Do Analysts' Cash Flow Forecasts Encourage Managers to Improve the Firm's Cash Flows? Evidence from Tax Planning*

BENJAMIN C. AYERS, *University of Georgia*

ANDREW C. CALL, *Arizona State University*†

CASEY M. SCHWAB, *Indiana University*

ABSTRACT

Recent research finds that analysts' cash flow forecasts have meaningful financial reporting ramifications, but, to date, the identified effects are unlikely to yield meaningful cash flow benefits. This study examines whether analysts' cash flow forecasts encourage managers to enhance the firm's cash flow position through tax avoidance activities. We evaluate the change in cash tax avoidance after analysts begin issuing cash flow forecasts relative to a propensity score matched control sample of firms without cash flow forecasts. Consistent with analysts' cash flow forecasts encouraging tax avoidance that enhances the firm's cash flow health, we find a negative association between cash tax payments and analysts' cash flow coverage. Additional analysis suggests this association is driven primarily by strategies to permanently avoid rather than to temporarily defer tax payments and that increased cash tax avoidance activity represents a nontrivial component of the overall increase in reported operating cash flows after the initiation of analysts' cash flow coverage.

Les prévisions de trésorerie des analystes encouragent-elles les gestionnaires à améliorer la position de trésorerie de l'entreprise ? Données tirées de la planification fiscale

RÉSUMÉ

Les travaux de recherche récents révèlent que les prévisions de trésorerie des analystes ont d'importantes répercussions sur l'information financière; jusqu'à maintenant, cependant, les incidences relevées sont peu susceptibles d'entraîner des avantages appréciables au chapitre de la trésorerie. Les auteurs se demandent si les prévisions de trésorerie des analystes encouragent les gestionnaires à améliorer la position de trésorerie de l'entreprise en recourant à des mesures d'évitement des décaissements relatifs à l'impôt. Ils évaluent l'évolution du comportement d'évitement fiscal une fois que les analystes ont commencé à produire des prévisions de trésorerie par rapport à un échantillon de contrôle constitué d'entreprises à l'égard desquelles les analystes ne produisent pas de prévisions de trésorerie, sélectionnées selon la méthode de l'appariement des coefficients de propension. Conformément à l'idée selon laquelle les

* Accepted by Partha Mohanram. Ayers gratefully acknowledges the support of the Terry College of Business and the J. M. Tull School of Accounting; Call gratefully acknowledges the support of the W. P. Carey School of Business; and Schwab gratefully acknowledges the support of the Kelley School of Business. This paper has benefited from helpful comments from John Campbell, Margaret Christ, Stacie Laplante, Rick Laux, Steve Utke, workshop participants at Arizona State University, Temple University, the University of Iowa Tax Readings Group, the University of Texas Capital Markets Readings Group, and participants in the *Journal of the American Taxation Association* Conference.

† Corresponding author.

Contemporary Accounting Research Vol. 35 No. 2 (Summer 2018) pp. 767–793 © CAAA
doi:10.1111/1911-3846.12403

prévisions de trésorerie des analystes encouragent les activités d'évitement fiscal propres à améliorer la santé de la trésorerie de l'entreprise, les auteurs notent l'existence d'un lien négatif entre les décaissements relatifs à l'impôt et la couverture des flux de trésorerie par les analystes. Une analyse supplémentaire semble indiquer que ce lien repose principalement sur des stratégies visant à éviter de façon permanente, plutôt qu'à reporter temporairement, les décaissements relatifs à l'impôt, et que l'intensification des activités d'évitement des décaissements relatifs à l'impôt constitue un élément non négligeable de la hausse globale des flux de trésorerie liés à l'exploitation observée après le début de la couverture des flux de trésorerie par les analystes.

1. Introduction

Recent research finds that analysts' cash flow forecasts have meaningful financial reporting ramifications. McInnis and Collins (2011) find that when a firm's analysts begin issuing cash flow forecasts, the quality of the firm's reported accruals improves and the probability of meeting or beating earnings benchmarks declines. Lee (2012) finds that firms with cash flow forecasts are more likely to alter the classification of cash flows within the cash flow statement and to strategically time certain short-term transactions (i.e., delay payments to suppliers or accelerate collections from customers in the fourth quarter) in an effort to enhance year-end reported operating cash flows. While analysts' cash flow forecasts have been shown to elicit certain financial reporting responses, these responses are unlikely to have a meaningful effect on the firm's long-term cash flow health. Specifically, altering the classification of cash flows within the cash flow statement has no direct cash flow consequence, and delaying payments to suppliers from the fourth quarter of one year to the first quarter of the following year is unlikely to yield meaningful cash flow benefits. In this study, we examine whether cash flow forecasts affect managerial efforts to improve the firm's cash flow health. Specifically, we examine the association between analysts' cash flow forecasts and cash tax avoidance.

Tax avoidance is a particularly useful setting to investigate whether cash flow forecasts impact managerial actions to improve the firm's cash flow position for several reasons. First, tax avoidance strategies are usually long-term in nature, either permanently avoiding taxes or deferring the payment of taxes for several years. As a result, the cash savings from tax avoidance can be substantial, especially relative to the modest savings that result from deferring payments for only one quarter (or less). Second, while other alternatives to improving the firm's cash flows (e.g., reducing advertising or research and development expenditures) may yield short-term improvements in the firm's cash position, they can also reduce firm value and have a negative impact on the firm's long-term cash flows (Roychowdhury 2006), issues less likely to plague firms that improve their cash position through tax avoidance. Third, the accounting for income taxes allows us to identify a firm's cash tax payments, total tax expense, and the portion of the current year's total tax expense that is being deferred until subsequent years. This allows us to more cleanly measure the extent to which the firm defers or permanently avoids tax payments, something that is much more difficult to quantify with the avoidance of non-tax payments.

Finally, linking cash flow forecasts to cash tax avoidance is of particular interest given recent research (Graham et al. 2014; Robinson et al. 2010) and anecdotal evidence that managers focus on tax avoidance that reduces financial statement tax expense, with only a secondary interest in tax avoidance that only enhances cash flows (i.e., that reduces cash taxes paid). Accordingly, this is a particularly interesting setting to test whether cash flow forecasts alter managerial behavior with respect to the firm's cash flow position.

Prior research posits that analysts' cash flow forecasts create an alternative focal point that demands managers' attention (Lee 2012), encouraging actions that improve the firm's

reported cash flows. In addition, Call (2009) finds that investors assign relatively more weight to operating cash flows after the initiation of analysts' cash flow coverage than in the period before analysts begin forecasting cash flows. As a result, when analysts begin issuing cash flow forecasts, managers have increased incentives to improve the firm's operating cash flow position, and the net benefits of engaging in activities that avoid cash tax payments increases. Accordingly, we contend that, ceteris paribus, cash flow forecasts encourage increased tax avoidance that enhances the firm's cash flow position.

To investigate our hypothesis, we employ a difference-in-differences design and identify a sample of firms for which analysts begin providing cash flow forecasts and a propensity score matched control sample of firms without cash flow forecasts. The matched sample controls for the fact that (a) the initiation of analysts' cash flow coverage is not an exogenous event, and (b) tax avoidance activity associated with cash flow forecasts could arise from the same underlying economic forces associated with the issuance of cash flow forecasts. Our primary measure of cash tax avoidance is the firm's cash tax payment scaled by the number of common shares outstanding. We test whether firms in our cash flow forecast sample increase cash tax avoidance (i.e., reduce cash tax payments) in the three years following the initiation of analysts' cash flow coverage relative to the three years before analysts began issuing cash flow forecasts. We compare this change in cash tax avoidance to the corresponding change for the propensity score matched control sample, controlling for factors associated with either the initiation of analysts' cash flow coverage or tax avoidance activity. These controls ensure that any changes in tax planning are not attributable to cross-sectional differences in the determinants of analysts' cash flow coverage or to cross-sectional differences in other determinants of tax planning.

Consistent with cash flow forecasts encouraging increased tax avoidance that enhances cash flows, we find that analysts' cash flow coverage is negatively associated with cash tax payments. In terms of economic magnitude, our findings suggest that relative to the propensity score matched control sample, cash flow forecast firms experience an 8.2 cent reduction in cash tax payments per share after analysts begin issuing cash flow forecasts for the firm (after controlling for other determinants of tax avoidance and cash flow coverage), which equates to approximately $35.4 million less in cash taxes paid over the three-year period following the initiation of analysts' cash flow coverage for the average firm in our sample.

We investigate the relation between cash flow forecasts and cash tax avoidance in more detail by separately analyzing cash tax avoidance attributable to permanent tax planning strategies and tax deferral strategies. Investigating permanent tax planning and tax deferral separately provides insight into the types of tax strategies managers pursue when faced with increased incentives to engage in cash tax planning. While both permanent and deferral strategies have the potential to reduce the firm's cash tax payments and yield meaningful cash flow benefits, all else equal, managers face stronger incentives to engage in permanent tax avoidance activities because they result in tax-related cash flows that are less likely to reverse. Consistent with increased incentives to invest in permanent tax planning strategies, we find that, relative to the propensity score matched control sample, firms engage in more *permanent* tax avoidance activities following the initiation of cash flow forecast coverage. This finding further suggests analysts' cash flow coverage encourages managers to engage in tax planning activities that meaningfully improve the firm's cash flow health.

To triangulate our results, we examine the change in *reported* operating cash flows after analysts begin issuing cash flow forecasts. While both profit and loss firms reduce cash tax payments after analysts begin cash flow coverage, we find that only profitable firms report increased operating cash flows during this period. This increase in reported operating cash flows is (i) unique to cash flow forecast firms (i.e., it is not found for the propensity score matched control firms), and (ii) not explained by other determinants of reported operating

cash flows or by the determinants of analysts' cash flow coverage. Further, for these profitable firms, the cash savings resulting from increased tax avoidance is responsible for approximately 56 percent of the increase in reported operating cash flows. Together, these results suggest that analysts' cash flow forecasts encourage managers to engage in activities that enhance cash flows and that tax avoidance activities that improve the firm's cash flow health represent an economically meaningful portion of this increase.

This study makes several contributions to the literature. First, we provide insight into *real* cash flow effects of analysts' cash flow forecasts. Specifically, we find an economically significant relation between cash flow forecasts and tax avoidance that suggests cash flow forecasts encourage managers to focus on activities that significantly enhance the firm's long-term cash position. While prior research suggests cash flow forecasts impact financial reporting behavior, we document benefits to the firm's underlying cash flow health as a result of analysts' cash flow forecasting activities.

Second, the forecasting literature documents various benefits to firms of analyst coverage and their forecasting activities, including a reduction in information asymmetry between insiders and outsiders (Frankel and Li 2004), a reduction in the cost of capital (Easley and O'Hara 2004), and increased external monitoring to reduce earnings management (Yu 2008). We add to this literature by documenting that analysts' cash flow forecasts encourage firms to avoid or reduce cash tax payments. Given recent evidence that suggests tax planning enhances firm value (Mills et al. 1998; Desai and Dharmapala 2009; Wilson 2009; De Simone and Stomberg 2013; Goh et al. 2013), our findings suggest a potential benefit to firms of analysts' cash flow coverage.

We also add to the literature that documents the effect of firm monitors on tax avoidance. McGuire et al. (2012) find that auditor expertise can affect a firm's tax avoidance, while Cheng et al. (2012) document that firms targeted by hedge funds experience an increase in tax avoidance activity. We complement these findings by showing that sell-side analysts also play a role in helping firms maximize their tax avoidance opportunities.

Finally, this study sheds light on the determinants of tax avoidance, incentives affecting the type of tax avoidance, and the role that an alternative performance metric plays in managers' attention to tax planning. Given the conclusions of prior research that firms "undershelter" their income (Weisbach 2002) and focus on total tax expense reported in the financial statements (instead of cash taxes paid), our evidence suggests one mitigating factor to the somewhat puzzling behavior documented in prior research.

2. Prior research and hypothesis development

Analysts' cash flow forecasts

Academic research on analysts' cash flow forecasts began with DeFond and Hung's (2003) analysis of the market demand for cash flow information.[1] They hypothesize that market participants demand supplemental cash flow information when earnings are difficult to interpret and when cash flows are particularly relevant in assessing firm viability. They find results consistent with these hypotheses, suggesting analysts respond to market demand by providing cash flow forecasts for firms exhibiting these characteristics.

In recent years, the literature on analysts' cash flow forecasts has explored a variety of issues related to analysts' cash flow forecasting activities. These topics include country-level

1. Similar to the adjustments analysts make when forecasting earnings, they make adjustments to their cash flow estimates to produce a forecast that is most relevant to the firm in question (Call et al. 2013). Similar to what is done when reporting actual earnings, I/B/E/S defines the actual cash flow value based on the exclusions made by the majority of analysts following the firm (Givoly et al. 2009).

institutional factors that predict the incidence of analysts' cash flow forecasts (DeFond and Hung 2007), analyst-level determinants of cash flow forecast issuance (Ertimur and Stubben 2005), the market pricing of cash flow surprises (Brown et al. 2013), the effect of analysts' cash flow forecasts on the pricing of operating cash flows (Call 2009) and on market efficiency (Mohanram 2014; Radhakrishnan and Wu 2014), the benefit of forecasting cash flows on analysts' *earnings* forecasts and on analyst turnover (Call et al. 2009; Pandit et al. 2012), and the underlying quality of analysts' cash flow forecasts (Givoly et al. 2009; Call et al. 2013).

The studies most relevant to ours are those that explore changes in managers' financial reporting behavior when analysts issue cash flow forecasts. McInnis and Collins (2011) argue that when analysts supplement their earnings forecast with a cash flow forecast, they also implicitly provide a forecast of accruals. They contend that this implicit accrual forecast makes accrual manipulations more transparent, constraining managers' accrual-based earnings management. Consistent with this hypothesis, they find that after analysts start forecasting cash flows for the firm, accrual quality improves and the probability of meeting or beating analysts' earnings expectations declines.

Lee (2012) argues that managers inflate reported operating cash flows when analysts issue cash flow forecasts for the firm. Specifically, she finds that firms with cash flow forecasts are more likely than other firms to file a restatement that decreases operating cash flows, suggesting cash flow forecasts create incentives for managers to opportunistically misclassify the firm's cash flows to inflate reported operating cash flows. Similarly, although prior to July 2000 GAAP allowed firms to classify the tax benefit of stock options as either an operating, investing, or financing cash flow, Lee (2012) finds that firms whose analysts issued cash flow forecasts were more likely to classify this cash inflow as an operating cash flow. These findings are consistent with analysts' cash flow forecasts encouraging managers to opportunistically classify the firm's cash flows in an effort to inflate reported operating cash flows.

In addition to documenting the opportunistic classification of cash flows, Lee (2012) also finds that managers are more likely to strategically time certain short-term transactions that enhance reported cash flows when analysts issue cash flow forecasts for the firm. Specifically, she finds that managers delay payments in the fourth quarter (e.g., deferring cash payments from the fourth quarter of one year to the first quarter of the following year) and accelerate fourth quarter cash receipts (e.g., shifting cash receipts from the first quarter of the following year to the fourth quarter of the current year) in an effort to report inflated year-end operating cash flows.

In general, both McInnis and Collins (2011) and Lee (2012) provide evidence that analysts' cash flow forecasts encourage managerial behavior that has a meaningful impact on reported earnings and reported cash flows. While these studies find evidence that analysts' cash flow forecasts affect managerial *reporting* choices, they do not speak to the effect of cash flow forecasts on the firm's underlying cash flow health.[2] For example, neither a reduction in accrual-based earnings management nor misclassifications within the statement of cash flows directly affect the firm's cash flow position. Similarly, while Lee (2012) documents that cash flow forecasts encourage firms to delay certain cash payments (e.g., payments to suppliers), she finds that these deferrals reverse the next quarter. As such, while these short-term activities may yield a desired financial reporting outcome at the end of the

2. McInnis and Collins (2011) also examine whether analysts' cash flow forecasts encourage managers to engage in more real (i.e., non-accrual) transactions to manage earnings. However, they do not examine whether managers attempt to increase cash flows following analysts' initiation of cash flow coverage.

fourth quarter, they are unlikely to yield any meaningful cash flow benefit to the firm.[3] The purpose of this study is to examine the effect of analysts' cash flow forecasts on managerial efforts to enhance the firm's cash flow position.

Tax avoidance

Tax avoidance is a particularly useful setting to evaluate managerial efforts to enhance cash flows for four reasons. First, tax avoidance strategies are often long-term in nature, either permanently avoiding or deferring the payment of taxes to future years. Tax planning strategies that permanently avoid tax payments include investing in tax-exempt municipal bonds and maximizing potential research and development credits and IRC section 199 deductions. Strategies that defer tax payments include cost-segregation studies, writing down damaged or obsolete inventory, and accelerating deductions for fixed assets, the medical portion of workers' compensation, bad debts, or accrued compensation.[4] The cash savings from tax avoidance can be substantial, especially relative to the modest savings that result from deferring payments for only one quarter (or less). Indeed, in their study of investments in tax planning, Mills et al. (1998) estimate an average return of approximately $4 for each $1 invested in tax planning. Likewise, Wilson (2009) estimates an average return of approximately $12 for each $1 in fees paid related to tax shelters (ignoring any associated in-house costs).

Second, although managers seeking to improve the firm's cash position have many options, tax avoidance is a relatively appealing choice because improvements in tax avoidance generally do not interfere with the firm's day-to-day operations. Other "real" activities the firm could employ to improve cash flows, such as reductions in advertising budgets, scaling back research and development expenditures, and delaying capital expenditures, can actually reduce firm value and impair the firm's long-term cash flows (Roychowdhury 2006).

Third, the accounting for income taxes allows us to identify a firm's cash tax payments, total tax expense, and the portion of the current year's total tax expense that is being deferred to subsequent years. This allows us to more cleanly measure the extent to which the firm defers or permanently avoids tax payments, something that is more difficult to quantify with the deferral of non-tax payments.

Finally, as Edwards et al. (2016) discuss, recent research (Graham et al. 2014; Armstrong et al. 2012; Robinson et al. 2010) suggests that when managers engage in tax avoidance, they tend to focus on strategies that reduce financial statement tax expense, with only a secondary interest in tax avoidance that enhances cash flows (i.e., reduces cash taxes paid). The evidence suggests that managers focus on tax planning strategies with a direct impact on earnings, not cash, likely because earnings are their main focal point.

Hypothesized relation between analysts' cash flow forecasts and cash tax avoidance

We hypothesize that managers are more likely to engage in additional tax avoidance activities after analysts begin forecasting cash flows for two possible reasons. First, prior research suggests that some managers may not have exhausted all positive net present value (NPV) tax avoidance strategies prior to the initiation of analysts' cash flow coverage. For example, Cheng et al. (2012) find that firms targeted by hedge fund activists exhibit significant increases in tax avoidance activity after the hedge fund intervention, and McGuire et al.

3. Short-term efforts to boost year-end cash flows can actually put the firm in a *worse* cash flow position. For example, managers can improve reported cash flows at year-end by factoring the firm's receivables.
4. Because different firms likely employ different tax avoidance strategies, it is difficult to identify a particular strategy that is employed by firms whose analysts issue cash flow forecasts. As a result, we focus on measures of tax avoidance that aggregate the impact of all permanent and deferral strategies.

(2012) find the tax expertise of the external auditor influences the tax avoidance activity of the client firm. The results of both studies suggest that some firms leave tax savings on the table and have not exhausted all tax avoidance opportunities.[5] For these firms, we argue that analysts' added focus on cash flows encourages managers to exert additional effort to engage in tax avoidance strategies.

Second, findings in prior research suggest that all firms—including those that were already optimizing their tax avoidance activities—likely experience an increase in the net benefits associated with cash inflows (e.g., cash tax savings) following the initiation of analysts' cash flow coverage because (i) analyst coverage plays a valuable monitoring role in scrutinizing managerial behavior, and (ii) analysts' forecasts provide public signals of future firm performance to the market. The increased monitoring results in a reduction in agency costs and, particularly germane to our study, increases the marginal value of cash holdings (Chen et al. 2015). Moreover, the additional signal of firm performance (i.e., the cash flow forecast) reduces information asymmetry (Kelly and Ljungvist 2012; Li and You 2015), which also increases the marginal value of cash holdings (Drobetz et al. 2010). In our setting, the increasing marginal value of cash suggests that, holding constant the costs of tax avoidance, managers have greater incentive to generate cash tax savings following the initiation of cash flow forecasts.[6] Accordingly, we predict that the initiation of analysts' cash flow coverage is associated with increased cash tax avoidance.

While we argue that analysts' cash flow forecasts increase the benefits associated with tax planning without increasing the costs of tax planning, we acknowledge that there are costs of tax planning which may offset some or all of the incremental benefits of engaging in additional tax planning. These costs include implementation, reputational, and agency costs, and—for tax strategies that are not easily reversible—a loss in "managerial flexibility." Accordingly, whether the *incremental* benefits of engaging in additional tax avoidance following the initiation of analysts' cash flow coverage exceed the costs of doing so is an empirical question.[7]

3. Sample and research design

Sample

Table 1 details our sample selection criteria. We begin with all firms on the I/B/E/S detail file for which analysts issue an annual EPS forecast from 1993 through 2010.[8] We eliminate firm-year observations without COMPUSTAT data needed to calculate the tax and accounting variables required in our empirical tests.[9] Because our primary analyses rely on a propensity score matched sample (which is described in the following section), we eliminate

5. Armstrong et al. (2012), Graham et al. (2014), and Leone (2008) provide additional empirical and anecdotal evidence that firms do not exhaust all tax avoidance opportunities.
6. Our assertion that analysts' cash flow coverage plays a monitoring role and reduces information asymmetry is consistent with evidence provided in prior studies suggesting that the initiation of analysts' cash flow coverage reduces earnings management (McInnis and Collins 2011), increases the value relevance of cash flows (Call 2009), and results in reported cash flows that are more predictive of future cash flows (Call 2009). Framing these arguments in terms of a firm's cost of capital yields similar predictions. Specifically, reductions in agency costs and information asymmetry reduce a firm's cost of capital (Bowen et al. 2008; Bradley et al. 2014; Kelly and Ljungvist 2012; Li and You 2015), which results in some investments (e.g., tax strategies) that were negative NPV projects prior to the reduction in cost of capital becoming positive NPV projects.
7. We do not examine the incentive to meet-or-beat analysts' cash flow forecasts (Brown et al. 2013), or whether optimistic vs. pessimistic cash flow forecasts are more likely to encourage tax avoidance.
8. During our sample period, 17 percent of analysts issued at least one annual cash flow forecast for a firm they follow. Among these analysts, the average analyst issues cash flow forecasts for 64 percent of his/her covered firms.
9. In untabulated tests, we also eliminate financial and utility firms, and our empirical results are unchanged.

TABLE 1
Sample selection

Data restrictions	*N*
Starting I/B/E/S sample	67,787
Less:	
Firm-years missing tax measures	−12,156
Firm-years missing control variables	0
Firm-years missing selection model variables	−28,021
Post-forecast firm-years for firms without continuous cash flow forecasts	−4,671
Subsample used to estimate propensity scores	22,939
Less:	
Firm-year observations outside of the matched sample window	−13,773
Firm-year control observations with a cash flow forecast	−478
Firm-year observations without quality match	−1,335
Propensity score matched sample (DV = *TXPD*/*CSHO*)	7,353

firm-year observations without data needed to compute the selection model variables and, thus, the propensity scores. Consistent with Mohanram (2014), we only retain cash flow forecast firms and their matched control firms if they are reasonable matches (i.e., their propensity scores differ by no more than 10 percent). For the matched firms, we retain firm-year observations during the three years prior to and the three years after analysts' initial cash flow forecast for the firm, thereby eliminating firm-year observations that do not fall in this window. This yields a final sample of 7,353 firm-year observations across the cash flow forecast and control samples.

Research design

To empirically test our hypothesis that analysts' cash flow forecasts encourage tax avoidance, we examine changes in tax avoidance around the initiation of analysts' cash flow coverage. For each firm with a cash flow forecast, we identify the first year analysts issue cash flow forecasts for the firm. This year and the following two years constitute the "post" subsample. The three years prior to the first cash flow forecast constitute the "pre" subsample.[10] We predict that firms with cash flow forecasts engage in more tax avoidance activity in the "post" period than in the "pre" period. The choice of three-year windows (e.g., three years before and three years after the initiation of analysts' cash flow coverage) is consistent with prior research (McInnis and Collins 2011) and allows us to capture tax avoidance strategies that take more than one year to implement and take effect. The three-year window also makes it unlikely that one-time tax fluctuations due to IRS settlements or payments or from time-specific macroeconomic events (Edwards et al. 2016) would unduly influence our analyses.

However, we note that analysts do not issue cash flow forecasts for a random set of firms. Rather, these firms differ from firms without cash flow forecasts in predictable ways, as documented by DeFond and Hung (2003). It is therefore possible that tax avoidance activity is associated with firm characteristics that predict analysts' cash flow coverage and not with the cash flow forecasts themselves. In addition, the provision of cash flow forecasts has increased through the years. As a result, any evidence that cash flow forecasts are

10. If analysts do not issue a cash flow forecast for a firm in any year during the "post" subsample (e.g., either one or two years after the initial cash flow forecast), we omit these firm-year observations from the analysis.

associated with an increase in tax avoidance could simply represent an increase in tax avoidance in recent years.

To overcome these concerns and to provide more robust evidence on the effect of analysts' cash flow forecasts on cash tax avoidance, we compare changes in tax avoidance activity of firms whose analysts initiate cash flow coverage to that of a propensity score matched control sample. The primary benefit of using a control sample matched on propensity scores is that it allows us to compare firms with analysts' cash flow forecasts to a set of firms without cash flow forecasts but that are similar on important observable dimensions associated with the likelihood of analyst cash flow coverage and cash tax planning, allowing us to more clearly attribute any increase in tax avoidance to analysts' initiation of cash flow coverage.

To identify the propensity score matched control sample, we follow Armstrong et al. (2010) and estimate the following model as a function of the determinants of the treatment effect (i.e., analysts' cash flow coverage) and the outcome effect (i.e., cash tax planning) for all firms in the I/B/E/S database with available data:[11]

$$\text{Prob}(CFF_{it}=1) = \gamma_0 + \sum_{k=1}^{6} \gamma_k CFF\_Determinants_{kit} + \sum_{k=7}^{14} \gamma_k TaxPlanning\_Determinants_{kit} + \varepsilon_{it}. \quad (1)$$

where CFF_{it} is an indicator variable equal to one if firm i has a cash flow forecast in year t, and zero otherwise; $CFF\_Determinants_{kit}$ is a vector of variables previously shown to be associated with analysts' cash flow coverage (DeFond and Hung 2003; McInnis and Collins 2011); $TaxPlanning\_Determinants_{kit}$ is a vector of variables expected to be associated with tax planning. We briefly discuss these variables below and provide detailed variable definitions in the Appendix. We winsorize all continuous variables at the 1 percent and 99 percent levels.

Determinants of analysts' cash flow forecast coverage

Size: We control for firm size ($Size_{it-1}$) because DeFond and Hung (2003) find that firm size is positively correlated with analysts' cash flow coverage.

Capital intensity: We control for capital intensity ($CapInt_{it-1}$) because capital-intensive firms are more reliant on operating cash flows to maintain and replace fixed assets, and their ability to demonstrate internally generated cash flows is therefore more relevant for these firms.

Financial health: We control for financial health ($Health_{it-1}$) because for firms facing solvency or liquidity concerns, operating cash flows become an important measure of whether the firm will be able to continue as a going concern.

Absolute accruals: We control for the absolute value of firm i's total accruals in year $t-1$ ($AbsAcc_{it-1}$) because cash flows are useful in validating earnings information when earnings contain a large accrual component and the risk of misstatement is high (Penman 2001).

Earnings volatility: We control for the volatility of firm i's earnings (Vol_{it-1}) because operating cash flows become a relatively more important metric when earnings are volatile.

Heterogeneity of accounting choice: We control for the heterogeneity of accounting choice ($Hetero_{it-1}$) because earnings comparability is impaired and operating cash flows

11. Armstrong et al. (2010) point out that matching on the determinants of the outcome effect (as well as the determinants of the treatment effect) relaxes the assumption of a constant functional relationship between control variables and the outcome effect.

become more important when firms elect accounting methods that differ from those used by peer firms.

Determinants of tax planning

Return on assets: We control for pre-tax return on assets (ROA_{it}) because more profitable firms generally exhibit fewer tax shields and therefore higher tax payments.[12]

Leverage: We control for leverage (Lev_{it}) because debt provides an important tax shield (Graham 1996; Mills and Newberry 2004; Newberry 1998) and, for multinationals, the flexibility to place debt in high-tax locations (Newberry and Dhaliwal 2001).

Intellectual property: Intellectual property, such as patents and brand intangibles, increases opportunities for income shifting and permanent tax avoidance. As such, we control for R&D expenditures ($R\&D_{it}$) and expect them to be negatively related to tax payments.

Foreign operations: We control for the firm's foreign operations ($Foreign_{it}$) because an extensive literature establishes that taxpayers respond to tax incentives to place income in low-tax jurisdictions.

Net operating loss (NOL): We include an indicator variable (NOL_{it}) for the presence of NOL carryforwards and expect that firms with NOLs have lower cash tax payments.[13]

Inventory intensity: We control for inventory intensity ($InvInt_{it}$) because firms with larger inventories often have fewer tax planning opportunities.

Growth: We include the book-to-market ratio (BM_{it}) to control for growth to account for tax planning opportunities that vary with firm growth.

Discretionary accruals: We include discretionary accruals ($DiscAcc_{it}$) as a control for earnings quality (Kothari et al. 2005). If firms that exhibit lower quality financial earnings are more tax aggressive (Frank et al. 2009; Wilson 2009; Lisowsky 2010), we expect $DiscAcc_{it}$ to be negatively related to cash tax payments.

We report the results of estimating equation (1) in Table 2. Consistent with expectations, we find that analysts are more likely to initiate cash flow coverage for larger firms ($Size_{it}$), firms with larger capital expenditures ($CapInt_{it}$), firms with solvency or liquidity concerns ($Health_{it}$), more volatile firms (Vol_{it-1}), and firms with greater heterogeneity in their accounting choices ($Hetero_{it}$).[14] Note also that many of the coefficients on the $TaxPlanning\_Determinants_{kit}$ are statistically significant, which suggests that including them in the selection model is appropriate.

After estimating equation (1), we calculate a propensity score for each firm-year observation, which represents the probability of receiving the treatment effect (a cash flow forecast) conditional on the independent variables included in equation (1). For each firm for which analysts issue cash flow forecasts, we identify the first year in our sample in which analysts issue a cash flow forecast for the firm. We then select the firm without a cash flow forecast with the closest propensity score in the same year and industry and designate this firm as the matched control firm.[15] Requiring the matched control firm to be from the same fiscal year as the corresponding cash flow forecast firm controls for potential time-series changes in tax avoidance. Requiring the matched control firm to be from the same industry

12. For these variables, we make no predictions regarding their association with analysts' cash flow forecast coverage, but we anticipate they will be associated with tax planning (i.e., in our second-stage analysis). Note that $TaxPlanning\_Determinants_{kit}$ does not include variables that represent size, capital intensity, or distress because $CFF\_Determinants_{kit}$ includes variables that control for these constructs.
13. Results are similar when we replace NOL_{it} with the magnitude or change in NOLs.
14. When we replace the absolute value of accruals with signed accruals, per McInnis and Collins (2011), our inferences are unchanged.
15. We follow Mohanram (2014) and require matched control firms to have a propensity score that is within 0.10 of the corresponding cash flow forecast firm.

TABLE 2
Selection model

Variable	Pred.	Coefficient	*p*-value
Intercept	?	−4.874	<0.001
$Size_{it-1}$	+	0.5878	<0.001
$CapInt_{it-1}$	+	0.3392	<0.001
$Health_{it-1}$	−	−0.0225	<0.001
$AbsAcc_{it-1}$	?	0.5939	0.005
Vol_{it-1}	+	0.0126	<0.001
$Hetero_{it-1}$	+	0.7528	<0.001
ROA_{it}	?	0.1382	0.349
Lev_{it}	?	−0.3143	0.002
$R\&D_{it}$	?	−1.3632	<0.001
$Foreign_{it}$	?	2.9575	<0.001
NOL_{it}	?	0.6399	<0.001
$InvInt_{it}$	?	−2.512	<0.001
BM_{it}	?	0.0481	0.249
$DiscAcc_{it}$	?	−0.2433	0.244
N		22,939	
Pseudo R^2		22.9%	

Notes: This table reports the logistic regression that is the basis of our propensity scores. See the Appendix for variable definitions.

is important given that tax avoidance opportunities vary by industry. We identify exactly one propensity score matched control firm for each cash flow forecast firm in our sample and find the propensity scores for the cash flow forecast firms and their matched control firms are statistically indistinguishable.[16] Because significant differences remain in some individual variables across cash flow forecast and control firms, we include both $CFF\_Determinants_{kit}$ and $TaxPlanning\_Determinants_{kit}$ as control variables in our second-stage regression (Cram et al. 2009; Armstrong et al. 2010).

For each control firm, we classify the year of the match and the following two years as the "post" observations and the three years prior to the match as the "pre" observations. In this way, our treatment (cash flow forecast) and control (no cash flow forecast) firms are aligned in calendar time and matched on firm characteristics associated with analysts' decision to issue cash flow forecasts. While no firm-year observation in the control sample has a cash flow forecast in the "pre" period (by construction), we remove any firm-year observation from the control sample if analysts ultimately issue a cash flow forecast for the firm in the "post" period. Our final cash flow forecast sample consists of 2,063 firm-year observations in the "post" period and 1,494 firm-year observations in the "pre" period, and the propensity score matched control sample consists of 1,997 firm-year observations in the "post" period and 1,799 firm-year observations in the "pre" period.

We compare changes in tax avoidance activity from the "pre" to the "post" period for the cash flow forecast sample, relative to the corresponding change in tax avoidance activity for the propensity score matched control sample. To investigate the effect of analysts' cash flow forecasts on cash tax avoidance, we estimate the following equation:

16. In the match year, the average propensity score for cash flow forecast firms is 0.329, which is insignificantly different (*p*-value = 0.673) from the average propensity score of 0.325 for the control firms, suggesting we have identified a reasonable control sample.

$$TXPD/CSHO_{it} = \beta_0 + \beta_1 CFF_{it} + \beta_2 Post_{it} + \beta_3 CFF_{it} \times Post_{it} + \sum_{k=4}^{9} \beta_k CFF\_Determinants_{kit} + \sum_{k=10}^{17} \beta_k TaxPlanning\_Determinants_{kit} + \varepsilon_{it}, \quad (2)$$

where $TXPD/CSHO_{it}$ is firm i's cash taxes paid per share in year t and is calculated as cash tax payments in year t as a percentage of total common shares outstanding during year t. Higher values of $TXPD/CSHO_{it}$ indicate lower levels of cash tax avoidance. Cash taxes paid per share is an appropriate measure of tax avoidance in our setting because analysts' cash flow forecasts are also issued on a per share basis. In addition, as a practical consideration, this measure allows us to measure tax avoidance for firms with negative pre-tax income, something that is not feasible when using cash effective tax rates. Finally, this measure is not susceptible to earnings management that increases book income but not taxable income (Guenther et al. 2014).[17] Nevertheless, as robustness, we also estimate equation (2) using cash effective tax rates as the dependent variable (see section 5).

CFF_{it} equals one if firm i is in the treatment (cash flow forecast) sample, and zero if firm i is a propensity score matched control firm. $Post_{it}$ equals one for the cash flow forecast and propensity score matched control firms during the "post" period and equals zero in the "pre" period. If cash flow forecasts are associated with increased cash tax avoidance, the coefficient on $CFF_{it} \times Post_{it}$ will be significantly negative.

Permanent and deferred tax avoidance strategies

In supplemental analyses, we introduce two additional measures of tax avoidance and re-estimate equation (2) to better understand the nature of the tax avoidance activities analysts' cash flow forecasts encourage. Firms can employ two types of tax planning strategies to reduce their cash tax payments. First, firms can engage in tax planning activities that permanently avoid the payment of taxes. We measure the use of permanent tax planning strategies ($Permanent/CSHO_{it}$) as the difference between the U.S. statutory rate (35 percent) multiplied by pre-tax income and the firm's total tax expense, scaled by common shares outstanding. Second, firms can reduce cash tax payments by deferring tax payments until future periods. We measure the use of such deferral tax planning strategies ($Deferral/CSHO_{it}$) as the ratio of deferred tax expense to common shares outstanding. Ceteris paribus, larger values of $Permanent/CSHO_{it}$ and $Deferral/CSHO_{it}$ are consistent with a firm having lower cash tax payments.

These supplemental analyses provide insight into the types of tax strategies managers pursue after analysts begin issuing cash flow forecasts for the firm and after managers have heightened incentives to engage in cash tax planning. Because permanent tax planning provides tax-related cash flows that are less likely to reverse, to the extent that these strategies have not already been exhausted, we anticipate that firms are more likely to engage in permanent tax planning strategies than in deferral tax strategies (which result in tax-related cash flows that reverse over time). However, given prior literature suggesting that firms are unlikely to have exhausted all tax deferral options, we also anticipate that firms are more likely to engage in deferral-based strategies once they have greater incentives to do so.

17. Our use of *TXPD/CSHO* is consistent with suggestions made by Hanlon and Heitzman (2010, 129) who encourage researchers to "carefully consider the underlying construct that is most appropriate for their research question" and to "select an empirical proxy... that best fits that construct based on logical reasoning."

TABLE 3
Descriptive statistics partitioned by pre- and post-cash flow forecast period and cash flow forecast vs. non-cash flow forecast firm classification

Panel A	Means (CFF firms)		Medians (CFF firms)	
Variable	Pre-CFF (N = 1,494)	Post-CFF (N = 2,063)	Pre-CFF (N = 1,494)	Post-CFF (N = 2,063)
Cash flow forecast measures				
$CFF\%_{it}$	0.000	0.246***	0.000	0.167***
Tax avoidance measures				
$TXPD/CSHO_{it}$	0.524	0.422***	0.360	0.231***
$Deferral/CSHO_{it}$	0.051	0.055	0.005	0.007
$Permanent/CSHO_{it}$	0.016	0.060***	−0.003	0.015***
$CashETR_{it}$	0.245	0.221***	0.251	0.210***
Determinants of cash flow forecasts				
$Size_{it-1}$	6.407	6.659***	6.385	6.579***
$CapInt_{it-1}$	0.554	0.630***	0.385	0.374
$Health_{it-1}$	5.479	5.131*	3.742	3.542
$AbsAcc_{it-1}$	0.077	0.079	0.056	0.061**
Vol_{it-1}	1.960	2.236*	0.644	0.744***
$Hetero_{it-1}$	0.208	0.224***	0.250	0.250***
Determinants of tax avoidance				
ROA_{it}	0.064	0.056*	0.077	0.067***
Lev_{it}	0.215	0.205	0.201	0.186*
$R\&D_{it}$	0.061	0.061	0.011	0.007***
$Foreign_{it}$	0.015	0.017	0.000	0.000**
NOL_{it}	0.300	0.392***	0.000	0.000***
$TLCF_{it}$	0.089	0.124***	0.000	0.000***
$\Delta TLCF_{it}$	0.016	0.018	0.000	0.000**
$InvInt_{it}$	0.134	0.109***	0.112	0.077***
BM_{it}	0.473	0.498**	0.389	0.411
$AbnAcc_{it}$	−0.010	−0.010	−0.010	−0.009
Additional variables				
OCF/AT_{it}	0.094	0.093	0.096	0.094
$Cash\&Equiv/AT_{it}$	0.159	0.175**	0.076	0.102***

Panel B	Means (Non-CFF firms)		Medians (Non-CFF firms)	
Variable	Pre-CFF (N = 1,799)	Post-CFF (N = 1,997)	Pre-CFF (N = 1,799)	Post-CFF (N = 1,997)
Cash flow forecast measures				
$CFF\%_{it}$	0.000	0.000†††	0.000	0.000†††
Tax avoidance measures				
$TXPD/CSHO_{it}$	0.476††	0.438**	0.268†††	0.212***
$Deferral/CSHO_{it}$	0.028†	0.033††	0.000	0.000††
$Permanent/CSHO_{it}$	0.015	0.024†††	−0.003	0.002†††
$CashETR_{it}$	0.246	0.248†††	0.251	0.246†††
Determinants of cash flow forecasts				
$Size_{it-1}$	6.044†††	6.152**, †††	5.956†††	6.035*, †††
$CapInt_{it-1}$	0.616††	0.685**	0.382	0.397
$Health_{it-1}$	5.769	4.849***	3.926	3.523***
$AbsAcc_{it-1}$	0.079	0.086**, †††	0.056	0.061**
Vol_{it-1}	2.286†	2.521	0.697	0.834***, ††

(The table is continued on the next page.)

TABLE 3 (continued)

Panel B	Means (Non-CFF firms)		Medians (Non-CFF firms)	
Variable	Pre-CFF ($N = 1{,}799$)	Post-CFF ($N = 1{,}997$)	Pre-CFF ($N = 1{,}799$)	Post-CFF ($N = 1{,}997$)
$Hetero_{it-1}$	0.217	0.236***, †††	0.250†	0.250***, †††
Determinants of tax avoidance				
ROA_{it}	0.057	0.035***, †††	0.071	0.055***, †††
Lev_{it}	0.196†††	0.204	0.174†††	0.171
$R\&D_{it}$	0.063	0.062	0.010	0.012†††
$Foreign_{it}$	0.015	0.014†††	0.000	0.000
NOL_{it}	0.393†††	0.479***, †††	0.000†††	0.000***, †††
$TLCF_{it}$	0.128††	0.169***, ††	0.000†††	0.000***, †††
$\Delta TLCF_{it}$	0.015	0.022*	0.000	0.000**
$InvInt_{it}$	0.124††	0.110***	0.100†	0.082***
BM_{it}	0.550†††	0.572†††	0.456†††	0.488***, †††
$AbnAcc_{it}$	−0.009	−0.009	−0.007	−0.006†
Additional variables				
OCF/AT_{it}	0.090	0.081**, †††	0.095	0.088**, ††
$Cash\&Equiv/AT_{it}$	0.181†††	0.189††	0.099†††	0.115**, †

Notes: ***, **, and * indicate a significant difference within the CFF or non-CFF sample between the "pre" and "post" CFF periods means or medians at the 0.01, 0.05, and 0.10 levels, respectively. †††, ††, and † indicate a significant difference across the CFF and non-CFF samples within the "pre" CFF or "post" CFF means or medians at the 0.01, 0.05, and 0.10 levels, respectively. See the Appendix for variable definitions.

4. Results

Descriptive statistics

In Table 3, we report mean values of (i) the percentage of firm i's analysts issuing an earnings forecast who also issue a cash flow forecast in year t ($CFF\%$), (ii) tax avoidance measures, (iii) $CFF\_Determinants_{kit}$, and (iv) $TaxPlanning\_Determinants_{kit}$, separately for our cash flow forecast and control firms in the "pre" and "post" periods. Focusing on the level of tax payments in the "pre" period, cash flow forecast firms report mean cash taxes per share of 0.524 (panel A), which is statistically higher than the mean cash taxes per share of 0.476 for our control sample (panel B, p-value < 0.05). In the "post" period, cash flow forecast firms report mean cash taxes per share of 0.422, which is statistically lower than their mean cash taxes per share in the "pre" period (p-value < 0.01) but no longer statistically different from control firms' mean cash taxes per share of 0.438. These univariate statistics provide preliminary evidence of increased cash tax avoidance for cash flow forecast firms after the initiation of cash flow coverage. Univariate tests also reveal that cash flow forecast firms have lower levels of *Permanent*/*CSHO* in the "pre" period than in the "post" period. Moreover, although cash flow forecast and the control firms exhibit similar levels of *Permanent*/*CSHO* in the pre-CFF period, cash flow forecast firms reported significantly higher levels of *Permanent*/*CSHO* in the post-CFF period. Although we find that cash flow forecast firms exhibit higher levels of *Deferral*/*CSHO* in both the "pre" and "post" CFF periods relative to control firms, we do not find any evidence of an increase in *Deferral*/*CSHO* from the "pre" to "post" CFF period for cash flow forecast firms or for control firms. These findings are consistent with our hypothesis that analysts' cash flow

forecasts encourage managers to increase their tax avoidance activities and improve the firm's cash flow health. We refrain from drawing formal conclusions until we control for known determinants of tax avoidance based on our difference-in-differences research design.

Among the control variables reported in Table 3, we find various significant differences between cash flow forecast and control firms in the "pre" period that sometimes persist in the "post" period. These differences highlight the importance of controlling for determinants of cash flow forecasts and determinants of tax avoidance in our multivariate analyses.

Multivariate results

We first examine the effect of analysts' cash flow forecasts on cash tax avoidance by estimating equation (2) and present these results in the first column of Table 4. Consistent with our prediction, the coefficient on the $CFF_{it} \times Post_{it}$ interaction is negative and significant (p-value < 0.001). The magnitude of the coefficient (-0.0818) is also economically meaningful as it suggests that, relative to the propensity score matched control sample, cash flow forecast firms experience an 8.2 cent reduction in cash tax payments per share after analysts begin issuing cash flow forecasts for the firm. In terms of cash taxes saved, this reduction equates to approximately $35.4 million less in cash taxes paid over the three-year period following the initiation of analysts' cash flow coverage for the average firm.[18] Consistent with prior studies, we also find that cash tax payments are increasing in profitability (ROA_{it}) and inventory intensity ($InvInt_{it}$), and decreasing in leverage (Lev_{it}), research and development expenditures ($R\&D_{it}$), the presence of net operating losses (NOL_{it}), and discretionary accruals ($DiscAcc_{it}$). We also find a positive association between cash tax payments and firm size ($Size_{it-1}$) and heterogeneity of accounting choice ($Hetero_{it-1}$), and a negative association between cash tax payments and firm health ($Health_{it}$), the absolute value of total accruals ($AbsAcc_{it-1}$), earnings volatility (Vol_{it-1}), and the book-to-market ratio (BM_{it}).

In the second and third columns of Table 4, we report results for tests estimating equation (2) using two alternative measures of tax avoidance. First, we replace $TXPD/CSHO_{it}$ with $Permanent/CSHO_{it}$, which captures tax avoidance activity that permanently avoids the payment of taxes. Such activity not only reduces cash tax payments but also reduces total tax expense in the financial statements. Second, we replace $TXPD/CSHO_{it}$ with $Deferral/CSHO_{it}$, which captures efforts to enhance cash flows by deferring the payment of taxes. Tax deferral strategies reduce the firm's cash tax payments in year t, but have no impact on reported earnings in year t because they have no impact on the firm's total tax expense for financial statement purposes. Decomposing tax avoidance in this way is interesting because it sheds light on the channels through which firms reduce their cash tax payments following analysts' initiation of cash flow coverage.

Consistent with expectations, the coefficient on $CFF_{it} \times Post_{it}$ is positive and significant (p-value $= 0.022$) when $Permanent/CSHO_{it}$ is the dependent variable. When $Deferral/CSHO_{it}$ is the dependent variable, the coefficient on $CFF_{it} \times Post_{it}$ is insignificant. These findings suggest that relative to a propensity score matched control sample, managers of firms whose

18. We calculate this figure ($35.4 million) as -0.0818 (coefficient on $CFF_{it} \times Post_{it}$) multiplied by $147.30 (average number of common shares outstanding in the "post" period for cash flow forecast firms, the denominator of $TXPD/CSHO$) multiplied by three years (the maximum number of years a cash flow forecast firm is included in the "post" period).

TABLE 4
Cash flow forecasts and cash tax planning

	TXPD/CSHO coefficient (*p*-value)	*Deferral/CSHO* coefficient (*p*-value)	*Permanent/CSHO* coefficient (*p*-value)	*Cash ETR* coefficient (*p*-value)
Intercept	0.1235	0.0172	−0.0212	0.1458*
	(0.475)	(0.762)	(0.876)	(0.056)
CFF_t	−0.0016	0.0240**	−0.0080	−0.0018
	(0.948)	(0.029)	(0.443)	(0.826)
$Post_t$	0.0019	−0.0007	−0.0028	0.0009
	(0.921)	(0.942)	(0.761)	(0.899)
$CFF_t \times Post_t$	−0.0818***	−0.0038	0.0259**	−0.0252***
	(<0.001)	(0.794)	(0.022)	(0.008)
$Size_{t-1}$	0.0972***	0.0068*	0.0153***	0.0107***
	(<0.001)	(0.054)	(<0.001)	(<0.001)
$CapInt_{t-1}$	−0.0014	0.0177**	0.0079	−0.0419***
	(0.922)	(0.030)	(0.262)	(<0.001)
$Health_{t-1}$	−0.0088***	−0.0022***	−0.0029***	−0.0009
	(<0.001)	(<0.001)	(<0.001)	(0.216)
$AbsAcc_{t-1}$	−0.2431***	−0.0075	−0.0408	−0.0908*
	(0.002)	(0.8573)	(0.329)	(0.076)
Vol_{t-1}	−0.0086***	0.0006	0.0012*	−0.0028***
	(<0.001)	(0.4315)	(0.091)	(<0.001)
$Hetero_{t-1}$	0.3502***	0.0653**	0.0015	0.0378
	(<0.001)	(0.0360)	(0.961)	(0.102)
ROA_t	1.1334***	0.2472***	0.3343***	0.0659
	(<0.001)	(0.0001)	(<0.001)	(0.132)
Lev_t	−0.0994**	0.0840***	−0.0011	−0.0368*
	(0.043)	(0.0048)	(0.967)	(0.074)
$R\&D_t$	−0.1267**	0.0103	−0.3197***	−0.2309***
	(0.050)	(0.7981)	(<0.001)	(0.001)
$Foreign_t$	0.1008	−0.1292	0.7745***	−0.1628**
	(0.736)	(0.2282)	(<0.001)	(0.045)
NOL_t	−0.0659***	0.0192**	0.0147	−0.0364***
	(<0.001)	(0.0373)	(0.102)	(<0.001)
$InvInt_t$	0.7482***	−0.1078**	−0.0494	0.2214***
	(<0.001)	(0.0417)	(0.350)	(<0.001)
BM_t	−0.0556***	0.0221	0.0063	0.0681***
	(0.009)	(0.1139)	(0.619)	(<0.001)
$DiscAcc_t$	−0.3881***	0.3836***	−0.2402***	−0.2686***
	(<0.001)	(0.0001)	(<0.001)	(<0.001)
Adjusted R^2	0.3303	0.0789	0.1382	0.1106
N	7,353	6,908	6,908	5,358

Notes: We report OLS regressions and control for industry and year fixed effects. Huber-White robust standard errors are clustered by firm. When predictions are made, *p*-values are one-tailed. *TXPD/CSHO* captures cash taxes paid per share. *Deferral/CSHO* and *Permanent/CSHO* capture tax savings per share from deferral-based and permanent tax strategies, respectively. *CashETR* equals the ratio of cash taxes paid (TXPD) to pre-tax income adjusted for special items (PI − SPI). ***, **, and * denote significance at the 0.01, 0.05, and 0.10 levels, respectively. See the Appendix for additional variable definitions.

analysts initiate cash flow coverage use permanent tax strategies that help reduce cash taxes.[19]

5. Supplemental analysis

Alternative measure of cash tax avoidance

In our primary tests above, we measure cash tax avoidance as the extent to which the firm minimizes cash taxes paid per share of common stock. This measure is appealing because it corresponds to analysts' cash flow forecasts, which are also estimated on a per share basis. It also allows us to examine cash tax avoidance for loss firms, which is more difficult to do when employing cash effective tax rates that are scaled by pre-tax income. Nevertheless, in this section we re-estimate equation (2) using an alternative measure of cash tax avoidance. Specifically, we measure the firm's cash effective tax rate ($CashETR_{it}$) measured as the ratio of cash taxes paid to pre-tax income adjusted for special items. If a firm's $CashETR_{it}$ is above one (below zero), we set $CashETR_{it}$ equal to one (zero). Note that because the denominator of $CashETR_{it}$ is a measure of income, we exclude firm-year observations with negative pre-tax income.

In the final column of Table 4, we report the results of estimating equation (2) with this alternative measure of cash tax avoidance. We find that the coefficient on $CFF_{it}\times Post_{it}$ continues to be significantly negative (coefficient = −0.0252, p-value = 0.008), consistent with the initiation of analysts' cash flow coverage leading to a 2.52 percent decrease in cash effective tax rates.

Estimating first-stage model separately by year

Prior studies examining the determinants and consequences of analysts' initiation of cash flow forecasts do not consider the possibility that the determinants of the initiation of cash flow forecasts may change over time. To account for this possibility, we re-estimate equation (1) annually and create an alternative control sample based on propensity scores generated by this annual estimation. Using this alternative matched control sample, we then re-estimate equation (2) and present the results in the first column of Table 5. Consistent with our primary analyses, we find that the coefficient on $CFF_{it}\times Post_{it}$ continues to be significantly negative (coefficient = −0.0428, p-value = 0.058), consistent with the initiation of analysts' cash flow coverage leading to a decrease in cash tax payments.

Matching separately by firm-year observation

As an alternative to our main research design, we identify a different propensity score matched control firm for each firm-year observation in our sample, rather than comparing a given firm in our cash flow forecast sample to a single control firm in all years in both the "pre" and "post" periods. This alternative allows a cash flow forecast firm to be matched to a different control firm each year, based on the most suitable match for the firm-year observation in question. When we re-estimate equation (2) using this alternative matching procedure, we continue to find a significant coefficient on $CFF_{it}\times Post_{it}$ (coefficient = −0.0853, p-value = 0.003), as reported in the second column of Table 5.

19. In untabulated analysis, we examined the association between the initiation of cash flow forecasts and "risky" tax avoidance using predicted uncertain tax benefits (computed using the methodology outlined in Rego and Wilson 2012) and the volatility of cash ETRs to proxy for risky tax avoidance. We find no evidence of an association between the initiation of cash flow forecasts and proxies for risky tax avoidance. This is not necessarily surprising given that (i) prior studies provide little evidence of a link between increased tax avoidance and tax risk (Dyreng et al. 2008; Saavedra 2015; Guenther et al. 2016), and (ii) managers have incentives to take actions to manage and smooth reported items (e.g., Bartov 1993), making it less likely that managers would avoid taxes using strategies that increase the volatility of cash flows.

TABLE 5
Cash flow forecasts and cash tax planning: Alternative research designs

	Annual estimation of propensity scores coefficient (*p*-value)	Separate matched control firm each year coefficient (*p*-value)
Intercept	0.4791**	0.0842
	(0.041)	(0.594)
CFF_t	−0.0515**	0.0133
	(0.047)	(0.379)
$Post_t$	−0.0122	0.0236
	(0.561)	(0.310)
$CFF_t \times Post_t$	−0.0428*	−0.0853***
	(0.058)	(0.003)
$Size_{t-1}$	0.0990***	0.0905***
	(<0.001)	(<0.001)
$CapInt_{t-1}$	0.0075	−0.0288
	(0.572)	(0.186)
$Health_{t-1}$	−0.0117***	−0.0150***
	(<0.001)	(<0.001)
$AbsAcc_{t-1}$	−0.3376***	−0.3382***
	(<0.001)	(0.009)
Vol_{t-1}	−0.0074***	−0.0081***
	(<0.001)	(<0.001)
$Hetero_{t-1}$	0.3763***	0.2418***
	(<0.001)	(0.007)
ROA_t	1.1565***	1.4039***
	(<0.001)	(<0.001)
Lev_t	−0.1369***	−0.0431
	(0.009)	(0.274)
$R\&D_t$	−0.1239*	−0.1681*
	(0.059)	(0.078)
$Foreign_t$	0.0012	−0.4461*
	(0.997)	(0.094)
NOL_t	−0.0874***	−0.1025***
	(<0.001)	(<0.001)
$InvInt_t$	0.5325***	0.5606***
	(<0.001)	(<0.001)
BM_t	−0.0421*	−0.0424
	(0.064)	(0.203)
$DiscAcc_t$	−0.2665***	−0.2914***
	(0.003)	(0.010)
Adjusted R^2	0.3214	0.3278
N	6,859	5,208

Notes: We report OLS regressions and control for industry and year fixed effects. Huber-White robust standard errors are clustered by firm. When predictions are made, *p*-values are one-tailed. *TXPD*/*CSHO* captures cash taxes paid per share. ***, **, and * denote significance at the 0.01, 0.05, and 0.10 levels, respectively. See the Appendix for additional variable definitions.

Sample imbalance and survivorship concerns

In our difference-in-differences research design, we include up to three firm-year observations in the "post" period and up to three firm-year observations in the "pre" period for each treatment and control firm. While this design ensures that the number of unique cash

flow forecast firms in our analysis equals the number of unique control firms, the number of firm-year observations is not identical between cash flow forecast and control samples because data limitations eliminate some firm-year observations from the analysis. Further, any cash flow forecast (control) firm-year observation in the "post" period without (with) a cash flow forecast is removed from the analysis. The result is a slight imbalance in the number of firm-year observations in the cash flow forecast and control samples, as evidenced in Table 3.

To address any concern this design creates (e.g., survivorship), we re-estimate our analyses after requiring that (i) all firms are represented in both the "pre" and "post" periods, and (ii) each firm-year observation from the cash flow forecast sample (in either the "pre" or "post" period) is matched to a specific firm-year observation from the corresponding control firm in the same fiscal year. Specifically, we eliminate any cash flow forecast or control firm not present in both the "pre" and "post" periods, as well as any cash flow forecast or control firm-year observation that for any reason does not have a matched counterpart. These requirements ensure that cash flow forecast firms and control firms are present in both the "pre" and "post" periods and that the cash flow forecast and control samples are perfectly aligned in calendar time. This procedure results in a total of 1,001 (1,001) cash flow forecast (control) observations in the "pre" period and 711 (711) cash flow forecast (control) observations in the "post" period. We re-estimate our analyses using this sample and our inferences remain unchanged (untabulated). Specifically, we continue to find a significantly negative coefficient on $CFF_{it} \times Post_{it}$ (coefficient = −0.0760, p-value = 0.009), indicating that firms whose analysts begin issuing cash flow forecasts reduce their cash tax payments.

Matched-pair fixed effects

When using matched samples, Cram et al. (2009) recommend including an indicator variable for each pairing in the regression model to obtain asymptotically correct coefficient estimates. In our setting, such an indicator variable would take the value of one for a given cash flow forecast firm and the corresponding control firm in both the "pre" and "post" periods and would take the value of zero for all other firm-year observations (from other cash flow forecast and other control firms). Each set of matched firms would similarly have its own matched-pair fixed effect.

When we include matched-pair fixed effects in our analysis, our findings yield similar conclusions. Specifically, as reported in Table 6, the initiation of analysts' cash flow coverage is associated with a reduction in cash tax payments per share (coefficient on $CFF_{it} \times Post_{it} = -0.0296$, p-value = 0.058). Similar to the results presented above, these findings suggest that the initiation of analyst cash flow coverage results in an increase in tax avoidance.

6. Reported operating cash flows in the "post" period

Our analyses suggest that upon initiation of analysts' cash flow coverage, firms more actively engage in cash tax avoidance to improve their cash flow position. A natural follow-up question is whether firms' total *reported* operating cash flows increase after the initiation of analysts' cash flow coverage, and if so, the extent to which cash tax avoidance contributes to this increase. To evaluate the change in reported operating cash flows for cash flow forecast firms from the "pre" to the "post" period relative to the corresponding change for our propensity score matched sample, we adapt the operating cash flow prediction model developed by Barth et al. (2001), as follows:

TABLE 6
Cash flow forecasts and cash tax planning: controlling for matched-pair fixed effects

Variable	Coefficient (*p*-value)	Coefficient (*p*-value)
Intercept	0.2942*	−0.0730
	(0.051)	(0.444)
CFF_t	−0.0449	−0.0500*
	(0.100)	(0.065)
$Post_t$	−0.0348	0.0252
	(0.147)	(0.384)
$CFF_t \times Post_t$	−0.0512*	−0.0492*
	(0.058)	(0.062)
CFF determinants controls included	Yes	Yes
Tax planning controls included	Yes	Yes
Match pair fixed effects	Yes	Yes
Industry and year fixed effects	No	Yes
N	5,413	5,413
Adjusted R^2	0.5114	0.5188

Notes: We report OLS regressions and control for matched-pair fixed effects. Huber-White robust standard errors are clustered by firm and are used to control for heteroscedasticity and serial correlation. When predictions are made, *p*-values are one-tailed. The dependent variable, *TXPD/CSHO*, captures cash taxes paid per share. * denotes significance at the 0.10 level. See the Appendix for additional variable definitions.

$$OCF_{it} = \beta_0 + \beta_1 CFF_{it} + \beta_2 Post_{it} + \beta_3 CFF_{it} \times Post_{it} + \beta_4 OCF_{it-1} + \beta_5 \Delta AR_{it-1} + \beta_6 \Delta Inv_{it-1} + \beta_7 \Delta AP_{it-1} + \beta_8 Depr_{it-1} + \beta_9 Amort_{it-1} + \beta_{10} Other_{it-1} + \sum_{k=11}^{16} \beta_k CFF\_Determinants_{kit} + \varepsilon_{it}, \quad (3)$$

where OCF_{it} (OCF_{it-1}) equals reported operating cash flows in year t (year $t-1$), ΔAR_{it} is the change in accounts receivable from year $t-2$ to year $t-1$, ΔInv_{it} is the change in inventory from year $t-2$ to year $t-1$, ΔAP_{it} is the change in accounts payable from year $t-2$ to year $t-1$, $Depr_{it}$ is depreciation expense in year $t-1$, $Amort_{it}$ is amortization expense in year $t-1$, and $Other_{it}$ is all other accruals in year $t-1$. Barth et al. (2001) find that year $t-1$ operating cash flows, change in accounts receivable, change in inventory, change in accounts payable, depreciation, amortization, and other accruals have significant predictive ability for year t operating cash flows. We also include the determinants of analysts' cash flow coverage in equation (3), as previously defined, to account for any effect of these firm characteristics on reported operating cash flows. We further augment the model with CFF_{it}, $Post_{it}$, and $CFF_{it} \times Post_{it}$. The coefficient on $CFF_{it} \times Post_{it}$ captures the change in reported operating cash flows in the "post" period relative to the "pre" period that is (a) unique to cash flow forecast firms, and (b) not captured by other determinants of reported operating cash flows.

Because the data requirements imposed in equation (3) slightly reduce the size of our sample, we first re-estimate our main test using this reduced sample to confirm our finding that firms increase cash tax avoidance activities following the initiation of analysts' cash flow forecasts. As reported in column (1) of panel A of Table 7, we

TABLE 7
Cash flow forecasts and reported operating cash flows

Panel A: All firms

Dependent variable:	*TXPD/CSHO*	*OCF*
	Coefficient	Coefficient
Variable	(*p*-value)	(*p*-value)
Intercept	0.0724	−0.0179
	(0.662)	(0.234)
CFF_t	0.0235	0.0045*
	(0.375)	(0.073)
$Post_t$	−0.0191	−0.0025
	(0.316)	(0.323)
$CFF_t \times Post_t$	−0.0896***	−0.0005
	(<0.001)	(0.880)
OCF_{t-1}	1.1835***	0.5896***
	(<0.001)	(<0.001)
ΔAR_{t-1}	0.5956***	0.1183***
	(<0.001)	(<0.001)
ΔInv_{t-1}	0.9119***	0.2103***
	(<0.001)	(<0.001)
ΔAP_{t-1}	−0.4541***	−0.3732***
	(0.006)	(<0.001)
$Depr_{t-1}$	−0.8545*	0.3775***
	(0.058)	(<0.001)
$Amort_{t-1}$	−2.5370***	0.0496
	(0.001)	(0.341)
$Other_{t-1}$	0.7977***	0.2387***
	(<0.001)	(<0.001)
$Size_{t-1}$	0.1038***	0.0058***
	(<0.001)	(<0.001)
$CapInt_{t-1}$	−0.0305**	−0.0105***
	(0.026)	(<0.001)
$Health_{t-1}$	−0.0094***	0.0007***
	(<0.001)	(0.003)
$AbsAcc_{t-1}$	−0.1050	0.0517**
	(0.382)	(0.028)
Vol_{t-1}	−0.0107***	0.0001
	(<0.001)	(0.442)
$Hetero_{t-1}$	0.3854***	0.0004
	(<0.001)	(0.952)
Adjusted R^2	0.2930	0.4847
N	6,876	6,876

Panel B: Profitable firms only

Intercept	0.2640	−0.0083
	(0.295)	(0.468)
CFF_t	0.0142	−0.0029
	(0.663)	(0.260)
$Post_t$	−0.0296	−0.0056**
	(0.219)	(0.024)
$CFF_t \times Post_t$	−0.1042***	0.0073**
	(0.001)	(0.026)

(The table is continued on the next page.)

TABLE 7 (continued)

Panel B: Profitable firms only

$Size_{t-1}$	0.1053***	0.0037***
	(<0.001)	(<0.001)
ΔAR_{t-1}	0.9780***	0.1141***
	(<0.001)	(<0.001)
ΔInv_{t-1}	1.2720***	0.1818***
	(<0.001)	(<0.001)
ΔAP_{t-1}	−0.8520***	−0.2696***
	(<0.001)	(<0.001)
$Depr_{t-1}$	−0.8117	0.5311***
	(0.191)	(<0.001)
$Amort_{t-1}$	−5.0197***	0.1688
	(<0.001)	(0.112)
$Other_{t-1}$	1.1016***	0.1811***
	(<0.001)	(<0.001)
$CapInt_{t-1}$	−0.1309***	−0.0078**
	(<0.001)	(0.012)
$Health_{t-1}$	−0.0172***	0.0021***
	(<0.001)	(<0.001)
$AbsAcc_{t-1}$	−0.5650***	0.1527***
	(0.005)	(<0.001)
Vol_{t-1}	−0.0099***	0.0000
	(<0.001)	(0.928)
$Hetero_{t-1}$	0.3280***	−0.0128*
	(0.002)	(0.078)
$CashFlows_{t-1}$	1.6187***	0.4496***
	(<0.001)	(<0.001)
Adjusted R^2	0.2512	0.4284
N	4,980	4,980

Notes: OLS regressions control for industry and year. Huber-White robust standard errors are clustered by firm to control for heteroscedasticity and serial correlation. When predictions are made, p-values are one-tailed. The dependent variable equals either *OCF*, which equals the ratio of operating cash flows adjusted for special items and discontinued items (OANCF − XIDOC) to average assets, or *TXPD*/*CSHO*, which equals the ratio of cash taxes paid (TXPD) to common shares outstanding (CSHO). ***, **, and * denote significance at the 0.01, 0.05, and 0.10 levels, respectively. See the Appendix for additional variable definitions.

continue to find a significant coefficient on $CFF_{it}\times Post_{it}$ (coefficient = −0.0896, p-value < 0.001).

In column (2), we report the results from estimating equation (3) to examine the increase in reported operating cash flows following the initiation of analysts' cash flow forecasts. However, we find no increase in reported operating cash flows following the initiation of analysts' cash flow coverage (coefficient on $CFF_{it}\times Post_{it} = -0.0005$, p-value = 0.880). We note, however, that this analysis includes both profit and loss firms, and loss firms may have difficulty increasing operating cash flows during periods of financial distress.

Therefore, in panel B of Table 7, we examine the change in operating cash flows among profitable firms. In column (1), we continue to find that these firms increase their tax avoidance activity after analysts initiate cash flow coverage (coefficient on $CFF_{it}\times Post_{it} = -0.1042$, p-value = 0.001). Moreover, in column (2), we find a statistically significant increase in reported operating cash flows in the "post" period for these profitable firms, even after controlling for the determinants of operating cash flows identified by Barth

et al. (2001) and the determinants of analysts' cash flow coverage identified by DeFond and Hung (2003). This finding is consistent with our central hypothesis that analysts' cash flow forecasts increase the net benefit of efforts to enhance the firm's cash flow position. Our finding that firms engage in additional tax avoidance following the initiation of analysts' cash flow coverage, but that only profitable firms enjoy a net increase in reported operating cash flows, suggests that the cash savings loss firms enjoy from tax avoidance are offset by reductions to operating cash flows in other areas.

To provide an economic interpretation of these results, we focus on the coefficient for $CFF_{it} \times Post_{it}$ for profitable firms in panel B of Table 7. Our evidence suggests that, relative to the "pre" period, reported operating cash flows in the "post" period increase by $73.4 million for the mean cash flow forecast firm in our sample. In comparison, the mean cash flow forecast firm in this sample enjoys decreased cash tax payments in the "post" period of $40.9 million, suggesting that 56 percent of the overall increase in reported operating cash flows for the mean firm in our sample is attributable to increased efforts to avoid cash tax payments.[20] In sum, these findings suggest that managers of profitable firms likely engage in a variety of activities to enhance *reported* operating cash flows after analysts initiate cash flow coverage and that improvements in cash flow health through additional cash tax avoidance represent an important component of these activities.

7. Conclusion

We hypothesize that when analysts initiate cash flow coverage of a firm, the firm's managers increase their efforts to improve the firm's cash flow health. To investigate this hypothesis, we employ a difference-in-differences design where we examine changes in tax avoidance in the years surrounding analysts' initiation of cash flow coverage, relative to changes in tax avoidance over the same period for a propensity score matched control sample of firms without analysts' cash flow forecasts. Controlling for factors associated with the initiation of analysts' cash flow coverage and other known determinants of tax avoidance, we find that the initiation of cash flow coverage is negatively associated with changes in cash tax payments. This result is consistent with cash flow forecasts encouraging increased tax avoidance that enhances the firm's cash flow position. We also find that analysts' cash flow coverage is positively (and significantly) associated with permanent tax avoidance but is not associated with deferral-based tax avoidance activity that would ultimately reverse.

We conduct additional tests to determine if *reported* operating cash flows increase for cash flow forecast firms after the initiation of analysts' cash flow coverage and to determine the role of cash tax avoidance strategies in this increase. We find that profitable firms report higher operating cash flows following the initiation of analysts' cash flow coverage and that increased cash tax avoidance is responsible for approximately 56 percent of this increase in operating cash flows. However, while loss firms also engage in additional tax avoidance activity when analysts issue cash flow forecasts, these cash savings appear to be offset by reductions in operating cash flows in other areas. These findings further reinforce the notion that analysts' cash flow forecasts encourage managers to engage in activities, such as cash tax avoidance, that enhance the firm's cash flow position in nontrivial ways.

20. To make valid comparisons between reductions in cash taxes paid and increases in reported operating cash flows, we use a common set of firms to estimate both amounts. For the subsample of profitable firms with data to calculate both amounts, we observe a $40.9 million reduction in cash tax payments over the three years in the "post" period. We calculate the $40.9 million decrease in tax payments as the product of the mean profitable cash flow forecast firm's common shares outstanding (the denominator of $TXPD/CSHO_{it}$) and the coefficient on $CFF \times Post$ in equation (2) when re-estimated using this sample ($130.85 million $\times$ -0.1042 $\times$ 3 years). We calculate the $73.4 million increase in operating cash flows as the product of the mean firm's average total assets (the denominator of OCF_{it}) and the coefficient on $CFF \times Post$ in equation (3) ($3,349.8 $\times$ 0.0073 $\times$ 3 years = $73.4 million).

This study makes several contributions to the literature. First, our findings suggest cash flow forecasts encourage managers to focus on activities that significantly enhance the firm's long-term cash position. While prior research suggests cash flow forecasts impact financial reporting behavior, we document improvements to the firm's cash flow position as a result of analysts' cash flow forecasting activities.

Second, we add to the analyst literature by documenting that analysts' cash flow forecasts encourage firms to avoid tax payments. Given recent evidence that suggests tax planning enhances firm value (Mills et al. 1998; Desai and Dharmapala 2009; Wilson 2009; De Simone and Stomberg 2013; Goh et al. 2013), our findings suggest a potential benefit to firms of analysts' cash flow coverage. We also complement research on the role of firm monitors in encouraging tax avoidance. Prior research finds that firm auditors (McGuire et al. 2012) and hedge funds (Cheng et al. 2012) can help managers increase their tax avoidance activity. We add to this literature by documenting that analysts who cover the firm can also encourage managers to maximize their tax avoidance opportunities.

Finally, our findings shed light on the determinants of tax avoidance, the type of tax avoidance, and the role that an alternative performance metric plays in managers' focus on tax planning. Given general conclusions from prior research that firms "under-shelter" their income (Weisbach 2002) and focus on total tax expense reported in the financial statements (instead of cash taxes paid), our evidence suggests analysts' cash flow forecasts are a mitigating factor to the somewhat puzzling behavior documented in prior research.

Appendix
Variable definitions

Variable	Definition
Cash flow forecast variables	
CFF	An indicator variable equal to one if firm *t*'s analysts issue a cash flow forecast in year *t*, and zero otherwise
CFF%	The percentage of firm *i*'s analysts issuing an earnings forecast who also issue a cash flow forecast in year *t*
Tax avoidance variables	
TXPD/CSHO	The ratio of taxes paid to common shares outstanding (txpd/csho)
Permanent/CSHO	The difference between the U.S. statutory rate multiplied by 35 percent and total tax expense, scaled by common shares outstanding ((35 percent × pi − txt)/csho)
Deferral/CSHO	The ratio of deferred tax expense to common shares outstanding ((txdfed + txdfo)/csho); if missing (txdfed + txdfo), then (txdi/csho)
First-stage selection model variables	
AbsAcc	Income before extraordinary items (ib) minus cash from operations (oancf), scaled by total assets (at). This variable is calculated in year *t*
Vol	The coefficient of variation of earnings (ib) measured over year *t* and the previous four years scaled by the coefficient of variation of operating cash flows (oancf) measured over the same period. This variable is calculated as (|standard deviation of earnings/mean of earnings|)/(|standard deviation of operating cash flows/mean of operating cash flows|)
Hetero	An index ranging from zero to one that captures the similarity of a firm's accounting choices in year *t* relative to other firms in the same industry. In each year, we examine five accounting choices, and for each accounting choice, assign the firm a value of one if its chosen method differs from the

(The table is continued on the next page.)

Appendix (Continued)

Variable	Definition
	most frequently chosen method in its industry group, and zero otherwise. The five accounting choices are (i) inventory valuation, (ii) investment tax credit, (iii) depreciation, (iv) successful-efforts vs. full-cost for companies with extraction activities, and (v) purchase vs. pooling. The five scores are summed and divided by the number of accounting choices in the industry (which for some industries is less than five). Higher (lower) index values are consistent with heterogeneous (homogeneous) accounting choices
Health	We estimate Altman's *Z*-score in year *t* as a proxy for financial health. Consistent with Altman (1968), the *Z*-score equals 1.2 × (Net working capital/Total assets) + 1.4 × (Retained earnings/Total assets) + 3.3 × (Earnings before interest and taxes/Total assets) + 0.6 × (Market value of equity/Book value of liabilities) + 1.0 × (Sales/Total assets). Lower Altman's *Z*-scores indicate poorer financial health. In the empirical tests that follow, we multiply the Altman's *Z*-scores by negative one, such that higher values are consistent with cash flow information being a more useful performance metric
CapInt	The ratio of gross property, plant, and equipment (ppegt) divided by sales revenue (sale). This variable is calculated as of year *t*
Size	The natural logarithm of market value of equity (prcc_f × csho) in millions of dollars, measured as of the beginning of year *t*
Tax planning opportunities	
ROA	The ratio of pre-tax income to total assets (pi/at) in year *t*
Foreign	The absolute ratio of pre-tax foreign income to total pre-tax income (|pifo/pi|) in year *t*; if missing pre-tax foreign income, foreign pre-tax income is set equal to zero
Lev	The ratio of total debt to total assets (dltt + dlc)/at in year *t*
CapInt	The ratio of net property, plant, and equipment to total assets (ppent/at) in year *t*
InvInt	The ratio of inventory to total assets (invt/at) in year *t*
R&D	The ratio of R&D expense to total revenues (xrd/revt) in year *t*
DiscAcc	Discretionary accruals computed at the end of the year estimated using a modified Jones' model (Kothari et al. 2005) in year *t*
NOL	An indicator variable if the firm reported a net operating loss (tlcf) in the current year and zero otherwise
TLCF	The ratio of net operating losses to assets (tlcf/at) in year *t*
BM	The ratio of the book value of equity to the market value of equity (ceq/(csho × prcc_f)) in year *t*
Determinants of operating cash flows	
OCF	Operating cash flows (oancf) in year *t*, or alternatively, in year $t-1$
ΔAR	The change in accounts receivable (recch) from year $t-2$ to year $t-1$
ΔInv	The change in inventory (invch) from year $t-2$ to year $t-1$
ΔAP	The change in accounts payable (apalch) from year $t-2$ to year $t-1$
Depr	Depreciation expense (dp − am) in year $t-1$
Amort	Amortization expense (am) in year $t-1$
Other	Other accruals (ib − (oancf − xidoc + ΔAR + ΔInv − ΔAP − *Depr* − *Amort*)) in year $t-1$

References

Altman, E. 1968. Financial ratios, discriminant analysis, and the prediction of corporate bankruptcy. *Journal of Finance* 23 (4): 589–609.

Armstrong, C., J. Blouin, and D. Larcker. 2012. The incentives for tax planning. *Journal of Accounting and Economics* 53 (1/2): 391–411.

Armstrong, C., A. Jagolinzer, and D. Larcker. 2010. Chief executive officer equity incentives and accounting irregularities. *Journal of Accounting Research* 48 (2): 225–71.

Barth, M. E., D. P. Cram, and K. K. Nelson. 2001. Accruals and the prediction of future cash flows. *The Accounting Review* 76 (1): 27–58.

Bartov, E. 1993. The timing of asset sales and earnings manipulation. *The Accounting Review* 68 (4): 840–55.

Bowen, R., X. Chen, and Q. Cheng. 2008. Analyst coverage and the cost of raising equity capital: Evidence from underpricing of seasoned equity offerings. *Contemporary Accounting Research* 25 (3): 657–99.

Bradley, D., J. Clarke, S. Lee, and C. Ornthanalai. 2014. Are analysts' recommendations informative? Intraday evidence on the impact of time stamp delays. *Journal of Finance* 69 (2): 645–73.

Brown, L. D., K. Huang, and A. S. Pinello. 2013. To beat or not to beat? The importance of analysts' cash flow forecasts. *Review of Quantitative Finance and Accounting* 41 (4): 723–52.

Call, A. C. 2009. Analysts' cash flow forecasts and the properties and pricing of operating cash flows. Working paper, Arizona State University.

Call, A. C., S. Chen, and Y. H. Tong. 2009. Are analysts' earnings forecasts more accurate when accompanied by cash flow forecasts? *Review of Accounting Studies* 14 (2–3): 358–91.

Call, A. C., S. Chen, and Y. H. Tong. 2013. Are analysts' cash flow forecasts naïve extensions of their own earnings forecasts? *Contemporary Accounting Research* 30 (2): 438–65.

Chen, T., J. Harford, and C. Lin. 2015. Do analysts matter for governance? Evidence from natural experiments. *Journal of Financial Economics* 115 (2): 383–410.

Cheng, C. S. A., H. H. Huang, Y. Li, and J. Stanfield. 2012. The effect of hedge fund activism on corporate tax avoidance. *The Accounting Review* 87 (5): 1493–526.

Cram, D. J., V. Karan, and I. Stuart. 2009. Three threats to validity of choice-based and matched-sample studies in accounting research. *Contemporary Accounting Research* 26 (2): 477–516.

De Simone, L., and B. Stomberg. 2013. Do investors differentially value tax avoidance of income mobile firms? Working paper, Stanford University and University of Georgia.

DeFond, M., and M. Hung. 2003. An empirical analysis of analysts' cash flow forecasts. *Journal of Accounting and Economics* 35 (1): 73–100.

DeFond, M., and M. Hung. 2007. Investor protection and analysts' cash flow forecasts around the world. *Review of Accounting Studies* 12 (2–3): 377–419.

Desai, M., and D. Dharmapala. 2009. Corporate tax avoidance and firm value. *Review of Economics and Statistics* 91 (3): 537–46.

Drobetz, W., M. C. Grüninger, and S. Hirschvogl. 2010. Information asymmetry and the value of cash. *Journal of Banking and Finance* 34 (9): 2168–84.

Dyreng, S., M. Hanlon, and E. Maydew. 2008. Long-run corporate tax avoidance. *The Accounting Review* 83 (1): 61–82.

Easley, D., and M. O'Hara. 2004. Information and the cost of capital. *Journal of Finance* 59 (4): 1553–83.

Edwards, A., C. Schwab, and T. Shevlin. 2016. Financial constraints and cash tax savings. *The Accounting Review* 91 (3): 859–81.

Ertimur, Y., and S. Stubben. 2005. Analysts' incentives to issue revenue and cash flow forecasts. Working paper, University of Colorado and University of Utah.

Frank, M., L. Lynch, and S. Rego. 2009. Tax reporting aggressiveness and its relation to aggressive financial reporting. *The Accounting Review* 84 (2): 467–96.

Frankel, R., and X. Li. 2004. Characteristics of a firm's information environment and the information asymmetry between insiders and outsiders. *Journal of Accounting and Economics* 37 (2): 229–59.

Givoly, D., C. Hayn, and R. Lehavy. 2009. The quality of analysts' cash flow forecasts. *The Accounting Review* 84 (6): 1877–911.

Goh, B., J. Lee, C. Lim, and T. Shevlin. 2013. The effect of corporate tax avoidance on the cost of equity. Working paper, Singapore Management University and University of California at Irvine.

Graham, J. 1996. Proxies for the corporate marginal tax rate. *Journal of Financial Economics* 42 (2): 187–221.

Graham, J., M. Hanlon, T. Shevlin, and N. Shroff. 2014. Incentives for tax planning and avoidance: Evidence from the field. *The Accounting Review* 89 (3): 991–1023.

Guenther, D. A., L. K. Krull, and B. M. Williams. 2014. Are "tax aggressive" firms just inflating earnings? Working paper, University of Oregon and Indiana University.

Guenther, D. A., S. R. Matsunaga, and B. M. Williams. 2016. Is tax avoidance related to firm risk? *The Accounting Review*, 92 (1): 115–36.

Hanlon, M., and S. Heitzman. 2010. A review of tax research. *Journal of Accounting and Economics* 50 (2–3): 127–78.

Kelly, B., and A. Ljungvist. 2012. Testing asymmetric-information asset pricing models. *Review of Financial Studies* 25 (5): 1366–413.

Kothari, S. P., A. Leone, and C. Wasley. 2005. Performance matched discretionary accrual measures. *Journal of Accounting and Economics* 39 (1): 163–97.

Lee, L. F. 2012. Incentives to inflate reported cash from operations using classification and timing. *The Accounting Review* 87 (1): 1–33.

Leone, M. 2008. There's a cash machine in your tax department. *CFO.com*, December 11.

Li, K., and H. You. 2015. What is the value of sell-side analysts? Evidence from coverage initiations and terminations. *Journal of Accounting and Economics* 60 (2–3): 141–60.

Lisowsky, P. 2010. Seeking shelter: Empirically modeling tax shelters using financial statement information. *The Accounting Review* 85 (5): 1693–720.

McGuire, S. T., T. C. Omer, and D. Wang. 2012. Tax avoidance: Does tax-specific industry expertise make a difference? *The Accounting Review* 87 (3): 975–1003.

McInnis, J., and D. Collins. 2011. The effect of cash flow forecasts on accrual quality and benchmark beating. *Journal of Accounting and Economics* 51 (1): 219–39.

Mills, L., M. Erickson, and E. Maydew. 1998. Investments in tax planning. *Journal of the American Taxation Association* 20 (1): 1–20.

Mills, L., and K. Newberry. 2004. Do foreign multinationals' tax incentives influence their U.S. income reporting and debt policy? *National Tax Journal* 57 (1): 89–107.

Mohanram, P. 2014. Analysts' cash flow forecasts and the decline of the accruals anomaly. *Contemporary Accounting Research* 31 (4): 1143–70.

Newberry, K. 1998. Foreign tax credit limitations and capital structure decisions. *Journal of Accounting Research* 36 (1): 157–66.

Newberry, K., and D. Dhaliwal. 2001. Cross-jurisdictional income shifting by U.S. multinationals: Evidence from international bond offerings. *Journal of Accounting Research* 39 (3): 643–62.

Pandit, S., R. Willis, and L. Zhou. 2012. Security analysts, cash flow forecasts, and turnover. *International Journal of Forecasting* 28 (4): 874–90.

Penman, S. 2001. *Financial statement analysis and security valuation*. New York: McGraw-Hill Irwin.

Radhakrishnan, S., and S. L. Wu. 2014. Analysts' cash flow forecasts and accrual mispricing. *Contemporary Accounting Research* 31 (4): 1191–219.

Rego, S., and R. J. Wilson. 2012. Equity risk incentives and corporate tax aggressiveness. *Journal of Accounting Research* 50 (3): 775–810.

Robinson, J., S. Sikes, and C. Weaver. 2010. Performance measurement of corporate tax departments. *The Accounting Review* 85 (3): 1035–64.

Roychowdhury, S. 2006. Earnings management through real activities manipulation. *Journal of Accounting and Economics* 42 (3): 335–80.

Saavedra, D. 2015. Tax spike firms. Working paper, University of California at Los Angeles.

Weisbach, D. A. 2002. Ten truths about tax shelters. *Tax Law Review* 55 (May): 215.

Wilson, R. 2009. An examination of corporate tax shelter participants. *The Accounting Review* 84 (3): 969–99.

Yu, F. 2008. Analyst coverage and earnings management. *Journal of Financial Economics* 88 (2): 245–71.