The effect of voluntary clawback adoption on non-GAAP reporting

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ABSTRACT

We examine the effect of voluntary adoption of clawback provisions on non-GAAP earnings disclosures. Prior literature documents that voluntary clawback adoption improves financial reporting quality by increasing the costs of misstating GAAP earnings. However, managers may respond to perceptions of reduced discretion over GAAP reporting by increasing their reliance on non-GAAP earnings disclosures. Using a propensity score matched sample, we find that non-GAAP earnings disclosure frequency increases and non-GAAP exclusion quality decreases after clawback adoption, consistent with a more opportunistic use of non-GAAP reporting. Additional cross-sectional tests help support this interpretation.

1. Introduction

This paper examines the effect of voluntary adoption of clawback provisions on firms' non-GAAP earnings disclosure practices. Firms adopt clawbacks to recover executive compensation based on financial performance that is subsequently invalidated, most typically through an earnings restatement. Clawbacks are intended to discourage intentional misstatement of accounting information by imposing an *ex post* penalty on managers, and recent studies document that financial reporting quality improves after their voluntary adoption (Chan et al., 2012; deHaan et al., 2013). This evidence suggests that adopting clawback provisions increases the costs associated with misstating earnings defined under generally accepted accounting principles (GAAP). However, it is possible that managers adapt to this more restrictive reporting environment by disclosing financial performance measures that would likely be less subject to restatement, such as non-GAAP earnings. We therefore examine whether the voluntary adoption of clawback provisions affects the frequency and quality of firms' non-GAAP earnings disclosures.

Non-GAAP (or "pro forma") earnings disclosures are alternative earnings performance measures provided by individual firms that attempt to measure "core" earnings by making adjustments to reported GAAP earnings. Prior research finds that non-GAAP earnings figures are, on average, more value relevant than GAAP earnings (Bhattacharya et al., 2003; Bradshaw and Sloan, 2002; Gu and Chen, 2004), but there is also evidence that these disclosures are used opportunistically by managers. For example, Doyle et al. (2003) report that items excluded from non-GAAP earnings are predictive of future performance, which suggests that these expenses are recurring and opportunistically excluded from core earnings. In addition, managers appear to use non-GAAP earnings disclosures to meet earnings benchmarks (Black and Christensen, 2009; Doyle et al., 2013; Lougee and Marquardt, 2004).

While prior research shows that clawback provisions improve GAAP earnings quality, it is unclear how voluntarily adopting these provisions might affect the frequency of non-GAAP earnings disclosures. Lougee and Marquardt (2004) find that the likelihood of non-GAAP disclosure is inversely related to GAAP earnings quality, which suggests that the frequency of non-GAAP disclosures will

decrease as GAAP earnings quality improves following voluntary clawback adoption. Alternatively, clawbacks serve as an *ex ante* deterrent of GAAP violations by increasing managers' costs of manipulating GAAP earnings for their personal benefit. Managers may compensate for this perceived reduction in GAAP reporting discretion by voluntarily releasing non-GAAP earnings measures to investors, which suggests that voluntary clawback adoption will increase the frequency of non-GAAP disclosure.

The impact of clawback adoption on the quality of non-GAAP earnings is similarly ambiguous. On the one hand, Frankel et al. (2011) find that better corporate governance is associated with higher quality non-GAAP earnings disclosures. Since clawbacks are generally viewed as improving governance practices, one might expect an improvement in non-GAAP reporting quality following their adoption. On the other hand, managers may respond to the increased costs of GAAP earnings misstatements by using non-GAAP disclosures more opportunistically since non-GAAP disclosures are unlikely to fall under the scope of clawback provisions.[1] The quality of non-GAAP earnings may thus decrease following voluntary adoption of clawback provisions.

To examine this question, we estimate a probit model of the likelihood of non-GAAP earnings disclosure before and after voluntary clawback adoption using two different samples: (1) a sample consisting of only clawback adopters and (2) a sample where clawback adopters are matched with non-adopters based on a propensity score matched sample (1:1 matching). The propensity score matching procedure mitigates concerns over correlated omitted variables and allows us to use a difference-in-differences research design to analyze changes in non-GAAP reporting before and after adoption. Our sample period is limited to 2005–2009 to ensure that firms' adoption decisions predate the strong SEC enforcement of clawback provisions in Sarbanes-Oxley (SOX), as well as the mandatory adoptions required under Dodd-Frank. After controlling for other determinants of non-GAAP disclosure, we find that firms are significantly more likely to disclose non-GAAP earnings after voluntary adoption of clawback provisions.

To investigate whether the increase in non-GAAP reporting frequency is motivated by a desire to better inform investors or to mislead investors, we examine the quality of non-GAAP earnings exclusions using two different measures. First, we follow Doyle et al. (2003) and Kolev et al. (2008) and define higher quality exclusions as being more transitory and having less predictive power for future operating income. Our second proxy for quality is based on Black et al. (2015) definition of 'aggressive' non-GAAP reporting – exclusions that are likely to contain recurring expenses and thus are inversely related to quality. Both measures indicate that exclusion quality decreases after a firm voluntarily adopts clawback provisions; i.e., future operating income is more negatively correlated with non-GAAP exclusions after adopting clawback provisions, and managers are more likely to exclude recurring expenses from non-GAAP earnings. An increase in non-GAAP reporting frequency combined with a decrease in non-GAAP exclusion quality is consistent with *greater opportunistic use* of non-GAAP earnings disclosures after clawback adoption. We confirm this interpretation in our cross-sectional analyses, as described below.

We first examine managerial incentives behind non-GAAP reporting. Doyle et al. (2013) document that managers use non-GAAP exclusions to meet or beat analyst forecasts. We find that managers are more likely to use non-GAAP exclusions to exceed analyst forecasts after clawback adoption, consistent with increased opportunism. We also examine the relation between non-GAAP reporting and incentive-based executive compensation, as Black et al. (2015) report evidence that non-GAAP disclosure is positively associated with its use. We report evidence that incentive-based compensation is associated with changes in the frequency, but not with the quality, of non-GAAP reporting after clawback adoption. We thus conclude that the increase in opportunistic non-GAAP disclosure that we observe after clawback adoption is unlikely to be driven by managerial contracting concerns.

The above analyses assume an indirect link from clawback adoption to non-GAAP reporting. That is, since clawbacks are unlikely to be triggered by irregularities in non-GAAP reporting, any impact of clawback adoption on non-GAAP reporting must be conditional on actual or perceived changes in GAAP reporting. We confirm this connection by comparing the relation between non-GAAP reporting and GAAP earnings quality before and after clawback adoption. We report an intensified relation between earnings response coefficients and non-GAAP disclosure frequency and quality after clawback adoption; in addition, we find some evidence of a more negative association between income-increasing GAAP earnings management and the exclusion of recurring expenses from non-GAAP earnings after adoption. These findings are consistent with managers responding to reduced discretion in GAAP reporting by shifting to non-GAAP disclosure. Lastly, we document that non-GAAP exclusion quality deteriorates to a greater extent after clawback adoption when managers have less ability to manage GAAP earnings through accruals. This finding also suggests that managers shift their focus from GAAP to non-GAAP earnings when faced with increased costs of manipulating GAAP earnings relative to non-GAAP earnings after clawback adoption, consistent with increased opportunism.

These results contribute to the existing literature in several ways. First, the study contributes to the growing literature on clawback adoption. Prior research has documented significant benefits associated with clawback adoption. For example, Chan et al. (2012) find a reduction in the frequency of accounting restatements and higher earnings response coefficients after voluntary clawback adoption, and deHaan et al. (2013) report reductions in firms' benchmark beating behavior and the dispersion of analyst forecasts. In addition, Iskandar-Datta and Jia (2013) find that clawback adoption enhances firm value for firms with a history of prior restatements, suggesting that investors view clawbacks as a credible corporate governance mechanism. In contrast, we document an increase in the frequency and a decrease in the quality of non-GAAP earnings, consistent with an increase in the opportunistic use of non-GAAP disclosure following clawback adoption. We thus contribute to recent literature documenting unintended consequences related to clawback adoption, such as Chan et al. (2015), who document a shift from accruals-based to real earnings management following clawback adoption, as well as deHaan et al. (2013), who report higher levels of executive compensation after adoption.

Our findings also extend the literature examining substitution effects between alternative financial reporting strategies. Prior

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[1] We provide a detailed discussion of whether non-GAAP disclosures could potentially trigger a clawback of executive compensation in Section 3.

research documents that firms increase real earnings management when accruals management is constrained (Badertscher, 2011; Chan et al., 2015; Cohen and Zarowin, 2010; Cohen et al., 2008; McInnis and Collins, 2011; Zang, 2012) and substitute classification shifting for more costly reporting strategies (Abernathy et al., 2014; Fan et al., 2010). However, the majority of these studies examine alternative reporting strategies *within* GAAP reporting. In contrast, we provide evidence that managers choose *between* GAAP and non-GAAP earnings to achieve their financial reporting objectives. These findings complement recent work by Doyle et al. (2013), who find that managers are more likely to shift to non-GAAP earnings to meet analyst forecasts when the cost of within-GAAP earnings management is high, as well as Kolev et al. (2008), who report a shift to classification shifting in response to restrictions on non-GAAP reporting. Our findings thus provide additional insight into the non-GAAP reporting phenomenon, which shows no sign of waning and continues to grow ever more prevalent over time (Bentley et al., 2018; Morgenson, 2016).

Our findings also have practical implications for both corporate boards and regulators as they move toward mandatory adoption of clawback provisions. On July 1, 2015, the Securities and Exchange Commission (SEC) proposed the new Rule 10D-1 to implement mandatory clawback adoptions, as required under the Dodd-Frank Wall Street Reform and Consumer Protection Act.[2] While one cannot assume that the changes we observe in non-GAAP reporting will generalize to mandatory adopters, our findings suggest the possibility that mandatory clawback adoption for all public firms may usher in a general shift toward the more opportunistic use of non-GAAP earnings disclosure. This possible outcome is likely to be of particular interest to the SEC, as their latest Compliance and Disclosure Interpretation (CDI) on non-GAAP disclosure, released in 2016, addresses potential misuse of these financial measures. This interpretive guidance challenges non-GAAP disclosure practices that were previously considered permissible and provides examples of various practices likely to prompt SEC scrutiny in the future.[3] The new guidance has been widely viewed as a "tightening" of previous policies (Michaels and Rapoport, 2016b). Our evidence suggesting that the opportunistic use of non-GAAP disclosure increases following clawback adoption provides empirical support for the SEC's renewed concern.

Our study has some limitations. First, as with all empirical research, we cannot completely rule out the possibility that our findings are due to correlated omitted variables, though sensitivity tests indicate that this is unlikely. Second, using non-GAAP earnings as a pre-treatment covariate was not possible in this study because these disclosures must be hand-collected from firms' press releases after choosing the control sample. Third, the increase in non-GAAP disclosure we document in the post-adoption period may be partially driven by an increasing trend in non-GAAP disclosure frequency over time; the inclusion of fixed year effects in our analyses and our matched-sample difference-in-differences research design helps control for this possibility. Finally, our findings are based on a relatively small sample of voluntary clawback adoptions and, as noted above, cannot necessarily be generalized to the mandatory adoption of clawbacks that is required under Dodd-Frank. Our empirical findings should be viewed with each of these caveats in mind.

The paper is organized as follows. Section 2 provides institutional background on clawback provisions and non-GAAP reporting, and Section 3 outlines our hypothesis development. Section 4 presents the sample selection procedure and descriptive statistics. In Section 5, we discuss the research design and the empirical results. We conclude the paper in Section 6.

2. Regulatory background

2.1. Clawback provisions

Clawback provisions allow a firm to recover incentive-based compensation from corporate executives upon the occurrence of some predefined event, most typically an earnings or financial statement restatement. The prevalence of voluntary clawback adoption has grown rapidly since the enactment of SOX in 2002. Section 304 of SOX authorized the SEC to enforce compensation recovery when a publicly traded firm restated financial statements due to misconduct. However, Chan et al. (2012) observe that the SEC did not effectively utilize Section 304 until July 2009, when it filed its first Section 304 complaint against the CEO of CSK Auto Corporation.

More recently, Section 954 of the Dodd-Frank Act of 2010 requires all public companies to adopt a provision for the recovery of incentive-based compensation in excess of what would have been paid under restated financial statements. While only CEOs and CFOs are subject to clawback provisions under SOX, Dodd-Frank broadens its coverage to all executive officers who are involved in the process of policy-making within the firm. Section 954 also does not limit recovery only to restatements resulting from misconduct, but to all restatements related to material noncompliance with financial reporting requirements. The SEC proposed Rule 10D-1 in July 2015 and as of mid-2018 has not yet provided the final rule related to mandatory clawback adoption.

Our examination of firm-initiated, or voluntary, clawback adoptions occurs within the regulatory backdrop described above. As shown in Fig. 1, our sample period of 2005 through 2009 falls after the enactment of SOX in 2002 and ends before the enactment of Dodd-Frank in 2010. Ending the sample period in 2009 helps to ensure that firms' clawback adoption decisions are truly voluntary and are not driven by SEC enforcement of SOX Section 304 or the mandatory clawback adoptions required under Dodd-Frank.

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[2] See http://www.sec.gov/news/pressrelease/2015-136.html. We note that implementation of the final rule may be delayed or blocked altogether with the U.S. Treasury Department's October 2017 proposal to overhaul Dodd-Frank, though Rule 10D-1 and clawback provisions are not specifically mentioned anywhere in the proposal (https://www.treasury.gov/press-center/press-releases/Documents/A-Financial-System-Capital-Markets-FINAL-FINAL.pdf).

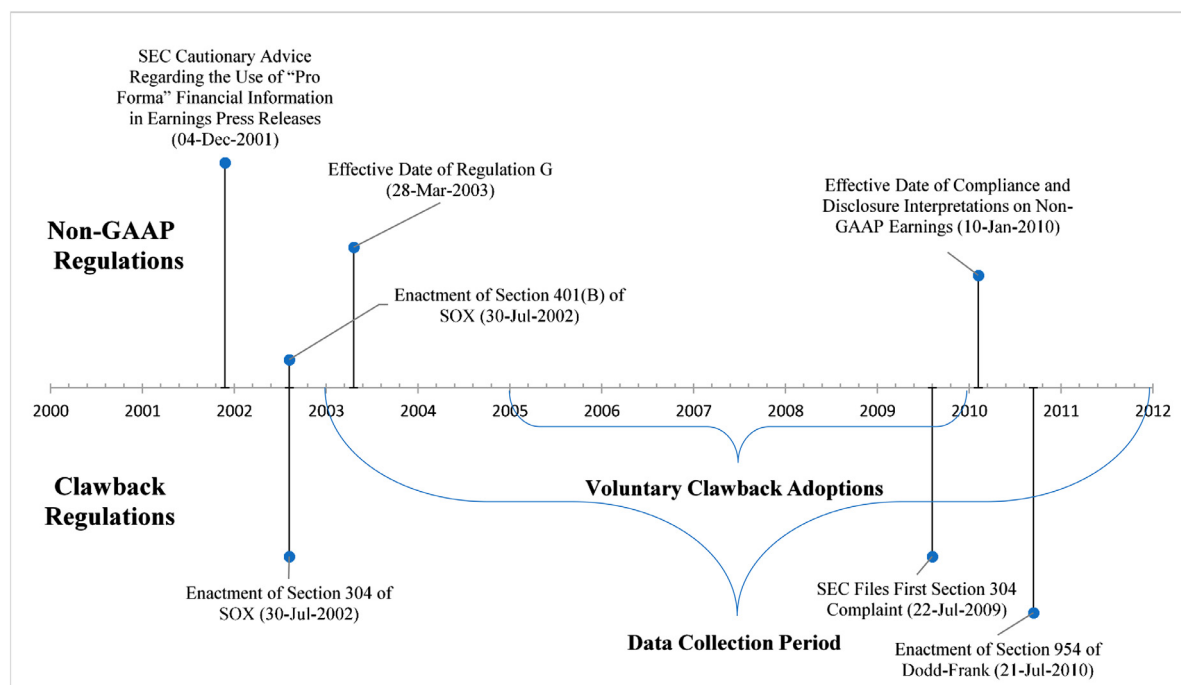[3] See https://www.sec.gov/divisions/corpfin/guidance/nongaapinterp.html.

Fig. 1. Timeline of SEC regulatory events related to clawbacks and non-GAAP reporting.

2.2. Non-GAAP reporting

While firms have been disclosing non-GAAP (or 'pro forma') metrics in their earnings press releases for decades (Bradshaw and Sloan, 2002; Gu and Chen, 2004), the practice did not draw serious regulatory attention until late 2001, when the SEC issued cautionary advice regarding its usage due to its potential to mislead investors (https://www.sec.gov/rules/other/33-8039.htm). The SEC followed this action with the enactment of SOX in 2002, which promulgated regulations governing the use of non-GAAP financial measures. In particular, Regulation G of SOX Section 401(b) requires that public firms disclosing non-GAAP financial measures include a presentation of and a quantitative reconciliation to the most directly comparable GAAP financial measure in the firms' 8-K filing. Marques (2006) and Heflin and Hsu (2008) document a decreased likelihood of non-GAAP disclosure in the period immediately following Regulation G, and Kolev et al. (2008) report an increase in the average quality of non-GAAP exclusions during this time period. However, the SEC later issued a Compliance and Disclosure Interpretation (CDI) on non-GAAP financial measures in early 2010 that was intended to ease perceived restrictions on non-GAAP disclosure that were not consistent with the actual requirements under Regulation G.

Fig. 1 shows the timing of these regulatory events. Although our sample period of 2005–2009 is relatively uneventful in terms of regulatory changes related to non-GAAP disclosure, we note that our empirical tests may be affected by trends in non-GAAP reporting over this period. The CDI issued by the SEC in 2010 may also potentially impact our empirical findings, as our data collection period partially post-dates this event. However, our use of a difference-in-differences research design and the inclusion of year fixed effects in our analyses should control for any potential confounding effects related to non-GAAP regulation.

3. Hypothesis development

Prior research has examined the consequences of voluntary clawback adoption on various aspects of firms' financial reporting environments.[4] For example, Chan et al. (2012) and deHaan et al. (2013) report evidence that the incidence of restatements declines following voluntary clawback adoption. Consistent with auditors' perception that clawback adopters have lower audit risk, Chan et al. (2012) report that auditors charge lower audit fees and issue their reports on a more timely basis, and deHaan et al. (2013) report a decrease in unexplained audit fees. Both of these studies also provide evidence that firms' earnings response coefficients increase following clawback adoption. In addition, deHaan et al. (2013) report declines in earnings management, as measured by abnormal accruals, and an increase in CEO pay-performance sensitivity following clawback adoption. The evidence from these two studies is consistent with an overall improvement in the quality of firms' financial reporting under GAAP following clawback

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[4] A few studies examine the determinants of clawback adoption decision. Babenko et al. (2017) find that prior executive misbehavior, governance structure, and executive compensations are related to adoption of a clawback provision. Brown et al. (2015) link clawback adoption to poor M&A decisions and to the acquisition of targets with low accounting quality.

adoption.[5]

We extend the literature on the consequences of voluntary adoption of clawback provisions by empirically examining the relation between clawbacks and the frequency and quality of non-GAAP earnings disclosures. Upon first consideration, it is not obvious that clawback adoption would affect non-GAAP reporting practices because the lack of a standard definition of non-GAAP earnings would appear to make the possibility of a restatement highly improbable or preclude its occurrence altogether. Furthermore, clawback provisions commonly refer to restatements of "financial statements" as the trigger for potential reimbursement. Because non-GAAP earnings are not presented within firms' financial statements but are instead voluntarily disclosed in earnings press releases, triggering events so defined would presumably exclude non-GAAP disclosures. However, some provisions do refer more generally to restatement of "financial results" or "any financial reporting requirement" in SEC filings.[6] While the required 8-K reconciliations of non-GAAP to GAAP earnings could arguably be subject to restatement in these instances, we were unable to identify a single instance of this occurring.[7] We therefore assume in our hypothesis development below that the disclosure of non-GAAP earnings, however opportunistically it might be defined by managers, is unlikely to trigger a clawback of executive compensation.[8]

We posit an indirect link between clawback adoption and non-GAAP disclosure. Prior research has shown that non-GAAP reporting depends on the relative informativeness of GAAP earnings, thus any improvement in GAAP earnings quality resulting from clawback adoption may have a related effect on the frequency and quality of non-GAAP earnings disclosures. Alternatively, the very fact that non-GAAP disclosures are unlikely to trigger clawback provisions may affect the relative usefulness of non-GAAP disclosure as a tool to potentially mislead investors. We explore both of these possibilities in developing our hypotheses.

3.1. Clawback adoption and the frequency of non-GAAP disclosure

It is well-known that there are two competing incentives underlying the disclosure of non-GAAP earnings. One motivation for releasing non-GAAP earnings is that managers use these disclosures opportunistically. For example, a number of studies report that non-GAAP earnings disclosures are used to meet or beat earnings benchmarks that cannot be reached via GAAP (Black and Christensen, 2009; Doyle et al., 2013; Heflin and Hsu, 2008). Prior research has also documented that recurring expenses are often excluded from non-GAAP earnings to inflate perceptions of firms' recurring earnings (Black and Christensen, 2009; Doyle et al., 2003). Because clawbacks increase the managerial costs of misstating GAAP earnings, thereby reducing managerial perceptions of reporting discretion under GAAP, managers may be more likely to attempt to reach financial reporting goals through opportunistic disclosure of non-GAAP earnings. This scenario suggests that the frequency of non-GAAP disclosure will *increase* after voluntary clawback adoption.

A second motivation for releasing non-GAAP earnings is that managers want to inform investors by providing them with a measure of core earnings that is likely to persist in the future. Managers therefore remove non-recurring items from GAAP earnings to better communicate firm performance. Consistent with this motivation, Bradshaw and Sloan (2002) and Bhattacharya et al. (2003) report that non-GAAP earnings are, on average, more value relevant than GAAP earnings, and Heflin et al. (2015) find that the frequency of non-GAAP disclosures increases with GAAP conditional conservatism. In addition, Lougee and Marquardt (2004) find that the likelihood of non-GAAP earnings disclosure is inversely related to GAAP earnings quality and that investors view non-GAAP earnings as more useful when GAAP earnings informativeness is low. If managers are using non-GAAP earnings informatively and if clawback adoption improves GAAP reporting quality, as documented in prior literature, then managers may feel less need to provide

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[5] Denis (2012) offers alternative interpretations of the evidence on improved financial reporting quality after clawback adoption. For example, she notes that reduced frequencies of earnings restatements after clawback adoption may be driven by manager's reluctance to disclose restatements and that reduced auditor effort may be based on an erroneous belief that firms that adopt clawbacks will issue more accurate reports. Investor responses to earnings reports may suffer from similar errors in perception. In addition, Chan et al. (2015) find that clawback adopters substitute real earnings management for accruals-based management following clawback adoption.

[6] A cursory review of incentive compensation plans reveals that "material restatement of financial statements" (Ford Motor Company 2010 Executive Compensation Recoupment Policy) or "having to restate all or a portion of its financial statements" (Caterpillar 2009 Incentive Plan) were common recoupment triggers. Other firms referred directly to SEC filings, such as in Textron Inc.'s 2015 Incentive Plan, where "substantial restatement of Company financial statements filed with the Securities and Exchange Commission" was defined as the trigger. Somewhat more broadly, Unit Corporation's 2010 plan refers to restatement of "financial results" as reported in a "Form 10-K, Form 10-Q, or other report" filed with the SEC, and HCA, Inc.'s 2010 plan refers to restatement of "any financial reporting requirement under either GAAP or the federal securities laws." See www.lawinsider.com for further examples.

[7] In fact, there has been only one SEC enforcement action related to non-GAAP earnings disclosures in the post-SOX era (https://www.sec.gov/litigation/litreleases/2009/lr21290.htm), though the incidence of SEC comment letters related to non-GAAP disclosure appears to have increased since the SEC established its Financial Reporting and Audit Task Force in 2013. Michaels and Rapoport (2016a) report that the SEC has corresponded with dozens of companies in the past few years about giving "undue prominence" to non-GAAP numbers in their earnings press releases, citing Equifax and T-Mobile as examples. Both of these companies agreed to revise their presentation of *future* disclosures, not to revise (or restate) past disclosures, a typical outcome in these cases. The only instances of non-GAAP "restatement" that we could identify relate to the disclosure of non-GAAP metrics in initial public offering prospectuses (Form S-1). In a prominent case, Groupon revised its Form S-1 filing in 2011 by removing a non-GAAP metric that the SEC viewed as potentially misleading to investors. We could find no examples of non-GAAP earnings restatements related to any post-IPO filings.

[8] It is possible that the use of non-GAAP disclosures as performance measures in incentive-based executive compensation contracts could potentially affect the amount of compensation subject to recovery in the event of a clawback. However, even in this instance, it is difficult to see how non-GAAP disclosures might trigger a clawback in the absence of a restatement of GAAP earnings.

investors with an alternative measure of firm performance through non-GAAP disclosure. This line of reasoning suggests that voluntary adoption of clawback provisions may result in a *decrease* in the frequency of non-GAAP earnings disclosure.

Another possibility is that voluntary adoption of clawbacks may signal the board's commitment to improving the financial reporting environment overall. Managers with opportunistic motives may be discouraged from using non-GAAP earnings due to an expectation of heightened monitoring by the boards following clawback adoption, resulting in a *decrease* in the frequency of non-GAAP disclosure.

Finally, it is also possible that clawback adoption does not change managerial behavior regarding non-GAAP disclosure if the adoption of clawback provisions is merely a signal of a firm's existing reporting quality. The signaling theory suggests that firms with high reporting quality are more likely to voluntarily adopt clawback provisions to communicate their superior quality to stakeholders (Chan et al., 2012). Firms with high reporting quality are less likely to be adversely affected by clawback adoption because managers in those firms are less likely to use non-GAAP earnings disclosures opportunistically. To the extent that firms with higher financial reporting quality voluntarily adopt clawback provisions as a credible signal, managers are unlikely to change their non-GAAP reporting patterns. In addition, since non-GAAP earnings are unlikely to be subject to restatement, managers may have little incentive to change their non-GAAP reporting practicing after clawback adoption.

We therefore make no directional prediction with regard to changes in the frequency of non-GAAP earnings disclosure after a firm voluntarily adopts clawback provisions and present the first hypothesis in null form:

H1. The voluntary adoption of clawback provisions has no effect on the frequency of non-GAAP earnings disclosure.

3.2. Clawback adoption and the quality of non-GAAP disclosure

In our second hypothesis, we consider the effect of clawback adoption on the quality of non-GAAP disclosure. Consistent with prior literature (Barth et al., 2012; Bentley et al., 2018; Black et al., 2015, 2017a, b; Curtis et al., 2014; Doyle et al., 2003; Frankel et al., 2011; Gu and Chen, 2004; Heflin et al., 2015; Kolev et al., 2008; Leung et al., 2018; Whipple, 2015), we define non-GAAP disclosure quality as the degree to which the items excluded from non-GAAP earnings are transitory or recurring. The intuition behind this approach is as follows. Managers who disclose non-GAAP earnings to better inform investors are likely to exclude items only if those items are transitory, so that non-GAAP measures better reflect core earnings; the exclusion of a transitory item is thus considered a "high-quality" exclusion. In contrast, managers who attempt to mislead investors are more likely to exclude recurring items from non-GAAP earnings; the exclusion of a recurring item is thus considered a "low quality" exclusion.[9] We adopt this widely-accepted definition of non-GAAP disclosure quality throughout the manuscript.[10]

As with H1, voluntary adoption of clawback provisions could arguably increase or decrease the quality of non-GAAP exclusions. Managers who are opportunistically motivated may compensate for the increased costs of manipulating GAAP earnings by excluding more recurring items from non-GAAP earnings, resulting in lower quality of exclusions. For example, Doyle et al. (2013) find that managers are more likely to use non-GAAP earnings to meet analyst forecasts when the cost of within-GAAP earnings management is high, as indicated by high levels of existing income-increasing accruals on the balance sheet (Barton and Simko, 2002). Clawback adoption could induce similar behavior by managers.

However, clawback adoption may signal firms' commitment to carefully monitor all aspects of financial reporting, including non-GAAP disclosures, and prior research has shown that the quality of non-GAAP exclusions is positively correlated with the strength of corporate governance (Frankel et al., 2011). This suggests that managers may respond to an improvement in corporate governance structure by increasing the quality of non-GAAP exclusions after clawback adoption, regardless of their motivations for non-GAAP disclosure.

Therefore, the second hypothesis is presented in null form:

H2. The voluntary adoption of clawback provisions has no effect on the quality of non-GAAP earnings exclusions.

3.3. Cross-sectional effects of clawback adoption on non-GAAP reporting

In addition to exploring whether voluntary clawback adoption affects the average frequency and quality of non-GAAP reporting, we also examine whether these relations vary cross-sectionally with managers' reporting incentives (H3 and H4) and with GAAP earnings reporting (H5 and H6). These additional tests will help confirm the inferences drawn from our tests of H1 and H2.

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[9] Note that this view of exclusion quality does not depend on whether managers remove expenses and losses, which increase non-GAAP earnings relative to GAAP earnings, or revenues and gains, which decrease non-GAAP earnings; only the exclusion's transitory or recurring nature is relevant. In practice, however, managers have greater incentive to exclude expenses and losses than revenues and gains, and consequently non-GAAP earnings exceed reported GAAP earnings in the typical case.

[10] As indicated in Black et al. (2018) extensive review of the non-GAAP literature, virtually all academic studies on non-GAAP reporting focus their analyses on the managers' exclusion decisions. A notable exception to this general approach is presented by Curtis et a. (2014), who employ the inclusion of transitory gains in non-GAAP earnings as an inverse measure of non-GAAP reporting quality. While innovative, this perspective necessarily presupposes the presence of transitory gains, which relatively few firms experience (e.g., less than 15% in our sample), resulting in small sample sizes and potentially introducing selection bias. We therefore follow the standard practice of defining non-GAAP quality based on exclusion decisions alone.

3.3.1. Non-GAAP disclosures and managerial reporting incentives

We consider two possible managerial reporting incentives that may drive changes in non-GAAP reporting following clawback adoption – meeting or beating earnings benchmarks and compensation contracting concerns. Doyle et al. (2013) and Black and Christensen (2009) document that non-GAAP earnings are used to meet or beat earnings benchmarks when these thresholds cannot be reached via GAAP earnings. If clawback adoption constrains managers' ability to meet reporting objectives using GAAP earnings, as documented by deHaan et al. (2013), then managers may be more likely to rely on non-GAAP disclosures to do so. Alternatively, managers may perceive less pressure to meet earnings thresholds upon clawback adoption, which would suggest no change in the use of non-GAAP disclosures to meet or beat benchmarks after clawback adoption. We thus present our third hypothesis in null form:

H3. The voluntary adoption of clawback provisions has no effect on use of non-GAAP reporting to meet or beat earnings benchmarks.

We also consider the role that incentive-based compensation might play in influencing non-GAAP reporting after clawback adoption. Prior literature confirms that compensation committees do use non-GAAP earnings in setting executive pay. For example, Black et al. (2015) document a positive association between non-GAAP reporting and executive compensation contract structure; in particular, they report a positive relation between non-GAAP disclosure and the use of short-term incentive plans. Pozen and Kothari (2017) and Guest et al. (2018) further find that boards of directors are influenced by non-GAAP earnings adjustments in approving CEO pay that is not otherwise supported by the firm's stock or GAAP earnings performance. If managers are concerned that their reduced ability to manage GAAP earnings will negatively impact their incentive-based compensation, they may be more likely to turn to non-GAAP reporting to provide compensation committees with an alternative performance measure. If this is the case, then we should observe a stronger association between non-GAAP reporting and incentive-based compensation after adoption; i.e., managers will exhibit greater sensitivity to incentive-based compensation in their non-GAAP disclosure decisions after clawback adoption. Alternatively, if managers do not expect compensation to depend on non-GAAP performance to a greater extent after clawback adoption, we should observe no change in the association between non-GAAP reporting and incentive-based pay. Presented in null form:

H4. The voluntary adoption of clawback provisions has no effect on the association between non-GAAP reporting and incentive-based compensation.

3.3.2. Non-GAAP disclosures and GAAP earnings reporting

Our last two hypotheses address the interaction between GAAP and non-GAAP earnings reporting. Because clawbacks are unlikely to be triggered by irregularities in non-GAAP reporting, any documented effects of clawback adoption on non-GAAP reporting must be related to actual or perceived changes in GAAP reporting. Prior literature has documented an improvement in GAAP earnings quality following clawback adoption. For example, Chan et al. (2015) document a decrease in accrual-based earnings management following clawback adoption, and both Chan et al. (2012) and deHaan et al. (2013) provide evidence that firms' earnings response coefficients increase after adoption. If non-GAAP reporting substitutes for GAAP earnings management following clawback adoption, we should observe that changes in the frequency and quality of non-GAAP reporting are associated with the improvement in GAAP earnings quality after adoption. Alternatively, changes in non-GAAP reporting after clawback adoption may be independent of changes in GAAP earnings quality if clawbacks result in business decisions that affect non-GAAP reporting more directly. For example, Biddle et al. (2017) find that clawback adoption affects firms' investment choices, reducing R&D expenditures and increasing capital expenditures and acquisition activity, and Babenko et al. (2017) report an increase in equity-based compensation following clawback adoption. Because non-GAAP exclusions related to R&D tax credits, acquisition costs, and stock-based compensation are common (Black et al., 2018), clawback adoption may influence non-GAAP reporting without necessarily having any effect on GAAP earnings quality. We therefore state H5 in null form:

H5. The voluntary adoption of clawback provisions has no effect on the association between non-GAAP reporting and GAAP earnings quality.

Our last hypothesis further explores the link between GAAP and non-GAAP earnings reporting by examining whether changes in non-GAAP reporting after clawback adoption vary cross-sectionally with managers' ability to manage GAAP earnings through accruals. Barton and Simko (2002) argue that previous accrual-based earnings management constrains managers' ability to further optimistically bias reported earnings, due to the high costs of deviating from GAAP (Dechow et al., 1996). They predict and find that managers' ability to optimistically bias earnings to meet analyst forecasts is decreasing with the extent of overstated assets already present on the balance sheet, as reflected in net operating assets (NOA). Ewert and Wagenhofer (2005) suggest that NOA might be used as a proxy to infer managers' incentives to engage in alternative means of earnings management, and both Black et al. (2017a) and Doyle et al. (2013) document that managers shift from accrual-based earnings management toward non-GAAP reporting when they are constrained by high NOA; i.e., non-GAAP disclosure and NOA are positively correlated.

Voluntary adoption of a clawback provision may affect the association between non-GAAP reporting and NOA. Clawback adoption may intensify managers' incentives to substitute non-GAAP reporting for accrual management because further income-increasing GAAP earnings management raises the probability of an eventual clawback of compensation if earnings are later restated. If this effect is increasing with NOA, as suggested by the Ettredge et al. (2010) finding of a positive association between "balance sheet bloat" from prior-period GAAP earnings management and fraudulent financial reporting in later periods, then managers may become more sensitive to NOA when making non-GAAP disclosure decisions after clawback adoption, resulting in a stronger positive association between non-GAAP reporting and NOA. However, past accrual-based earnings management may already constrain managers' ability to further inflate GAAP earnings such that the adoption of a clawback will not have any incremental effect beyond

that provided by existing levels of NOA. For example, high NOA firms may already be substituting non-GAAP disclosure for accrual-based management of GAAP earnings prior to clawback adoption. If this is the case, we will observe no change in the association between non-GAAP reporting and NOA levels. We thus present our hypothesis related to firms' ability to manage GAAP earnings in null form:

H6. The voluntary adoption of clawback provisions has no effect on the association between non-GAAP reporting and NOA.

4. Sample selection criteria and data description

Our basic empirical approach, which closely aligns with that of deHaan et al. (2013) and Chan et al. (2012), is as follows. We match each clawback adopter to a non-adopting control firm using propensity score matching and then perform a difference-in-differences analysis to assess pre- versus post-adoption changes in non-GAAP reporting. The difference-in-differences design controls for both cross-sectional and temporal differences between our treatment and control firms, and propensity score matching helps us to further mitigate cross-sectional differences between the two groups, especially those that may affect or are correlated with the likelihood of clawback implementation or non-GAAP reporting.

To identify our treatment sample of clawback adopters, we follow Chan et al. (2012) and obtain clawback adoption data and other corporate governance characteristics from the Corporate Library, which covers firms in the Russell 3000 Index. We initially identify 297 non-regulated firms as having voluntarily adopted clawback provisions during our sample period from 2005 to 2009.[11] We then hand-collect more detailed information regarding firms' clawback provisions from their proxy statements filed with the SEC.

We obtain data for the propensity matching procedure and for our hypothesis tests from several sources. As in Chan et al. (2012) and deHaan et al. (2013), we use annual data for the propensity matching procedure; however, because non-GAAP disclosures are released on a quarterly basis, we use quarterly data for our hypothesis tests. We obtain firm financial data from Compustat, CRSP, and I/B/E/S; auditor and accounting restatement information are obtained from Audit Analytics; shareholding information are obtained from Thomson Reuters; CEO variables are obtained from The Corporate Library; and executive compensation data are obtained from Execucomp. We match quarterly financial data with annual data based on the fiscal year.

After eliminating financial institutions and firms that do not have the requisite data, the treatment sample consists of 262 clawback adopters out of 2148 firms covered in the Corporate Library. Panel A of Table 1 presents the frequency distribution of the sample firms by year. Clawback provisions were infrequent in 2005, with only 8 firms having adopted clawback provisions, but we observe sharp increases in adoption frequency during 2007, 2008, and 2009. This increase in the frequency of clawback adoption is consistent with findings in prior research (Babenko et al., 2017; Chan et al., 2012).

Panel B of Table 1 compares the means and medians of the sample characteristics of clawback adopters (5208 firm-quarters) versus non-adopters (38,459 firm-quarters), using all available data from 2005 to 2009. We include variables that have been identified in prior research as important determinants of clawback adoption and of non-GAAP disclosure, as well as other firm characteristics. As shown in Panel B, clawback adopters differ significantly from non-adopters on almost every characteristic examined. Clawback adopters are much larger in size than non-adopters: mean (median) total assets of clawback adopters are $12,318 ($3702) million, which is six times larger than that of non-adopters. Clawback adopters also have significantly higher mean intangible intensity (0.199 vs. 0.178), higher leverage ratios (0.555 vs. 0.486), lower earnings volatility (0.015 vs. 0.030), are more likely to recognize special items (0.599 vs. 0.430) of greater magnitudes (0.055 vs. 0.044), exhibit lower frequencies of losses (0.138 vs. 0.300), and experience more negative accruals (−0.048 vs. −0.032) than non-adopters. Consistent with Chan et al. (2012), clawback firms have a higher percentage of independent directors on the board (0.852 vs. 0.811), have lower insider holdings (0.069 vs. 0.169), greater institutional holdings (0.834 vs. 0.710), and are more likely to hire Big 4 auditors (0.871 vs. 0.678). The CEOs of clawback firms are more likely to also be chairman of the board of directors (0.636 vs. 0.578) but have shorter tenure (5.353 vs. 5.550). Finally, the CEOs of clawback firms tend to earn significantly higher pay.

The numerous differences in the firm characteristics of clawback adopters versus non-adopters, as documented above, illustrate why we undertake a propensity matching approach to our analysis. A comparison of clawback adopters with the population of all non-adopting firms is unlikely to shed light on the question of whether clawback adoption leads to a particular outcome, such as future non-GAAP reporting decisions. We therefore select a single control firm for each clawback adopter by matching each adopter to the non-adopting firm with the closest predicted value (i.e, "propensity score") from a logit model estimation of clawback adoption. The dependent variable is an indicator variable that equals one if the firm has adopted a clawback provision and zero otherwise (*Claw*) and each of the firm characteristics from Panel B of Table 1 are included as independent variables, as follows:

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[11] We exclude financial firms from the sample because the majority of them mandatorily adopted clawback provisions under the Emergency Economic Stabilization Act (EESA) of 2008.

Table 1
Sample and descriptive statistics.

Panel A: Firms by voluntary clawback adoption status

Year	Initial adopters	Total adopters	Non-adopters	Total number of firms
2005	8	8	1950	1958
2006	25	33	2044	2077
2007	81	115	2101	2216
2008	78	191	2094	2285
2009	71	262	2077	2148

Panel B: Mean and median differences between voluntary clawback adopters and non-adopters

	Means			Medians		
	Clawback adopters	Non-adopters	Difference *t*-test	Clawback adopters	Non-adopters	Difference *Z*-test
Total Assets	12,318	2,380	66.02***	3,702	528	71.07***
Intangible	0.199	0.178	7.26***	0.143	0.103	14.81***
Market-to-Book	2.936	3.118	−2.10**	2.482	2.242	6.93***
Sales Growth	0.350	0.300	1.82*	0.319	0.163	7.93***
Leverage	0.555	0.486	19.87***	0.557	0.460	26.75***
Earnings Volatility	0.015	0.030	−20.71***	0.007	0.112	−30.39***
SI	0.599	0.430	23.14***	1.000	0.000	23.00***
Special Items	0.055	0.044	3.66***	0.000	0.000	8.29***
Loss	0.138	0.300	−24.56***	0.000	0.000	−24.39***
Ln(Audit Fee)	8.077	7.054	63.91***	8.050	7.015	56.50***
Accruals	−0.048	−0.032	−9.08***	−0.039	−0.031	−9.30***
Restatement	0.105	0.099	1.16	0.000	0.000	1.13
%Outside	0.852	0.811	29.38***	0.875	0.833	34.80***
% Insiderholding	0.069	0.169	−33.04***	0.029	0.078	−48.99***
%Intitutionalholding	0.834	0.710	21.48***	0.836	0.776	18.97**
Big4	0.871	0.678	28.86***	1.000	1.000	28.59***
CEOChairman	0.636	0.578	2.75***	1.000	1.000	2.75***
CEOTenure	5.353	5.550	−2.24**	5.000	5.000	−2.39**
CEOTurnover	0.248	0.321	0.13	0.000	0.000	0.14
Ln(CashPay)	6.997	6.938	2.31**	6.909	6.889	2.84***
Ln(Option)	5.294	5.050	2.04**	6.932	6.706	2.50**
Ln(TotalComp)	7.777	7.685	2.54**	7.756	7.650	2.67***
N	5,208	38,459		5,208	38, 459	

Variables are defined as follows. Ln*(Total Assets)* is the natural logarithm of total assets. *Intangible* is intangible assets divided by total assets. *Market-to-Book* is the market value of equity divided by book value of equity. *Sales Growth* is the annual percentage increase in sales, on a per share basis. *Leverage* is total liabilities divided by total assets. *Earnings Volatility* is the standard deviation of ROA over the past 8 fiscal quarters. *SI* is an indicator variable that equals 1 if a firm reports special items and 0 otherwise. *Special Items* is special items reported in Compustat, divided by total assets and multiplied by −1. *Loss* is an indicator variable equal to 1 if earnings before extraordinary items < 0 and 0 otherwise. Ln*(Audit Fee)* is the natural logarithm of annual audit fees. *Accruals* is net income less cash from operations, divided by total assets. *Restatement* is an indicator variable equal to 1 if a firm restated its financial statements with the prior two fiscal years and 0 otherwise. *%Outside* is the percentage of outside directors on the firm's board. *%Insiderholding* is the percentage of the firm's equity held by insiders. *%Institutionalholding* is the percentage of the firm's equity held by institutional investors. *Big4* is an indicator variable equal to 1 if the firm hires a Big 4 auditor and 0 otherwise. *CEOChairman* is an indicator variable equal to 1 if the CEO is also chairman of the board and 0 otherwise. *CEOTenure* is the natural logarithm of the length in years of the CEO's tenure. *CEOTurnover* is an indicator variable equal to 1 if the CEO was dismissed or resigned during the fiscal year and 0 otherwise. Ln*(CashPay)* is the natural logarithm of the CEO's annual salary plus bonus. Ln*(Option)* is the natural logarithm of the fair value of the CEO's option awards. Ln*(TotalComp)* is the natural logarithm of the CEO's total annual compensation. Tests of differences in means and medians are based on two-tailed tests. *, **, *** indicate p-values of 0.10, 0.05, and 0.01, respectively.

$$
\begin{aligned}
Claw_{t+1} = {}& \alpha_0 + \alpha_1 Ln\,(Total\ Assets)_{i,t} + \alpha_2 Intangible_{i,t} + \alpha_3 Market\ to\ Book_{i,t} \\
& + \alpha_4 Sales\ Growth_{i,t} + \alpha_5 Leverage_{i,t} + \alpha_6 Earnings\ Volatility_{i,t} \\
& + \alpha_7 SI_{i,t} + \alpha_8 Special\ Items_{i,t} + \alpha_9 Loss_{i,t} + \alpha_{10} Ln\,(Audit\ Fee)_{i,} \\
& + \alpha_{11} Accruals_{i,t} + \alpha_{12} Restatement_{i,t} + \alpha_{13}\%Outside_{i,t} \\
& + \alpha_{14}\%Insiderholding_{i,t} + \alpha_{15}\%Intitutionalholding_{i,t} + \alpha_{16} Big4_{\ i,t} \\
& + \alpha_{17} CEOChairman_{i,t} + \alpha_{18} CEOTenure_{i,t} + \alpha_{19} CEOTurnover_{i,t} \\
& + \alpha_{19} Ln\,(CashPay)_{i,t} + \alpha_{20} Ln\,(Option)_{i,t} + \alpha_{21} Ln\,(TotalComp)_{i,t} \\
& + Industry\ Fixed\ Effect + \varepsilon_{i,t}
\end{aligned}
\tag{1}
$$

We estimate Eq. (1) separately for each year from 2005 to 2009, using all firms with available data, to accurately match the characteristics of clawback firms with those of non-adopters in the year prior to adoption.[12] Panel A of Table 2 reports the logit

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[12] Similarly, deHaan et al. (2013) also match clawback firms with non-adopting firms using propensity score matching and conduct a difference-

Table 2
Propensity score matching.

Panel A: Logit estimation results

Variable	2006		2007		2008		2009	
	Coef	Z-stat	Coef	Z-stat	Coef	Z-stat	Coef	Z-stat
Intercept	−5.376	−1.64	−2.666	−1.63	−4.472**	−2.33	−9.103***	−5.16
Ln(Total Assets)	0.112	0.62	0.240**	2.52	0.422***	3.80	0.172**	1.97
Intangible	0.153	0.19	0.121	0.28	−1.014**	−2.11	−0.334	−0.82
Market-to-Book	0.044	0.97	0.014	0.46	−0.009	−0.27	0.014	0.43
Sales Growth	−1.018	−1.09	−1.514***	−3.16	−0.471	−1.09	−0.429	−1.19
Leverage	0.017	0.04	−0.179	−0.70	0.013	0.09	0.015	0.20
Earnings Volatility	−1.241	−0.58	−1.348	−1.22	−0.669	−0.83	−0.498	−0.62
SI	0.376	0.94	−0.035	−0.22	0.472**	2.29	0.093	0.50
Special Items	0.002**	2.26	0.001**	2.08	−0.001	−1.08	−0.001*	−1.83
Loss	−0.538	−0.85	−0.928**	−2.11	−0.040	−0.14	0.021	0.10
Ln(Audit Fee)	0.196	0.88	−0.020	−0.17	0.005	0.03	0.387***	3.15
Accruals	−1.038	−0.49	−2.424**	−2.19	−0.621	−0.51	0.638	0.66
Restatement	0.538*	1.95	0.052	0.27	0.088	0.42	0.228	1.26
%Outside	0.089	0.06	0.336	0.37	0.478	0.49	1.546	1.60
%Insiderholding	−0.140	−0.14	−0.642	−1.12	−2.008**	−2.28	−0.882	−1.54
%Institutionalholding	−1.141	−1.36	−0.159	−0.37	−0.097	−0.20	0.400	0.95
Big4	−0.838	−1.56	−0.007	−0.02	−0.315	−1.02	0.068	0.19
CEOChairman	0.035	0.12	−0.068	−0.49	−0.179	−1.18	−0.102	−0.75
CEOTenure	0.099	0.19	0.009	0.07	0.112	1.37	0.075	1.47
CEOTurnover	−0.429	−0.41	0.074	0.20	0.563*	1.89	0.687	1.30
Ln(CashPay)	0.014	0.05	−0.075	−0.46	0.355*	1.66	−0.164	−0.95
Ln(Option)	0.040	0.79	0.015	0.55	0.108**	2.54	−0.020	−0.62
Ln(TotalComp)	−0.068	−0.26	0.001	0.01	−0.522**	−2.37	0.033	0.18
Industry fixed effect	Yes		Yes		Yes		Yes	
N	560		995		1025		1019	
Pseudo R^2	0.260		0.168		0.232		0.192	

Panel B: Distribution of matched pairs by year

Year	Clawback adopters	Non-adopters
2006	16	16
2007	58	58
2008	60	60
2009	55	55
Total	189	189

Panel C: Propensity score matching results

	Means				Medians			
Variable	Clawback adopters	Non-adopters	Difference t-test		Clawback adopters	Non-adopters	Difference Z-test	
Ln(Total Assets)	8.418	8.366	−0.40		8.241	8.363	−0.15	
Intangible	0.186	0.186	−0.04		0.125	0.125	0.04	
Market-to-Book	2.812	2.780	−0.14		2.141	1.987	−1.24	
Sales Growth	0.071	0.080	0.58		0.079	0.078	0.27	
Leverage	0.380	0.372	−0.15		0.170	0.212	0.67	
Earnings Volatility	0.052	0.050	−0.32		0.033	0.029	−2.07 **	
SI	0.817	0.776	−1.12		1.000	1.000	−1.12	
Special Items	0.383	0.342	−0.51		16.781	14.631	−0.40	
Loss	0.114	0.118	0.14		0.000	0.000	0.14	
Ln(Audit Fee)	14.950	14.960	0.13		14.861	14.954	0.38	
Accruals	−0.055	−0.052	0.04		−0.043	−0.045	0.25	
Restatement	0.154	0.171	0.49		0.000	0.000	0.49	
%Outside	0.845	0.846	0.08		0.875	0.875	−0.47	
%Insiderholding	0.066	0.069	0.30		0.029	0.033	1.21	
%Intitutionalholding	0.815	0.822	0.49		0.823	0.837	0.64	
Big4 Auditor	0.959	0.955	−0.22		1.000	1.000	−0.22	
CEOChairman	0.585	0.541	−1.00		1.000	1.000	−1.00	
CEOTenure	4.463	4.476	0.09		5.000	5.000	0.14	
CEOTurnover	0.077	0.069	−0.35		0.000	0.000	−0.35	
Ln(CashPay)	6.909	6.857	−0.93		6.852	6.824	−0.89	
Ln(Option)	5.322	5.251	−0.25		6.990	6.748	−0.64	
Ln(TotalComp)	7.681	7.631	−0.60		7.741	7.609	−0.62	

Panel D: Difference in matched propensity scores

N	Mean	1%	25%	50%	75%	99%	Std. dev.
189	−0.001	−0.026	−0.001	0.000	0.000	0.007	

Table 2 (*continued*)

| Panel D: Difference in matched propensity scores | | | | | | | |
N	Mean	1%	25%	50%	75%	99%	Std. dev.
							0.005

The dependent variable *Claw* is an indicator variable equal to 1 if firm *i* is a voluntary clawback adopter and 0 otherwise. Other variables are defined in Table 1. All continuous variables are winsorized at 1 percent and 99 percent. P-values are based on two-tailed tests. *, **, *** indicate p-values of 0.10, 0.05, and 0.01, respectively.

estimation results by year.[13] Firm size is the most consistent determinant across the four years, but results for the other determinants vary considerably over time. For example, earnings restatements are a significant determinant of clawback adoption in 2006, while compensation variables are more important in 2008. These findings suggest that firms' motivations for clawback adoption vary considerably across the sample period, reinforcing our decision to match clawback adopters to control firms using propensity scores estimated for each year rather than for the pooled sample.

We match (without replacement) control firms to clawback adopters based on the closest predicted value from Eq. (1), within a maximum distance of three percent.[14] Matched control firms are assigned with "artificial" adoption years. For example, if a firm adopts a clawback provision in 2007, its matched control firm is also assigned an "artificial" adoption year of 2007. We require both clawback adopters and non-adopters to have at least one observation before and after the clawback adoption year so that we are able to employ the difference-in-difference research design. This procedure yields 189 pairs of voluntary clawback adopters and non-adopters. Panel B of Table 2 presents the distribution of matched pairs over 2006–2009, which roughly parallels the pattern observed in Panel A of Table 1.

We present descriptive data demonstrating the effectiveness of the propensity matching procedure in Panels C and D of Table 2. In Panel C, we compare means and medians of the independent variables in Eq. (1) for the clawback adopters and their matched controls in the year prior to clawback adoption. With the exception of median earnings volatility, there are no significant differences, which suggests that the treatment and control firms are well-matched on these dimensions. Further, in Panel D we find that the mean (median) difference in propensity scores between the two groups is −0.001 (0.000) and standard deviation of the difference is 0.005, indicating that there is no significant difference between the propensity scores of the treatment firms and their matched controls. We conclude that the propensity matching procedure has identified appropriate control firms for each clawback adopter.

Next, we collect non-GAAP earnings data for this sample of 189 treatment-control matched firm pairs from firms' earnings announcement press releases, similar to Bhattacharya et al. (2003), Lougee and Marquardt (2004), and Zhang and Zheng (2011). While much of the prior non-GAAP literature used LexisNexis as a data source for earnings press releases, we are able to use firms' Form 8-K filings with the SEC to obtain press release disclosures because our sample period falls after the enactment of the Sarbanes-Oxley Act (SOX), which requires an 8-K filing within four business days whenever firms disclose quarterly or annual operating results in preliminary earnings releases. We thus view 8-K filings as the most reliable source of press releases that disclose financial information to the general public.[15] We hand-collect company-disclosed quarterly earnings data from 8-Ks for each of our sample clawback adopters and their matched controls for the two-year period both before and after clawback adoption (5,784 firm-quarters).[16] We describe our procedure for identifying non-GAAP earnings disclosures within each press release in Appendix A.[17]

(*footnote continued*)

in-differences analysis. However, they use 2006 year-end data to match 2007, 2008 and 2009 clawback adopters with non-adopters.

[13] We do not report estimation results from 2005 because we were unable to find matched controls for the eight clawback adopters from this year using our chosen caliper width of 0.03.

[14] Lawrence et al. (2011) also use a caliper width of 0.03 in their PSM procedure.

[15] While we believe that the use of 8-K filings is superior to LexisNexis as a means of sourcing press release information, we nonetheless check the validity of our sample collection procedure by comparing 8-K data with non-GAAP disclosures taken from press releases identified using LexisNexis using the following procedure. First, we randomly selected 15 clawback adopters from our sample, for which we have 232 firm-quarters of press release data from 8-K filings. We then searched for earnings announcements disclosed in press releases via LexisNexis and were able to find only 210 firm-quarters (or 91%). Second, we randomly chose a second sample of 15 clawback adopters and searched for earnings announcements during our sample periods using LexisNexis. We find a total of 215 press releases from LexisNexis, all (i.e., 100%) of which were disclosed in 8-K filings on the SEC's EDGAR system. The results of these two-way validity tests give us confidence that samples of press releases collected from 8-K filings are more (or at least as) complete than samples identified using LexisNexis.

[16] Consistent with Chan et al. (2012, 2013, 2015)), we include the year of adoption in the post-adoption period, using all four quarters of data. Our rationale is as follows. The Corporate Library defines the year of adoption as the calendar year in which a clawback provision was first announced in firms' proxy statement filings with the SEC. The deadline for proxy filing is 120 days after the fiscal year-end, but most firms file proxy statements well ahead of this deadline, i.e., during the first fiscal quarter of the year (Wei and Yermack, 2011). We therefore include all four quarters in the "post" period because managers are likely to be aware of the firm's intention to adopt clawback provisions during the first fiscal quarter, which should affect their reporting choices for that quarter. Even in the occasional case where firms file proxy statements after the first quarter but before the 120-day deadline, the earnings announcement for the first quarter (in which any non-GAAP disclosures would appear) would not occur for several weeks after the end of the first quarter. Callen et al. (2006) report that the average lag between the end of the quarter and the preliminary earnings announcement is 22 days. We thus believe that including data for the first quarter of the year is an appropriate design choice. However, our results are not sensitive to excluding the first quarter of the clawback adoption year.

[17] Consistent with previous research (Bhattacharya et al. (2003)), we do not classify EBITDA as a non-GAAP performance measure due to its

Table 3.

Non-GAAP earnings descriptive statistics.

Panel A: Non-GAAP earnings disclosure – Clawback adopters vs. non-adopters

Variable	Means			Medians		
	Clawback adopters	Non-adopters	Difference *t*-test	Clawback adopters	Non-adopters	Difference Z-test
Prob(Non-GAAP)	0.449	0.502	3.969***	0.000	1.000	3.963***
Non-GAAP Earnings	0.534	0.536	0.168	0.450	0.480	−0.192
Non-GAAP Exclusions	0.069	0.070	0.171	0.000	0.000	−0.943
GAAP Earnings	0.465	0.466	−0.132	0.450	0.480	−0.550
SI	0.594	0.564	−2.234**	1.000	1.000	−2.233***
Special Items	0.079	0.091	1.55	0.000	0.000	0.550

Panel B: Non-GAAP earnings disclosure – Pre- and post-clawback adoption periods

Frequency of *Non-GAAP* Disclosure

	Clawback adopters	Non-adopters	Diff. (Z-stat)
Before	0.385	0.473	0.088 (4.82)***
After	0.509	0.534	0.025 (1.37)
Difference (Z-stat)	0.124 (6.70)***	0.061 (3.30)***	−0.063 (−3.32)***

Magnitude of *Non-GAAP Earnings*

	Clawback adopters	Non-adopters	Diff. (t-stat)
Before	0.544	0.548	0.004 (0.02)
After	0.514	0.515	0.001 (0.05)
Difference (t-stat)	0.030 (1.45)	0.033 (1.49)	0.003 (0.01)

Magnitude of *Non-GAAP Exclusions*

	Clawback adopters	Non-adopters	Diff. (t-stat)
Before	0.049	0.054	0.005 (0.55)
After	0.088	0.088	0.000 (0.02)
Difference (t-stat)	0.039 (3.75)***	0.034 (2.84)***	−0.005 (−0.35)

This table presents univariate differences of non-GAAP earnings across clawback adopters and non-adopters before and after clawback adoption. *Non-GAAP* is an indicator variable equal to 1 if firm *i* discloses non-GAAP earnings in quarter *q* and 0 otherwise. *Non-GAAP Earnings* is non-GAAP EPS as reported in firms' press releases. *Non-GAAP Exclusions* is Non-GAAP Earnings - GAAP Earnings (Basic EPS before extraordinary items and discontinued operations). *SI* is an indicator variable equal to 1 if a company reports special items and 0 otherwise. *Special Items* is special items reported in Compustat, divided by total assets and multiplied by −1. P-values are based on two-tailed tests. *, **, *** indicate p-values of 0.10, 0.05, and 0.01, respectively.

In Table 3, we present descriptive statistics for the non-GAAP reporting choices of clawback adopters and their matched control firms. As shown in Panel A, clawback adopters are less likely to disclose non-GAAP earnings over the entire sample period: the frequency is 0.449 for adopters versus 0.502 for non-adopters, and the difference is highly significant. However, there are no significant differences in the average magnitudes of non-GAAP earnings, non-GAAP exclusions, or GAAP earnings across the two groups. For comparison purposes, we also present mean and median frequency and magnitude of special items (*SI* and *Special Items*, respectively). Clawback adopters are more likely to recognize special items than are non-adopters (0.594 vs. 0.564, $t = -2.234$), but the magnitude of special items does not differ significantly.

In Panel B, we examine non-GAAP reporting patterns before and after clawback adoption. The frequency of non-GAAP disclosure increases for both clawback adopters and non-adopters, consistent with trends documented by Bentley et al. (2018), but the increase is significantly greater for clawback firms. The relative frequency of non-GAAP disclosure for these firms is 0.385 in the pre-adoption period versus 0.509 post-adoption, an increase of 12.4% ($Z = 6.70$, $p = 0.01$). While the relative frequency of non-GAAP disclosure also increases after the "artificial" adoption year for the non-adopters, from 0.473 to 0.534 ($Z = 3.30$, $p = 0.01$), the difference in relative frequency differences is −0.063, indicating that the clawback adopters experienced a significantly greater increase ($Z = -3.32$, $p = 0.01$). We note that this pattern of disclosure frequency is consistent with mean reversion and perform a parallel trend analysis in Section 5.1 to address this concern.[18] Panel B also reveals that there is no significant change, on average, in the magnitude of non-GAAP earnings for either adopters or non-adopters, but that the magnitude of total exclusions increases significantly for both groups.

(*footnote continued*)

widespread use long before the recent trend in non-GAAP reporting began. However, as a sensitivity test, we recoded 170 firm-quarters where EBITDA was disclosed in a press release; our results are robust to this reclassification.

[18] The observed difference in non-GAAP disclosure frequency between clawback adopters and non-adopters in the pre-adoption period suggests that pre-adoption non-GAAP disclosure level should ideally be included as a covariate in the propensity score matching procedure. Because our non-GAAP earnings disclosures are hand-collected from firms' earnings press releases, matching on pre-adoption disclosure level is impractical at best. We therefore do not match on this variable; however, the parallel trend analysis in Section 5.1 should alleviate concerns about this issue.

5. Research design and empirical results

5.1. The frequency of non-GAAP disclosure and voluntary clawback adoption

Our descriptive data from Table 3 suggests that the frequency of non-GAAP disclosure has increased dramatically after firms adopt clawbacks. To formally test H1, we estimate a probit model of the likelihood of disclosing non-GAAP earnings in a given quarter. We model the probability of releasing non-GAAP earnings as a function of clawback adoption and other determinants of non-GAAP disclosures that have been identified in prior literature, as follows[19]

$$Prob(Non-GAAP)_{iq} = \alpha_0 + \alpha_1 After_{iq} + Controls + Year\ Fixed\ Effect + Industry\ Fixed\ Effect + \varepsilon_{iq} \qquad (2)$$

$$Prob(Non-GAAP)_{iq} = \alpha_0 + \alpha_1 Claw_{iq} + \alpha_2 After_{iq} + \alpha_3 After \times Claw_{iq} + Controls \\ + Year\ Fixed\ Effect + Industry\ Fixed\ Effect + \varepsilon_{iq} \qquad (3)$$

The dependent variable, *Non-GAAP*, is an indicator variable that equals 1 if a firm discloses non-GAAP earnings in its earnings release for a given quarter and 0 otherwise. *After* is an indicator variable that equals 1 for periods when clawback provisions (or "artificial" clawback provisions for non-adopters) are in place and 0 otherwise. *Claw* is an indicator variable that equals 1 if a firm is a voluntary adopter of clawback provisions and 0 otherwise. In Model 2, the test sample includes only clawback adopters, and our main variable of interest is *After*. In Model 3, which employs the difference-in-differences research design, the test sample includes both clawback adopters and their matched control firms, and our main variable of interest is *After × Claw*. Significant coefficients on these variables would provide evidence that clawback adoption significantly influences the likelihood of non-GAAP disclosure.

We include the following control variables in both models. We include Ln *(Total Assets)* because large firms tend to disclose non-GAAP earnings more frequently, suggesting firm size is an important factor to control for systematic difference between clawback adopters and non-adopters. Firms with high intangibles or high-tech firms have less informative GAAP earnings, and therefore are more likely to release non-GAAP earnings than other firms (Lougee and Marquardt, 2004). As such, we include intangible intensity (*Intangible*) and a high-tech indicator variable (*Tech*). Since growth firms are more likely to report non-GAAP earnings, market-to-book ratio (*Market-to-Book*) and sales growth rate (*Sales Growth*) are included in the model (Lougee and Marquardt, 2004). *Leverage* is included to control for the increased likelihood of earnings management for highly levered firms, which may result in less informative GAAP earnings. *Earnings Volatility* is used as a control because investors tend to demand additional information when earnings are volatile (DeFond and Hung, 2013). Firms reporting large special items are more likely to disclose non-GAAP earnings. Following Heflin and Hsu (2008), we include two controls for special items: (1) *SI*, which is an indicator variable that equals 1 if a firm discloses special items in quarter *q* and 0 otherwise; and (2) *Special Items*, which is the reported dollar amount of special items divided by total assets.[20] Since firms that miss earnings benchmarks are more likely to disclose non-GAAP earnings, we include a loss indicator variable (*Loss*) that equals 1 when GAAP earnings before extraordinary items are negative and 0 otherwise. In addition, a "big bath" indicator variable (*Big Bath*) is included because firms may be more likely to report non-GAAP earnings when it reports a one-time charge that results in an operating loss. Heflin and Hsu (2008) find that firms are more likely to disclose non-GAAP earnings in the fourth quarter than in other quarters. We therefore include *QTR4*, an indicator variable equal to 1 for all firm-quarters that represent the firm's fourth fiscal quarter, and 0 otherwise. Finally, we follow Doyle et al. (2003) and include total accruals (*Accruals*) as a control variable. We control for time trends in non-GAAP reporting by including year fixed effects, and standard errors are clustered at the firm level.

The results from estimating Eqs. (2) and (3) are presented in Table 4. When we limit the sample to only clawback adopters, as in Eq. (2), we find that the likelihood of non-GAAP earnings disclosure is significantly higher after clawback adoption – the estimated coefficient on *After* is 0.495 ($p < 0.01$). This result indicates that managers are significantly more likely to release non-GAAP earnings after voluntarily adopting clawback provisions than before, consistent with the descriptive data from Table 3. This result still holds when we employ the difference-in-differences method, as in Eq. (3) – the estimated coefficient on *After × Claw* is 0.227 ($p < 0.05$). The null hypothesis H1 is thus rejected, suggesting that voluntary clawback adoption significantly increases the likelihood of non-GAAP earnings disclosure.

Regarding the control variables in Eqs. (2) and (3), the signs of their estimated coefficients are generally consistent with our expectations. We find the expected positive association between *Intangible* and *Tech* and the likelihood of non-GAAP disclosure, suggesting that firms with less informative earnings are more likely to report non-GAAP earnings to communicate their performance. *Earnings Volatility* and both *SI* and *Special Items* are positively associated with the probability of non-GAAP disclosure in both models, while accruals are negatively associated, consistent with prior literature.

The difference-in-differences research design assumes that, in the absence of treatment, average outcomes of treatment and control firms would have experienced parallel trends over time. The validity of this assumption is particularly important in our analysis, as the frequency of non-GAAP disclosure for treatment firms is below that of control firms in the pre-adoption period, raising the possibility that the results in Table 4 may be due to mean reversion in non-GAAP disclosure frequency for our treatment firms.

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[19] Lougee and Marquardt (2004) examine the economic determinants of pro forma reporting; Marques (2006) and Heflin and Hsu (2008) examine the effect of SEC intervention on the frequency of non-GAAP disclosures.

[20] In addition to these measures, Heflin and Hsu (2008) include the magnitude of industry mean special items because it explains significant portion of probability of disclosing non-GAAP earnings. Our results are insensitive to the inclusion of this variable.

Table 4.
Clawback adoption and the likelihood of non-GAAP disclosure.

Variable	Only clawback adopters		Propensity score matched sample	
	Coef	Z-stat	Coef	Z-stat
Intercept	− 3.066***	− 4.23	− 1.344**	− 2.20
Claw			− 0.274**	− 2.41
After	**0.495*****	**3.70**	− 0.068	− 0.63
After × Claw			**0.227****	**2.15**
Ln(Total Assets)	− 0.007	− 0.14	0.054	1.37
Intangible	2.285***	5.37	1.042***	3.46
Tech	0.792***	3.43	0.586***	3.52
Market-to-Book	0.006	0.85	0.007	1.46
Sales Growth	0.394**	2.08	0.167	1.14
Leverage	− 0.085	− 0.21	− 0.253	− 0.95
Earnings Volatility	9.055**	2.50	7.572***	3.49
SI	0.861***	7.73	0.807***	10.72
Special Items	0.475***	3.40	0.485***	4.42
Bigbath	0.161	0.81	0.028	0.19
Loss	− 0.087	− 0.46	− 0.160	− 1.20
QTR4	0.079	0.97	− 0.029	− 0.57
Accruals	− 1.918**	− 2.42	− 1.279**	− 2.54
Year fixed effect	Yes		Yes	
Industry fixed effect	Yes		Yes	
N	2,832		5,727	
Pseudo R^2	0.321		0.243	

The dependent variable *Non-GAAP* is an indicator variable equal to 1 if firm i discloses non-GAAP earnings in quarter q and 0 otherwise. *Claw* is an indicator variable equal to 1 if firm i is a voluntary clawback adopter and 0 otherwise. *After* is an indicator variable that equals 1 if the period q is after the voluntary clawback adoption and 0 otherwise; for non-adopters, we assign "artificial" adoption periods based on the matched adopting firm. *Tech* is an indicator variable equal to 1 if firm i operates in a high-tech industry, as defined by Francis and Schipper (1999), and 0 otherwise. *Bigbath* is an indicator variable equal to 1 if firm i reports income-decreasing special items and negative earnings in quarter q and 0 otherwise. *QTR4* is an indicator variable that equals 1 if quarter q is the fourth fiscal quarter and 0 otherwise. All other variables are as defined in Appendix B. The sample period covers the first quarter of 2004 through the fourth quarter of 2010 (2004 Q1–2010 Q4). All continuous variables are winsorized at 1 percent and 99 percent. The Z-statistics are corrected for heteroscedasticity and firm-level clustering of standard errors. P-values are based on two-tailed tests. *, **, *** represent significance at the 10%, 5%, and 1% levels, respectively.

Following prior research that employs the difference-in-differences approach (e.g., Chang et al., 2016; Kausar et al., 2016), we test the validity of the parallel trend assumption by conducting a placebo test that falsely assumes that clawback adoption occurs two years prior to actual adoption. To perform this test, we hand-collect additional quarterly non-GAAP earnings disclosures for the two-year period prior to the original two-year pre-adoption period for each of our treatment and control firms and compare disclosure frequency over this four-year period by re-estimating the probit regression model in Eq. (3). However, we replace the indicator variable *After* in Eq. (3) with *PseudoAfter*, which equals one in the original pre-adoption period and zero in two-year period prior to this time. For example, if a treatment firm adopts a clawback in 2008, *PseudoAfter* equals one for years 2006 and 2007 and zero for years 2004 and 2005, for both the treatment firm and its matched control. Our variable of interest is the interaction term *Pseudo-After × Claw*. If the estimated coefficient on this variable is significantly different from zero, this suggests that the assumption of parallel trends in disclosure frequency is not supported.

We present results in Internet Appendix A. Our results reveal no significant differences in the likelihood of non-GAAP disclosure across treatment and control groups in the four-year period prior to clawback adoption – the estimated coefficient on *Pseudo-After × Claw* is not significantly different from zero. These findings support the parallel trends assumption and suggest that the increase in the likelihood of non-GAAP disclosure that we document after clawback adoption is unlikely to be driven by mean reversion.

In addition, following Armstrong et al. (2012, 2010), and Hoitash et al. (2016), we assess the sensitivity of our inferences from the difference-in-differences analysis of frequency of non-GAAP reporting to potential hidden bias from unobserved correlated omitted variables, using the bounding approach proposed by Rosenbaum (2002). Our (untabulated) analysis indicates that the critical levels of Γ are greater than 2 based on Wilcoxon signed rank tests and between 1.6 and 1.7 based on Hodges-Lehmann point estimates. There is no established benchmark to determine whether a particular Γ is sufficiently high. However, given the large number of covariates included in the propensity matching procedure, we believe it is unlikely that a correlated omitted variable would increase the odds of clawback adoption to such an extent, and conclude that our results are reasonably robust.

In sum, our analysis of non-GAAP disclosure frequency indicates that firms utilize non-GAAP earnings more frequently after voluntary adoption of clawback provisions. The increase in the frequency of non-GAAP disclosures may be either due to the perceived reduction in GAAP reporting discretion following voluntary clawback adoptions or due to an improvement in GAAP financial reporting quality, depending on whether the underlying managerial motives are to inform or mislead investors. Therefore, we proceed to our tests of non-GAAP disclosure quality (H2).

5.2. The quality of non-GAAP exclusions and voluntary clawback adoption

As noted by Black et al. (2018), the most common approach to assessing the quality of non-GAAP earnings is by determining whether non-GAAP exclusions have implications for future performance (Barth et al., 2012; Bentley et al., 2018; Black et al., 2015, 2017b; Curtis et al., 2014; Doyle et al., 2003; Frankel et al., 2011; Gu and Chen, 2004; Heflin et al., 2015; Kolev et al., 2008; Leung et al., 2018; Whipple, 2015). If excluded items are transitory, they will have no predictive power for future performance; thus the "highest quality" non-GAAP exclusions are those that have the least association with future performance.

To test H2, we estimate the Doyle et al. (2003) model of exclusion quality, using both the sample of only clawback adopters and the sample of matched treatment-control pairs, as follows:

$$
\begin{aligned}
FOPI_{q+1,q+4} = {} & \alpha_0 + \alpha_1 Non - GAAP\ Exclusion_{i,q} + \alpha_2 After_{i,q} \\
& + \alpha_3 \textbf{\textit{After}}_{i,q} \times \textbf{\textit{Non} - \textbf{\textit{GAAP Exclusion}}}_{i,q} + \alpha_4 Non - GAAP\ Earnings_{i,q} \\
& + Controls + Fixed\ Effects + \varepsilon_{i,q}
\end{aligned}
\tag{4}
$$

$$
\begin{aligned}
FOPI_{q+1,q+4} = {} & \alpha_0 + \alpha_1 Non - GAAP\ Exclusion_{i,q} + \alpha_2 Claw_i + \alpha_3 After_{i,q} \\
& + \alpha_4 Claw_i \times Non - GAAP\ Exclusion_{i,q} \\
& + \alpha_5 After_{i,q} \times Non - GAAP\ Exclusion_{i,q} + \alpha_6 After_{i,q} \times Claw_i \\
& + \alpha_7 \textbf{\textit{After}}_{i,q} \times \textbf{\textit{Claw}}_i \times \textbf{\textit{Non} - \textbf{\textit{GAAP Exclusion}}}_{i,q} \\
& + \alpha_8 Non - GAAP\ Earnings_{i,q} + Controls + Fixed\ Effecs + \varepsilon_{i,q}
\end{aligned}
\tag{5}
$$

Following Kolev et al. (2008) and Curtis et al. (2014), we use future operating income (FOPI), defined as earnings per share from operations summed over the four quarters beginning with quarter $q + 1$, as the dependent variable in our tests of exclusion quality.[21] One advantage of using future EPS from operations as a dependent variable is that Compustat excludes nonrecurring special items but includes recurring items that may be classified as other exclusions from non-GAAP earnings (Kolev et al., 2008). Future operating cash flows, the dependent variable in Doyle et al. (2003), includes nonrecurring items and is therefore a less desirable proxy for 'core' earnings, which non-GAAP earnings purports to measure.[22]

Exclusion quality is reflected in the estimated coefficient on Non-GAAP Exclusions.[23] If the excluded items are completely non-recurring, then α_1 should equal zero. However, prior research (Curtis et al., 2014; Doyle et al., 2003; Kolev et al., 2008) documents that the estimated coefficient on Non-GAAP Exclusions is significantly negative. That is, excluding expenses and losses from non-GAAP earnings is associated with lower future operating income, while excluding revenue and gains predicts higher future income. Thus, significantly positive coefficients on our variables of interest (α_3 in Eq. (4) and α_7 in Eq. (5)) would indicate movement toward the benchmark of zero and that the quality of exclusions has improved after clawback adoption, while significantly negative coefficients would indicate movement away from the benchmark of zero and signal that the quality of exclusions has deteriorated after clawback adoption.

To control for potential confounding factors affecting future operating income and non-GAAP earnings, we include the following control variables. Doyle et al. (2003) argue that growing firms have lower future operating cash flows because of long-term investment and increases in working capital and find a negative association between sales growth rate and future performance. In addition, prior empirical work finds that market-to-book ratios are positively correlated to future earnings and non-GAAP reporting decisions. Therefore, we include the sales growth rate (Sales Growth) and the market-to-book ratio (Market-to-book) as control variables. Firm size (Ln(Total Assets)) is included because the costs of opportunistic non-GAAP reporting may increase with firm size. Firms with less predictable earnings could be perceived as lower quality of earnings, creating a demand for additional information (Lougee and Marquardt, 2004). We thus include Earnings Volatility and Loss to control for this effect. We include Ln(Age) to consider potential effects of firm age on non-GAAP exclusions and future earnings. Finally, total accruals (Accruals) are included in the model to control for any effects of accrual reversal on future earnings, which may affect the association between non-GAAP exclusions and future earnings.

We present results in Table 5. The estimated coefficients on Non-GAAP Exclusion in Eqs. (4) and (5) are significantly negatively (-0.370, and -0.572, respectively), suggesting that the excluded items are not completely transitory and but likely to recur within the next four quarters, consistent with Doyle et al. (2003) and Kolev et al. (2008). More importantly, in Eq. (4), the coefficient on

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[21] In Eq. (4) and Eq. (5), the right-hand side variables are measured on a quarterly basis, while the dependent variable ($FOPI_{q+1,q+4}$) is a sum over four quarters of data, which may induce autocorrelations in the error terms. We follow Petersen (2009), who suggests that including time fixed effects and estimating standard errors clustered by firm-level yields unbiased standard errors when both time and firm effects are present; however, we also estimate Eq. (4) and Eq. (5) with both Newey-West standard errors and with heteroscedasticity- and autocorrelation-consistent (HAC) standard errors, with the number of lags equal to 3. The results are similar to those reported in Table 5.

[22] Easton (2003) also criticizes the use of future operating cash flows in Doyle et al. (2003). Kolev et al. (2008) provide a more detailed discussion regarding the choice of a dependent variable in the Doyle et al. (2003) model and conclude future operating income is the preferred choice, given the set of possible alternatives.

[23] Note that the estimated coefficient on Non-GAAP Earnings reflects the predictive ability of GAAP earnings for future performance when Non-GAAP Exclusions is included as a separate regressor in Eq. (4) and Eq. (5), a point that we demonstrate using simulated data (results available upon request). Thus α_4 in Eq. (4) and α_8 in Eq. (5) do not reflect the quality of non-GAAP exclusions, and we accordingly do not employ them in our tests of H2, consistent with prior literature.

Table 5.

Clawback adoption and the quality of non-GAAP exclusions.

Variable	Only clawback adopters		Propensity score matched sample	
	Coef	t-stat	Coef	t-stat
Intercept	− 3.186***	− 5.14	− 1.738***	− 4.14
Non-GAAP Exclusion	− 0.370**	− 2.20	− 0.572**	− 2.37
Claw			− 0.163*	− 1.78
After	0.073	0.67	0.038	0.43
Claw × Non-GAAP Exclusion			0.299	1.05
After × Non-GAAP Exclusion	**− 0.364***	**− 1.96**	0.247	0.96
After × Claw			− 0.002	− 0.03
After × Claw × Non-GAAP Exclusion			**− 0.710****	**− 2.16**
Non-GAAP Earnings	1.578***	8.59	1.828***	13.91
Sales Growth	0.399**	2.48	0.143	1.05
Ln(Total Assets)	0.267***	4.91	0.267***	6.74
Earnings Volatility	− 7.303***	− 3.17	− 4.547**	− 2.46
Loss	0.221	1.36	− 0.031	− 0.26
Market-to-Book	0.019*	1.82	0.007	1.35
Ln(Firm Age)	0.365***	3.14	0.144	1.53
Accruals	− 0.836*	− 1.81	− 1.040***	− 2.99
Year fixed effect	Yes		Yes	
Industry fixed effect	Yes		Yes	
N	2,878		5,784	
Adjusted R²	0.589		0.577	

The dependent variable $FOPI_{q+1, \, q+4}$ is defined as earnings per share from operations, summed over quarters q + 1 to q + 4. *Non-GAAP Earnings* is non-GAAP EPS as reported in firms' press releases. *Non-GAAP Exclusions* is Non-GAAP Earnings - GAAP Earnings (Basic EPS before extraordinary items and discontinued operations). *Claw* is an indicator variable equal to 1 if firm i is a voluntary clawback adopter and 0 otherwise. *After* is an indicator variable that equals 1 if the period q is after the voluntary clawback adoption and 0 otherwise; for non-adopters, we assign "artificial" adoption periods based on the matched adopting firm. Ln*(Firm Age)* is the natural logarithm of the number of years since the firm first appeared in Compustat. All other variables are as defined in Appendix B. The sample period covers the first quarter of 2004 through the fourth quarter of 2010 (2004 Q1–2010 Q4). All continuous variables are winsorized at 1% and 99%. The t-statistics are corrected for heteroscedasticity and firm-level clustering of standard errors. P-values are based on two-tailed tests. *, **, *** represent significance at the 10%, 5%, and 1% levels, respectively.

After × Non-GAAP Exclusion is significantly negative (− 0.364), indicating that exclusions become *less transitory* after voluntary clawback adoption than before. This suggests that managers use non-GAAP earnings more opportunistically after clawback provisions are in place, consistent with the view that clawback provisions impose significant costs on managing GAAP earnings and that managers switch their focus toward non-GAAP earnings as an earnings management tool after adoption. Eq. (5) presents results using the propensity score matched sample. The coefficient on the main variable of interest, α_7, is significantly negative (− 0.710), again suggesting that the exclusion becomes less transitory, i.e., clawback firms use non-GAAP earnings more opportunistically after adoption.

The signs of coefficients on control variables are generally consistent with prior literature. *Non-GAAP Earnings, Sales Growth,* firm size (*Ln(Total Assets)*), and firm age (*Ln(Age)*) are all significantly positively related to future operating income, which suggests that large, mature and profitable firms with good growth opportunities tend to have better future performance. *Earnings Volatility* is negatively related to future operating income, suggesting that firms with less predictable earnings tend to report lower future earnings. Finally, total accruals (*Accrual*) are associated with lower future operating income, consistent with the reversal of accruals.

In addition to the Doyle et al. (2003) measure of exclusion quality, we use a simpler measure recently introduced by Black et al. (2015, 2017b). The variable *Aggressive* is defined as an indicator variable that equals one if *Non-GAAP Earnings* is greater than I/B/E/S Actual Earnings and zero otherwise. This measure of non-GAAP exclusion quality is interpreted as a measure of aggressive non-GAAP reporting since it indicates that the manager's exclusions are not supported by analysts and are likely to represent the exclusion of recurring rather than transitory items, consistent with recent evidence provided by Bentley et al. (2018).

To test H2 using this alternative measure, we adopt the same approach as in Eqs. (2) and (3), except that the dependent variable is now *Aggressive* and we add two executive compensation variables, Ln*(Bonus)* and Ln*(Option)*, as controls, following Black et al. (2015):

$$Prob(Aggressive_q) = \alpha_0 + \alpha_1 \textbf{\textit{After}}_{i,q} + Controls + FixedEffects + \varepsilon_q \tag{6}$$

$$Prob(Aggressive_q) = \alpha_0 + \alpha_1 Claw_i + \alpha_2 After_{i,q} + \alpha_3 \textbf{\textit{After}}_{i,q} \times \textbf{\textit{Claw}}_i$$
$$+ Controls + Fixed\ Effects + \varepsilon_q \tag{7}$$

We present our findings in Table 6. We first compare univariate differences in the frequency of *Aggressive* non-GAAP reporting before and after clawback adoption in Panel A. We find no difference in *Aggressive* across adopters and non-adopters in the pre-adoption period; the relative frequencies are 0.105 and 0.113, respectively, and the difference is not significant. However, we document a highly significant increase in the frequency of *Aggressive* reporting for the clawback adopters after adoption, from 0.105 to 0.158 ($p < 0.01$). While the frequency of *Aggressive* reporting also increased for non-adopters, from 0.113 to 0.132, the difference is

Table 6.

Aggressiveness of non-GAAP reporting after clawback adoption.

Panel A: Univariate differences in frequency of *Aggressive* disclosure			
	Clawback adopters	Non-adopters	Diff. (Z-stat)
Before	0.105	0.113	0.008 (0.70)
After	0.158	0.132	−0.026 (−1.98)**
Difference (Z-stat)	0.053 (4.31)***	0.019 (1.62)	−0.034 (1.95)*

Panel B: Probit analysis of *Aggressive* disclosure				
	Clawback only sample		Propensity score matched sample	
	Coef	Z-stat	Coef	Z-stat
Intercept	1.199*	−2.00	0.158	0
Claw			0.004	0.03
After	**0.302***	**1.87**	−0.005	−0.04
After* × *Claw			**0.227***	**1.69**
Ln(Total Assets)	−0.188*	−3.05	−0.132*	−2.94
Intangible	0.656	1.25	0.326	1.01
Tech	0.560*	2.07	0.240	1.29
Market-to-Book	0.008	0.51	0.008	0.79
Sales Growth	0.256*	1.72	0.088	0.83
Leverage	0.758*	1.89	0.017	0.06
Earnings Volatility	−2.911	−0.99	2.021	1.02
SI	0.190	1.20	0.213*	2.09
Special Items	−0.122	−0.64	0.101	0.79
Bigbath	−0.264	−1.24	−0.183	−1.23
Loss	0.245	1.19	0.193	1.35
QTR4	0.017	0.20	−0.041	−0.67
Accruals	−0.729	−1.00	−0.538	−0.94
Ln(Bonus)	−0.004	−0.13	0.012	0.65
Ln(Option)	−0.023	−1.05	−0.007	−0.51
Year fixed effect	Yes		Yes	
Industry fixed effect	Yes		Yes	
N	2,144		4,625	
Pseudo R^2	0.157		0.102	

The dependent variable *Aggressive* is an indicator variable equal to 1 if non-GAAP EPS is greater than I/B/E/S actual EPS and 0 otherwise. *Claw* is an indicator variable equal to 1 if firm *i* is a voluntary clawback adopter and 0 otherwise. *After* is an indicator variable that equals 1 if the period *q* is after the voluntary clawback adoption and 0 otherwise; for non-adopters, we assign "artificial" adoption periods based on the matched adopting firm. Ln*(Bonus)* is the natural logarithm of the CEO's annual cash bonus. Ln*(Option) is* the natural logarithm of the CEO's annual option award. All other variables are as defined in Appendix B. The sample period covers the first quarter of 2004 through the fourth quarter of 2010 (2004 Q1–2010 Q4). All continuous variables are winsorized at 1 percent and 99 percent. The Z-statistics are corrected for heteroscedasticity and firm-level clustering of standard errors. P-values are based on two-tailed tests. *, **, *** represent significance at the 10%, 5%, and 1% levels, respectively.

not significant. Further, a test of difference-in-differences is marginally significant ($Z = 1.95$, $p < 0.10$), consistent with a decrease in quality of non-GAAP exclusions following clawback adoption.

In Panel B, we present estimation results for Eqs. (6) and (7), where the variables of interest are *After* and *After* × *Claw*, respectively. For the sample of clawback adopters, the estimated coefficient on *After* is 0.302 and marginally significant ($p < 0.10$), while for the propensity matched sample, the estimated coefficient on *After* × *Claw* is 0.227 and also marginally significantly different from zero ($p < 0.10$). These results indicate that aggressive non-GAAP reporting is marginally more likely to occur after clawback adoption, consistent with the results in Table 5 showing that exclusion quality deteriorates after adoption.

Taking the results from the frequency (H1) and quality (H2) tests together, our evidence indicates that the frequency of non-GAAP disclosure increases and the quality of non-GAAP exclusions deteriorates after the voluntary adoption of clawback provisions. This is consistent with an overall increase in opportunistic non-GAAP reporting following voluntary clawback adoption, which is not an intended consequence of clawback adoption. The cross-sectional tests in H3 – H6 should provide additional insight into this finding.

5.3. Cross-sectional tests

To help confirm our initial inference that opportunistic non-GAAP reporting increases after clawback adoption, we examine whether the changes we document in non-GAAP reporting frequency and quality vary cross-sectionally with managers' non-GAAP reporting incentives (H3 and H4) and with GAAP earnings reporting (H5 and H6). For brevity, we confine our cross-sectional analyses to the propensity score matched sample. In addition, we employ the simpler of our two measures of non-GAAP exclusion quality – the indicator variable *Aggressive* – as it becomes difficult to interpret estimated coefficients on four-way interaction terms when cross-sectional variables are introduced into the Doyle et al. (2003) model. Our general approach is to add appropriate test variables to our statistical models of *Non-GAAP* and *Aggressive*, unless prior literature provides a compelling alternative specification (see Eq. (8) in Section 5.3.1 below).[24]

Table 7.
Meeting/beating analyst forecasts with non-GAAP exclusions.

Dependent Variable	MBE = 1 if (Street > Forecast) (Doyle et al., 2013) *Prob (Street_MBE1)*		MBE = 1 if (Street > Forecast) and (Forecast > GAAP) *Prob (Street_MBE2)*	
	Coef	Z-stat	Coef	Z-stat
Claw	0.103	1.34	−0.025	−0.10
After	0.004	0.05	0.334	1.46
PosExc	0.172*	1.65	1.734***	8.88
After × Claw	−0.020	−0.19	−0.503	−1.43
Claw × PosExc	−0.220	−1.61	−0.229	−0.82
After × PosExc	−0.235*	−1.87	−0.526**	−2.32
After × Claw × PosExc	**0.350****	**2.03**	0.588*	1.64
PosDA	0.081	1.63	−0.016	−0.19
Market-to-Book	0.003	0.68	0.004	0.64
Sales Growth	0.383***	3.77	−0.140	−0.97
Ln(Total Assets)	0.048**	2.27	0.171***	4.5
Profitable	0.877***	9.11	0.749***	4.53
ROA	3.552***	4.01	−4.243***	−3.26
Year fixed effect	Yes		Yes	
Industry fixed effect	Yes		Yes	
N	5,553		2,643	
Pseudo R^2	0.101		0.209	

Street_MBE1 is an indicator variable equal to 1 if I/B/E/S actual EPS (Street) is greater than the most recent consensus median EPS forecast (Forecast) and 0 otherwise. *Street_MBE2* is an indicator variable equal to 1 if Street > Forecast and Forecast > GAAP EPS and 0 otherwise. *Claw* is an indicator variable equal to 1 if firm *i* is a voluntary clawback adopter and 0 otherwise. *After* is an indicator variable that equals 1 if the period *q* is after the voluntary clawback adoption and 0 otherwise; for non-adopters, we assign "artificial" adoption periods based on the matched adopting firm. *PosExc* is an indicator variable equal to 1 if non-GAAP earnings exceeds GAAP earnings and 0 otherwise. *PosDA* is an indicator variable equal to 1 if discretionary accruals, estimated using the modified cross-sectional Jones (1991) model, are positive and 0 otherwise. *Profitable* is an indicator variable equal to 1 if I/B/E/S actual earnings > 0 and 0 otherwise. *ROA* is income before extraordinary items divided by total assets. *Market-to-Book, Sales Growth,* and Ln*(Total Assets)* are defined in Appendix B. The sample period covers the first quarter of 2004 through the fourth quarter of 2010 (2004 Q1–2010 Q4). All continuous variables are winsorized at 1 percent and 99 percent. The t-statistics are corrected for heteroscedasticity and firm-level clustering of standard errors. P-values are based on two-tailed tests. *, **, *** represent significance at the 10%, 5%, and 1% levels, respectively.

5.3.1. Non-GAAP disclosures and managerial reporting incentives

In H3, we test whether clawback adoption affects managers' use of non-GAAP reporting to meet or beat analyst earnings forecasts. We adopt the model in Doyle et al. (2013), as follows:

$$\begin{aligned}\text{Prob}(MBE)_{i,q} = \alpha_0 &+ \alpha_1 Claw_i + \alpha_2 After_{i,q} + \alpha_3 PosExc_{i,q} + \alpha_4 After_{i,q} \times Claw_i \\ &+ \alpha_5 Claw_i \times PosEx_{i,q} + \alpha_6 After_{i,q} \times PosExc_{i,q} + \alpha_7 \boldsymbol{After_{i,q} \times Claw_i} \\ &\times \boldsymbol{PosExc_{i,q}} + Controls + Fixed\ Effects + \varepsilon_{i,q}\end{aligned}$$

(8)

We examine two meeting/beating variables (*MBE*). The first is defined as per Doyle et al. (2013) as an indicator variable that equals one if I/B/E/S actual earnings meets or exceeds the median consensus analyst earnings forecast from I/B/E/S, and zero otherwise (*Street_MBE1*). The main variable of interest in Doyle et al. (2013) is *PosExc*, an indicator variable that equals one if non-GAAP earnings exceeds GAAP earnings and zero otherwise. They report a significantly positive coefficient on *PosExc* and interpret it as evidence that managers opportunistically exclude expenses from non-GAAP earnings to meet or beat analyst forecasts. We add to their main model the indicator variables *Claw* and *After* and interact them with *PosExc* as our first test of H3.

The results using *Street_MBE1* are presented in the left column of Table 7. Consistent with Doyle et al. (2013), we report a positive coefficient of 0.172 on *PosExc*, though it is only marginally significant at $p < 0.10$. Of greater interest to us, however, is the significantly positive coefficient on *After × Claw × PosExc* of 0.350 ($p < 0.05$). This finding indicates that firms are more likely to exclude expenses from non-GAAP earnings to meet or exceed analyst forecast after clawback adoptions. In addition, the significantly positive coefficients on the control variables *Salesgrowth*, Ln*(Total Assets), Profitable*, and *ROA* are consistent with Doyle et al. (2013).

In addition, because we are most interested in examining the frequency with which firms use positive non-GAAP exclusions to exceed a forecast that they would otherwise miss under GAAP earnings, we slightly modify the Doyle et al. (2013) meet-or-beat measure. Their definition of *Street_MBE1* captures numerous instances where GAAP earnings meets or exceeds the forecast and firms nonetheless exclude expenses from non-GAAP earnings or do not even release a non-GAAP measure at all. These cases of meeting-or-beating are less relevant for our purposes. We therefore eliminate these instances by redefining *MBE* so that it equals one if I/B/E/S actual earnings meets or exceeds the forecast *and* GAAP earnings miss the forecast (*Street_MBE2*) and by limiting the sample only to

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[24] For consistency, we employ the full set of control variables from Table 6 – *Ln(TotalAssets), Intangible, Tech, Market-to-Book, Sales Growth, Leverage, Earnings Volatility, SI, Special Items, Bigbath, Loss, QTR4, Accruals Ln(Bonus),* and *Ln(Option)* – in all of the analyses presented in Tables 8 through 11, except that we omit *Ln(Bonus)* and *Ln(Option)* in Table 8, where compensation becomes the variable of interest.

those firms that disclosed non-GAAP earnings.

The results are shown in the right column of Table 7. The estimated coefficient on *PosExc* is much higher than previously at 1.734 and is very highly significant, with $t = 8.88$. However, our main variable of interest is *After* × *Claw* × *PosExc*, which has a positive coefficient of 0.588 but is only marginally significant ($p < 0.10$), indicating that this type of meeting/beating behavior is somewhat more likely to occur after clawback adoption. Notably, the coefficients on the control variables are comparable to those in the first column, with the exception of *ROA*. The negative coefficient on *ROA* indicates that missing the forecast using GAAP earnings (and exceeding it using non-GAAP) is more likely for less profitable firms, an intuitive result.

Overall, the results from Table 7 are consistent with an increase in the opportunistic use of non-GAAP disclosure after clawback adoption and suggest that meeting external earnings benchmarks is one incentive behind managers' non-GAAP reporting choices.[25]

Next, we examine in H4 the role that compensation incentives play in determining non-GAAP reporting decisions after clawback adoption. To test H4, we adopt an approach similar to Black et al. (2015) and estimate the following probit regression models:

$$
\begin{aligned}
Prob(Non-GAAP)_{i,q} \; &or \; Prob(Aggressive)_{i,q} \\
&= \alpha_0 + \alpha_1 Claw_i + \alpha_2 After_{i,q} + \alpha_3 After_{i,q} \times Claw_i + \alpha_4 Comp_{i,q} \\
&+ \alpha_5 Claw_i \times Comp_{i,q} + \alpha_6 After_{i,q} \times Comp_{i,q} + \alpha_7 After_{i,q} \times Claw_i \\
&\times Comp_{i,q} + Controls + Fixed\ Effects + \varepsilon_{i,q}
\end{aligned}
\tag{9}
$$

Our main variable of interest is the interaction term *After* × *Claw* × *Comp*, where *Comp* is a measure of current incentive-based executive compensation. We examine both annual bonus and equity-based incentive compensation. Following Efendi et al. (2007), we scale each variable by cash salary for the same fiscal year to capture the relative importance of each component of incentive compensation. However, because deHaan et al. (2013) find an increase in CEO base salaries following clawback adoption, we also scale by total compensation.

We present results in Table 8. In Panel A, where the dependent variable is *Non-GAAP*, the estimated coefficient on *After* × *Claw* × *Comp* is 1.569 and significant at the 0.05 level ($t = 2.18$) when we examine the association between bonus over total cash compensation and the likelihood of non-GAAP reporting. The estimated coefficient on *After* × *Claw* × *Comp* is also at least marginally significantly positive when we scale bonus and equity-based pay over total compensation, as shown in the two right-most columns of Panel A. These findings suggest that the use of incentive-based pay provides managers with incentive to disclose non-GAAP earnings more frequently following clawback adoption. However, in Panel B, where the dependent variable is *Aggressive*, the estimated coefficient on *After* × *Claw* × *Comp* is not significantly different from zero in any of the specifications. These findings are consistent with Black et al. (2015), who document a significantly positive association between short-term incentive pay and non-GAAP reporting but find no significant link between short-term incentive pay and aggressive non-GAAP disclosure. Curtis et al. (2017) document a similar result, reporting that compensation committees contract on adjusted earnings to remove the effects of events outside of manager's control, inconsistent with managerial opportunism. Overall, the results in Table 8 suggest that the use of incentive-based pay may motivate managers to disclose non-GAAP earnings more frequently, but not necessarily more opportunistically, after clawback adoption, perhaps because compensation committees are able to 'undo' the reporting effects of aggressive disclosure.[26]

5.3.2. Non-GAAP disclosures and GAAP earnings reporting

In H5, we examine whether the changes we observe in non-GAAP reporting after clawback adoption are linked to changes in GAAP earnings quality. We use two measures of GAAP earnings quality examined in the prior clawback literature – accruals-based earnings management and earnings response coefficients.

We first test H5 by examining whether the changes in non-GAAP reporting after clawback adoption are linked to income-increasing accruals-based management, using the following the probit models:

$$
\begin{aligned}
Prob(Non-GAAP)_{i,q} &or \; Prob(Aggressive)_{i,q} \\
&= \alpha_0 + \alpha_1 Claw_i + \alpha_2 After_{i,q} + \alpha_3 PosDA_{i,q} + \alpha_4 After_{i,q} \times Claw_i \\
&+ \alpha_5 Claw_i \times PosDA_{i,q} + \alpha_6 After_{i,q} \times Income\_Inc\_EM_{i,q} \\
&+ \alpha_7 After_{i,q} \times Claw_i \times PosDA_{i,q} + Controls + Fixed\ Effects \\
&+ \varepsilon_{i,q}
\end{aligned}
\tag{10}
$$

The variable *PosDA* is an indicator variable that equals one if discretionary accruals, estimated using the modified cross-sectional

---

[25] We also modified the Doyle et al. (2013) meet-or-beat measure by replacing non-GAAP earnings (I/B/E/S actual earnings) with our hand-collected non-GAAP disclosures from press releases. This measure is arguably most relevant for our purposes, as it is not affected by analyst adjustments to managers' non-GAAP reporting decisions. Consistent with the results in Table 7, we find a significantly positive coefficient on *After* × *Claw* × *PosExc* (t = 2.25, p <0.01). However, we caution that this result may suffer from a potential mechanical relationship because both the dependent and independent variable are based on non-GAAP earnings.

[26] Note that our tests in Table 8 cannot definitively rule out the use of incentive-based compensation contracts as a motivation for the increase in opportunistic non-GAAP disclosure that we document for the average clawback adopter because they are joint tests of managerial and compensation committee choices. That is, managers may aggressively report non-GAAP earnings, but if compensation committees adjust for managerial opportunism, then no statistical association will be observed between aggressive disclosure and incentive pay.

Table 8.

Executive compensation and non-GAAP earnings disclosure.

Panel A: *Non-GAAP* earnings disclosure

Compensation measure (*Comp*)	Bonus/Cash compensation		Equity/Cash compensation		Bonus/Total compensation		Equity/Total Compensation	
	Coef	Z-stat	Coef	Z-stat	Coef	Z-stat	Coef	Z-stat
Intercept	−1.900***	−4.33	−1.950***	−4.40	−1.875***	−4.29	−2.157***	−4.82
Claw	−0.325**	−2.42	−0.320*	−1.81	−0.341***	−2.59	−0.151	−0.56
After	−0.060	−0.48	−0.105	−0.71	−0.064	−0.51	0.104	0.50
Comp	0.338	0.84	0.036	1.61	0.511	0.58	0.597*	1.81
After × Claw	0.237*	1.80	0.400**	2.16	0.250*	1.93	−0.119	−0.40
Claw × Comp	−0.998*	−1.68	−0.017	−0.51	−2.003*	−1.65	−0.503	−1.02
After × Comp	−0.801	−1.62	−0.004	−0.14	−2.147	−1.48	−0.489	−1.30
After × Claw × Comp	1.569**	2.18	−0.018	−0.46	3.945**	1.97	0.971*	1.68
Ln(Total Assets)	0.043	1.00	0.024	0.52	0.041	0.96	0.030	0.70
Intangible	1.059***	3.45	1.057***	3.47	1.066***	3.49	1.035***	3.41
Tech	0.475***	2.72	0.455***	2.58	0.480***	2.75	0.451***	2.57
Market-to-Book	0.006	1.19	0.005	1.04	0.006	1.16	0.006	1.18
Sales Growth	0.144	1.01	0.140	1.02	0.142	1.00	0.148	1.03
Leverage	−0.197	−0.68	−0.205	−0.71	−0.197	−0.67	−0.155	−0.53
Earnings Volatility	9.054***	3.65	8.722***	3.52	9.143***	3.64	8.698***	3.56
SI	0.776***	9.44	0.784***	9.59	0.779***	9.46	0.785***	9.61
Special Items	0.525***	4.38	0.526***	4.39	0.527***	4.38	0.518***	4.35
Bigbath	0.052	0.34	0.048	0.30	0.050	0.33	0.049	0.32
Loss	−0.172	−1.25	−0.171	−1.26	−0.170	−1.23	−0.185	−1.35
QTR4	−0.013	−0.24	−0.004	−0.07	−0.010	−0.19	−0.005	−0.10
Accruals	−1.023*	−1.93	−0.911*	−1.73	−0.993*	−1.87	−0.951*	−1.81
Year fixed effect	Yes		Yes		Yes		Yes	
Industry fixed effect	Yes		Yes		Yes		Yes	
N	4,829		4,829		4,829		4,829	
Pseudo R^2	0.250		0.250		0.251		0.251	

Panel B: *Aggressive* non-GAAP disclosure

Compensation measure (*Comp*)	Bonus/Cash compensation		Equity/Cash compensation		Bonus/Total compensation		Equity/Total Compensation	
	Coef	Z-stat	Coef	Z-stat	Coef	Z-stat	Coef	Z-stat
Intercept	−0.550	−0.81	−0.636	−0.85	−0.582	−0.86	−0.701	−1.05
Claw	0.062	0.41	−0.016	−0.08	0.055	0.37	0.315	1.04
After	−0.003	−0.02	0.010	0.06	0.019	0.15	0.200	0.81
Comp	0.300	0.69	−0.004	−0.15	1.042	1.21	0.233	0.59
After × Claw	0.174	1.22	0.248	1.11	0.164	1.17	−0.001	0.00
Claw × Comp	−0.968	−1.63	0.004	0.11	−1.997	−1.59	−0.662	−1.11
After × Comp	−0.011	−0.02	−0.003	−0.10	−0.747	−0.54	−0.399	−0.98
After × Claw × Comp	0.933	1.11	−0.007	−0.14	2.772	1.17	0.476	0.61
Ln(Total Assets)	−0.137***	−3.24	−0.128***	−2.88	−0.135***	−3.20	−0.126***	−2.95
Intangible	0.308	0.95	0.321	1.01	0.303	0.93	0.298	0.94
Tech	0.250	1.37	0.253	1.41	0.249	1.36	0.258	1.46
Market-to-Book	0.007	0.78	0.007	0.75	0.007	0.77	0.007	0.68
Sales Growth	0.081	0.76	0.084	0.79	0.082	0.77	0.074	0.69
Leverage	0.020	0.07	0.012	0.04	0.018	0.06	−0.014	−0.05
Earnings Volatility	2.220	1.13	2.098	1.06	2.161	1.10	1.990	1.00
SI	0.213**	2.11	0.215**	2.13	0.218**	2.15	0.218**	2.19
Special Items	0.097	0.76	0.092	0.72	0.094	0.74	0.094	0.74
Bigbath	−0.174	−1.19	−0.170	−1.16	−0.173	−1.18	−0.164	−1.12
Loss	0.200	1.39	0.196	1.37	0.201	1.39	0.194	1.36
QTR4	−0.041	−0.66	−0.043	−0.70	−0.041	−0.66	−0.046	−0.75
Accruals	−0.539	−0.94	−0.557	−0.98	−0.529	−0.92	−0.600	−1.05
Year fixed effect	Yes		Yes		Yes		Yes	
Industry fixed effect	Yes		Yes		Yes		Yes	
N	4,629		4,629		4,629		4,629	
Pseudo R^2	0.102		0.101		0.102		0.102	

The dependent variable in Panel A, *Non-GAAP,* is an indicator variable equal to 1 if firm *i* discloses non-GAAP earnings in quarter *q* and 0 otherwise. The dependent variable in Panel B, *Aggressive*, is an indicator variable equal to 1 if non-GAAP EPS is greater than I/B/E/S actual EPS and 0 otherwise. *Claw* is an indicator variable equal to 1 if firm *i* is a voluntary clawback adopter and 0 otherwise. *After* is an indicator variable that equals 1 if the period *q* is after the voluntary clawback adoption and 0 otherwise; for non-adopters, we assign "artificial" adoption periods based on the matched adopting firm. *Comp* is alternatively defined as either CEO annual cash bonus or equity compensation, divided by either CEO total cash compensation or total compensation, as indicated in each column heading. All other variables are defined in Appendix B. The sample period covers the first quarter of 2004 through the fourth quarter of 2010 (2004 Q1–2010 Q4). All continuous variables are winsorized at 1 percent and 99 percent. The Z-statistics are corrected for heteroscedasticity and firm-level clustering of standard errors. P-values are based on two-tailed tests. *, **, *** represent significance at the 10%, 5%, and 1% levels, respectively.
%%%

Table 9.

Non-GAAP reporting and accruals-based earnings management.

| | $Prob(Non-GAAP)_{i,q}$ | | $Prob(Aggressive)_{i,q}$ | |
	Coef	Z-stat	Coef	Z-stat
Intercept	−1.063**	−2.16	0.462	1.11
Claw	−0.376**	−2.25	−0.169	−0.89
After	0.004	0.03	−0.052	−0.33
PosDA	0.098	1.01	0.044	0.40
After × Claw	0.257	1.48	0.510**	2.45
Claw × PosDA	−0.033	−0.22	0.235	1.37
After × PosDA	−0.209	−1.63	0.068	0.48
After × Claw × PosDA	**0.149**	**0.82**	**−0.393***	**−1.79**
Ln(Total Assets)	0.048	1.08	−0.134***	−2.99
Intangible	1.032***	3.38	0.307	0.95
Tech	0.456***	2.60	0.240	1.29
Market-to-Book	0.006	1.23	0.008	0.78
Sales Growth	0.150	1.03	0.089	0.84
Leverage	−0.212	−0.74	0.024	0.09
Earnings Volatility	8.908***	3.63	2.058	1.05
SI	0.787***	9.60	0.214**	2.11
Special Items	0.523***	4.37	0.112	0.87
Bigbath	0.050	0.32	−0.173	−1.14
Loss	−0.171	−1.24	0.200	1.37
QTR4	−0.021	−0.39	−0.062	−0.97
Accruals	−1.050*	−1.93	−0.717	−1.20
Ln(Bonus)	0.002	0.11	0.013	0.68
Ln(Option)	−0.005	−0.38	−0.007	−0.49
Time Fixed	Yes		Yes	
Industry Fixed	Yes		Yes	
N	4,812		4,612	
Pseudo R^2	0.2486		0.1036	

Non-GAAP is an indicator variable equal to 1 if firm i discloses non-GAAP earnings in quarter q and 0 otherwise. *Aggressive* is an indicator variable equal to 1 if non-GAAP EPS is greater than I/B/E/S actual EPS in quarter q and 0 otherwise. *Claw* is an indicator variable equal to 1 if firm i is a voluntary clawback adopter and 0 otherwise. *After* is an indicator variable that equals 1 if the period q is after the voluntary clawback adoption and 0 otherwise; for non-adopters, we assign "artificial" adoption periods based on the matched adopting firm. *PosDA* is an indicator variable equal to 1 if discretionary accruals, estimated using the modified cross-sectional Jones (1991) model, are positive and 0 otherwise. All other variables are defined in Appendix B. The sample period covers the first quarter of 2004 through the fourth quarter of 2010 (2004 Q1–2010 Q4). All continuous variables are winsorized at 1 percent and 99 percent. The Z-statistics are corrected for heteroscedasticity and firm-level clustering of standard errors. P-values are based on two-tailed tests. *, **, *** represent significance at the 10%, 5%, and 1% levels, respectively.

Jones (1991) model, are positive, and zero otherwise. The main variable of interest is *After × Claw × PosDA*. A negative coefficient on this interaction term is consistent with managers using non-GAAP disclosure as a substitute for accrual-based management of GAAP earnings following clawback adoption.

As shown in the left-hand column of Table 9, where the dependent variable is *Non-GAAP,* we find no evidence that managers are more likely to substitute non-GAAP disclosure for accrual-based earnings management after clawback adoption – the estimated coefficient of 0.149 on *After × Claw × PosDA* is not significantly different from zero (Z = 0.82). However, in Panel B, where the dependent variable is *Aggressive*, we find a marginally significantly negative association between the likelihood of income-increasing discretionary accruals and aggressive non-GAAP reporting after clawback adoption (the estimated coefficient is −0.393, t = −1.79). This latter finding provides some support for the idea that managers substitute aggressive non-GAAP disclosure (i.e., managers exclude recurring expenses from non-GAAP earnings) for reduced accrual-based earnings management after clawback adoption.

We also test H5 by examining whether the changes in non-GAAP reporting after clawback adoption are linked to changes in ERCs by estimating the following OLS regression model:

$$Freq(NonGAAP)_{i,t} \text{ or } Freq(Aggressive)_{i,t}$$
$$= \alpha_0 + \alpha_1 Claw_i + \alpha_2 After_t + \alpha_3 ERC_{i,t} + \alpha_4 After_t \times Claw_{i_t}$$
$$+ \alpha_5 Claw_i \times ERC_{i,t} + \alpha_6 After_t \times ERC_{i,t}$$
$$+ \alpha_7 After_t \times Claw_i \times ERC_{i,t} + Controls + Industry\ Fixed\ Effect$$
$$+ \varepsilon_{i,t} \tag{11}$$

The dependent variable *Freq(Non-GAAP)* is defined as the natural log of the number of quarters in which the firm discloses non-GAAP earnings in the pre- or post-adoption period; *Freq(Aggressive)* is similarly defined for aggressive non-GAAP disclosure.[27] We estimate ERCs using the standard methodology by regressing three-day abnormal returns around the quarterly earnings

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[27] Results from estimating Eq. (11) are insensitive to defining the dependent variables *Freq(Non-GAAP)* and *Freq(Aggressive)* as raw rather than logged frequencies.

Table 10.

Non-GAAP reporting and GAAP earnings informativeness.

| | Freq(Non-GAAP) | | Freq(Aggressive) | |
	Coef	Z-stat	Coef	Z-stat
Intercept	0.107	0.3	0.796*	1.73
Claw	−0.192**	−2.05	−0.037	−0.46
After	0.055	0.76	0.005	0.07
ERC	0.017	1.16	0.011	0.85
After × Claw	0.163*	1.66	0.101	1.16
Claw × ERC	−0.039*	−1.82	−0.013	−0.74
After × ERC	−0.105***	−2.87	−0.055*	−1.84
After × Claw × ERC	**0.133***	**2.85**	**0.080**	**2.20**
AvgLn(Total Assets)	0.019	0.62	−0.066**	−2.36
AvgIntangible	0.516**	2.24	0.134	0.64
AvgTech	0.242*	1.96	0.056	0.48
AvgMarket-to-Book	0.331	1.52	0.334	1.39
AvgSales Growth	0.009	0.76	0.003	0.29
AvgLeverage	−0.076	−0.34	0.023	0.12
AvgEarnings Volatility	6.075***	2.63	2.684	0.99
AvgSI	0.866***	6.99	0.194*	1.72
AvgSpecial Items	0.849**	2.59	0.260	1.01
AvgBigbath	−0.444	−1.14	−0.436	−1.43
AvgLoss	−0.016	−0.06	0.212	0.99
AvgQTR4	0.011	0.01	0.581	1.42
AvgAccrual	−2.468**	−2.57	−0.494	−0.57
AvgLn(Bonus)	−0.004	−0.24	0.006	0.53
AvgLn(Option)	−0.013	−1.24	−0.007	−0.75
AvgBeta	0.051	0.69	−0.002	−0.03
Industry fixed effect	Yes		Yes	
N	660		660	
Pseudo R^2	0.382		0.074	

Freq(Non-GAAP) is the natural log of the number of fiscal quarters in which non-GAAP earnings is disclosed in the pre- and post- adoption periods. *Freq(Aggressive)* is the natural log of the number of fiscal quarters in which non-GAAP EPS > I/B/E/S actual EPS in the pre- and post-adoption periods. *Claw* is an indicator variable equal to 1 if firm i is a voluntary clawback adopter and 0 otherwise. *After* is an indicator variable that equals 1 if the period q is after the voluntary clawback adoption and 0 otherwise; for non-adopters, we assign "artificial" adoption periods based on the matched adopting firm. *ERC* is the earnings response coefficient, estimated separately for the pre- and post- adoption periods, using 3-day cumulative abnormal returns around the quarterly earnings report date and changes in net income (GAAP earnings). We require at least 8 quarters of earnings and return data to estimate *ERC*. All other variables are averaged over the pre- and post-adoption periods using the definitions listed in Appendix B. The sample period covers the first quarter of 2004 through the fourth quarter of 2010 (2004 Q1–2010 Q4). All continuous variables are winsorized at 1 percent and 99 percent. Z-statistics are corrected for heteroscedasticity and firm-level clustering of standard errors. P-values are based on two-tailed tests. *, **, *** represent significance at the 10%, 5%, and 1% levels, respectively.

announcement date on unexpected earnings, defined as seasonally-differenced quarterly net income scaled by total assets. We require eight quarters of earnings data to estimate *ERC* for both the pre- and post-adoption periods, which gives us a maximum of 756 observations (189 matched pairs in the pre- and post-periods); however, missing data reduces the sample size to 660. The main variable of interest is *After × Claw × ERC*. If changes in non-GAAP reporting are related to the effect of clawback adoption on ERCs, we expect to observe a significantly positive coefficient on this interaction variable. We include all of the control variables used previously but also add systematic risk as measured by the beta coefficient from a market model of returns (Collins and Kothari, 1989). Each control variable is averaged or estimated over the 8 quarters in the relevant period. As reported in Table 10, we find a significantly positive coefficient of 0.133 ($t = 2.85$) on *After × Claw × ERC* when *Freq(NonGAAP)* is the dependent variable, as well as a significantly positive coefficient of 0.080 ($t = 2.20$) when *Freq(Aggressive)* is the dependent variable, indicating that the changes we document in non-GAAP reporting after clawback adoption are linked to GAAP-based ERCs, as expected.

Overall, the analyses in Tables 9 and 10 support the relation between clawback adoption and the changes we observe in non-GAAP reporting. We argue that managers may use non-GAAP earnings disclosure more opportunistically because the costs of GAAP earnings management increase after clawback adoption – i.e., any effect of clawback adoption on non-GAAP disclosure is conditional on its impact on GAAP earnings quality. The analyses in Tables 9 and 10 help to affirm this link and give us additional confidence that our main results are not by driven by correlated omitted variable bias.[28]

Lastly, in H6, we test whether cross-sectional variation in managers' ability to engage in accruals-based management of GAAP earnings affects their use of non-GAAP disclosures after clawback adoption. Following Barton and Simko (2002), we use beginning

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[28] We also used earnings restatements as a proxy for GAAP earnings quality but found no evidence that non-GAAP reporting was associated with fewer restatements after clawback adoption. However, as observed by deHaan et al. (2013) and Denis (2012), earnings restatements may be a poor proxy for earnings quality after clawback adoption because their reduced frequency could stem from managerial reluctance to restate rather than an actual improvement in GAAP earnings quality.

Table 11.
Net operating assets and non-GAAP reporting.

| | $Prob(Non-GAAP)_{i,q}$ | | $Prob(Aggressive)_{i,q}$ | |
	Coef	Z-stat	Coef	Z-stat
Intercept	1.055*	−1.78	−0.240	−0.39
Claw	−0.310*	−1.69	0.242	1.17
After	−0.023	−0.17	0.087	0.61
After × Claw	0.120	0.70	−0.149	−0.79
NOA	0.060	1.43	0.035	1.09
Claw × NOA	−0.033	−0.55	−0.106	−1.44
After × NOA	−0.049	−1.28	−0.035	−1.44
After × Claw × NOA	**0.098***	**1.74**	**0.160*****	**2.98**
Ln(Total Assets)	0.041	0.92	−0.132***	−3.05
Intangible	0.906***	2.80	0.285	0.90
Tech	0.450**	2.55	0.247	1.34
Market-to-Book	0.007	1.25	0.007	0.70
Sales Growth	0.175	1.32	0.108	1.00
Leverage	−0.098	−0.32	0.059	0.21
Earnings Volatility	8.521***	3.44	1.749	0.86
SI	0.794***	9.72	0.223**	2.21
Special Items	0.508***	4.23	0.087	0.68
Bigbath	0.047	0.30	−0.201	−1.33
Loss	−0.147	−1.08	0.206	1.45
QTR4	−0.019	−0.34	−0.051	−0.82
Accruals	−1.034*	−1.92	−0.621	−1.06
Ln(Bonus)	0.002	0.09	0.010	0.49
Ln(Option)	−0.005	−0.37	−0.008	−0.54
Year fixed effect	Yes		Yes	
Industry fixed effect	Yes		Yes	
N	4,797		4,598	
Pseudo R^2	0.255		0.1056	

Non-GAAP is an indicator variable equal to 1 if firm *i* discloses non-GAAP earnings in quarter *q* and 0 otherwise. *Aggressive* is an indicator variable equal to 1 if non-GAAP EPS is greater than I/B/E/S actual EPS and 0 otherwise. *Claw* is an indicator variable equal to 1 if firm *i* is a voluntary clawback adopter and 0 otherwise. *After* is an indicator variable that equals 1 if the period *q* is after the voluntary clawback adoption and 0 otherwise; for non-adopters, we assign "artificial" adoption periods based on the matched adopting firm. *NOA* is net operating assets at the beginning of period q, scaled by sales for quarter q-1. All other variables are defined in Appendix B. The sample period covers the first quarter of 2004 through the fourth quarter of 2010 (2004 Q1–2010 Q4). All continuous variables are winsorized at 1 percent and 99 percent. The Z-statistics are corrected for heteroscedasticity and firm-level clustering of standard errors. P-values are based on two-tailed tests. *, **, *** represent significance at the 10%, 5%, and 1% levels, respectively.

net operating assets (NOA) as our proxy for earnings management constraints. To test H6, we add an interaction term between NOA and *After × Claw* to probit models of non-GAAP frequency and quality, as follows:

$$
\begin{aligned}
Prob(Non-&GAAP)_{i,q} or\ Prob(Aggressive)_{i,q} \\
=&\alpha_0 + \alpha_1 Claw_i + \alpha_2 After_{i,q} + \alpha_3 After_{i,q} \times\ Claw_i + \alpha_4 NOA_{i,q-1} \\
&+\alpha_5 Claw_i \times NOA_{i,q-1} + \alpha_6 After_{i,q} \times NOA_{i,q-1} + \alpha_7 After_{i,q} \times Claw_i \\
&\times NOA_{i,q-1} + Controls + Fixed\ effects + \varepsilon_q
\end{aligned}
\tag{12}
$$

As shown in Table 11, the estimated coefficient on the main variable of interest, *After × Claw × NOA*, is 0.098 and marginally significantly positive in the left-hand column, where the dependent variable is *Non-GAAP*. In the right-hand column, where the dependent variable is *Aggressive*, the estimated coefficient is 0.160 and highly significant at the 0.01 level. These results indicate that managers at firms with higher NOA levels are marginally more likely to disclose non-GAAP earnings more frequently after clawback adoption but are significantly more likely to engage in aggressive disclosure by excluding recurring items from non-GAAP earnings.[29] Managers thus appear to become more sensitive to NOA, our proxy for the ability to manage GAAP earnings through accruals, when making non-GAAP reporting decisions after clawback adoption. This finding provides additional evidence consistent with our underlying premise that it is the increased cost of GAAP earnings management under clawbacks that indirectly leads to the changes we document in non-GAAP reporting.

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[29] As an alternative test of exclusion quality, we also rank clawback adopters by NOA and repeat the analysis in Table 5 for the highest and lowest quintiles of NOA. The estimated coefficient on *After × Claw × Non-GAAP Exclusion* is significantly negative only for the highest quintile of NOA, consistent with the results from Table 11.

6. Conclusions

The primary objective of compensation recovery provisions, or clawbacks, is to prevent managers from issuing misstated financial statements in anticipation of higher compensation. Consistent with this objective, the extant literature documents that voluntary adoption of clawback provisions improves financial reporting quality. Investors view earnings as more informative after clawback adoption. The presence of clawback provisions may, however, make GAAP earnings more costly for managers to misstate. We argue that increases in the costs of misstating GAAP earnings are likely to alter manager's non-GAAP reporting behavior because of the relatively lower costs for misstating non-GAAP earnings after clawback adoption.

We find that managers release non-GAAP earnings more frequently after the voluntary adoption of clawback provisions. In addition, the quality of non-GAAP exclusions tends to deteriorate after these provisions are adopted. These findings suggest that opportunistically-motivated managers may shift their focus from GAAP to non-GAAP earnings in response to the increased costs of manipulating GAAP earnings relative to non-GAAP earnings after clawback adoption. Additional cross-sectional tests help to corroborate our findings.

These findings contribute to the growing literature on clawback adoption, as well as to the more general literature examining substitution effects between alternative financial reporting strategies. Our results also have practical relevance, as the SEC has proposed Rule 10D-1 to implement mandatory clawback adoption for all publicly traded firms. We caution, however, that the changes we observe in non-GAAP reporting following voluntary adoption of clawbacks may not generalize to mandatory adopters. Voluntary adopters may have had the most to gain in terms of improvement in GAAP earnings quality, which suggests that reporting effects may be less pronounced for mandatory adopters. Alternatively, if agency conflicts, such as those examined by Dey (2008), interfered with optimal adoption decisions, stronger results might be observed for at least some mandatory adopters. Future research might address these questions if and when the SEC releases the final version of Rule 10D-1.

Acknowledgments

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.jacceco.2018.09.002.

Appendix A. Identifying non-GAAP disclosure

We examine each press release obtained from firms' 8-K filings and classify a firm as having disclosed non-GAAP earnings in these circumstances:

1) The earnings press release includes "non-GAAP", "adjusted", or "modified" earnings in addition to GAAP earnings. Most of companies using these terms provide a table reconciling the non-GAAP earnings figure with GAAP earnings, as per Regulation G. However, we classify a firm as reporting non-GAAP earnings in these instances regardless of whether the company provides a separate reconciliation table.

2) The firm reports earnings excluding certain items (e.g. special items or other expenses) and **clearly mention amounts of exclusions and items excluded**. Most of these cases do not provide separate reconciliation tables, so we carefully read texts and income statements. For example, Valeo Energy Corp.'s 2009 3Q earnings announcement clearly describes items excluded in earnings but does not provide reconciliation tables:

SAN ANTONIO, October 27, 2009 — Valero Energy Corporation (NYSE: VLO) today reported a net loss of $219 million, or $0.39 per share, for the third quarter of 2009, excluding special items. This compares to net income of $1.0 billion, or $1.91 per share, for the third quarter of 2008, excluding special items. On a GAAP basis, the company reported a net loss of $489 million, or $0.87 per share, for the third quarter of 2009, compared to third quarter 2008 net income of $1.2 billion, or $2.18 per share. **Special items in the third quarter 2009 include an asset impairment loss of $417 million before taxes**, or $0.48 per share after taxes, related primarily to the permanent shutdown of the gasifier complex at the company's Delaware City refinery. The third quarter 2008 special items include a gain of $305 million on the sale of the Krotz Springs, Louisiana refinery and $43 million of asset impairment losses before taxes, which together amount to $0.27 per share after taxes.

The third quarter 2009 operating loss was $579 million versus $1.8 billion of operating income in the third quarter of 2008. **Excluding the special items discussed above, the third quarter 2009 operating loss was $162 million** compared to $1.6 billion of operating income in the third quarter of 2008.

1) Following prior literature (Bhattacharya et al., 2003), if the company reports EBITDA, we do not classify that company as a non-

GAAP reporting firm; however, we do classify disclosure of "modified" or "adjusted" EBITDA as non-GAAP reporting. Most firms reporting "modified" or "adjusted" EBITDA provide separate reconciliation tables. For example, Hovnanian Enterprises, Inc. includes in its 3Q 2009 earnings releases "adjusted" EBITDA, which excludes an inventory impairment loss, land option write-offs, and a gain on extinguishment of debt.

Appendix B. Variable definitions (listed alphabetically)

Variable names	Variable definition
Accruals	Net income less cash from operations, divided by total assets
After	Indicator variable that equals 1 if the period *q* is after the voluntary clawback adoption and 0 otherwise. For non-clawback adopters, we assign "artificial" adoption years using propensity score matching.
Aggressive	Indicator variable equal to 1 if non-GAAP earnings > I/B/E/S actual earnings and 0 otherwise
AvgBeta	Mean value of CAPM beta for pre- and post-adoption periods. Beta is the market model systematic risk estimate obtained by regressing 60 daily raw returns on the CRSP equally weighted return ending in quarter t-1.
Big4	Indicator variable equal to 1 if a company hires a Big 4 auditor and 0 otherwise
Bigbath	Indicator variable equal to 1 if a firm reports income-decreasing special items and negative earnings in the same quarter and 0 otherwise
Bonus/Cash Compensation	CEO annual cash bonus, divided by CEO total cash compensation
Bonus/Total Compensation	CEO annual cash bonus, divided by CEO total compensation
CEOChairman	Indicator variable equal to 1 when a CEO is also chairman of the board and 0 otherwise
CEOTenure	Natural logarithm of length of CEO tenure in years
CEOTurnover	Indicator variable equal to one if a CEO is dismissed/resigned and 0 otherwise
Claw	Indicator variable equal to 1 if firm *i* is a voluntary clawback adopter and 0 otherwise
DA	Discretionary accruals (DA) are defined as the residual from the following industry-adjusted cross-sectional regression, estimated by 2-digit SIC and quarter: $$\frac{Accruals_{i,t}}{Assets_{i,t-1}} = k_1 \frac{1}{Assets_{i,t-1}} + k_2 \frac{(\Delta Sales - \Delta AR)_{i,t}}{Assets_{i,t-1}} + k_3 \frac{PPE_{i,t}}{Assets_{i,t-1}} + \varepsilon_{i,t}$$
Earnings Volatility	Standard deviation of ROA over past 8 quarters
Equity/Cash Compensation	CEO annual equity compensation, divided by CEO total cash compensation
Equity/Total Compensation	CEO annual equity compensation, divided by CEO total compensation
ERC	Earnings response coefficient in the pre- and post-adoption periods, estimated by regressing 3-day cumulative abnormal returns around the quarterly earnings report date on unexpected earnings, defined as seasonally-differenced quarterly net income scaled by total assets. To estimate *ERC*, we require at least 8 quarters of earnings surprise and return data.
FOPI (Future Operating Income)	Earnings Per Share from operations, summed over quarters *q* + 1 to *q* + 4
Freq (Aggressive)	Natural logarithm of the number of quarters that the company reports *Aggressive* non-GAAP earnings in the pre- or post-adoption period.
Freq (Non-GAAP)	Natural logarithm of the number of quarters that the company discloses non-GAAP earnings in the pre- or post-adoption period, respectively.
GAAP Earnings	Basic EPS before extraordinary items and discontinued operations
Intangible	Intangible assets divided by total assets
Leverage	Total liabilities divided by total assets
Ln(Audit Fee)	Natural logarithm of audit fees
Ln(Bonus)	Natural logarithm of annual bonus
Ln(CashPay)	Natural logarithm of annual salary plus bonus
Ln(Firm Age)	Natural log of the number of years since the firm first appeared in Compustat
Ln(Option)	Natural logarithm of the fair value of option awards
Ln(Total Assets)	Natural logarithm of total assets
Ln(TotalComp)	Natural logarithm of total annual compensation
Loss	Indicator variable equal to 1 if earnings before extraordinary items < 0 and 0 otherwise
Market-to-Book	Market value of equity divided by book value of equity
NOA	Net operating assets at the beginning of period q, scaled by sales for quarter q-1.
Non-GAAP	Indicator variable equal to 1 if a firm discloses non-GAAP earnings and 0 otherwise
Non-GAAP Earnings	Non-GAAP Earnings per Share, as reported in firms' press releases

Non-GAAP Exclusions	Non-GAAP Earnings minus GAAP Earnings
PosDA	Indicator variable equal to 1 if discretionary accruals (estimated using modified cross-sectional Jones, 1991 model) > 0 and 0 otherwise
PosExc	Indicator variable equal to 1 if Non-GAAPExclusions > 0 and 0 otherwise
Prob(Street_MBE1)	An indicator variable equal to 1 if I/B/E/S actual EPS > analyst consensus EPS forecast and 0 otherwise
Prob(Street_MBE2)	An indicator variable equal to 1 if I/B/E/S actual EPS > analyst consensus EPS forecast and GAAP EPS is less than analyst consensus EPS forecast, and 0 otherwise
Profitable	Indicator variable equal to 1 if I/B/E/S actual earnings > 0 and 0 otherwise
QTR4	Indicator variable equal to 1 for 4th quarter and 0 otherwise
Restatement	Indicator variable equal to 1 if a firm restated its financial statements within the prior two years and 0 otherwise
ROA	Income before extraordinary items divided by total assets
Sales Growth	Annual percentage increase in sales, on a per share basis
SI	Indicator variable equal to 1 if a company reports special items and 0 otherwise
Special Items	Special items reported in Compustat, divided by total assets and multiplied by -1
Tech	Indicator variable equal to 1 if firm i is a high-tech industry as defined in Francis and Schipper (1999) and 0 otherwise
%Insiderholding	The percentage of insiders' shareholding
%Institutionalholding	The percentage of institutional investors' shareholding
%Outside	The percentage of outside directors on board

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