recall our primary analyses are focused on the insider trading of officers as they often have greater access to accounting records and knowledge of financial disclosure details. To provide

[25] Specifically, Ge et al. (2011) identify a sample of CFOs that work in the same position for at least two different firms across different periods to determine manager-specific fixed effects. When adding these manager-specific fixed effects to regressions of accounting quality attributes on *i)* firm fixed effects and *ii)* time-varying firm characteristics, they find that manager-specific factors explain a modest portion of variation in the attributes. Similar research designs are used in recent studies to examine manager-specific effects on variables such as earnings guidance (Bamber et al. 2010) or tax avoidance (Dyreng et al. 2010). Our study differs from these studies in that we use an independent assessment of manager characteristics, that being the auditor identified weakness in "tone at the top", to examine the relation between manager-specific styles and insider trading profitability.

insights into whether non-officers engage in more profitable insider trading in the presence of ineffective ICFR, we examine the profitability of share sales by insider type. Specifically we partition the sample by C-suite (CEOs/CFOs), other officers (e.g. Chief Operating Officer, Chief Investment Officer, etc.), and non-officer directors and re-estimate equation (3) using *SALESPROFIT%* as the dependent variable. Panel B of Table 7 reports the results. We continue to find a positive association between ineffective ICFR and insider trading profitability for both CEOs/CFOs and other officers. Moreover, we find these insiders' trading profits to be higher when there are problems with "tone at the top". In contrast, when we estimate equation (2) using non-officer director sales profitability the coefficients on *MWIC* and *TONE* are insignificant. A potential explanation for not finding a significant association between the profitability of non-officer directors' sales and *MWIC* (*TONE*) is that these insiders' ownership interests are relatively small thereby limiting the number of shares that can be sold. Overall, however, the evidence presented in Panel B of Table 7 suggests firms' internal control problems, in general, and weak "tone at the top", specifically, are related to C-suite personnel and other officers' insider selling profitability.

*5.3. Tone at the top, insider trading profitability, and C-suite turnover*

Our findings thus far demonstrate that ineffective ICFR is positively related to the profitability of CEO/CFO insider sales and that weak "tone at the top" adds to explaining the profitability of CEO and CFO insider selling. If the board ultimately realizes *i)* that the CEO and CFO are selling their holdings when they have informational advantages over other shareholders due to weak ICFR, and *ii)* the CEO and CFO have been identified as lacking integrity by the

firm's auditor, the board may consider terminating these key executives as a way to remediate weak "tone at the top".[26]

To investigate this conjecture, we collect CEO/CFO turnover data for our sample firms from Audit Analytics Director and Officer Changes database and assess whether the profitability of insider selling is related to CEO and/or CFO turnover conditional on weak "tone at the top" by estimating the following logit regression:

$$TURNOVER = \beta_0 + \beta_1 DPROFIT + \beta_2 TONE + \beta_3 TONE*DPROFIT + Control\ variables + \varepsilon \quad (4)$$

where *TURNOVER* is coded one when the effective date of turnover for the CEO (CFO) is within one year of the fiscal year end *t*, and zero otherwise[27] and *DPROFIT* is defined as the decile-rank of *SALESPROFIT%* for the CEO (CFO). Consistent with prior literature, we control for other factors shown to be associated with the probability of top management turnover including ineffective ICFR (Johnstone et al. 2010).

*- Insert Table 8 about here -*

Results of estimating equation (4) are presented in Table 8. We first report the results including only the main effects of *DPROFIT* and *TONE* on CEO and CFO turnover ("Main effects" columns). We find that insider sales profitability (*DPROFIT*) is significantly associated with the likelihood of CEO and CFO turnover. The results also indicate that top managers identified as lacking integrity via a weak "tone at the top" adverse internal control opinion are

[26] We acknowledge there may be other ways to remediate weak "tone at the top" and that CEOs/CFOs will voluntarily leave their firms to pursue other employment opportunities or to enter retirement. Moreover, CEOs/CFOs may voluntarily resign or retire as a result of private negotiations with the board rather than face termination. Consequently, identifying the underlying reason for CEO/CFO turnover is extremely difficult, if not impossible (see e.g., Desai et al. 2006 for a discussion).

[27] Descriptive statistics indicate 13.9 and 21.4 percent of the CEOs and CFOs, respectively, of firms having ineffective ICFR (*MWIC*=1) leave their positions as compared to 8.0 and 9.8 percent for firms with effective ICFR (*MWIC*=0). We find the percentage of CEOs and CFOs being replaced when firms have weak "tone at the top" (*TONE*=1) increases sharply to 27.2 and 34.4 percent, respectively. All differences in frequencies are statistically significant (p-value<0.001).

more likely to leave their firms. Turning to the control variables, the positive and significant coefficient on *MWIC* in the CEO turnover and CFO turnover analysis is consistent with Johnstone et al. (2010).

Turning to the "Interaction effects" columns, we continue to find a positive and significant coefficient on *DPROFIT* in both the CEO and CFO turnover analyses whereas the main effect of *TONE* on CEO and CFO turnover disappears. However, the positive and significant coefficients on *TONE*DPROFIT* indicate that the combination of weak "tone at the top" and insider selling profits is incrementally associated with C-suite turnover. The average marginal effects for the *TONE*DPROFIT* interaction term are 2.43% (p-value=0.003) for CEO turnover and 2.19% (p-value=0.014) for CFO turnover, which are economically meaningful relative to the unconditional probabilities of CEO turnover (8.5%) and CFO turnover (10.9%).[28] Overall, these findings indicate that the profitability of insider selling is associated with CEOs and CFOs leaving their firms, and the profitability of insider selling by unethical CEOs and CFOs further increases the likelihood of C-suite turnover.[29]

## 6. Summary and conclusions

In this study we investigate whether ineffective internal control over financial reporting (ICFR) is related to the profitability of insider trading. Managers are responsible for the effectiveness of their firms' internal control as well as the reliability of external financial

[28] In non-linear regression models such as a logit, the marginal effects of interaction variables depend on the values of the covariates. Thus, the parameter estimate for an interaction variable does not necessarily indicate the sign or magnitude of its marginal effect. Moreover, the statistical significance of the interaction variable cannot be assessed by testing whether the parameter estimate differs from zero. Therefore, we compute the marginal effect and test for statistical significance based on the methodology of Ai and Norton (2003).

[29] To investigate whether our remediation results reported in Table 5 are driven by CEOs/CFOs who ultimately leave their firms' employment, we repeat our over time analysis excluding all firm-year observations associated with any firm for which *CEO (CFO) TURNOVER* = 1 during the year internal control problems are remediated (not tabled). Using the reduced sample of 22,211 observations, we continue to find a positive and significant coefficient on *PRE* whereas the coefficient on *POST* remains insignificant, supporting our claim that general weaknesses in internal control are related to the profitability of insider trading.

reporting. These same officers are able to transfer wealth from shareholders to themselves by trading on their private information, which in the presence of ineffective ICFR is more extensive due to the potential for greater noise and bias in financial statements.

As predicted, we find insider trading is more profitable for firms disclosing material weaknesses in ICFR as required under Section 404 of SOX. The association between ICFR effectiveness and trading profitability is present in the years leading up to the material weakness disclosure, but disappears after remediation. Moreover, we find that top managers lacking integrity, i.e., weak "tone at the top", earn incrementally higher insider trading profits. Results are driven by the profitability of share sales, consistent with managers liquidating their holdings at inflated share prices when financial reporting does not fully communicate management's private information. Results are robust to controlling for abnormal accruals, and we find income-increasing earnings management to enhance the profitability of insider sales in firms with weak "tone at the top". We also provide evidence that weak "tone at the top" CEOs and CFOs engaging in more profitable insider trading are more likely to leave their firms' employment.

Collectively, our results suggest that another benefit of public reporting on the effectiveness of ICFR is that it assists in identifying a setting where there is a greater risk of wealth transfer from shareholders to managers via managers selling their firms' shares.

**Appendix A** Variable definitions

| Variable | Definition |
|---|---|
| *PROFIT%* | Aggregate profitability of officer trades during the firm-year measured as a percentage of market value at the beginning of the fiscal year, see equation (1) in the text for more details. |
| *MWIC* | An indicator variable for ineffective internal control equal to one if firm reports a material weakness in ICFR, zero otherwise. |
| *TONE* | An indicator variable for ineffective internal control due to weak "tone at the top" equal to one if the auditor's internal control report identifies a material weakness in ICFR because of "senior management competency, tone, reliability issues" or "ethical or compliance issues with personnel", zero otherwise. |
| *MV* | Market capitalization at fiscal year-end calculated as the product of end-of-year stock price (Compustat Fundamentals Annual table, data item PRCC_F) and number of shares outstanding (CSHO). |
| *BTM* | Book-to-market ratio calculated as the ratio of book value of equity (CEQ) to market value of equity (MV) at fiscal year end. |
| *BHARPRE* | Buy-and-hold abnormal returns over the one-year period ending one day before the first insider transaction by an officer during the fiscal year, calculated as the CRSP raw buy-and-hold return minus the average buy-and-hold return for equally sized firms using the NYSE/AMEX/NASDAQ size deciles, set to zero for firm-years with no officer trading activity. |
| *NUMEST* | Analyst following that is equal to the number of earnings forecasts (I/B/E/S) outstanding before the annual earnings announcement, and set to zero when missing. |
| *FSINFORM* | Financial statement informativeness computed as the adjusted R-squared 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's Fundamentals Quarterly table for the 20-quarter period ending with the fourth quarter of fiscal year *t* (minimum of 8 quarterly observations required). Per share amounts and numbers of shares outstanding are adjusted for stock splits using the ADJEX adjustment factor. |
| *RND* | An indicator variable equal to 1 if company reports non-zero R&D expenditures (XRD), zero otherwise. |
| *INST* | Institutional ownership calculated as the percentage of common shares outstanding owned by institutional shareholders (Thomson Reuters). |
| *AGE* | Firm age measured by the number of years the company has stock price data on CRSP. |
| *MAG_AR* | The median of absolute market reactions 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 measured over the (maximum) five year period ending the fiscal quarter before the end of fiscal year t. |
| *RETVOL* | The standard deviation of daily stock returns (CRSP) during the fiscal year. |
| *%LOSS* | The percentage of the most recent three years in which the company reports a loss (IB<0). |
| *INV* | The ratio of inventory (INVT) to total assets. |
| *BIG4* | An indicator variable equal to one if firm is audited by Big 4 auditor (PricewaterhouseCoopers, Deloitte & Touche, Ernst & Young, KPMG), zero otherwise. |
| *SEGMENTS* | The number of business segments (Compustat segments file). |
| *FSALES* | An indicator variable equal to one if firm reports foreign sales (Compustat segments file), zero otherwise. |
| *M&A* | An indicator variable equal to one if firm reports sales from mergers and acquisitions (Compustat), zero otherwise. |
| *RESTRUCT* | An indicator variable equal to one if firm reports restructuring charges (Compustat), zero otherwise. |
| *ΔAUDITOR* | An indicator variable equal to one if firm has changed auditor for the current fiscal year, zero otherwise. |

**Appendix A continued.**

| | |
|---|---|
| *BHAR_10K* | The buy-and-hold abnormal stock return for the five day window centered around the 10-K filing date [-2, 2], where abnormal returns are computed as the difference between the raw CRSP return minus the average return for similar sized firms using CRSP's NYSE/AMEX/NASDAQ decile portfolios. |
| *BHAR_NT* | The buy-and-hold abnormal stock return for the five day window centered around the filing date of a notification of late filing on Form 12b-25 prior to the 10-K filing [-2, 2] (Audit Analytics), equal to zero for firms not filing a Form 12b-25. |
| *BHAR_RESTATE* | The buy-and-hold abnormal stock return for the five day window centered around the announcement of a restatement [-2, 2] during the period between fiscal year end and the 10-K filing date (Audit Analytics), equal to zero for firms not announcing a restatement. |
| *BHAR_8K* | The buy-and-hold abnormal stock return for the five day window centered around the filing date of an 8-K including the phrase "material weakness" [-2, 2] during the period between fiscal year end and the 10-K filing date for all firms where *MWIC*=1 (manual search through EDGAR), equal to zero for all other firms. |

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**Table 1.**
Sample selection and summary statistics on insider trading

**Panel A: Sample selection**

| Description | Firm-years | Firms |
|---|---|---|
| Firms on Audit Analytics with a SOX 404 disclosure for years 2004-2008 | 20,518 | 5,951 |
| Less: no match with CRSP/Compustat | -1,887 | -642 |
| Less: missing data items on Compustat | -907 | -151 |
| Less: missing stock return data on CRSP | -2,057 | -653 |
| Final sample | 15,667 | 4,505 |

**Panel B: Summary statistics on insider trades**

| Description | n | Mean | Median |
|---|---|---|---|
| Value traded | | | |
| Open market purchases | 4,552 | $618,832 | $94,819 |
| Open market sales | 10,603 | $12,100,000 | $2,701,191 |
| Value traded as percentage of opening market value | | | |
| Open market purchases | 4,552 | 0.063% | 0.016% |
| Open market sales | 10,603 | 0.619% | 0.216% |

**Panel C: Internal control effectiveness over time**

| | 2004 | 2005 | 2006 | 2007 | 2008 | Total |
|---|---|---|---|---|---|---|
| Total firm-years | 2,451 | 3,259 | 3,396 | 3,512 | 3,049 | 15,667 |
| Percent ineffective internal control | 17.3% | 11.6% | 8.8% | 7.3% | 3.2% | 9.3% |

Firm-year sample consists of NYSE, AMEX, and NASDAQ firms with available data on Audit Analytics, Compustat, and CRSP. Audit Analytics firm-years are first matched with Compustat based on CIK identifier. The resulting firm-year sample is matched with CRSP using the CRSP/Compustat merged table. Lastly, based on CUSIP identifiers, firm-years are matched with all insider transactions that occur during the fiscal year. Companies with no change in CUSIP are matched by CRSP's header CUSIP. For companies that have a changing CUSIP over time, CRSP's historical eight-digit CUSIP identifier (NCUSIP) is used. Ineffective internal control is identified using Audit Analytics. Ineffective internal control is disclosed in the audit report accompanying the firm's 10-K filing. Insider trades are the open market purchases and sales of shares as reported by officers on Table I of SEC Form 4, obtained from the Thomson Reuters insider filing database. Open market share purchases do not include share purchases through stock option exercises. Years 2004-2008 are fiscal years based on Compustat notation.

**Table 2.**
Summary statistics for insider trading profitability and control variables

**Panel A: Insider trading profitability by internal control effectiveness**

| | Mean | Q1 | Median | Q3 | % top decile | #pos/#neg |
|---|---|---|---|---|---|---|
| Ineffective internal control (n=1,455) | | | | | | |
| *PROFIT%* | **0.0462** | -0.0003 | **0.0000** | 0.0289 | **12.99%** | **1.68** |
| Unscaled profitability | **$273,390** | -$1,137 | **$0** | $187,258 | 8.73% | |
| Effective internal control (n=14,212) | | | | | | |
| *PROFIT%* | 0.0044 | -0.0042 | 0.0000 | 0.0202 | 9.67% | 1.37 |
| Unscaled profitability | $51,263 | -$34,846 | $0 | $214,454 | 10.11% | |

**Panel B: Insider trading determinants by internal control effectiveness**

| Ineffective internal control (n=1,455) | Mean | St. dev. | Q1 | Median | Q3 |
|---|---|---|---|---|---|
| $ln(MV_{t-1})$ | **6.239** | 1.323 | 5.250 | **5.976** | 6.967 |
| $BTM_{t-1}$ | **0.489** | 0.317 | 0.260 | 0.437 | 0.664 |
| $BHARPRE_t$ | 0.035 | 0.476 | -0.212 | **0.000** | 0.125 |
| $NUMEST_t$ | **4.807** | 5.315 | 1 | 3 | 7 |
| $FSINFORM_t$ | **0.376** | 0.292 | 0.129 | **0.365** | 0.619 |
| $RND_t$ | **0.471** | 0.499 | 0 | **0** | 1 |
| $INST_t$ | **0.594** | 0.342 | 0.347 | **0.616** | 0.857 |
| $AGE_t$ | **16.910** | 14.158 | 8 | **12** | 21 |
| $RETVOL_t$ | **0.029** | 0.012 | 0.020 | **0.027** | 0.036 |
| $MAG\_AR_t$ | **0.035** | 0.019 | 0.022 | **0.032** | 0.045 |
| Effective internal control (n=14,212) | | | | | |
| $ln(MV_{t-1})$ | 6.877 | 1.587 | 5.660 | 6.696 | 7.872 |
| $BTM_{t-1}$ | 0.460 | 0.282 | 0.256 | 0.422 | 0.614 |
| $BHARPRE_t$ | 0.046 | 0.391 | -0.155 | 0.000 | 0.150 |
| $NUMEST_t$ | 5.455 | 6.227 | 0 | 3 | 8 |
| $FSINFORM_t$ | 0.446 | 0.313 | 0.178 | 0.461 | 0.724 |
| $RND_t$ | 0.399 | 0.490 | 0 | 0 | 1 |
| $INST_t$ | 0.649 | 0.320 | 0.424 | 0.699 | 0.885 |
| $AGE_t$ | 19.098 | 16.125 | 8 | 14 | 24 |
| $RETVOL_t$ | 0.024 | 0.011 | 0.016 | 0.021 | 0.029 |
| $MAG\_AR_t$ | 0.030 | 0.017 | 0.018 | 0.026 | 0.038 |

**Panel C: Market reactions to MWIC-related disclosures**

| | n | Mean | t-stat | % <0 |
|---|---|---|---|---|
| $BHAR\_10K_t$ | 1,455 | -0.35% | 1.81 * | 51.9% |
| $BHAR\_NT_t$ | 690 | -1.98% | 5.35 *** | 58.1% |
| $BHAR\_RESTATE_t$ | 378 | -2.30% | 5.02 *** | 61.4% |
| $BHAR\_8K_t$ | 442 | -1.04% | 1.98 ** | 51.4% |

**Table 2 continued.**

All variables are defined as in Appendix A. All continuous variables are winsorized to the 1st and 99th percentiles of their distributions. Bold text indicates the difference between the mean (median) for firms with ineffective internal control (*MWIC*=1) and firms with effective internal control (*MWIC*=0) is significant at the 0.05 level. Differences in means (medians) are assessed using a t-test (Wilcoxon rank-sum test). ***, **, and * reflect significance at the 0.01, 0.05, and 0.10 level, respectively.

**Table 3.**
Pairwise correlations

| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | $PROFIT\%_t$ | | **0.05** | **-0.02** | **-0.03** | **0.05** | -0.01 | **-0.05** | **0.02** | -0.01 | **-0.03** | **0.05** | **0.03** |
| 2 | $MWIC_t$ | **0.03** | | **-0.12** | **0.03** | -0.01 | **-0.03** | **-0.06** | **0.04** | **-0.05** | **-0.04** | **0.15** | **0.09** |
| 3 | $ln(MV_{t-1})$ | -0.01 | **-0.12** | | **-0.21** | **0.04** | **0.55** | **0.12** | **-0.05** | **0.34** | **0.37** | **-0.46** | **-0.23** |
| 4 | $BTM_{t-1}$ | **-0.04** | **0.02** | **-0.19** | | **-0.20** | **-0.20** | **-0.07** | **-0.24** | **-0.02** | 0.01 | **-0.14** | **-0.14** |
| 5 | $BHARPRE_t$ | **0.05** | **-0.03** | **0.12** | **-0.19** | | **0.04** | **0.13** | **0.03** | **0.05** | **-0.02** | **0.15** | **0.13** |
| 6 | $NUMEST_t$ | **0.06** | -0.01 | **0.44** | **-0.18** | **0.07** | | **0.10** | **0.07** | **0.26** | **0.14** | **-0.16** | **-0.02** |
| 7 | $FSINFORM_t$ | **-0.04** | **-0.07** | **0.13** | **-0.07** | **0.18** | **0.12** | | **-0.10** | **0.05** | **0.04** | **-0.13** | **-0.07** |
| 8 | $RND_t$ | **0.03** | **0.04** | **-0.07** | **-0.26** | 0.00 | **0.08** | **-0.11** | | **0.06** | **0.03** | **0.34** | **0.26** |
| 9 | $INST_t$ | **0.04** | **-0.05** | **0.40** | **-0.04** | **0.08** | **0.30** | **0.05** | **0.06** | | **0.08** | **-0.17** | **-0.03** |
| 10 | $AGE_t$ | **-0.03** | **-0.04** | **0.28** | **0.06** | 0.01 | **0.06** | **0.07** | -0.01 | **0.08** | | **-0.29** | **-0.18** |
| 11 | $RETVOL_t$ | **0.05** | **0.14** | **-0.47** | **-0.17** | 0.00 | **-0.13** | **-0.13** | **0.34** | **-0.10** | **-0.30** | | **0.57** |
| 12 | $MAG\_AR_t$ | **0.03** | **0.10** | **-0.23** | **-0.19** | **0.04** | **0.03** | **-0.09** | **0.30** | 0.01 | **-0.17** | **0.62** | |

Pearson (Spearman) correlations are presented above (below) the diagonal based on a sample of 15,667 firm-year observations. Sample selection is described in Table 1 and all variables are defined as in Appendix A. All continuous variables are winsorized to the 1st and 99th percentiles of their distributions. Bold text indicates statistical significance at the level of 0.05 or better.

**Table 4.**
Weak internal control and insider trading profitability

| Dependent variable: $PROFIT\%_t$ | Base model | | | Controlling for MWIC determinants | | | Controlling for market reactions | | |
|---|---|---|---|---|---|---|---|---|---|
| | Coeff. | | t-stat | Coeff. | | t-stat | Coeff. | | t-stat |
| Test variable | | | | | | | | | |
| $MWIC_t$ | 0.040 | *** | 4.86 | 0.041 | *** | 4.88 | 0.037 | *** | 4.50 |
| Insider trading determinants | | | | | | | | | |
| $ln(MV)_{t-1}$ | 0.000 | | 0.03 | 0.001 | | 0.54 | 0.001 | | 0.39 |
| $BTM_{t-1}$ | -0.022 | *** | -2.76 | -0.022 | *** | -2.65 | -0.022 | *** | -2.65 |
| $BHARPRE_t$ | 0.033 | *** | 3.69 | 0.033 | *** | 3.71 | 0.032 | *** | 3.66 |
| $ln(NUMEST)_t$ | 0.005 | ** | 1.97 | 0.005 | * | 1.90 | 0.005 | * | 1.89 |
| $FSINFORM_t$ | -0.040 | *** | -5.91 | -0.040 | *** | -6.10 | -0.040 | *** | -6.09 |
| $RND_t$ | 0.003 | | 0.39 | 0.005 | | 0.57 | 0.005 | | 0.57 |
| $INST_t$ | -0.001 | | -0.10 | -0.001 | | -0.13 | -0.001 | | -0.11 |
| $ln(AGE)_t$ | 0.000 | | -0.05 | 0.001 | | 0.18 | 0.001 | | 0.21 |
| $RETVOL_t$ | 1.082 | *** | 3.55 | 1.039 | *** | 3.10 | 1.017 | *** | 3.05 |
| $MAG\_AR_t$ | 0.062 | | 0.28 | 0.058 | | 0.26 | 0.052 | | 0.24 |
| MWIC determinants | | | | | | | | | |
| $\%LOSS_t$ | | | | 0.001 | | 0.11 | -0.001 | | -0.11 |
| $INV_t$ | | | | 0.033 | | 1.12 | 0.033 | | 1.15 |
| $BIG4_t$ | | | | -0.003 | | -0.41 | -0.002 | | -0.35 |
| $SEGMENTS_t$ | | | | -0.003 | ** | -2.38 | -0.003 | ** | -2.42 |
| $FSALES_t$ | | | | -0.006 | | -0.89 | -0.005 | | -0.84 |
| $M\&A_t$ | | | | 0.004 | | 0.90 | 0.003 | | 0.82 |
| $RESTRUCT_t$ | | | | 0.000 | | -0.01 | 0.000 | | 0.05 |
| $\Delta AUDITOR_t$ | | | | -0.007 | | -0.77 | -0.008 | | -0.81 |
| Market reaction variables | | | | | | | | | |
| $BHAR\_10K_t$ | | | | | | | -0.152 | *** | -5.40 |
| $BHAR\_NT_t$ | | | | | | | -0.160 | ** | -2.17 |
| $BHAR\_RESTATE_t$ | | | | | | | -0.235 | | -1.43 |
| $BHAR\_8K_t$ | | | | | | | -0.012 | | -0.09 |
| Year dummies | Included | | | Included | | | Included | | |
| Industry dummies | Included | | | Included | | | Included | | |
| n | 15,667 | | | 15,667 | | | 15,667 | | |
| Adj. $R^2$ | 1.76% | | | 1.77% | | | 2.04% | | |

OLS regressions with *PROFIT%* as the dependent variable. Sample selection is described in Table 1 and all variables are defined as in Appendix A. All continuous variables are winsorized to the 1st and 99th percentiles of their distributions. Standard errors are adjusted for heteroskedasticity and clustering at the firm-level. Year dummies are based on Compustat fiscal year notation. Industry dummies are based on 2-digit SIC industry classifications from CRSP. ***, **, and * reflect significance at the 0.01, 0.05, and 0.10 level, respectively.

**Table 5.**
Weak internal control and insider trading profitability: Over-time analysis

| Dependent variable: *PROFIT%*$_t$ | Base model | | | Controlling for MWIC determinants | | | Controlling for market reactions | | |
|---|---|---|---|---|---|---|---|---|---|
| | Coeff. | | t-stat | Coeff. | | t-stat | Coeff. | | t-stat |
| Test variable | | | | | | | | | |
| *PRE*$_t$ | 0.032 | *** | 3.25 | 0.031 | *** | 3.20 | 0.031 | *** | 3.21 |
| *POST*$_t$ | 0.000 | | -0.02 | 0.000 | | -0.03 | 0.000 | | -0.01 |
| Insider trading determinants | | | | | | | | | |
| *ln(MV)*$_{t-1}$ | -0.006 | *** | -3.08 | -0.006 | *** | -2.62 | -0.006 | *** | -2.69 |
| *BTM*$_{t-1}$ | -0.014 | * | -1.83 | -0.016 | ** | -2.02 | -0.016 | ** | -1.97 |
| *BHARPRE*$_t$ | 0.047 | *** | 4.43 | 0.048 | *** | 4.49 | 0.048 | *** | 4.47 |
| *ln(NUMEST)*$_t$ | 0.007 | ** | 2.36 | 0.007 | ** | 2.26 | 0.007 | ** | 2.26 |
| *FSINFORM*$_t$ | -0.052 | *** | -6.64 | -0.051 | *** | -6.65 | -0.050 | *** | -6.62 |
| *RND*$_t$ | 0.016 | * | 1.77 | 0.014 | | 1.58 | 0.014 | | 1.55 |
| *INST*$_t$ | 0.006 | | 0.67 | 0.005 | | 0.61 | 0.005 | | 0.64 |
| *ln(AGE)*$_t$ | -0.010 | *** | -2.95 | -0.008 | ** | -2.33 | -0.008 | ** | -2.29 |
| *RETVOL*$_t$ | 0.253 | | 0.98 | 0.168 | | 0.64 | 0.142 | | 0.54 |
| *MAG_AR*$_t$ | 0.465 | ** | 2.28 | 0.419 | ** | 1.98 | 0.420 | ** | 2.00 |
| MWIC determinants | | | | | | | | | |
| *%LOSS*$_t$ | | | | 0.016 | * | 1.81 | 0.015 | * | 1.73 |
| *INV*$_t$ | | | | 0.030 | | 0.93 | 0.030 | | 0.92 |
| *BIG4*$_t$ | | | | 0.012 | | 1.47 | 0.013 | | 1.52 |
| *SEGMENTS*$_t$ | | | | -0.004 | ** | -2.52 | -0.004 | ** | -2.54 |
| *FSALES*$_t$ | | | | -0.001 | | -0.13 | -0.001 | | -0.11 |
| *M&A*$_t$ | | | | 0.005 | | 1.03 | 0.004 | | 0.95 |
| *RESTRUCT*$_t$ | | | | -0.001 | | -0.15 | 0.000 | | -0.10 |
| *ΔAUDITOR*$_t$ | | | | -0.007 | | -0.77 | -0.008 | | -0.84 |
| Market reaction variables | | | | | | | | | |
| *BHAR_10K*$_t$ | | | | | | | -0.086 | *** | -3.41 |
| *BHAR_NT*$_t$ | | | | | | | -0.148 | * | -1.88 |
| *BHAR_RESTATE*$_t$ | | | | | | | -0.410 | * | -1.70 |
| *BHAR_8K*$_t$ | | | | | | | -0.084 | | -0.50 |
| Year dummies | Included | | | Included | | | Included | | |
| Industry dummies | Included | | | Included | | | Included | | |
| n | 23,535 | | | 23,535 | | | 23,535 | | |
| Adj. $R^2$ | 1.64% | | | 1.68% | | | 1.77% | | |

An analysis of the association between internal control effectiveness and insider trading profitability over time, based on an extended sample period including years 2002-2008. The sample described in Table 1 is augmented with firm-years of accelerated filers (i.e., SOX 404 disclosers) before the first year of SOX 404 compliance, resulting in a sample of 23,535 firm-years. *PRE* is an indicator variable equal to one for fiscal years *before the fiscal year of SOX 404 assessment* and for which a material weakness is subsequently disclosed (e.g., equal to one for fiscal 2002-2003 if the firm discloses a material weakness for fiscal 2004), zero otherwise. *POST* is an indicator variable equal to one for fiscal years *after remediation* of material weaknesses (e.g., equal to one for fiscal year 2006 if the firm discloses a material weakness for fiscal 2004 and a clean opinion for fiscal 2005), zero otherwise. All other variables are defined as in Appendix A. All continuous variables are winsorized to the 1$^{st}$ and 99$^{th}$ percentiles of their distributions. Standard errors are adjusted for heteroskedasticity and clustering at the firm-level. Year dummies are based on Compustat fiscal year notation. Industry dummies are based on 2-digit SIC industry classifications from CRSP. ***, **, and * reflect significance at the 0.01, 0.05, and 0.10 level, respectively.

**Table 6.**
Insider trading profitability: "Tone at the top"

**Panel A: Summary statistics on insider trading profitability conditional on "tone at the top"**

| | Mean | Q1 | Median | Q3 | % top decile | #pos/#neg |
|---|---|---|---|---|---|---|
| Weak tone at the top (n=125) | | | | | | |
| *PROFIT%* | **0.1053** | 0.0000 | **0.0000** | 0.0481 | 16.80% | **3.00** |
| Unscaled profitability | **$1,008,288** | $0 | **$0** | $562,962 | **14.40%** | **3.00** |
| | | | | | | |
| Other ineffective internal control (n=1,330) | | | | | | |
| *PROFIT%* | 0.0406 | -0.0007 | 0.0000 | 0.0280 | 12.63% | 1.61 |
| Unscaled profitability | $204,321 | -$1,797 | $0 | $160,558 | 8.20% | 1.61 |

**Panel B: "Tone at the top" and type of trades**

| | Dependent variable: | | | | | |
|---|---|---|---|---|---|---|
| | *PROFIT%* | | *PURCHASEPROFIT%* | | *SALESPROFIT%* | |
| | Coeff. | t-stat | Coeff. | t-stat | Coeff. | t-stat |
| Test variables | | | | | | |
| $MWIC_t$ | 0.032 *** | 3.76 | -0.001 | -1.56 | 0.032 *** | 3.87 |
| $TONE_t$ | 0.063 ** | 2.24 | -0.002 | -1.62 | 0.067 ** | 2.48 |
| Insider trading determinants | Included | | Included | | Included | |
| MWIC determinants | Included | | Included | | Included | |
| Market reaction variables | Included | | Included | | Included | |
| Year dummies | Included | | Included | | Included | |
| Industry dummies | Included | | Included | | Included | |
| n | 15,667 | | 15,667 | | 15,667 | |
| Adj. $R^2$ | 2.08% | | 1.41% | | 2.37% | |

OLS regressions with *PROFIT%, PURCHASEPROFIT%*, or *SALESPROFIT%* as the dependent variable, where *PROFIT%, PURCHASEPROFIT%*, and *SALESPROFIT%* measure profits related to all insider transactions, purchase transactions by insiders, and sales transactions by insiders, respectively. All variables are defined as in Appendix A. All continuous variables are winsorized to the 1st and 99th percentiles of their distributions. Sample selection is described in Table 1 where 125 of the 1,455 ineffective internal control firm-year observations are identified by the audit report as having "tone at the top" internal control weaknesses (Source: Audit Analytics). Standard errors are adjusted for heteroskedasticity and clustering at the firm-level. Year dummies are based on Compustat fiscal year notation. Industry dummies are based on 2-digit SIC industry classifications from CRSP. ***, **, and * reflect significance at the 0.01, 0.05, and 0.10 level, respectively.

**Table 7.**
Additional analysis

**Panel A: Controlling for and interaction with abnormal accrual controls**

Dependent variable: *SALESPROFIT%*$_t$

| | Main effects | | Interaction effects | |
|---|---|---|---|---|
| | Coeff. | t-stat | Coeff. | t-stat |
| Test variables | | | | |
| *MWIC*$_t$ | 0.034 *** | 3.53 | 0.031 *** | 2.87 |
| *TONE*$_t$ | 0.077 ** | 2.49 | 0.036 | 1.15 |
| Accrual variables | | | | |
| *POS_AACADJ*$_t$ | 0.110 * | 1.95 | 0.085 | 1.53 |
| *POS_AACADJ*$_t$**MWIC*$_t$ | | | 0.075 | 0.38 |
| *POS_AACADJ*$_t$**TONE*$_t$ | | | 1.591 ** | 2.14 |
| *NEG_AACADJ*$_t$ | 0.009 | 0.25 | 0.007 | 0.21 |
| Insider trading determinants | Included | | Included | |
| MWIC determinants | Included | | Included | |
| Market reaction variables | Included | | Included | |
| Year dummies | Included | | Included | |
| Industry dummies | Included | | Included | |
| n | 11,956 | | 11,956 | |
| Adj. $R^2$ | 2.71% | | 2.81% | |

**Panel B: Profitability of insider sales transactions by insider type**

Dependent variable: *SALESPROFIT%*$_t$

| | CEOs/CFOs | | Other officers | | Non-officer directors | |
|---|---|---|---|---|---|---|
| | Coeff. | t-stat | Coeff. | t-stat | Coeff. | t-stat |
| Test variables | | | | | | |
| *MWIC*$_t$ | 0.018 *** | 3.84 | 0.010 *** | 2.92 | 0.006 | 0.89 |
| *TONE*$_t$ | 0.034 ** | 2.18 | 0.025 ** | 2.14 | 0.031 | 1.50 |
| Insider trading determinants | Included | | Included | | Included | |
| MWIC determinants | Included | | Included | | Included | |
| Market reaction variables | Included | | Included | | Included | |
| Year dummies | Included | | Included | | Included | |
| Industry dummies | Included | | Included | | Included | |
| n | 15,667 | | 15,667 | | 15,667 | |
| Adj. $R^2$ | 1.85% | | 2.30% | | 1.41% | |

Panel A presents OLS regressions with *SALESPROFIT%* as the dependent variable. *POS_AACADJ* is the value of performance-adjusted abnormal accruals (Kothari et al. 2005) if positive, zero otherwise. *NEG_AACADJ* is the value of performance-adjusted abnormal accruals (Kothari et al. 2005) if negative, zero otherwise. Panel B presents results for *SALESPROFIT%* separated by type of insider (Source: Thomson insider trading data) for the sample of firm-years for the period 2004-2008. All variables are defined in Appendix A. All continuous variables are winsorized to the 1st and 99th percentiles of their distributions. Standard errors are adjusted for heteroskedasticity and clustering at the firm-level. Year dummies are based on Compustat fiscal year notation. Industry dummies are based on 2-digit SIC industry classifications from CRSP. ***, **, and * reflect significance at the 0.01, 0.05, and 0.10 level, respectively.

**Table 8.**
Trading profitability, weak "tone at the top", and C-suite turnover

| Dependent variable: | *CEO TURNOVER*$_{t+1}$ | | | | | | *CFO TURNOVER*$_{t+1}$ | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Main effects | | | Interaction effects | | | Main effects | | | Interaction effects | | |
| | Coeff. | | z-stat | Coeff. | | z-stat | Coeff. | | z-stat | Coeff. | | z-stat |
| Test variables | | | | | | | | | | | | |
| *DPROFIT*$_t$ | 0.032 | *** | 3.45 | 0.028 | *** | 2.84 | 0.022 | ** | 2.55 | 0.025 | *** | 2.61 |
| *TONE*$_t$ | 0.970 | *** | 4.02 | 0.361 | | 0.97 | 0.714 | *** | 3.51 | 0.297 | | 0.92 |
| *TONE*$_t$**DPROFIT*$_t$ | | | | 0.156 | ** | 2.37 | | | | 0.114 | * | 1.76 |
| Control variables | | | | | | | | | | | | |
| *MWIC*$_t$ | 0.357 | *** | 3.62 | 0.351 | ** | 2.47 | 0.651 | *** | 7.99 | 0.758 | *** | 6.65 |
| *MWIC*$_t$**DPROFIT*$_t$ | | | | 0.001 | | 0.02 | | | | -0.035 | | -1.29 |
| *ln(ASSETS)*$_t$ | 0.014 | | 0.60 | 0.017 | | 0.69 | -0.058 | *** | -2.74 | -0.058 | *** | -2.72 |
| *INDROA*$_t$ | -0.983 | *** | -4.59 | -0.994 | *** | -4.65 | -0.506 | *** | -2.62 | -0.507 | *** | -2.62 |
| *BHAR*$_t$ | -0.148 | ** | -2.24 | -0.151 | ** | -2.28 | -0.116 | ** | -2.05 | -0.115 | ** | -2.02 |
| *GROWTH*$_t$ | -0.182 | ** | -2.14 | -0.185 | ** | -2.17 | 0.008 | | 0.12 | 0.006 | | 0.09 |
| *LEVERAGE*$_t$ | -0.031 | | -0.19 | -0.035 | | -0.22 | 0.010 | | 0.07 | 0.004 | | 0.03 |
| *BTM*$_t$ | -0.078 | | -0.70 | -0.081 | | -0.72 | 0.023 | | 0.22 | 0.022 | | 0.22 |
| *INST*$_t$ | -0.031 | | -0.30 | -0.033 | | -0.31 | -0.080 | | -0.85 | -0.074 | | -0.78 |
| *ln(NUMEST)*$_t$ | 0.166 | *** | 3.75 | 0.167 | *** | 3.77 | 0.141 | *** | 3.51 | 0.140 | *** | 3.49 |
| *ln(AGE)*$_t$ | -0.011 | | -0.25 | -0.012 | | -0.28 | -0.055 | | -1.47 | -0.056 | | -1.49 |
| *RESTATE*$_t$ | -0.090 | | -0.83 | -0.091 | | -0.85 | 0.082 | | 0.88 | 0.085 | | 0.92 |
| *SOX302*$_t$ | 0.159 | | 1.38 | 0.169 | | 1.48 | 0.179 | * | 1.80 | 0.178 | * | 1.80 |
| MWIC determinants | Included | | | Included | | | Included | | | Included | | |
| Year dummies | Included | | | Included | | | Included | | | Included | | |
| N | 15,667 | | | 15,667 | | | 15,667 | | | 15,667 | | |
| Wald $\chi^2$ | 325.9 | *** | | 331.5 | *** | | 422.9 | *** | | 426.6 | *** | |
| Pseudo $R^2$ | 0.035 | | | 0.035 | | | 0.036 | | | 0.036 | | |

Analysis of CEO and CFO turnover as reported by Audit Analytics from calendar years 2004-2009 where the effective date of turnover is within one year of the previous fiscal year-end. The table reports logistic regressions with *TURNOVER* as the dependent variable coded one when the CEO (CFO) turnover occurs within one year of the previous fiscal year-end, zero otherwise. *DPROFIT* is the decile-rank of *SALESPROFIT%* for insider sales by the CEO (CFO); *ln*(*ASSETS*) is the natural log of one plus total assets; *INDROA* is industry-adjusted return on assets at the 2-digit SIC level; *GROWTH* is the average growth rate in sales over the prior three years. *LEVERAGE* is the ratio of total debt to assets; *BTM* is the ratio of book to market value of common equity; *RESTATE* is an indicator variable

**Table 8 continued.**

coded one if the firm has a financial restatement, zero otherwise; *SOX302* is an indicator variable coded one when the firm reports ineffective internal control over financial reporting under SOX Section 302 in the 1st, 2nd, or 3rd quarter, zero otherwise. Sample selection is described in Table 1 and all other variables are defined as in Appendix A. All continuous variables are winsorized to the 1st and 99th percentiles of their distributions. Standard errors are adjusted for heteroskedasticity and clustering at the firm-level. The average marginal effects for the *TONE*DPROFIT* interaction term are 2.43% (p-value=0.003) for CEO turnover and 2.19% (p-value=0.014) for CFO turnover. The marginal effects and the tests of significance are based on the methodology of Ai and Norton (2003). Year dummies are based on Compustat fiscal year notation.

**JAE 959**
**Title: Internal Control over Financial Reporting and Managerial Rent Extraction: Evidence from the Profitability of Insider Trading**

**Highlights**

- We find insider trading to be more profitable in the presence of ineffective internal control.
- Incremental trading profitability disappears after weaknesses are remediated.
- The profitability of insider sales is greater for managers identified as lacking integrity.
- We highlight new market consequences of ineffective internal control and weak tone at the top.