Re-Standardized Financial Statement Data

Matthew Lyle

Goizueta Business School
Emory University
matthew.lyle@emory.edu

Federico Siano

Naveen Jindal School of Management
University of Texas at Dallas
federico.siano@utdallas.edu

Teri Lombardi Yohn

Goizueta Business School
Emory University
tyohn@emory.edu

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Abstract

Compustat is a widely used database in accounting and finance research. Its common products, such as the Annual and Quarterly files, are regularly standardized by Compustat to ensure comparability of financial statements across firms and time. While convenient, this re-standardization introduces a form of look-ahead bias and poses significant challenges for replicating prior research, as historical data are often altered. This study utilizes Compustat Snapshot products, which preserves data as it existed at each point in time, revealing that standardizations significantly alter key financial figures such as sales and earnings, among many others, leading to material differences in research findings. For instance, the hedge returns around earnings announcements for high versus low seasonally adjusted quarterly earnings surprise deciles and the hedge returns for high versus low annual accrual deciles can differ substantially depending on when the data are accessed. Our findings indicate that precise replication of prior studies using common Compustat products is nearly impossible due to these ongoing standardizations.

1. Introduction

Compustat is the de facto standard academic research database for financial statement data. The most widely used Compustat products in academic research are the North America Fundamentals Annual and Quarterly files, and many of the most highly cited and well-known studies use these data. We refer to these files as the Compustat "common products." While academic papers that use these data are far too many to list, many of the key results presented in highly influential studies such as Foster, Olsen, and Shevlin (1984), Bernard and Thomas (1989), Fama and French (1992, 1993), and Sloan (1996), and many others, are based on Compustat data.

Compustat databases are convenient to use and are considered high quality as they consist of a long history of machine-readable financial statement data that are standardized, where Compustat analysts use judgment, following a pre-specified set of rules, to adjust the financial statement line items to allow for comparability across companies and time. The common products are standardized as of the date the newest vintage of the data is made available to researchers. For example, assume a researcher collects Compustat data on June 30th, 1995, for all firms with non-missing earnings announcements prior to January 1st, 1995. Compustat can update and standardize all financial data available on or prior to June 29th, 1995. Therefore, all financial data on or prior to that date will be standardized as of that standardization date. If the researcher then repeats this same task and collects Compustat data on June 30th, 1996, for all firms with non-missing earnings announcements prior to January 1st, 1995, Compustat can again update and standardize all financial data available prior to June 29th, 1996. That is, the data files are rewritten every time the data is re-standardized and, as a result, the data collected in 1995 will be different than the data collected in 1996.

This standardization saves researchers (and those who use Compustat for making investment decisions) considerable time since they otherwise may need to undertake this cumbersome task and standardize data provided in press releases and SEC filings on their own. However, the standardization requires judgment on behalf of S&P Global (the company that currently provides Compustat products) on how various financial statement values should be classified and adjusted.

This study offers initial evidence of the impact this re-standardization may have on empirical results involving Compustat data. To do so, we use an alternative product offered by S&P Global: *Compustat Snapshot*. The Snapshot product consists of both Annual and Quarterly files, but unlike the common product, the data files are *not* overwritten. Instead, the newly standardized data are appended to the prior standardized data. As such, the Snapshot dataset allows us to examine how the Compustat files evolve over time and to offer insight into the variation in financial statement variables over time, for any fixed sets of observations.

Because the universe of fundamental variables available in Compustat is large (i.e., 653 and 640 variables in the Annual and Quarterly files, respectively), we focus our analysis on few variables that are frequently used in the prior empirical literature: earnings, sales, and accruals. In our initial analysis, we examine the variability of these variables through time for each firm fiscal quarter and year. We find that the absolute variability, when a change occurs, of quarterly earnings, quarterly sales, and annual accruals attributable to Compustat adjustments is on average 100%, 144%, and 129%, respectively, relative to the prior point-in-time figure. Remarkably, the adjustments can lead to the sign of earnings reported by Compustat to flip approximately 14 percent of the time. The sign of annual accruals also flips approximately eight percent of the time. The variation remains similarly high even when we remove adjustments related to restatements (amendments) or adjustments related to moving from a preliminary basis (when the Compustat numbers are based on earnings releases) to those based on documents filed with the SEC.

While we view this degree of variation as striking, it is unclear if the Compustat re-standardization would have a material impact on inferences drawn from a research study. In a recent work, Du, Huddart, and Jian (2023) find that using the Annual financial statement numbers "as-filed" with the SEC, as opposed to the common Compustat products, can impact inferences of research studies; however, they do not examine if re-standardization of Compustat data can impact research inferences when using Compustat at different points in time. To offer insight into this, we examine the relation between earnings and accruals, and stock returns and examine how results change if a researcher conducted analyses at different points in time, holding fixed the sample selection criteria and time period. Specifically, for quarterly earnings and quarterly sales, we follow Foster et al. (1984) and Bernard and Thomas (1989) and assume that earnings follow a seasonal random walk. We then examine returns around earnings announcements for data collected at different points in time. Similarly, when we examine the relation between returns and annual accruals, we follow Sloan (1996) and annually sort firms based on accruals to examine future yearly returns for data collected at different points in time.

Our results indicate that the relation between these financial statement variables and returns varies depending on when a researcher collects the data. For example, when we fix the sample to include only those firms with earnings announcements prior to June 30th,1995 and examine the difference in decile returns between high and low seasonal random walk-based earnings surprises at each June 30th from 1995 to 2023, we find that the range of the hedge returns for a portfolio of firms with high minus low quarterly earnings surprises is remarkably large, at around 31 percentage points.[1] Put differently, if a researcher were to examine the difference in returns between firms with the highest and lowest quarterly earnings surprises for those firms that had earnings announcements prior to June 30th, 1995, reported annualized return spreads can differ by up to 31 percentage points depending on when the data were collected.

Similarly, for annual accruals, holding the sample fixed to include only those firms with calculable accrual variables prior to June 30th, 2000, and examining the difference between future returns for high and low accrual decile firms each subsequent June 30th, we find that differences in annual returns can differ as much as four percentage points (or by roughly 30 percent of the mean high-minus-low return spreads).

Collectively, our findings suggest that replication of prior results may be incredibly difficult, if not impossible, using the common Compustat products, even if a researcher uses the exact sample selection criteria. Moreover, as we discuss next, Compustat's re-standardization has additional implications for empirical analysis: (1) there is a systematic look-ahead bias in the changes, which differs from the survivorship bias discussed in Kothari, Shanken, and Sloan (1995); and (2) the re-standardization results in seemingly systematic changes that increase the relation between stock returns and earnings and decrease the relation between stock returns and accruals.

Kothari et al. (1995) document that Compustat, at least during earlier time periods, may contain survivorship bias. We document that look-ahead bias is present in the common Compustat products and that this is particularly important for studies examining the relation between financial statement variables and stock returns at the time of the earnings announcement. Because of Compustat updates and re-standardization, the data used in empirical studies were not available to

[1] Throughout the manuscript, we use the terms "earnings changes" and "surprises" interchangeably.

investors at the time a researcher examines the relation between earnings and returns. Instead, the data are changed based on information as of the most recent Compustat data update. For example, if a researcher examines how Compustat variables relate to returns over short windows around earnings announcements, those variables may not have been available to investors as of that point in time, and many variables were likely to have been adjusted by Compustat at future points in time, biasing the data the researcher would use when testing for a relation. All studies that use Compustat common products will contain this bias.

Hand, Green, and Soliman (2011) document that the hedge returns to the accruals anomaly first documented by Sloan (1996) have attenuated substantially over time. Hand et al. (2012) use point-in-time data and verify that the attenuation is not driven by the common Compustat products. However, we document another feature of this data as it relates to quarterly earnings and annual accruals and returns. There appears to be a general trend in how the re-standardization of Compustat data impacts the relation between returns and earnings as well as accruals. Specifically, using a fixed sample selection criterion and conducting the same analysis at future points in time, we find that the relation between returns and earnings is generally increasingly positive while the relation between returns and accruals is generally increasingly negative. Since the sample selection criteria is held fixed in our analysis, the trend in the relation must be attributable to how Compustat data are updated and adjusted.

The issues we have documented with using common Compustat products are potentially important for many types of studies and there is no clear solution. While point-in-time data have been used in a few prior studies (e.g., Hand et al., 2011, Livnat and López-Espinosa, 2008, Bowles, Reed, Ringgenberg, Thornock, 2023), it is uncommon. Even when using point-in-time data to perform a replication, one would need to know the exact standardization date of the Compustat data used in the original study, which is never provided. The only way to precisely replicate a prior study would be if both the original and replicating study used the point in time products from Compustat Snapshot, and if the prior study provides sufficient details of how the research was conducted. Based on our examination of the prior literature, this has not been done. We argue that the standardization of Compustat data over time is an important issue that has generally been overlooked in both accounting and finance research. For example, none of the authors of this study were aware of the degree and frequency with which Compustat modifies the financial statement variables in its common products or its potential impact on research findings.

2 Background

Collecting a long history of financial statement data for a broad sample of firms is an intensive task. The introduction of XBRL has made this task easier; however, the effort required to collect the data remains nontrivial. In a recent study, Du et al. (2023) undertakes the task of collecting annual as-filed financial statement data via XBRL for years 2012-2019. While one could follow Du et al. (2023) and collect the financial statement data from XBRL directly, XBRL data is limited historically in coverage. For example, the data provided on WRDS by Du et al. (2023) only has coverage for companies as large as Apple and Nvidia starting in 2015. Extending the history of financial data back further would require even more work, since one would need to collect the financial statements, parse them, and interpret them. Given the investment of such a task, it is natural that we observe companies who specialize in data collection and curation and sell the data for a profit.

Prior studies have documented that I/B/E/S, the popular research data provider, regularly modifies their data products (e.g., Ljungqvist, Malloy, and Martson, 2009; Call, Hewitt, Watkins, and Yohn, 2021) effectively rewriting the history of certain products that are commonly used in academic research. The exact same *rewriting* of data is done to the common Compustat products, such that the entire history of all financial statements is repeatedly overwritten through time.

Unlike the common products, the Compustat Snapshot products provide a detailed history of how Compustat data was modified, beginning in 1986. According to the manuals provided, Compustat is updated from various sources. When a firm provides an earnings release, Compustat includes the information on a preliminary basis from the source (e.g., news releases, newswires, and WSJ earnings digest). Once the firm files financial statements with the SEC and the report is made public, Compustat updates (with a lag) the financial information on a "final" basis from the source (e.g., Form 10-Q for quarterly reports and Form10-K for annual reports). If the firm files amended financial statements with the SEC, Compustat also updates the financial information from the amended source (i.e., Form 10-Q/A for quarterly reports and Form10-K/A for annual reports). However, Compustat adjusts the financial statements filed with the SEC according to a proprietary set of rules and "as-filed" financial statements are never provided to Compustat subscribers. In addition, Compustat continues to adjust financial statement line items after the original update.

Table A1 in Appendix A provides an illustrative example of how Compustat is updated for General Electric (GVKEY: 005047) for fiscal year 2015 and fiscal quarter 3. In Panel B, the columns include data for sales (*Saleq*), income before extraordinary items (*Ibq*), operating income after depreciation (*Oiadpq*), net income (*Niq*), special items (*Spiq*), inventory (*Invtq*), operating cash flow (year-to-date) (*Oancfy*), total assets (*Atq*), and cost of goods sold (*Cogsq*). Each row in the table represents a change in one or more data items contained in the entire Compustat quarterly files. For comparison, in Panel A, we also collect "as-filed" financials from the SEC.

The first time General Electric's 2015-3 fiscal period is updated on Compustat coincides with the filing date (10/16/2015) of the 8-K that includes the earnings announcement press release for the 2015-3 fiscal period. This data point carries an update code (*Updq*) of 2, meaning the data have been written to Compustat on a *preliminary* basis. In comparison with the values recovered from the 8-K, the preliminary Compustat values we report all match exactly, except for *Oiadpq*, since it was unclear on how we might calculate it exactly. The second update to Compustat occurred on 10/26/2015, which was also on a preliminary basis, indicating that at least one of the items, *other* than those that we display, in the Compustat files was adjusted on that date. The values remained on a preliminary basis until the filing date of the 10-Q, 11/02/2015, after which all updates to the Compustat files, for this firm-fiscal period, were turned to a *final* basis (i.e., *Updq* = 3). For the first update on a final basis, Compustat agrees with the SEC filings for all but *Cogs* (and *Oiadpq*, which we did not calculate). However, additional values start to deviate after Compustat is updated on 1/23/2016, where *Saleq* drops from 31,510 to 22,273 (i.e., a 29 percent absolute difference), and *Ibq* increases from 2,853 to 4,030 (i.e., a 41 percent absolute difference); *Oiadpq* changes from 3,549 to 3,480 (i.e., a two percent absolute difference), and *Cogsq* changes from 18,210 to 19,871 (i.e., a nine percent absolute difference). These values continue to change over time, where sales range from a low of 20,880 to a final number of 27,859. *Ibq* moves from 4,040 to a low of 1,344, and to a final number of 1,965. *Oiadpq* goes from 3,480, a low of -2,980 to a final number of 2,777. *Cogsq* moves from 19,871 to a high of 21,586, and to a final number of 18,902.

While the point of our study is to offer insights into the frequency and magnitude that re-standardization has on Compustat financial statement numbers, if these adjustments were driven around company-initiated amendments, such as through a 10-Q/A, then perhaps the variation we document would be unsurprising. To offer some insight into this potential explanation, we collected all SEC filings for General Electric between 11/03/2015 and 11/05/2016. Within this period, a total of 23 forms were filed, of which one was a 10-K and three were 10-Qs, the remaining were form 8-Ks. We were unable to find a 10-Q/A or 10-K/A filed within this period, suggesting that Compustat re-standardization can have a material impact on line items, regardless of if a company has filed an amendment to a primary regulatory filing. In fact, there was a 10-Q/A filed on 11/09/2016; however, this filed amendment did not lead Compustat to adjust any General Electric fiscal quarter 2015-3 items, since no financial statement data for that fiscal period has been updated since 11/06/2016.

This example also helps to highlight an important bias that may arise when conducting a research study. The date that the Compustat files indicate accounting information was first released for this firm and fiscal period (i.e., *Rdq*) was 10/16/2015. If a researcher assumes that *Rdq* is the date that Compustat data were available to investors, for example, the *Saleq* number the researcher would assume investors used was 31,510 if the study was conducted between 10/16/2015 and 1/22/2016. However, if the researcher were to conduct the same study any time after that, the *Saleq* number the researcher would assume investors used could be, 22,273, 20,880, 22,938, 27,858, or 27,859, depending on the exact time the study was conducted. Any study conducted that uses sales in empirical analysis after 1/2/2015 will suffer from look-ahead bias since future Compustat adjustments, and when they might occur, could not have been known by investors at that time.

Tables A3 and A4 present a similar analysis for *Boeing* (GVKEY: 002285) for the fiscal year 2016, utilizing Compustat Snapshot annual data. The initial data is added on 01/25/2017, which corresponds to the filing date of the 8-K containing the earnings press release and is considered preliminary. Notably, compared to the "as-filed" data with the SEC, significant discrepancies are observed in *Oiadp* (a 17 percent absolute difference) and *Cogs* (a four percent absolute difference). The data for the fiscal year 2016 is subsequently updated on 02/11/2017, following Boeing's 10-K filing with the SEC on 02/08/2017. This update reveals considerable variations in several financial statement variables, including *Oiadp*, *Spi*, and *Cogs*. Over time, these variables undergo five additional updates, reflecting further changes. Importantly, these modifications do not appear to be linked to amended filings. Despite Boeing filing a 10-K/A on 02/10/2017, which did not alter financial statement variables but primarily provided disclosures related to the "Iran Threat Reduction and Syria Human Rights Act" and other certifications, significant re-standardizations persist. Overall, the analysis of the Compustat annual file reveals patterns of re-standardization akin to those observed in the quarterly file.

From a research perspective, this issue poses several challenges, particularly for studies attempting to glean insight into economic magnitudes, for which there is no obvious solution. First, because Compustat data are transformed from the underlying raw financial reports used, one cannot say that an "x" percentage change in a financial statement variable is expected to result in a "y" percentage change in a dependent variable, or that a long-short trading strategy generates "x" percent in abnormal returns, since the financial statement variables are subject to change any time following the analysis of that study. Second, most prior studies that use Compustat data will not be exactly replicable. This does not mean that direction of the association previously documented would flip or completely vanish (though it is possible); however, coefficients from a linear regression will almost certainly change depending on when a study is conducted.

One potential solution is to use alternative products offered through Compustat Snapshot, such as the "as first reported" (also known as "unrestated") and "most recently restated" (also known as "restated") files. While these files are offered as supplemental to the Snapshot "point-in-time" products, our investigation of the products indicates that the products correspond to rows nested within the point in time products. In other words, the term "unrestated" in the product does not imply a lack of adjustment. Rather, it represents the "first adjusted" data point relative to SEC filings within Compustat. Consequently, even the data points that Compustat labels as "unrestated" are actually the initial standardizations for a specific firm-fiscal period in the Compustat point-in-time files, marking the first entry for a firm-fiscal year and quarter. On the other hand, the "restated" product represents the most recent (or last) re-standardization performed to the Compustat data for that firm-fiscal year and quarter. Utilizing the "unrestated" product may mitigate concerns related to reproducibility and look-ahead bias. As the sample remains constant, it offers an opportunity to gain insights into economic magnitudes using this initially standardized Compustat data. However, the "unrestated" product includes data that were first recorded in Compustat either on a preliminary or finalized basis. Therefore, the suitability of using this product depends on the specific research question at hand. While economic magnitudes remain a challenge to define and measure (see for example Lyle and Yohn, 2023), regardless of sample stability, our view is that reproducibility could be enhanced considerably by using the Snapshot point-in-time products. So long as the sample composition filters and how any empirical tests are conducted are provided with sufficient detail, reproducibility issues and look ahead bias could largely be eliminated.

3 Data

3.1 Data overview and descriptive statistics

We conduct a detailed analysis of the characteristics and sample distribution of the Compustat Snapshot *quarterly* product. We initially focus on this quarterly product because annual data can generally be seen as a compilation of the quarterly figures. In subsequent analyses, we also explore the implications of using the Snapshot *annual* product on specific research findings.

The Compustat Snapshot quarterly reports encapsulate all the datapoints re-standardized over time starting from 1986 for any firm-quarter. Although Snapshot data extends back to 1968, we exclude datapoints prior to 1986, the year Compustat began recording updates. Table 1 indicates that Snapshot quarterly contains about 8.5 million datapoints from 1986 to 2023, covering approximately 40,000 unique firms. The average (median) number of within-firm-quarter observations (updates) is 6.3 (6.0), suggesting each firm-quarter datapoint is updated approximately six times. Furthermore, the average interval between the activation of each datapoint and the corresponding earnings announcement is 685 days, or roughly two years, indicating a re-standardization cycle of about two years per datapoint.

Table 2 delves deeper into the types of variations observed in key financial statement analysis (FSA) variables within a firm-quarter in Panel A. We identify three types of changes: (1) *numeric-to-numeric*, (2) *nan-to-numeric*, and (3) *numeric-to-nan*. Our findings show that 30 percent, 55 percent, and six percent of the 8.5 million datapoints respectively exhibit these update types. We observe that *numeric-to-numeric* changes often coincide with changes in approximately seven FSA items. We further examine whether significant variation could stem from SEC amendments or a mixture of preliminary and finalized data. To address potential data source confounding, we utilize the Compustat-provided "*Srcq*" field (document source type), analyzing variations both with and without keeping the document source type constant. Notably, even when controlling for document source type, the level of variation remains substantial.

Panel B of Table 2 shifts focus from the frequency of changes to the magnitude of change, employing the absolute percentage change across consecutive updates for the same firm-quarter observation. The average FSA item and firm-quarter show an absolute variation of 65 percent for numeric-to-numeric changes, which we consider significant. Even median variation is notable, reaching 20 percent.

In Table 3, we analyze the quarterly Snapshot data by fiscal year, noting a trend where both the frequency and magnitude of updates have doubled over time. Additionally, the percentage of observations exhibiting change remains high, although it fluctuates non-linearly.

Table 4 provides a quarter-by-quarter analysis. Panel A reveals modest variability across quarters, essential for dismissing systematic differences in data re-standardization practices. Interestingly, Panel B indicates that while quarter 4 typically sees fewer updates, the changes are more significant in magnitude.

Finally, Table 5 examines within firm-quarter variation by industry. Analysis of variability in quarterly data for the most represented industries—Business Services, Banking, Trading, Pharmaceuticals, and Oil—shows fairly consistent frequency and characteristics of updates across these sectors, with the Trading industry experiencing fewer but more significant FSA item re-standardizations. Analysis of less represented industries, such as Candy and Soda, Rail Equipment, Defense, and Tobacco, also reveals comparable statistics. Overall, the variation observed in the quarterly Snapshot file does not appear to stem from systematic industry differences.

3.2 High-varying financial statement analysis items

Table 6 presents an analysis of a subset of 58 key financial statement analysis (FSA) variables, which are widely used in empirical financial and accounting research and exhibit significant variation across point-in-time dates. In detail, we examine the sample distribution of numeric-to-numeric changes for each FSA item between consecutive updates. Notably, we conduct this analysis *within* document source type. In other words, we keep the document type constant (e.g., comparing data referred to a final SEC filing with other data referring to the same final SEC filing). Our approach is particularly conservative but ensures that observed variation is *not* driven by inconsistencies in document source types.[2] This analysis highlights several findings.

Initially, we observe that some of the most frequently used variables in empirical financial and accounting research show considerable average and median absolute percentage variations across re-standardization dates. For example, variables such as *Cheq* (cash), *Spiq* (special items), *Ppentq* (property, plant, and equipment), *Rectq* (receivables), *Niq* (net income), *Invtq* (inventories), *Dvpq* (dividends), *Ibq* (income before extraordinary items), *Intanq* (intangibles), *Dpq* (depreciation), *Oiadp* (operating income after depreciation), *Dlttq* (long-term debt), *Xrdq* (R&D), *Cogsq* (cost of goods sold), *Saleq* (sales), and *Xsgaq* (SG&A) demonstrate an absolute percentage change ranging from 20 percent to 130 percent. In other words, when any of these items undergoes a numeric-to-numeric change between updates, the change typically equals at least 20 percent of the original value and can exceed 100 percent.

Furthermore, we note significant variability around the mean for these essential FSA items. For instance, the interquartile range of variation for *Niq*, *Ibq*, *Saleq*, *Oiadpq*, *Cogsq*, and *Invtq* spans approximately 0.3-50 percent, 3-50 percent, 1-20 percent, 2-40 percent, 1-30 percent, and 0.4-100 percent, respectively.

3.3 Variation in FSA ratios

[2] Restated, this restriction ensures that we do not consider variations across point-in-time dates due to Compustat's re-standardizations, which update a datapoint from a preliminary to a final source. In a series of sensitivity analyses, we also conduct all the analyses *across* (rather than *within*) document source types, and we find consistent and slightly higher variation in financial statement items.

Typically, financial statement analysis variables are scaled in financial and accounting research to derive relevant financial ratios. Therefore, in Table 7, we explore how re-standardization at subsequent point-in-time dates can impact *scaled*, rather than absolute, FSA items. These statistics offer initial insights into the combined impact of multiple simultaneously varying FSA items on a given construct of interest.

We focus on analyzing six key FSA ratios. Specifically, we examine: *ROA* (net income/total assets), *ROE* (net income/common equity), *Gross Profit Margin* ([sales – cost of goods sold]/lagged sales), *Net Profit Margin* (net income/sales), *Special Items* (special items/sales), and *Leverage* ([long-term liabilities + short-term liabilities]/common equity). For each ratio, we conduct two types of analyses. First, we assess variation as percentage changes. Second, we explore changes in percentage points. Again, similarly to the analysis in Table 6, we examine only changes *within* document source types (keeping the source type fixed).

We continue to observe significant variation in these FSA ratios. For instance, ROA, ROE, and Special Items vary by approximately 90 percent, 80 percent, and 140 percent respectively. To better understand the economic significance of these fluctuations, we inspect the variation expressed in percentage points and find that the aforementioned variations correspond to changes of 5, 6, and 23 percentage points respectively. We also note substantial interquartile range variation across all ratios.

3.4 Analysis of earnings changes

One of the most utilized variables in financial archival research, especially within capital market settings, is earnings changes. Therefore, we offer insights into the variation across re-standardizations for this key financial construct. Specifically, we build on influential capital markets research in accounting and finance, assuming that earnings follow a seasonal random walk model (e.g., Foster et al. 1984; Bernard and Thomas 1989). We define quarterly earnings changes as the difference between quarter-*q* and quarter-*q-4* earnings, scaled by the market value of equity at quarter-*q-4*. Notably, we employ three distinct Compustat variables to proxy for quarterly earnings: income before extraordinary items (*Ibq*), net income (*Niq*), and sales (*Saleq*).

Table 8 summarizes key statistics. In Panel A, we find that the mean and median absolute percentage variation in earnings changes are substantial, reaching 100 percent and 20 percent, respectively. Additionally, there is pronounced variability around the mean. These findings apply to all proxies for earnings we employ. Furthermore, our evidence is consistent when we exclude amendments from the sample and keep the document source type constant.

In Panel B, we report statistics for cases where re-standardization across consecutive point-in-time dates results in a flip in the sign of earnings changes. This analysis is particularly indicative of the extreme variability that earnings changes can exhibit due to re-standardization, an issue that is especially relevant given the role income numbers play in helping financial statement users distinguish "good" from "bad" news (Ball and Brown 1968).

We note three key insights. First, we show that between 10% and 15% of the observations with a change in earnings also exhibit sign switches in earnings changes, a proportion we consider economically significant. Second, the mean absolute percentage change for earnings changes that flip sign is greater than 400%, indicating a very substantial effect. Finally, we highlight that major corporations, including General Electric, American Express, and ExxonMobil, frequently experience sign switches, underscoring the relevance of this phenomenon.

4 Return-based analyses

To provide more insights into the economic magnitude of the variation highlighted in prior sections and to better connect our findings to research settings common in accounting and finance research, we perform three types of return-based tests. First, we analyze quarterly earnings response coefficients (ERC) for a constant sample of observations across multiple re-standardization dates. Second, we test for differences across re-standardization dates in announcement-window "hedge portfolio" returns generated from a trading strategy that goes long on securities exhibiting "high" earnings changes and short on those exhibiting "low" earnings changes. Finally, we test for differences across re-standardization dates in long-window "hedge portfolio" returns generated from a trading strategy that goes long on securities exhibiting "low" accruals and short on those exhibiting "high" accruals.

4.1 ERC analysis

We analyze whether re-standardized data for a constant sample of quarterly observations generate substantial differences in the magnitude and statistical significance of announcement-window earnings response coefficients (ERC). Our approach is as follows. First, we assume that a researcher downloads Compustat *quarterly* data on June 30 each year from 1995 to 2019 (the years in which the "initial sample" is formed). For instance, in 1995, the researcher downloads data spanning 10 years (from 1986 to 1995, inclusive); in 1996, the data spans 11 years (from 1986 to 1996, inclusive), and so forth. Next, for each year in which the "initial sample" is formed (i.e., 1995-2019), the universe of Compustat quarterly observations is reassessed at the following future "fixed dates": March 31, June 30, September 30, and December 31.[3] In other words, for each

[3] The choice of the number of re-assessments does not impact our results. In a series of sensitivity analyses, we adopt two alternative re-assessment approaches. First, we re-assess the sample at each date on which a change in earnings is observed. Second, we re-assess the sample only once a year, specifically on June 30 of each year following the "initial sample" year.

"initial sample" year, the same firm-quarter observations are reassessed each year, four times per year. Finally, for each "initial sample" year and associated future point-in-time dates, we conduct the following cross-sectional OLS regressions:

$$\mathbf{CAR\ [-1,1]_{q} = \alpha + \beta\ IBQ\_CHG_{q} + \varsigma} \qquad \textbf{(1)}$$

Where CAR [-1,1] is the firm-level cumulative abnormal stock return in the 3-day period surrounding a firm's earnings announcement, and IBQ_CHG is the quarterly change in *Ibq* (usually referred to as "surprise" or "earnings innovation" in the capital markets literature), computed assuming a seasonal random walk model and scaled by lagged market value of equity. IBQ_CHG is evaluated at the specific point-in-time date using data available on that date. We primarily focus on the OLS β coefficient (ERC) and its associated *t*-statistic. Additionally, standard errors are always clustered by firm and date. In all analyses, we exclude data points derived from amendments to regulatory filings (i.e., Srcq = 8).[4] We also choose 2019 as the last year in which the initial sample is formed to ensure that our analyses are based on a reasonable number of quarterly observations.

Table 9 reports the results. Columns (1)-(7) present the sample distribution of the ERC coefficients for each "initial sample" re-assessed at future point-in-time dates. Columns (8)-(14) show the sample distribution of the associated *t*-statistics. We find substantial variation in ERC and associated statistical significance in several of the years in which the "initial sample" is formed. For example, for the sample formed in 1995 and re-assessed until 2023, the ERC coefficient ranges from a minimum value of 8.19 to a maximum value of 9.75 (a 20 percent difference), and its *t*-statistics span from 6.78 to 11.68 (a 72 percent difference). Similarly high variation can be observed for the samples formed in 1996, 1997, 1998, 2001, 2002, 2003, and

[4] In sensitivity analyses we also run this analysis keeping the document source type constant: the tenor of the results does not change.

2004. Overall, the variation in announcement-window ERC appears to be non-negligible in most years and particularly sizeable in several years.

Next, we perform a graphical analysis. Specifically, we plot the ERC *t*-statistics across point-in-time re-standardizations for each "initial sample" year. Figure 1 presents this evidence. Interestingly, we observe a seemingly systematic increasing pattern in the statistical association between returns and earnings changes across point-in-time updates, with notable exceptions in 2002, 2003, and 2004. This evidence, while only suggestive, appears relevant as it indicates that re-standardization may inject a look-ahead bias into the quarterly data, inflating the association between earnings and market reactions.

4.2 Short-window hedge portfolio analysis based on earnings changes

We continue our analysis of quarterly Snapshot data through a portfolio-based approach. Specifically, we assume once again that a researcher downloads Compustat quarterly data on June 30 each year from 1995 to 2019 (the years in which the "initial sample" is formed). For each year in which the "initial sample" is formed (i.e., 1995-2019), the universe of Compustat quarterly observations is reassessed on one future "fixed date": June 30.[5] In other words, for each "initial sample," the same firm-quarter observations are reassessed each year, once per year.

For each "initial sample" year and associated future point-in-time dates, we assess the *rank* of IBQ_CHG (computed assuming a seasonal random walk model and scaled by the lagged market value of equity) at the firm-quarter level. As rank metrics, we use *quintiles* (resulting in comparisons between the first and fifth quintiles) and *deciles* (resulting in comparisons between the tenth and first deciles). Consequently, we evaluate the variation in "high" minus "low" hedge

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[5] We utilize only one date per year to minimize the computational effort. However, the tenor of the results does not change when using four or more re-assessment dates per year.

portfolio returns, computed within the 3-day window surrounding the earnings announcement, across different re-standardization dates.

Table 10 presents the results. Columns (1)-(5) display results for portfolio ranks based on quarterly quintiles of earnings changes, while columns (6)-(10) show results for portfolio ranks based on quarterly deciles of earnings changes. Overall, we observe that the difference in annualized hedge portfolio returns is particularly sizable. For instance, for the initial sample formed in 1995, the annualized difference between the *maximum* and *minimum* return resulting from the hedge trading strategy across re-standardization dates reaches almost 30 percentage points. Similarly, for the initial sample formed in 2005, the annualized difference between the *last* and *first* return resulting from the hedge trading strategy across re-standardization dates is 15 percentage points.

To further explore the time-series dynamics of differences in hedge portfolio returns across point-in-time updates, we conduct graphical analyses. Notably, Figure 2 again demonstrates a seemingly systematic increase in the differences over time in hedge portfolio returns, suggesting potentially biased associations.

4.3 Long-window hedge portfolio analysis based on annual accruals

Our final analysis involves annual accruals calculated using the Compustat Snapshot *annual* file. Our goal is to examine the variation in accruals-based hedge portfolio 12-month abnormal returns across point-in-time updates, assessing the outcome of a trading strategy similar to the one described by Sloan (1996).

Initially, we form yearly samples similar to the analyses described previously, with the primary difference being the use of annual rather than quarterly data. For each initial sample, we compute firm-year accruals using two methods: (i) the balance sheet method, and (ii) the cash flow method, following Sloan (1996). We then reassess annual accruals once per year (on June 30) in each subsequent year up to 2023. For this analysis, we exclude (a) amendments to regulatory filings (SRC = 8), (b) preliminary data (UPD = 1 or 2), and (c) financial and real estate companies.

Additionally, we calculate future 12-month stock returns using CRSP data. The returns used for this analysis are future 12-month buy-and-hold abnormal returns, computed in excess of a size-matched value-weighted portfolio return based on the beginning-of-the-year market capitalization. The accumulation period starts four months after the fiscal year ends.[6]

Next, we calculate the hedge portfolio return as the difference between the abnormal return on the decile-1 portfolio and the return on the decile-10 portfolio. Deciles are formed annually based on the value of accruals scaled by average total assets. Finally, we assess the variation in hedge portfolio returns across point-in-time updates.

We begin our analysis by replicating the Sloan (1996) trading strategy for each initial sample year, starting from observations in 1986 and ignoring future point-in-time updates. The results of this replication are detailed in the Online Appendix. Table OA 1 demonstrates that the difference between portfolio returns generates a positive and significant spread, consistent with Sloan (1996), although the returns appear to diminish over time.

Table 11 presents the results of replicating the hedge portfolio analysis for each initial sample at different points in time. Our primary finding is that Compustat re-standardization significantly impacts not only the quarterly but also the annual file. We observe that the difference between the maximum and minimum hedge portfolio accruals-based returns reaches up to 4

[6] Delisting returns are excluded from the primary analyses. However, results are qualitatively similar when including delisting returns. When a delisting can be classified as "performance-based," a -30% return in imputed.

percentage points (in 2000, for accruals computed using the cash flow method), representing 30 percent of the average hedge portfolio annual return across point-in-time updates. Similarly, substantial differences can be identified in other years, including 1995, 1996, 1999, 2001, 2002, 2007, 2009, 2011, 2012, and 2014-2017.

Finally, mirroring the graphical analyses described in sections 4.1 and 4.2, we plot the hedge portfolio return for a subset of initial sample years having at least 15 time-series observations across point-in-time updates. Interestingly, in Figure 3, we notice a reduction in hedge portfolio returns across point-in-time updates, suggesting again a systematic bias in the re-standardization process.

5 Conclusion

This study highlights the substantial impact of Compustat's re-standardization process on financial research. By utilizing Compustat Snapshot products, which preserve point-in-time data, we reveal how ongoing standardizations of Compustat data significantly alter key financial figures such as sales and earnings, introducing material differences in research findings. The variation in financial statement data due to these adjustments can lead to inconsistent replication of prior studies and introduce biases that affect the relation between financial statement variables and stock returns.

Our findings demonstrate that the relation between returns and earnings is generally increasingly positive, while the relation between returns and accruals is increasingly negative over time. This trend suggests that the way Compustat updates its data influences the results of empirical studies, potentially leading to different conclusions if the timing of data collection is not adequately accounted for. For instance, our analysis of hedge portfolio returns based on earnings surprises and accruals across different re-standardization dates shows significant variability, emphasizing the necessity for careful consideration of data versioning in financial research.

Furthermore, our investigation confirms that precise replication of prior studies using common Compustat products is nearly impossible without access to point-in-time data. The Snapshot products provide a solution by offering detailed historical data, enabling researchers to mitigate look-ahead bias and making replication more straightforward. However, the complexity and frequency of data adjustments underscore the importance of transparency in research methodology and the need for detailed documentation of data collection and analysis procedures.

In conclusion, this study underscores the critical role of data integrity and transparency in financial research. By adopting point-in-time data and thereby enhancing reproducibility, the academic community can achieve more reliable and accurate insights, fostering a deeper understanding of financial markets and firm behavior.

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Appendix A

Table A1 - Example from the Quarterly Snapshot File – *General Electric* (GVKEY: 005047)

- *8-K* filed on 10/16/2015; see: https://www.sec.gov/Archives/edgar/data/40545/000004054515000101/ge8k3q2015ex99.htm
- *10-Q* filed on 11/02/2015; see https://www.sec.gov/Archives/edgar/data/40545/000004054515000114/0000040545-15-000114-index.htm

Panel A: As-filed data

Filing Date	***Report Date***	***Fyearq***	***Fqtr***	***Fyr***	***Type***	***Saleq***	***Ibq***	***Oiadpq***	***Niq***	***Spiq***	***Invtq***	***Oancfy***	***Atq***	***Cogsq***
10/16/2015	9/30/2015	2015	3	12	8-K	31,510	2,853	A	2,506	0	19,300	A	581,300	19,925
11/02/2015	9/30/2015	2015	3	12	10-Q	31,510	2,853	A	2,506	0	19,285	13,147	581,300	19,925

Panel B: COMPUSTAT data

Bdate	***Edate***	***Datadate***	***Fyearq***	***Fqtr***	***Fyr***	***Srcq***	***Updq***	***Saleq***	***Ibq***	***Oiadpq***	***Niq***	***Spiq***	***Invtq***	***Oancfy***	***Atq***	***Cogsq***
10/16/2015	10/25/2015	9/30/2015	2015	3	12	21	2	31,510	2,853	4,549	2,506	0	19,300	NaN	581,300	19,925
10/26/2015	11/02/2015	9/30/2015	2015	3	12	21	2	31,510	2,853	4,549	2,506	0	19,300	NaN	581,300	19,925
11/03/2015	11/03/2015	9/30/2015	2015	3	12	5	3	31,510	2,853	4,549	2,506	0	19,285	13,147	581,300	18,210
11/04/2015	01/22/2016	9/30/2015	2015	3	12	5	3	31,510	2,853	4,549	2,506	0	19,285	13,147	581,300	18,210
01/23/2016	02/28/2016	9/30/2015	2015	3	12	5	3	22,273	4,040	3,480	2,506	0	19,285	13,147	581,300	19,871
02/29/2016	04/21/2016	9/30/2015	2015	3	12	5	3	20,880	4,040	-318	2,506	3,797	19,285	13,147	581,300	21,586
04/22/2016	05/05/2016	9/30/2015	2015	3	12	5	3	22,938	1,344	-2,980	2,506	3,797	19,285	13,147	581,300	21,489
05/06/2016	07/21/2016	9/30/2015	2015	3	12	5	3	22,938	1,344	-2,980	2,506	3,797	19,285	13,147	581,300	21,489
07/22/2016	10/20/2016	9/30/2015	2015	3	12	5	3	27,858	2,146	2,776	2,506	3,797	19,285	13,147	581,300	20,528
10/21/2016	11/05/2016	9/30/2015	2015	3	12	5	3	27,858	1,965	2,777	2,506	NaN	19,285	13,147	581,300	20,527
11/06/2016	12/31/2050	9/30/2015	2015	3	12	5	3	27,859	1,965	2,777	2,506	NaN	19,285	13,147	581,300	18,902

This table reports examples of COMPUSTAT re-standardization for quarterly figures. The examples derive from COMPUSTAT Snapshot Quarterly, and the regulatory reports filed with the SEC. The company analyzed in these examples is General Electric (i.e., GVKEY: 005047). The examples include the following fundamental variables: (a) sales (*saleq*), (b) income before extraordinary items (*ibq*), (c) operating income after depreciation (*oiadpq*), (d) net income (*niq*), (e) special items (*spiq*), (f) inventory (*invtq*), (g) operating cash flow (*oancfy*, year-to-date), (h) total assets (*atq*), and (i) cost of goods sold (*cogsq*).

Panel A reports fundamental figures as-filed within the official SEC documents (i.e., 8-K filings for press releases, and 10-Q filings for quarterly reports. Panel B reports fundamental figures as provided by COMPUSTAT and re-standardized across point-in-time dates.

“A” indicates that the identification of the fundamental figure was ambiguous.

Table A2 - 10-Q, 10-K, and 8-K filings submitted by *General Electric* (GVKEY: 005047) to EDGAR after 11/02/2015 and before 11/05/2016.

Filing Date	***Type***	***Topic***
11/23/15	8-K	items 2.01 and 9.01 – Acquisition/Disposition of Assets and Financial Statements
11/30/15	8-K	items 2.06, 8.01, and 9.01 – Impairments, Other Events, Financial Statements/Exhibits
12/03/15	8-K	items 1.01, 2.03, 3.03, 5.03, 8.01, and 9.01 – Definitive Agreement, Off-Balance Sheet, Security Holders Rights, Amendments to Bylaws, Other Events, and Financial Statements/Exhibits
12/17/15	8-K	item 8.01 – Other Events
01/20/16	8-K	items 3.03, 5.03, 8.01, and 9.01 – Security Holders Rights, Amendments to Bylaws, Other Events, Financial Statements/Exhibits
01/22/16	8-K	items 2.02 and 9.01 – Results of Operations and Financial Statements/Exhibits
01/26/16	8-K	items 8.01 and 9.01 – Other Events and Financial Statements/Exhibits
02/03/16	8-K	items 8.01 and 9.01 – Other Events and Financial Statements/Exhibits
02/26/16	10-K	Standard annual reporting
04/22/16	8-K	items 2.02 and 9.01 – Results of Operations and Financial Statements/Exhibits
04/29/16	8-K	item 5.07 – Submission of Matters to Shareholders Vote
05/04/16	10-Q	Standard quarterly reporting
06/03/16	8-K	items 8.01 and 9.01 – Other Events and Financial Statements/Exhibits
06/29/16	8-K	item 8.01 – Other Events
07/22/16	8-K	items 2.02 and 9.01 – Results of Operations and Financial Statements/Exhibits
08/01/16	10-Q	Standard quarterly reporting
08/30/16	8-K	item 5.02 – Directors
09/01/16	8-K	items 5.03 and 9.01 – Amendments to Bylaws and Financial Statements/Exhibits
10/21/16	8-K	items 2.02 and 9.01 – Results of Operations and Financial Statements/Exhibits
10/31/16	8-K	items 8.01 and 9.01 – Other Events and Financial Statements/Exhibits
11/02/16	10-Q	Standard quarterly reporting
11/03/16	8-K	items 1.01 and 9.01 – Definitive Agreement and Financial Statements/Exhibits

This table reports the time series of 10-Qs, 10-Ks, and 8-Ks filed by General Electric with the SEC through the EDGAR system. The time interval goes from the 10-Q filing date of the example reported in the prior table (i.e., 11/02/2015) to the end of 2016.

Table A3 - Example from the Annual Snapshot File – *Boeing* (GVKEY: 002285)

- *8-K* filed on 01/25/2017; see: https://www.sec.gov/Archives/edgar/data/12927/000095012317000426/0000950123-17-000426-index.htm
- *10-K* filed on 02/08/2017; see https://www.sec.gov/Archives/edgar/data/12927/000001292717000006/0000012927-17-000006-index.htm

Panel A: As-filed data

Filing Date	*Report Date*	*Fyear*	*Type*	*Sale*	*Ib*	*Oiadp*	*Ni*	*Spi*	*Invt*	*Oancf*	*At*	*Cogs*
01/25/2017	12/31/2016	2016	8-K	94,571	4,895	5,834	4,895	A	43,199	10,499	89,997	80,790
02/08/2017	12/31/2016	2016	10-K	94,571	4,895	5,834	4,895	A	43,199	10,499	89,997	80,790

Panel B: COMPUSTAT data

Bdate	*Edate*	*Datadate*	*Fyear*	*Src*	*Upd*	*Sale*	*Ib*	*Oiadp*	*Ni*	*Spi*	*Invt*	*Oancf*	*At*	*Cogs*
01/25/2017	02/10/2017	12/31/2016	2016	88	2	94,571	4,895	6,855	4,895	-1,258	43,199	10,499	89,997	77,563
02/11/2017	02/13/2018	12/31/2016	2016	5	3	94,571	4,895	8,090	4,895	-2,493	43,199	10,499	89,997	77,835
02/14/2018	10/03/2018	12/31/2016	2016	5	3	94,571	4,895	8,090	4,895	-2,493	43,199	10,499	89,997	77,835
10/04/2018	01/29/2019	12/31/2016	2016	5	3	94,571	4,895	8,090	4,895	-2,493	43,199	10,499	89,997	77,835
01/30/2019	07/15/2021	12/31/2016	2016	5	3	94,571	4,895	6,832	4,895	-1,235	43,199	10,499	89,997	79,093
07/16/2021	09/28/2021	12/31/2016	2016	5	3	94,571	4,895	6,832	4,895	-1,235	43,199	10,499	89,997	79,093
09/29/2021	12/31/2050	12/31/2016	2016	5	3	94,571	4,895	6,832	4,895	-1,235	43,199	10,499	89,997	79,093

This table reports examples of COMPUSTAT re-standardization for annual figures. The examples derive from COMPUSTAT Snapshot Annual, and the regulatory reports filed with the SEC. The company analyzed in these examples is Boeing (i.e., GVKEY: 002285). The examples include the following fundamental variables: (a) sales (*sale*), (b) income before extraordinary items (*ib*), (c) operating income after depreciation (*oiadp*), (d) net income (*ni*), (e) special items (*spi*), (f) inventory (*invt*), (g) operating cash flow (*oancf*), (h) total assets (*at*), and (i) cost of goods sold (*cogs*).

Panel A reports fundamental figures as-filed within the official SEC documents (i.e., 8-K filings for press releases, and 10-K filings for annual reports. Panel B reports fundamental figures as provided by COMPUSTAT and re-standardized across point-in-time dates.

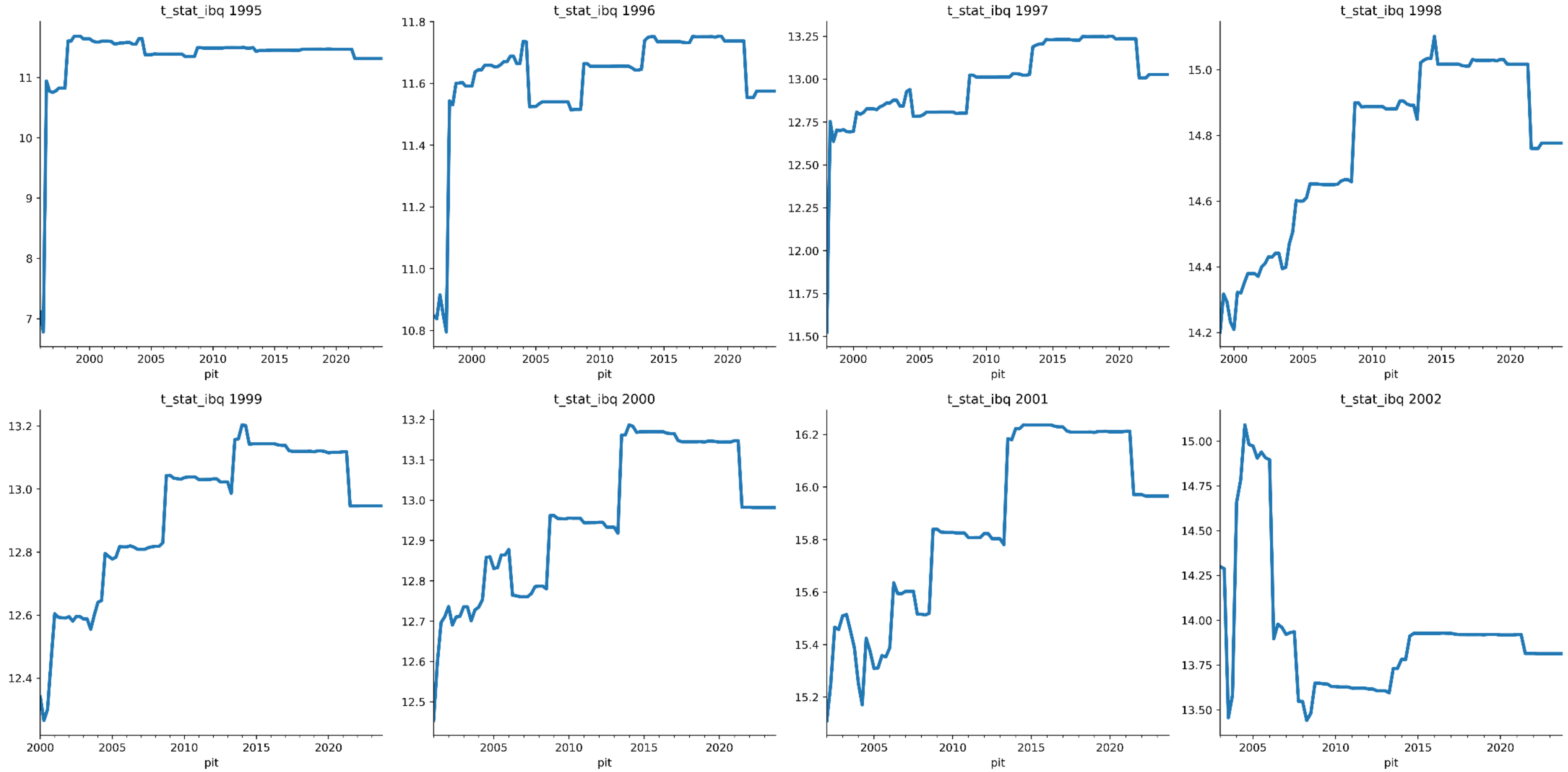
“A” indicates that the identification of the fundamental figure was ambiguous.

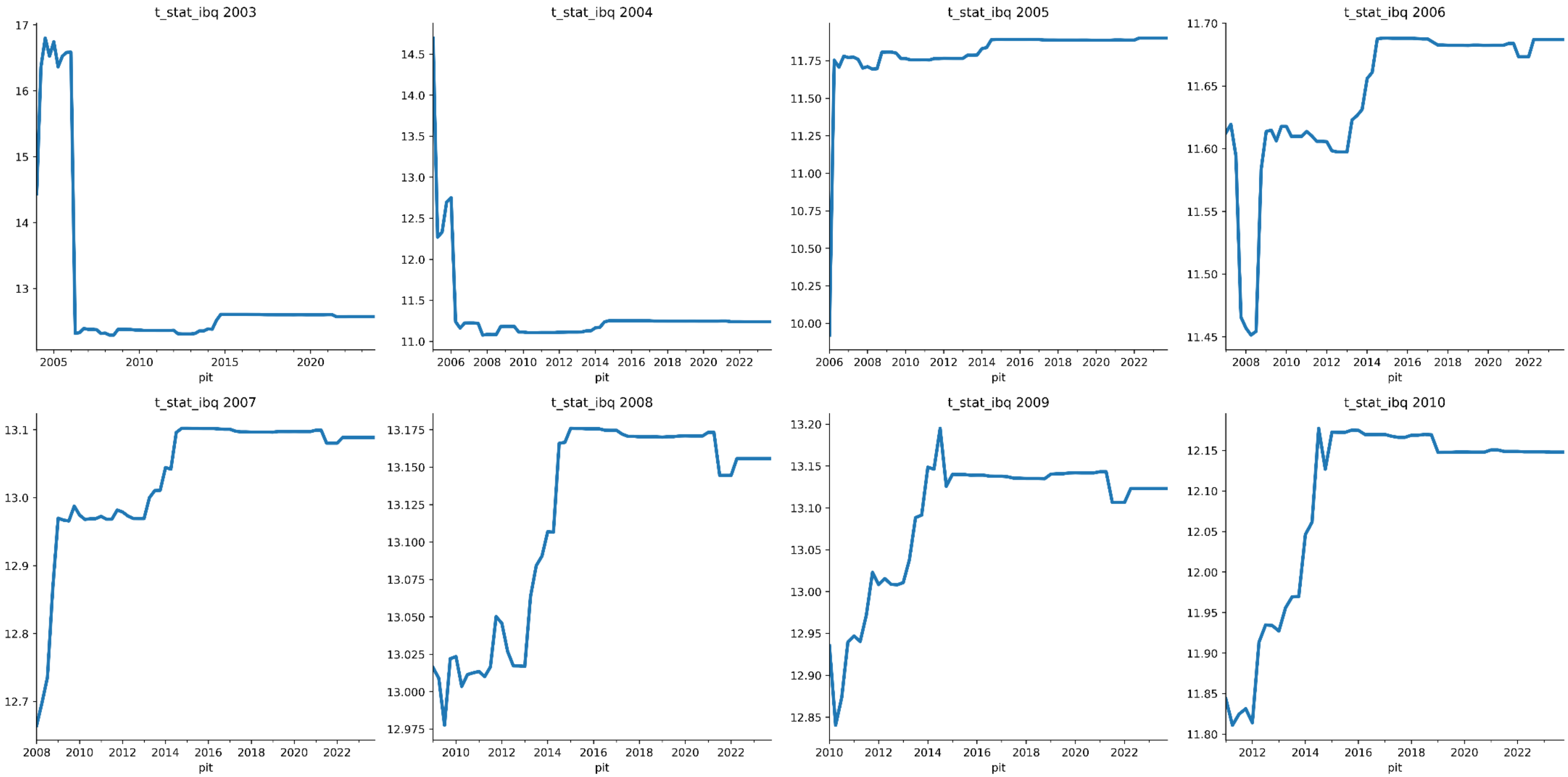
Table A4 - 10-Q, 10-K, and 8-K filings submitted by *Boeing* (GVKEY: 002285) to EDGAR after 02/08/2017 and before 12/31/2018.

Filing Date	*Type*	*Topic*
02/10/17	10-K/A	Amendment to 10-K Due to" and Certifications
08/10/17	8-K	items 5.02, 5.03, and 9.01 – Directors, Amendments to Bylaws, Financial Statements/Exhibits
10/25/17	8-K	items 2.02 and 9.01 – Results of Operations and Financial Statements/Exhibits
11/03/17	8-K	items 1.01, 2.03, and 9.01 – Entry into Definitive Agreement, Off-Balance Sheet Arrangement, and Financial Statements
12/11/17	8-K	items 8.01 and 9.01 – Other Events and Financial Statements/Exhibits
12/15/17	8-K	item 5.02 – Directors
12/18/17	8-K	items 5.03 and 9.01 – Amendments to Bylaws, and Financial Statements/Exhibits
01/31/18	8-K	items 2.02 and 9.01 – Results of Operations and Financial Statements/Exhibits
02/12/18	10-K	Standard annual reporting
02/23/18	8-K	items 8.01 and 9.01 – Other Events and Financial Statements/Exhibits
04/25/18	8-K	items 2.02 and 9.01 – Results of Operations and Financial Statements/Exhibits
05/01/18	8-K	item 5.07 – Submission of Matters to Shareholders Vote
05/01/18	8-K	items 1.01, 7.01, and 9.01 – Entry into Definitive Agreement, Regulation FD, and Financial Statements/Exhibits
06/07/18	8-K	items 1.01 and 9.01 – Entry into Definitive Agreement, and Financial Statements/Exhibits
07/05/18	8-K	items 8.01 and 9.01 – Other Events and Financial Statements/Exhibits
07/13/18	8-K	items 8.01 and 9.01 – Other Events and Financial Statements/Exhibits
07/25/18	8-K	items 2.02 and 9.01 – Results of Operations and Financial Statements/Exhibits
10/24/18	8-K	items 2.02 and 9.01 – Results of Operations and Financial Statements/Exhibits
10/25/18	8-K	items 5.03 and 9.01 – Amendments to Bylaws, and Financial Statements/Exhibits
10/31/18	8-K	items 1.01, 2.03, 8.01, and 9.01 – Entry into Definitive Agreement, Off-Balance Sheet Arrangement, Other Events and Financial Statements/Exhibits
12/17/18	8-K	items 8.01 and 9.01 – Other Events and Financial Statements/Exhibits

This table reports the time series of 10-Qs, 10-Ks, and 8-Ks filed by Boeing with the SEC through the EDGAR system. The time interval goes from the 10-K filing date of the example reported in the prior table (i.e., 02/08/2017) to the end of 2018.

Figure 1 – ERC *t*-statistics at future point-in-time dates




t_stat_ibq 2003
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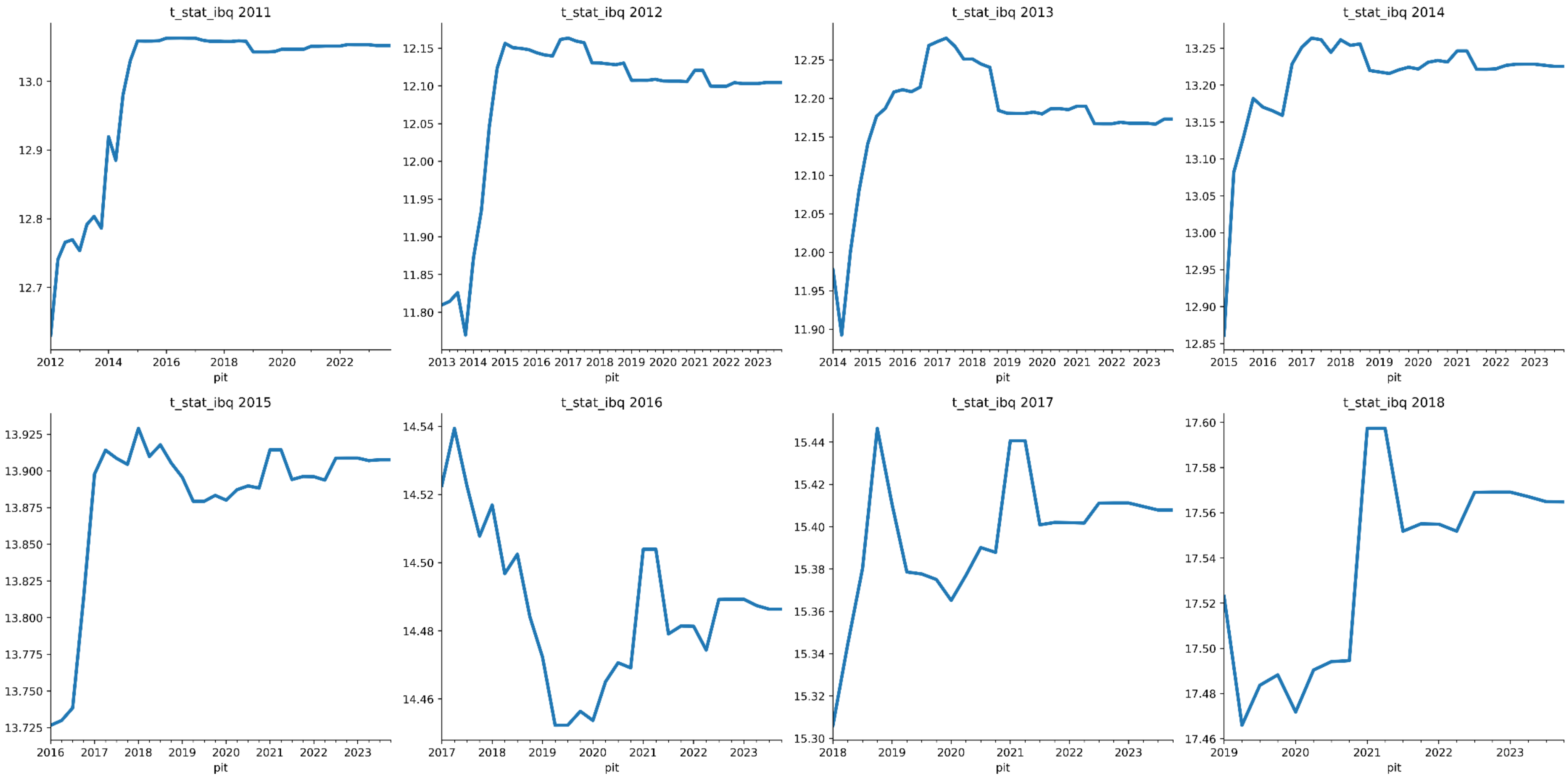
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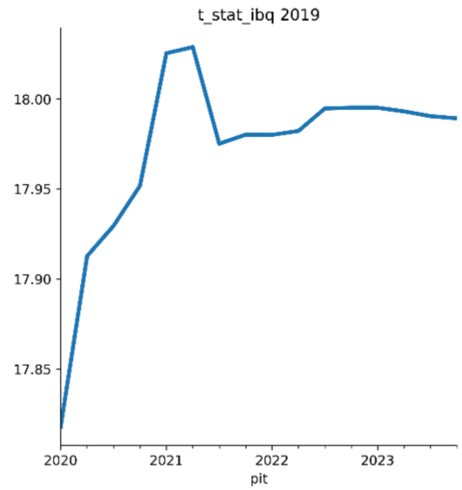
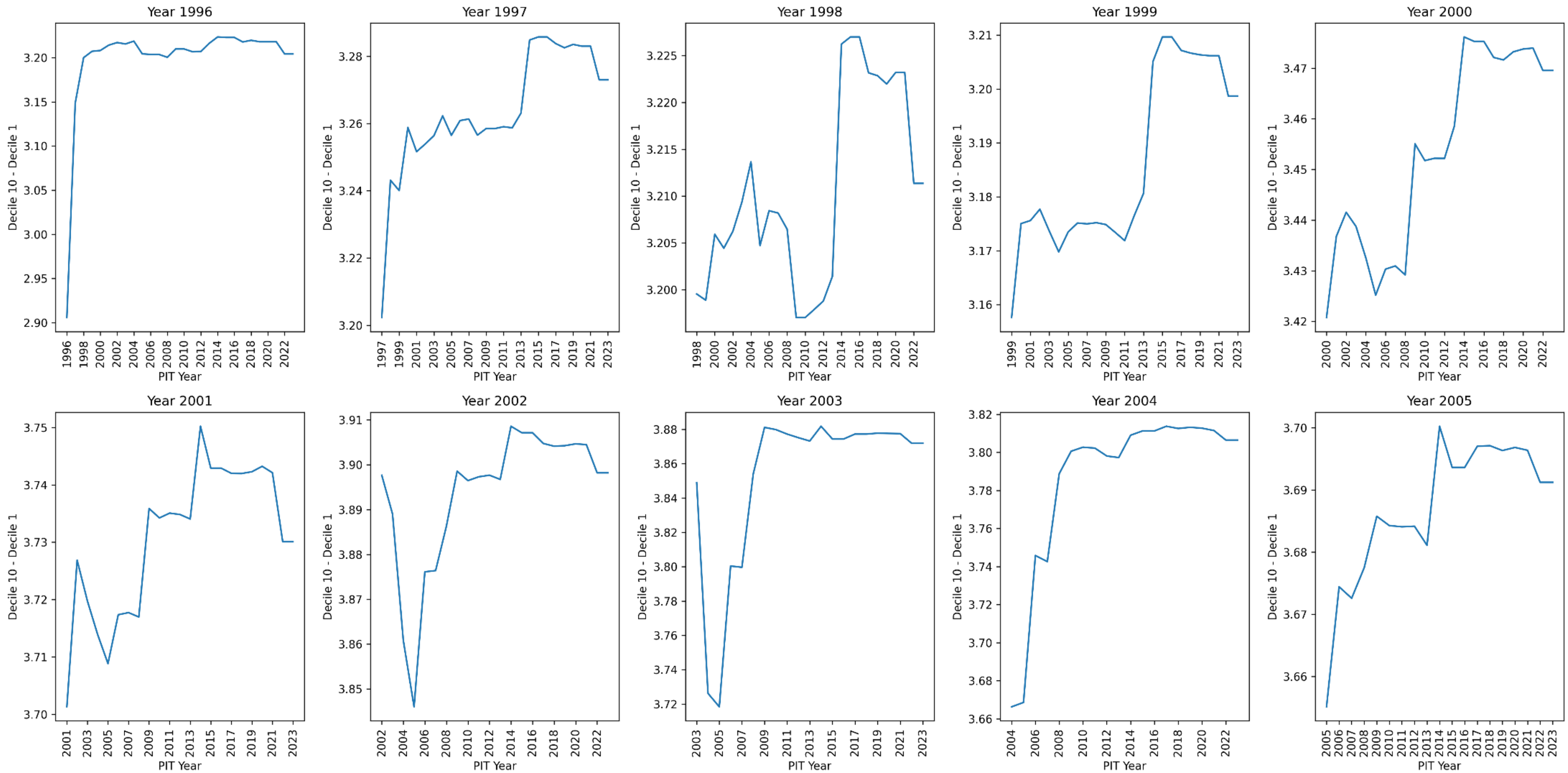
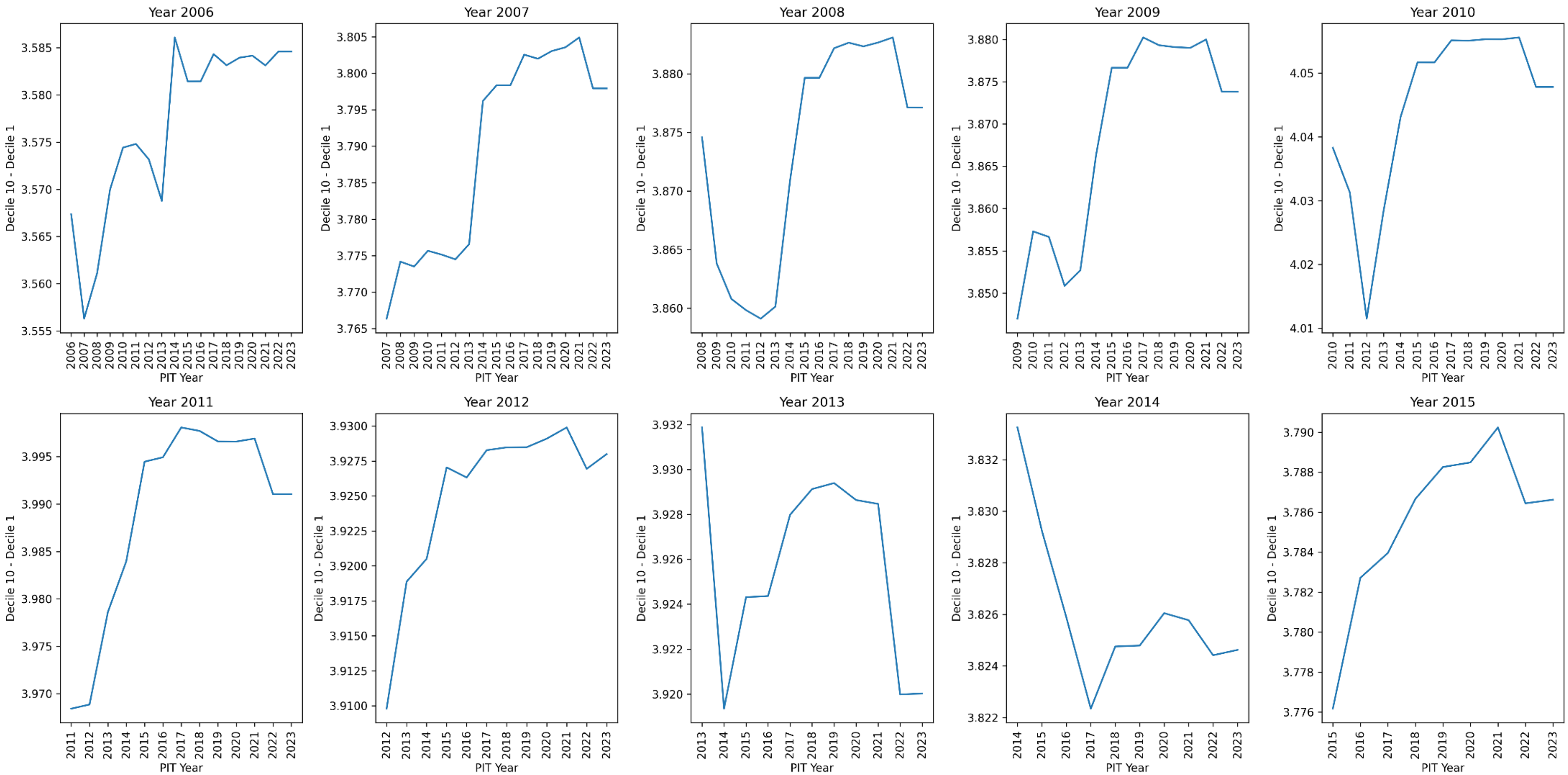


Figure 1 presents, for each initial sample formation year (1995-2019), the variation of ERC *t*-statistic across future point-in-time dates. Each calendar year, from 1995 to 2019, a sample of quarterly observations starting on June 30th, 1986, is formed. Each yearly sample is reassessed four times per year (i.e., on March 31st, June 30th, September 30th, December 31st), until 2023, using data points that are valid at each future date. The last year in which the initial sample is formed is 2019, to ensure that our analyses are based on a reasonable number of observations. Observations classified by Compustat as amendments to filings (i.e., SRCQ = 8) are excluded from this analysis. For each year in which the sample is formed, and subsequent reassessments, short-window (i.e., 3-day announcement period) abnormal stock returns are regressed on earnings changes computed based on a seasonal random walk model and using earnings before extraordinary items. Earnings are scaled by beginning-of-quarter market capitalization. Continuous variables are winsorized at the 1st and 99th percentiles of their quarter-year distribution.

Figure 2 – Short-window “hedge portfolio” returns based on decile ranks of earnings surprises




Year 2006
Year 2007
Year 2008
Year 2009
Year 2010
Year 2011
Year 2012
Year 2013
Year 2014
Year 2015
Decile 10 - Decile 1
PIT Year

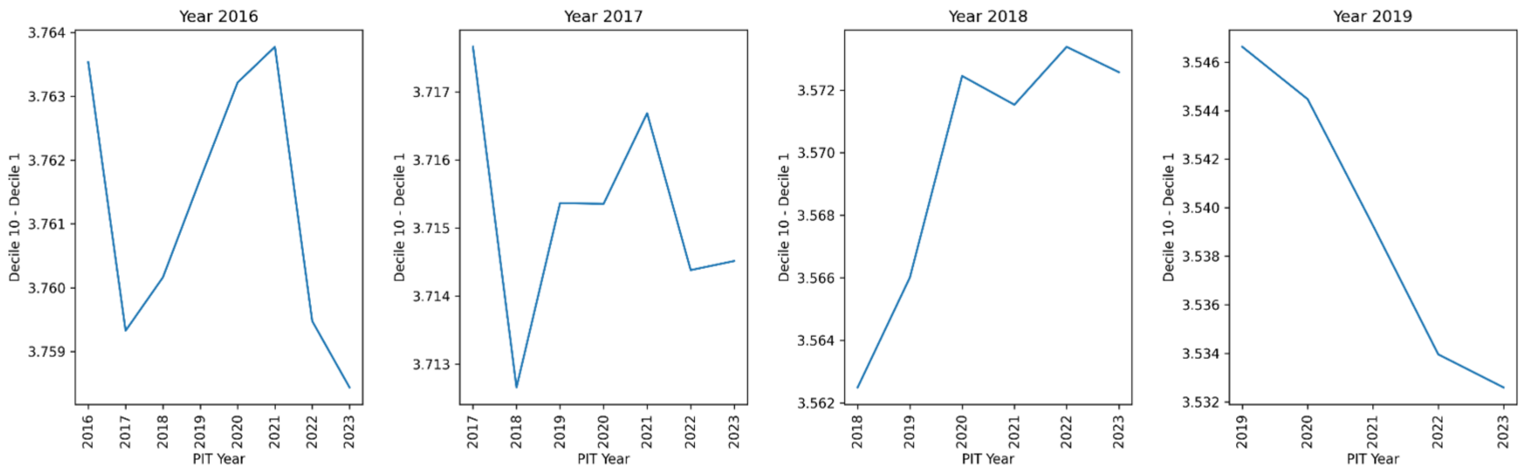
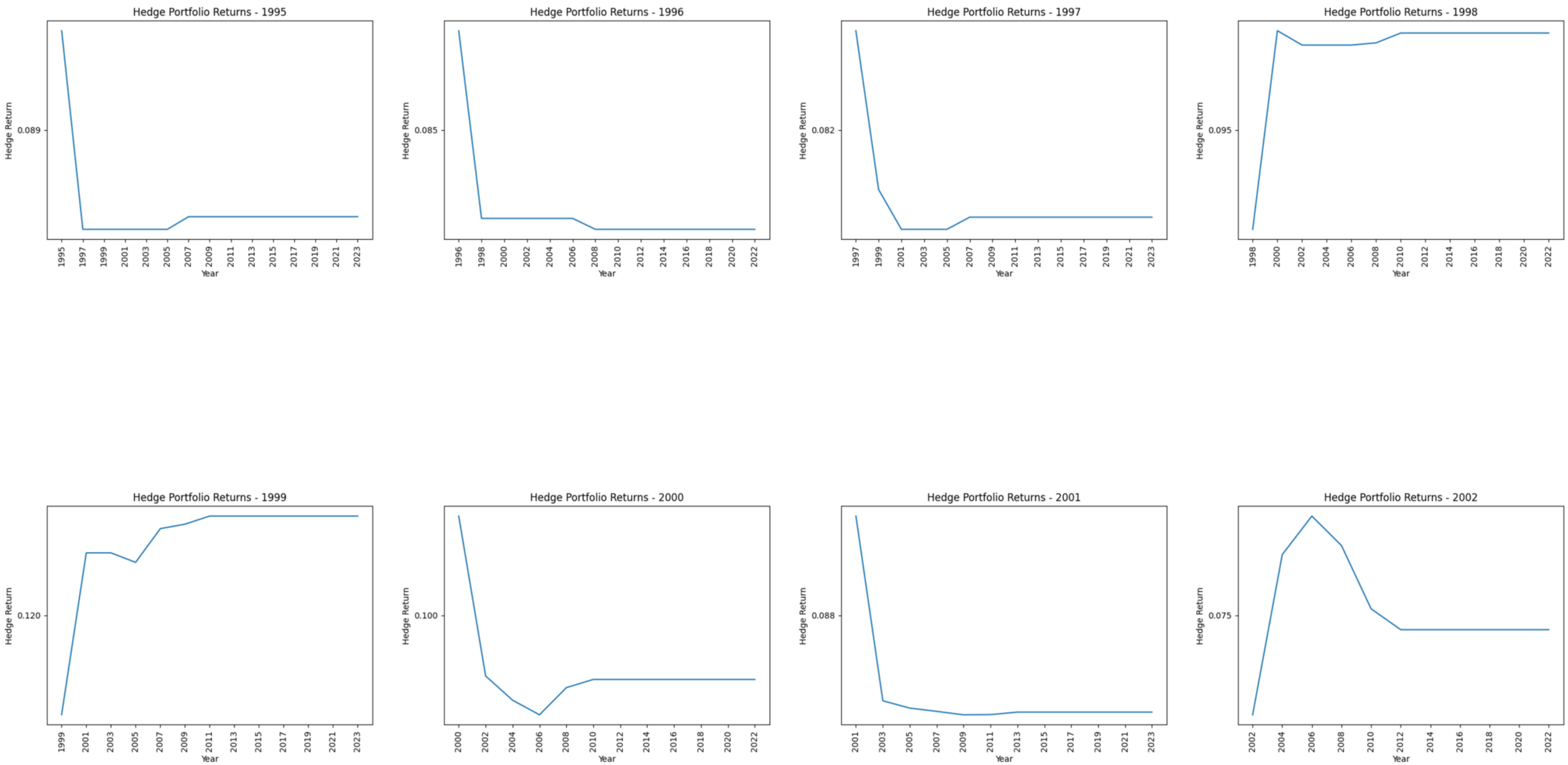


Figure 2 presents, for each initial sample formation year (1995-2019), the variation of "hedge portfolio" returns across future point-in-time dates, for a trading strategy that goes long on securities in the decile-10 of quarterly earnings changes, and short on securities in the decile-1 of quarterly earnings changes (equally weighted). For each year in which the "sample" is formed (i.e., 1995-2019), the universe of Compustat quarterly observations is reassessed at future "fixed dates": on June 30 each year until end of 2023. In other words, for each "sample", the same firm-quarter observations are reassessed every year until 2023. For each "sample" year and associated future point-in-time dates, the *rank* (based on deciles) of quarterly earnings changes (based on IBQ and computed assuming a seasonal random walk model and scaled by lagged market value of equity) is assessed at the firm-quarter level. Specifically, this figure reports differences in the short-window hedge portfolio returns of a trading strategy based on a long position in the securities sorted in the "high" portfolio (i.e., 10) and a short position in the securities sorted in the "low" portfolio (i.e., decile 1) in the 3-day period surrounding earnings announcements. Continuous variables are winsorized at the 1st and 99th percentiles of their quarter-year distribution.

Figure 3 – Long-window “hedge portfolio” returns based on decile ranks of annual accruals



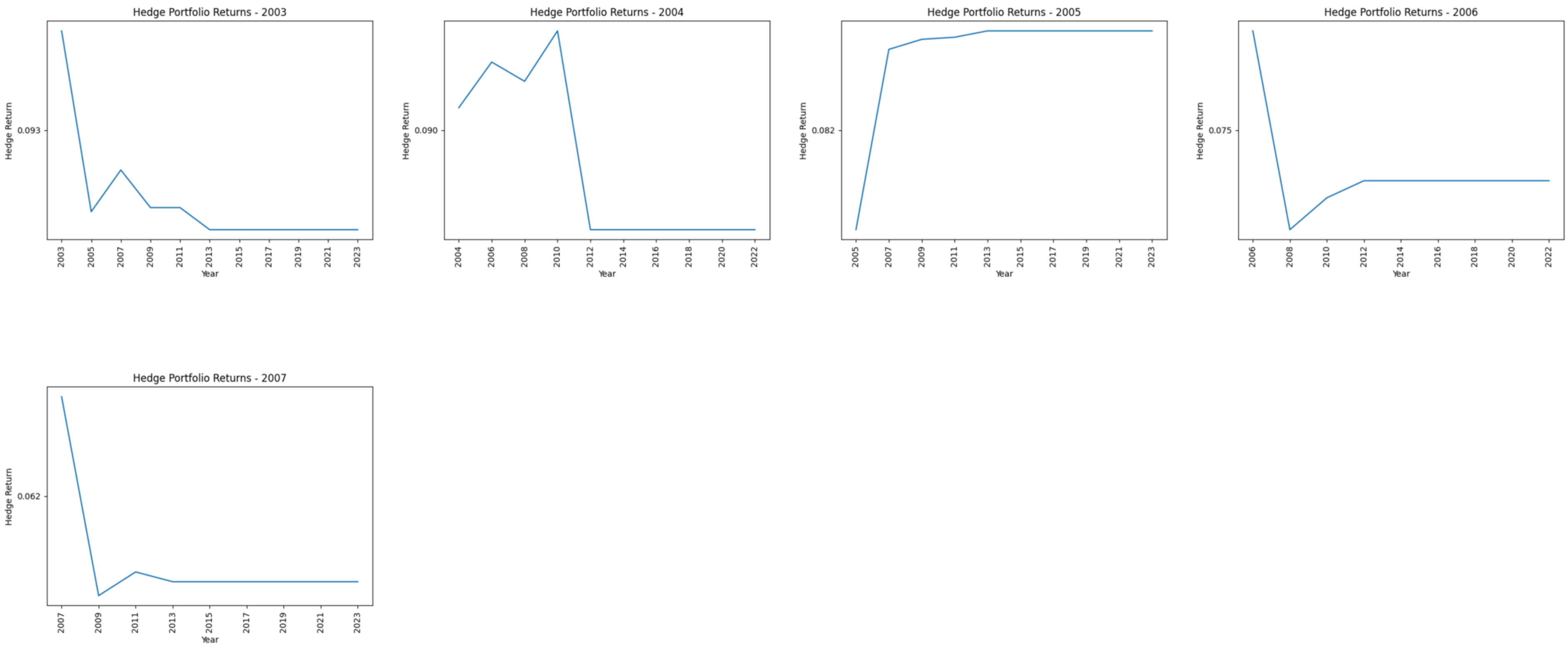


Figure 3 presents, for initial samples formed in 1995-2007 (having at least 15 time-series observations), the variation of "hedge portfolio" returns across future point-in-time dates, for a trading strategy that goes long on securities in the decile-1 of annual accruals, and short on securities in the decile-10 of annual accruals (equally weighted). For each year in which the "sample" is formed (i.e., 1995-2019), the universe of Compustat annual observations is reassessed at one future "fixed dates": on June 30 each year until end of 2023. In other words, for each "sample", the same firm-quarter observations are reassessed every year until 2023. Continuous variables are winsorized at the 1st and 99th percentiles of their quarter-year distribution.

Table 1 – Full sample statistics for Compustat Snapshot Quarterly

Observations (1)	Fiscal Years (2)	Firms (3)	Mean #Updates (4)	Median #Updates (5)	Mean Distance vs. EA date (days) (6)
8,565,969	38 (1986-2023)	39,783	6.3	6.0	685

Table 1 presents summary statistics for the full sample of quarterly observations sourced from Compustat Snapshot. Columns (4) and (5) display the mean and median number of updated data points for the same firm, fiscal quarter, and earnings announcement date. Column (6) shows the mean number of days between the activation date of the first firm-quarter data point and the earnings announcement date for the same firm-quarter observation.

Table 2 – Analysis of firm level within-quarter variation across "point-in-time" updates

Panel A: Types and frequency of updates in financial statement items (FSA)

	% Observations with at least one update	Mean number of updated FSA	Median number of updated FSA
	(1)	(2)	(3)
FSA Δ numeric-to-numeric			
Across SRCQ	35.2	7.6	3.4
Within SRCQ	25.6	6.8	2.2
FSA Δ nan-to-numeric			
Across SRCQ	61.1	18.2	1.1
Within SRCQ	53.2	5.9	1.0
FSA Δ numeric-to-nan			
Across SRCQ	7.3	4.2	2.0
Within SRCQ	5.9	3.7	2.0

Panel B: Magnitude of updates for numeric-to-numeric changes

	Absolute Percentage Change					
	Mean	***P10***	***P25***	***P50***	***P75***	***P90***
	(1)	(2)	(3)	(4)	(5)	(6)
FSA Δ numeric-to-numeric						
Across SRCQ	68.95	0.05	1.33	20.32	52.00	100
Within SRCQ	64.70	0.02	0.48	9.10	41.53	100

Table 2 presents firm-level within-quarter variation in Compustat Snapshot quarterly data across "point-in-time" updates. Panel A shows sample statistics for three different types of updates on financial statement analysis (FSA) variables. *FSA Δ numeric-to-numeric* presents changes in FSA variables across consecutive point-in-time updates involving only numeric variables (e.g., a change from 2 to 3). *FSA Δ nan-to-numeric* represents changes in FSA variables across consecutive point-in-time updates involving missing and numeric variables (e.g., a change from "missing" to 3). *FSA Δ numeric-to-nan* presents changes in FSA variables across consecutive point-in-time updates involving numeric and missing variables (e.g., a change from 2 to missing). Each of these analyses is repeated twice: (i) "Across SRCQ" includes analyses that capture changes across different values of the Compustat variable "SRCQ" (i.e., document source type); (ii) "Within SRCQ" includes analyses that capture changes for a constant value of the Compustat variable "SRCQ" (i.e., document source type). Panel B reports absolute percentage changes (both across and within "SRCQ") for numeric-to-numeric changes in FSA variables. Financial statement variables are winsorized at the 1st and 99th percentiles of their quarterly distribution to compute absolute percentage changes.

Table 3 – Analysis by fiscal year

Year	% Observations with at least one update	Mean number of updated FSA	Mean absolute percentage change numeric-to-numeric	Median absolute percentage change numeric-to-numeric
(1)	(2)	(3)	(4)	(5)
1986	42	3.6	46.3	3.5
1987	47	3.2	52.8	10.7
1988	43	3.2	53.7	11.6
1989	44	3.1	47.7	9.1
1990	42	3.1	50.6	10.8
1991	40	3.8	55.0	16.8
1992	44	4.1	54.8	17.1
1993	44	3.6	55.7	17.7
1994	42	4.1	54.9	11.3
1995	49	3.8	52.8	16.9
1996	49	4.0	52.6	16.7
1997	45	4.4	46.9	12.4
1998	29	5.0	52.2	17.0
1999	21	5.3	59.0	19.3
2000	22	6.1	58.9	16.8
2001	24	5.6	51.7	12.5
2002	31	6.9	47.7	11.5
2003	23	7.2	53.3	15.2
2004	19	9.3	54.1	11.0
2005	27	8.4	60.4	16.3
2006	28	7.8	59.6	16.1
2007	25	8.0	62.4	16.6
2008	26	10.7	67.8	18.6
2009	23	10.6	73.6	27.1
2010	23	10.7	75.3	27.6
2011	25	12.2	79.2	24.6
2012	29	12.8	79.5	24.3
2013	35	12.5	92.3	30.1
2014	45	12.3	96.6	29.5
2015	52	11.6	98.2	31.5
2016	51	11.6	96.2	31.3
2017	53	11.9	93.4	30.2
2018	50	11.9	94.5	31.0
2019	44	11.5	93.6	29.5
2020	45	12.0	103.4	31.4
2021	46	11.6	97.8	30.1
2022	43	12.2	100.8	30.7
2023	31	11.3	101.1	31.3

Table 3 presents firm-level within-quarter variation in Compustat Snapshot quarterly data across "point-in-time" updates split by fiscal year. Columns (4) and (5) report the mean and median of the absolute percentage change for those financial statement analysis (i.e., FSA) variables exhibiting numeric-to-numeric changes. The analyses of changes in FSA variables are conducted "across" SRCQ codes. Financial statement variables are winsorized at the 1st and 99th percentiles of their quarterly distribution to compute absolute percentage changes.

Table 4 – Analysis by fiscal quarter

Panel A: Sample statistics by fiscal quarter

Quarter (1)	Observations (2)	Firms (3)	Mean #Updates (4)	Median #Updates (5)	Mean Distance vs. EA date (days) (6)
1	2,318,162	39,136	6.73	7.0	657
2	2,240,104	39,176	6.42	6.0	694
3	2,062,300	39,226	6.10	6.0	699
4	1,945,403	39,134	5.81	6.0	689

Panel B: Magnitude of updates for numeric-to-numeric changes

	Quarter (1)	Mean absolute percentage change (2)	Median absolute percentage change (3)
FSA Δ numeric-to-numeric			
Across SRCQ	1	63	16
	2	65	19
	3	60	15
	4	80	29
Within SRCQ	1	59	7
	2	66	8
	3	61	5
	4	78	19

Table 4 presents summary statistics and firm-level within-quarter variation in Compustat Snapshot quarterly data across "point-in-time" updates, split by fiscal quarter. Panel A reports summary statistics. Columns (4) and (5) include the mean number of updates for a constant firm-quarter observation across SRCQ codes. Panel B shows both "across" and "within" SRCQ variation in financial statement analysis (i.e., FSA) variables for numeric-to-numeric changes. Financial statement variables are winsorized at the 1st and 99th percentiles of their quarterly distribution to compute absolute percentage changes.

Table 5 – Analysis by industry

Panel A: Summary statistics for the top-10 industries by percentage of observations

	% Observations (1)	Firms (2)	Mean #Updates (3)	Mean Distance vs. EA date (days) (4)
Business Services	10	4,119	5.72	702
Banking	9	3,076	5.62	771
Trading	8	8,987	2.40	629
Pharma	5	2,291	4.98	598
Oil	5	2,110	5.31	674
Electrical Equipment	5	1,281	6.82	672
Retail	4	1,399	5.47	631
Utilities	3	682	5.42	778
Communication	3	1,081	5.78	739
Computers	3	1,032	6.14	744

Panel B: Frequency and magnitude of numeric-to-numeric updates in top-10 industries

	% Observations with at least one update (1)	Mean number of updated FSA (2)	Mean absolute percentage change (3)	Median absolute percentage change (4)
Business Services	33	7	64	19
Banking	36	6	59	16
Trading	25	8	68	17
Pharma	31	7	75	21
Oil	31	7	70	17
Electrical Equipment	33	7	55	17
Retail	35	6	52	13
Utilities	28	7	46	13
Communication	34	7	65	15
Computers	34	6	52	14

Panel C: Summary statistics for the bottom-5 industries by percentage of observations

	% Observations (1)	Firms (2)	Mean #Updates (3)	Mean Distance vs. EA date (days) (4)
Candy & Soda	0.3	78	4.89	566
Ship/Rail Equipment	0.2	51	5.23	623
Defense	0.1	43	6.22	621
Tobacco	0.1	31	5.93	702
Other	0.1	2	5.24	692

Panel D: Frequency and magnitude of numeric-to-numeric updates in bottom-5 industries

	% Observations with at least one update (1)	Mean number of updated FSA (2)	Mean absolute percentage change (3)	Median absolute percentage change (4)
Candy & Soda	32	8	64	18
Ship/Rail Equipment	34	6	64	17
Defense	34	7	54	16
Tobacco	36	7	59	13
Other	25	2	58	14

Table 5 presents summary statistics and firm-level within-quarter variation in Compustat Snapshot quarterly data across "point-in-time" updates, split by industry.

Panels A and B report statistics for the top-10 industries by percentage of observations. Specifically, they present summary statistics and frequency and magnitude of numeric-to-numeric updates for financial statement analysis (i.e., FSA) variables, respectively. The statistics are calculated "across" SRCQ codes.

Panels C and D report statistics for the bottom-5 industries by percentage of observations. Specifically, they present summary statistics and frequency and magnitude of numeric-to-numeric updates for financial statement analysis (i.e., FSA) variables, respectively. The statistics are calculated "across" SRCQ codes.

Financial statement variables are winsorized at the 1st and 99th percentiles of their quarterly distribution to compute absolute percentage changes.

Table 6 – Analysis of financial statement analysis (FSA) items

FSA	Description	Absolute percentage change						
		Mean	SD	P10	P25	Median	P75	P90
		(1)	(2)	(3)	(4)	(5)	(6)	(7)
nopiq	Non-Operating Income (Expense) - Total	234.95	814.44	1.43	9.09	50.00	100.00	338.08
xidoq	Extraord. Items and Discontinued Operations	210.67	716.18	5.05	42.99	100.00	100.00	169.71
dlcq	Debt in Current Liabilities	202.20	733.24	0.05	3.89	45.94	100.00	254.25
spiopq	Other Special Items Pretax	190.93	632.72	1.86	14.23	70.61	100.00	231.33
rectoq	Receivables - Current Other incl Tax Refunds	185.37	588.28	3.71	33.57	99.35	100.00	130.3
cshiq	Common Shares Issued	174.53	1026.54	0.02	0.25	3.39	50.24	110.61
cstkq	Common/Ordinary Stock (Capital)	167.17	1103.84	0.07	0.85	6.41	41.52	99.9
acoq	Current Assets - Other - Total	159.31	566.95	0.71	7.54	37.76	100.00	184.75
aoq	Assets - Other - Total	157.70	818.44	0.00	0.09	4.18	37.09	100.00
rcpq	Restructuring Cost Pretax	131.71	440.38	1.19	6.76	32.89	95.64	175
cheq	Cash and Short-Term Investments	130.24	653.08	0.01	1.25	14.84	51.84	105.52
xiq	Extraordinary Items	126.47	250.99	34.99	100.00	100.00	100.00	100.00
spiq	Special Items	124.89	306.39	2.56	22.22	100.00	100.00	112.9
fcaq	Foreign Exchange Income (Loss)	116.47	329.22	0.17	1.49	22.62	100.00	200.00
altoq	Other Long-term Assets	103.42	355.2	1.52	8.21	32.78	79.32	100.00
ppentq	Property Plant and Equipment - Total (Net)	101.64	569.8	0.00	0.00	2.00	23.49	98.52
ivltq	Total Long-term Investments	99.09	344.09	0.16	1.78	20.13	100	100.00
aqaq	Acquisition/Merger After-Tax	98.73	265.91	1.69	8.13	35.00	98.41	153.45
lcoq	Current Liabilities - Other - Total	95.71	305.17	0.34	4.31	24.97	100.00	100.00
rectrq	Receivables - Trade	91.10	308.57	0.16	1.94	14.42	100.00	100.00
loq	Liabilities - Other	89.20	256.3	0.01	1.92	28.38	100.00	100.00
epspiq	Earnings Per Share – with Extraord. Items	86.22	217.35	2.56	6.80	25.00	75.24	155.00
apq	Account Payable/Creditors - Trade	84.88	298.77	0.00	0.76	14.54	58.23	106.17
niq	Net Income (Loss)	82.20	276.76	0.11	1.29	10.38	48	134.38
invtq	Inventories - Total	78.84	220.5	0.00	0.41	15.18	100.00	100.00
dvpq	Dividends - Preferred/Preference	77.54	138.63	0.88	7.50	55.56	100.00	100.00
txpq	Income Taxes Payable	75.75	117.38	0.15	7.28	91.48	100.00	100.00
loxdrq	Liabilities - Other - Excluding Deferred	75.20	247.21	0.12	2.00	18.83	78.56	100.00
epspxq	Earnings Per Share (Basic) - No Extraord. Items	73.72	165.93	2.74	7.14	25.00	72.22	140.00
txtq	Income Taxes - Total	72.31	195.09	0.46	2.93	16.13	70.66	120.75
ibq	Income Before Extraordinary Items	70.93	213.75	0.38	2.55	13.16	49.87	126.47

FSA	Description	Absolute percentage change						
		Mean	**SD**	**P10**	**P25**	**Median**	**P75**	**P90**
		(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
intanq	Intangible Assets - Total	69.43	155.19	0.47	4.05	25.05	100.00	100.00
cshoq	Common Shares Outstanding	63.37	321.9	0.03	0.30	2.23	14.58	77.70
piq	Pretax Income	63.35	190.98	0.26	1.94	10.71	45.58	114.17
oiadpq	Operating Income After Depreciation	55.46	161.01	0.25	1.66	8.80	40.53	108.07
rectq	Receivables - Total	51.14	200.31	0.00	0.53	6.41	29.15	84.14
dlttq	Long-Term Debt - Total	43.47	113.63	0.00	1.03	13.95	46.17	100.00
dpq	Depreciation and Amortization – Total	40.82	89.31	0.46	2.58	13.11	48.30	91.98
xrdq	Research and Development Expense	38.96	78.67	0.63	3.27	14.09	46.22	84.11
oibdpq	Operating Income Before Depreciation	37.76	108.59	0.21	1.20	6.00	27.75	78.08
xintq	Interest and Related Expense- Total	37.25	84.86	0.24	1.71	9.52	44.12	94.23
cogsq	Cost of Goods Sold	33.25	100.82	0.14	0.93	5.17	26.53	77.74
req	Retained Earnings	28.56	94.51	0.00	0.44	3.90	15.80	55.68
ceqq	Common/Ordinary Equity - Total	25.28	120.78	0.00	0.00	0.53	7.18	32.78
xrdy	Research and Development Expense	24.71	51.91	0.19	1.24	6.33	24.55	66.19
ppegtq	Property, Plant and Equipment - Total (Gross)	19.05	69.23	0.00	0.00	0.02	5.45	48.06
revtq	Revenue - Total	18.65	36.59	0.09	0.75	3.95	17.99	54.56
saleq	Sales/Turnover (Net)	18.49	36.21	0.09	0.73	3.88	17.77	54.30
xsgaq	Selling, General and Administrative Expenses	18.10	35.93	0.17	0.99	4.70	18.50	49.51
lctq	Current Liabilities - Total	17.18	53.21	0.00	0.03	1.33	9.55	40.33
xoprq	Operating Expense - Total	13.97	29.13	0.07	0.45	2.52	11.18	46.58
seqq	Stockholders Equity	13.61	41.91	0.00	0.00	0.75	7.38	31.03
tiiq	Interest Income - Total (Financial Services)	13.12	23.99	0.04	0.29	2.19	13.88	46.17
actq	Current Assets - Total	10.09	26.79	0.00	0.00	0.72	6.17	27.45
dpretq	Depr/Amort of Property	9.73	19.08	0.30	0.91	2.81	8.05	24.74
ltq	Liabilities - Total	5.62	19.65	0.00	0.00	0.00	1.10	10.32
ltmibq	Liabilities - Total and Noncontrolling Interest	5.54	18.95	0.00	0.00	0.00	1.30	10.77
atq	Assets - Total	4.86	15.26	0.00	0.00	0.01	1.63	10.80

Table 6 reports firm-level within-quarter variation in Compustat Snapshot data across "point-in-time" updates, for a selection of financial statement analysis (i.e., FSA) items. The variation in such FSA items is assessed through the analysis of the absolute percentage changes across "point-in-time" updates keeping firm, quarter, and SRCQ fixed. Only numeric-to-numeric changes are considered. The FSA items are reported in descending order of mean absolute percentage change. Financial statement variables are winsorized at the 1st and 99th percentiles of their quarterly distribution to compute absolute percentage changes.

Table 7 – Analysis of financial statement analysis (FSA) ratios

Ratio (1)	Type (2)	Description (3)	Mean (4)	SD (5)	P25 (6)	Median (7)	P75 (8)
ROA	Percentage Δ	{NIQ [q] / ATQ [q-1]} * 100	87.75	306.62	1.39	10.41	47.64
ROA	Percentage Points Δ	{NIQ [q] / ATQ [q-1]} * 100	5.14	23.12	0.02	0.18	1.23
ROE	Percentage Δ	{NIQ [q] / CEQQ [q-1]} * 100	82.40	283.19	1.30	9.65	45.24
ROE	Percentage Points Δ	{NIQ [q] / CEQQ [q-1]} * 100	6.06	22.20	0.05	0.41	2.38
Gross Profit Margin	Percentage Δ	{(SALEQ [q] - COGSQ [q]) / SALEQ [q-1]} * 100	47.47	142.31	0.86	7.50	36.38
Gross Profit Margin	Percentage Points Δ	{(SALEQ [q] - COGSQ [q]) / SALEQ [q-1]} * 100	20.38	66.69	0.25	2.22	11.09
Net Profit Margin	Percentage Δ	{NIQ [q] / SALEQ [q-1]} * 100	78.06	260.02	1.30	10.00	46.37
Net Profit Margin	Percentage Points Δ	{NIQ [q] / SALEQ [q-1]} * 100	45.37	230.21	0.12	1.01	6.43
Special Items	Percentage Δ	{SPIQ [q] / SALEQ [q-1]} * 100	143.79	434.24	11.90	80.00	100.00
Special Items	Percentage Points Δ	{SPIQ [q] / SALEQ [q-1]} * 100	23.32	109.62	0.17	0.85	4.37
Leverage	Percentage Δ	{(DLTTQ [q] + DLCQ [q]) / CEQQ [q]} * 100	21.29	41.40	0.01	5.71	25.82
Leverage	Percentage Points Δ	{(DLTTQ [q] + DLCQ [q]) / CEQQ [q]} * 100	28.78	59.68	0.01	4.93	28.34

Table 7 reports firm-level within-quarter variation in Compustat Snapshot data across "point-in-time" updates, for a selection of financial statement analysis (i.e., FSA) ratios. The analyses are performed keeping firm, quarter, and SRCQ fixed. Only numeric-to-numeric changes are considered. Column (2) shows whether the analysis is expressed as a percentage change across consecutive point-in-time dates (i.e., Percentage Δ) or, alternative, in percentage points (i.e., Percentage Points Δ). Column (3) provides a detailed description of how the financial ratio is calculated. Ratios are evaluated utilizing data available at a given point in time. Columns (4) – (8) report sample summary statistics for each ratio. Financial statement ratios are winsorized at the 1st and 99th percentiles of their quarterly distribution.

Table 8 – Analysis of earnings changes

Panel A: Summary statistics for numeric-to-numeric absolute changes in earnings change variables

Variable	Absolute percentage change Mean (1)	SD (2)	P10 (3)	P25 (4)	P50 (5)	P75 (6)	P90 (7)
IBQ_CHG	102.58	299.25	0.66	3.87	18.41	68.77	197.16
NIQ_CHG	100.38	322.46	0.09	1.43	12.56	60.26	178.79
SALEQ_CHG	144.18	432.26	0.63	4.44	24.52	94.27	272.45

Panel B: Summary statistics for "sign switches"

Variable	% Switches (1)	Mean absolute percentage change (2)	Examples of "high-switching" companies (3)	 (4)
IBQ_CHG	10.42%	421.22	Xerox Holdings	General Electric
NIQ_CHG	9.34%	467.20	Wells Fargo	American Express
SALEQ_CHG	14.27%	473.74	Unilever	Exxon Mobile

Table 8 reports firm-level within-quarter variation in Compustat Snapshot data across "point-in-time" updates, for alternatively defined earnings change variables. Earnings changes are computed assuming a seasonal "random walk" model. The three earnings changes variables reported are *IBQ_CHG* (i.e., change in earnings before extraordinary items scaled by lagged market capitalization), *NIQ_CHG* (i.e., change in net income scaled by lagged market capitalization), and *SALEQ_CHG* (i.e., change in sales scaled by lagged market capitalization). This analysis is performed excluding all the observations without a valid match in the CRSP database. Panel A includes sample summary statistics for absolute percentage changes in the earnings change variables. Panel B reports statistics for all the cases in which, due to re-standardization, the sign of the earnings changes flips, from positive to negative or vice versa, across point-in-time dates. Column (1) reports the percentage of all the observations exhibiting a change in earnings changes that are also characterized by sign switches. All variables are winsorized at the 1st and 99th percentiles of their quarterly distribution.

Table 9 – ERC analyses

		Dependent Variable: *CAR [-1,1]*; Independent Variable: *Δ IBQ*													
		ERC							*t*-stat						
Sample formation	**#PIT dates**	**Mean**	**SD**	**Min**	**P25**	**P50**	**P75**	**Max**	**Mean**	**SD**	**Min**	**P25**	**P50**	**P75**	**Max**
		(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**	**(11)**	**(12)**	**(13)**	**(14)**
1995	112	9.60	0.23	8.19	9.58	9.66	9.75	9.75	11.35	0.63	6.78	11.39	11.47	11.50	11.68
1996	108	10.04	0.11	9.63	9.99	10.06	10.14	10.14	11.61	0.19	10.80	11.57	11.66	11.74	11.75
1997	104	10.69	0.07	10.42	10.65	10.71	10.77	10.78	12.98	0.24	11.53	12.81	13.01	13.23	13.25
1998	100	11.50	0.07	11.31	11.44	11.51	11.57	11.57	14.76	0.25	14.20	14.61	14.86	15.02	15.10
1999	96	12.94	0.06	12.82	12.88	12.96	13.01	13.02	12.93	0.22	12.27	12.81	13.02	13.12	13.20
2000	92	13.22	0.06	13.09	13.15	13.23	13.28	13.29	12.96	0.17	12.45	12.79	12.96	13.15	13.19
2001	88	13.73	0.10	13.49	13.70	13.78	13.81	13.82	15.86	0.33	15.11	15.59	15.83	16.21	16.24
2002	84	11.67	0.22	11.45	11.58	11.61	11.63	12.30	13.92	0.38	13.44	13.64	13.92	13.93	15.09
2003	80	10.75	0.49	10.53	10.57	10.58	10.60	12.27	12.91	1.25	12.29	12.37	12.57	12.60	16.80
2004	76	9.57	0.42	9.41	9.44	9.46	9.46	11.65	11.31	0.50	11.08	11.13	11.24	11.25	14.70
2005	72	9.67	0.03	9.61	9.66	9.68	9.68	9.87	11.81	0.23	9.92	11.77	11.89	11.89	11.90
2006	68	10.46	0.01	10.43	10.45	10.47	10.47	10.48	11.64	0.06	11.45	11.61	11.68	11.69	11.69
2007	64	11.49	0.02	11.46	11.48	11.49	11.50	11.55	13.03	0.10	12.66	12.97	13.09	13.10	13.10
2008	60	12.42	0.02	12.38	12.41	12.43	12.43	12.45	13.12	0.07	12.98	13.04	13.16	13.17	13.18
2009	56	13.15	0.01	13.13	13.14	13.16	13.16	13.19	13.09	0.08	12.84	13.08	13.14	13.14	13.20
2010	52	9.78	0.03	9.71	9.77	9.80	9.80	9.82	12.09	0.12	11.81	12.06	12.15	12.17	12.18
2011	48	9.95	0.03	9.87	9.95	9.96	9.96	9.97	13.00	0.12	12.63	13.04	13.05	13.06	13.06
2012	44	10.60	0.01	10.58	10.59	10.60	10.60	10.63	12.08	0.10	11.77	12.10	12.11	12.13	12.16
2013	40	10.41	0.02	10.37	10.39	10.42	10.43	10.44	12.18	0.08	11.89	12.17	12.18	12.21	12.28
2014	36	10.46	0.02	10.41	10.44	10.46	10.47	10.49	13.21	0.07	12.86	13.22	13.23	13.24	13.26
2015	32	10.64	0.03	10.59	10.62	10.65	10.66	10.66	13.88	0.05	13.73	13.89	13.90	13.91	13.93
2016	28	10.70	0.02	10.65	10.70	10.71	10.71	10.72	14.49	0.02	14.45	14.47	14.49	14.50	14.54
2017	24	9.99	0.01	9.96	9.99	9.99	10.00	10.01	15.40	0.03	15.31	15.38	15.40	15.41	15.45
2018	20	10.23	0.01	10.22	10.22	10.22	10.23	10.27	17.54	0.04	17.47	17.49	17.55	17.57	17.60
2019	16	10.83	0.02	10.81	10.82	10.82	10.83	10.87	17.97	0.05	17.82	17.97	17.99	17.99	18.03

Table 9 presents ERC analyses based on data sourced at different points in time. Each calendar year, from 1995 to 2019, a sample of quarterly observations starting on June 30th, 1986, is formed. Each yearly sample is reassessed four times per year (i.e., on March 31st, June 30th, September 30th, December 31st), until 2023, using data points that are valid at each future date. The last year in which the initial sample is formed is 2019, to ensure that our analyses are based on a reasonable number of observations. Observations classified by Compustat as amendments to filings (i.e., SRCQ = 8) are excluded from this analysis. For each year in which the sample is formed, and subsequent reassessments, short-window (i.e., 3-day announcement period) abnormal stock returns are regressed on earnings changes computed based on a seasonal random walk model and using earnings before extraordinary items. Earnings are scaled by beginning-of-quarter market capitalization. *Sample formation* indicates the reference year in which the sample (starting in 1986) is formed. *#PIT dates* indicate the number of future dates on which the sample formed in the sample formation year is reassessed. For example, the sample formed in 1995 is reassessed at 112 future point-in-time dates (i.e., four per year, starting on March 30th, 1996, and until December 31st, 2023). Columns (1) – (7) include distributional statistics for the earning response coefficient (ERC) of the regressions that are run, for a fixed same sample formed in the initial formation year, at different future dates. Columns (8) – (14) include distributional statistics for the *t*-statistics of the previously described regressions. To calculate *t*-statistics, standard errors are clustered by firm and quarter. All variables utilized to run the ERC regressions are winsorized at the 1st and 99th percentiles of their quarterly distribution.

Table 10 – "Hedge portfolio" analysis based on earnings changes and short-window announcement returns

			Annualized %Stock Returns **"High-minus-Low" Trading Strategy Across Future PIT Dates**									
			Partitioning Variable: *Quintiles*					**Partitioning Variable: *Deciles***				
Sample formation	**#Obs sample**	**#PIT dates**	**SD (ppt) (1)**	**Max-Min (ppt) (2)**	***p*-value Max-Min (3)**	**Last-First (ppt) (4)**	**Random (ppt) (5)**	**SD (ppt) (6)**	**Max-Min (ppt) (7)**	***p*-value Max-Min (8)**	**Last-First (ppt) (9)**	**Random (ppt) (10)**
6/30/1995	72,993	28	6.13	24.56	0.00	24.56	24.56	7.31	26.91	0.00	24.92	19.90
6/30/1996	91,938	27	2.62	11.69	0.00	11.34	6.33	3.73	20.53	0.00	19.19	7.17
6/30/1997	121,162	26	1.59	6.60	0.00	4.52	6.60	1.67	7.04	0.00	5.63	4.70
6/30/1998	144,639	25	1.37	3.99	0.00	3.31	2.99	1.28	4.62	0.00	1.73	1.73
6/30/1999	154,604	24	1.34	4.10	0.00	1.51	3.36	1.70	4.97	0.00	4.13	4.13
6/30/2000	161,930	23	0.87	2.41	0.00	0.21	0.21	0.98	3.82	0.00	0.02	0.02
6/30/2001	169,603	22	0.89	2.79	0.00	0.11	0.11	1.40	6.13	0.00	0.20	0.06
6/30/2002	180,637	21	2.51	9.53	0.00	1.32	1.32	4.23	15.94	0.00	1.24	1.24
6/30/2003	191,412	20	3.12	11.69	0.00	2.82	2.82	4.25	15.81	0.00	3.77	3.77
6/30/2004	162,466	19	1.30	3.77	0.00	2.35	2.83	1.76	6.14	0.00	5.37	4.37
6/30/2005	176,762	18	4.43	13.81	0.00	13.34	12.94	4.95	15.29	0.00	14.90	14.90
6/30/2006	208,751	17	0.75	2.49	0.00	0.63	1.41	1.19	3.50	0.00	-0.47	-0.47
6/30/2007	210,903	16	0.54	1.73	0.00	-0.19	1.24	0.80	2.09	0.00	-0.21	0.18
6/30/2008	211,516	15	0.64	2.44	0.00	-1.83	-0.75	1.08	4.21	0.00	-2.07	-0.52
6/30/2009	216,161	14	0.56	1.71	0.00	-0.34	1.31	1.00	3.62	0.00	-0.15	1.25
6/30/2010	221,622	13	0.30	1.00	0.00	-0.19	-0.19	0.85	2.48	0.00	0.22	0.22
6/30/2011	224,527	12	0.27	0.99	0.00	0.31	0.31	0.56	1.72	0.00	1.22	0.69
6/30/2012	228,872	11	0.40	1.26	0.00	-1.00	-1.00	0.40	1.44	0.00	-1.18	-0.45
6/30/2013	232,501	10	0.77	2.09	0.00	-1.29	-1.93	0.58	1.72	0.00	-0.74	-1.56
6/30/2014	216,241	9	0.46	1.84	0.00	-0.96	0.56	0.84	3.24	0.00	-2.23	-0.90
6/30/2015	223,341	8	0.68	1.73	0.00	1.52	1.17	0.40	1.15	0.00	0.70	0.62
6/30/2016	229,788	7	0.27	0.76	0.00	0.22	0.66	0.33	1.12	0.00	0.34	0.09
6/30/2017	234,165	6	0.19	0.49	0.00	-0.47	-0.33	0.33	1.02	0.00	0.07	0.34
6/30/2018	238,909	5	0.39	1.08	0.00	-1.02	-1.06	0.76	2.36	0.00	-1.52	-2.31
6/30/2019	244,016	4	0.41	0.98	0.00	-0.97	-0.88	0.96	2.77	0.00	-2.70	-1.67

Table 10 presents a portfolio analysis based on Compustat quarterly samples formed at different points in time, each reassessed multiple times at future dates. Assume that a researcher downloads Compustat quarterly data on June 30 each year from 1995 to 2019 (the years in which the "sample" is formed). In 1995, the researcher downloads data spanning 10 years (from 1986 to 1995, inclusive); in 1996, the data spans 11 years (from 1986 to 1996, inclusive), and so forth. For each year in which the "sample" is formed (i.e., 1995-2019), the universe of Compustat quarterly observations is reassessed at future "fixed dates": on June 30 each year until end of 2023. In other words, for each "sample", the same firm-quarter observations are reassessed every year until 2023. For each "sample" year and associated future point-in-time dates, the *rank* (alternatively based on quintiles, in Columns (1)-(5), and deciles, in Columns (6)-(10)) of quarterly earnings changes (based on IBQ and computed assuming a seasonal random walk model and scaled by lagged market value of equity) is assessed at the firm-quarter level. Specifically, this table reports differences in the annualized hedge portfolio returns of a trading strategy based on a long position in the securities sorted in the "high" portfolio (i.e., quintile 5 or decile 10) and a short position in the securities sorted in the "low" portfolio (i.e., quintile 1 or decile 1) in the 3-day period surrounding earnings announcements.

Columns (1) and (6) report the standard deviation, expressed in percentage points (i.e., ppt), of the annualized hedge portfolio returns for each "sample" across multiple future point-in-time dates. Columns (2) and (7) report the difference, expressed in percentage points (i.e., ppt), in return between the maximum and minimum hedge portfolio return across future point-in-time dates. Columns (3) and (8) shows the statistical significance of the former return. Columns (4) and (9) report the difference, expressed in percentage points (i.e., ppt), in return between the last and first hedge portfolio return across future point-in-time dates. Columns (5) and (10) report the difference, expressed in percentage points (i.e., ppt), in return between the last and a random hedge portfolio return across future point-in-time dates.

Observations classified by Compustat as amendments to filings (i.e., SRCQ = 8) are excluded from this analysis. The analyses are performed keeping firm, quarter, and SRCQ fixed. All variables are winsorized at the 1st and 99th percentiles of their quarterly distribution.

Table 11 – “Hedge portfolio” accruals-based analysis

PIT	#Obs Sample	#PIT Dates	SD (ppt) (1)	Max-Min (ppt) (2)	Max-Min/ Mean (%) (3)	Last-First (ppt) (4)	Rand (ppt) (5)	SD (ppt) (6)	Max-Min (ppt) (7)	Max-Min/ Mean (%) (8)	Last-First (ppt) (9)	Rand (ppt) (10)
			Hedge Portfolio Future 12-month Abnormal Returns									
			Accruals Calculation: Balance Sheet Method					*Accruals Calculation: Statement of Cash Flows Method*				
6/30/1995	25,233	28	0.25	1.09	9.82	-0.52	0.52	0.20	0.70	7.26	-0.10	0.15
6/30/1996	29,111	27	0.22	0.79	7.58	-0.77	0.77	0.36	1.14	12.66	-1.04	1.00
6/30/1997	33,325	26	0.27	1.23	10.41	0.83	-0.83	0.13	0.66	7.25	0.35	-0.33
6/30/1998	36,635	25	0.22	1.11	8.55	0.53	-0.53	0.37	1.32	12.21	1.26	-1.26
6/30/1999	37,620	24	0.80	3.01	17.94	2.94	-2.90	0.89	3.36	24.04	3.24	-3.24
6/30/2000	38,243	23	0.71	2.60	16.78	-2.36	2.36	1.00	3.96	33.30	-3.94	3.94
6/30/2001	38,447	22	0.36	1.17	7.75	-0.99	1.09	0.59	1.92	18.86	-1.76	1.71
6/30/2002	39,060	21	0.38	1.41	10.46	-1.33	1.29	0.27	1.07	11.85	-0.99	0.86
6/30/2003	39,925	20	0.11	0.55	3.93	-0.19	0.41	0.09	0.45	4.11	0.17	-0.38
6/30/2004	40,347	19	0.06	0.33	2.35	-0.11	0.25	0.10	0.43	3.97	-0.43	0.28
6/30/2005	40,853	18	0.12	0.58	4.51	-0.38	0.00	0.16	0.79	8.08	-0.46	0.46
6/30/2006	40,877	17	0.19	0.78	6.21	-0.59	0.56	0.26	0.88	9.93	-0.73	0.63
6/30/2007	40,840	16	0.28	1.08	9.69	-0.85	0.22	0.35	1.28	17.58	-1.13	0.21
6/30/2008	40,437	15	0.27	1.14	11.32	-0.72	0.72	0.07	0.36	5.83	-0.02	-0.13
6/30/2009	40,457	14	0.26	0.96	9.87	0.94	-0.94	0.35	1.35	17.35	1.29	-1.29
6/30/2010	40,810	13	0.16	0.61	6.10	0.40	-0.40	0.12	0.54	6.61	0.33	-0.33
6/30/2011	40,684	12	0.20	0.83	8.96	-0.80	0.79	0.31	1.10	14.49	-0.99	0.99
6/30/2012	41,014	11	0.16	0.65	7.13	-0.56	0.56	0.21	0.90	13.11	-0.73	0.73
6/30/2013	40,965	10	0.21	0.77	8.91	-0.68	0.68	0.11	0.39	5.77	-0.31	0.31
6/30/2014	41,303	9	0.27	0.92	12.05	-0.92	0.92	0.28	0.89	14.64	-0.89	0.00
6/30/2015	41,870	8	0.24	0.89	12.68	-0.89	0.79	0.35	1.18	23.64	-1.16	1.16
6/30/2016	41,850	7	0.07	0.25	3.75	-0.18	0.06	0.17	0.54	12.22	-0.46	0.50
6/30/2017	41,884	6	0.16	0.53	8.35	-0.46	0.45	0.20	0.60	13.48	-0.60	0.45
6/30/2018	42,067	5	0.23	0.61	10.08	-0.61	0.51	0.11	0.32	7.57	-0.31	0.31
6/30/2019	42,381	4	0.28	0.90	18.31	-0.51	0.19	0.10	0.40	11.33	-0.30	0.30

Table 10 presents an accruals-based portfolio analysis based on Compustat annual samples formed at different points in time, each reassessed multiple times at future dates. Assume that a researcher downloads Compustat annual data on June 30 each year from 1995 to 2019 (the years in which the “sample” is formed). In 1995, the researcher downloads data spanning 10 years (from 1986 to 1995, inclusive); in 1996, the data spans 11 years (from 1986 to 1996, inclusive), and so forth. For each year in which the “sample” is formed (i.e., 1995-2019), the universe of Compustat annual observations is reassessed at future “fixed dates”: on June 30 each year until end of 2023. In other words, for each “sample”, the same firm-quarter observations are reassessed every year until 2023. For each “sample” year and associated future point-in-time dates, the rank (based on deciles) of annual accruals (alternatively calculated using a balance sheet and statement of cash flows methods) is assessed at the firm-year level. Specifically, this table reports differences in future 12-month abnormal annual hedge portfolio returns for a trading strategy based on a long position in the securities sorted in the “low” portfolio (i.e., decile 1) and a short position in the securities sorted in the “high” portfolio (i.e., decile 10) of annual accruals.

Columns (1) and (6) report the standard deviation, expressed in percentage points (i.e., ppt), of future 12-month abnormal return across multiple future point-in-time dates. Columns (2) and (7) report the difference, expressed in percentage points (i.e., ppt), in return between the maximum and minimum hedge portfolio return across future point-in-time dates. Columns (3) and (8) report the percentage weight of the difference in returns from Columns (2) and (7) relative to the average portfolio return across point-in-time dates. Columns (4) and (9) report the difference, expressed in percentage points (i.e., ppt), in return between the last and first hedge portfolio return across future point-in-time dates. Columns (5) and (10) report the difference, expressed in percentage points (i.e., ppt), in return between the last and a random hedge portfolio return across future point-in-time dates.

The returns used for this analysis are future 12-month buy-and-hold abnormal returns, computed in excess of a size-matched value-weighted portfolio return based on beginning-of-the-year market capitalization. The cumulation period starts 4 months after the fiscal year ends. The hedge portfolio return is computed as the abnormal return on decile-1 portfolio minus return on decile-10 portfolio. The deciles are formed yearly based on the value of accruals scaled by average total assets. Delisting returns are excluded from the primary analyses. However, results are qualitatively similar when including delisting returns. When a delisting can be classified as “performance-based,” a -30% return in imputed. Observations classified by Compustat as amendments to filings (i.e., SRC = 8) are excluded from this analysis. Financial and real estate companies (6000<=SIC<=6999) are excluded from this analysis. All variables are winsorized at the 1st and 99th percentiles of their quarterly distribution.

Online Appendix

Table OA 1 – Accruals-based “hedge portfolio” returns for different initial samples

Abnormal buy-and-hold future 12-month returns for accruals-based decile portfolios
[Accruals Computed Using the Balance Sheet Method]

	1995	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**
Accruals Portfolio															
1	0.039	0.041	0.049	0.022	0.030	0.067	0.033	0.042	0.039	0.062	0.042	0.042	0.057	0.029	0.052
2	0.037	0.027	0.021	0.023	0.037	0.044	0.040	0.041	0.038	0.051	0.042	0.044	0.043	0.040	0.035
3	0.018	0.018	0.015	0.010	0.017	0.024	0.019	0.022	0.021	0.030	0.030	0.027	0.030	0.027	0.033
4	0.029	0.021	0.014	0.010	0.006	0.004	0.023	0.022	0.018	0.024	0.026	0.030	0.026	0.026	0.020
5	0.015	0.013	0.006	-0.001	-0.006	-0.018	0.007	0.008	0.007	0.016	0.022	0.026	0.027	0.026	0.025
6	0.005	0.003	0.003	0.005	-0.005	-0.007	0.017	0.017	0.008	0.003	0.008	0.006	0.008	0.008	0.007
7	-0.004	-0.008	-0.012	-0.016	-0.024	-0.029	-0.012	-0.004	-0.006	-0.003	0.000	-0.001	-0.002	0.005	0.001
8	-0.025	-0.025	-0.031	-0.032	-0.033	-0.029	-0.020	-0.015	-0.020	-0.015	-0.008	-0.006	-0.003	0.004	-0.004
9	-0.036	-0.034	-0.043	-0.045	-0.052	-0.047	-0.043	-0.041	-0.040	-0.025	-0.021	-0.017	-0.009	-0.004	-0.007
10	-0.048	-0.048	-0.061	-0.066	-0.068	-0.063	-0.067	-0.062	-0.062	-0.044	-0.044	-0.039	-0.035	-0.026	-0.025
1-10	**0.087**	**0.089**	**0.111**	**0.087**	**0.098**	**0.130**	**0.100**	**0.104**	**0.101**	**0.106**	**0.085**	**0.081**	**0.092**	**0.055**	**0.077**
p-value	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Abnormal buy-and-hold future 12-month returns for accruals-based decile portfolios
[Accruals Computed Using the Balance Sheet Method]

	2010	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**
Accruals Portfolio														
1	0.047	0.053	0.042	0.035	0.033	0.023	0.029	0.023	0.032	0.022	0.011	0.020	0.021	0.024
2	0.045	0.051	0.042	0.036	0.034	0.023	0.018	0.011	0.015	0.018	0.016	0.025	0.020	0.010
3	0.033	0.036	0.038	0.033	0.031	0.030	0.020	0.025	0.025	0.012	0.012	0.015	0.015	0.014
4	0.028	0.032	0.026	0.024	0.025	0.026	0.024	0.018	0.021	0.022	0.018	0.017	0.017	0.015
5	0.026	0.026	0.026	0.024	0.022	0.018	0.018	0.012	0.013	0.010	0.004	0.009	0.008	0.004
6	0.005	0.005	0.006	0.005	0.001	0.004	0.003	0.002	0.001	0.001	-0.002	-0.006	-0.004	-0.004
7	0.004	0.006	0.002	0.004	0.005	0.006	0.003	0.003	0.006	0.010	0.005	0.005	0.004	0.005
8	0.005	-0.005	-0.004	-0.006	0.002	0.006	0.006	0.004	0.007	0.004	0.003	-0.001	0.002	0.002
9	0.008	-0.004	-0.006	-0.002	-0.001	-0.001	-0.001	-0.013	0.001	0.001	0.002	-0.006	-0.003	-0.001
10	-0.021	-0.019	-0.021	-0.021	-0.022	-0.023	-0.027	-0.026	-0.026	-0.021	-0.025	-0.025	-0.030	-0.031
1-10	**0.068**	**0.072**	**0.063**	**0.056**	**0.055**	**0.046**	**0.056**	**0.049**	**0.058**	**0.043**	**0.036**	**0.045**	**0.051**	**0.055**
p-value	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.04	0.02	0.00	0.00

This table reports the long-window (12-month) “hedge portfolio” returns of an accruals-based trading strategy similar to Sloan (1996), across years.