The Fourth-Quarter Earnings Effect

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October 2025

We gratefully acknowledge financial support from ESMT Berlin and INSEAD. We appreciate helpful comments and suggestions from Brad Abbott, Waqar Ali, Martina Andreani, Amadeus Bach, Sudipta Basu, Dan Bens, Sanjay Bissessur, Tamer Boyaci, Jeff Callen, Gavin Cassar, Roman Chychyla, Chuck Downing, Peter Easton, Marco Errico, J. P. Ferguson, Jeremiah Green, Trevor Harris, Robert Hills, Elsa Juliani, Sharon Katz, Alina Lerman, Ally Lin, David McCann, Steve Monahan, Suresh Nallareddy, Jim Ohlson, Stephen Penman, Katherine Schipper, Harm Schütt, Merih Sevilir, Ayung Tseng, David Veenman, Ally Zimmerman, and seminar participants at BI Norwegian Business School, ESMT Berlin, Humboldt University, INSEAD, WZB Berlin Social Science Center, the ESMT Berlin Accounting PhD seminar, the Annual Congress of the European Accounting Association, the Accounting Design Project, and the Egyptian Online Seminars in Business, Accounting and Economics. All errors remain our own.

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Abstract

We document that firms report lower earnings in the fourth quarter than in interim quarters. The effect (1) is robust to controlling for firms' immediate business environment at a given point in time and time-invariant factors, (2) persists across time and the earnings distribution, (3) concentrates in accrual expense estimates and is absent (weakened) in sales in and cash flows (working capital accruals), (4) and is pronounced for smaller firms. We present evidence consistent (inconsistent) with the hypothesis that low investment in cost estimation and internal information systems (auditor conservatism, earnings management, and integral reporting) is driving the effect. Analysts do not fully account for the fourth-quarter effect and are systematically more negatively surprised in the fourth quarter. Stock returns around negative earnings announcement surprises fall less and reverse more quickly in the fourth quarter than in interim quarters. A trading strategy exploiting these patterns yields abnormal returns.

JEL Classification: C52, G14, G17, M41
Keywords: Earnings, Seasonality, Internal Information Quality

1. Introduction

Corporate earnings are essential for valuation and stewardship (Monahan 2018; Yohn 2020). Consequently, a large literature explores the properties of annual earnings. In contrast, quarterly earnings have received much less attention, even though they provide information on a timelier basis and elicit increasingly strong investor reactions (Landsman and Maydew 2002; Beaver, McNichols, and Wang 2020).[1] Furthermore, papers that study the properties of quarterly earnings typically abstract away from the inherent variation in earnings within a fiscal year, a key feature distinguishing quarterly from annual earnings, by employing higher-order ARIMA models or taking seasonal differences. In this paper, we address this gap by studying variation in quarterly earnings within a fiscal year. Specifically, we document that fourth-quarter earnings are on average 47.4% lower than interim earnings, describe the drivers of this effect, and provide evidence that analysts and investors do not fully account for it.

We begin our analysis by documenting that asset-scaled earnings average around -10.5% in the first three quarters and -15.4% in the fourth quarter. When plotting average earnings over our sample period, we observe regular, large downward spikes during the fourth quarter, and that the effect is pervasive throughout our entire sample period. Addressing concerns that firms' business models or firms designating their fiscal quarters based on the seasonality of their industries drive the fourth-quarter effect, we confirm that the effect persists after controlling for contemporaneous industry-level performance and time-invariant firm-level factors by including industry-month-year as well as firm fixed effects. To illustrate, consider two firms, Firm A and Firm B, within the same industry at the same point in time. Assume that Firm A designates the

[1] The Securities and Exchange Commission (SEC) requires firms to report on a quarterly basis since 1970.

quarter under consideration as its second quarter while Firm B designates the quarter as its fourth quarter. Our estimates indicate that Firm B's earnings will be lower, despite the firms operating in the same industry and reporting at the same point in time. Lastly, we examine how the effect plays out over firms' earnings distribution. Using quantile regressions, we document that the effect is present across percentiles and monotonically increases towards the left-hand tail of the earnings distribution.

To better understand the drivers of the fourth-quarter effect, we decompose earnings in two ways. First, we break earnings into sales and expenses and find that sales and expenses are both higher during the fourth quarter. Thus, the negative fourth-quarter earnings effect derives entirely from an increase in expenses and is partially offset by a contemporaneous but smaller increase in sales.[2] The expense effect persists even after controlling for sales and largely derives from cost of goods sold (COGS) and sales, general, and administrative expenses (SG&A). Second, we decompose earnings into cash flow from operations (CFO), working capital accruals, and accrual estimates. While cash flow from operations is systematically higher in the fourth quarter than in interim quarters, working capital accruals and accrual estimates are systematically lower. The effect is nearly twice as strong for accrual estimates as for working capital accruals, which, together with the expense decomposition results, suggest that the fourth quarter effect largely derives from managers' accrual expense estimates rather than from real changes in firms' underlying operations.[3] In additional analyses, we test and find that the fourth-quarter effect is

[2] Sales could be higher in the fourth quarter because firms might designate their fourth quarter as the quarter in which they generate the highest sales. For example, retail firms tend to end their fiscal year in December or January, following the sales-intensive Christmas season.

[3] The FASB requires that "[g]oodwill of a reporting unit shall be tested for impairment on an annual basis" and that "[t]he annual goodwill impairment test may be performed any time during the fiscal year provided the test is performed at the same time every year" (ASC 350-20-35-28). It could be that firms tend to conduct these tests at the end of the fiscal year, i.e., the fourth quarter. To test whether goodwill impairments drive our results, in untabulated analyses, we re-estimate our results with goodwill impairments as the dependent variable and do not find that goodwill

present for three specific accrual expense estimates (bad debt expense, warranty expense, and inventory impairments).

To examine potential causes underlying the fourth-quarter effect, we examine how it varies with firm size, a commonly used proxy for the degree of public and regulatory scrutiny firms face (Zimmerman 1983). While the effect pervades throughout the firms' size distribution, it is stronger for smaller firms, consistent with the effect concentrating in firms that face less public scrutiny. Decomposing earnings into various income statement line items suggests that the size-driven effect variation is largely due to accrual expense estimates within COGS and SG&A.

We examine auditor conservatism, earnings management, integral reporting (i.e., US GAAP's requirement to treat each quarter as an integral part of the fiscal year, which leads to dependencies among the financial statements across quarters), and weaknesses in firms' accounting systems as potential explanations for the fourth-quarter effect. While the findings that the effect is stronger for smaller firms that face less public scrutiny are inconsistent with the earnings management and auditor conservatism explanation, they are broadly consistent with the integral reporting and accounting system quality explanations. In additional analyses, inconsistent with the auditor conservatism, earnings management, and integral reporting explanations, we show that the fourth-quarter effect (1) gets stronger after the SEC mandated interim-quarter auditor reviews (which, under the auditor conservatism explanation, should have weakened the effect), (2)

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impairments significantly differ across quarters. A related concern is that impairments more generally tend occur in the fourth quarter and that some firms might include these impairment charges in cost of goods sold or SG&A (e.g., inventory impairments). Indeed, as listed in Appendix B, Compustat's definition of cost of goods sold includes "extractive industries' lease and mineral rights charged off and development costs written off" (Point 10), and "write downs of oil and gas properties" (Point 30). In untabulated analyses, we address this concern in two ways. First, we re-estimate our results after excluding observations from extractive industries (2-digit SIC code 13) and find that our inferences remain unchanged. Second, we re-estimate our results separately for firms with above and below median R&D expenses (to proxy for a higher and lower likelihood of development cost write downs) and find that the fourth-quarter earnings effect is present in and does not statistically significantly differ across the two subsamples.

is weaker for firms with higher discretionary accruals (a commonly employed earnings management measure), and (3) persists for firms following IFRS, which mandates the discrete approach to financial reporting (i.e., to treat each fiscal quarter on a stand-alone basis). Further, we find that the negative fourth-quarter effect is pronounced for firms that invest relatively less in cost estimation by employing fewer (and paying less to) controllers and for firms with low internal information system quality, which suggests that the effect at least partially derives from firms' costing systems that do not process complex and diverse cost accounting data in a precise or timely manner. These inferences are supported by anecdotal evidence derived from conversations with practicing controllers.

In our final set of analyses, we test whether analysts and investors account for the fourth-quarter effect. Consistent with analysts not fully accounting for the fourth-quarter effect, we find that analysts systematically overestimate earnings in the fourth quarter. Aligning with the analyses discussed above, analysts are mainly surprised by lower-than-expected earnings deriving from larger-than-expected expenses. Consistent with investors not fully accounting for the fourth-quarter effect, investors bid down stock prices in response to negative interim as well as fourth-quarter earnings surprises. However, while the market reaction persists for interim quarters, it reverses entirely for the fourth quarter within sixty days, suggesting that, as time passes and additional information becomes available through other sources, it becomes clear that the initial fourth-quarter market reaction was driven by accounting estimates that constitute a poor reflection of economic reality. We construct a trading strategy that exploits these patterns and demonstrate that investors can trade profitably by betting on return reversals following negative, but not positive, fourth-quarter earnings surprises.

Our analysis is subject to several limitations. First, since firms choose their fiscal quarter designation, the documented effects cannot be seen as causal. Instead, our analysis should be viewed as an exploratory study of a striking and pervasive financial reporting regularity that should be of interest to both investors and standard setters. Second, while our evidence is broadly consistent with the hypothesis that firms' internal information system quality is at least partially driving the fourth-quarter effect, it could be that a correlated factor that we are not including in our analysis is driving both, our measures of firms' internal information system quality as well as the fourth-quarter effect. Similarly, multiple factors or explanations, not necessarily limited to those forwarded here, may be at play simultaneously. Third, while our returns analysis controls for factors proposed in the recent asset pricing literature, a previously unexplored risk factor may be driving the patterns we observe.

With these limitations in mind, we primarily contribute to three streams of literature. First, we contribute to the earnings properties literature, which has primarily focused on annual earnings.[4] The limited number of studies focusing on quarterly earnings largely abstract away from seasonal features of the earnings process by taking seasonal differences or by seasonally adjusting via ARIMA models.[5] Indirectly speaking to potential seasonal features in the earnings process, Collins, Hopwood, and McKeown (1984), Basu, Hwang, and Jan (2002), and Basu, Hwang, and Jan (2005) report that analysts' and time series models' absolute forecast errors, the frequency of losses, the average magnitude of these losses, and special items are larger in the fourth quarter than

[4] For a review of the annual earnings literature see Monahan (2018).
[5] See, e.g., Green and Segall (1967), Griffin (1977), Coates (1972), Reilly, Morgenson, and West (1972), Foster (1977), Brown and Rozeff (1979), Collins and Hopwood (1980), Brown, Hagerman, Griffin, and Zmijewski (1987), Silhan (1989), and Bernard and Thomas (1989).

in interim quarters.[6] We contribute to these studies by documenting that fourth-quarter earnings are significantly lower than interim earnings and that this effect holds after controlling for the underlying economic reality and persists through time and across the earnings distribution.[7] We also shed light on the drivers of the fourth-quarter effect by splitting earnings into their underlying sales/expense and cash/accrual components and by examining how the effect varies with firm size. Importantly, in contrast to Basu et al.'s (2005) focus on auditor conservatism and special items, the effect (1) concentrates in COGS and SG&A rather than in special items, (2) varies with firm size for COGS and SG&A but not for special items, and (3) is pronounced for firms with lower accounting system quality. Our results are consistent with accounting system quality rather than auditor conservatism, earnings management, or integral reporting driving the fourth-quarter effect. Further, from a methodological standpoint, our results suggest that researchers should account for quarterly seasonality and be careful when using quarterly data, as those data might suffer more from estimation issues than annual data.

Second, we contribute to the mispricing literature, which has documented how investors can use various accounting figures (in particular annual and quarterly seasonally adjusted earnings)[8] or seasonality in investor behavior (such as Rozeff and Kinney's (1976) January effect

[6] Several studies provide evidence that the stock market reaction to unexpected earnings differs with firms' fiscal quarter designation. See, Griffin (1976), Joy, Litzenberger, and McEnally (1977), Bathke Jr and Lorek (1984), Mendenhall and Nichols (1988), Jones and Bublitz (1990), Kross and Schroeder (1990), Salamon and Stober (1994), Lee and Park (2000), and Chen, Jiang, and Zhu (2022). In untabulated analysis, consistent with these studies, we find that earnings response coefficients are lower in the fourth quarter and that this effect is stronger for smaller firms.

[7] One interpretation of this finding is that negative fourth-quarter earnings might signal lower earnings quality. This interpretation is related to but distinct from timely loss recognition. When losses are not recognized in the quarter in which bad news arise, those losses may be recognized in the fourth quarter instead (i.e., less timely loss recognition). However, our findings suggest that the fourth-quarter earnings effect does not necessarily arise because of bad news, but because managers underestimate accrual expense estimates in interim quarters.

[8] See, e.g., the analysis of the post earnings announcement drift based on seasonally adjusted earnings changes in Bernard and Thomas (1989) and Bernard and Thomas (1990).

and French's (1980) Monday effect) to trade profitably.[9] We show that investors can also trade profitably by exploiting seasonal patterns in earnings based on firms' classification of a given quarter, even after holding calendar time constant. That is, we show that returns following fourth-quarter (but not following interim-quarter) earnings announcements predictably fall and reverse within sixty days. This is different from the findings in Chang, Hartzmark, Solomon, and Soltes (2017) who document that investors do not account for predictably positive earnings in any quarter of the fiscal year. Further, while prior studies in the mispricing literature typically explain the presence of mispricing by appealing to information collection cost (Grossman and Stiglitz 1980) or processing constraints (Maćkowiak and Wiederholt 2009) on the investor side, we provide evidence suggesting that mispricing could arise because of collection cost or processing constraints on the firm side. Specifically, our results suggest that the fourth-quarter effect arises at least in part because firms' accounting systems fail to process diverse and complex cost data in a timely manner, leading to accrual expense misestimation. If this effect varies in the cross-section in not perfectly predictable ways, it would be impossible for an investor who is neither cost nor processing constrained to perfectly back out the true fundamentals.

Third, we contribute to the literature on the costs of quarterly reporting. This literature has largely focused on quarterly reporting, causing managers to behave myopically.[10] We highlight another cost of reporting at quarterly frequency: low accounting system quality. Specifically, the fourth-quarter effect (1) concentrates in observations with low accounting systems quality and (2)

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[9] For reviews of this literature, see Lakonishok and Smidt (1988) and Nissim (2024). Johnston, Leone, Ramnath, and Yang (2012) find that investors and analysts do not account for the fact firms extend one of their fiscal quarters by a week to account for the one or two missing days per year when assuming a 52-week year. If firms would systematically concentrate these adjustments in their fourth fiscal quarter, this might confound our results. To address this concern, we test whether and find that our results hold after conditioning into 13-week quarters.

[10] For a review of this literature, see Kajüter, Lessenich, Nienhaus, and van Gemmern (2022).

leads to a muted capital market reaction to earnings announcements that fully reverses within sixty days. These results suggest that the fourth-quarter earnings surprise carries little information to begin with and impairs information processing, which, to the best of our knowledge, comprises a previously undocumented cost of quarterly reporting. The finding that earnings are systematically lower in the final subperiod of the fiscal year is also present for semi-annual reporters in countries outside of the US. This suggests that the effect may persist even if, as currently debated, the US would switch from a quarterly to a semiannual reporting frequency.

Our findings should be of interest to investors who increasingly base their investment decisions on timely quarterly figures (Beaver et al. 2020), academics who seek to understand firms' earnings processes, and regulators who design and enforce reporting standards and frequency with the goal that firms' financial reports faithfully represent (i.e., complete, neutral, and free from error) economic reality (FASB 2010, QC12).

2. Data

We obtain financial statement data for the 1989Q1 (the first year-quarter in which quarterly cash flow statement data became available) to 2023Q4 (the last year-quarter for which a full year of fiscal quarter data are available at the time of writing) period from Compustat Quarterly. Following prior research, we exclude financials and utilities since their accounting and business models systematically differ from those of other firms. Following Casey, Gao, Kirschenheiter, Li, and Pandit (2016), we use the Compustat balancing equations to impute missing values.[11] To control for cross-sectional heterogeneity in size and time-series variation in the purchasing power

[11] Our inferences remain unchanged when not using the balancing equations to impute missing values and when restricting the sample to the intersection of Compustat and CRSP. In our analyses, we focus on the broader Compustat sample since it allows us to speak about mandatory financial reports more broadly rather than only about the financial reports of a smaller set of publicly traded firms.

of money (i.e., inflation), we deflate all income and cash flow statement variables by total assets.[12] We winsorize all variables at the 1st and 99th percentiles, except for returns variables. We define all variables in Appendix A. We (1) condition observations with data on all four fiscal quarters for a given firm-year, then (2) require positive values for total assets, and lastly (3) require non-missing values for all variables.[13]

3. Descriptive Evidence for the Fourth-Quarter Earnings Effect

3.1. Descriptive Statistics

Table 1 Panel A presents descriptive statistics computed from the full, pooled sample. While the average firm reports earnings of -11.7%, the median firm reports earnings of -0.3%.[14] Earnings exhibit substantial volatility with a standard deviation of 41.6% and an interquartile range of 8.7%. On average, sales, COGS, and SG&A are 24.5%, 18.6%, and 12.5%, respectively. The corresponding shares for depreciation and special items are much smaller (1.1% and 0.5% on average). Relative to its mean and median, special items are much more volatile than other income statement line items.

Table 1 Panel B (Panel C) presents averages (medians) for all variables split by the firm's fiscal quarter designation. Earnings are on average (median) 47.4% [= -0.154 × 3/[-0.104 + -0.107

[12] Our inferences remain unchanged when deflating by lagged total assets or by total assets at the end of the fiscal year.

[13] Our results are robust to including financials and utilities, to including firm-quarters for whose fiscal year some quarterly observations are missing, to excluding firms that enter the sample in the previous year or that exit the sample in the subsequent year, and to scaling by market value of equity instead of total assets.

[14] We compute earnings based on Compustat's net income (NIQ) variable. In untabulated tests, we assess the robustness of our findings to two alternative income measures. First, we confirm our results for Compustat's income before extraordinary items (IBQ) variable. Compustat's definition of IBQ has changed over time. Thus, to maintain consistency, we use NIQ in our main tests. Second, we confirm our results for net income using eXtensible Business Reporting Language (XBRL) data compiled by CalcBench. While these data are less susceptible to the concern that our results might be an artifact of Compustat's data standardization procedures, they are available from 2009 only. Thus, to maintain a longer time series and to maintain consistency with prior research, we use Compustat data in our main tests.

+ -0.103] – 1] (243.5% [= -0.007 × 3/[-0.003 + -0.002 + -0.001] – 1]) smaller in the fourth quarter than in interim quarters. The opposite pattern holds for sales, which are, for the average as well as the median, approximately monotonically increasing from the first to the fourth quarter. These differences are driven by different expense categories (COGS, SG&A, depreciation, and special items) whose averages and medians are highest in the fourth quarter. While the negative fourth-quarter effect is absent (if not positive) for CFO, it is strong for accruals, which points to systematic cross-quarter variation in managers' accrual expense estimates as a potential driver.

Figure 1 plots the number of fourth-quarter observations by the month in which they end. We exclude observations with a December end since they are by far the most common (81,305 observations) and thereby would make it difficult to assess the frequency for other months. Besides December, most firms end their fourth quarter in March, June, or September. However, our sample features fourth-quarter observations ending in any month of the year.[15]

Figure 2 Panel A plots average earnings by year over our sample period. We mark the fourth quarter with red dots. Consistent with prior research (e.g., Hayn 1995), average earnings are declining over our sample period. Most strikingly, the fourth-quarter effect is clearly visible. Relative to the surrounding interim quarters, average earnings are systematically lower in the fourth quarter without a single exception. In the following sections, we systematically explore what drives this stark pattern. To control for general time trends, Figure 2 Panel B replicates Figure

[15] Firms occasionally change the month in which they end their fourth quarter. For the Compustat sample over the 1993-2008 period, Du and Zhang (2013) find that 1,786 firms changed their fourth-quarter end month. Reasons firms list for this change include changes in corporate control, regulation, and industry norms. Effectively conditioning into firms that change the end month of their fiscal quarters, in untabulated tests, we repeat the Table 2 analysis after including firm-month-year fixed effects. This analysis compares quarters that are designated as different fiscal quarters across different years (1) within a given firm (2) within the same month-year. Within this smaller sample (43,955), the slope coefficients remain similar to those in Table 2. While *Q2*'s (0.005) and *Q3*'s (0.003) slope coefficient are not statistically significant at conventional levels, *Q4*'s slope coefficient (-0.049) remains highly significant (t = -8.10).

2 Panel A after standardizing by fiscal year. While time trends in the earnings series disappear, the fourth quarter effect becomes visually even more stark.

3.2. Controlling for the Business Environment

One explanation for the fourth-quarter earnings effect is that managers do not designate their quarters randomly but tend to designate the quarter with the highest sales volume as their fourth and final quarter and "walk down" investors by disclosing lower earnings numbers in the preceding interim quarters (Richardson, Teoh, and Wysocki 2004). While this explanation is consistent with the fourth-quarter sales effect in Table 1 Panel B, it is inconsistent with earnings being lower rather than higher in the fourth quarter.

To account for firms' contemporaneous business environment, Table 2 regresses earnings on indicators for the second (*Q2*), third (*Q3*), and fourth (*Q4*) quarters with increasingly stringent fixed effect architectures. The first quarter constitutes the reference group. We cluster standard errors by firm. Column (1) presents the baseline results without fixed effects. Given that OLS estimates reflect conditional means, this column effectively tests the statistical significance of the differences between fiscal quarters for the first row of Table 1 Panel B. Consistent with the discussion above, earnings in the fourth quarter are systematically lower than earnings in interim quarters. Specifically, *Q4*'s slope coefficient indicates that fourth-quarter earnings are 5.0% of total assets lower than first-quarter earnings, while second and third quarter earnings are close in magnitude to first-quarter earnings. While second and third quarter earnings are statistically significantly different from first quarter earnings, relative to the fourth-quarter effect, the differences of -0.2% and 0.1% of total assets are less economically significant and statistically smaller ($p < 0.01$ for both).

Columns (2) to (4) introduce firm and four-digit SIC code industry-month-year fixed effects.[16] First, adding firm fixed effects in Column (2) tests whether the fourth-quarter earnings effect holds within firm, i.e., does not arise from time-invariant, cross-sectional differences across firms. We find that this is the case. If anything, the fourth-quarter earnings effect becomes statistically and economically stronger after adding firm fixed effects. Second, adding industry-month-year fixed effects tests whether the fourth-quarter earnings effect holds within industry-month-year, i.e., whether earnings systematically differ for firms within the same industry at the same point in time based on whether the firm designates the year-quarter under consideration as its, say, first or fourth quarter.[17] The fourth-quarter earnings effect becomes even stronger after adding industry-month-year fixed effects individually in Column (3) and jointly with firm fixed effects in Column (4).

3.3. Across the Earnings Distribution

The descriptive evidence in Table 1 indicates the presence of large loss observations that might drive our results. To address this concern, Table 3 and Figure 3 test how the fourth-quarter earnings effect behaves across the earnings distribution via quantile regressions. Specifically, we estimate our results from the 10th to the 90th percentiles in increments of five. The negative fourth-quarter earnings effect persists across the earnings distribution and monotonically increases in magnitude from the 90th towards the 10th percentile of the earnings distribution.[18]

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[16] Our results are robust to controlling for month-year fixed effects rather than industry-month-year fixed effects. In our main analyses, we use industry-month-year fixed effects since they subsume year-month effects and control for additional, industry-specific variation that might confound our estimates.

[17] In untabulated analyses, we test how the fourth-quarter earnings effect has developed over our sample period by evenly splitting the sample time series into four subsample periods and re-estimating the full model. The effect persists across all subsamples.

[18] One concern with these results is that estimates might be biased when using fixed-effects models with maximum likelihood estimators, such as quantile regressions, in panel data settings with a large number of firms but a small number of periods (Neyman and Scott 1948). While, with 140 periods (= 35 years × 4 quarters per year), our sample

3.4. Individual Income Statement Accounts

The previous sections document that earnings are systematically lower in the fourth quarter and that this effect is unlikely to be explained by real differences in firms' underlying businesses, becomes stronger over time, is present across the earnings distribution, and increases in magnitude towards the left-hand side of the earnings distribution. We next explore whether and how differences in firms' accounting treatment drive the fourth-quarter earnings effect by splitting earnings into its underlying components.

Table 4 Panel A begins by splitting earnings into sales and several expense categories: *COGS*, *SG&A*, *Depreciation*, and *Special Items*. Counteracting the negative fourth-quarter earnings effect but consistent with the intuition that firms tend to designate the quarter with the highest sales as their fourth quarter, Column (1) estimates that sales are on average 1.1% higher in the fourth quarter than in the first quarter. However, expenses increase even more than sales, driving the fourth-quarter earnings effect to be negative. The 2.4% estimated increase in *COGS* in Column (2) alone more than offsets the sales increase. With 1.6%, 0.2%, and 1.0%, the *SG&A*, *Depreciation*, and *Special Items* effects estimated in Columns (3) to (5), while smaller, further contribute to offsetting the fourth-quarter sales effect.[19][20]

Addressing concerns that the expense results might be mechanically driven by the fourth-quarter sales effect due to revenue-expense matching, Table 4 Panel B directly controls for that

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is not small by most econometric standards (Cameron and Miller 2015), we re-estimate the Table 3 analysis using a bootstrap estimator. Our inferences remain unchanged.

[19] Because Compustat's SG&A contains R&D expenses as well, we re-estimate the analysis for SG&A after excluding R&D. Our inferences remain unchanged.

[20] When the peak seasonal quarter is in Q4, during high inflation, LIFO inventory accounting will result in higher COGS than under FIFO inventory accounting. This does not drive our results. First, we account for seasonality with our fixed-effect structure. Second, in untabulated tests, we partition our sample into firms that use FIFO and firms that use LIFO. The fourth quarter effect is present in both subsamples, but economically and statistically more significant for the FIFO subsample.

possibility by including sales as a control variable (Binz, Joos, and Kubic 2023). While especially the *COGS* (from 2.4% to 1.7%) and to a lesser extent the *SG&A* (from 1.6% to 1.3%) results weaken, they remain statistically and economically significant. Further, consistent with the intuition that depreciation and special items tend to be less variable (i.e., less strongly related to sales) than *COGS* and *SG&A*, controlling for sales does not appear to significantly affect the fourth-quarter effects for *Depreciation* and *Special Items*.

3.5. Cash and Accruals

The Table 4 results indicate that the fourth-quarter earnings effect is driven by firms' expenses rather than seasonal variation in sales. However, it remains unclear whether this increase in expenses is real (in the sense that firms truly spend more resources in the fourth quarter) or whether it derives from managerial estimates. If the fourth-quarter effect largely derives from managerial estimates (fluctuations in firms' underlying business), we expect the results to concentrate in the earnings' accrual estimates (cash flow) component.

To test this hypothesis, following Lev, Li, and Sougiannis (2010), we decompose earnings in two steps as illustrated in Figure 4. First, in Table 5 Panel A Column (1) and (2), we split earnings into CFO and accruals. While the fourth-quarter CFO effect is positive and thereby aligns with the fourth-quarter sales effect, the effect is large and negative for accruals. In terms of economic magnitude, accruals are 6.8% of total assets lower in the fourth quarter than in the first quarter. Second, because accruals are not entirely due to managerial estimates but also derive from investment in working capital that is necessary for the firm's day-to-day operations, Columns (3) and (4) further split accruals into changes in working capital and accrual estimates, such as bad debt expense. Consistent with Frankel, Levy, and Shalev (2017), working capital falls in the fourth quarter relative to other quarters (the p-values of all F-tests are smaller than 0.01). Further, while

both the working capital as well as the estimates effects are negative and thereby jointly contribute to the fourth-quarter accruals effect, the effect is substantially larger for estimates than for changes in working capital. In terms of economic magnitude, earnings deriving from accounting estimates fall by 4.4% of total assets, which is 1.52 (= -0.044/-0.029) times the effect size for changes in working capital.

Columns (5) to (7) investigate the fourth-quarter effect for three specific accrual expense estimates: bad debt expense, warranty expense, and inventory impairment. Since Compustat does provide sparse or no coverage on these expenses, we use CalcBench, which compiles granular data from firms' XBRL annual reports, as the source instead. The data are available starting is 2009. Consistent with our previous findings, we find that all three categories of accrual expense estimates tend to be significantly higher in the fourth quarter than in interim quarters (all p-values < 0.01).

Adopting the structure of Table 4 Panel B, Table 5 Panel B re-estimates the Table 5 Panel A results after controlling for CFO. While the fourth-quarter effect, if anything, grows for accruals and estimates, it shrinks for changes in working capital. For the specific accrual expense estimates, the effect remains unchanged.

3.6. Firm Size

Together with the findings in Table 4, the Table 5 results suggest that the fourth-quarter earnings effect is driven by managers' accrual expense estimates. The question then becomes whether managers make these estimates in good faith (i.e., in alignment with shareholder interests). To explore this, we examine how the effect varies with firm size, a commonly used proxy for the degree of public scrutiny firms face (e.g., Zimmerman 1983). Specifically, Figure 5 re-estimates Tables 5 and 6 after splitting the sample by size quartiles, which we compute via ranking firms by total assets within each month-year. If managers do (do not) make the fourth-quarter expense

estimates documented in the previous sections in good faith, we expect the results to get stronger the more (less) public scrutiny managers face, i.e., for larger (smaller) firms.

Figure 5 Panel A documents that, while present throughout the size distribution, the fourth-quarter earnings effect concentrates in small firms. Most starkly, while earnings fall by 0.5% ($p < 0.01$) of total assets for the largest quartile of firms, earnings fall by 13.9% ($p < 0.01$) for the smallest quartile of firms in the fourth quarter. Addressing concerns that the large effect magnitude for small firms derives from small denominator (i.e., total assets) values, the same pattern does not hold for sales: the positive fourth-quarter sales effect is approximately constant across the size distribution.

Figure 5 Panel B explores which expense categories drive the fourth-quarter earnings' size effect. While the effect gets stronger for all expense types when moving down the size distribution, the pattern is most pronounced for COGS and SG&A, which, as documented in Table 4, also drive the bulk of the overall effect. Figure 5 Panel C (Panel D) show that the moderating effect of size is stronger for accruals (estimates) than for CFO (changes in working capital). Together, these findings suggest that a lack of public scrutiny magnifies the fourth-quarter increase in expenses that arise from accounting estimates. This result raises the concern that these estimates are not made in good faith.

4. Potential Explanations

This section discusses several explanations for the fourth-quarter earnings effect and whether they are consistent with the evidence presented in the previous sections. While all explanations can explain the basic fourth-quarter effect, some explanations fit the additional evidence better than others. However, multiple explanations might be at play at the same time.

4.1. Auditor Conservatism

While the SEC requires only an auditor review for interim reports released over the fiscal year, it requires a full audit for annual reports released at the end of the fiscal year. Basu et al. (2002) argue that auditors' legal liability is higher for full audits than for auditor reviews, which creates career and other reputational concerns for the auditors and incentivizes them to push firms to be more conservative in their fourth-quarter reporting.[21] While auditor conservatism is consistent with the fourth-quarter earnings effect, it does not explain our finding that the fourth-quarter earnings effect is stronger for small firms that face less public scrutiny. Under auditor conservatism deriving from auditors' reputational concerns, we expect the effect to be stronger for large firms that face more public scrutiny (Benston 1969).

To test the role of auditor conservatism more directly, we build on the SEC requirement that firms obtain auditor reviews of their interim reports, which became effective in March 2000 (Manry, Tiras, and Wheatley 2003). Before March 2000, firms were not required to obtain an audit of their interim reports. While auditor reviews are less intensive than annual audits, auditor reviews involve auditors throughout the fiscal year and thereby increase the legal liability auditors face for interim reports relative to fiscal year reports. Thus, if the threat of legal liability induces auditors to push firms to be more conservative in their financial reporting, we would expect conservatism in the interim quarters to increase. If so, negative accounting charges in the fourth quarter *relative* to interim quarters should fall for at least two reasons. First, the increase of interim quarter conservatism should increase the amount and frequency of negative accounting charges in the interim quarters, leaving less of a built up to be charged off in the fourth quarter. Second, even if

[21] Auditor conservatism differs from conditional conservatism. Under conditional conservatism, bad news (here earnings-reducing charges) are recognized more quickly than good news (Basu 1997). Hence, we would expect bad news to be recognized in the quarter in which the news occurs (i.e., not necessarily the fourth quarter). In contrast, under auditor conservatism, auditors push firms to recognize more bad news in the fourth fiscal quarter.

fourth-quarter auditor conservatism and accounting charges remain the same, interim-quarter auditor conservatism and accounting charges increase, inducing the ratio of fourth-quarter to interim-quarter charges to fall. Thus, we would expect the fourth-quarter effect to weaken after the introduction of mandatory auditor reviews.

To test this hypothesis, we restrict our sample to the 1998 to 2001 period and interact *Q2* to *Q4*, with *Auditor Review*, an indicator that the observation's fiscal period ends in or after March 2000. Table 6 presents the results. Across all columns, we find that the interaction between *Q4* and *Auditor Review* is negative, suggesting that the fourth-quarter effect gets stronger after the introduction of mandatory auditor reviews, which is inconsistent with the auditor conservatism explanation.

4.2. Earnings Management

The fourth-quarter effect might arise through earnings management in at least three ways. First, Givoly and Ronen (1981) and Das, Shroff, and Zhang (2009) argue that managers manage fourth-quarter earnings to smooth annual earnings after observing interim earnings in the first three quarters of the fiscal year. Under earnings smoothing, we would expect upward and downward earnings adjustments in the fourth quarter that partially offset the earnings realizations in the first three interim quarters, not systematic downwards adjustments across the earnings distribution.[22]

Second, managers might manage earnings upwards in their interim reports when they face relatively less scrutiny through auditors, investors, and regulators and then make the correct estimates in their annual reports when they face more scrutiny.[23] As a result, consistent with the

[22] In untabulated analyses, we document that the fourth-quarter earnings effect is prevalent in the subsample in which the sum of interim earnings is positive and in the subsample in which the sum of interim earnings is negative, which is also inconsistent with earnings smoothing.

[23] Relatedly, Kinney and Trezevant (1993) and Xu and Zwick (2024) find that firms tend to push capital expenditures toward the year-end to reduce tax payments. Since, as shown in Figure 1, the year-end often aligns with the fourth

results above, interim earnings will be artificially high and fourth-quarter earnings will be artificially low. Since fourth-quarter earnings are usually not separately disclosed, this practice might skip stakeholders' attention and not lead to a public backlash. To test this explanation, we examine how the fourth-quarter effect varies for observations in the highest (High) and lowest (Low) quartile of the discretionary accruals distribution, a commonly employed measure of earnings management. Table 7 Panel A, B, C, and D measures discretionary accruals following Jones (1991), the modified Jones (1991) model proposed in Dechow, Sloan, and Sweeney (1995), the adjusted modified Jones (1991) model proposed in Kothari, Leone, and Wasley (2005), and the performance-matched adjusted modified Jones (1991) model proposed in Kothari et al. (2005), respectively. The last row of each panel (*Difference*) tests whether *Q4*'s slope coefficients are different across columns.[24] Across all panels, we document that the fourth-quarter effect is significantly stronger in the low discretionary accruals sample. Inconsistent with the explanation forwarded at the start of this paragraph, this suggests that the fourth-quarter effect is *decreasing* in earnings management, i.e., inconsistent with the notion that earnings management is driving the fourth-quarter effect.

Third, Gunny, Jacob, and Jorgensen (2013) argue that contracting incentives push managers to upward manage earnings in the fourth quarter because managers' compensation,

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quarter, this might counteract our results by lowering tax expense. Consistent with this, in untabulated analyses, we find that tax expense is lower in the fourth quarter. As a result, the fourth-quarter earnings effect is pronounced when focusing on pre-tax instead of post-tax earnings. Callen, Livnat, and Ryan (1996) also find that capital expenditures tend to be higher in the fourth quarter. They argue that this is because managers try to make full use of their allocated budgets to prevent losing them or their allocation in the future. Consistent with the results in Table 4 Column (4), this might contribute to the fourth-quarter earnings effect by increasing depreciation expense. However, as discussed in Section 3.4, the depreciation effect is small relative to the COGS and SG&A effects.

[24] Following Easton, Kapons, Monahan, Schütt, and Weisbrod (2024), we test the statistical significance of this difference by grouping the "High" and "Low" observations into a single regression that interacts an indicator for the "High" group with our fiscal quarter indicators and fixed effects. The *Difference* row reports the p-value of the slope coefficient interaction term between the "High" group indicator and *Q4*.

bonuses, and performance indicators as well as several other contracting provisions, such as debt covenants, tend to be based on earnings figures released in the fourth quarter. This explanation is consistent with Figure 5's finding that the fourth-quarter earnings effect is stronger in smaller firms that face less public scrutiny. However, it is inconsistent with the direction of the fourth-quarter earnings effect itself; under upwards earnings management, we would expect fourth-quarter earnings to be higher. Further, Durtschi and Easton (2009) provide evidence that the earnings management measures employed in Gunny et al. (2013) are confounded by scaling and sample selection. They argue that another explanation than earnings management better describes the patterns documented in prior literature: integral reporting.

4.3. Integral Reporting

Collins et al. (1984) argue that fourth-quarter earnings are noisier than interim earnings because of integral reporting practices. The FASB requires firms to treat reporting in "each interim period […] primarily as an integral part of an annual period" (ASC 270-10-45-1). Thus, US GAAP requires firms to treat each fiscal quarter as a part of the overall fiscal year rather than on a stand-alone basis (i.e., under the discrete approach used for annual reporting). As a result, the accounting numbers published in quarterly reports within the same fiscal year become dependent on each other (Rangan and Sloan 1998). Since these dependencies are not directly observable, firms need to estimate them, which is challenging.[25] If firms systematically underestimate the share of annual

[25] While firms must use the same procedures to estimate revenues for interim reporting as for annual reporting (ASC 270-10-45-3), there are several differences for expenses which yield considerably more discretion to managers than in annual reporting (Mendenhall and Nichols 1988; Brown and Pinello 2007). First, whether individual expenses benefitting several periods are expensed or capitalized depends on managers expectations about the firms' activities and sales during the other quarters of the same fiscal year. For example, "[s]ome declines in the market value (for inventory measured using LIFO or the retail inventory method) or net realizable value (for all other inventory) of inventory at interim dates […] can reasonably be expected to be restored in the fiscal year [and] need not be recognized at the interim date since no loss is expected to be incurred in the fiscal year" (ASC 270-10-45-6c). Similarly, "[i]f quantity discounts are allowed to customers based upon annual sales volume, the amount of such discounts charged to each interim period shall be based on the sales to customers during the interim period in relation to estimated annual

expenses accruing in interim quarters, the integral approach would require them to recognize the charges in the fourth quarter and thereby drive the fourth-quarter effect.

While these predictions are broadly consistent with the results of the previous section, in Table 8, we document that the fourth-quarter earnings effect is also present for firms that report in accordance with IFRS, which mandates the discrete approach to financial reporting.[26] Under the discrete approach, firms treat each fiscal quarter as a stand-alone fiscal period, which removes the integral approach's cross-quarter dependencies described in the previous paragraph. We proceed in three steps. First, we confirm that the fourth-quarter effect is present for US firms (Column (1)) and for US firms for which Compustat indicates that they follow US GAAP. Second, we show that the effect is also present and even stronger for international firms that cross-list in the US via American Depositary Receipts (ADRs) for which Compustat indicates that they follow IFRS, which they are allowed to since November 15, 2007. Lastly, we show that the effect is present (and again stronger than for US firms) for Canadian firms before as well as after the Canadian Accounting Standards Board required firms to adopt IFRS since January 1, 2011. These findings are inconsistent with the integral approach driving the fourth-quarter earnings effect.[27]

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sales" (ASC 270-10-45-9b). Second, managers must forecast period expenses resulting from year-end adjustments (e.g., bad debt provisions, incentive compensation, quantity discounts) and prospectively allocate them across interim periods (ASC 270-10-45-10). Third, the estimation approaches used for interim reporting can also differ from those used for annual reporting. For example, "some entities use estimated gross profit rates to determine the cost of goods sold during interim periods or use other methods different from those used at annual inventory dates" (ASC 270-10-45-6a). Similarly, while advertising costs need to be expensed as incurred for annual reporting, for interim reporting they "may be deferred within a fiscal year if the benefits of an expenditure made clearly extend beyond the interim period in which the expenditure is made" (ASC 270-10-45-9d). Please note that these differences do not explain why earnings should be systematically lower in the fourth quarter relative to interim quarters.

[26] This test also addresses concerns that our results arise because under US GAAP more specifically and the integral approach more broadly certain accounting tests, such as impairment testing, generally only occur at year end. Under the discrete approach, all accounting tests occur in every period.

[27] In an untabulated test, we analyze whether the fourth-quarter earnings effect is present for international firms that do not report under U.S. GAAP and use semiannual interim reporting. Hence we test whether there is a general true-up effect for the last interim reporting period. We use Compustat Global from the year 2000 to 2024 and use earnings before extraordinary items because net income is not available for that dataset. We estimate the specification that we employ in the main body of the paper but replace the quarter dummies with half-year dummies for a sample of 441,547

4.4. Accounting System Quality

A final possibility is that firms' accounting systems are simply not sophisticated enough to track various accounts on a timely basis over the fiscal year, leading to large true-ups at the end of the fiscal year (i.e., in the fourth quarter) (Collins et al. 1984). This effect should be pronounced for expenses relative to sales since cost data tends to be more diverse, complex, and harder to allocate (Labro 2019). We use two sets of measures to test this possibility.

4.4.1. Employment Data Measures

Employing the same design as Table 7, Table 9 examines how the fourth-quarter effect varies with two information system quality measures based on employment data from Revelio. Revelio aggregates and standardizes publicly available online profiles and resumes from various sources (such as job postings, networking sites, and government data) and has frequently been employed in recent accounting literature.[28] The data spans from 2008 to 2023. We use Revelio to measure the percentage of employees working in controlling and test how the fourth-quarter effect varies for observations in the highest and lowest quartile of the resulting distribution by year.[29] Controllers are responsible for supporting business planning, budgeting, and monitoring performance of business units, and are therefore directly involved in the computation of cost of goods sold and SG&A, the two expense accounts that drive the fourth-quarter effect. Thus, if

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firm-half-year observations. We find a strong negative and statistically significant coefficient for the second half-year dummy for the full sample, and separately estimated for the three largest countries in the sample (Japan, Great Britain, and Australia).

[28] See, e.g., Li, Lourie, Nekrasov, and Shevlin (2022), Cai, Chen, Rajgopal, and Azinovic-Yang (2024), and Baker, Larcker, McClure, Saraph, and Watts (2024).

[29] We classify the following as controlling employees: controller, cost analyst, business controller, control analyst, cost accountant, finance controller, financial analysis, financial controller, financial planning analysis, financial planning analyst, planning, planning analyst, plant controller, business planning, cost controller, financial planning, reporting analyst, stock controller, strategic planning, demand planning, financial planner, business planning analyst, cost accounting, financial analyst fp a, project controller, strategic planner, fp a, controlling, supply planning.

controllers aid firms in making better expense estimates, we expect the fourth-quarter effect to be weaker for firms employing more controllers.[30]

Table 9 Panel A presents the results. The negative fourth-quarter earnings effect is significant for firms with a low percentage of controllers but insignificant for firms with a high percentage of controllers. The difference between the fourth-quarter earnings coefficients of the two regressions is statistically significant ($p < 0.01$). In Table 9 Panel B, we test whether this finding is robust to using the percentage of wages to employees working in controlling instead of the percentage of employees working in controlling as the cross-sectional variable.[31] Our inferences remain unchanged. Overall, these results suggests that the fourth-quarter effect is weaker for firms that invest more intro accurate cost estimation.

4.4.2. Gallemore and Labro (2015) Measures

Table 10 examines the robustness of our Table 9 results to using three information system quality measures proposed by Gallemore and Labro (2015). First, Panel A tests how the effect varies for observations in the highest and lowest quartile of absolute management forecast errors per year. While the fourth-quarter earnings effect is statistically significant and negative for firms with the highest absolute management forecast errors, it is not statistically significant and close to zero for firms with the lowest median absolute management forecast errors. The difference

[30] One way this could play out is that firms that do invest little in cost estimation underestimate accrual expenses in the interim quarters (where auditors only conduct a review rather than a full audit) and are then pushed by the auditors to recognize the correct amount of accrual expenses for the full fiscal year (where auditors conduct a full audit). Since firms do not produce a separate report for the fourth quarter, the fourth-quarter accrual expense estimates are then imputed as the difference between the accrual expense estimates for the full fiscal year and the sum of the accrual expense estimates for the interim quarters. As a result, while the fiscal year accrual expense estimates would be accurate, the interim (fourth) quarter accrual expense estimates would be too low (high). Please note that this explanation is distinct from the auditor conservatism explanation in Basu et al. (2002) because auditors do not impose any conservative bias here but only seek to make firms' financial reports to reflect economic reality as closely as possible.

[31] Compensation data in Revelio is based on an estimate rather than actual salary data. Thus, this additional analysis must be interpreted with caution.

between the fourth-quarter earnings coefficients of the two regressions is statistically significant ($p < 0.01$). Second, Panel B tests how the effect varies in the highest and lowest quartiles of earnings announcement reporting lag per year. While the fourth-quarter earnings effect is present for observations with the highest reporting lag, the effect is not present for observations with the lowest reporting lag. Again, the difference in fourth-quarter earnings coefficients is statistically significant ($p < 0.01$). Third, Panel C tests how the effect varies for observations with and without SOX Section 404 material control weaknesses. While the fourth-quarter earnings effect is present for observations with and without internal control weaknesses, the effect is 5.27 (= -0.079/-0.015) times larger for firms with SOX Section 404 material control weaknesses and the difference in slope coefficients is again statistically significant ($p < 0.01$).

In sum, these results suggest that the fourth-quarter earnings effect is pronounced for firms with lower quality information systems, which is consistent with accounting system quality driving, or at least, contributing to the fourth-quarter earnings effect. This inference is further corroborated by anecdotal evidence we gathered from several informal conversations we had with controllers. The controllers were generally not surprised when we told them about the fourth-quarter earnings effect and agreed with our inference that the effect might be driven by ex post true ups ahead of the upcoming audit at the end of the fiscal year. As one controller with more than a decade of experience as a vice president of controlling at a Fortune 400 company put it: "there was a tone that the street would be less punishing on fourth quarter results as […] the street was more concerned about looking forward than in the past […] especially realizing that a lot of year end cleanup happens [in the fourth quarter]." The following section builds on this statement by examining whether analysts and investors (i.e., "the street") account for the fourth-quarter earnings effect.

5. Do Analysts and Investors Account for the Fourth-Quarter Earnings Effect?

The previous sections document (1) that earnings are systematically lower in the fourth quarter, (2) that the effect largely arises from accrual expense estimates, (3) that the effect is pronounced for smaller firms facing less public scrutiny, and (4) that, while the evidence that auditor conservatism, earnings management, and integral reporting explain the fourth quarter effect is at best mixed, the evidence is broadly consistent with the fourth-quarter effect arising because firms' accounting systems do not process complex cost information in a precise or timely manner. Regardless of the explanation, in this section, we explore whether market participants, financial analysts and investors, understand the fourth-quarter effect.

5.1. Analysts

Prior findings that analysts and statistical models produce the highest forecast errors in the fourth fiscal quarter suggest that analysts do not fully account for the fourth-quarter effect.[32] To replicate these results for our extended sample, we compute *Earnings Surprise* by subtracting the latest IBES analyst consensus earnings-per-share forecast before the earnings announcement from announced earnings and scale this difference by the share price two days before the earnings announcement. We retain observations that have a share price two days before the earnings announcement that is larger than 1. We obtain analyst forecast data from IBES and share price data from CRSP. Following the approach outlined in DellaVigna and Pollet (2009), we obtain earnings announcement dates from Compustat and IBES.

Table 11 Panel A Column (1) presents the results of regressing *Earnings Surprise* on fiscal quarter indicators. Consistent with Collins et al. (1984) and Doran (1994), relative to interim

[32] See Collins et al. (1984), Bathke Jr and Lorek (1984), Jones and Bublitz (1990), Doran (1994), and Lee and Park (2000).

quarters, analysts overestimate earnings and analyst forecast errors are larger in the fourth quarter. In terms of economic magnitude, the estimates suggest that analysts overestimate earnings by 0.6% of market value of equity more in the fourth quarter than in the first quarter. To further examine analysts' overestimation of earnings, we build on the findings in Table 4 and 6 that the fourth-quarter earnings effect principally derives from accrual expense estimates, which lower earnings, but not from sales or CFO, which increase earnings. As a result, if analyst do not anticipate the fourth-quarter increase in accrual expense estimates, the fourth-quarter earnings effect should principally surprise them negatively, not positively. To test this prediction, Table 11 Panel A Column (2) (Column (3)) regresses *Positive Earnings Surprise* (*Negative Earnings Surprise*), which equals *Earnings Surprise* if *Earnings Surprise* is positive (negative) and zero otherwise, on fiscal quarter indicators. Consistent with the fourth-quarter earnings effect surprising analysts principally on the downside, negative but not positive earnings surprises are larger in the fourth quarter than in interim quarters.[33]

Lastly, in Table 11 Panel B, we more directly test whether analysts are mostly surprised by expenses rather than sales for a limited sample of firms for which analyst sales as well as earnings forecasts are available, allowing us to disaggregate *Earnings Surprise* into *Sales Surprise* (the consensus sales forecast minus realized sales) and *Expense Surprise* (= *Sales Surprise – Earnings Surprise*).[34] This analysis yields two insights. First, the estimates in Column (1) confirm that, for

[33] In untabulated analyses, we analyze realized earnings and earnings forecasts separately and find that realized earnings show a pronounced, negative fourth-quarter effect whereas fourth-quarter earnings forecasts are weakly positive (at the 10% significance level) relative to first-quarter earnings. This shows (1) that the fourth quarter earnings effect also holds for IBES realized earnings that are not confounded by one-time special items and (2) that earnings forecasts do not adjust to the systematic fourth-quarter earnings effect.

[34] IBES does not provide consensus sales forecast data. Thus, we create consensus sales forecasts ourselves from the IBES History Detail file in two steps. First, for firm quarters for which at least three analyst sales forecasts are available, we take an average across all analysts' sales forecasts made before the earnings announcement. Second, we divide the difference between the sales forecast and its realization by the market value of equity two days before the earnings announcement. Following prior research, we retain only firm-quarters with a share price larger than one. The resulting

this smaller sample, relative to interim quarters, earnings in the fourth quarter are lower than analysts expect. Second, consistent with analysts being surprised by unexpectedly high expenses but not by unexpectedly low sales, the estimates in Columns (2) and (3) document that, relative to interim quarters, expenses (sales) do (do not) tend to be higher than analysts expect in the fourth quarter.

5.2. Investors

The analyses in Table 11 suggest that capital market participants, as proxied by analysts, do not fully account for the negative fourth-quarter earnings effect and, as a result, tend to be negatively surprised by fourth-quarter earnings announcements. In this section, we design a trading strategy to exploit this pattern and test whether this strategy yields abnormal returns.[35]

To begin, Figure 6 Panel A and B plot the cumulative stock market return from five days before to sixty days after firms' earnings announcement date for fourth-quarter as well as interim earnings announcements separately for positive and negative earnings surprises. To facilitate interpretation, we start the cumulation period on the earnings announcement date. The orange (blue) line shows the cumulative returns for fourth-quarter (interim) earnings announcements. For positive earnings surprises, while cumulative returns continue drifting upwards following the earnings announcement (Bernard and Thomas 1989), we do not observe systematic differences between fourth-quarter and interim earnings announcement returns. In contrast, for negative earnings surprises, consistent with Mendenhall and Nichols (1988), Jones and Bublitz (1990),

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variable exhibits a few large outliers. To prevent these outliers from dominating the estimation, we exclude observations below the 1st percentile and above the 99th percentile each year. To increase consistency, we construct the earnings consensus forecasts for this analysis using a similar procedure.

[35] We obtain return data from CRSP and impute missing delisting returns with -30% for NYSE and AMEX stocks and with -55% for NASDAQ stocks (Shumway 1997; Shumway and Warther 1999). For the trading strategy analysis, we do not require data on all four fiscal quarters in a given firm-year to avoid a forward-looking bias.

Kross and Schroeder (1990), Lee and Park (2000), and Chen et al. (2022), returns fall less around the earnings announcement date for the fourth than for interim quarters. Importantly, however, not reported in prior literature, they also reverse more quickly. While cumulative returns remain approximately steady after interim earnings announcements, cumulative returns around fourth-quarter announcements mean revert to zero within sixty days.

In Table 12, we build on these patterns and, each month, sort firms into long (short) portfolios based on whether the earnings announcement in the previous month pertains to the fourth quarter or to interim quarters. To capture return reversals after the earnings announcement date, we only use earnings announcements on or after the twentieth calendar day of the previous month. Panel A reports equal-weighted returns. Column (1) reports results based on all observations. The hedge portfolio returns are positive and statistically significant. The average monthly return amounts to 0.669% (t = 2.84). Importantly, the hedge returns are coming from the subset of observations with negative earnings surprises. For negative earnings surprises, the monthly hedge returns amount to 1.356% (t = 2.74). In contrast, the hedge returns for the subsample of firms with positive earnings surprises are statistically insignificant. The results are similar, if not stronger, for value-weighted returns (Panel B).[36] In Panels C and D, we report alphas based on the Fama and French (2015) five-factor model. Following announcements of negative earnings surprises, the hedge return alphas for equal-weighted returns amount to 1.555% (t = 2.98), and the hedge return alphas for value-weighted returns amount to 1.552% (t = 2.97). In total, these

[36] Given our finding that most firms have their highest sales in the fourth quarter, one concern is that the large positive *Q4* returns for positive earnings surprises may be picking up the seasonality effect documented in Chang et al. (2017). However, Chang et al. (2017) find that analysts *underestimate* the seasonality of earnings (resulting in positive earnings surprises). This differs from our strategy, as we expect to find hedge returns for firms with *negative* earnings surprises.

results suggest that investors may be able to exploit the return patterns surrounding fourth-quarter earnings announcements to trade profitably.

6. Conclusion

We document that earnings in the fourth fiscal quarter are significantly lower than earnings in other fiscal quarters. This pattern holds when accounting for seasonality within a fiscal year and holds across various sub-periods of our sample. The effect is largely driven by an increase in accrual expense estimates. Partitioning by firms' size shows that the fourth-quarter earnings effect is stronger for small firms. While we find only conflicting or mixed evidence that auditor conservatism, earnings management, or integral reporting drive the effect, we find consistent evidence that the effect is pronounced for firms that invest less in cost estimation and their internal information systems, suggesting that the fourth-quarter effect arises at least partially because firms' accounting systems do not process complex cost estimates in a precise or timely manner. Lastly, we present evidence that analysts tend to systematically overestimate fourth-quarter earnings, suggesting that capital market participants do not fully account for the fourth-quarter earnings effect. We construct a trading strategy based on the fourth-quarter earnings effect and show that the strategy generates abnormal returns.

We contribute to the literature examining seasonal patterns in firms' reported performance. Our findings should be of interest to users of financial statements who are interested in adjusting firms' financial statements to get closer to economic reality as well as standard setters who are interested in changing reporting standards such that firms' financial statements do not systematically deviate from economic reality. While our findings indicate that low internal information quality might compromise the quality of quarterly data, we do not directly speak to the validity of the inferences drawn in prior research that uses quarterly data. Future research could

fill this gap. Specifically, while the common practices of seasonally adjusting or adding fiscal quarter fixed effects might alleviate the concern, ex ante the efficacy of these practices is unclear since the measurement error documented here might not be constant across years, firms, or firm-years.

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Appendix A. Variable Definitions

Panel A. Dependent and Independent Variables

Variable	Definition
Earnings	Net income (Compustat: NIQ) scaled by total assets (Compustat: ATQ).
Sales	Sales (Compustat: SALEQ) scaled by total assets (Compustat: ATQ).
COGS	Cost of goods sold (Compustat: COGSQ) scaled by total assets (Compustat: ATQ).
SG&A	Sales, general, and administrative expense (Compustat: XSGAQ) scaled by total assets (Compustat: ATQ).
Depreciation	Depreciation expense (Compustat: DPQ) scaled by total assets (Compustat: ATQ).
Special Items	Special items (Compustat: -SPIQ) scaled by total assets (Compustat: ATQ).
CFO	Cash flow from operations (Compustat: -OANCFQ or CalcBench: Operating Cash Flow) scaled by total assets (Compustat: ATQ or CalcBench: Assets).
Accruals	Accruals (Compustat: NIQ − OANCFQ) scaled by total assets (Compustat: ATQ).
Δ*Working Capital*	Changes in working capital (Compustat: -1 × [RECCHQ + APALCHQ + TXACHQ + AOLOCHQ + INVCHQ]) scaled by total assets (Compustat: ATQ).
Estimates	Accrual estimates (Compustat: *Accruals* − Δ*Working Capital*) scaled by total assets (Compustat: ATQ).
Bad Debt Expense	Bad Debt Expense (CalcBench: Provision For Doubtful Accounts In Period) scaled by total assets (CalcBench: Assets).
Warranty Expense	Warranty expense (CalcBench: Product Warranty Payments) scaled by total assets (CalcBench: Assets).
Inventory Impairment	Inventory impairment (CalcBench: Inventory Write Down In Period) scaled by total assets (CalcBench: Assets).
Q2	Indicator for the second fiscal quarter.
Q3	Indicator for the third fiscal quarter.
Q4	Indicator for the fourth fiscal quarter.
Earnings Surprise	I/B/E/S actual quarterly EPS minus latest analyst consensus forecast before the earnings announcement scaled by share price two days before the earnings announcement. All variables are adjusted for stock splits.
Positive Earnings Surprise	max(*Earnings Surprise*, 0)
Negative Earnings Surprise	min(*Earnings Surprise*, 0)
Sales Surprise	I/B/E/S actual quarterly sales per share minus average analyst sales per share forecasts before the earnings announcement scaled by share price two days before the earnings announcement. All variables are adjusted for stock splits.
Expense Surprise	The difference between sales per share actuals minus earnings per share actuals and sales per share forecasts minus earnings per share forecasts.

Panel B. Cross-Sectional Variables

Variable	Definition
Discretionary Accruals	Discretionary accruals computed in accordance with Jones (1991), the modified Jones (1991) model proposed in Dechow et al. (1995), the adjusted modified Jones (1991) model proposed Kothari et al. (2005), or the performance-matched adjusted modified Jones (1991) model proposed Kothari et al. (2005).
|*Management Forecast Error*|	Absolute difference in managements' last EPS forecast (IBES: VAL_1 for point forecasts and 0.5 × [VAL_1 + VAL_2] for range forecasts) and the realization of the forecasted figure (IBES: VALUE] before quarter end scaled by share price (Compustat: PRCCQ).
Reporting Lag	Earnings announcement date (Compustat: RDQ) minus fiscal year end date (Compustat: DATADATE).
Internal Control Weakness	Number of SOX Section 404 material control weaknesses (Audit Analytics: COUNT_WEAK).
% of Employees in Controlling	Number of employees in controlling functions divided by total number of employees.
% of Wages in Controlling	The sum of the total wages of all employees in controlling functions divided by the sum of the total wages of all employees.

Appendix B. Compustat Data Guide Expense Line Items Definitions

cogsq includes the following items

1. Agricultural, aircraft, automotive, radio and television manufacturers' amortization of tools and dies
2. Airlines' mutual aid agreements
3. Amortization of deferred costs (i.e., start-up costs)
4. Amortization of tools and dies where the useful life is two years or less
5. Amortization of film and television costs
6. Cooperatives' patronage dividends
7. Direct costs - when a separate selling, general and administrative expenses figure is reported
8. Direct labor
9. Expenses associated with sales-related income from software development
10. Extractive industries' lease and mineral rights charged off and development costs written off
11. Freight-in
12. Heat, light and power
13. Improvements to leased properties
14. Insurance and safety
15. Land developers' investment real estate expense
16. Licenses
17. Maintenance and repairs
18. Operating Expense - Totals
19. Pension, retirement, profit sharing, provision for bonus and stock options, and other employee benefits, for manufacturing companies. For non-manufacturing companies, this expense goes into Selling, General, and Administrative Expenses
20. R&D - customer sponsored portion
21. Real estate investment trusts' advisory fees
22. Rent and royalty
23. Lease expense
24. Salary expense
25. Supplies
26. Taxes, other than income taxes
27. Terminals and traffic
28. Transportation
29. Warehouse expense
30. Write downs of oil and gas properties

xsgaq includes the following items

1. Advertising expense
2. Bad debt expense, provision for doubtful accounts
3. Commissions
4. Directors' fees and remuneration
5. Engineering expense
6. Foreign currency adjustments when included by the company
7. Freight-out expense
8. Indirect costs when a separate cost of goods sold figure is given
9. Marketing expense (except for banks)
10. Operating Expense - Totals when a separate cost of goods sold figure is given and there is no selling, general, and administrative expenses
11. Parent company charges for administrative services
12. Pension, retirement, profit sharing, provision of bonus and stock options, employee insurance, and other employee benefit expenses, for non-manufacturing companies
13. R&D - company sponsored
14. Research and development expenses, unless included in cost of goods sold by the company
15. Research revenue that is less that 50 percent of total revenues for two years
16. Strike expense
17. Extractive industries' lease rentals or expense, exploration expense, research and development expense, and geological and geophysical expenses
18. Routine legal litigation expenses (this would not include legal litigation settlements)

dpq includes the following items

1. Amortization of patents, trademarks, and other intangibles
2. Amortization of book plates
3. Amortization of capitalized leases
4. Amortization of leasehold improvements
5. Amortization of tools and dies
6. Depletion charges
7. Real estate companies' amortization of development and production expense if not part of property, plant and equipment
8. Airlines' provision for obsolescence of materials and supplies even if the associated item is a current asset
9. Extractive industries' abandonments, retirements, intangible drilling costs and dry-hole expense for companies using the full-cost method of accounting for oil assets.
10. Utilities' amortization charges to operation
11. Amortization of software costs, included in Selling, General, and Administrative Expenses

spiq includes the following items

1. Adjustments applicable to prior years (except recurring prior year income tax adjustments)
2. After-tax adjustments to net income for the purchase portion of net income of partly pooled companies when the adjustment is carried over to retained earnings
3. Any significant nonrecurring items
4. Current year's results of discontinued operations and operations to be discontinued
5. Flood, fire, and other natural disaster losses
6. Impairment of goodwill/unamortized intangibles
7. Interest on tax settlements (when reported separately from other interest expense)
8. Inventory writedowns when reported separately or called "nonrecurring"
9. Nonrecurring profit or loss on the sale of assets, investments, securities, among others
10. Profit or loss on the repurchase of debentures
11. Purchased research and development
12. Relocation and moving expense
13. Reserve for litigation
14. Restructuring charges (includes closing and exit costs)
15. Severance pay when reported separately on the Income Statement
16. Transfers from reserves provided for in prior years
17. Write-down of assets
18. Write-downs or write-offs of receivables, intangibles, among others
19. Write-offs of capitalized computer software costs
20. Year 2000 expenses

Figure 1. Fourth-Quarter End Months

This figure plots the number of fourth-quarter observations by the month in which they end. We exclude observations with a December end since they are by far the most common (81,283 observations) and thereby would make it difficult to assess the frequency for other months.

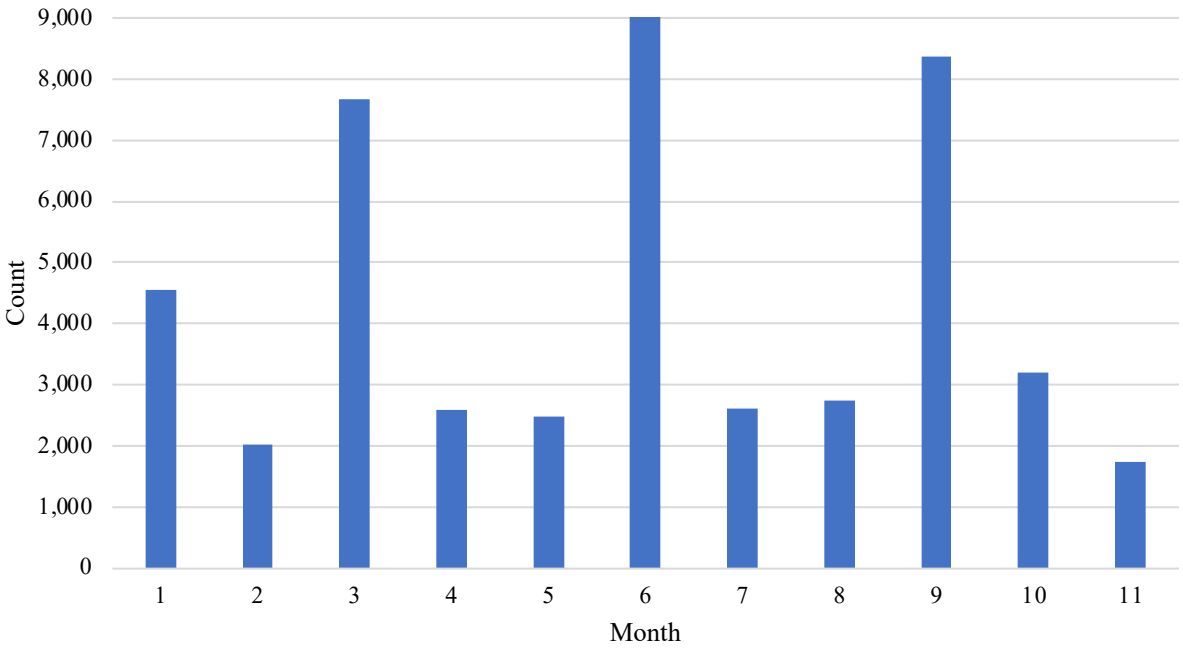
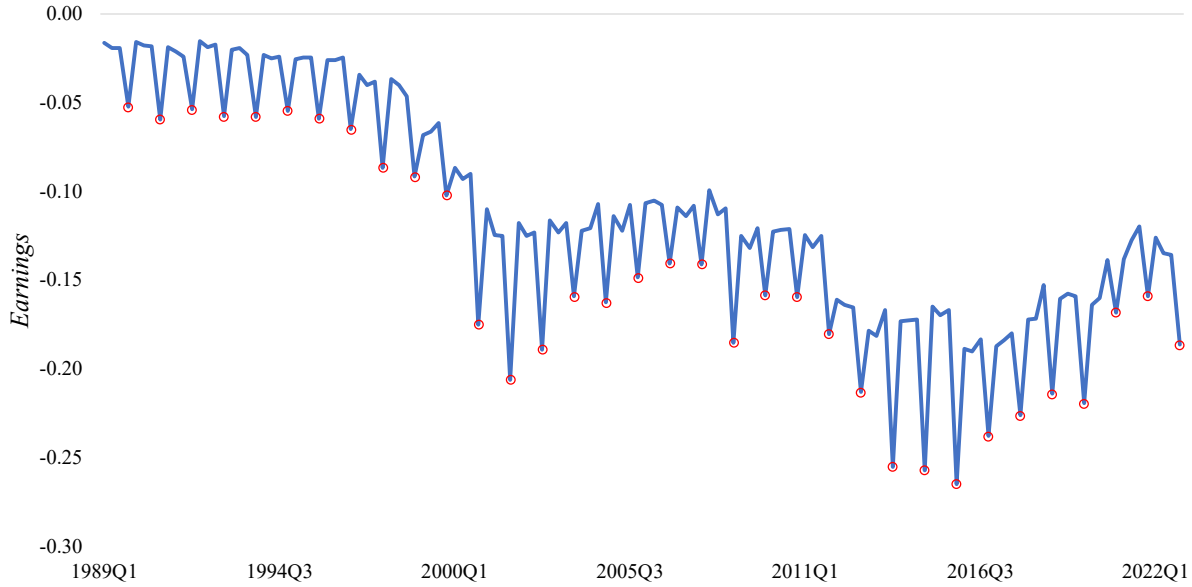


Figure 2. Average Earnings over Time

Panel A (Panel B) plots average earnings over time after standardizing by fiscal year. Red dots mark fourth fiscal quarters. All variables are defined in Appendix A.

Panel A. Raw Earnings



Panel B. After Standardizing by Fiscal Year

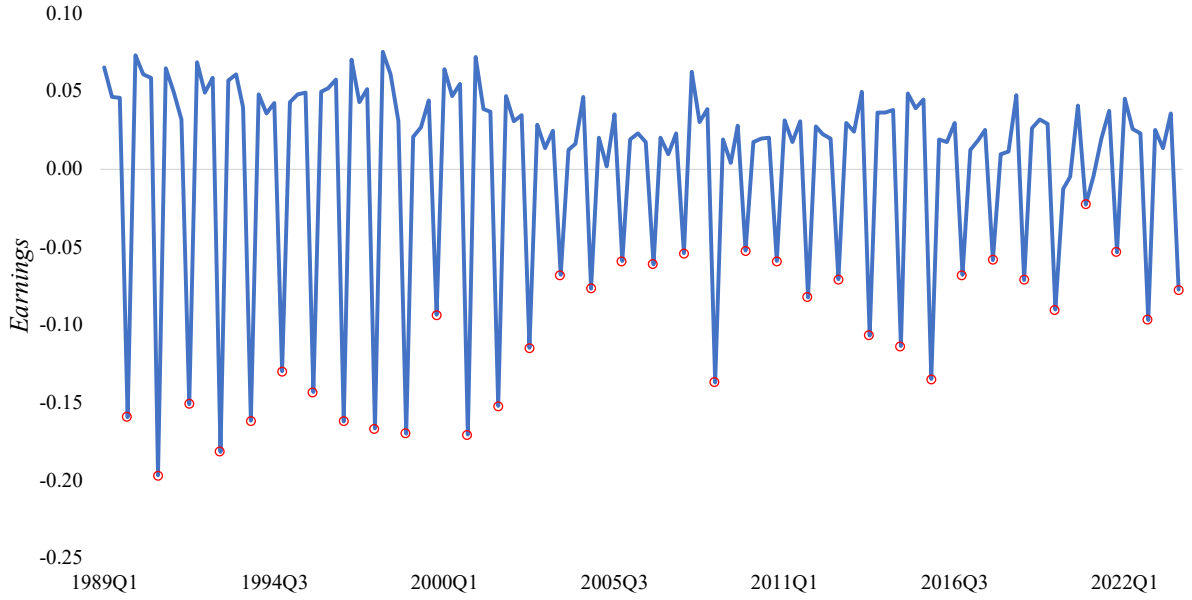


Figure 3. Fourth-Quarter Earnings Effect Across the Earnings Distribution

This figure plots the fourth quarter's slope coefficient and its 95% confidence interval obtained by regressing earnings on indicators for the different fiscal quarters and firm and industry-month-year fixed effects via quantile regressions across the full earnings distribution. Standard errors are clustered by firm. All variables are defined in Appendix A.

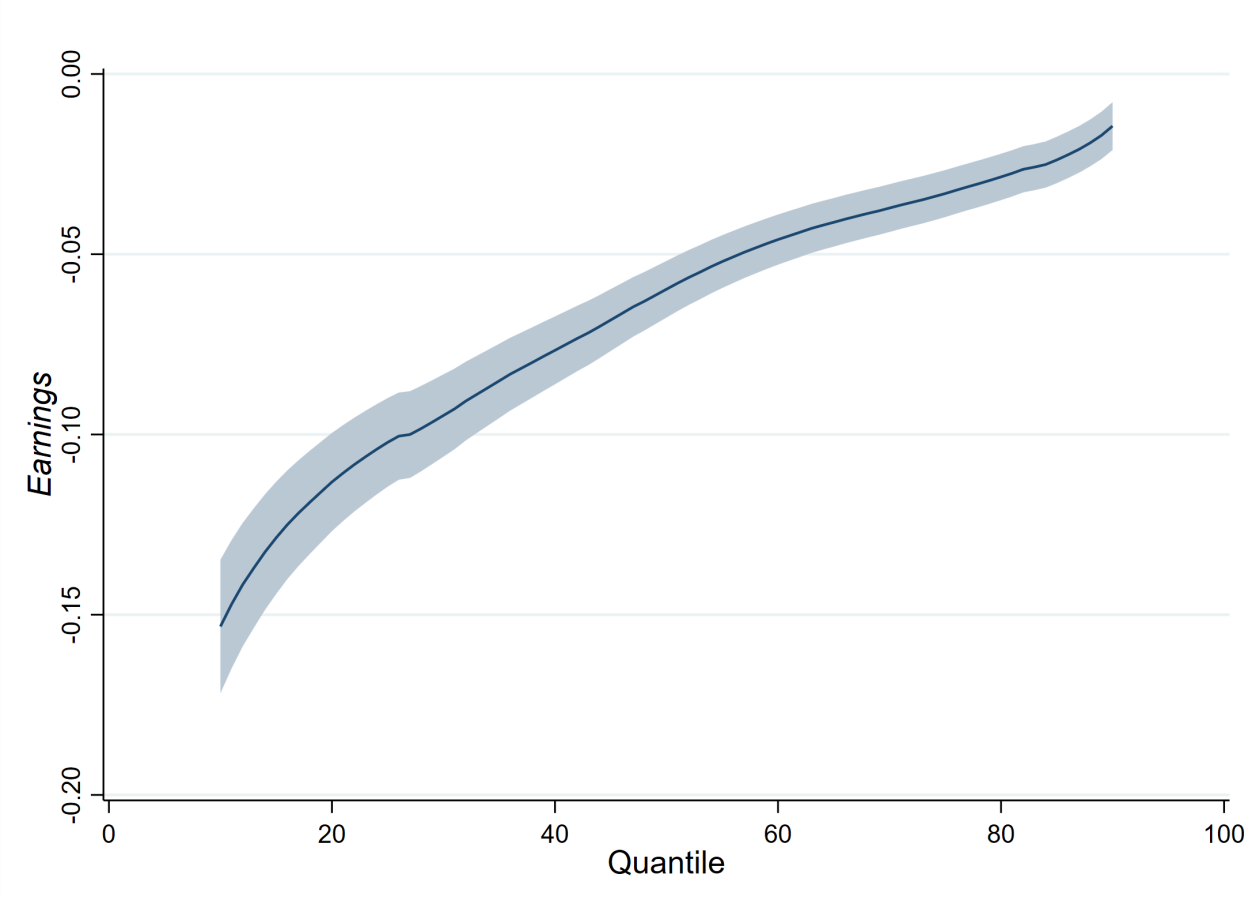


Figure 4. Earnings Decomposition
This figure illustrates our earnings decomposition.

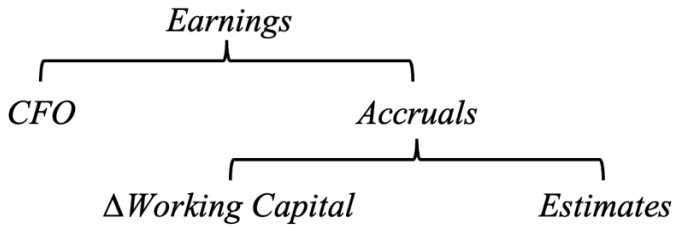
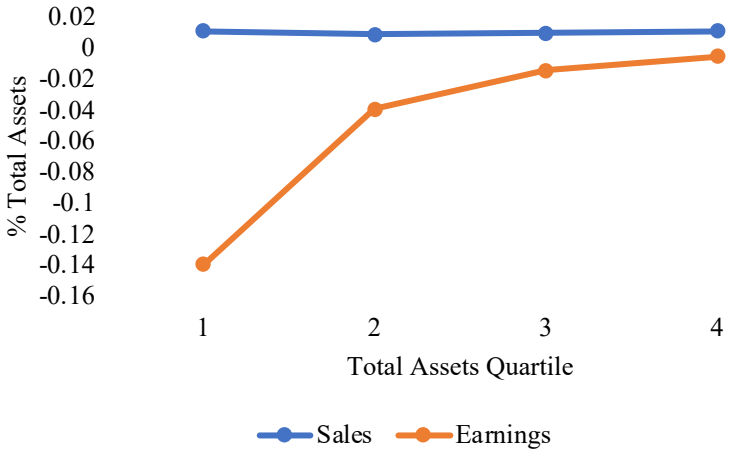
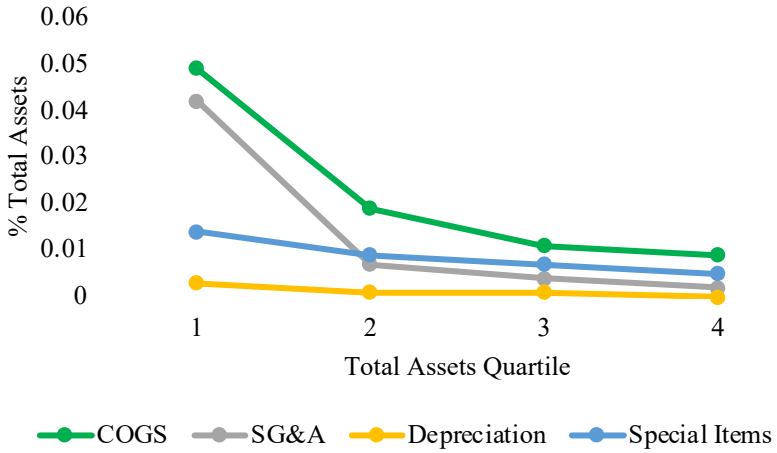


Figure 5. Fourth-Quarter Earnings Effect over Firm Size Distribution
This figure plots fourth-quarter effects over the firm size distribution.

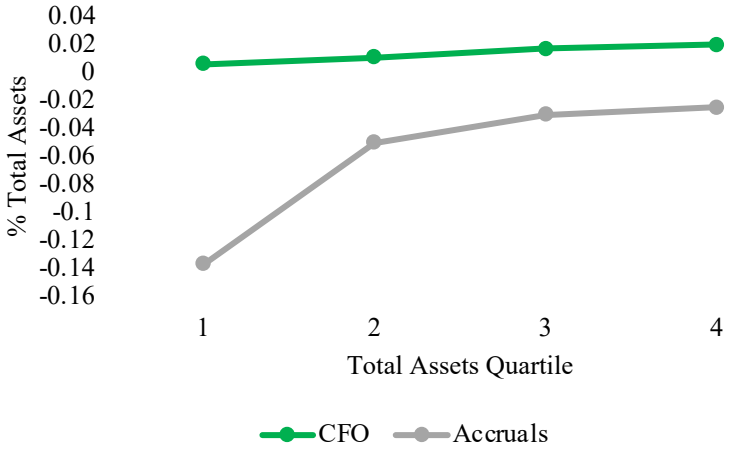
Panel A. Earnings and Sales



Panel B. Expenses



Panel C. CFO and Accruals



Panel D. Changes in Working Capital and Estimates

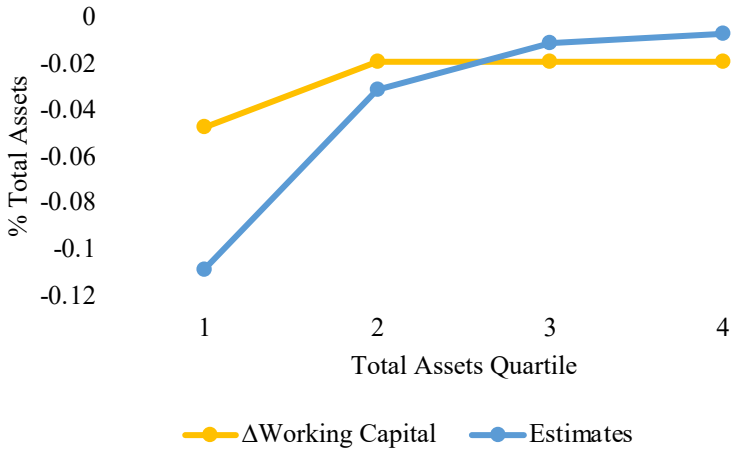
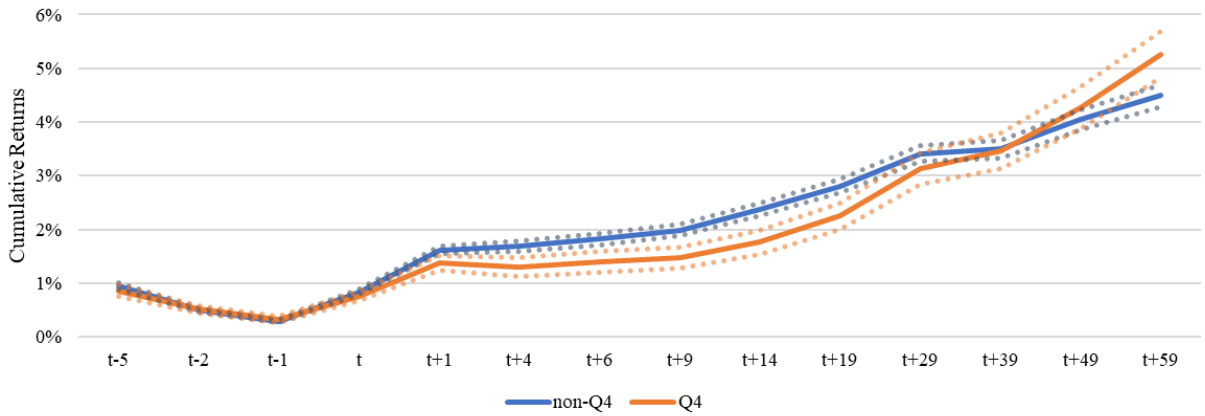


Figure 6. Cumulative Returns Around Earnings Announcement Date

Panel A (Panel B) plots average cumulative returns around the earnings announcement date for observations with negative earnings surprises (positive earnings surprises), split by fourth quarter observations and non-fourth quarter observations. Returns at time t (t – 1) are the one-day return on (before) the earnings announcement date. Returns at time t + x are the cumulative returns from the earnings announcement date until and including the xth trading day after the earnings announcement date. Returns at time t – x are the cumulative returns from the xth day before the earnings announcement date until and including the day before the earnings announcement date. Dotted lines represent 95% confidence intervals based on standard errors that are clustered by firm. All variables are defined in Appendix A.

Panel A. Cumulative Returns Around Earnings Announcement for Positive Earnings Surprises



Panel B. Cumulative Returns Around Earnings Announcement for Negative Earnings Surprises

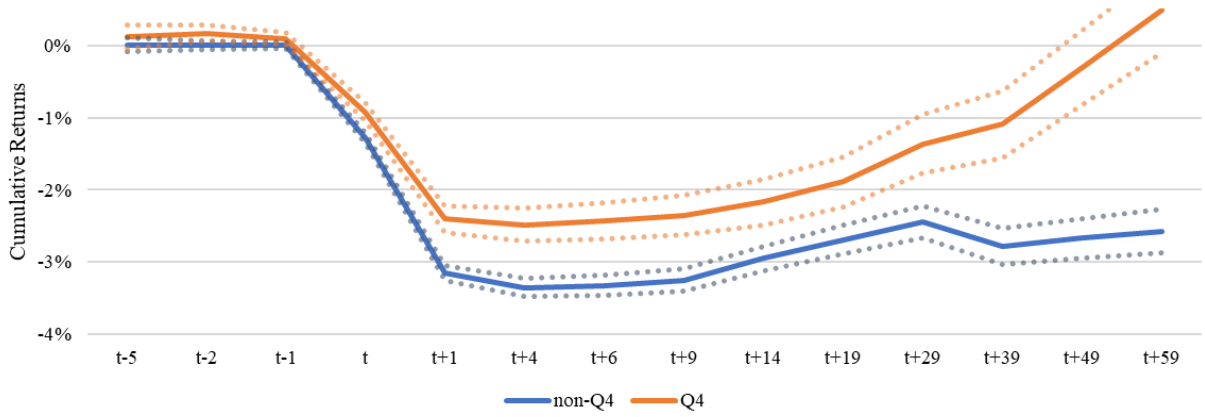


Table 1. Descriptive Statistics

Panel A presents pooled descriptive statistics by variable. Panel B (Panel C) presents pooled averages (medians) by quarter. All variables are defined in Appendix A.

Panel A. Descriptive Statistics by Variable

	Observations	Mean	Std	P1	P25	Median	P75	P99
Earnings	528,235	-0.117	0.416	-2.804	-0.071	-0.003	0.016	0.158
Sales	528,235	0.245	0.238	0.000	0.056	0.196	0.354	1.164
COGS	528,235	0.186	0.215	0.000	0.038	0.125	0.252	1.175
SG&A	528,235	0.125	0.240	0.000	0.018	0.062	0.130	1.619
Depreciation	528,235	0.011	0.012	0.000	0.003	0.009	0.015	0.066
Special Items	528,235	0.005	0.031	-0.059	0.000	0.000	0.000	0.222
CFO	528,235	-0.043	0.180	-1.073	-0.050	0.001	0.031	0.197
Accruals	528,235	-0.070	0.287	-1.984	-0.049	-0.015	0.008	0.302
Δ*Working Capital*	528,235	-0.015	0.143	-1.049	-0.020	0.001	0.023	0.298
Estimates	528,235	-0.057	0.225	-1.838	-0.030	-0.015	-0.007	0.248

Panel B. Averages by Quarter

	Q1	Q2	Q3	Q4
Earnings	-0.104	-0.107	-0.103	-0.154
Sales	0.237	0.245	0.244	0.253
COGS	0.176	0.184	0.182	0.201
SG&A	0.121	0.123	0.119	0.138
Depreciation	0.011	0.011	0.011	0.012
Special Items	0.002	0.004	0.004	0.011
CFO	-0.051	-0.046	-0.039	-0.037
Accruals	-0.050	-0.057	-0.060	-0.113
Δ*Working Capital*	-0.005	-0.010	-0.013	-0.034
Estimates	-0.046	-0.049	-0.049	-0.084

Panel C. Medians by Quarter

	Q1	Q2	Q3	Q4
Earnings	-0.003	-0.002	-0.001	-0.007
Sales	0.189	0.196	0.197	0.202
COGS	0.118	0.123	0.124	0.135
SG&A	0.060	0.061	0.060	0.065
Depreciation	0.008	0.009	0.009	0.009
Special Items	0.000	0.000	0.000	0.000
CFO	-0.006	0.000	0.003	0.010
Accruals	-0.008	-0.013	-0.016	-0.028
Δ*Working Capital*	0.006	0.003	0.000	-0.006
Estimates	-0.014	-0.015	-0.015	-0.018

Table 2. Fourth-Quarter Earnings Effect

This table regresses *Earnings* on indicators for different fiscal quarters (*Q2* to *Q4*) and firm and industry-month-year fixed effects. All variables are defined in Appendix A. Robust t-statistics are presented in parentheses. Standard errors are clustered by firm. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)
Variables	*Earnings*			
Q2	-0.002***	-0.001*	-0.005***	-0.005***
	(-3.13)	(-1.79)	(-3.71)	(-3.16)
Q3	0.001*	0.001	0.001	0.000
	(1.71)	(1.52)	(0.63)	(0.31)
Q4	**-0.050*** **	**-0.046*** **	**-0.059*** **	**-0.056*** **
	(-37.98)	**(-36.98)**	**(-28.06)**	**(-27.67)**
Observations	528,235	528,235	528,235	528,235
Adjusted R-squared	0.003	0.460	0.020	0.440
Firm FE	No	Yes	No	Yes
Industry-Month-Year FE	No	No	Yes	Yes

Table 3. Fourth-Quarter Earnings Effect over Earnings Distribution

This table regresses *Earnings* on indicators for different fiscal quarters (*Q2* to *Q4*) and firm and industry-month-year fixed effects across the *Earnings* distribution via quantile regressions. All variables are defined in Appendix A. Robust t-statistics are presented in parentheses. Standard errors are clustered by firm. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)
Percentile	P10	P25	P50	P75	P90
Variables	*Earnings*				
Q2	-0.008**	-0.006***	-0.004***	-0.003***	-0.003***
	(-2.56)	(-2.96)	(-3.54)	(-3.39)	(-2.59)
Q3	0.000	0.000	0.000	0.000	0.000
	(0.14)	(0.22)	(0.36)	(0.43)	(0.42)
Q4	**-0.139*** **	**-0.093*** **	**-0.050*** **	**-0.027*** **	**-0.011*** **
	(-30.52)	**(-31.61)**	**(-30.28)**	**(-21.46)**	**(-8.31)**
Observations	528,235	528,235	528,235	528,235	528,235
Firm FE	Yes	Yes	Yes	Yes	Yes
Industry-Month-Year FE	Yes	Yes	Yes	Yes	Yes

Table 4. Fourth-Quarter Income Statement Effects

Panel A (Panel B) regresses *COGS*, *SG&A*, *Depreciation*, and *Special Items* on indicators for different fiscal quarters (*Q2* to *Q4*) and firm and industry-month-year fixed effects before (after) controlling for *Sales*. All variables are defined in Appendix A. Robust t-statistics are presented in parentheses. Standard errors are clustered by firm. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A. Before Controlling for Sales

Variables	(1) *Sales*	(2) *COGS*	(3) *SG&A*	(4) *Depreciation*	(5) *Special Items*
Q2	0.005***	0.007***	0.002*	0.000***	0.001***
	(7.30)	(8.78)	(1.69)	(3.74)	(7.62)
Q3	0.006***	0.005***	-0.002**	0.000***	0.002***
	(8.23)	(6.99)	(-2.40)	(5.17)	(12.88)
Q4	**0.011*** **	**0.024*** **	**0.016*** **	**0.002*** **	**0.010*** **
	(15.57)	**(32.07)**	**(15.53)**	**(31.91)**	**(54.72)**
Observations	528,235	528,235	528,235	528,235	528,235
Adjusted R-squared	0.743	0.630	0.467	0.486	0.042
Firm FE	Yes	Yes	Yes	Yes	Yes
Industry-Month-Year FE	Yes	Yes	Yes	Yes	Yes

Panel B. After Controlling for Sales

Variables	(1)	(2) *COGS*	(3) *SG&A*	(4) *Depreciation*	(5) *Special Items*
Q2		0.003***	0.000	0.000***	0.001***
		(5.51)	(0.48)	(2.64)	(7.50)
Q3		0.002***	-0.004***	0.000***	0.002***
		(2.60)	(-3.81)	(3.94)	(12.75)
Q4		**0.017*** **	**0.013*** **	**0.001*** **	**0.010*** **
		(28.37)	**(13.12)**	**(29.84)**	**(54.46)**
Sales		0.645***	0.241***	0.011***	0.004***
		(483.37)	(109.66)	(102.89)	(10.36)
Observations		528,235	528,235	528,235	528,235
Adjusted R-squared		0.761	0.481	0.499	0.042
Firm FE		Yes	Yes	Yes	Yes
Industry-Month-Year FE		Yes	Yes	Yes	Yes

Table 5. Cash Flow and Accruals

Panel A (Panel B) regresses *CFO*, *Accruals*, Δ*Working Capital*, *Estimates*, and specific accrual expense estimates (*Bad Debt Expense*, *Warranty Expense*, and *Inventory Impairment*) on indicators for different fiscal quarters (*Q2* to *Q4*) and firm and industry-month-year fixed effects before (after) controlling for *CFO*. All variables are defined in Appendix A. Robust t-statistics are presented in parentheses. Standard errors are clustered by firm. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A. Before Controlling for CFO

Variables	(1) *CFO*	(2) *Accruals*	(3) Δ*Working Capital*	(4) *Estimates*	(5) *Bad Debt Expense*	(6) *Warranty Expense*	(7) *Inventory Impairment*
Q2	0.005***	-0.008***	-0.004***	-0.005***	-0.000***	0.000	-0.000*
	(6.46)	(-6.13)	(-5.07)	(-5.25)	(-2.94)	(0.77)	(-1.74)
Q3	0.011***	-0.012***	-0.007***	-0.005***	-0.000***	0.000*	-0.000
	(15.74)	(-9.38)	(-9.58)	(-5.43)	(-2.59)	(1.67)	(-1.57)
Q4	**0.013*** **	**-0.068*** **	**-0.029*** **	**-0.044*** **	**0.003*** **	**0.006*** **	**0.005*** **
	(15.79)	**(-37.85)**	**(-30.49)**	**(-28.08)**	**(15.23)**	**(20.86)**	**(14.11)**
Observations	528,235	528,235	528,235	528,235	52,101	13,040	20,079
Adjusted R-squared	0.451	0.286	0.183	0.232	0.474	0.607	0.291
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-Month-Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Panel B. After Controlling for CFO

Variables	(1) *CFO*	(2) *Accruals*	(3) *ΔWorking Capital*	(4) *Estimates*	(5) *Bad Debt Expense*	(6) *Warranty Expense*	(7) *Inventory Impairment*
Q2		-0.009***	-0.004***	-0.006***	-0.000**	0.000	-0.000
		(-6.55)	(-4.83)	(-6.55)	(-2.12)	(1.23)	(-1.39)
Q3		-0.013***	-0.006***	-0.008***	-0.000	0.000*	-0.000
		(-10.55)	(-8.90)	(-8.46)	(-1.45)	(1.92)	(-1.08)
Q4		**-0.070*** **	**-0.028*** **	**-0.048*** **	**0.003*** **	**0.006*** **	**0.005*** **
		(-38.29)	**(-30.12)**	**(-30.40)**	**(15.57)**	**(20.80)**	**(14.10)**
CFO		0.165***	-0.058***	0.271***	-0.007***	-0.002	-0.009**
		(10.97)	(-6.84)	(25.86)	(-3.54)	(-0.89)	(-2.55)
Observations		528,235	528,235	528,235	52,101	13,040	20,079
Adjusted R-squared		0.292	0.186	0.258	0.475	0.607	0.293
Firm FE		Yes	Yes	Yes	Yes	Yes	Yes
Industry-Month-Year FE		Yes	Yes	Yes	Yes	Yes	Yes

Table 6. Mandatory Auditor Reviews

This table regresses Earnings on indicators for different fiscal quarters (*Q2 to Q4*) and firm and industry-month-year fixed effects interacted with an indicator that the observation's fiscal period ends after March 1st, 2000. We restrict the sample period to fiscal years between 1998 and 2001. All variables are defined in Appendix A. Robust t-statistics are presented in parentheses. Standard errors are clustered by firm. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)
Variables	*Earnings*			
Q2	0.001	0.000	0.003	0.003
	(0.29)	(0.24)	(0.72)	(0.95)
Q3	0.002	-0.003	0.009**	0.002
	(0.98)	(-1.20)	(1.98)	(0.40)
Q4	**-0.040*** **	**-0.042*** **	**-0.037*** **	**-0.043*** **
	(-10.95)	**(-12.64)**	**(-6.07)**	**(-8.31)**
Auditor Review	-0.043***	-0.005		
	(-9.57)	(-1.55)		
Q2 × Auditor Review	-0.011***	-0.010***	-0.002	-0.008
	(-2.75)	(-2.87)	(-0.31)	(-1.22)
Q3 × Auditor Review	-0.010**	-0.008*	-0.012	-0.010
	(-2.21)	(-1.92)	(-1.28)	(-1.31)
Q4 × Auditor Review	**-0.047*** **	**-0.043*** **	**-0.044*** **	**-0.042*** **
	(-7.60)	**(-7.47)**	**(-3.83)**	**(-4.63)**
Observations	71,929	71,929	71,929	71,929
Adjusted R-squared	0.015	0.519	0.020	0.480
Firm FE	No	Yes	No	Yes
Industry-Month-Year FE	No	No	Yes	Yes

Table 7. Earnings Management

Panel A to D regresses Earnings on indicators for different fiscal quarters (*Q2 to Q4*) and firm and industry-month-year fixed effects separately for firms in the lowest (Low) and highest (High) yearly quartiles with respect to discretionary accruals models. The last row of each Panel (Difference) presents the p-value of testing whether *Q4*'s slope coefficients in Columns (1) and (2) are statistically significantly different. All variables are defined in Appendix A. Robust t-statistics are presented in parentheses. Standard errors are clustered by firm. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A. Jones Model

	(1)	(2)
	Discretionary Accruals	
Sample	Low	High
Variables	*Earnings*	
Q2	-0.013***	0.004
	(-3.61)	(1.57)
Q3	-0.013***	0.007**
	(-3.64)	(2.49)
Q4	**-0.098*** **	**-0.015*** **
	(-21.44)	**(-4.20)**
Observations	97,097	96,996
Adjusted R-squared	0.490	0.435
Firm FE	Yes	Yes
Industry-Month-Year FE	Yes	Yes
Difference	0.000	

Panel B. Modified Jones Model

	(1)	(2)
	Discretionary Accruals	
Sample	Low	High
Variables	*Earnings*	
Q2	-0.014***	0.004
	(-3.88)	(1.45)
Q3	-0.014***	0.007***
	(-3.97)	(2.62)
Q4	**-0.101*** **	**-0.015*** **
	(-21.98)	**(-4.07)**
Observations	97,088	96,979
Adjusted R-squared	0.492	0.438
Firm FE	Yes	Yes
Industry-Month-Year FE	Yes	Yes
Difference	0.000	

Panel C. Kothari et al. (2005) Model

	(1)	(2)
	Discretionary Accruals	
Sample	Low	High
Variables	*Earnings*	
Q2	-0.011***	0.000
	(-3.34)	(0.15)
Q3	-0.011***	0.003
	(-3.15)	(1.01)
Q4	**-0.085*** **	**-0.035*** **
	(-20.00)	**(-8.40)**
Observations	97,085	96,980
Adjusted R-squared	0.517	0.408
Firm FE	Yes	Yes
Industry-Month-Year FE	Yes	Yes
Difference	0.000	

Panel D. Performance-Matched Kothari et al. (2005) Model

	(1)	(2)
	Discretionary Accruals	
Sample	Low	High
Variables	*Earnings*	
Q2	-0.007**	-0.003
	(-2.05)	(-1.01)
Q3	-0.007**	0.002
	(-2.06)	(0.77)
Q4	**-0.077*** **	**-0.045*** **
	(-17.17)	**(-11.15)**
Observations	94,220	94,110
Adjusted R-squared	0.493	0.422
Firm FE	Yes	Yes
Industry-Month-Year FE	Yes	Yes
Difference	0.000	

Table 8. Integral Reporting

Columns (1) to (5) regresses *Earnings* on indicators for different fiscal quarters (*Q2* to *Q4*) and firm and industry-month-year fixed effects separately for (1) US firms, (2) US firms report in accordance with US GAAP, (3) firms listed in the US that report in accordance with IFRS, (4) Canadian firms before 2011 (when they report in accordance with Canadian GAAP), and (5) Canadian firms after 2011 (when they report in accordance with IFRS). All variables are defined in Appendix A. Robust t-statistics are presented in parentheses. Standard errors are clustered by firm. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)
Sample	US	US GAAP	IFRS	Canada before IFRS	Canada after IFRS
Variables			*Earnings*		
Q2	-0.002	-0.002	-0.018***	-0.024***	-0.020***
	(-1.11)	(-0.56)	(-2.67)	(-2.89)	(-2.80)
Q3	0.002	0.007*	-0.002	-0.021***	-0.019**
	(1.02)	(1.79)	(-0.25)	(-2.66)	(-2.52)
Q4	**-0.043*** **	**-0.040*** **	**-0.141*** **	**-0.113*** **	**-0.104*** **
	(-21.92)	**(-9.77)**	**(-14.54)**	**(-8.90)**	**(-8.99)**
Observations	432,099	172,271	48,658	29,173	32,564
Adjusted R-squared	0.479	0.562	0.301	0.239	0.243
Firm FE	Yes	Yes	Yes	Yes	Yes
Industry-Month-Year FE	Yes	Yes	Yes	Yes	Yes

Table 9. Accounting System Quality: Employment Data

Panel A (Panel B) regresses *Earnings* on indicators for different fiscal quarters (*Q2* to *Q4*) and firm and industry-month-year fixed effects separately for firms in the lowest (Low) and highest (High) yearly quartiles with respect to the share of employees working in controlling (the share of wages paid to controlling employees). The last row of each Panel (*Difference*) presents the p-value of testing whether *Q4*'s slope coefficients in Columns (1) and (2) are statistically significantly different. All variables are defined in Appendix A. Robust t-statistics are presented in parentheses. Standard errors are clustered by firm. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A. Share of Employees in Controlling

	(1)	(2)
	% of Employees in Controlling	
Quartile	Low	High
Variables	*Earnings*	
Q2	-0.001	0.003
	(-0.14)	(0.50)
Q3	0.017*	0.005
	(1.67)	(0.87)
Q4	**-0.046*** **	**-0.008**
	(-4.30)	**(-1.32)**
Observations	31,030	31,018
Adjusted R-squared	0.526	0.437
Firm FE	Yes	Yes
Industry-Month-Year FE	Yes	Yes
Difference	0.002	

Panel B. Share of Wages in Controlling

	(1)	(2)
	% of Wages in Controlling	
Quartile	Low	High
Variables	*Earnings*	
Q2	-0.001	0.004
	(-0.17)	(0.74)
Q3	0.016	0.007
	(1.60)	(1.19)
Q4	**-0.046*** **	**-0.006**
	(-4.35)	**(-0.97)**
Observations	30,964	30,951
Adjusted R-squared	0.526	0.439
Firm FE	Yes	Yes
Industry-Month-Year FE	Yes	Yes
Difference	0.001	

Table 10. Accounting System Quality: Gallemore and Labro (2015) Measures

Panel A (Panel B) regresses *Earnings* on indicators for different fiscal quarters (*Q2* to *Q4*) and firm and industry-month-year fixed effects separately for firms in the lowest (Low) and highest (High) yearly quartiles with respect to management forecast accuracy (reporting lag). Panel C does the same for firms without (No) and with (Yes) an internal control weakness. The last row of each Panel (*Difference*) presents the p-value of testing whether *Q4*'s slope coefficients in Columns (1) and (2) are statistically significantly different. All variables are defined in Appendix A. Robust t-statistics are presented in parentheses. Standard errors are clustered by firm. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A. Absolute Management Forecast Errors

	(1)		(2)
	|*Management Forecast Error*|	
Quartile	Low		High
Variables		*Earnings*	
Q2	0.002		-0.010
	(0.90)		(-1.05)
Q3	0.003		-0.003
	(1.30)		(-0.47)
Q4	**0.003**		**-0.029*****
	(1.54)		**(-2.93)**
Observations	11,597		11,577
Adjusted R-squared	0.335		-0.541
Firm FE	Yes		Yes
Industry-Month-Year FE	Yes		Yes
Difference		0.002	

Panel B. Reporting Lag

	(1)		(2)
		Reporting Lag	
Quartile	Low		High
Variables		*Earnings*	
Q2	0.000		-0.007
	(0.28)		(-0.87)
Q3	0.001		0.012
	(0.89)		(1.60)
Q4	**-0.001**		**-0.095*****
	(-0.92)		**(-11.94)**
Observations	130,353		115,708
Adjusted R-squared	0.590		0.366
Firm FE	Yes		Yes
Industry-Month-Year FE	Yes		Yes
Difference		0.000	

Panel C. Internal Control Weakness

	(1)		(2)
	Internal Control Weakness		
Sample	No		Yes
Variables	*Earnings*		
Q2	-0.003		0.011
	(-1.32)		(0.89)
Q3	0.005**		0.028**
	(2.19)		(1.98)
Q4	**-0.015*** **		**-0.079*** **
	(-5.74)		**(-5.57)**
Observations	157,074		35,454
Adjusted R-squared	0.562		0.508
Firm FE	Yes		Yes
Industry-Month-Year FE	Yes		Yes
Difference		0.000	

Table 11. Earnings Surprises at Earnings Announcements

Panel A (Panel B) regresses *Earnings Surprise*, *Positive Earnings Surprise*, and *Negative Earnings Surprise* (*Earnings Surprise*, *Sales Surprise*, and *Expense Surprise*) on indicators for different fiscal quarters (*Q2* to *Q4*) and firm and industry-month-year fixed effects. All variables are defined in Appendix A. Robust t-statistics are presented in parentheses. Standard errors are clustered by firm. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A. Positive and Negative Earnings Surprises

	(1)	(2)	(3)
Variables	*Earnings Surprise*	*Positive Earnings Surprise*	*Negative Earnings Surprise*
Q2	0.000	0.001	-0.001
	(0.05)	(1.28)	(-1.05)
Q3	-0.002***	-0.000	-0.002***
	(-2.65)	(-0.05)	(-2.93)
Q4	**-0.006*** **	**0.000**	**-0.006*** **
	(-6.73)	**(1.49)**	**(-7.39)**
Observations	167,779	167,779	167,779
Adjusted R-squared	-0.011	-0.065	0.070
Firm FE	Yes	Yes	Yes
Industry-Month-Year FE	Yes	Yes	Yes

Panel B. Sales and Expense Surprises

	(1)	(2)	(3)
Variables	*Earnings Surprise*	*Sales Surprise*	*Expense Surprise*
Q2	-0.000	0.000	0.001
	(-0.88)	(0.96)	(1.37)
Q3	-0.000	-0.001***	-0.001
	(-0.68)	(-3.46)	(-1.22)
Q4	**-0.001***	**0.000**	**0.001** **
	(-1.90)	**(0.64)**	**(2.03)**
Observations	57,017	57,017	57,017
Adjusted R-squared	0.048	0.192	0.070
Firm FE	Yes	Yes	Yes
Industry-Month-Year FE	Yes	Yes	Yes

Table 12. Trading Strategy

This table reports average monthly excess returns (Panel A & B) and Fama and French 5-factor alphas (Panel C & D) for two portfolios. Each month, observations are sorted into the long (short) portfolio when earnings announcements in the previous month were a fourth-quarter announcement (a non-fourth fiscal quarter announcement). Only earnings announcements on or after the 20th calendar day of the previous month are considered. Portfolios are rebalanced monthly. Reported returns are means across average monthly portfolio returns. T-statistics are presented in parentheses and are based on standard errors of average monthly portfolio returns across the sample period. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A. Equal-Weighted Returns

	(1) All Firms	(2) Negative Earnings Surprises	(3) Positive Earnings Surprises
Q4	1.2***	1.154**	1.151***
	(3.14)	(2.18)	(2.77)
Non-Q4	0.53*	-0.202	0.941***
	(1.67)	(-0.50)	(2.86)
Q4 – Non-Q4	**0.669*** **	**1.356*** **	**0.21**
	(2.84)	**(2.74)**	**(0.72)**

Panel B. Value-weighted Returns

	(1) All Firms	(2) Negative Earnings Surprises	(3) Positive Earnings Surprises
Q4	1.696***	1.894***	1.625***
	(4.55)	(3.59)	(4.02)
Non-Q4	1.149***	0.286	1.292***
	(3.97)	(0.80)	(4.25)
Q4 – Non-Q4	**0.547***	**1.608*** **	**0.333**
	(1.78)	**(3.24)**	**(0.96)**

Panel C. Equal-Weighted 5-Factor Alphas

	(1) All Firms	(2) Negative Earnings Surprises	(3) Positive Earnings Surprises
Q4	0.529**	0.428	0.41
	(2.21)	(0.95)	(1.39)
Non-Q4	-0.346**	-1.127***	0.06
	(-2.50)	(-3.96)	(0.37)
Q4 – Non-Q4	**0.875*** **	**1.555*** **	**0.35**
	(3.58)	**(2.98)**	**(1.14)**

Panel D. Value-weighted 5-Factor Alphas

	(1) All Firms	(2) Negative Earnings Surprises	(3) Positive Earnings Surprises
Q4	1.163***	0.983**	0.999***
	(3.92)	(2.10)	(2.97)
Non-Q4	0.356**	-0.569**	0.485***
	(2.11)	(-2.05)	(2.64)
Q4 – Non-Q4	**0.807** **	**1.552*** **	**0.514**
	(2.53)	**(2.97)**	**(1.41)**