Insider Trading Restrictions and Earnings Management

We study whether firms that voluntarily restrict insider trading have lower incentives for earnings management. Using a large sample of US firms, we measure these restrictions based on the extent to which insider transactions happen shortly after quarterly earnings announcements. We find that the adoption of insider trading restrictions is associated with a reduction of 9.92 percent in absolute discretionary accruals. Our findings are robust to controlling for changes in corporate governance, and we do not find evidence of a substitution effect between accruals and real earnings management, target beating or timeliness of loss recognition. Taken together, our results indicate that the voluntary adoption of blackout periods that limit insider trading improves the quality of financial reporting.

Keywords: *insider trading; voluntary insider trading restrictions; earnings management; real earnings management; corporate governance.*

JEL codes: *G14,G34*

Introduction

We study whether the adoption of firm-level insider trading restrictions influences earnings management. From an economic point of view, insiders' decisions to trade their firms' shares depend on the trade-off between trading profits and litigation risk costs. In the absence of trading restrictions, it is expected that earnings management facilitates opportunistic insider trading. In line with this view, regulators have expressed their concerns that insider trading opportunities create incentives for corporate insiders to garble the earnings signal (e.g., SEC, 1998).

In reaction to these regulatory concerns, in recent years many firms have implemented restrictions on the *timing* of insider trades beyond mandatory regulation to avoid illegal insider trading, or accusations thereof, in relation to upcoming earnings announcements. These restrictions consist of self-imposed blackout periods that allow insiders to trade in a company's shares only during a limited window following an earnings announcement,[1] usually corresponding to the first third of the quarter immediately after the announcement (Bettis, Coles, & Lemmon, 2000). These restrictions are adopted on a voluntary basis by boards of directors.

Despite their popularity, there is limited research on the consequences of these self-imposed insider trading restrictions (ITRs), and no evidence on whether they affect the quality of financial reporting. The voluntary adoption of ITRs by US firms provides a unique setting to study this issue. Indeed, in response to the international debate on the costs and benefits of insider trading, whether to restrict it and how, many countries have opted to regulate it (e.g., Zhang & Zhang, 2018). Meanwhile, in the US, regulations such as the Insider Trading and Securities Fraud Enforcement Act of 1988, the Stock Enforcement Remedies & Penny Stock Reform of 1990, and the Sarbanes-Oxley Act increased scrutiny over insider trading, but did not forbid it.

[1] Throughout the paper, we use the terms "insider trading restrictions" and "blackout periods" interchangeably.

Against this backdrop, an increasing number of firms have opted to voluntarily design and adopt their own ITR policies (Bettis et al., 2000; Roulstone, 2003). This growth in voluntary ITRs may be because the aforementioned regulatory efforts also protected insiders' preplanned, non-information-based trades from litigation, thereby providing legal cover for strategic trading and, in fact, incentivized it (Henderson, Jagolinzer, & Muller, 2015; Jagolinzer, 2009).[2] This sets the question of what the consequences are of such voluntary policies.

In this paper, we examine whether self-imposed blackout periods influence earnings management. To develop our predictions we build on prior work that suggests that, in the absence of ITRs, earnings management is positively associated with insider trading because it facilitates it, leading to greater profitability. For example, based on a set of firms charged with GAAP violations, Beneish (1999) finds that managers report overstated earnings to extend the period until the price drops, which allows them to sell their equity holdings at higher prices. Beneish & Vargus (2002) argue that managers can use income-increasing accruals to inflate share prices. This increases insider trading profitability by avoiding losses and extending the gap between their sales of shares and the release of negative private information, and reduces the litigation risk associated with SEC scrutiny.

Following the logic of this prior work, we expect that firms' efforts to restrict insider trading will lead to a reduction in earnings management. However, the nature of the imposed restrictions could plausibly have the opposite effect. Restricting the timing of trades to a window after the

[2] Anecdotal evidence also supports the view that mandatory regulation focused on the disclosure of the trades potentially provides legal cover, therefore failing at curbing insider trading. For example, in February 2019, the senior director of corporate law of Apple, lawyer Gene Levoff, was charged by the SEC with insider trading. He was in charge of restricting employees' insider trading. (See, e.g., https://www.cnbc.com/2019/02/13/sec-files-insider-trading-lawsuit-against-former-apple-lawyer.html)

earnings announcement could incentivize managers to obfuscate the information in the announcement, to retain their ability to trade profitably.

To examine whether these restrictions curb earnings management, we identify US firms that voluntarily adopted ITRs from 1996 to 2012, following the methods of Roulstone (2003) and Lee, Lemmon, Li, & Sequeira (2014). We classify firms as adopters of ITRs based on their insider trading patterns. In a restricted firm, insiders would be likely to trade their firm's shares during the *allowed* window, as opposed to during the *restricted* period. Specifically, we first calculate the percentage of insider trades that happen in the first third of a quarter (i.e., during the first 20 trading days between two consecutive quarterly earnings announcements). We refer to this percentage as *PercentageSafe*. Then, similar to Lee et al. (2014), we identify firms that voluntarily adopt ITRs by isolating the first quarter when: (1) at least 75 percent of the insider transactions fall within the *allowed* trading window (i.e., during the first third of the quarter); and (2) this percentage remains above 50 percent thereafter. We validate our method and measure by manually checking the insider trading policies for a random subsample of firms.

We match our ITR adopters to non-adopters (control firms) to understand the consequences of insider trading restrictions. To ensure that ITR adopters and control firms are similar in their *ex-ante* probability of adopting ITRs, we use propensity score matching (PSM). We study the quarterly levels of earnings management before and after adopting these blackout periods using a difference-in-differences approach. We measure earnings management using the modified Jones discretionary accruals model, as adjusted by Collins, Pungaliya, & Vijh (2017).

After controlling for firm characteristics associated with earnings management, we document that adopting ITRs is associated with less earnings management. We show a predicted reduction of 9.92 percent in absolute discretionary accruals and of 9.48 percent in income-

increasing accruals after a firm adopts blackout periods, *ceteris paribus*. To check whether these results are sensitive to our choice of ITRs proxy, we repeat our analysis using a more stringent measure of voluntary ITRs. To construct this alternative measure, we consider that a firm restricts insider trading when 75 percent of trades in *each* quarter following the adoption date happen during the allowed window. We find similar results. Additionally, to rule out the possibility that our measure might capture preplanned trades by insiders due to the adoption of rule 10b5-1 in 2000, we restrict our sample to the pre-2000 period. Our results also hold.

Next, we conduct additional tests to better depict the consequences of ITRs. First, we study real earnings management (REM). Enhanced monitoring over one type of earnings management may create incentives to manage earnings in other ways (Cohen, Dey, & Lys, 2008; Zang, 2012; Chan, Chen, Chen, & Yu, 2015). We replicate our main tests using REM measures, based on Roychowdhury (2006), and find no evidence of substitution, while total earnings management decreases post-ITRs. Thus, our results suggest that, by limiting trading to certain time windows, voluntary ITRs dampen the incentives for earnings management. This makes intuitive sense: if the opportunity to trade on low quality earnings is limited, the overall practice of lowering earnings quality using *any* instrument (accounting or real) should be reduced.

Following Bhojraj, Hribar, Picconi, & McInnis (2009), we also study the probability of firms meeting earnings targets. We find a reduced likelihood of meeting or beating earnings forecast by opportunistically reducing research and development expenditures after ITRs adoption. This is consistent with the previously discussed evidence. We next examine the timeliness of loss recognition following the adoption of ITRs. If managers have to wait to trade until after the earnings announcement, they might choose to delay bad news to maintain stock prices. We find

no support for this scenario. Finally, we provide evidence of a lower probability of earnings restatements in firms that voluntarily adopt ITRs.

Our paper makes several contributions to the literature. First, we add to the earnings management research by identifying a novel mechanism to reduce it: *via* voluntarily adopted ITRs. This answers the call in Beneish & Vargus (2002) for research to investigate the extent to which insider trading opportunities influence earnings management. Our evidence is relevant to regulators such as the SEC, given enduring concerns that insider trading may lead to a deterioration of the firm information environment. Our study also relates to recent work on the effects of the voluntary adoption of corporate policies on financial reporting quality, such as claw-back provisions (Chan, Chen, Chen, & Yu, 2012; Chan et al., 2015). The study of voluntary ITRs allows us to observe changes in reporting quality following a change in the way in which insiders are allowed to make use of private information. Evidence on the consequences of voluntary firm-level decisions is important, as it informs regulators of the need to mandate rules that may eliminate the benefits of signaling through costly voluntary actions. Also, exploiting voluntary ITR adoption in a single country (the US) removes other country-level heterogeneities.

Second, we contribute to the strand of literature that analyzes why firms impose ITRs. Despite the apparently large number of firms imposing blackouts, research on the consequences of these policies remains inconclusive. Some argue that restrictions on insider trading impose costs on insiders (Manne, 1966), have cost of capital benefits (Fishman & Hagerty, 1992), and that restricting trading via lockups before seasoned equity offerings reduces agency problems (Karpoff, Lee, & Masulis, 2013). On the other side of the debate, others find that insider trading in the restricted period continues and is profitable, unless approval to trade by the firm's general counsel is also required (Jagolinzer, Larcker, & Taylor, 2011; Lee et al., 2014). For firms to

impose ITRs, the benefits must outweigh the costs. Our results identify one potential benefit stemming from ITR adoption and support the notion that these self-imposed restrictions can reduce earnings management. This is of interest, especially in light of prior findings that cast doubts over ITRs effectiveness in curbing trading or reducing its profitability.

The remainder of the paper is structured as follows. We begin by reviewing the literature. Next, we describe the data and research methods. We then present the main results, followed by the additional analyses and conclusion.

Related research and hypothesis

To convey managerial information about firm performance, GAAP allows managers, who fall under the SEC definition of firm insiders, a certain level of judgment over financial reporting.[3] Executives can choose the reporting measures, estimates, and disclosures that best depict the firm's underlying economics. However, this discretion leaves room for opportunistic earnings management and for managers to alter financial reports, reducing the quality of public financial information (Healy & Wahlen, 1999). Extant work consistently shows that insiders make risk-adjusted abnormal returns from trading in the securities of their firms (e.g., Jagolinzer et al., 2011; Lakonishok & Lee, 2001; Seyhun, 1986), suggesting that they can beat the market by using private information, and carefully timing their trades. For example, Huddart, Ke, & Shi (2007) find that when insiders avoid trading in the period before the earnings announcement, they trade afterward and profit on the information yet to be released in the 10-Q or 10-K.

Prior research establishes the association between managerial incentives and firm-level earnings management. Cheng & Warfield (2005) find that managers with high equity incentives

[3]Corporate insiders are defined by the 1934 Securities and Exchange Act as corporate officers, directors, and owners of 10 percent or more of any equity class of securities.

manage earnings to meet or just beat analysts' forecasts, to increase the value of the shares to be sold. Teoh, Welch, & Wong (1998) show that issuers with unusually high accruals in the IPO year experience poor stock returns in the following three years, suggesting that earnings management is used for window-dressing purposes before public offerings. This literature contextualizes the agency problem faced by insiders. On the one hand, insiders are responsible for making decisions that maximize firm value and for designing disclosure policies that increase the information available to outside investors. On the other hand, private information creates incentives to obtain profits via insider trading, and these profits increase with the extent of information advantage.

Several studies show that higher informativeness of insider trading is associated with lower financial reporting quality. Explaining this finding, prior work considers firms' disclosures as exogenous and suggests that insiders take advantage of the low quality of these disclosures, as well as of their private information, to trade opportunistically (Aboody, Hughes, & Liu, 2005; Maffett, 2012; Gu & Li, 2012). However, some insiders, such as managers, can directly affect the accounting practices of their firms, while other insiders, such as directors or large shareholders, can influence these practices indirectly, by opting not to monitor managers and instead profit from stock tips (Bhattacharya & Daouk, 2002). Consistent with this view, Beneish & Vargus (2002), Cheng & Lo (2006) and Rogers (2008) argue that insiders can influence firm disclosure and trade profitably on their subsequent information advantage. Indeed, insider trading yields higher returns in firms with more information asymmetries and lower reporting quality (Aboody et al., 2005; Frankel & Li, 2004; Huddart & Ke, 2007). Consistent with this view, Park & Park (2004) find that insider trading is associated with prior period discretionary accruals. Richardson, Teoh, & Wysocki (2004) similarly find that insider selling incentivizes

managers to guide analysts to decrease optimistic earnings forecasts to beatable targets and maintain a high share valuation after the earnings announcement, and McVay, Nagar, & Tang (2006) find an association between earnings management to meet analysts' forecasts and next-quarter sales of managerial stock. Findings by Core, Guay, Richardson, & Verdi (2006) corroborate the link between accruals and insider trading, as they document a greater abnormal volume of insider purchases when firms report lower accruals.

Hypothesis development

Despite the evidence that insider trading affects the information environment of firms, there is little research focusing on the efforts of firms to restrict it. Notable exceptions are Bettis et al. (2000), Roulstone (2003), Jagolinzer et al. (2011), and Lee et al. (2014). Also closely related is the work of Zhang & Zhang (2018), that exploits variation in international insider trading regulation and finds a decrease in earnings smoothness after country-wide enforcements of insider trading laws. In the US, Beneish (1999) finds that the SEC rarely imposes trading sanctions on insiders who were charged with inflating earnings and also selling stock. Research analyzing the effectiveness of insider trading laws in international settings finds that insider trading enforcement in fact increases the incidence and profitability of insider trading (Bris, 2005).

It is not obvious how this mixed evidence on the effect of mandatory insider trading regulation translates to single-country voluntary adoption settings, where firms are classified as ITR adopters based on actual observed patterns of insider trading. Consider the case of insider sales (a similar logic would apply to purchases). Before the adoption of ITRs, an insider privy to future bad earnings news would prefer to sell shares prior to the upcoming earnings announcement (EA_t), when the share price would likely drop. However, managers face high

scrutiny around news events (Seyhun, 1992), and doing so may trigger suspicion on the part of the SEC. Beneish & Vargus (2002) argue that SEC scrutiny in insider sales decreases with the time gap between the trade and the subsequent drop in share price. In this context, the insider may manage accruals to increase the earnings reported at EA_t to delay the decrease in stock price, and deflect regulatory attention. We therefore expect that it is likely that, when there are no ITRs in place, insiders have incentives to engage in earnings management.

After the adoption of ITRs, the insider must wait to trade until after the earnings announcement (EA_t). If the insider manages earnings before the sale, the profits on the trade would be higher, but this increases the risk of litigation as the release of bad earnings news are delayed to the following quarterly earnings announcement, EA_{t+1}. This is a reasonable assumption as discretionary accruals often reverse in the following quarter (Baber, Kang, & Li, 2011). Alternatively, if ITRs deter insiders from managing earnings prior to the sale, profits from trading would be lower, but so would the litigation risk. Given that litigation risk is costly to insiders, we expect that the latter scenario is more likely to happen. Ultimately, the choice made by insiders when faced with a trade-off between insider trading profits and litigation risk is an empirical question of interest. Formally stated, we test the following hypothesis:

H1: *Voluntary adoption of ITRs reduces earnings management.*

Data and measurement choice

Sample selection

For our analyses, we require the dates of both insider trades and quarterly earnings announcements. Insider trading data comes from Thomson Financial Insider Filings. We retain only open market purchases and sales. Quarterly earnings announcement dates and accounting information comes from Compustat Quarterly. We require complete accounting information to

calculate discretionary accruals as described below.[4] This generates a sample of 11,215 firms and 334,457 quarterly observations from 1996-2012. We remove financial firms, as their accrual-generating process cannot be compared to that of other firms. We compute corporate governance measures based on I/B/E/S and ISS (formerly RiskMetrics) data.

We begin by computing *PercentageSafe* as the ratio of trades performed by managers during the safe-to-trade period to the total volume of trades over the entire quarter. We define an ITR adopter as a firm that has a significant increase in *PercentageSafe* and maintains a high level over the following quarters. We eliminate firms where *PercentageSafe* does not fall below 50 percent in any quarter during the sample-period, as these firms are likely to have put ITRs in place prior to our sample-period. Our methodology allows us to identify firms that adopt blackout periods and those that do not have such restrictions in place, and also to determine the quarter when a firm adopts blackout windows. We outline these details in the following section. To ensure that our criteria for identifying whether a firm is an adopter or not is met, we require that adopting firms have insider trading data for at least three quarters before and after the ITR adoption and that non-adopters also have data for at least seven quarters.

Because our main analysis consists of a difference-in-differences approach on a PSM sample, we require that firms have data for the ITR determinants outlined below. For adopting firms this includes having non-missing data in the quarter of ITR adoption, as this is the quarter used for matching. Finally, adopting firms need to have at least one observation before and one after the adoption quarter available after eliminating quarters with missing ITR determinants. Next, we use propensity score matching to match each ITR-adopting firm to a control firm. After

[4] We retain observations for firms that have incomplete time series data in these databases by replacing missing values by 0 and including a binary indicator that takes 1 when the variable is missing and 0 otherwise.

matching, the final sample consists of 566 ITR-adopting firms and 566 control firms over the period 1996–2012. The sample generation process is summarized in Table 1.

[INSERT TABLE 1 ABOUT HERE]

Insider trading restrictions proxy

Insider trading restrictions are firm-level voluntarily adopted policies, whereby firms self-regulate who can trade the company stock, when and under which circumstances, often under the general adage of 'when in doubt, do not trade.' As an illustrative example, below we provide an excerpt from Shake Shack's insider trading policy:[5]

> *No officer, director or employee shall purchase or sell any type of security while in possession of material, non-public information relating to the security, whether the issuer of such security is the Company or any other company. Additionally, no officer, director or employee listed on Schedule I shall purchase or sell any security of the Company during the period beginning on the 14th calendar day before the end of any fiscal quarter of the Company and ending upon the completion of the first full trading day after the public release of earnings data for such fiscal quarter or during any other trading suspension period declared by the Company. For the purposes of this Policy, a "trading day" is a day on which national stock exchanges are open for trading."* (Shake Shack INC., Insider Trading Compliance Policy)

Consistent with this anecdotal evidence, Bettis et al. (2000) find that the most common restriction is to allow insiders to trade only during a period closely following earnings announcements. However, the exact date when blackouts are imposed is an internal decision, often unobservable (the case quoted above exemplifies this fact). This justifies the use of an ITRs proxy based on actual insider trading. We follow Roulstone (2003) in considering the allowed trading window as the first third (approximately one calendar month or 20 trading days) of the period between two consecutive quarterly earnings announcements. Figure 1 depicts the nature of the allowed *versus* restricted trading periods in two quarters. Furthermore, we compute

[5] Original document available at: https://s2.q4cdn.com/686132520/files/doc_downloads/policies/Insider-Trading-Compliance-Policy-(Shake-Shack-Inc)-Final-Approved-1-15-15.pdf

PercentageSafe as the ratio of the number of trades by insiders during the allowed trading window to the total number of trades by insiders during the quarter. Because not all insiders have decision-making power over financial reporting, we only consider trades performed by insiders in management functions, defined as CEOs, CFOs, chairmen of the board, officers, presidents and vice-presidents (Lee et al., 2014). Also following Lee et al. (2014), we remove quarters with less than three trades, given that in such cases *PercentageSafe* would not be meaningful.

[INSERT FIGURE 1 ABOUT HERE]

To identify firms that adopt ITRs, we proceed as follows. First, we identify the first quarter for which *PercentageSafe* is greater than or equal to 75 percent. This cut-off is consistent with Roulstone (2003) and Lee et al. (2014) and based on findings in Bettis et al. (2000) that insiders in firms with these types of ITRs are three times more likely to trade in the allowed window than in the restricted window. Similarly, Jagolinzer et al. (2011) show that approximately 24 percent of the trades in their sample take place during the restricted period; they suggest that this might partially be a consequence of Rule 10b5-1, enacted in 2000, which allows insiders to pre-plan their trades. Second, we require that the subsequent mean *PercentageSafe* is greater than or equal to 50 percent.[6] That is because once the ITR is in place, it is unlikely to be removed (Lee et al 2014). For these firms, the *EventDate* (ITR adoption) is the first quarter in which both of these conditions are met (Lee et al., 2014).[7] Non-adopters are then firms that do not experience an

[6] As the allowed trading window varies with the trading policies of individual firms, we adopt 50 percent as our cutoff for having insider trading periods in place to capture that there may be firms that have longer allowed trading windows yet enforce the restrictions. This allocates 4,682 of the firms in the sample as firms that adopt between 1996 and 2012, representing 190,552 firm-year observations, and 5,855 firms as non-adopters representing 134,579 firm-year observations. Our inferences hold when we use a stricter benchmark of 75 percent as reported in Table 9.
[7] We start with the full universe of insider trading and financial data, which begins in 1986. This allows us to classify as adopters those firms that adopt ITRs during the sample period (i.e., after 1996, when RiskMetrics data becomes available) and to exclude from the analysis early adopters (that adopt before 1996).

increase in *PercentageSafe* above 75 percent followed by a quarterly average above the 50 percent threshold.[8]

To validate our identification strategy, we hand-collect data on insider trading policies of a subsample of randomly selected firms included in the S&P 500 (236 in total). Consistent with Jagolinzer et al. (2011), we find that ITPs are not generally available. They state that "*although there seems to be little proprietary information in the ITP and many companies have corporate governance material on their Web sites, ITPs are generally not publicly available for most firms*" (p. 1253). By searching firm's corporate websites, when available, we identify corporate governance documents that outline their policies and collect data on the nature of the restrictions. We compare the current disclosed policy to the most recently observed insider trading and find that almost 70 percent of the adopters we identify using our method also have documents outlining blackout periods. Only rarely do firms state that they have blackouts whilst insider trading still occurs in the restricted time window (14 firms). These firms are, however, correctly classified in our analyses, as our empirical strategy identifies ITR adopters as firms where insiders do not trade during the restricted windows. This manual analysis provides some assurance that our classification is adequate, and justifies our approach of using actual trading behavior, given the partial and incomplete disclosure policies observed. A further benefit of our approach is that while ITRs may be adopted by more firms (Bettis et al. (2000) report that 78 percent of firms in their sample have explicit blackout periods), not all firms appear to monitor their application, leading to insider trading in the blackout periods. In additional analyses, we report a robustness test using a more restrictive definition of ITR adopters.

[8] Based on our calculations the proportion of adopters increases from 35.6 percent in 1996 to 61.8 percent in 2012.

Accruals-based earnings management proxy

To avoid bias in our measure, we compute discretionary accruals using the entire universe of firms in Compustat Quarterly. We estimate the following model in cross-section for industry-quarters with a minimum of 10 observations.

$$\frac{TA_{i,q}}{Assets_{i,q-4}} = \alpha + \beta_1 \frac{1}{Assets_{i,q-4}} + \beta_2 \frac{\Delta Sales_{i,q} - \Delta Rec_{i,q}}{Assets_{i,q-4}} + \beta_3 \frac{PPE_{i,q}}{Assets_{i,q-4}} + \beta_4 ROA_{i,q-4} + \beta_5 SG_{i,q-4} + \varepsilon_{i,q}, \quad (1)$$

where *TA* is earnings before extraordinary items and discontinued operations minus operating cash flow.[9] *ΔSales* is the change in sales, *ΔRec* is the change in accounts receivable, and *PPE* is gross property, plant, and equipment. Following Collins et al. (2017), we include as additional regressors return on assets in the same quarter of the previous year, $ROA_{i,q-4}$, and the growth in sales in the same quarter of the previous year, $SG_{i,q-4}$. All variables, including the intercept, are scaled by total assets at the end of the previous quarter. We also include an unscaled intercept. The absolute values of the estimated residuals from Equation (1) are our discretionary accruals measure (*AbsDA_MJ*). All variables are defined in Appendix 1.

Research design

Propensity score matching

We use propensity score matching to identify pairs of adopters and control firms. This approach is more robust to the misspecification of the functional form of the underlying relation between earnings management and the effective date of the ITRs than the typical regression approach. It

[9] We undo the year-to-date values in the statement of cash flows to arrive at the quarterly figure.

allows us to alleviate concerns regarding the endogeneity induced by a preference of firms with a particular set of characteristics for adopting blackouts.

In particular, we estimate the probability that a firm will impose blackouts as a function of a set of corporate governance and information asymmetry variables as follows.

$PROB(Adopter = 1) = 1/(1+e^{\beta X})$, where:

$$\beta X = \alpha_0 + \alpha_0 Size + \alpha_1 BTM + \alpha_2 ROA + \alpha_3 Lev + \alpha_4 InstOwner + \alpha_5 InstOwner\_d + \alpha_6 BdIndep + \alpha_7 BdIndep\_d + \alpha_8 InvEIndex + \alpha_9 EIndex\_d + \alpha_{10} TotalComp + \alpha_{11} Tenure + \alpha_{12} Execucomp\_d + \alpha_{13} ZScore + \alpha_{14} NrAnalyst + \alpha_{15} Analyst\_d + \alpha_{16} Growth \quad (2)$$

Equation (2) represents the *probit* model used. We base our choice of determinants of voluntary adopting ITRs on the literature that finds that restricted firms are larger, have lower book-to-market (BTM) ratios, are followed by more analysts, and have greater institutional ownership than nonrestricted ones (Roulstone, 2003; Lee et al., 2014). We also include return on assets, board independence, entrenchment index, total compensation, tenure, Z-score, leverage, and sales growth to ensure the control sample is similar across all observable dimensions and, importantly, across corporate governance dimensions (see Appendix 1 for the variables definitions). For every event-quarter in the ITR adoption group, we select the closest control firm using the nearest-neighbor matching procedure, with replacement. Each firm in the control group receives a pseudo-event date in the same quarter as its corresponding ITR-adopting firm. Our final sample consists of 566 matched pairs. To retain the maximum number of observations, we include all observations that fall within the earliest and latest quarter of available data for each matched pair in all samples, even if data for an interim quarter is missing for one of the firms in a

pair. This results in a sample of 19,183 firm-quarter observations for firms that adopt during our sample period and 17,337 for the closest match non-adopters. [10]

Regression analysis on the matched sample

We study whether voluntarily adopted ITRs affect earnings management. As a first test, we examine the relation between earnings management and our measure of ITR adoption.

$$AM_{i,q} = \alpha + \beta_1 Post_q + \beta_2 Adopter_i + \beta_3 Post\ x\ Adopter_{i,q} + \beta_4 Controls_{i,q} + \nu_u + t_q + \varepsilon_{i,q}, \quad (3)$$

where AM_{it} is our earnings management proxy, as described. $Post_q$ takes the value 0 (1) before (after) the event or pseudo-event, and is missing in the quarter of the event or pseudo-event; $Adopter_i$ is an indicator variable equal to 1 if a firm adopts ITR at one point during the sample period, and 0 for control firms; and *Post* x $Adopter_{i,q}$ takes the value 1 after a firm has adopted ITRs, and 0 otherwise. ν_u and t_q are industry and quarter fixed effects, respectively. *Controls* is a vector of control variables that have been shown by the literature to influence the level of earnings management which suggests that larger firms, and firms with better corporate governance and better internal control mechanisms, are less likely to manage earnings (Warfield, Wild, & Wild, 1995; Klein, 2002). More profitable and more stable firms (with lower growth opportunities) are also less likely to manage earnings (Kothari, Leone, & Wasley, 2005; Collins et al., 2017), as are firms with higher institutional ownership (Zang, 2012). Therefore, we control for firm size (*Size*), book-to-market (*BTM*), and firm profitability (*ROA*). Following Chan et al. (2015), we also control for the firm information environment (*NrAnalyst*), board independence

[10] If we run the PSM without replacement, our sample decreases to 452 pairs, corresponding to 19,794 observations. The main inferences are retained for this reduced sample.

(*BoardIndep*), the level of managerial entrenchment (*InvEIndex*),[11] and the extent of balance sheet bloat (*NOA*), given that the use of accruals-based earnings management is constrained by the extent to which the firm has previously engaged in such practices (Barton & Simko 2002). Finally, we also control for Altman's Z-score (*ZScore*), auditor size (*BIG4*), and leverage (*Lev*).

We use absolute discretionary accruals to measure earnings management. A concern with using unsigned abnormal accruals is a potential over-rejection of the null hypothesis. Prior work shows that several firm-specific characteristics relate to the error variance in discretionary accruals estimation models, though this does not necessarily contribute to earnings management (Hribar & Nichols 2007). To mitigate this potential bias, we follow Hribar & Nichols' (2007) recommendation in controlling for operating volatility by including the standard deviation of cash flows (*Sigma_CFO*) and the standard deviation of revenues (*Sigma_REV*). In Equation (3), the main coefficient of interest is β_3. A negative and significant coefficient for *Post* x *Adopter* would indicate a decrease in the level of earnings management after the voluntary adoption of ITRs, as compared to the control group.

Results

Descriptive analysis

Figure 2 depicts the change in discretionary accruals (*AbsDA_MJ*) before and after voluntary adoption. Panel A provides preliminary evidence that voluntary ITRs are associated with lower earnings management and suggests that voluntary ITR adoption has lasting consequences. Panel B depicts absolute discretionary accruals by quartiles of the dollar-volume of insider trading in a

[11]In the case of board independence, institutional ownership, analyst following, and EIndex, to retain the maximum number of observations, we replace missing values for these variables by zero and include in the model an indicator variable that takes the value 1 when this is the case; and 0 otherwise.

quarter. As can be seen, in all insider trading quartiles, the extent of earnings management decreases following the adoption of ITRs.

[INSERT FIGURE 2 ABOUT HERE]

Table 2, panel A presents the results of the *probit* model on which we base our propensity score matched control sample (Equation 2). Panel B reports the mean of all observable characteristics in the year of the adoption of the restriction for the ITR-adopting firm and its matched control firm. Column 3 reports the *p*-values of the *t*-test for difference in means. There are no significant differences in observable characteristics in the adopters and non-adopters in the year of adoption. This suggests that PSM successfully identifies control firms that are similar to our ITR-adopting firms across these observable determinants of voluntarily adopting ITRs. Panel C presents descriptive statistics of adopters and non-adopters throughout the sample period. This is the sample that we use for the main analyses we subsequently report. Panel D shows that most adopters operate in the health and consumer industries. In panel E, we present descriptive statistics of the consequences of ITR adoption. There are no significant changes in the book-to-market and return on assets for these firms, although, after adoption, Tobin's Q seems to decrease and the Z-score to increase. Overall, this supports the idea that adopting firms are not worse off after adoption. In line with Roulstone (2003), total compensation seems to be higher after adoption, implying that managers require a pay premium for these restrictions.

[INSERT TABLE 2 ABOUT HERE]

Regression analysis

Our main test of H1 is equation (3), which we use to study the levels of accruals-based earnings management before and after trading restrictions take effect. The main coefficient of interest is

β_3. A negative (positive) coefficient would indicate lower (greater) earnings management after a blackout takes effect within a firm, as compared to control firms.

[INSERT TABLE 3 ABOUT HERE]

Table 3 presents the results from regressing our measures of earnings management on ITR adoption in the PSM sample. We show results for our main absolute discretionary accruals measure (*AbsDA_MJ*) in column 1, and for the subsamples with positive and negative accruals in columns 2 and 3, respectively. We find that ITR adoption has a negative effect on the extent of *AbsDA_MJ*, as *Post* x *Adopter* has a negative and significant coefficient at the 1 percent and 5 percent levels in all three columns.[12,13] This translates to a predicted reduction of 9.92 percent in absolute discretionary accruals (column 1), and a 9.48 (10.51) percent reduction in income-increasing (decreasing) accruals (columns 2 and 3) when a firm adopts blackout periods, *ceteris paribus*.

Endogeneity concerns

Insider trading restrictions are endogenous since firms voluntarily adopt them. We take several steps to address endogeneity concerns. First, we use propensity score matching to control for observable characteristics related with the likelihood of adoption. Second, because unobservable characteristics may influence the decision to adopt, we re-estimate our main specification using firm fixed effects, instead of industry fixed effects. This should mitigate the effect of any

[12] Prior literature argues that most accruals earnings management takes place in the last quarter of the fiscal year, when incentives to manipulate earnings are the highest (Jacob & Jorgensen 2007). We verify whether our inferences hold when we retain only the fourth quarter from the sample, and results indicate a significant decrease in overall *AbsDA_MJ* (coeff.= -0.0073, *t*-stat=-2.9214) and for *AbsDA_MJ* if DA_MJ≥0 (coeff.=-0.0059, *t*-stat=-1.7354), and a decrease significant one-tail at 10% levels in *AbsDA_MJ* if DA_MJ<0 (-coeff.=0.0053, *t*-stat=-1.3175).

[13] We also re-estimate these results by including in model (3) a set of industry-year indicator variables and their interactions with each of the determinants in model (1), in order to avoid biased estimates (Chen et al 2018). We find a significant decrease in the overall *AbsDA_MJ* (coeff.= -0.0036, *t*-stat=-3.0497), *AbsDA_MJ* if DA_MJ≥0 (coeff.=-0.0038, *t*-stat=-1.2562) and *AbsDA_MJ* if DA_MJ<0 (-coeff.=0.0049, *t*-stat=-3.2040).

unobservable firm-specific characteristics that are relatively stable over time. This modification does not alter the inferences of our results.[14] Third, we re-estimate our main results replacing the current quarter earnings management measure with the next quarter, as well as with the fourth quarter measure (i.e., one year ahead). If the relation documented in Table 3 is due to external events that affect the decision to manage earnings in that period, then ITR adoption should not predict future earnings management. Table 4, panels A and B provides results based on discretionary accruals as well as for a set of real earnings management proxies that are described in Appendix 2. The results comport with our main findings. This lowers concerns over the existence of concurrent events that are spuriously associated with the timing of both the adoption of ITRs and the reduction in earnings management.

[INSERT TABLE 4 ABOUT HERE]

Finally, to further control for self-selection bias associated with the decision to manage earnings, we follow Cohen & Zarowin (2010), Zang (2012), and Chan et al. (2015) and estimate a two-stage Heckman (1979) model. First, we model this decision on the matched sample of ITR-adopting firms and control firms using the following *probit* model:

$$SuspectEM_{i,q} = \alpha + \beta_1 Size_{i,q} + \beta_2 BTM_{i,q} + \beta_3 ROA_{i,q} + \beta_4 Lev_{i,q} + \beta_5 NrAnalyst_{i,q} + \beta_6 HabitBeater_{i,q} + \beta_7 HabitBeater\_d_{i,q} + t_q + \varepsilon_{i,q}, \quad (4)$$

where *SuspectEM* takes the value 1 if total earnings management is above the industry-year median and 0 otherwise. Total earnings management (*AbsTotEM1* and *AbsTotEM2*) is the sum of real and accruals earnings management (see Appendix 1 for definitions of variables and Appendix 2 for details of the real earnings management measure calculation). *HabitBeater*

[14] In untabulated results, we find that the coefficients of *Post* x *Adopter* are -0.0042 (*t*-stat = -2.3085), -0.0052 (*t*-stat = -2.2395) and -0.0034 (*t*-stat = -1.4326, significant at one-tail 10% levels) for AbsDA_MJ, AbsDA_MJ if DA_MJ≥0 and AbsDA_MJ if DA_MJ<0, respectively.

measures the number of analysts' forecasts that have been met over the last four quarters, under the assumption that firms that usually aim to meet or beat analyst forecasts are likely to continue doing so. All other variables have been previously described. Table 5, panel A provides results from the above first-stage regression, where we model the probability that a firm is classified as *SuspectEM*. The results suggest that smaller firms with lower profitability (as measured by *ROA*) and lower book-to-market are more likely to be classified as suspect of managing earnings. This is consistent with our expectations and in line with prior work. *HabitBeater* is negative; this is not surprising given our definition of *SuspectEM,* and it suggests that firms that systematically *just* beat analysts' targets are unlikely to be above the industry median levels for total earnings management levels in any given year.

[INSERT TABLE 5 ABOUT HERE]

In the second stage, we estimate the following regression on the sample of firms identified as suspects in the first stage, and include the Inverse Mills Ratio (*InvMills*).

$$AM_{i,q}=\alpha + \beta_1 Post_q + \beta_2 Adopter_i + \beta_3 Post\ x\ Adopter_{i,q} + \beta_4 Controls_{i,q} + \beta_5 InvMills_{i,q} + v_u + t_q + \varepsilon_{i,q} \quad (5)$$

Table 5, panel B shows that our main results remain unchanged, consistent with the idea that the extent of accruals-based earnings management decreases following the adoption of ITRs.

Corporate governance

An alternative explanation to our findings is that firms that improve their governance may impose both ITRs and stricter adherence to high-quality GAAP. While there is no significant difference between any of the control variables at the point that firms adopt ITRs, as shown in Table 2, we conduct an additional analysis to understand whether better corporate governance

drives the reduction in discretionary accruals. Specifically, we study changes in the board independence (*BdIndep*) and managerial entrenchment (*EIndex*) surrounding ITR adoption.

[INSERT TABLE 6 ABOUT HERE]

For this analysis, we use the same PSM sample as for the main test, but additionally require non-missing data for board independence and for *EIndex*.[15] Table 6 presents the results from this test. We find that entrenchment is lower for non-adopters, suggesting better corporate governance after a pseudo-event for non-adopters, and alleviating concerns that changes in entrenchment explain our results. In contrast, we find that board independence is higher post-adoption for both ITR adopters and non-adopters. This reinforces the importance of controlling for board independence and entrenchment in our main tests. To further investigate whether this may be driving our results, we identify those firms in the PSM sample that go from greater to lower board independence in the period following adoption, by comparing the means of *BdIndep* across periods. Of such firms, there are 26 adopters and 19 non-adopters. Using a two-tailed *t*-test, we compare the means of our measures of discretionary accruals in the two periods for these subsamples. The results are presented in Table 6, panel B. Despite the reduction in board independence, ITR adopters have lower earnings management in the post-period, compared to the pre-ITR period. This effect is not present in the sample of non-adopters, for which the only significant difference is an increase in magnitude of income-increasing accruals. This provides some assurance that the restrictions directly affect information quality. However, given the small samples, we are cautious not to draw further implications from this test.

[15] In our main test, to retain as many observations as possible, we replace missing values for these variables by zero and include in the model an indicator variable that takes the value 1 when this is the case; and 0 otherwise. This is why mean values reported in panel A, Table 6 differ from those in Table 2, panels B and C.

Additional analyses

Voluntary ITRs and real earnings management

Earnings may be managed by structuring transactions (Healy & Wahlen, 1999). Indeed, a growing literature suggests that managers may prefer to take real operating and investment decisions to manage earnings (Graham, Harvey, & Rajgopal, 2005). This literature provides evidence that managers attempt to achieve earnings targets either *via* accruals manipulation, with no direct cash flow consequences (like under-provisioning for bad-debt expenses or delaying asset write-offs), or *via* real transaction management, which affect cash flows and are usually considered costlier (like giving price discounts or cutting discretionary expenditures).

This work documents a substitution between reduced accruals management and increased real earnings management (REM), and provides compelling evidence that managers trade off the benefits and costs of using different instruments to manage earnings, selecting those that lower net costs (Zang, 2012). This substitution is particularly likely following corporate governance changes that aim at improving accounting quality, but fail to reduce the overall incentives for earnings management, thereby triggering a switch between instruments as the net costs of accruals earnings management become steeper. For example, the rational expectation equilibrium model developed by Ewert & Wagenhofer (2005) shows that an unwanted consequence of tighter accounting standards that limit discretion over accruals is that they may induce managers to resort to REM. Consistent with this prediction, Cohen et al. (2008) find that, following the passage of SOX, accruals management decreased while REM increased, and Chan et al. (2015) document this substitution effect after companies adopt voluntary compensation recovery policies (also known as claw-backs).

These studies indicate that corporate governance improvements represent shocks to earnings management instruments but may be ineffective in reducing total earnings management, as they may simply motivate a shift in earnings management practices. Under *H1*, we expect that self-adopted ITRs represent a shock to managerial *incentives to trade* and therefore to managing earnings. Thus, we expect that no significant substitution will emerge as a consequence of ITRs. There are at least three reasons to explain this. First, ITRs restrict the window for when insiders can trade. As noted before, this decreases the opportunities to trade on private information and generally means that earnings management *via* any means is rendered less effective. Second, a consequence of imposing retricted windows is that any earning management strategy needs to be carefully timed. A limitation of REM practices is that they must be taken during the fiscal year to impact reported earnings, while accruals-based decisions may be delayed until the financial statements are prepared (Zang, 2012). This further limits the usefulness of REM in the presence of ITRs. More generally, as noted in the extant literature, REM actions are costly practices that may lower firm value and damage the firm competitive advantage. Thus, managers with a long-term horizon and stock-option plans over a number of years likely prefer accruals-based practices that do not damage the firm's cash flow generation potential.

[INSERT TABLE 7 ABOUT HERE]

We compute the real earnings management measures as explained in Appendix 2. Table 7 presents the results from this analysis. Panels A and B show that REM measures are not significantly different after ITR adoption for adopting firms relative to control firms, indicating, as discussed above, that REM may not be a preferred mechanism for generating insider trading gains in either period. However, the negative and significant coefficient of *Post* x *Adopter* in columns 3 and 4 do indicate a significant reduction in overall earnings management. For the

individual measures of REM, reported in panel C, the coefficient is negative and significant for *AbsABCash*.

Firms might combine accruals and REM to achieve their strategy (Cohen, 2008; Doukakis, 2014). Therefore, we additionally control for accruals management in our REM tests (columns 2 and 4 of panels A and B). In panel D, we include a REM proxy as an additional control to our main specification from equation (2). Our inferences do not change. Taken together, our results are consistent with a decrease in managerial incentives for earnings management following the introduction of blackout periods. Overall, this indicates that voluntary ITRs likely limit the opportunities to profit from earnings management of any type. This is an interesting finding, given concurrent research that suggests a limited effectiveness of other voluntary corporate policies, such as claw-backs, which create a substitution between earnings management practices (Chan et al., 2015). By imposing a window that restricts the opportunities to profit from information asymmetry surrounding earnings announcements, ITRs appear to improve the quality of financial reporting in a more comprehensive way than other policies.

Earnings targets, timeliness of loss recognition, and earnings restatements

Next, we test whether our results hold for other established measures of earnings quality. First, we analyze earnings targets. Bhojraj et al. (2009) show that abnormal reductions in expenditures to beat analysts' forecasts are associated with greater subsequent insider selling. That is, insiders appear to manage earnings upward to meet targets, thereby inflating prices before selling their shares. We test whether voluntary ITRs reduce this behavior. Admittedly, target beating may happen without manipulation, by guiding analysts to lower their earnings forecasts, but importantly and to the point of our analyses, it *can* be achieved through managing earnings. We aim to identify the effects of ITRs on this latter behavior by using three measures

of earnings quality developed by Bhojraj et al. (2009): (1) if a firm has a change in R&D scaled by total assets above the median for all firms in the same one-digit SIC industry code and year (*q_R&D*=1), (2) if a firm has a change in advertising expenditure above the median for all firms in the same one-digit SIC industry code and year (*q_Adv*=1), and (3) if discretionary accruals are below the median for all firms in the same one-digit SIC industry industry code and year (*q_DA*=1). We aggregate these three variables and create a quality indicator, *Qual*, which takes the value of 1 if the sum of the three individual indicators is 2 or greater; and zero otherwise.[16]

We test the effect of voluntary ITRs on the propensity to use low quality earnings to just meet or beat earnings target by using the following *probit* model and the same control variables identified in our main tests.

$$Low\_Qual\_Beater_{i,q} = \alpha + \beta_1 Post_q + \beta_2 Adopter_i + \beta_3 Post\ x\ Adopter_{i,q} + \beta_4\ Controls_{i,q} + \varepsilon_{i,q}, \quad (6)$$

where *Low_Qual_Beater* takes the value 1 if a firm just meets or beats the earnings target (reported actual earnings per share are no lower than half a cent below the forecast) and has low quality earnings (*Qual*=0); and 0 otherwise. We also replace the quality indicator with the measures for *q_R&D* and *q_DA* to generate the dependent variables *Low_R&D_Qual_Beater* and *Low_DA_Qual_Beater*. A significant negative (positive) β_3 coefficient would indicate a reduced (increased) probability that the firm uses low quality earnings to just meet or beat earnings targets after voluntarily adopting ITRs.

The results of this test are reported in Table 8, panel A. They show that, after ITR adoption, firms are less likely to meet or beat earnings targets by reporting low quality earnings as

[16] We do not have enough data on advertisement expenditure to create any meaningful analysis using this measure in isolation, but it forms part of the composite measure.

indicated by the negative significant coefficients of *Post* x *Adopter* for *Low_Qual_Beater* and *Low_R&D_Qual_Beater*. This corroborates our previous findings.

[INSERT TABLE 8 ABOUT HERE]

Second, we examine the timeliness of loss recognition following the adoption of ITRs. If managers have to wait to trade until after the earnings announcement, they may delay bad news to maintain the stock price level. Therefore, we test whether managers substitute earnings management for timely loss recognition tactics. Our measure of timeliness is based on Ball and Shivakumar (2005).[17] Specifically, we estimate the following regression:

$$\begin{aligned} ACC_{i,q} = {} & \beta_1 + \beta_2 dREV_{i,q} + \beta_3 GPPE_{i,q} + \beta_4 DCF_{i,q} + \beta_5 CF_{i,q} + \beta_6 Post_{i,q} + \beta_7 Adopter_i \\ & + \beta_8 CF_{i,q} DCF_{i,q} + \beta_9 CF_{i,q} Post_{i,q} + \beta_{10} CF_{i,q} Adopter_i + \beta_{11} DCF_{i,q} Post_{i,q} \\ & + \beta_{12} DCF_{i,q} Adopter_i + \beta_{13} Post_{i,q} \, x \, Adopter_i + \beta_{14} CF_{i,q} Post_{i,q} \, x \, Adopter_i \\ & + \beta_{15} CF_{i,q} Post_{i,t} Ret_{i,q} + \beta_{16} CF_{i,q} DCF_{i,q} Adopter_i + \beta_{17} DCF_{i,q} Post_{i,q} \, x \, Adopter_i \\ & + \beta_{18} DCF_{i,q} CF_{i,q} Post_{i,q} \, x \, Adopter_i + \varepsilon_{i,q} \end{aligned} \quad (7)$$

ACC is accruals scaled by average total assets, *dREV* is the change in revenue scaled by average total assets, *GPPE* is gross property, plant and equipment scaled by average total assets, *CF* is the industry median adjusted cash flow from operations scaled by average total assets, and *DCF* is an indicator variable taking the value 1 if *CF* is negative and 0 otherwise. (See Appendix 1 for definitions.) This equation is estimated on a quarterly basis. The coefficient of interest is β_{18}, which measures the incremental timeliness of accruals in recognizing negative cash flow news relative to positive cash flow news for adopting firms relative to control firms in the post-

[17] We do not use Basu's (1997) market-based model because it relies on prices, which are likely correlated with insider trading, and therefore it might capture a mechanical relation between deferral of bad news and insider trading. In unreported tests, we use Basu's model based on annual earnings per share before extraordinary items deflated by beginning of period price to capture the incremental timeliness of earnings in recognizing bad news relative to good news for adopters *versus* non-adopters in the period after ITR adoption. We find that the difference between groups is not significant using this measure.

adoption period. The results are presented in Table 8, panel B. We find evidence of an incremental timeliness in loss recognition for adopters *versus* non-adopters in the period after ITR, consistent with our prior findings that accounting quality generally improves after ITRs.

Overall, the evidence presented in Table 8, panels A and B suggests managers are not more likely to defer the recognition of bad news after ITR adoption, since witholding bad news would lead to an increased probability of target beating, and a decrease in loss timeliness.

Third, we turn our attention to earnings restatements. While earnings management proxies can be noisy in reflecting the quality of financial reporting, earnings restatements provide an *ex-post* identification of earnings management where, apart from corrections of mistakes, firms disclose past inaccuracies in preparing their financial statements (Chiu, Teoh, & Tian, 2013; Kedia & Rajgopal, 2011). Restatements can hence be understood as an extreme case of earnings management, and thus, finding that the likelihood of restatements is lower after firms adopt ITRs would support our hypothesis. We collect annual restatements data from AuditAnalytics, which reduces our sample to 9,140 observations with full data available, due to differences in coverage across databases. The variable *Restate* is an indicator variable that takes the value 1 for the yearly observations starting from the year when the firm has had a restatement, and 0 before that year, as well as for all observations that correspond to firms that have not had any restatements throughout our sample period (Abbott, Parker, & Presley, 2012; Agrawal & Chadha, 2005).[18] We estimate a simple logit regression of the probability that a firm restates its earnings (*Restate*=1) where the control variables are based on Abbott et al. (2012) and described in Appendix 1.

[INSERT TABLE 9 ABOUT HERE]

[18] For example, if a firm has its first restatement in 2005, *Restate* would take the value 0 for all the firm-year observations prior to 2004, and the value 1 starting in 2005.

Table 9 shows that ITR adopters tend to be less likely to restate their earnings targets following the adoption of ITRs than their control counterparts, as indicated by the negative significant coefficient of *Post* x *Adopter*. This is in line with our previous results.

Alternative identification of ITR adoption

Several aspects may introduce noise in our ITR adoption measure. Our main ITR measure allows for some trades to happen in the restricted periods after identified adoption. This is to accommodate the fact that the precise length of individual firm-level blackouts is unknown, and because the extant literature generally agrees that the adoption of blackout periods does not completely eliminate trading during restricted periods. In fact, Ali & Hirshleifer (2017) show that insiders that are considered opportunistic given their trading patterns during the period before an earnings announcement trade profitably in future periods. Also, the SEC Rule 10b5-1 enacted in 2000 allows insiders to announce trades in advance, thereby providing a defense against accusations of opportunistically timing trades to use private information (Jagolinzer, 2009). This could interfere with the observed trading patterns that we use in developing our main ITR measure, because a pre-announced trade may happen in the blackout period without contradicting the policy. Overall, these two concerns, when jointly considered, mean that some non-adopters may be misclassified as voluntary adopters in our sample. In our view, such a misclassification would bias *against* finding evidence of ITRs' effects. Still, we take the following steps in addressing them. First, we restrict our sample to the pre-2000 period, before these pre-approved plans existed, and repeat our main analysis. Untabulated results show the same decrease in earnings management in the period following the adoption of ITRs (with a coefficient of *Post* x *Adopter* of -0.0062, *t-stat* = -2.3162).

Second, we conduct a further robustness check and repeat our analyses using an alternative measure of ITRs that is more restrictive. Specifically, we require that at least 75 percent of insider trades happen in the safe trading period in *every* quarter following adoption.[19] This definition of ITR adopters is less likely to misclassify non-adopters as adopters. Those adopters that do not consistently enforce the policy or that allow insider trading in the restricted period if trades are pre-announced under Rule 10b5-1 will be classified as non-adopters. Furthermore, we require that there is no missing data for the control variables.

[INSERT TABLE 10 ABOUT HERE]

Because the sample of firms identified as adopters using this more restrictive definition is significantly smaller, we use a reduced propensity score matching procedure to obtain a comparable sample of firms. The results are reported in panel A, Table 10. Panel B shows the ITR-adopting firms and control firms are similar, and panel C shows the coefficient for *Post x Adopter* is negative and significant, corroborating our main finding of a reduction in absolute discretionary accruals after voluntary ITR adoption.

Conclusions

We examine whether firms that voluntarily adopt ITRs enjoy lower earnings management. We build on prior work to identify all US firms that voluntarily adopt and enforce these ITRs. To alleviate endogeneity concerns, we use propensity score matching to create a matched-pair research design that allows us to identify firms that resemble the ITR-adopting firms but do not adopt trading restrictions (control firms). Our results indicate that firms that voluntarily adopt ITRs have lower earnings management than their matched controls in the post-event period.

[19] Jagolinzer et al. (2011) report that there is still some insider trading during blackout windows contrary to insider trading policy. Our measure thus allows for some instances in which insiders might trade in the blackout period.

We also show that voluntary adoption is not associated with a substitution between accruals and real earnings management, and we document a reduction in the total level of earnings management. Furthermore, we find a decrease in the use of low quality earnings to meet or beat targets, and a reduction in the likelihood of earnings restatements following ITR adoption. We do not find a greater deferral of bad news. Thus, our results provide novel insights regarding a question left unanswered by previous studies that documented that a large percentage of the firms in S&P 500 voluntarily adopt ITRs, despite finding no consistent answers as to why. Our findings are consistent with the hypothesis that insider trading opportunities create incentives for insiders to negatively influence the quality of financial statements disclosed by their company.

Our study is not without limitations. ITRs are usually not directly observable, and therefore we employ an indirect proxy of whether a firm has such restrictions in place. We develop our proxy for ITRs building on previous work that has identified that restricted firms allow trading only during a limited window following earnings announcements. While the measure we use has the advantage of reflecting the actual trading patterns of insiders, it may misclassify some firms, given that firms may establish different blackout windows. We validate our measure by manually checking the insider trading policies for a random subsample of firms. But, despite our efforts to alleviate endogeneity concerns, we cannot completely rule out the possibility that other corporate events may be (partly) responsible for our results. The results presented are consistent with the idea that earnings management is partly justified by insider trading incentives. Overall, our findings provide evidence that, when firms prevent insiders from trading in the shares of the company, there is a reduction in earnings management.

References

Abbott, L. J., Parker, S., & Presley, T. J. (2012). Female board presence and the likelihood of financial restatement. *Accounting Horizons*, *26*(4), 607–629. http://doi.org/10.2308/acch-50249

Aboody, D., Hughes, J., & Liu, J. (2005). Earnings quality, insider trading, and cost of capital. *Journal of Accounting Research*, *43*(5), 651–673. http://doi.org/10.1111/j.1475-679X.2005.00185.x

Agrawal, A., & Chadha, S. (2005). Corporate governance and accounting scandals. *The Journal of Law & Economics*, *48*(2), 371–406.

Ali, U., & Hirshleifer, D. (2017). Opportunism as a firm and managerial trait: Predicting insider trading profits and misconduct. *Journal of Financial Economics*, *126*(3), 490–515. http://doi.org/10.1016/j.jfineco.2017.09.002

Baber, W. R., Kang, S. H., & Li, Y. (2011). Modeling discretionary accrual reversal and the balance sheet as an earnings management constraint. *The Accounting Review*, *86*(4), 1189–1212. http://doi.org/10.2308/accr-10037

Ball, R., & Shivakumar, L. (2005). Earnings quality in UK private firms: comparative loss recognition timeliness. *Journal of accounting and economics*, *39*(1), 83-128

Barton, J., & Simko, P. J. (2002). The balance sheet as an earnings management constraint. *The Accounting Review*, *77*, 1–27.

Basu, S. (1997). The conservatism principle and the asymmetric timeliness of earnings. *Journal of Accounting and Economics, 24*(1), 3-37.

Bebchuk, L., Cohen, A., & Ferrell, A. (2009). What matters in corporate governance. *Review of Financial Studies*, *22*(2), 783–827. http://doi.org/10.1093/rfs/hhn099

Beneish, M. D. (1999). Incentives and penalties related to earnings overstatements that violate GAAP. *The Accounting Review*, *74*(4), 425–457. http://doi.org/10.2308/accr.1999.74.4.425

Beneish, M. D., & Vargus, M. E. (2002). Insider trading, earnings quality, accrual mispricing. *The Accounting Review*, *77*(4), 755–791.

Bettis, J. C., Coles, J. L., & Lemmon, M. L. (2000). Corporate policies restricting trading by insiders. *Journal of Financial Economics*, *57*(2), 191–220. http://doi.org/10.1016/S0304-405X(00)00055-6

Bhattacharya, U., & Daouk, H. (2002). The world price of insider trading. *The Journal of Finance*, *57*(1), 1–34.

Bhojraj, S., Hribar, P., Picconi, M., & McInnis, J. (2009). Making sense of cents: An examination of firms that marginally miss or beat analyst forecasts. *Journal of Finance*, *64*(5), 2361–2388. http://doi.org/10.1111/j.1540-6261.2009.01503.x

Bris, A. (2005). Do insider trading laws work? *European Financial Management*, *11*(3), 267–312. http://doi.org/10.1111/j.1354-7798.2005.00285.x

Capkun, V., & Collins, D.W. (2018). The effects of IFRS adoption on observed earnings smoothness properties: The confounding effects of changes in timely gain and loss recognition. European Accounting Review, 27(5): 797-815. http://doi.org/10.1080/09638180.2018.1477610

Chan, L. H., Chen, K. C. W., Chen, T. Y., & Yu, Y. (2012). The effects of firm-initiated clawback provisions on bank loan contracting. *Journal of Accounting and Economics*,

54(2–3), 180–196. http://doi.org/10.1016/j.jfineco.2013.08.010

Chan, L. H., Chen, K. C. W., Chen, T. Y., & Yu, Y. (2015). Substitution between real and accruals-based earnings management after voluntary adoption of compensation clawback provisions. *The Accounting Review*, *90*(1), 147–174. http://doi.org/10.2308/accr-50862

Chen, W., Hribar, P., & Melessa, S. (2018). Incorrect inferences when using residuals as dependent variables. *Journal of Accounting Research*, *56*(3), 751-796. https://doi.org/10.1111/1475-679X.12195

Chen, S., Ni, S.X., & Zhang, F. (2018). CEO retirement, corporate governance and conditional accounting conservatism. European Accounting Review, 27(3): 437-465, DOI: 10.1080/09638180.2017.127906

Cheng, Q., & Lo, K. (2006). Insider trading and voluntary disclosures. *Journal of Accounting Research*, *44*(5), 815–848. http://doi.org/10.1111/j.1475-679X.2006.00222.x

Cheng, Q., & Warfield, T. D. (2005). Equity incentives and earnings management. *The Accounting Review*, *80*(2), 441–476. http://doi.org/10.2308/accr.2005.80.2.441

Chiu, P. C., Teoh, S. H., & Tian, F. (2013). Board interlocks and earnings management contagion. *Accounting Review*, *88*(3), 915–944. http://doi.org/10.2308/accr-50369

Cohen, D. A., Dey, A., & Lys, T. Z. (2008). Real and accrual-based earnings management in the pre- and post-Sarbanes-Oxley periods. *The Accounting Review*, *83*(3), 757–787.

Cohen, D. A., & Zarowin, P. (2010). Accrual-based and real earnings management activities around seasoned equity offerings. *Journal of Accounting and Economics*, *50*(1), 2–19. http://doi.org/10.1016/j.jacceco.2010.01.002

Collins, D. W., Pungaliya, R. S., & Vijh, A. M. (2017). The effects of firm growth and model specification choices on tests of earnings management in quarterly settings. *Accounting Review*, *92*(2), 69–100. http://doi.org/10.2308/accr-51551

Core, J. E., Guay, W. R., Richardson, S. A., & Verdi, R. S. (2006). Stock market anomalies: What can we learn from repurchases and insider trading? *Review of Accounting Studies*, *11*(1), 49–70. http://doi.org/10.1007/s11142-006-6395-y

Doukakis, L. C. (2014). The effect of mandatory IFRS adoption on real and accrual-based earnings management activities. *Journal of Accounting and Public Policy*, *33*(6), 551-572.

Ewert, R., & Wagenhofer, A. (2005). Economic effects of tightening accounting standards to restrict earnings management. *The Accounting Review*, *80*(4), 1101–1124.

Fishman, M. J., & Hagerty, K. M. (1992). Insider trading and the efficiency of stock prices. *RAND Journal of Economics*, *23*(1), 106–122. http://doi.org/10.2307/2555435

Frankel, R., & Li, X. (2004). Characteristics of a firm's information environment and the information asymmetry between insiders and outsiders. *Journal of Accounting and Economics*, *37*(2), 229–259. http://doi.org/10.1016/j.jacceco.2003.09.004

Graham, J. R., Harvey, C. R., & Rajgopal, S. (2005). The economic implications of corporate financial reporting. *Journal of Accounting and Economics*, *40*(1–3), 3–73. http://doi.org/10.1016/j.jacceco.2005.01.002

Gu, F., & Li, J. Q. (2012). Insider trading and corporate information transparency. *Financial Review*, *47*(4), 645–664.

Healy, P. M., & Wahlen, J. M. (1999). A review of the earnings management literature and its implications for standard setting. *Accounting Horizons*, *13*(4), 365–383. http://doi.org/10.2308/acch.1999.13.4.365

Heckman, J. J. (1979). Sample selection bias as a specification error. *Econometrica*, *47*(1), 153–161. http://doi.org/10.1007/S10021-01

Henderson, M. T., Jagolinzer, A., & Muller, K. (2015). Offensive disclosure: How voluntary disclosure can increase returns from insider trading. *Georgetown Law Journal*, *103*, 1275–1306.

Hribar, P., & Nichols, D. C. (2007). The use of unsigned earnings quality measures in tests of earnings management. *Journal of Accounting Research*, *45*(5), 1017–1053. http://doi.org/10.1111/j.1475-679X.2007.00259.x

Huddart, S. J., & Ke, B. (2007). Information asymmetry and cross-sectional variation in insider trading. *Contemporary Accounting Research*, *24*(1), 195–232.

Huddart, S., Ke, B., & Shi, C. (2007). Jeopardy, non-public information, and insider trading around SEC 10-K and 10-Q filings. *Journal of Accounting and Economics*, *43*(1), 3–36. http://doi.org/10.1016/j.jacceco.2006.06.003

Ipino, E., & Parbonetti, A. (2017). Mandatory IFRS adoption: the trade-off between accrual-based and real earnings management. *Accounting and Business Research, 47*(1), 91-121. https://doi-org.ezxy.ie.edu/10.1080/00014788.2016.1238293

Jacob, J., & Jorgensen, B.N. (2007). Earnings management and accounting income aggregation. J*ournal of Accounting and Economics*, 43(2-3), 369 - 390. http://doi.org/10.1016/j.jacceco.2007.01.007

Jagolinzer, A. D. (2009). SEC Rule 10b5-1 and Insiders' Strategic Trade. *Management Science*, *55*(2), 224–239. http://doi.org/10.1287/mnsc.1080.0928

Jagolinzer, A. D., Larcker, D. F., & Taylor, D. J. (2011). Corporate governance and the information content of insider trades. *Journal of Accounting Research*, *49*(5), 1249–1274. http://doi.org/10.1111/j.1475-679X.2011.00424.x

Karpoff, J. M., Lee, G., & Masulis, R. W. (2013). Contracting under asymmetric information: Evidence from lockup agreements in seasoned equity offerings. *Journal of Financial Economics*, *110*(3), 607–626. http://doi.org/10.1016/j.jfineco.2013.08.015

Kedia, S., & Rajgopal, S. (2011). Do the SEC's enforcement preferences affect corporate misconduct? *Journal of Accounting and Economics*, *51*(3), 259–278. http://doi.org/10.1016/j.jacceco.2011.01.004

Klein, A. (2002). Audit committee, board of director characteristics, and earnings management. *Journal of Accounting and Economics*, *33*(3), 375–400. http://doi.org/10.1016/S0165-4101(02)00059-9

Kothari, S. P., Leone, A. J., & Wasley, C. E. (2005). Performance matched discretionary accrual measures. *Journal of Accounting and Economics*, *39*(1), 163–197. http://doi.org/10.1016/j.jacceco.2004.11.002

Lakonishok, J., & Lee, I. (2001). Are insider trades informative ? *The Review of Financial Studies*, *14*(1), 79–111.

Leary, M. T., & Roberts, M. R. (2013). Do peer firms affect corporate financial policy? *Journal of Finance*, *69*(1), 139–178. http://doi.org/10.1111/jofi.12094.This

Lee, I., Lemmon, M., Li, Y., & Sequeira, J. M. (2014). Do voluntary corporate restrictions on insider trading eliminate informed insider trading? *Journal of Corporate Finance*, *29*, 158–178. http://doi.org/10.1016/j.jcorpfin.2014.07.005

Maffett, M. (2012). Financial reporting opacity and informed trading by international

institutional investors. *Journal of Accounting and Economics*, *54*(2–3), 201–220. http://doi.org/10.1016/j.jacceco.2012.09.002

Manne, H. G. (1966). *Insider Trading and the Stock Market*. New York: Free Press.

McVay, S., Nagar, V., & Tang, V. W. (2006). Trading incentives to meet the analyst forecast. *Review of Accounting Studies*, *11*(4), 575–598. http://doi.org/10.1007/s11142-006-9017-9

Park, M. S., & Park, T. (2004). Insider sales and earnings management. *Journal of Accounting and Public Policy*, *23*(5), 381–411. http://doi.org/10.1016/j.jaccpubpol.2004.07.003

Richardson, S., Teoh, S. H., & Wysocki, P. D. (2004). The walk-down to beatable analyst forecasts: The role of equity issuance and insider trading incentives. *Contemporary Accounting Research*, *21*(4), 885–924. http://doi.org/10.1506/KHNW-PJYL-ADUB-0RP6

Rogers, J. L. (2008). Disclosure quality and management trading incentives. *Journal of Accounting Research*, *46*(5), 1265–1296. http://doi.org/10.1111/j.1475-679X.2008.00308.x

Roulstone, D. T. (2003). The relation between insider-trading restrictions and executive compensation. *Journal of Accounting Research*, *41*(3), 525–551. http://doi.org/10.1111/1475-679X.00115

Roychowdhury, S. (2006). Earnings management through real activities manipulation. *Journal of Accounting and Economics*, *42*(3), 335–370. http://doi.org/10.1016/j.jacceco.2006.01.002

Seyhun, H. N. (1986). Insiders' profits, costs of trading, and market efficiency. *Journal of Financial Economics*, *16*(2), 189–212. http://doi.org/10.1016/0304-405X(86)90060-7

Seyhun, H. N. (1992). The effectiveness of the insider trading sanctions. *Journal of Law and Economics*, *1*.

Teoh, S. H., Welch, I., & Wong, T. J. (1998). Earnings management and the long-run market performance of initial public offerings. *The Journal of Finance*, *53*(6).

Warfield, T. D., Wild, J. J., & Wild, K. L. (1995). Managerial ownership, accounting choices, and informativeness of earnings. *Journal of Accounting and Economics*, *20*(1), 61–91. http://doi.org/10.1016/0165-4101(94)00393-J

Zang, A. Y. (2012). Evidence on the trade-off between real activities manipulation and accrual-based earnings management. *The Accounting Review*, *87*(2), 675–703. http://doi.org/10.2308/accr-10196

Zhang, I. X., & Zhang, Y. (2018). Insider trading restrictions and insiders' supply of information: Evidence from earnings smoothing. *Contemporary Accounting Research*, *35*(2), 898–929. http://doi.org/10.1111/1911-3846.12419

Appendix 1. Variable definitions

Variable	Definition
AbsABCash	the absolute value of abnormal cash flow from operations, see Appendix 2 for details.
AbsABExp	the absolute value of abnormal discretionary expenses, see Appendix 2 for details.
AbsABProd	the absolute value of abnormal production, see Appendix 2 for details.
AbsDA_MJ	the absolute value of abnormal accruals (DA_MJ).
AbsRTM1	the absolute value of the first real transaction management proxy (RTM1).
AbsRTM2	the absolute value of the second real transaction management proxy (RTM2).
AbsTotEM1	the sum of AbsDA_MJ and AbsRTM1.
AbsTotEM2	the sum of AbsDA_MJ and AbsRTM2.
ACC	accruals scaled by average total assets.
Adopter	an indicator variable that takes value one for firms in which *PercentageSafe* changes from a mean value below 50 percent in the period before a quarter where it rises to at least 75 percent and has a mean above 50 percent thereafter.
AM	one of our earnings management proxies described above.
Analyst_d	an indicator variable that takes the value one when *NrAnalyst* is missing, and zero otherwise.
BdIndep	board independence, computed as the number of independent directors divided by the total number of directors on the board; it takes the value zero when data is missing.
BdIndep _d	an indicator variable that takes the value one when data on independent directors is missing, and zero otherwise.
BIG4	an indicator variable that takes the value one if the firm is audited by one of the Big 4 auditing firms, and zero otherwise.
BTM	firms book value divided by the market value of common equity.
CF	the industry median-adjusted operating cash flow, scaled by average total assets.
DA_MJ	abnormal accruals computed based on the modified Jones model described in Equation (1).
DCF	an indicator variable taking the value one if $CF < 0$.
dREV	the change in revenue, scaled by average total assets.
EIndex	the value of the entrenchment index (*EIndex*) developed by Bebchuk, Cohen, and Ferrell (2009).
EIndex_d	an indicator variable that takes the value one if *InvEIndex* is missing and zero otherwise.
EventDate	identifies when firms start to apply blackout periods as the quarter when the largest increase in *PercentageSafe* was recorded compared to the average values of *PercentageSafe* for the firm up to date. A firm is considered to restrict insider trading if during all the quarters following *EventDate*, *PercentageSafe* is maintained at a minimum level of 75 percent (that is, minimum 75percent of all quarterly trades take place in the allowed trading window). Firms that restrict insider trading according to this definition represent our ITR adopting group of firms.
Execucomp_d	an indicator variable taking the value one if the firm is covered by ExecuComp and zero otherwise.
GPPE	gross property, plant and equipment, scaled by average total assets.
Growth	sales growth, computed as sales at the end of the current year minus sales at the beginning of the current year, scaled by the sales at the beginning of the current year.

InstOwner	the percentage shares owned by institutional investors; when data on institutional ownership is missing, the variable takes the value zero.
InstOwner_d	an indicator variable that takes the value one when data on institutional investors is missing, and zero otherwise.
InvEIndex	the value of the entrenchment index (*EIndex*) developed by Bebchuk et al. (2009), multiplied by (-1). InvEIndex is assigned the value zero when *EIndex* is missing.
InvMills	Inverse Mill's ratio obtained from equation (4).
ITR	an indicator variable that takes the value one if the firm has blackout periods in place, and otherwise zero.
HabitBeater	number of analysts' forecasts that have been met over the last four quarters.
HabitBeater_d	an indicator variable that takes the value one when *HabitBeater* is missing, and zero otherwise.
Lev	the firm's leverage, computed as the sum between debt in current and long term liabilities, scaled by total assets.
LowDA_QualBeater	an indicator variable that takes the value one if a firm just beats the earnings targets, i.e. reported actual earnings per share are no lower than half a cent below the forecast, and has discretionary accruals are above the median for all firms in the same one-digit SIC industry and year (i.e., *q_DA*=0).
LowQualBeater	an indicator variable that takes the value one if a firm just beats the earnings targets, i.e. reported actual earnings per share are no lower than half a cent below the forecast, and has low quality earnings.
LowR&D_QualBeater	an indicator variable that takes the value one if a firm just beats the earnings targets, i.e. reported actual earnings per share are no lower than half a cent below the forecast, and has a change in R&D scaled by total assets below the median for all firms in the same one-digit SIC industry and year (i.e., *q_R&D*=0).
NOA	net operating assets, computed as shareholders' equity less cash and marketable securities plus total debt.
NrAnalyst	the natural log of the number of analysts following the firm at the end of the previous quarter.
PercentageSafe	the ratio of number of trades taking place during the allowed trading window to the total number of trades during the period between two consecutive earnings announcements.
Post	an indicator variable for whether the observation is after the insider trading restrictions period; it takes the value one in the quarters following the event, zero before the event and a missing value in the event quarter.
q_Adv	an indicator variable that takes the value one if a firm has a change in advertising expenditure above the median for all firms in the same one-digit SIC industry and year, and zero otherwise.
q_DA	an indicator variable that takes the value one if discretionary accruals are below the median for all firms in the same one-digit SIC industry and year, and zero otherwise.
q_R&D	an indicator variable that takes the value one if a firm has a change in R&D scaled by total assets above the median for all firms in the same one-digit SIC industry and year, and zero otherwise.
Qual	an indicator variable that takes the value one if (*q_R&D+q_Adv+q_DA)* is greater or equal than two, and zero otherwise.
Restate	an indicator variable that takes the value one if the firm has experienced a financial restatement up until that year, and zero otherwise.
Restricted	an indicator variable taking the value one if the trade takes place in the restricted

	period, and zero otherwise.
ROA	income before extraordinary items scaled by total assets.
RTM1	RTM1 = ABProd - ABExp (Zang, 2012).
RTM2	RTM2 = - ABCash - ABExp (Zang, 2012).
r10b5	an indicator variable taking the value zero before the observation is before 2003 when Rule 10b-5 was adopted, and one afterwards.
Size	the logarithm of market equity.
Sigma_CFO	the standard deviation of cash flows deflated by lagged total assets over the last 4 quarters (see Hribar & Nichols, 2007).
Sigma_REV	the standard deviation of sales deflated by lagged total assets over the last 4 quarters (see Hribar & Nichols, 2007).
SuspectEM	an indicator variable taking the value one if total earnings management (AbsTotEM1 and AbsTotEM2) is above the industry-year median, and zero0 otherwise.
Tobin's Q	Tobin's Q = (Total Assets – Book value of common stock + Market value of common stock)/Total Assets.
TotalComp	total compensation as reported in ExecuComp, divided by 1000 to use the same units as in Compustat (*tdc1/1000*).
Tenure	CEO tenure (in number of years) based on Execucomp data.
ZScore	the decile of Altman's Z-score, where Z-score is computed as *3.3 * Net Income/Assets + Sales/Assets + 1.4 * Retained earnings/Assets + 1.2 * Working capital/Assets* (Leary and Roberts 2013).

Appendix 2. Real earnings management measure

Following Roychowdhury (2006), we compute three proxies of real transaction management, measuring abnormal levels of discretionary expenses as well as cash flow from operating expenses and production. Our measures are given by the residuals from estimating Equations (A2.1), (A2.2), and (A2.3) by quarter and two-digit SIC code for the entire universe of Compustat quarterly.

$$\frac{Expense_{i,q}}{Assets_{i,q-4}} = \alpha + \beta_1 \frac{1}{Assets_{i,q-4}} + \beta_2 \frac{Sales_{i,q}}{Assets_{i,q-4}} + \varepsilon_{i,q} \quad \text{(A2.1)}$$

$$\frac{CFO_{i,q}}{Assets_{i,q-4}} = \alpha + \beta_1 \frac{1}{Assets_{i,q-4}} + \beta_2 \frac{Sales_{i,4}}{Assets_{i,q-4}} + \beta_3 \frac{\Delta Sales_{i,q}}{Assets_{i,q-4}} + \varepsilon_{i,q} \quad \text{(A2.2)}$$

$$\frac{Prod_{i,q}}{Assets_{i,q-4}} = \alpha + \beta_1 \frac{1}{Assets_{i,q-4}} + \beta_2 \frac{Sales_{i,4}}{Assets_{i,q-4}} + \beta_3 \frac{\Delta Sales_{i,q}}{Assets_{i,q-4}} + \beta_3 \frac{\Delta Sales_{i,q-4}}{Assets_{i,q-4}} + \varepsilon_{i,q} \quad \text{(A2.3)}$$

Roychowdhury (2006) states that managers may boost short-term earnings by (1) reducing discretionary expenditures such as R&D or advertising, (2) manipulating sales *via* price discounts or more lenient credit terms that accelerate sales, and inflate sales revenue although these practices may decrease operating cash flow, or (3) overproduction to spread fixed overhead costs over more units.

Following Cohen & Zarowin (2010), and Chan et al. (2015), we compute three individual real earnings management measures: *ABExp*, *ABCash*, *and ABProd*. To capture the total effects of real earnings management, we follow Zang (2012) and Ipino and Parbonetti (2017) and compute a first real earnings management measure, *RTM1*, we multiply *ABExp* by minus one (such that higher values indicate higher likelyhood that the firm reduces discretionary expenses), and add it to *ABProd* (i.e., *RTM1=ABProd – ABExp).* For the second measure, *RTM2*, we multiply both *ABExp* and *ABCash* by minus one (such that higher amounts reflect higher likelihood for real earnings management) and take the sum (i.e., *RTM2=–ABCash – ABExp*. Our real earnings management proxies (*AbsRTM1* and *AbsRTM2*) are given by the absolute value of the respective residuals, so that they reflect the extent, rather than the direction, of earnings manipulation. Finally, we measure total earnings management, *AbsTotEM1 (AbsTotEM2)*, as the sum between *AbsRTM1 (AbsRTM2)* and *AbsDA_MJ*. Using these proxies, we repeat our main analyses.

Table 1. Sample Selection

			All Firms	Adopters	Non-adopters
Firms in Compustat and Thomson Financial Insider Filings, 1996-2012			11,215		
Less:	Financial firms	(2,519)	8,696		
	Early adopters	(511)	8,185	3,641	4,544
	Firms with data for less than seven quarters	(1,094)	7,091	2,872	4,219
	Firms with missing data for ITR determinants	(3,441)	3,650	732	2,918
	Adopters without data in both periods	(129)	3,521	603	2,918
PSM matched sample:			**1,132**	**566**	**566**

This table shows the sample selection procedure to arrive at the propensity-score-matched sample.

Table 2. Propensity score matched sample

Panel A. Determinants of ITR adoption for Propensity Score Matching (PSM)

Variables	Adopters	*t*-stat
Size	0.1268***	(21.5761)
BTM	-0.0031	(-0.3172)
ROA	1.0679***	(10.7323)
Lev	-0.1319**	(-2.5402)
InstOwner	0.0193	(0.3905)
InstOwner_d	-0.0007	(-0.0277)
BdIndep	0.2157***	(2.8571)
BdIndep_d	-0.2345***	(-4.3030)
InvEIndex	-0.0106	(-0.5300)
EIndex_d	-0.0408	(-0.7081)
TotalComp	0.0000*	(1.6770)
Tenure	-0.0168***	(-6.2214)
Execucomp_d	-0.1106***	(-3.5936)
ZScore	-0.0154***	(-3.9373)
Growth	-0.0191**	(-2.1426)
NrAnalyst	-0.0235	(-1.5972)
Analyst_d	-0.1613***	(-6.7600)
Constant	-0.6088***	(-4.8147)
Industry and year FE	Yes	
Pseudo R-squared	0.1789	
N	49,769	

Panel B. Descriptive statistics for ITR adopters and Non-adopters in the year of the PSM

	Mean		
Variables	Adopters	Non-adopters	*p*-value
Size	5.614	5.614	0.997
BTM	0.593	0.668	0.136
ROA	0.003	0.003	0.927
NOA	3.392	4.032	0.137
InstOwner	0.020	0.022	0.843
BdIndep	0.170	0.196	0.225
InvEindex	-0.158	-0.173	0.740
NrAnalyst	1.117	1.160	0.529
ZScore	5.136	5.372	0.210
Sigma_CFO	0.041	0.040	0.707
Sigma_REV	0.106	0.090	0.163
Growth	0.275	0.261	0.777
Lev	0.254	0.247	0.641
TotalComp	0.726	1.053	0.112
Tenure	0.820	0.903	0.639

Table 2. (cont'd)

Panel C. Descriptive statistics for the ITR adopters and Non-adopters in the PSM sample

Non-adopters	N	Mean	SD	Median	Min	Max
AbsDA_MJ	9466	0.030	0.042	0.018	0	0.453
AbsRTM1	9466	0.058	0.068	0.040	0	0.642
AbsRTM2	9466	0.050	0.075	0.034	0	2.571
AbsTotEM1	9466	0.088	0.096	0.062	0.001	1.044
AbsTotEM2	9466	0.080	0.094	0.058	0	2.589
Size	9466	6.39	2.123	6.467	0.672	11.252
BTM	9466	0.608	0.754	0.468	-5.646	6.628
ROA	9466	0.003	0.057	0.012	-0.582	0.171
NOA	9466	3.902	5.463	2.470	-4.518	106.333
InstOwner	9466	0.105	0.248	0	0	0.999
BdIndep	9466	0.294	0.353	0	0	1
InvEindex	9466	-0.321	0.958	0	-5	0
NrAnalyst	9466	1.467	1.130	1.609	0	3.761
ZScore	9466	5.863	2.998	6	1	10
Sigma_CFO	9466	0.028	0.033	0.019	0	1.037
Sigma_REV	9466	0.072	0.236	0.035	0	5.829
r10b5	9466	0.672	0.470	1	0	1
BIG4	9466	0.756	0.430	1	0	1
Lev	9466	0.237	0.202	0.204	0	1.597

Adopters	N	Mean	SD	Median	Min	Max
AbsDA_MJ	18092	0.036	0.048	0.021	0	0.453
AbsRTM1	18092	0.063	0.071	0.043	0	0.642
AbsRTM2	18092	0.056	0.070	0.038	0	2.571
AbsTotEM1	18092	0.100	0.105	0.069	0	1.044
AbsTotEM2	18092	0.092	0.097	0.064	0	2.595
Size	18092	5.888	2.039	5.944	0.534	11.212
BTM	18092	0.614	0.603	0.500	-5.646	6.628
ROA	18092	0.003	0.052	0.011	-0.582	0.171
NOA	18092	3.143	3.997	2.231	-5.131	106.333
InstOwner	18092	0.111	0.256	0	0	1
BdIndep	18092	0.258	0.354	0	0	1
InvEindex	18092	-0.216	0.789	0	-5	0
NrAnalyst	18092	1.316	1.066	1.386	0	3.714
ZScore	18092	5.468	2.757	6	1	10
Sigma_CFO	18092	0.035	0.049	0.024	0	2.226
Sigma_REV	18092	0.087	0.441	0.049	0	35.364
r10b5	18092	0.648	0.478	1	0	1
BIG4	18092	0.740	0.439	1	0	1
Lev	18092	0.242	0.197	0.219	0	1.574

Table 2. (cont'd)

Panel D. Industry distribution of adopters

Industry	Number of adopters	Percentage
Chemicals	22	3.89%
Consumer	128	22.61%
Energy	37	6.54%
Health	141	24.91%
Manufacture	77	13.60%
Other	148	26.15%
Technology	13	2.30%
Total	566	100.00%

Panel E. Firm performance and CEO compensation before and after ITR adoption for adopters

Variables	Before ITRs	After ITRs	*p*-value
BTM	0.607	0,618	0.194
ROA	0.003	0.002	0.308
ZScore	0.451	0.496	0.080
Tobin's Q	1.944	1.816	0.000
TotalComp	0.417	0.977	0.000

Table 2, Panel A presents the results of the following *probit* model: $PROB(Adopter = 1) = 1/(1+e^{-\beta X})$, where $\beta X=\alpha_0+\alpha_1 Size +\alpha_2 BTM +\alpha_3 ROA +\alpha_4 Lev +\alpha_5 InstOwner +\alpha_6 InstOwner\_d +\alpha_7 BdIndep +\alpha_8 BdIndep\_d +\alpha_9 InvEIndex +\alpha_{10} EIndex\_d +\alpha_{11} TotalComp +\alpha_{12} Tenure +\alpha_{13} Execucomp\_d +\alpha_{14} ZScore +\alpha_{15} NrAnalyst +\alpha_{16} Analyst\_d +\alpha_{17} Growth +\eta +t +\varepsilon$, and η and t are industry and year fixed effects, respectively. This model is estimated for the entire sample of observations that have at least one observation before and one after the adoption quarter for treatment firms (603 distinct firms), and all available quarters for control firms (2918 distinct firms) that we will select the matched sample from. In order to select the matched pairs, we estimate the model in equation (2) for each year separately. Z-statistics in parentheses. ***, **, * indicate significance at the 1%, 5% and 10% level, respectively. Panel B shows the mean and median of the observable characteristics of the sample of adopters and the propensity score matched control sample in the EventDate (pseudo-event) for adopters (non-adopters). Panel C shows the descriptive statistics for variables used in the analysis for the 566 matched pairs. Panel D shows the industry distribution of the adopting firms, and panel E shows their firm performance and CEO compensation before and after ITR adoption. Variables are defined in Appendix 1.

Table 3. The effect of ITR adoption on earnings management

	AbsDA_MJ	AbsDA_MJ *if* DA_MJ≥0	AbsDA_MJ *if* DA_MJ<0
Post	0.0010	0.0007	0.0012
	(0.8892)	(0.4693)	(0.7745)
Adopter	0.0042***	0.0011	0.0072***
	(3.1467)	(0.5918)	(4.2385)
Post x Adopter	**-0.0047*** **	**-0.0043** **	**-0.0052*** **
	(-3.2152)	**(-2.2758)**	**(-2.8605)**
Size	-0.0002	-0.0022***	0.0015***
	(-0.5201)	(-4.4444)	(2.8590)
BTM	-0.0042***	-0.0054***	-0.0014
	(-5.0625)	(-4.8840)	(-1.4606)
ROA	-0.2285***	0.1449***	-0.3667***
	(-11.0058)	(3.8876)	(-15.1822)
NOA	-0.0002**	0.0001	-0.0003**
	(-2.5233)	(1.1050)	(-2.2860)
InstOwner	-0.0009	0.0018	-0.0044
	(-0.3269)	(0.4843)	(-1.1958)
InstOwner_d	-0.0018	0.0025	-0.0063**
	(-1.0279)	(1.0231)	(-2.4432)
BdIndep	0.0036	0.0083*	-0.0007
	(1.0097)	(1.8705)	(-0.1659)
BdIndep_d	0.0056**	0.0088***	0.0014
	(2.1638)	(2.6102)	(0.4976)
InvEIndex	0.0001	0.0000	0.0003
	(0.0905)	(0.0287)	(0.4627)
EIndex_d	0.0032	0.0028	0.0028
	(1.5181)	(0.8696)	(1.0737)
NrAnalyst	-0.0019**	-0.0018*	-0.0018
	(-2.2595)	(-1.8465)	(-1.5987)
Analyst_d	-0.0012	-0.0015	-0.0017
	(-0.8525)	(-0.8466)	(-0.8117)
ZScore	0.0006**	-0.0008***	0.0013***
	(2.2557)	(-2.6064)	(4.0526)
Sigma_CFO	0.2486***	0.2465***	0.2696***
	(3.3359)	(3.1779)	(3.5355)
Sigma_REV	-0.0044	-0.0001	-0.0069***
	(-1.4064)	(-0.0130)	(-2.7433)
r10b5	0.0039	0.0054	-0.0004
	(1.4348)	(1.5436)	(-0.0890)
BIG4	-0.0018	-0.0014	-0.0019
	(-1.5489)	(-1.0407)	(-1.3582)
Lev	-0.0007	-0.0026	0.0014
	(-0.2640)	(-0.6957)	(0.3918)
Constant	-0.0064	-0.0028	-0.0100
	(-0.7268)	(-0.2477)	(-1.1080)
Industry and qtr. FE	Yes	Yes	Yes
R-squared	0.2647	0.2372	0.4156
Observations	27,558	14,585	12,973

Table 3 presents the results of estimating equation (3) on the PSM sample. Industry and quarter fixed effects are included. T-statistics are presented in parentheses. ***, **, * indicate significance at the 1%, 5% and 10% levels, respectively. Robust standard errors are clustered at firm level. Variables are defined in Appendix 1.

Table 4. Future earnings management for the matched sample

Panel A. Next quarter earnings management

Variables	AbsDA_MJ	AbsRTM1	AbsRTM2	AbsTotEM1	AbsTotEM2
Post	0.0013	-0.0019	-0.0001	-0.0002	0.0017
	(0.9837)	(-0.7013)	(-0.0564)	(-0.0548)	(0.5713)
Adopter	0.0025	-0.0019	-0.0006	0.0002	0.0020
	(1.6256)	(-0.5156)	(-0.1746)	(0.0562)	(0.5503)
Post x Adopter	**-0.0040****	**-0.0019**	**-0.0031**	**-0.0047**	**-0.0068***
	(-2.3918)	**(-0.5806)**	**(-0.8773)**	**(-1.1848)**	**(-1.7946)**
Constant	0.0116	0.0635***	0.0296***	0.0720***	0.0411***
	(1.4478)	(4.6773)	(2.6219)	(4.1136)	(2.7703)
Controls Included	Yes	Yes	Yes	Yes	Yes
Industry and qtr. FE	Yes	Yes	Yes	Yes	Yes
R-squared	0.1762	0.2498	0.1766	0.2183	0.1782
N	24,662	24,662	24,662	24,662	24,662

Panel B. Next year earnings management

Variables	AbsDA_MJ	AbsRTM1	AbsRTM2	AbsTotEM1	AbsTotEM2
Post	0.0015	-0.0025	-0.0018	-0.0000	0.0001
	(1.0558)	(-0.9566)	(-0.6383)	(-0.0011)	(0.0221)
Adopter	0.0022	-0.0027	-0.0017	-0.0001	0.0013
	(1.4022)	(-0.6726)	(-0.4262)	(-0.0122)	(0.3344)
Post x Adopter	**-0.0042****	**-0.0019**	**-0.0011**	**-0.0059**†	**-0.0056**†
	(-2.5110)	**(-0.6028)**	**(-0.3010)**	**(-1.4397)**	**(-1.3606)**
Constant	0.0175**	0.0842***	0.0561***	0.0847***	0.0614***
	(2.1001)	(6.0710)	(4.8583)	(5.2757)	(4.4557)
Controls Included	Yes	Yes	Yes	Yes	Yes
Industry and qtr. FE	Yes	Yes	Yes	Yes	Yes
R-squared	0.1819	0.2503	0.1690	0.2210	0.1738
N	24,150	24,150	24,150	24,150	24,150

Table 4 presents the results from estimating equation (3) using as dependent variables the discretionary, real and total earnings management measures for next quarter (panel A), and for the next year (panel B). The vector of controls included in both panels consists of the following variables: *Size, BTM, ROA, NOA, InstOwner, InstOwner_d, BdIndep, BdIndep_d, InvEIndex, EIndex_d, NrAnalyst, Analyst_d, ZScore, Sigma_CFO, Sigma_REV, BIG4, Lev,* and *r10b5*. Industry and quarter fixed effects are included. T-statistics are presented in parentheses. ***, **, * indicate significance at the 1%, 5% and 10% levels, and † indicates one-sided significance at the 10% level. Robust standard errors are clustered at firm level. Variables are defined in Appendix 1.

Table 5. Inverse Mills on PSM sample

Panel A. Inverse Mills test, first stage

Variables	Suspect
Size	-0.0093*
	(-1.6489)
BTM	-0.0470***
	(-4.3311)
ROA	-0.9556***
	(-6.8822)
NrAnalyst	-0.1813***
	(-12.4729)
HabitBeater	-0.0467**
	(-2.5239)
HabitBeater_d	-0.2352***
	(-9.1748)
Lev	0.1212***
	(3.5924)
Constant	0.8492***
	(12.7051)
Pseudo R-squared	0,0145
Qtr. FE	Yes
N	36619

Panel B. Inverse Mills test, second stage

Variables	AbsDA_MJ	AbsDA_MJ if DA_MJ≥0	AbsDA_MJ if DA_MJ <0
Post	0.0008	0.0015	0.0009
	(0.5315)	(0.7361)	(0.4917)
Adopter	0.0074***	0.0054**	0.0092***
	(4.1993)	(2.3163)	(4.0376)
Post x Adopter	**-0.0049****	**-0.0052****	**-0.0057****
	(-2.4383)	**(-2.0833)**	**(-2.4507)**
InvMills	0.0023	0.0134	-0.0529
	-0.0496	-0.2600	(-0.8347)
Constant	-0.0125	-0.0161	0.0012
	(-0.6763)	(-0.7929)	-0.047
Controls included	Yes	Yes	Yes
Industry and qtr. FE	Yes	Yes	Yes
R-squared	0,3405	0,3139	0,4925
N	18,391	9,713	8,678

Table 5 presents the results of a two-stage model to control for firms' endogenous decisions to manage earnings. Panel A shows the results of estimating the probit model in equation (4) on the PSM sample. Z-statistics are presented in parentheses. Panel B shows the results of estimating equation (5) on the sample of firms classified in the first stage as being suspect of managing earnings (i.e., *SuspectEM*=1). The vector of controls included in panel B includes: *Size, BTM, ROA, NOA, InstOwner, InstOwner_d, BdIndep, BdIndep_d, InvEIndex, EIndex_d, NrAnalyst, Analyst_d, ZScore, Sigma_CFO, Sigma_REV, BIG4, Lev,* and *r10b5*. *t*-statistics are presented in parentheses. ***, **, * indicate significance at the 1%, 5% and 10% levels, respectively. Robust standard errors are clustered at firm-level. Variables are defined in Appendix 1.

Table 6. Changes in corporate governance

Panel A: Differences in means of corporate governance variables means between ITR adopters and non-adopters

	BdIndep					EIndex				
	Pre-period		Post-period		*Diff*	Pre-period		Post-period		*Diff*
	N	Mean	N	Mean	*p-value*	N	Mean	N	Mean	*p-value*
Adopters and non-adopters	4,926	0.645	8,007	0.715	0.000	1,593	2.558	1,740	2.479	0.073
Adopters	2,311	0.658	4,465	0.720	0.000	715	2.459	910	2.443	0.802
Non-adopters	2,615	0.634	3,542	0.708	0.000	878	2.639	830	2.520	0.050

Panel B: Differences in means of AbsDA_MJ for firms that record a drop in board independence

	Adopters (N=26)					Non-adopters (N=19)				
	Pre-period		Post-period		*Diff*	Pre-period		Post-period		*Diff*
	N	Mean	N	Mean	*p-value*	N	Mean	N	Mean	*p-value*
AbsDA_MJ	557	0.034	350	0.024	0.000	498	0.027	416	0.025	0.449
DA_MJ	557	0.003	350	0.001	0.493	498	0.004	416	0.001	0.193
DA_MJ >= 0	295	0.034	197	0.022	0.000	267	0.029	227	0.023	0.058
DA_MJ < 0	262	-0.033	153	-0.027	0.160	231	-0.024	189	-0.027	0.469

Table 6 Panel A shows the differences in corporate governance variables (*BdIndep* and *EIndex*) in the propensity score matched sample. Panel B shows the differences in the means of discretionary accruals before and after ITR adoption for those firms in the propensity score matched sample that go from higher to lower board independence. Variables are defined in Appendix 1.

Table 7. The effect of ITRs on real and total earnings management

Panel A. The effect of ITRs on RTM1 and TotalEM1

Variables	AbsRTM1	AbsRTM1	AbsTotEM1	AbsTotEM1
Post	-0.0021	-0.0021	-0.0001	-0.0002
	(-0.8560)	(-0.8620)	(-0.0356)	(-0.0704)
Adopter	0.0013	0.0013	0.0053	0.0057*
	(0.3890)	(0.4063)	(1.5686)	(1.6780)
Post x Adopter	**-0.0027**	**-0.0027**	**-0.0067***	**-0.0066***
	(-0.9010)	**(-0.8963)**	**(-1.8559)**	**(-1.8377)**
DA_MJ		0.0136		0.0820*
		(0.4896)		(1.7291)
Constant	0.0303*	0.0304*	0.0147	0.0153
	(1.9278)	(1.9301)	(0.7414)	(0.7652)
Controls included	Yes	Yes	Yes	Yes
Industry and qtr. FE	Yes	Yes	Yes	Yes
R-squared	0.3130	0.3131	0.3134	0.3150
N	27,558	27,558	27,558	27,558

Panel B. The effect of ITRs on RTM2 and TotalEM2

Variables	AbRTM2	AbsRTM2	AbsTotEM2	AbsTotEM2
Post	0.0003	0.0003	0.0024	0.0023
	(0.1223)	(0.1170)	(0.8917)	(0.8718)
Adopter	0.0012	0.0012	0.0055*	0.0057*
	(0.3686)	(0.3830)	(1.7577)	(1.8283)
Post x Adopter	**-0.0038**	**-0.0038**	**-0.0087****	**-0.0087****
	(-1.1699)	**(-1.1677)**	**(-2.5188)**	**(-2.5138)**
DA_MJ		0.0106		0.0488
		(0.5218)		(1.2326)
Constant	0.0185	0.0186	0.0049	0.0053
	(1.5058)	(1.5123)	(0.2961)	(0.3154)
Controls included	Yes	Yes	Yes	Yes
Industry and qtr. FE	Yes	Yes	Yes	Yes
R-squared	0.1943	0.1944	0.2176	0.2183
N	27,558	27,558	27,558	27,558

Panel C. The effect of ITRs on components of real earnings management

Variables	AbsABCash	AbsABExp	AbsABProd
Post	0.0015	-0.0006	-0.0005
	(0.9769)	(-0.2491)	(-0.4044)
Adopter	0.0024	-0.0009	0.0029**
	(1.4928)	(-0.2498)	(2.1898)
Post x Adopter	**-0.0057*** **	**-0.0027**	**-0.0010**
	(-2.6393)	**(-0.8936)**	**(-0.6596)**
Constant	0.0201**	0.0286***	0.0235**
	(2.1811)	(2.6847)	(2.0517)
Controls included	Yes	Yes	Yes
Industry and qtr. FE	Yes	Yes	Yes
R-squared	0.1948	0.3344	0.3248
N	27,558	27,558	27,558

Panel D. The effect of ITRs on accruals earnings management when controlling for RTM

Variables	AbsDA_MJ	AbsDA_MJ if DA_MJ>=0	AbsDA_MJ if DA_MJ<0
Post	0.0010	0.0009	0.0005
	(0.8848)	(0.5336)	(0.3059)
Adopter	0.0042***	0.0009	0.0056***
	(3.1414)	(0.3839)	(2.8405)
Post x Adopter	**-0.0047*** **	**-0.0034* **	**-0.0046** **
	(-3.2220)	**(-1.8197)**	**(-2.3555)**
RTM1	-0.0105	0.2185***	-0.2210***
	(-0.9772)	(13.8872)	(-13.6862)
Constant	-0.0061	-0.0043	0.0048
	(-0.6850)	(-0.4455)	(0.5339)
Controls included	Yes	Yes	Yes
Industry and qtr. FE	Yes	Yes	Yes
R-squared	0.2650	0.3421	0.5266
N	27,558	14,585	12,973

Table 7 presents the results from estimating equation (3) using as dependent variables proxies for real earnings management. Panel A (B) shows the effect of ITRs on RTM1 (RTM2) and AbsTotEM1 (AbsTotEM2); columns 2 and 4 additionally control for discretionary accruals. Panel C shows the effect of ITRs on each of the components of real earnings management. Abnormal discretionary expenses are estimated using equation (9), where *Expense* is defined as the sum of research and development and selling, general and administrative expenses. Abnormal cash from operations is estimated using equation (10) where *CFO* is cash flow from operations. Abnormal production costs are estimated using equation (11), where Prod are production costs, obtained as the sum of cost and goods sold and change in inventory during the year. Panel D shows the effect that adopting ITRs has on AbsDA_MJ when controlling for RTM1 in addition to the vector of controls included in main analysis (Table 3). The vector of controls included consists of the following variables: *Size, BTM, ROA, NOA, InstOwner, InstOwner_d, BdIndep, BdIndep_d, InvEIndex, EIndex_d, NrAnalyst, Analyst_d, ZScore, Sigma_CFO, Sigma_REV, BIG4, Lev,* and *r10b5*. Industry and quarter fixed effects are included. T-statistics are presented in parentheses. ***, **, * indicate significance at the 1%, 5% and 10% levels, respectively. Robust standard errors are clustered at firm-level. Variables are defined in Appendix 1.

Table 8. Target beating behavior and timeliness of bad news recognition

Panel A. Meeting and beating earnings targets

Variables	LowQualBeater	LowR&D_Qual Beater	LowDA_QualBeater
Post	0.0743	0.1588**	-0.0447
	(1.0164)	(2.0914)	(-0.9956)
Adopter	0.1921**	0.1582*	0.0201
	(2.2868)	(1.8267)	(0.4097)
Post x Adopter	**-0.1337**[†]	**-0.2950*** **	**0.0445**
	(-1.4833)	**(-3.1683)**	**(0.8032)**
Constant	-0.2155	0.2661	-0.2927
	(-0.4042)	(0.4821)	(-0.5263)
Controls included	Yes	Yes	Yes
Industry and qtr. FE	Yes	Yes	Yes
Pseudo R-squared	0.0907	0.1384	0.0552
N	5,564	5,776	14,045

Panel B. Timeliness of loss recognition

Variables	ACC	z-stat
Post x Adopter x CF x DCF	**0.0007****	**(2.2429)**
dREV	0.0016***	(6.7877)
GPPE	0.0000	(0.3377)
DCF	0.0003***	(2.7887)
CF	0.0002	(1.6366)
CF x DCF	0.0003	(1.2368)
Post	0.0000	(0.2074)
Post x DCF	-0.0001	(-0.4395)
CF x Post	-0.0000	(-0.4253)
CF x Post x DCF	-0.0000	(-0.0213)
Adopter	-0.0001***	(-3.0061)
Adopter x Post	0.0002	(1.0378)
CF x Adopter	0.0002	(1.1538)
CF x Adopter x DCF	-0.0009***	(-2.6972)
Post x Adopter	0.0001**	(2.3498)
Post x Adopter x DCF	-0.0002	(-1.0250)
CF x Post x Adopter	-0.0001	(-0.7246)
Constant	-0.0002***	(-7.2530)
R-squared	0.0325	
N	30,292	

Table 8, panel A presents the results from estimating equation (6) using as dependent variables *LowQualBeater*, *LowR&D_QualBeater* and *LowDA_QualBeater*, respectively. The vector of controls included in panel A consists of the following variables: *Size, BTM, ROA, NOA, InstOwner, InstOwner_d, BdIndep, BdIndep_d, InvEIndex, EIndex_d, NrAnalyst, Analyst_d, ZScore, Sigma_CFO, Sigma_REV, r10b5, BIG4, and Lev.* Industry and quarter fixed effects are included. Z-statistics based on robust standard errors are presented in parentheses. Panel B presents the results of the timeliness of loss recognition analysis in equation (7). The dependent variable is *ACC*. ***, **, * indicate significance at the 1%, 5% and 10% levels. Variables are defined in Appendix 1.

Table 9. Earnings restatements

Variables	Coefficient	P>z
Adopter	0.0465	(0.4393)
Post	0.2154**	(2.2787)
Post x Adopter	**-0.3409*** **	**(-2.7701)**
InstOwner	**-0.3845** **	**(-2.4028)**
InstOwner_d	-0.0372	(-0.3472)
BdIndep	-0.6041**	(-2.0593)
BdIndep_d	-0.5393**	(-2.4858)
InvEIndex	0.1860***	(2.6522)
EIndex_d	-0.4441**	(-2.1888)
Growth	-0.0040	(-0.0552)
Lev	0.6876***	(4.5405)
Constant	-4.0818***	(-5.7208)
Industry and year FE	Yes	
Pseudo R-squared	0.3069	
N	9,140	

Table 9 shows the results of a logit regression where the dependent variable, *Restate*, is 1 if the firm has had any restatement. Industry and year fixed effects are included. Z-statistics based on robust standard errors are in parentheses. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively. Variables are defined in Appendix 1.

Table 10. Alternative Measure of ITRs

Panel A: Propensity score matching

	Coefficient	*P>z*
Size	-0.12794	0
BTM	0.022003	0.382
NrAnalyst	0.126663	0
InstOwner	-0.03939	0.487
Pseudo R-squared	0.0204	
N	169,389	

Panel B: Descriptive statistics for the ITR adopters and control firms after the propensity score match in the event year

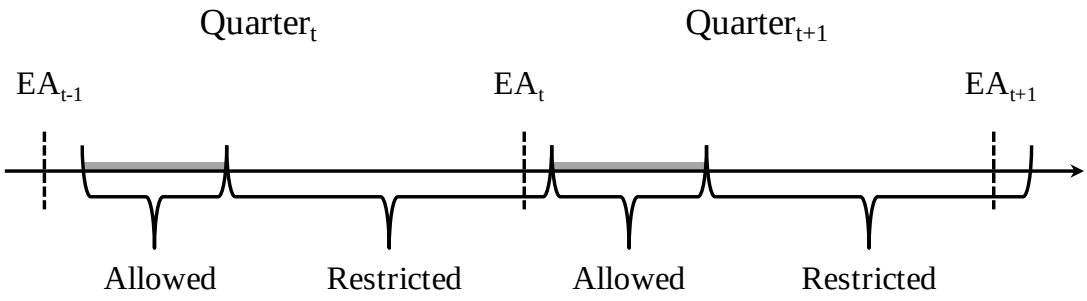
	Adopters	Control Firms	*p*-value
Size	5.627202	5.657199	0.8634
BTM	0.6646	0.578058	0.2695
InstOwner	0.416665	0.406294	0.7554
NrAnalyst	1.729423	1.654257	0.3262
N	171	171	

Panel C: Earnings management

	AbsDA_MJ	AbsDA_MJ if DA_MJ≥0	AbsDA_MJ if DA_MJ<0
Post	-0.0004	0.0018	-0.0019
	(-0.21)	(0.71)	(-0.83)
Adopter	0.0022	0.0003	0.0065*
	(0.83)	(0.09)	(1.93)
Post x Adopter	**-0.0079****	**-0.0098****	**-0.0049**
	(-2.47)	**(-2.42)**	**(-1.22)**
Controls included	Yes	Yes	Yes
Ind & Qtr. FE	Yes	Yes	Yes
R-squared	0.3048	0.3116	0.4972
N	6,305	3,340	2,965

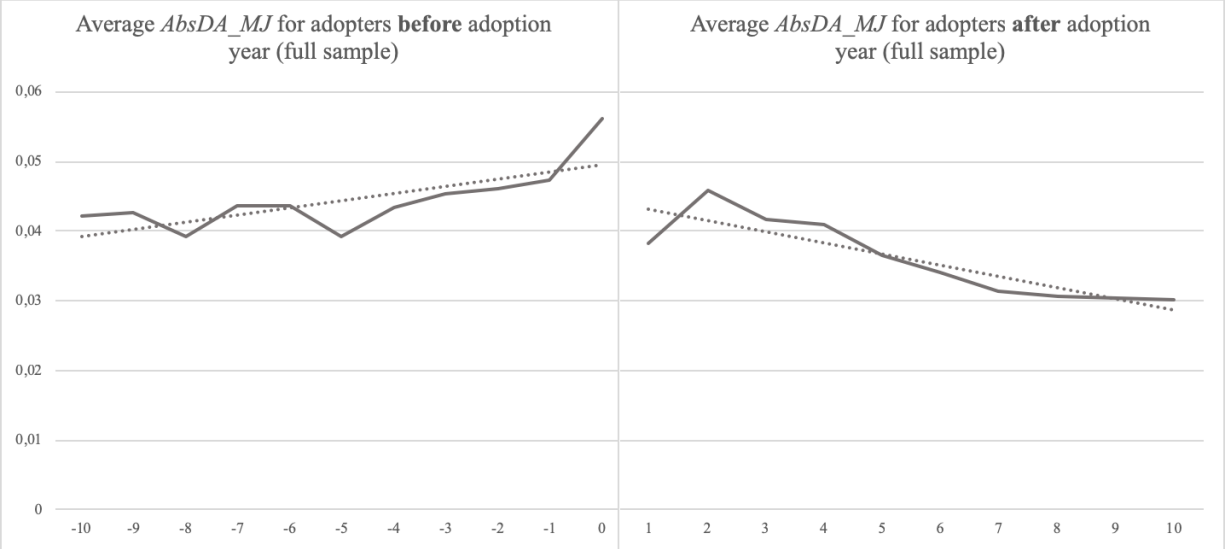
This table presents the analysis on the more restricted sample derived from the alternative measure of ITR adoption. For this analysis, we have only retained observations that have non-missing data for *NrAnalyst* and *InstOwner*. Panel A shows the results of the *probit* model used to obtain the propensity score matched sample of 171 pairs of ITR adopters and control firms. Panel B presents the descriptive statistics of these firms in the event quarter. Panel C presents the results of estimating equation 3 on this sample. *Post x Adopter* takes 1 (0) in the period after (before) adoption, and is set to missing in the adoption quarter. Industry and quarter fixed effects are included. T-statistics are presented in parentheses. ***, **, * indicate significance at the 1%, 5% and 10% levels, respectively. Robust standard errors are clustered at firm-level. Variables are defined in Appendix 1.

Figure 1. Illustration of Insider Trading Restriction Windows

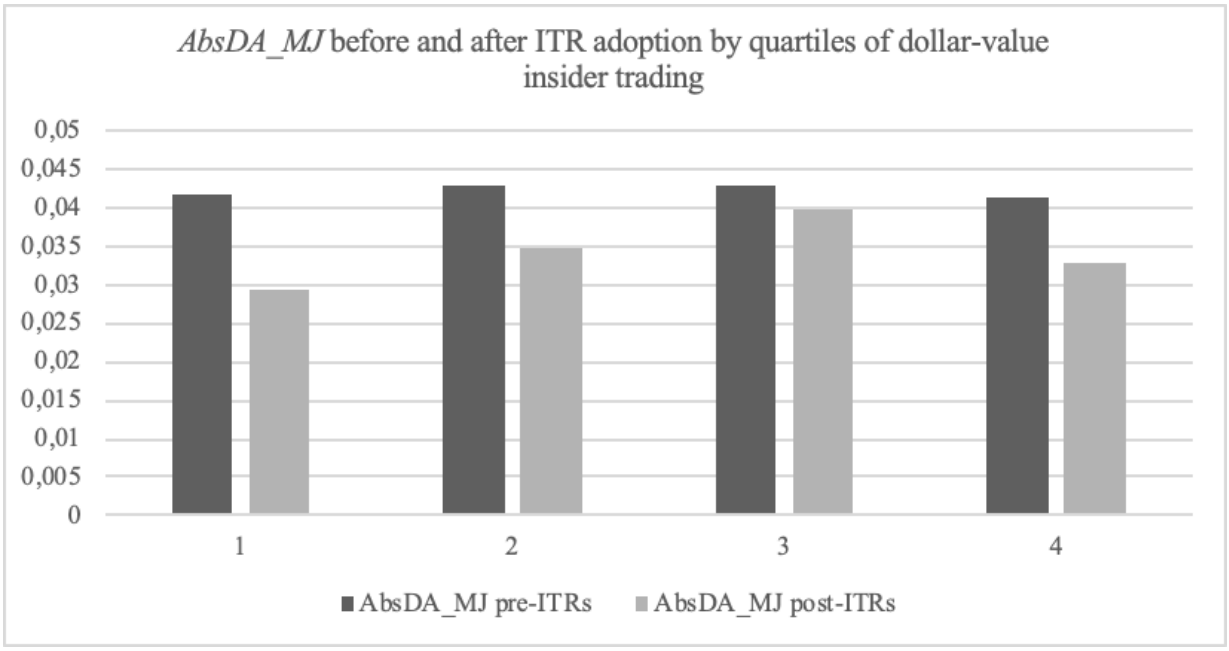


EA indicates Earnings Announcement date for each quarter. *Allowed* is the window when insider trading is allowed, and it is typically the first third (approximately one calendar month or 20 trading days) of the period between two consecutive quarterly earnings announcements. *Restricted* is the window when insider trading is not allowed.

Figure 2. Earnings management before and after ITR adoption



Panel A. Average *AbsDA_MJ* for the PSM sample of firms that adopt insider trading restrictions. The left side of the figure shows the values for average annual *AbsDA_MJ* recorded by adopters before the adoption year (years -10 to 0), and the right side shows the average annual *AbsDA_MJ* after the adoption year (years 1 to 10).



Panel B. Average *AbsDA_MJ* for adopters in the PSM sample before and after ITR adoption, by quartiles of insider trading volume in dollar-amount.