The Usefulness of EBITDA

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ABSTRACT

Despite investors' claims that they commonly use EBITDA, the amount of EBITDA information available to investors and the extent of its usefulness is largely undocumented. We find that analysts provide EBITDA information for more than 85 percent of firms since 2015, and that these measures are largely on an "adjusted" basis, which excludes items beyond just interest, taxes, depreciation and amortization (ITDA). Relative to a variety of performance measures (net income, operating cash flows, street earnings), portfolios formed on EBITDA are the best at predicting future operating cash flows—especially across firms with differences in capital assets, financing, or tax planning. However, EBITDA portfolios are generally worse at predicting future operating earnings and free cash flows. Thus, EBITDA's usefulness depends on which measure of future performance investors care about. Further, we find that the exclusion of non-ITDA items improves EBITDA's usefulness, which is inconsistent with concerns that additional "adjustments" to EBITDA reduce its quality. Finally, investors do not fixate only on EBITDA but also price EBITDA's exclusions, although they incorporate some of this information with a delay. Overall, our evidence confirms EBITDA's usefulness for investors and also highlights its limitations, providing support for both the proponents and critics of EBITDA.

Keywords: EBITDA, non-GAAP financial measures, analysts, persistence, value relevance, comparability, capital structure

JEL Classification: M41, G32, G24

I. Introduction

Survey evidence finds that "EBITDA" (i.e., earnings before interest, taxes, depreciation, and amortization) is important to capital market participants when analyzing a firm (CFA et al., 2016; Allee et al., 2024). For example, in its 2016 survey, the CFA finds that nearly 70 percent of its members consider EBITDA in their analyses. The prominent use of EBITDA, however, appears at odds with criticism levied against the measure. For example, in his 2015 letter to Berkshire Hathaway shareholders, Warren Buffett writes: "when CEOs or investment bankers tout pre-depreciation figures such as EBITDA as a valuation guide, watch their noses lengthen while they speak." The non-GAAP literature, which has largely focused on non-GAAP EPS, offers little evidence on the usefulness of EBITDA.[1] Studies that do examine EBITDA typically focus on either researcher-defined EBITDA values or on indicator variables for the presence of EBITDA disclosures, and thus do not examine the actual EBITDA metrics used in capital markets. In this paper, we provide a clearer understanding of EBITDA and its usefulness by examining the following research questions: (1) How prevalent are EBITDA metrics in capital markets? (2) What are the properties of EBITDA metrics? and (3) How can EBITDA metrics inform equity investors?

Critics of EBITDA raise at least two concerns about EBITDA's usefulness for investors. First, by definition, EBITDA excludes interest, taxes, depreciation, and amortization (hereafter, ITDA components) from earnings and researchers generally view the exclusion of recurring earnings components (such as ITDA) as being potentially misleading for investors (Doyle et al., 2003; Dechow et al., 2024). For example, excluding depreciation and amortization ignores expenses related to capital investments required to operate the firm. Second, most EBITDA metrics are calculated on an adjusted basis (i.e., adjusted EBITDA) and exclude items beyond ITDA

[1] Evidence related to non-GAAP EPS does not necessarily generalize to EBITDA because non-GAAP EPS rarely excludes interest, taxes, and depreciation, which are definitionally excluded from EBITDA.

(hereafter, non-ITDA exclusions). Because non-ITDA exclusions can vary across firms and analysts (e.g., some calculations exclude stock-based compensation, others do not), critics question the validity of these additional exclusions and whether their variability hinders comparisons of performance across firms. These different EBITDA calculations have piqued the SEC's interest and are among its most frequently scrutinized measures (Cohn 2016). EBITDA has also caught the FASB's attention as they have recently sought feedback on whether EBITDA and other alternative performance measures should be standardized (FASB 2024).

Proponents, however, argue that EBITDA helps to measure how much cash a firm generates from its core operations because it strips out non-cash expenses related to major capital investments and certain non-operating expenses.[2] This perspective motivates EBITDA's frequent use in valuation, IPOs, and debt covenants (Li, 2016; Dyreng et al., 2017; Brown et al., 2022). Further, EBITDA can be particularly useful when comparing performance across firms in the same industry because it acts as a normalized measure of cash-generating ability that abstracts away from differences in capital, tax, and debt structures (hereafter, "capital structure") (Schelling, 2019). For example, consider two operationally equivalent firms with different historical methods of growth: one grew by acquiring another business and the other grew organically. Under purchase accounting, in which the acquiror recognizes purchased intangible assets and measures all acquired assets at fair value, the acquiring firm would recognize more depreciation and amortization going forward than the organically growing firm. Thus, GAAP earnings would differ for the two firms even though they are operationally equivalent. EBITDA, however, is not affected by these capital structure differences and could be more useful in comparing the two firms' performance.

[2] For example, Investopedia states the following: "By adding interest, taxes, depreciation, and amortization back to net income, EBITDA can be used to track and compare the underlying profitability of companies regardless of their depreciation assumptions or financing choices….Excluding all of these items keeps the focus on the cash profits generated by the company's business." https://www.investopedia.com/terms/e/ebitda.asp

To analyze our research questions, we gather EBITDA information from analysts and firms for 2004 through 2023. We find that analysts provide quarterly EBITDA measures for approximately 76 percent of firm-quarter observations in our sample (85 percent since 2015). Firms disclose EBITDA for approximately 37 percent of firm-quarters and these disclosures are increasing over time (56 percent in 2023). These statistics indicate that EBITDA, unlike other non-GAAP measures, is primarily provided by analysts rather than explicitly from the firm. Consequently, research focusing solely on firms' EBITDA disclosures overlooks a large amount of EBITDA information available to capital markets. Further, despite EBITDA's simple definition, we find that over 90 percent of EBITDA measures since 2010 exclude items beyond the ITDA components (i.e., they exclude non-ITDA items) and the magnitude of non-ITDA exclusions is increasing over time. Thus, analyses that only consider ITDA exclusions via researcher-calculated EBITDA measures ignore the adjusted EBITDA metrics actually used in capital markets. Given the prevalence of analysts' EBITDA measures, we focus the remainder of our analyses on these measures and refer to them as "EBITDA" hereafter.

Next, we examine the benefits and weaknesses of EBITDA as prescribed by the proponents and critics of the measure. To assess potential benefits, we first examine how well portfolios formed on EBITDA identify differences in future operating cash flows across firms in the same industry, as compared to portfolios formed on GAAP net income. We also examine whether this benefit is stronger when there is more variation in capital structure across firms within the same industry. If net income distorts operating performance across firms because of differences in capital structure, then EBITDA portfolios should identify larger differences in future operating cash flows among firms with greater capital structure variation. Consistent with proponents' claims, we find that EBITDA portfolios are superior to net income portfolios when predicting

future operating cash flows.[3] Further, the benefits of forming portfolios based on EBITDA are higher in industries with greater variability in their capital structure. Overall, our evidence provides support for proponents' claims about EBITDA's usefulness for assessing future operating cash flows and for mitigating differences in capital structure when comparing performance.

Next, we investigate whether the benefits of EBITDA extend to predicting other measures of operating performance. Specifically, we examine future operating earnings and free cash flows, both of which include expenses related to capital investments. Unlike our previous results, we find that portfolios based on EBITDA are inferior to net income portfolios when predicting future operating earnings and free cash flows. Further, the inferiority of EBITDA is exacerbated in industries with greater capital structure variability. Thus, the benefits associated with using EBITDA are limited to assessing future operating cash flows and do not extend more generally to other measures of operating performance. In sum, whether EBITDA is useful or harmful to investors depends on the specific measure of future performance that investors care about. Thus, our evidence supports both proponents' and critics' claims about EBITDA's usefulness.

Critics' concerns about EBITDA center on (1) EBITDA excluding recurring expenses, which largely relate to ITDA exclusions, and (2) variation in EBITDA's calculation, which is largely due to non-ITDA exclusions. To understand the validity of each concern, we analyze the separate effects of ITDA and non-ITDA exclusions on EBITDA's usefulness. First, we modify analysts' EBITDA so that it excludes only ITDA items and compare it to net income. Consistent with our earlier analyses, excluding ITDA components increases the ability to predict future

[3] These results are not merely mechanical due to net income including items (depreciation and amortization) excluded from operating cash flows and EBITDA. When comparing EBITDA directly to current operating cash flows, where EBITDA includes items that operating cash flows does not, we continue to find that EBITDA is superior for predicting future operating cash flows. Further, we also compare EBITDA to analysts' street earnings, another common measure for operating performance, and continue to find that EBITDA is superior in predicting operating cash flows.

operating cash flows but decreases the ability to predict future operating earnings and free cash flows. This evidence partially supports critics' concerns about EBITDA's exclusion of recurring items since these exclusions can hinder predictions of certain operating performance measures. Second, we modify analysts' EBITDA so that it excludes only non-ITDA items (i.e., it does not exclude ITDA items) and compare it to net income. We find that excluding non-ITDA items enhances EBITDA's ability to predict both future operating cash flows and free cash flows without hindering its prediction of future operating earnings. This evidence does not support critics' concerns about variation in EBITDA's calculation. Although non-ITDA exclusions are unstandardized and vary across firms, they improve, and do not hinder, EBITDA's usefulness in predicting future operating performance. Further analyses suggest that these non-ITDA exclusions are similar to the items analysts exclude from non-GAAP EPS and are comprised of special items, discontinued operations, and non-cash operating items (e.g., stock-based compensation expense).

Given that EBITDA's usefulness depends on how future operating performance is measured, fixation on EBITDA could be detrimental to investors depending on how they weigh different performance measures when assessing value. To analyze whether investors fixate on EBITDA, we examine the stock market response and subsequent drift related to EBITDA and exclusions news. We find that investors respond to both earnings components at the earnings announcement date, but the response to EBITDA is significantly stronger than the response to exclusions. This finding is inconsistent with investors ignoring exclusions and only fixating on EBITDA. Instead, investors treat both EBITDA and exclusions as inputs for valuation and weigh them differently. After the announcement date, we find significant drift related to both EBITDA and exclusions, which suggests that investors do not fully understand the implications of either

component at the earnings announcement date. Thus, while investors do not ignore items excluded from EBITDA, they also require time to fully understand their implications for valuation.

Due to EBITDA's usefulness and investors' interest in EBITDA, it is unclear why many firms choose not to disclose EBITDA. In determinants analyses, we find that firms are more likely to disclose EBITDA when demand for the information is higher (e.g., the industry has more acquisitions or greater capital structure variation), when proprietary costs are lower (e.g., the firm has lower R&D spending), and when the firm achieves benchmarks based on EBITDA that they miss on a GAAP basis. We also examine whether firms' EBITDA disclosures are related to the usefulness of EBITDA and find that EBITDA better predicts future operating cash flows when firms disclose it. Together, these analyses suggest that firms selectively disclose EBITDA when it is less costly to do so and when EBITDA is particularly useful for investors.

Our study makes several contributions to the literature on non-GAAP financial measures. First, we investigate how EBITDA can inform equity-market participants. Consistent with assertions made by its proponents, EBITDA is useful in assessing future operating cash flows, especially among firms with variable capital structures, suggesting EBITDA facilitates comparisons across firms. Additionally, despite concerns about the variability of non-ITDA exclusions across firms, we find that these exclusions enhance EBITDA's usefulness. However, consistent with concerns raised by critics of EBITDA, ITDA exclusions make EBITDA inferior for predicting future operating earnings and free cash flows. Thus, while EBITDA is useful for predicting a specific dimension of performance (i.e., operating cash flows), it should not be considered as being universally superior for predicting other measures of operating performance.

Second, we provide new evidence on EBITDA as a non-GAAP financial measure. Unlike other non-GAAP measures examined in prior research (e.g., non-GAAP revenue, non-GAAP

earnings), EBITDA is available for nearly all firms with analyst coverage, is primarily provided by analysts rather than by firms, and is nearly always on an adjusted basis. Prior research on EBITDA often focuses on the determinants of its disclosure, researcher-constructed EBITDA metrics, or how EBITDA disclosures affect managers' choices in operating the firm (e.g., Bouwens et al., 2019; Rozenbaum, 2019). In contrast, we examine and provide evidence on the actual EBITDA measures found in capital markets, which should be of interest to researchers. For example, researchers have long been interested in the role of accruals in predicting future cash flows (e.g., Dechow, 1994). Recently, Ball and Nikolaev (2022) use a researcher-defined earnings measure to show that accruals-based earnings better predict future operating cash flows than the operating cash flow measure itself. We extend this inference by using the actual EBITDA metric found in capital markets, which represents an accrual-based earnings measure used by analysts and investors. EBITDA's widespread use (CFA et al., 2016; Allee et al., 2024) suggests that equity market participants understand the benefits of accrual measures for predicting future cash flows.

Third, our evidence informs standard setters. The FASB recently issued an Invitation to Comment related to "financial performance indicators" (FASB 2024), specifically mentioning EBITDA, to better understand the decision-usefulness of these measures and what role standard setters should play in overseeing them. Our evidence of EBITDA's prevalence in capital markets, source (i.e., analysts), variable calculation (due to non-ITDA exclusions), and usefulness serves as an important input into questions about the need for mandatory disclosure or standardization of EBITDA. Potential questions our findings raise for standard setters include: (1) What benefits would accrue from mandating firms to disclose EBITDA given that EBITDA is currently provided by analysts for nearly all firms and that firms disclose EBITDA when it is particularly useful? (2)

Would developing a standardized EBITDA, with a specific set of non-ITDA exclusions, yield an EBITDA measure that is more useful than what is already in capital markets (Gee and Park, 2024)?

2. Background

2.1 Non-GAAP Research

Non-GAAP reporting relates to measures of firm performance that depart from GAAP-based measures. Within non-GAAP measures, non-GAAP EPS (often referred to as non-GAAP earnings) has received the most attention in academic research. In their seminal work, Bradshaw and Sloan (2002) find that non-GAAP earnings typically exceed GAAP-based earnings and that investors respond more strongly to non-GAAP earnings. Although managers and analysts often exclude transitory items when calculating non-GAAP earnings, prior research finds that they can exclude recurring earnings components as well (e.g., Doyle et al., 2003; Black et al., 2021). The literature largely views the removal of recurring components from non-GAAP earnings as representing misleading or "low quality" exclusions (Doyle et al., 2003; Kolev et al., 2008). While proponents of non-GAAP earnings suggest such measures can benefit investors by providing a clearer picture of firms' core operations, skeptics raise concerns that non-GAAP earnings depict firm performance as being more favorable than reality.

Prior research explores why managers and analysts report non-GAAP earnings and whether their intent is to inform or mislead investors. This research has produced evidence consistent with both motivations. Specifically, prior research finds that non-GAAP earnings can be informative because it (1) often excludes transitory items, even when such adjustments would reduce non-GAAP earnings, (2) represents a more comparable earnings metric when benchmarked against GAAP-based earnings, and (3) captures the more risk-relevant components of GAAP earnings (Bhattacharya et al., 2003; Gu and Chen, 2004; Curtis et al., 2014; Black et al., 2021; Heflin et al.,

2022). In contrast, several studies raise concerns about non-GAAP reporting being misleading for investors. First, prior research questions why managers and analysts would exclude recurring earnings components like stock compensation and amortization if the intent of non-GAAP earnings is to capture core operations (e.g., Doyle et al., 2003, 2013). Research also finds that investors misprice earnings components that map strongly into future performance (Gee et al., 2024) and that non-GAAP reporting can increase firms' crash risk (Hsu et al., 2022).

Academics have largely focused their research on managers' and analysts' non-GAAP EPS metrics even though a broad set of non-GAAP metrics exist in capital markets. In their review of non-GAAP reporting, Black et al., (2018) call for research on a larger set of non-GAAP measures "…to examine whether results related to non-GAAP earnings apply to other…metrics…and whether these other measures incrementally inform financial statement users beyond traditional non-GAAP earnings metrics." We follow this call and extend the domain of non-GAAP reporting research to specifically examine the usefulness of EBITDA.[4]

EBITDA falls into the broader category of non-GAAP earnings, however, its construction differs from that of non-GAAP EPS. For example, EBITDA definitionally adjusts for interest, taxes, depreciation, and amortization. In contrast, non-GAAP EPS does not have a standard set of adjustments and rarely excludes ITDA items (with the exception of amortization for some firms). Appendix A provides several examples of EBITDA calculations and highlights similarities and differences between EBITDA and non-GAAP EPS. Aside from the ITDA items, the remaining (non-ITDA) adjustments are similar across EBITDA and non-GAAP EPS but not identical. Furthermore, some firms choose to report one of the metrics but not the other. Beyond their calculations, the SEC also views EBITDA and non-GAAP earnings as serving different purposes

[4] Outside of non-GAAP EPS, a few studies have examined non-GAAP revenue (Campbell et al., 2022), free cash flow (Adame et al., 2023), and funds from operations (Baik et al., 2008; Gee and Park, 2024).

and applies different disclosure requirements to the measures. For example, the SEC allows non-GAAP earnings to be presented on a per share basis, however, it views EBITDA as a liquidity measure and forbids firms from disclosing liquidity measures like EBITDA on a per share basis.[5]

2.2 EBITDA

Investors commonly use EBITDA as a measure of firm performance. For example, a CFA Institute survey found that approximately 70 percent of respondents use some form of EBITDA in their analysis, compared to 52% who use non-GAAP earnings (CFA 2016). Furthermore, Allee et al. (2024) report that investment professionals find EBITDA to be a very useful summary performance measure. Other research finds that EBITDA is commonly used in rewarding executive compensation (Bennett et al., 2017; Bloomfield et al., 2021) and debt contracting (Li, 2016; Badawi et al., 2022), suggesting EBITDA's usefulness extends beyond equity valuation.[6]

Existing research on EBITDA often examines the valuation implications of EBITDA. In particular, studies compare investment performance across trading strategies using EBITDA or EBITDA-based multiples relative to other performance-based multiples (Liu et al., 2002, 2007; Loughran and Wellman, 2011; Nissim, 2017). For example, Liu et al., (2002) examine the ability of different performance-based multiples to explain future stock returns. They show that historical EBITDA multiples outperform operating cash flow and revenue multiples, presumably because it better matches relevant expenses with revenues using accrual-based accounting. However, EBITDA multiples are, in-turn, outperformed by forward-looking earnings multiples such as analysts' street EPS forecasts. In related work, Francis et al., (2003) investigate the extent to which

[5] See https://www.sec.gov/corpfin/non-gaap-financial-measures.htm, Question 103.02.

[6] EBITDA is also commonly used to identify potential acquisition targets. EBITDA is useful in this setting because the target's depreciable and amortizable values will change because of the acquisition (e.g., marking assets to fair value), and the interest and tax structure of the target will differ under the acquiror. In these settings, the acquiror would exclude ITDA items and then apply new estimates for financing, tax planning, and capital structure values based on their expected values post-acquisition.

different performance metrics explain contemporaneous returns. They show earnings dominates EBITDA in its ability to explain returns, even for industries where it seems EBITDA is a preferred performance metric (based on S&P industry surveys).

Studies examining the usefulness of EBITDA as a valuation tool rely on standardized EBITDA measures, such as those reported in Compustat, and do not consider whether firms or analysts actually reported an EBITDA measure.[7] In addition, an important feature of the EBITDA measures that firms and analysts disseminate (and one that draws substantial criticism) is that reported EBITDA frequently excludes additional items beyond the standard ITDA earnings components. Thus, while standardized EBITDA measures are empirically convenient, they may not relate to the actual EBITDA measures provided by firms or analysts, or those used by investors.

Recent EBITDA research focuses on how frequently firms disclose EBITDA, the types of firms that disclose it, and the consequences of such disclosure. For example, Rozenbaum (2019) finds that the proportion of firms disclosing EBITDA in annual earnings announcements increased from 17 percent in 2003 to 35 percent in 2011. Using EBITDA disclosure as a proxy for management's focus on EBITDA, Rozenbaum (2019) finds this focus is associated with overinvestment in capital relative to industry peers. Laurion (2020) also finds that EBITDA-reporting firms have larger capital expenditures, consistent with them discounting the items excluded from EBITDA. Finally, Bouwens et al. (2019) find that smaller, less profitable, more capital intensive, and more leveraged S&P 1500 firms are more likely to disclose EBITDA.[8]

[7] For example, Liu et al., (2002) measure EBITDA using Compustat variable *OIBDP*, which is defined as operating income before depreciation and amortization. Thus, in their valuation analysis EBITDA is defined consistently for all firms and in all periods, regardless of whether they actually reported EBITDA or excluded non-ITDA items.

[8] Several other studies examine a broader definition of non-GAAP reporting and identify non-GAAP reporters using a variety of non-GAAP metrics, such as non-GAAP EPS, EBITDA, and FFO (e.g., Marques, 2006; Laurion and Sloan, 2022). Because these studies consider multiple non-GAAP metrics, it is difficult to draw inferences from their results about specific metrics like EBITDA.

3. Sample Selection and Descriptive Evidence

Given the limited research on EBITDA, we first explore two potential data sources of EBITDA: firms and analysts. We require financial data from Compustat to identify firms (using as-first-reported data where available) and we use I/B/E/S as a data source for analysts. We begin our sample in 2004 due to the relatively sparse coverage of non-EPS measures in I/B/E/S prior to this period (Bradshaw et al., 2018). We remove financial firms, firms with missing or zero assets, firms without I/B/E/S EPS coverage, and firms without required data in Compustat to calculate net income and ITDA (i.e., interest, taxes, depreciation, and amortization). This sample selection process, summarized in Table 1, yields an Initial Sample of 207,176 firm-quarter observations which we use as a starting point to describe the frequency of EBITDA reporting. We then restrict this sample further for analyses in which we examine the properties and usefulness of EBITDA, resulting in a main sample of 107,395 firm-quarter observations.[9]

To identify firms reporting EBITDA, we use earnings announcement URLs provided by the authors of Bentley et al. (2018) and textual analysis.[10] To identify analysts' EBITDA reporting, we use the existence of actual EBITDA measures reported in I/B/E/S. Figure 1 reports that 33.2 percent (2.7 + 30.5) of firms and 75.6 percent (45.1 + 30.5) of analysts provide EBITDA over our sample period, where analysts are the sole source of EBITDA for 45.1 percent of observations. That analysts provide EBITDA more frequently than firms, and often when firms do not, is a feature not found in other non-GAAP financial measures.[11] For example, non-GAAP EPS is

[9] We winsorize continuous variables at the 1st and 99th percentile using this main sample.
[10] In particular, we search their earnings announcements for "EBITDA" and allow single character suffixes to this term (e.g., EBITDAR, EBITDAX).
[11] In untabulated analyses, we confirm that in all instances where I/B/E/S reports actual EBITDA values, I/B/E/S also includes analysts' forecasted EBITDA values. Thus, the EBITDA values we examine reflect information used by analysts rather than simply information prepared by data providers.

provided with similar frequencies by both analysts and firms (Bentley et al., 2018) and non-GAAP revenue is provided more frequently by firms than by analysts (Campbell et al., 2022).

Figure 2, Panel A, plots analysts' and firms' EBITDA reporting over time, along with analysts' non-GAAP EPS reporting for comparison. Both analysts' and firms' EBITDA reporting increases over time, although we observe a wide disparity in the reporting rates between analysts and firms throughout the time series. For example, analysts' EBITDA metrics are available for at least 80 percent of firm-quarters beginning in 2011 and have remained fairly stable since that time. In contrast, firms' EBITDA reporting frequency increases monotonically over the sample period and is 55.7 percent in 2023. Analysts also report EBITDA more frequently than they report street EPS on a non-GAAP basis. Thus, analysts evaluate firms on a non-GAAP basis (EBITDA) more frequently than researchers would infer by studying analysts' street EPS alone (e.g., Bentley et al., 2018; Bradshaw et al., 2018; Bratten et al., 2023).

In Figure 2, Panel B, we plot the frequency with which analysts and firms provide EBITDA on an adjusted basis (i.e., excludes non-ITDA items beyond the standard ITDA items).[12] We find that EBITDA is nearly always on an "adjusted" basis; at least 95 percent of EBITDA measures since 2013 are "adjusted" and thus exclude non-ITDA items. To assess the economic significance of these non-ITDA exclusions, we plot in Panel C the mean absolute values of ITDA and non-ITDA exclusions from analysts' EBITDA metrics over time, where we scale these values by sales. Relative to ITDA exclusions, the magnitude of non-ITDA exclusions increases more over the sample period and equals or exceeds the magnitude of ITDA exclusions in recent years. The results

[12] For analysts' EBITDA, we assess whether EBITDA is adjusted by comparing EBITDA from IBES to earnings before interest, taxes, depreciation and amortization calculated using Compustat. For firms' EBITDA, we look for non-GAAP keywords (i.e., "adjust", "exclude", "remove", "without", "except for", "absent", "non-GAAP", and "pro forma", and variants of these terms) in the sentence containing the EBITDA term. This approach relies on firms following SEC guidance requiring them to appropriately label EBITDA measures (see https://www.sec.gov/corpfin/non-gaap-financial-measures.htm, Question 102.09).

in Panels B and C imply that non-ITDA exclusions are an economically significant component of EBITDA's calculation. This suggests that researcher-defined standardized EBITDA metrics, which focus on ITDA exclusions and ignore non-ITDA exclusions, do not faithfully represent the actual EBITDA metrics provided to and used in capital markets.

Given that EBITDA is most frequently provided by analysts, we focus our analyses on analysts' EBITDA measures instead of firms' EBITDA measures.[13] This permits us to provide evidence on the usefulness of the most common EBITDA information available to investors. In additional analyses (see Section 5), we examine why managers choose to disclose EBITDA and how this disclosure is associated with the usefulness of analysts' EBITDA metrics.

4. Empirical Analyses

Table 2 presents descriptive statistics for our sample and the variables used in our analyses, based on our main sample of 107,395 firm-quarter observations. All variables are defined in Appendix B. Similar to our presentation in Figure 2, Panel C, we scale earnings and exclusions by sales, however we now retain the signs of the values such that revenues have a positive value and expenses/losses have a negative value.[14] As expected, firms in our sample report much higher EBITDA values (*EBITDA*) as compared to net income (*NI*) (e.g., 7.5 percent of sales versus a loss of 11.0 percent of sales). Comparing ITDA and non-ITDA exclusions indicates that non-ITDA exclusions represent 19.7 percent of the total adjustments to EBITDA (-0.034 / (-0.139 + -0.034)) while ITDA exclusions represent 80.3 percent of total exclusions. Firms in our sample are large,

[13] In order for analysts to construct EBITDA metrics, they must get their information from the information that firms provide, whether that be firms' explicit EBITDA disclosures or through taking other information that firms disclose and combining it to create an EBITDA metric.

[14] We scale by sales instead of assets because assets are impacted by the same types of items that EBITDA is designed to abstract away from (purchase price accounting, intangible assets, deferred tax assets, etc.).

with mean logged assets (*Size*) of 7.582, and have a book-to-market ratio (*BTM*) of 49.0 percent. These firms are covered by approximately ten (five) analysts that report street EPS (EBITDA) in each quarter (*NUMEST_EPS* and *NUMEST_EBITDA*, respectively).

4.1. Predictive ability for future operating performance

Proponents of EBITDA assert that EBITDA is useful because it better measures a firm's ability to generate cash flows from its core operations. To examine this potential benefit, we compare the abilities of EBITDA and net income (which includes the ITDA and non-ITDA items that EBITDA excludes) to predict future operating cash flows. Because earnings properties vary greatly by industry, we perform comparisons within Fama-French 12 industries. Specifically, for each calendar quarter (based on the earnings announcement date, e.g., Q1-2020), we rank firms' EBITDA and net income into quintiles by industry, where firms with the highest (lowest) current performance receive the highest (lowest) quintile rank. We then compare future operating cash flows across the quintile ranks to determine whether EBITDA or net income better distinguishes firms' future operating cash flows. In addition to operating cash flows, we also examine operating earnings and free cash flows to understand whether any benefits from EBITDA in predicting future operating cash flows generalize to other measures of operating performance.

Table 3, Panels A and B, report average future operating performance for quintiles ranked by net income or EBITDA. Across these panels, the results indicate that for all three measures of future operating performance, performance increases monotonically based on both net income and EBITDA rankings. Comparing values across the ranks, EBITDA appears to better identify firms with lower and higher future operating cash flows (see Quintiles 1 and 5), while net income appears to better identify firms with lower and higher future operating earnings and free cash flows.

To empirically compare the benefits of EBITDA and net income, we use a stacked regression approach and compare the difference in future performance across quintiles formed on

EBITDA to the difference in future performance across quintiles formed on net income. Specifically, we estimate the following equation:

$$Future\ Performance = \beta_0 + \beta_1 Quintiles + \beta_2 Quintiles \times EBITDA_{Ind} + \beta_3 EBITDA_{Ind} + \varepsilon \quad (1)$$

For a given firm-quarter observation, *Future Performance* is operating cash flows, operating earnings, or free cash flows summed over the next four quarters (*OCF*, *OPEARN*, and *FCF*, respectively) scaled by total sales. *Quintiles* indicates an observation's quintile rank (based on either net income or EBITDA) and ranges from 0 to 1, where 0 corresponds to observations in the bottom quintile and 1 corresponds to observations in the top quintile. This construction is similar to the construction of long-short portfolios in other contexts. $EBITDA_{Ind}$ is an indicator equal to 1 when an observation's quintiles are formed on EBITDA and 0 when an observation's quintiles are formed on net income. Given the interaction term in Equation 1, the coefficient β_1 on *Quintiles* reports how *Future Performance* differs across quintiles formed on net income. The coefficient β_2 on *Quintiles* × $EBITDA_{Ind}$ reports how the difference in future performance across quintiles formed on EBITDA compares to the difference across quintiles formed on net income. We interpret a positive coefficient on β_2 as evidence that EBITDA is superior to net income in predicting differences in future operating performance. In estimating Equation 1 and all other equations that follow, we cluster by firm and calendar quarter (e.g., Q1 2010, based on the earnings announcement date) unless otherwise noted.

Table 3, Panel C, presents the results of estimating Equation 1. When operating cash flows is the measure of future performance (Column 1), the coefficient on the interaction term is significantly positive, which indicates that EBITDA is better relative to net income at predicting differences in future operating cash flows. These results are consistent with claims made by

EBITDA proponents about the usefulness of EBITDA for predicting operating cash flows. Next, we extend our analysis to the other measures of future operating performance. For both operating earnings (Column 2) and free cash flows (Column 3), the coefficient on the interaction term is significantly negative, which indicates that EBITDA is worse relative to net income at predicting differences in future realizations of operating earnings and free cash flows. These results are consistent with claims made by EBITDA critics that EBITDA omits relevant information for predicting operating performance. Overall, Table 3 provides empirical support for the benefits claimed by EBITDA proponents and for the limitations claimed by EBITDA critics.

4.2. Predictive ability and variation in capital structure

Proponents of EBITDA claim that EBITDA is better than net income for comparing performance across peer firms because it mitigates differences in capital structure (i.e., capital, tax, and debt structures) (D'Souza et al., 2010). For example, GAAP earnings could differ for two operationally equivalent firms due to differences in capital structure (e.g., an acquisitive firm recognizes more depreciation and amortization than an organically growing firm). EBITDA, however, is less affected by these capital structure differences because it excludes items like depreciation and amortization and can help in comparing performance across the two firms.

We extend our analysis in Table 3 to consider industries with higher variability in capital structure relative to industries with lower variability. Formally, we compare the predictive ability of EBITDA and net income across such industries by estimating the following equation:

$$\begin{aligned} Future\ Performance = \quad & \beta_0 + \beta_1 Quintiles + \beta_2 Quintiles \times EBITDA_{Ind} + \\ & \beta_3 Quintiles \times EBITDA_{Ind} \times HiVariation + \\ & \beta_4 Quintiles \times HiVariation + \beta_5 EBITDA_{Ind} + \\ & \beta_6 HiVariation + \beta_7 EBITDA_{Ind} \times HiVariation + \varepsilon \end{aligned} \tag{2}$$

HiVariation equals 1 if a firm is in an industry with high variation in their capital structure and 0 if not. Appendix C details how we calculate industry capital structure variation. At a high level, we define capital structure variation by first ranking all firms in our sample each quarter on three ratios: (1) a debt-to-equity ratio, (2) a depreciation and amortization ratio, and (3) a tax ratio. We add these three ranks together to represent capital structure for a given firm-quarter observation. Next, we measure an industry's capital structure variation by computing the standard deviation of this capital structure measure across all firm-quarter observations in an industry's time series over our sample period.[15] We then classify an industry as having high capital structure variation if the standard deviation for an industry exceeds the median across industries.[16] In Equation 2, the coefficient β_2 on *Quintiles* × $EBITDA_{Ind}$ reflects EBITDA's predictive ability relative to net income in industries with *low* variation in capital structure. The coefficient β_3 on *Quintiles* × $EBITDA_{Ind}$ × *HiVariation* indicates whether EBITDA's predictive ability is incrementally different in industries with *high* variation in capital structure.

Table 4 presents the results of estimating Equation 2. We first examine results when operating cash flows is the measure of future performance (Column 1). The coefficients on the two-way interaction term *Quintiles* × $EBITDA_{Ind}$ and the triple interaction term are both significantly positive. This pattern of results indicates that not only is EBITDA better at predicting differences in future operating cash flows in industries with low variation in capital structure, but EBITDA performs even better in industries with high variation in capital structure. These results

[15] We use ratio ranks rather than ratio values because the standard deviation is sensitive to scale, such that industries with firms with larger ratio values would mechanically have larger standard deviations. By using all observations in an industry's time series, we pick up variation in capital structure due to (1) changes across time within the same firm, including seasonality; (2) time-invariant differences between industry firms; and (3) changes in industry composition due to entry or exit.

[16] The industries where *HiVariation* = 1 are: Chemicals and Allied Products; Consumer Durables; Oil, Gas, and Coal Extraction and Products; Telephone and Television Transmission; Wholesale, Retail, and Some Services; and Other. The industries where *HiVariation* = 0 are: Business Equipment; Consumer Nondurables; Healthcare, Medical Equipment and Drugs; Manufacturing; and Utilities.

are consistent with claims made by EBITDA proponents about the usefulness of EBITDA at mitigating differences in capital structure.

We next extend our analysis to the other measures of future operating performance. For operating earnings (Table 4, Column 2), we find that the coefficient on the two-way interaction term *Quintiles* × $EBITDA_{Ind}$ is not significantly different from zero, suggesting EBITDA performs no better or worse than net income in predicting future operating earnings for industries with low variation in capital structure. For free cash flows (Column 3), the coefficient on the same two-way interaction term is significantly positive, suggesting that EBITDA is better than net income at predicting future free cash flows in industries with low variation in capital structure. The coefficient on the triple interaction for both operating earnings and free cash flows, however, is significantly negative, indicating that EBITDA performs significantly worse in industries with high variation in capital structure when predicting these performance measures. This suggests that EBITDA performs even worse for predicting future operating earnings and free cash flows in the exact settings in which it performs even better for predicting operating cash flows.

Overall, our results in Tables 3 and 4 suggest that EBITDA offers benefits that are consistent with proponents' claims, but these benefits are limited to the context of predicting operating cash flows. In other contexts, EBITDA performs worse relative to net income. Further, in the settings where EBITDA offers the greatest benefits for operating cash flows (i.e., when capital structure is more variable in an industry), EBITDA's limitations for other measures of operating performance are also the most severe.

4.3. Predictive Ability and EBITDA Comparisons with Other Measures of Performance

In Table 3, we find that EBITDA is incrementally useful relative to net income in predicting operating cash flows. However, other financial measures exist that may be better than net income at predicting operating cash flows and would serve as stronger benchmarks for assessing the

benefits of EBITDA. Further, there may be some concern that the evidence in Table 3 is simply mechanical due to net income including items which operating cash flows and EBITDA exclude (i.e., depreciation and amortization). In other words, performance measures have less predictive ability whenever they include items that are not present in the measure they are predicting. To address these points, we compare EBITDA to two alternative measures: (1) *current* operating cash flows, and (2) analysts' street earnings, the measure through which analysts report non-GAAP earnings. Both alternative measures help address the concern that net income is a weak benchmark to compare to EBITDA. Using current operating cash flows also addresses the mechanical concern; EBITDA may be at a relative disadvantage when predicting future operating cash flows because EBITDA includes items which are not included in current operating cash flows (i.e., accruals). Thus, if EBITDA has greater predictive ability than operating cash flows, this cannot be attributed to a mechanical explanation.

We report the results of this analysis in Table 5.[17] Panel A of Table 5 compares the ability to predict future performance across quintiles formed on EBITDA and *current* operating cash flows. In Column 1, the coefficient on the interaction is significantly positive, suggesting that EBITDA is better than current operating cash flows for predicting future operating cash flows. Again, this result cannot be explained by a mechanical disadvantage to operating cash flows. For both operating earnings (Column 2) and free cash flows (Column 3), the coefficient on the interaction term is significantly positive, which indicates that EBITDA better predicts differences in future realizations for all three measures of future performance.

[17] Current operating cash flow is operating cash flow for the quarter calculated from the year-to-date variable (i.e., oancfy from Compustat) and scaled by sales (saleq from Compustat). Street earnings are actual I/B/E/S street EPS for the quarter multiplied by the number of diluted shares (cshfdq from Compustat) and scaled by sales (saleq from Compustat).

Panel B reports results when comparing the difference in future performance across quintiles formed on EBITDA to the difference in future performance across quintiles formed on analysts' street earnings. We find that EBITDA is better at predicting future operating cash flows, but worse at predicting both future operating earnings and free cash flows. Overall, the results in Table 5 suggest that EBITDA outperforms current operating cash flows in predicting a variety of measures of future performance and outperforms street earnings only in predicting future operating cash flows. Similar to those in Table 3, these findings imply that EBITDA's usefulness depends on the measure of performance that investors want to predict.

4.4. The Roles of ITDA and non-ITDA Exclusions

We next examine the roles that ITDA and non-ITDA exclusions play in EBITDA's predictive ability relative to net income. The composition of ITDA exclusions is well understood (i.e., interest, taxes, depreciation and amortization). While they have a clear motivation, such as, addressing variation in capital structure, they are also at the core of the complaints made by critics of EBITDA because they are recurring items. The composition of non-ITDA items is less well understood, and their nonstandard nature raises concerns about the comparability of EBITDA metrics. We separately examine the roles of ITDA and non-ITDA exclusions by comparing alternative EBITDA calculations to net income. First, we use *EBITDA_ITDAonly*, which reflects an EBITDA measure that excludes only the ITDA components of net income. Second, we modify EBITDA by adding back the adjustment for ITDA items so that the new measure only excludes non-ITDA components. We label this measure *EBITDA_nonITDAonly*. Thus, relative to net income, *EBITDA_ITDAonly* isolates the effects of the ITDA exclusions and *EBITDA_nonITDAonly* isolates the effects of the non-ITDA exclusions.

Table 6 reports the results of estimating a modified version of Equation 1 with the comparison of *EBITDA_ITDAonly* and net income (Panel A) and *EBITDA_nonITDAonly* to net income (Panel B). The results in Table 6, Panel A, which isolate the ITDA exclusions, are similar to those in Table 3. In particular, *EBITDA_ITDAonly* has greater predictive ability than net income for future operating cash flows but is worse when predicting future operating earnings and free cash flows. These results suggest that ITDA exclusions themselves bring both benefits and limitations to EBITDA, consistent with both proponents' and critics' claims. Table 6, Panel B, reports results of the comparison of *EBITDA_nonITDAonly* to net income. For future operating cash flows (Column 1) and free cash flows (Column 3), we find that non-ITDA exclusions enhance the predictive ability of EBITDA. For future operating earnings (Column 2), non-ITDA exclusions have no significant effect on EBITDA's predictive ability. Thus, although non-ITDA items may raise concerns about EBITDA being calculated differently across firms, we find that these adjustments improve the usefulness of EBITDA when assessing future cash flows and have no significant effect when assessing future operating earnings.

4.4.1. What are non-ITDA exclusions?

Given that non-ITDA exclusions are economically significant and improve EBITDA's predictive ability, we next perform several analyses to better understand these exclusions. Unlike firms' non-GAAP reporting, analysts' non-GAAP financial measures are not subject to Regulation G's reconciliation requirement. Thus, we are unable to observe analysts' precise EBITDA calculations, including their non-ITDA adjustments. Instead, we rely on two complementary approaches to provide evidence on the nature of non-ITDA exclusions. First, we examine how non-ITDA exclusions relate to future operating performance using a similar research design as

found in the non-GAAP reporting literature (e.g., Kolev et al., 2008). Second, we compare non-ITDA exclusions to items commonly excluded from non-GAAP earnings.

To understand how non-ITDA exclusions relate to future operating performance, we regress future operating performance on EBITDA, ITDA, and non-ITDA components using the following model:

$$Future\ Performance = \beta_0 + \beta_1 EBITDA + \beta_2 ITDA + \beta_3 NonITDA + \beta_n \sum Controls + \varepsilon \quad (3)$$

The primary variables of interest are previously defined. Following prior non-GAAP research, we include controls that explain future performance including size, book-to-market, an indicator variable for loss firms, sales growth, and earnings volatility. We also use industry and year fixed effects, similar to prior research, and cluster standard errors by earnings announcement quarter and industry.

Table 7, Panel A, reports the results of this analysis. For the relation with future operating cash flows (Column 1), we find that the coefficient on *EBITDA* is 2.958, which is interpreted as $1 of EBITDA being related to approximately $2.96 of future operating cash flows. The coefficients on *ITDA* and *NonITDA* in Column 1 are significantly smaller at approximately 1/8th to 1/10th the magnitude of the coefficient on EBITDA and are not significantly different from each other (untabulated). These findings suggest that both ITDA and non-ITDA exclusions have weak relations with future operating cash flows. For the analyses using future operating earnings (Column 2) and free cash flows (Column 3), we find that the coefficient on *ITDA* is not statistically different from the coefficient on *EBITDA* in Column 2 and is significantly larger than the coefficient on *EBITDA* in Column 3 (untabulated). In contrast, the coefficient on *NonITDA* is significantly smaller than those on *ITDA* and *EBITDA* in both columns (untabulated). These

findings suggest that, unlike ITDA exclusions, non-ITDA exclusions have much weaker relations with other measures of future operating performance than does EBITDA, consistent with these items relating more to transitory earnings components.

We next compare non-ITDA exclusions to the items excluded from non-GAAP EPS measures, which prior literature finds to be generally informative (e.g., Bradshaw et al., 2018; Bratten et al., 2024). Table 7, Panel B, presents this analysis. In Columns 1 and 2, we restrict our sample to observations where analysts report street EPS on a non-GAAP basis. In Column 1, we regress non-ITDA exclusions on non-GAAP EPS exclusions (converted from per-share amounts into dollar amounts) and find that non-GAAP EPS exclusions explain 75 percent of the variation in non-ITDA exclusions, suggesting that non-ITDA exclusions are similar to non-GAAP EPS exclusions for these firms. In Column 2, we decompose non-GAAP EPS exclusions into transitory and "other" components and find that non-ITDA exclusions strongly relate to both exclusion types, which suggests that non-ITDA reflect a mixture of recurring and nonrecurring items.

In Columns 3 and 4 of Panel B, we assess the extent to which specific categories of non-GAAP EPS exclusions explain non-ITDA exclusions, using our full sample of firms. Using a dominance analysis, we regress non-ITDA exclusions on potential non-GAAP EPS exclusions and identify which explain the most variation (Belnap et al., 2024).[18] We find that non-ITDA exclusions are best explained by special items (*SpecialItems*), non-operating items (*NonopItems*), discontinued operations (*DiscOps*), and stock-based compensation expense (*StockComp*).

Overall, the evidence from Table 7 suggests that non-ITDA exclusions largely represent the types of items excluded from non-GAAP earnings, which have been studied in prior research.

[18] To corroborate the categories in our dominance analysis, we examine non-GAAP exclusions using hand-collected reconciliation data from firms disclosing EBITDA. Specifically, we randomly sample 100 observations where both firms and analysts report EBITDA. For 74 observations where both reported equivalent EBITDA numbers (i.e., a difference of less than 2.5 percent), the observed exclusion frequencies corroborate the categories we include.

Prior research generally interprets these types of exclusions as being informative due to their weaker relation with future operating performance, but also acknowledges that they are not entirely unrelated to future performance and thus should not be entirely ignored.

4.5. Pricing of EBITDA and EBITDA Exclusions

Our earlier analyses provide evidence that EBITDA metrics are useful for predicting future operating cash flows. However, it also provides support for critics' claims that EBITDA omits information that is important for assessing other types of future operating performance. The extent to which this omission of information is concerning depends on how investors price EBITDA and the information it omits (i.e., EBITDA exclusions). Table 7, Panel A, indicates that both ITDA and non-ITDA exclusions are associated with future performance, which suggests that investors should price them to some degree rather than ignore them entirely. It is unclear ex ante whether investors fixate on EBITDA and ignore EBITDA exclusions or instead price both components.

We examine how investors price new information about EBITDA and exclusions at the earnings announcement using the following equation:

$$RET_{AnnDay} = \beta_0 + \beta_1 EBITDA_{Surp} + \beta_2 Exclusions_{Surp} + \beta_n \sum Controls + \varepsilon \quad (4)$$

RET_{AnnDay} is the three-day market adjusted return centered on the earnings announcement date. $EBITDA_{Surp}$ is the EBITDA surprise and $Exclusions_{Surp}$ is the exclusions surprise.[19] We rank all surprise variables into deciles each quarter and scale these rankings to range between 0 and 1. A significantly positive coefficient on the surprise variables implies that investors price news related to the earnings component at the earnings announcement date. We include controls for size, book-

[19] We are unable to separately calculate exclusions surprises for ITDA and non-ITDA items because we do not have separate forecasts for these items. As a result, we calculate exclusions surprise using total exclusions.

to-market, sales growth, and earnings volatility. We also use industry and year fixed effects and cluster standard errors by earnings announcement date.

Table 8 reports the results. Consistent with prior research, Column 1 provides evidence that investors positively respond to GAAP earnings surprises. In Column 2, we disaggregate the GAAP earnings surprise into EBITDA and exclusion surprises and find that the market prices information about each earnings component. Thus, investors do not fixate on EBITDA and ignore exclusions entirely. In Column 2, the coefficient on $EBITDA_{Surp}$ is significantly larger than the coefficient on $Exclusions_{Surp}$ and the coefficient on $GAAP_{Surp}$ in Column 1 (comparisons are significantly different, untabulated). This pattern of results is consistent with EBITDA identifying the components of GAAP earnings that are more important to investors and investors not ignoring the items that EBITDA excludes.

We next examine whether investors' responses to EBITDA and exclusions are complete at the earnings announcement or whether investors revise these responses after the earnings announcement date. We focus on return windows during the first quarter (RET_{1qtr}) and second quarter (RET_{2qtr}) after the earnings announcement window. In Column 3, we find significant evidence that investors price EBITDA and exclusions through the next quarter. These results indicate that investors incorporate the information about both EBITDA and exclusions with some delay, which provides some support for critics' claims that EBITDA information can mislead investors. Column 4 reveals that the pricing of exclusions resolves more quickly than the pricing of EBITDA, as we find no significant pricing revisions for exclusions in the second quarter after the announcement.

Overall, these analyses indicate that investors do not fixate on EBITDA and completely ignore the information in exclusions. The response to EBITDA is stronger than the response to

exclusions, which is consistent with EBITDA disaggregating GAAP earnings into components that are more versus less important for valuation. However, investors do not completely price EBITDA and exclusions at the earnings announcement, which provides some support for concerns that investors are misled by EBITDA information.

5. Additional Analyses - Firms' Reporting of EBITDA

Throughout our analyses, we focus on analyst-provided EBITDA because it is more prevalent in capital markets than firm-reported EBITDA (Figure 2). In this section, we investigate why firms provide EBITDA less frequently than analysts, which is puzzling because: (1) investors report that they use EBITDA, and our evidence confirms its usefulness in predicting future operating cash flows; and (2) analysts and managers provide non-GAAP EPS, another non-GAAP financial measure, with similar frequency (Bentley et al., 2018).

We first investigate factors associated with whether firms disclose EBITDA (i.e., determinants of *EBITDA_FirmDisclose*). We examine four sets of determinants designed to capture incentives firms may face regarding EBITDA disclosure. First, we examine three proxies related to the information environment which may prompt demand for EBITDA disclosure: (1) a measure for the proportion of firms in a Fama-French 12 industry engaging in acquisitions over the past four quarters (*Deals*), (2) an indicator for whether the industry has high capital structure variation (*HiVariation*), and (3) an indicator for whether a firm's reported EPS contains transitory items (*HasTransItems*). Second, we examine two proxies related to potential proprietary costs of disclosure: (1) the firm's R&D intensity (*R&D*), which is increasing in proprietary costs, and (2) the industry's Herfindahl–Hirschman index (*HHI*), which is decreasing in proprietary costs. Third, as a proxy for opportunistic benchmark beating behavior, we use an indicator for cases where

GAAP earnings miss analysts' GAAP earnings benchmark, but EBITDA meets analysts' EBITDA benchmark (*NIMiss_EBITDAMeet*). Fourth, as a proxy for potential regulatory costs, we include an indicator for whether the firm received a non-GAAP comment letter from the SEC in the prior year (*NG_SECLetter*). Finally, we include several control variables, including: an indicator equal to one if the firm discloses non-GAAP EPS (*NGEPS_FirmDisclose*), several controls commonly used in prior research on the determinants of non-GAAP reporting (size, book-to-market, and a loss indicator), and a time trend variable (*Time*).

Table 9, Panel A, reports descriptive statistics for the variables in this determinants analysis. We find that firms report EBITDA for approximately 44 percent of observations in our sample. Panel B reports the results from a logit regression to examine the determinants of firms' EBITDA reporting. To facilitate interpretability, we standardize all continuous variables to have a standard deviation equal to one. In Column 1, we limit the sample to observations where analysts provide EBITDA to understand firms' choices conditional on the existence of EBITDA information being provided by another party. In Column 2, we further limit the sample to observations where firms report non-GAAP EPS (based on data from Bentley et al. 2018), thus conditioning on both the existence of EBITDA information by analysts and the disclosure of non-GAAP financial measures by the firm. Column 2 helps to isolate the factors associated with firms' EBITDA disclosures while holding constant factors related to other non-GAAP reporting choices.

Across both columns, we find consistent evidence that EBITDA disclosure relates to information demands: EBITDA is disclosed more often in industries that are more acquisitive and where there is higher capital structure variation. We also find consistent evidence that EBITDA is sensitive to proprietary costs: EBITDA is disclosed less frequently when firms have greater R&D intensity. Finally, we find that EBITDA disclosure is related to benchmark beating, where EBITDA

disclosure is more likely when it meets or beats analysts' EBITDA forecasts while GAAP EPS misses analysts' GAAP EPS forecasts. We do not find consistent evidence across the columns that EBITDA disclosure is related to potential regulatory costs.

We next examine whether a firm's choice to disclose EBITDA informs on whether EBITDA is more or less useful. To investigate this question, we examine whether the relative predictive ability of EBITDA and net income for future operating performance differs based on whether firms disclose EBITDA.[20] Table 10 presents the results of this analysis, where we estimate a modified version of Equation 2 in which we replace *HiVariation* with *EBITDA_FirmDisclose*.[21] The coefficients on the interaction of *Quintiles* and $EBITDA_{Ind}$ suggest that when firms do not disclose EBITDA, EBITDA better predicts future operating cash flows and is worse at predicting future operating earnings and future free cash flows. However, the coefficients on the triple interaction across all three columns suggest that when firms disclose EBITDA, EBITDA better predicts future operating cash flows and has no differential ability to predict future operating earnings or future free cash flows. These results suggest that firms disclose EBITDA when EBITDA has more benefits and fewer limitations, indicating firms are more willing to bear the costs of such disclosure when EBITDA is more informative. These results do not support concerns that EBITDA is particularly misleading when firms provide it.

[20] We use analysts' EBITDA values in this analysis because they are the only archived source of EBITDA values. Although, firms' EBITDA values and analysts' EBITDA values may differ and have different properties, a random sample of 100 observations where both firms and analysts report EBITDA reveals that firms' EBITDA values are equivalent to analysts' EBITDA values (i.e., a difference of less than 2.5 percent) for 74 observations. Thus, analysts' EBITDA values are a reasonable approximation for firms' EBITDA values in cases where both parties report EBITDA.

[21] For this analysis, we form quintile rankings of EBITDA and net income for only those observations where *EBITDA_FirmDisclose* is not missing.

6. Conclusion

Despite EBITDA's reported use (CFA 2016; Allee et al. 2024), academic research related to non-GAAP financial measures has largely focused on other non-GAAP measures, such as non-GAAP EPS. Thus, our study contributes by examining the pervasiveness, properties, and usefulness of EBITDA in capital markets. We find that, in contrast to non-GAAP earnings, analysts are the primary providers of EBITDA and they provide this information for nearly all firms in recent years (more than 85 percent of firms since 2015). Analysts' EBITDA measures nearly always exclude non-ITDA items, and these items are an economically significant part of EBITDA's calculation in recent years. Thus, characterizing EBITDA as net income adjusted for only ITDA items mischaracterizes the EBITDA metrics used by market participants. Despite concerns about non-ITDA exclusions, they are similar to the items excluded from non-GAAP earnings measures and they improve EBITDA's predictive ability for future operating performance.

Relative to a variety of performance measures (net income, operating cash flows, street earnings), we find that EBITDA is the best predictor of operating cash flows, especially when firms have more varied capital structures. Thus, investors interested in predicting future operating cash flows are justified in their use of EBITDA, especially when they wish to abstract away from differences in capital assets, financing, and tax strategies across comparison firms. However, EBITDA is generally worse than other measures at predicting future operating earnings and free cash flows. Thus, investors interested in measures of performance other than operating cash flows should be wary of using EBITDA. Our analysis uses analysts' EBITDA measures because they are more prevalent in capital markets than firms' measures. However, we find that firms' disclosure of EBITDA occurs when EBITDA is more useful for investors, which challenges concerns that firms primarily disclose EBITDA to mislead investors.

When examining how investors price EBITDA information, we find that investors do not fixate on EBITDA, but instead price both EBITDA and exclusions. Further, investors price the two components differently, consistent with the components having differential information for assessing value. While this evidence assuages some concerns that investors are wholly unaware of EBITDA's limitations, we also find evidence that investors incorporate information in EBITDA and exclusions with some delay. Thus, investors do not fully understand how to price EBITDA and exclusions at the earnings announcement date, which provides some support for critics' claims that EBITDA information can mislead investors.

Overall, our evidence provides important insights into the usefulness of EBITDA. We validate investors' use of EBITDA by highlighting that it is a superior measure for predicting operating cash flows, especially when there is greater variation in capital structure. However, we also validate criticisms of EBITDA by noting its limitations in predicting performance outside of future operating cash flows compared to other measures of performance (e.g., net income). Our evidence of EBITDA's prevalence in capital markets, source (i.e., analysts), variable calculation (due to non-ITDA exclusions), and usefulness is relevant for questions about the need for mandatory disclosure or standardization of EBITDA, both of which are of current interest to accounting standard setters such as the FASB.

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Appendix A: Examples of EBITDA and Non-GAAP EPS Disclosures

In this Appendix, we provide five examples of firms' EBITDA and Non-GAAP EPS disclosures to highlight the variation that exists between these two measures. We extract these examples from firms' earnings announcements and restructure the information to more easily compare the two measures.

Example 1: Disclosure of EBITDA and Non-GAAP EPS with Identical Non-ITDA Exclusions
- Huntsman Corporation's fiscal quarter ending on March 31, 2016[22] -

Huntsman Corporation reports both EBITDA and non-GAAP EPS metrics. Only EBITDA excludes the ITDA items and EBITDA and non-GAAP EPS exclude the same non-ITDA items.

Line Item	EBITDA	Non-GAAP EPS
Net Income	$ 56.0	$ 56.0
ITDA Adjustments		
Income tax expense	26	
Depreciation and amortization	100	
Interest expense	50	
Non-ITDA Adjustments		
Acquisition and integration expense	9	9
Loss from discontinued operations	2	2
Certain legal settlements and related expenses	1	1
Net plant incident remediation costs	1	1
Amortization of pension actuarial losses	16	16
Restructuring and impairment costs	13	13
EBITDA	$ 274.0	
Tax Adjustment for Non-GAAP Exclusions		(10.0)
Non-GAAP Earnings		$ 88.0
Non-GAAP EPS		**$0.37**

[22] https://www.sec.gov/Archives/edgar/data/1307954/000110465916114859/a16-9665_1ex99d1.htm

Example 2: Disclosure of EBITDA and Non-GAAP EPS with Different Non-ITDA Exclusions - Scotts Miracle-Grow Company's fiscal quarter ending on March 28, 2015[23] -

Scotts Miracle-Grow Company reports both EBITDA and non-GAAP EPS metrics. Only EBITDA excludes the ITDA items and EBITDA and non-GAAP EPS exclude different non-ITDA items.

Line Item	EBITDA	Non-GAAP EPS
Net Income	$ 124.6	$ 124.6
ITDA Adjustments		
Income tax expense from continuing operations	70.0	
Depreciation	12.8	
Amortization	3.4	
Interest expense	15.0	
Non-ITDA Adjustments		
Mark-to-market adjustment on derivatives	7.2	
Income attributable to non-controlling interest	(0.3)	
Impairment, restructuring, other		5.1
EBITDA	$ 232.7	
Tax Adjustment for Non-GAAP Exclusions		(1.8)
Non-GAAP Earnings		$ 127.9
Non-GAAP EPS		**$2.06**

[23] https://www.sec.gov/Archives/edgar/data/825542/000154638015000012/exhibit991q2f15newsrelease.htm

Example 3: Disclosure of EBITDA and Non-GAAP EPS with Overlapping ITDA Exclusions and Different Non-ITDA Exclusions

- DowDupont Inc's fiscal quarter ending on June 30, 2018[24] -

DowDupont Inc. reports both EBITDA and non-GAAP EPS metrics. Both EBITDA and non-GAAP EPS exclude amortization (of intangibles), but only EBITDA excludes the remaining ITDA items. EBITDA and non-GAAP EPS exclude some similar non-ITDA items but also different ones.

Line Item	EBITDA	Non-GAAP EPS
Net Income	$ 1,803	$ 1,803
ITDA Adjustments		
Income tax expense	565	
Interest and Amortization of Debt Discount	309	
Amortization of Intangibles	333	333
Depreciation and Other Amortization	1,163	
Non-ITDA Adjustments		
Foreign exchange losses	57	
Income due to non-controlling Interests		(35)
Inventory step-up amortization	682	682
Integration and separation costs	558	558
Restructuring charges - net	189	189
Loss on divesture and change in JV ownership	17	17
EBITDA	$ 5,676	
Tax Adjustment for Non-GAAP Exclusions		(347)
Non-GAAP Earnings		$ 3,200
Non-GAAP EPS		**$1.37**

[24] https://www.sec.gov/Archives/edgar/data/1666700/000166670018000039/exhibit991enrschedules2q18.htm

Example 4: Disclosure of EBITDA Only

- Olin Corporation's fiscal quarter ending on June 30, 2019[25] -

Olin Corporation reports an EBITDA metric which excludes both ITDA and non-ITDA items but does not report a non-GAAP EPS metric.

Line Item	EBITDA
Net Income	$ (20.0)
ITDA Adjustments	
Income tax expense (benefit)	(4.9)
Depreciation and amortization	151.4
Interest income	(0.3)
Interest expense	57.9
Non-ITDA Adjustments	
Restructuring charges	3.8
Environmental recoveries (net)	(4.8)
Information technology integration (net)	21.5
EBITDA	$ 204.6

Example 5: Disclosure of Non-GAAP EPS Only

- Colgate-Palmolive Company's fiscal quarter ending on December 31, 2017[26] -

Colgate-Palmolive Company reports a non-GAAP EPS metric which excludes non-ITDA items but does not report an EBITDA metric.

Line Item	Non-GAAP EPS
Net Income	$ 323
Non-GAAP Adjustments	
Global growth and efficiency program	61
U.S. tax reform	275
Non-GAAP Earnings	$ 659
Non-GAAP EPS	**$0.75**

[25] https://www.sec.gov/Archives/edgar/data/74303/000007430319000048/exhibit991q22019earnin.htm

[26] https://www.sec.gov/Archives/edgar/data/21665/000115752318000124/a51748990ex99.htm

Appendix B: Variable Definitions

Variable	Variable Description and Calculation
BTM	The book to market ratio calculated as (seqq/(cshfdq *prccq) from Compustat).
Deals	The proportion of firms in a Fama-French 12 industry engaging in acquisitions over the past four quarters. We first identify merger and acquisition activity using SDC and require the transaction values to be greater than $1 million and the acquiror be public. Next, we count the number of deals in a quarter for a Fama-French 12 industry and divide this sum by the number of firms in that industry during the quarter. We take the average of this value over the past four quarters.
DiscOps	The value of discontinued operations scaled by sales (doq/saleq from Compustat).
Earnvol	The standard deviation of ROA (ibq/atq from Compustat) over at least five of the previous eight quarters.
EBITDA	Actual street EBITDA (EBT from I/B/E/S) scaled by sales (saleq from Compustat).
EBITDA_FirmDisclose	An indicator equal to 1 if a firm reports EBITDA in their earnings announcement and 0 otherwise. We search earnings announcements for "EBITDA" and allow single character suffixes to this term (e.g., EBITDAR, EBITDAX). Earnings announcement URLs were provided by the authors of Bentley et al. (2018).
EBITDA_ITDAonly	An EBITDA calculation that excludes only interest, taxes, depreciation, and amortization. Calculated as net income (niq from Compustat) scaled by sales (saleq from Compustat) less *ITDA*.
$EBITDA\_ITDAonly_{Ind}$	An indicator equal to 1 when quintile ranks are based on *EBITDA_ITDAonly* and 0 when quintile ranks are based on some other performance measure (e.g., net income).
EBITDA_nonITDAonly	An EBITDA calculation that excludes only non-ITDA items and includes interest, taxes, depreciation, and amortization. Calculated as net income (niq from Compustat) scaled by sales (saleq from Compustat) less *NonITDA*. This calculation is equivalent to *EBITDA + ITDA*.

$EBITDA\_nonITDAonly_{Ind}$	An indicator equal to 1 when quintile ranks are based on *EBITDA_nonITDAonly* and 0 when quintile ranks are based on some other performance measure (e.g., net income).
$EBITDA_{Ind}$	An indicator equal to 1 when quintile ranks are based on *EBITDA* and 0 when quintile ranks are based on some other performance measure (e.g., net income).
$EBITDA_{Surp}$	EBITDA per share surprise, calculated as unscaled *EBITDA* less the most timely consensus EBITDA forecast from I/B/E/S for the same period, scaled by the number of diluted shares outstanding (cshfdq from Compustat).
$Exclusions_{Surp}$	Exclusions per share surprise, calculated as ($GAAP_{Surp} - EBITDA_{Surp}$).
ExtraordItems	The value of extraordinary items scaled by sales (xiq/saleq from Compustat).
FCF	Free cash flow over the next four quarters, calculated as the sum of (oancfq + capxq) over the next four quarters where both oancfq and capxq are calculated from the year-to-date variables (i.e., oancfy or capxy from Compustat; note that capital expenditures are coded as negative values of capxy in Compustat). We scale this sum by sales in the current quarter (saleq from Compustat).
$GAAP_{Surp}$	GAAP EPS surprise, calculated as actual GAAP EPS (GPS from I/B/E/S) less the most timely consensus GPS forecast from I/B/E/S for the same period.
Growth	Sales growth, calculated as sales in the current quarter (saleq from Compustat) less sales four quarters ago (saleq from Compustat), scaled by total assets in the current quarter (atq from Compustat).
HasTransItems	An indicator equal to 1 if a firm reports *Transitory* items in the quarter and 0 otherwise.
HHI	The Herfindahl-Hirschman Index calculated as an individual firm's sales over the prior four quarters divided by the sum of sales over the prior four quarters for all firms in the same Fama-French 12 industry. The sample of firms for calculating this variable is our Initial Sample. For each firm quarter, we multiply the proportion by 100, square it, and then sum across all firms in the industry in that quarter.
HiVariation	An indicator equal to 1 if the firm's Fama-French 12 industry has above-median capital structure variation. We calculate capital structure variation as the extent

	to which firms in a given Fama-French 12 industry vary from one another according to three measures: (1) debt-to-equity ratio, (2) depreciation and amortization ratio, and (3) tax ratio. See Appendix C for details and an illustration.
ITDA	The value of interest, taxes, depreciation, and amortization (i.e., ITDA) calculated as (xintq + txtq + dpq from Compustat) multiplied by -1, scaled by sales (saleq from Compustat).
Loss	Indicator equal to 1 if the firm reports a GAAP loss (i.e., niq from Compustat < 0) and 0 otherwise.
MVE	Market value of equity, calculated as stock price multipled by diluted common shares outstanding (prccq*cshfdq).
NI	GAAP net income scaled by sales (niq/saleq from Compustat).
NG_Exclusions	The value of exclusions from street EPS, calculated as GAAP diluted EPS (epsfiq from Compustat) less I/B/E/S EPS, multiplied by diluted shares outstanding (cshfdq from Compustat) and scaled by sales (saleq from Compustat).
NG_SECLetter	An indicator equal to 1 if the firm received a non-GAAP reporting comment letter (iss_othrdisc_keys = 813 in Audit Analytics) in the prior four quarters (based on conversation_start_date in Audit Analytics), 0 otherwise.
NGEPS_FirmDisclose	An indicator equal to 1 if firms report non-GAAP EPS and 0 if firms do not report non-GAAP EPS, using the "mgr_exclude" variable from the authors of Bentley et al. (2018).
NIMiss_EBITDAMeet	An indicator equal to 1 when $GAAP_{Surp}$ is negative and $EBITDA_{Surp}$ is non-negative, and 0 otherwise.
Noncontrol	The value of noncontrolling interests scaled by sales (miiq/saleq from Compustat)*-1.
NonITDA	The value of non-ITDA exclusions, calculated as *EBITDA_ITDAonly – EBITDA*.
NonopItems	Nonoperating Income (Expense) scaled by sales (nopiq/saleq from Compustat).
NUMEST_EPS	The number of analysts forecasting one-quarter ahead street EPS in the most timely summary statistics from I/B/E/S.

NUMEST_EBITDA	The number of analysts forecasting one-quarter ahead EBITDA in the most timely summary statistics from I/B/E/S.
OCF	Operating cash flows over the next four quarters, calculated from the year-to-date variable (i.e., oancfy from Compustat). We scale this sum by sales in the current quarter (saleq from Compustat).
OPEARN	Operating earnings over the next four quarters, calculated from quarterly operating earnings per share variable multiplied by diluted shares outstanding to be on a gross basis (i.e., oepsxq * cshfdq from Compustat). We scale this sum by sales in the current quarter (saleq from Compustat).
Other	Other exclusions from street EPS, calculated as operating earnings per share (oepsxq from Compustat) less street EPS (EPS from I/B/E/S), multiplied by diluted shares outstanding (cshfdq from Compustat) and scaled by total sales (saleq from Compustat).
Quintiles	A variable ranging from 0 to 1 corresponding to the quintile rank of the associated performance measure (e.g., EBITDA, net income, operating cash flows). Observations with the lowest (highest) rank have a value of 0 (1).
R&D	R&D expense scaled by assets (xrdq / atq from Compustat).
RET_{1qtr}	First quarter post-earnings announcement buy and hold abnormal return, calculated over the [+2,+64] trading day period after the earnings announcement day, adjusted for the value weighted market return.
RET_{2qtr}	Second quarter post-earnings announcement buy and hold abnormal return, calculated over the [+65,+127] trading day period after the earnings announcement day, adjusted for the value weighted market return.
RET_{AnnDay}	Announcement day buy and hold abnormal return, calculated over the [-1,+1] day period surrounding the earnings announcement day, adjusted for the value weighted market return.
Size	Log of quarterly assets (atq from Compustat).
SpecialItems	Special items scaled by sales (spiq/saleq from Compustat).
StockComp	Stock compensation expense scaled by sales ((stkcoq*-1)/saleq from Compustat).

Time	A time trend variable starting at 0 for earnings announcement dates (RDQ from Compustat) within the first calendar quarter of 2004 and incrementing by 1 for each subsequent quarter in the sample.
Transitory	Transitory exclusions from street EPS, calculated as diluted earnings per share (epsfiq from Compustat) less operating earnings per share (oepsxq from Compustat), multiplied by diluted shares outstanding (cshfdq from Compustat) and scaled by sales (saleqq from Compustat).

Appendix C: Calculating Industry Capital Structure Variation

In this Appendix, we describe and provide a simplified example of how we calculate industry capital structure variation.

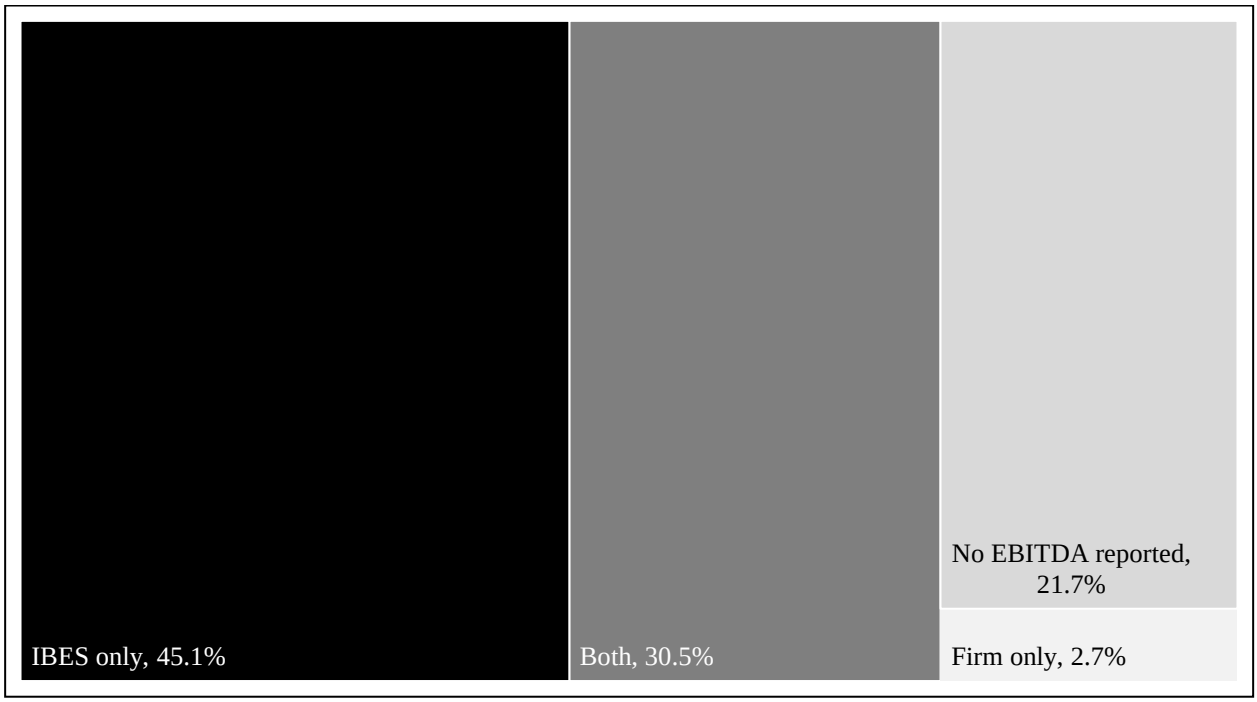
To represent capital structure, we first calculate three ratios for each firm-quarter observation in our sample: (1) debt-to-equity ratio, calculated as long-term debt (dlltq from Compustat) scaled by market value of equity (cshfdq*prccq from Compustat); (2) depreciation and amortization ratio, calculated as depreciation and amortization (dpq from Compustat) scaled by the sum of net PP&E and net intangibles (ppentq + intanq from Compustat); and (3) tax ratio, calculated as total tax expense (txtq from Compustat) scaled by total assets (atq from Compustat). Next, we rank all firms across the sample each quarter (based on the earnings announcement date) according to each ratio and then add a given firm's ranks together. We refer to this sum as the firm's capital structure. To represent industry capital structure variation, we calculate the standard deviation of firms' capital structures across time for each industry.

Table C.1 illustrates the calculation in a hypothetical world where there are only six firms in the economy from two different industries: Firms A, B, and C are in the Telephone and Television Transmission industry and firms D, E, and F are in the Utilities industry. Columns 1-3 identify the industry, quarter, and firm. Columns 4-6 present the hypothetical ranks for each ratio across all six firms for each quarter. Column 7 presents is the sum of the ranks for each firm-quarter observation (i.e., the measure of each firm's capital structure). Column 8 presents the standard deviation of capital structure by industry. Column 9 indicates the industry with above-median standard deviation, which forms the variable *HiVariation*.

Table C.1: Illustration of Industry Capital Structure Variation

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Industry	Quarter	Firm	Debt-to-Equity Ratio Rank	Depreciation & Amortization Ratio Rank	Tax Ratio Rank	Sum of Ranks (Capital Structure)	Standard Deviation of Ranks by Industry	Indicator for Above-Median Std. Dev. (*HiVariation*)
Telephone and Television Transmission	2020Q1	A	3	2	6	11	2.467	1
	2020Q1	B	2	3	5	10	2.467	1
	2020Q1	C	4	5	4	13	2.467	1
	2020Q2	A	2	3	5	10	2.467	1
	2020Q2	B	1	4	4	9	2.467	1
	2020Q2	C	4	6	3	13	2.467	1
	2020Q3	A	4	3	6	13	2.467	1
	2020Q3	B	1	4	4	9	2.467	1
	2020Q3	C	3	5	1	9	2.467	1
	2020Q4	A	3	3	5	11	2.467	1
	2020Q4	B	2	4	4	10	2.467	1
	2020Q4	C	4	6	3	13	2.467	1
	2021Q1	A	3	1	5	9	2.467	1
	2021Q1	B	1	4	3	8	2.467	1
	2021Q1	C	6	6	4	16	2.467	1
	2021Q2	A	2	2	5	9	2.467	1
	2021Q2	B	1	3	2	6	2.467	1
	2021Q2	C	4	6	4	14	2.467	1
	2021Q3	A	2	3	5	10	2.467	1
	2021Q3	B	1	2	4	7	2.467	1
	2021Q3	C	4	6	3	13	2.467	1
	2021Q4	A	3	3	5	11	2.467	1
	2021Q4	B	1	2	4	7	2.467	1
	2021Q4	C	4	5	3	12	2.467	1
Utilities	2020Q1	D	1	6	1	8	2.021	0
	2020Q1	E	5	1	2	8	2.021	0
	2020Q1	F	6	4	3	13	2.021	0
	2020Q2	D	3	5	2	10	2.021	0
	2020Q2	E	5	1	1	7	2.021	0
	2020Q2	F	6	2	6	14	2.021	0
	2020Q3	D	2	6	2	10	2.021	0
	2020Q3	E	6	1	3	10	2.021	0
	2020Q3	F	5	2	5	12	2.021	0
	2020Q4	D	1	5	2	8	2.021	0
	2020Q4	E	5	2	1	8	2.021	0
	2020Q4	F	6	1	6	13	2.021	0
	2021Q1	D	2	5	1	8	2.021	0
	2021Q1	E	5	3	2	10	2.021	0
	2021Q1	F	4	2	6	12	2.021	0
	2021Q2	D	3	5	3	11	2.021	0
	2021Q2	E	6	4	1	11	2.021	0
	2021Q2	F	5	1	6	12	2.021	0
	2021Q3	D	3	4	2	9	2.021	0
	2021Q3	E	5	5	1	11	2.021	0
	2021Q3	F	6	1	6	13	2.021	0
	2021Q4	D	2	6	1	9	2.021	0
	2021Q4	E	5	4	2	11	2.021	0
	2021Q4	F	6	1	6	13	2.021	0

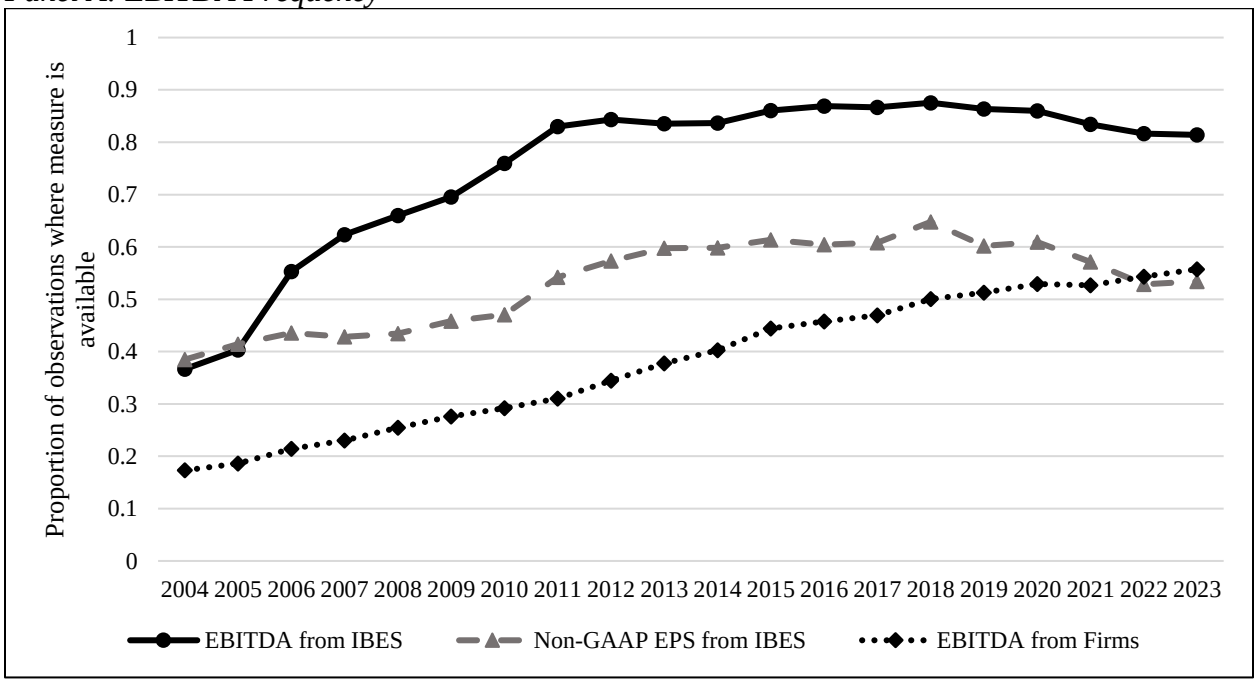
Figure 1: EBITDA Reporting



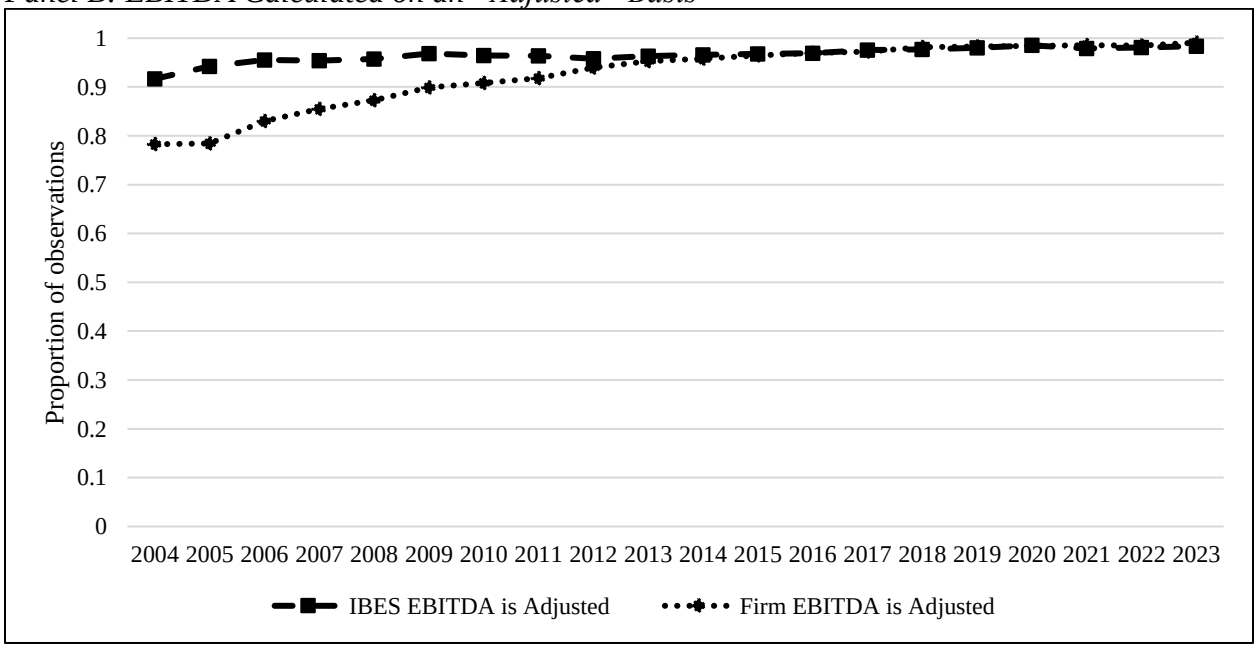
This figure presents the relative frequency of EBITDA reporting by firms and analysts (via I/B/E/S). The sample used for this figure begins with our Initial Sample (see Table 1) which requires the availability of street EPS in I/B/E/S, and data on firms' EBITDA disclosure. I/B/E/S EBITDA reporting is determined based on non-missing actual EBITDA (EBT in I/B/E/S) for a given firm-quarter observation. Firms' EBITDA reporting is determined based on a programmatic search of the earnings announcement for "EBITDA", allowing single-character suffixes (e.g., EBITDAR, EBITDAX). The categories represented in the figure include: (i) IBES only, where only I/B/E/S reports EBITDA; (ii) Both, where both I/B/E/S and the firm report EBITDA; (iii) Firm only, where only the firm reports EBITDA; and (iv) No EBITDA reported, where neither I/B/E/S nor the firm report EBITDA.

Figure 2: EBITDA Reporting and Adjustments

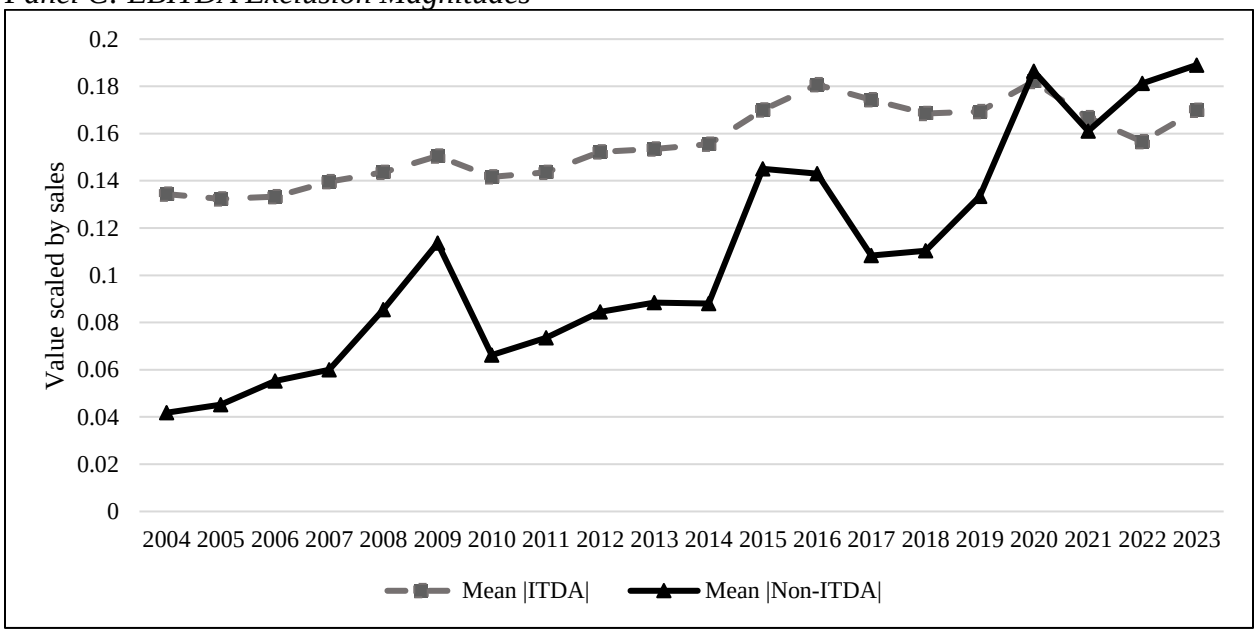
Panel A: EBITDA Frequency



Panel B: EBITDA Calculated on an "Adjusted" Basis



Panel C: EBITDA Exclusion Magnitudes



This figure presents statistics on the frequency of EBITDA reporting (Panel A), the extent to which EBITDA is "adjusted" to exclude items beyond just interest, taxes, depreciation, and amortization (ITDA) (Panel B), and the magnitude of ITDA and non-ITDA exclusions over time (Panel C). The sample for these figures begins with our Initial Sample (Table 1) and further requires either data on firms' EBITDA reporting or the actual reporting of EBITDA by I/B/E/S or firms, depending on the panel. In Panel A, we compare the frequency of EBITDA in I/B/E/S to the frequency with which I/B/E/S street EPS is on a non-GAAP basis and the frequency with which firms report EBITDA. In Panel B, we present the frequency with which I/B/E/S EBITDA and firm EBITDA is on an "adjusted" basis, conditional on EBITDA reporting. We determine that I/B/E/S EBITDA is adjusted by identifying nonzero non-ITDA exclusions (see the variable *NonITDA* in Appendix B). We determine that firm EBITDA is adjusted by the presence of non-GAAP keywords (i.e., "adjust", "exclude", "remove", "without", "except for", "absent", "non-GAAP", and "pro forma", and variants of these terms) in the sentence containing the EBITDA term. In Panel C, we present the absolute magnitude of ITDA and non-ITDA exclusions over time as a proportion of sales. We winsorize the values in Panel C at the 1st and 99th percentiles.

Table 1: Sample Selection

Firm-quarters from 2004-2023 on Compustat with non-missing earnings announcement dates and assets	**426,298**
Drop financial firms	(95,279)
Drop firms without street EPS on I/B/E/S	(94,657)
Drop firms without data to calculate *Net Income* or *ITDA*	(29,186)
Initial Sample for figures	**207,176**
Drop firms without EBITDA on I/B/E/S	(50,548)
Drop firms without data for predictive ability tests (Tables 3-6)	(44,640)
Drop firms without data to calculate control variables (Table 7)	(4,593)
Main Sample for analyses	**107,395**

This table provides details about our sample selection procedures. We begin with all firm-quarter observations from 2004-2023 from the intersection of the CRSP, Compustat, and I/B/E/S. All observations must have a reported earnings announcement date (rdq in Compustat) and non-missing, non-zero total assets (atq in Compustat). The Initial Sample for figures represents the starting sample for Figures 1 and 2. The Main Sample represents the starting sample for the rest of our analyses. All variables are defined in Appendix B.

Table 2: Descriptive statistics

Variable	Mean	Median	Std. Dev.
EBITDA	0.075	0.158	0.809
NI	-0.110	0.047	0.944
ITDA	-0.139	-0.091	0.158
NonITDA	-0.034	-0.004	0.181
OCF	0.251	0.465	2.652
OPEARN	-0.287	0.217	3.289
FCF	-0.319	0.206	3.347
Size	7.582	7.553	1.743
BTM	0.490	0.385	0.477
MVE	9,615.211	1,938.604	24,258.272
NUMEST_EPS	10.044	8.000	6.974
NUMEST_EBITDA	5.311	4.000	4.144

This table presents summary statistics for the variables used in our analyses, from our Main Sample of 107,395 firm quarters (except the number of EPS forecasts, which is missing for 19 observations). All continuous variables are winsorized at the 1st and 99th percentiles over the sample. All variables are defined in Appendix B.

Table 3: Predictive Ability for Future Operating Performance

Panel A: Net Income (N=107,395)

Net Income Quintile Rank	*OCF*	*OPEARN*	*FCF*
1	-1.259	-2.419	-2.231
2	0.294	-0.118	-0.068
3	0.493	0.178	0.138
4	0.693	0.355	0.260
5	1.058	0.603	0.341

Panel B: EBITDA (N=107,395)

EBITDA Quintile Rank	*OCF*	*OPEARN*	*FCF*
1	-1.492	-2.312	-2.160
2	0.227	-0.070	-0.030
3	0.535	0.166	0.136
4	0.781	0.301	0.222
5	1.231	0.514	0.270

Panel C: Comparison of Net Income and EBITDA

	Net Income vs. EBITDA		
	(1)	(2)	(3)
Variable	*OCF*	*OPEARN*	*FCF*
Quintiles	2.021***	2.617***	2.198***
	(15.331)	(15.217)	(13.410)
Quintiles × $EBITDA_{Ind}$	0.387***	-0.198***	-0.144***
	(12.568)	(-4.982)	(-2.653)
$EBITDA_{Ind}$	-0.193***	0.099***	0.072**
	(-9.114)	(4.190)	(2.447)
Constant	-0.757***	-1.594***	-1.416***
	(-7.359)	(-11.961)	(-11.920)
Observations	214,790	214,790	214,790
Adj. R-squared	0.089	0.074	0.051

This table presents predictive ability tests for EBITDA and GAAP Net Income. Panels A and B present measures of future operating performance over the next four quarters (operating cash flows, *OCF*; operating earnings, *OPEARN*; and free cash flows, *FCF*) based on quintile rankings of *Net Income* (Panel A) and *EBITDA* (Panel B). Ranks are formed each quarter within Fama-French 12 industries. Panel C tests for significant differences in the rankings between Panel A and Panel B by stacking the two sets of firm-quarter ranks together. *Quintiles* represents the ranks from Panels A and B, scaled to range from 0 to 1, and $EBITDA_{Ind}$ indicates whether the rank for a given observations is based on *EBITDA* (when $EBITDA_{Ind}$ = 1) or *Net Income* (when $EBITDA_{Ind}$ = 0). The variable of interest is highlighted in grey. All variables are defined in Appendix B. We report *t*-statistics in parentheses below coefficient estimates. Standard errors are clustered by firm and the calendar quarter of the earnings announcement date (e.g., Q1 2019). ***, **, and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Table 4: Predictive Ability and Variation in Capital Structure

	Net Income vs. EBITDA		
	(1)	(2)	(3)
Variable	***OCF***	***OPEARN***	***FCF***
Quintiles	3.031***	3.877***	3.405***
	(13.729)	(13.856)	(12.983)
Quintiles × $EBITDA_{Ind}$	0.261***	-0.023	0.187***
	(6.285)	(-0.500)	(3.962)
Quintiles × $EBITDA_{Ind}$ × *HiVariation*	0.251***	-0.349***	-0.660***
	(4.668)	(-4.700)	(-6.544)
Quintiles × *HiVariation*	-2.019***	-2.516***	-2.412***
	(-9.079)	(-9.159)	(-9.106)
$EBITDA_{Ind}$	-0.130***	0.011	-0.093***
	(-4.279)	(0.341)	(-2.770)
HiVariation	1.674***	1.850***	1.482***
	(9.786)	(8.676)	(6.925)
$EBITDA_{Ind}$ × *HiVariation*	-0.125***	0.174***	0.330***
	(-3.322)	(3.888)	(5.890)
Constant	-1.595***	-2.520***	-2.158***
	(-9.263)	(-11.547)	(-10.631)
Observations	214,790	214,790	214,790
Adj. R-squared	0.121	0.103	0.074

This table examines whether predictive ability differs in industries with higher variation in capital structure. *HiVariation* is an indicator equal to 1 if the firm's Fama-French 12 industry has above-median capital structure variation. We calculate capital structure variation as the extent to which firms in a given Fama-French 12 industry vary from one another according to three measures: (1) debt-to-equity ratio, (2) depreciation and amortization ratio, and (3) tax ratio. (See Appendix C for details and an illustration.) The industries where *HiVariation* = 1 are: Chemicals and Allied Products; Consumer Durables; Oil, Gas, and Coal Extraction and Products; Telephone and Television Transmission; Wholesale, Retail, and Some Services; and Other. The industries where *HiVariation* = 0 are: Business Equipment; Consumer Nondurables; Healthcare, Medical Equipment and Drugs; Manufacturing; and Utilities. The variables of interest are highlighted in grey. All variables are defined in Appendix B. We report *t*-statistics in parentheses below coefficient estimates. Standard errors are clustered by firm and the calendar quarter of the earnings announcement date (e.g., Q1 2019). ***, **, and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Table 5: Predictive Ability and Other Comparison Measures

Panel A: Comparison of Operating Cash Flows and EBITDA

	Operating Cash Flows vs. EBITDA		
	(1)	(2)	(3)
	OCF	***OPEARN***	***FCF***
Quintiles	2.210***	2.217***	1.940***
	(15.977)	(12.824)	(10.805)
Quintiles × $EBITDA_{Ind}$	0.197***	0.203***	0.115***
	(9.911)	(8.152)	(4.225)
$EBITDA_{Ind}$	-0.098***	-0.101***	-0.057***
	(-7.757)	(-6.611)	(-3.646)
Constant	-0.852***	-1.394***	-1.287***
	(-8.078)	(-10.486)	(-10.305)
Observations	214,790	214,790	214,790
Adj. R-squared	0.096	0.063	0.045

Panel B: Comparison of Street Earnings and EBITDA

	I/B/E/S Street Earnings vs. EBITDA		
	(1)	(2)	(3)
	OCF	***OPEARN***	***FCF***
Quintiles	2.182***	2.636***	2.226***
	(16.064)	(15.195)	(12.855)
Quintiles × $EBITDA_{Ind}$	0.225***	-0.217***	-0.171***
	(8.999)	(-6.753)	(-4.751)
$EBITDA_{Ind}$	-0.113***	0.108***	0.086***
	(-6.285)	(5.559)	(4.143)
Constant	-0.838***	-1.604***	-1.430***
	(-7.999)	(-11.967)	(-11.662)
Observations	214,790	214,790	214,790
Adj. R-squared	0.095	0.075	0.052

This table compares the predictive ability of EBITDA against current operating cash flows (Panel A) and street earnings (Panel B). Current operating cash flow is operating cash flow for the quarter calculated from the year-to-date variable (i.e., oancfy from Compustat) and scaled by sales (saleq from Compustat). I/B/E/S street earnings is actual I/B/E/S street EPS for the quarter multiplied by the number of diluted shares (cshfdq from Compustat) and scaled by sales (saleq from Compustat). To compare predictive ability, in each panel we stack two sets of firm-quarter ranks together. $EBITDA_{Ind}$ indicates whether the rank for a given observations is based on *EBITDA* (when $EBITDA_{Ind}$ = 1) or the comparison measure (when $EBITDA_{Ind}$ = 0). The variables of interest are highlighted in grey. All variables are defined in Appendix B. We report *t*-statistics in parentheses below coefficient estimates. Standard errors are clustered by firm and the calendar quarter of the earnings announcement date (e.g., Q1 2019). ***, **, and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Table 6: Predictive Ability and the Types of EBITDA Exclusions

Panel A: Effects of ITDA Exclusions Only

	Net Income vs. *EBITDA_ITDAonly*		
	(1)	(2)	(3)
	OCF	***OPEARN***	***FCF***
Quintiles	2.021***	2.617***	2.198***
	(15.331)	(15.217)	(13.410)
Quintiles × *EBITDA_ITDAonly* $_{Ind}$	0.201***	-0.174***	-0.205***
	(9.988)	(-7.055)	(-5.519)
EBITDA_ITDAonly $_{Ind}$	-0.100***	0.087***	0.103***
	(-7.018)	(5.525)	(5.065)
Constant	-0.757***	-1.594***	-1.416***
	(-7.359)	(-11.961)	(-11.920)
Observations	214,790	214,790	214,790
Adj. R-squared	0.081	0.075	0.050

Panel B: Effects of Non-ITDA Exclusions Only

	Net Income *vs EBITDA_nonITDAonly*		
	(1)	(2)	(3)
	OCF	***OPEARN***	***FCF***
Quintiles	2.021***	2.617***	2.198***
	(15.331)	(15.217)	(13.410)
Quintiles × *EBITDA_nonITDAonly* $_{Ind}$	0.168***	-0.009	0.084**
	(7.932)	(-0.414)	(2.609)
EBITDA_nonITDAonly $_{Ind}$	-0.084***	0.005	-0.042**
	(-6.816)	(0.360)	(-2.457)
Constant	-0.757***	-1.594***	-1.416***
	(-7.359)	(-11.961)	(-11.920)
Observations	214,790	214,790	214,790
Adj. R-squared	0.080	0.080	0.057

This table presents tests isolating the effects of ITDA and non-ITDA exclusions on EBITDA's predictive ability. In Panel A, we compare net income to an EBITDA measure that excludes only ITDA items (*EBITDA_ITDAonly*). In Panel B, we compare net income to an EBITDA measure that excludes only non-ITDA items (*EBITDA_nonITDAonly*). To compare predictive ability, in each panel we stack two sets of firm-quarter ranks together. In Panel A, *EBITDA_ITDAonly*$_{Ind}$ indicates whether the rank for a given observations is based on *EBITDA_ITDAonly* (when *EBITDA_ITDAonly*$_{Ind}$ = 1) or *Net Income* (when *EBITDA_ITDAonly*$_{Ind}$ = 0). In Panel B, *EBITDA_nonITDAonly*$_{Ind}$ indicates whether the rank for a given observations is based on *EBITDA_nonITDAonly* (when *EBITDA_nonITDAonly*$_{Ind}$ = 1) or *Net Income* (when *EBITDA_nonITDAonly*$_{Ind}$ = 0). The variables of interest are highlighted in grey. All variables are defined in Appendix B. We report *t*-statistics in parentheses below coefficient estimates. Standard errors are clustered by firm and the calendar quarter of the earnings announcement date (e.g., Q1 2019). ***, **, and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Table 7: What are Non-ITDA Exclusions?

Panel A: Relation with Future Operating Performance

Variable	(1) ***OCF***	(2) ***OPEARN***	(3) ***FCF***
EBITDA	2.958***	3.530***	3.276***
	(60.732)	(74.629)	(53.855)
ITDA	0.422***	3.375***	4.651***
	(3.400)	(16.882)	(13.091)
NonITDA	0.292***	1.209***	0.735***
	(4.100)	(11.600)	(5.113)
Size	0.018***	0.036***	0.065***
	(3.459)	(7.635)	(7.561)
BTM	-0.056***	-0.164***	-0.001
	(-3.815)	(-6.591)	(-0.037)
Loss	0.115***	0.063***	0.222***
	(5.949)	(2.827)	(5.507)
Growth	-0.755***	-0.687***	-0.784***
	(-4.576)	(-4.264)	(-3.121)
Earnvol	-0.668	-0.328	-0.969
	(-1.497)	(-0.651)	(-1.388)
Observations	107,395	107,395	107,395
Adj. R-squared	0.852	0.874	0.769
Fixed Effects	Yes	Yes	Yes

Panel B: Comparison with Non-GAAP Exclusions

	(1)	(2)	(3)	(4)
	EBITDA & Street EPS are Adjusted		*All Firm Quarters*	
Variable	***NonITDA***	***NonITDA***	***NonITDA***	Dominance Analysis Rank
NG_Exclusions	0.769***			
	(46.588)			
Transitory		0.915***		
		(18.520)		
Other		0.781***		
		(39.444)		
SpecialItems			0.926***	1
			(57.531)	
NonopItems			1.125***	2
			(22.027)	
ExtraordItems			0.931***	6
			(35.313)	
DiscOps			1.075***	3
			(39.246)	
NonControl			1.178***	5
			(7.345)	
StockComp			0.178***	4
			(7.110)	
Observations	61,446	61,446	107,395	
Adj. R-squared	0.751	0.738	0.476	
Fixed Effects	Yes	Yes	No	

This table presents tests to understand the composition of non-ITDA exclusions. In Panel A, we examine how EBITDA, ITDA, and non-ITDA exclusions relate to future operating performance. Panel A includes controls common in similar tests in the non-GAAP reporting literature (e.g., Kolev et al. 2008) as well as firm and earnings announcement year fixed effects. The variables of interest are highlighted in grey. In Panel B, Columns 1 and 2, we compare non-ITDA exclusions with exclusions from street EPS (*NG_Exclusions*) and separately examine transitory (*Transitory*) and other (i.e., recurring) exclusions (*Other*). Columns 1 and 2 limit the sample to observations where EBITDA is adjusted (i.e., nonzero *NonITDA*) and street EPS is adjusted (i.e., nonzero *NG_Exclusions*). These columns also include firm and earnings announcement year fixed effects. Columns 3 and 4 present the results of a dominance analysis, using the full sample, to understand which specific items best explain non-ITDA exclusions. All variables are defined in Appendix B. We report *t*-statistics in parentheses below coefficient estimates. Standard errors are clustered by firm and the calendar quarter of the earnings announcement date (e.g., Q1 2019). ***, **, and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Table 8: The Pricing of EBITDA and EBITDA Exclusions

Variable	(1) $\mathbf{RET_{AnnDay}}$	(2) $\mathbf{RET_{AnnDay}}$	(3) $\mathbf{RET_{1qtr}}$	(4) $\mathbf{RET_{2qtr}}$
$GAAP_{Surp}$	0.055***			
	(52.158)			
$EBITDA_{Surp}$		0.088***	0.012***	0.010***
		(77.365)	(3.795)	(3.044)
$Exclusions_{Surp}$		0.022***	0.008***	0.002
		(21.381)	(2.672)	(0.747)
Size	0.001***	-0.001***	-0.001	0.001
	(3.843)	(-4.097)	(-1.319)	(0.903)
BTM	0.010***	0.010***	0.017***	0.009**
	(9.413)	(9.692)	(4.885)	(2.403)
Growth	0.108***	0.065***	0.024	-0.104***
	(12.895)	(7.966)	(0.907)	(-3.425)
Earnvol	0.039**	0.051***	0.293***	0.198***
	(2.139)	(2.795)	(4.332)	(3.037)
Observations	100,957	100,957	100,957	100,957
Adj. R-squared	0.042	0.083	0.022	0.017
Fixed Effects	Yes	Yes	Yes	Yes

This table presents tests of how investors price EBITDA and EBITDA exclusions. We calculate buy-and-hold market-adjusted returns over different windows relative to the earnings announcement date. RET_{AnnDay} is returns over a [-1,+1] trading-day window, RET_{1qtr} is returns over the following quarter ([+2,+64]), and RET_{2qtr} is returns over the second quarter following the earnings announcement (+65,+127]). $GAAP_{Surp}$ is a quarterly decile rank of the I/B/E/S GAAP EPS surprise. $EBITDA_{Surp}$ is a quarterly decile rank of the I/B/E/S EBITDA surprise (converted to a per-share basis). $Exclusions_{Surp}$ is a quarterly decile rank of the exclusions surprise (converted to a per-share basis). We scale all three decile ranks to range from 0 to 1. All variables are defined in Appendix B. We report *t*-statistics in parentheses below coefficient estimates. Standard errors are clustered by earnings announcement date. We include industry and earnings announcement year fixed effects. ***, **, and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Table 9: Determinants of Firms' EBITDA Disclosures

Panel A: Descriptive Statistics

Variable	Mean	Median	Std. Dev.
EBITDA_FirmDisclose	0.441	0.000	0.497
Deals	0.033	0.032	0.010
HiVariation	0.476	0.000	0.499
HasTransItems	0.475	0.000	0.499
R&D	0.011	0.000	0.023
HHI	454.436	345.347	293.386
NIMiss_EBITDAMeet	0.158	0.000	0.365
NG_SECLetter	0.069	0.000	0.253
NGEPS_FirmDisclose	0.470	0.000	0.499
BTM	0.486	0.386	0.482
Size	7.258	7.222	1.756
Time	38.209	39.000	18.164
Loss	0.283	0.000	0.451

Panel B: Determinants Model

Construct	Variable	***EBITDA_FirmDisclose*** (1)	(2)
Information Demands	*Deals*	0.133***	0.076**
		(5.008)	(2.294)
	HiVariation	0.660***	0.573***
		(7.508)	(5.146)
	HasTransItems	0.316***	0.037
		(8.124)	(0.695)
Proprietary Costs	*R&D*	-0.815***	-0.903***
		(-14.755)	(-10.059)
	HHI	-0.001	0.007
		(-0.019)	(0.139)
Benchmark Beating	*NIMiss_EBITDAMeet*	0.102***	0.079**
		(2.919)	(2.129)
Regulatory Cost	*NG_SECLetter*	0.250***	0.092
		(4.521)	(1.409)
Controls	*NGEPS_FirmDisclose*	0.281***	
		(5.186)	
	BTM	0.045	0.076**
		(1.586)	(1.997)
	Size	-0.440***	-0.626***
		(-11.006)	(-11.068)
	Loss	0.485***	0.321***
		(8.821)	(4.945)
	Time	0.031***	0.036***
		(18.920)	(16.326)
	Constant	-2.261***	-1.839***
		(-24.137)	(-15.939)
	Observations	88,880	41,810
	Pseudo R-squared	0.131	0.139

This table presents tests related to why firms disclose EBITDA. *EBITDA_FirmDisclose* is an indicator set to 1 if the firm discloses EBITDA in the earnings announcement. In Panel A, we present descriptive statistics for the variables in the determinants model. In Panel B, we present estimated coefficients from a logit regression. *Deals* measures how frequently mergers, acquisitions, or other transactions occur in the firm's Fama-French 12 industry. *HiVariation* is an indicator set to 1 if the firm's industry has high capital structure variation. *HasTransItems* is an indicator set to 1 if the firm reports transitory items during the quarter. *R&D* is the firm's research and development expenditures. *HHI* is the firm's Fama-French 12 industry's Herfindahl-Hirschman Index. *NIMiss_EBITDAMeet* is an indicator set to 1 if the firm misses analysts' GAAP EPS forecast but meets or beats analysts' EBITDA forecast. *NG_SECLetter* is an indicator set to 1 if the firm has recently received an SEC Comment Letter about their non-GAAP reporting practices. *NGEPS_FirmDisclose* is an indicator set to 1 if the firm discloses non-GAAP EPS for the quarter. *BTM* is the book to market ratio. *Size* is firm size. *Time* is a time-trend measure. *Loss* is an indicator set to 1 if the firm reports a GAAP loss for the quarter. All variables are defined in Appendix B. We report *t*-statistics in parentheses below coefficient estimates. Standard errors are clustered by firm and the calendar quarter of the earnings announcement date (e.g., Q1 2019). ***, **, and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Table 10: Predictive Ability and Firms' EBITDA Disclosures

	Net Income vs. EBITDA		
	(1)	(2)	(3)
Variable	***OCF***	***OPEARN***	***FCF***
Quintiles	2.623***	3.264***	2.895***
	(11.933)	(11.822)	(11.111)
Quintiles × $EBITDA_{Ind}$	0.127***	-0.221***	-0.114**
	(3.313)	(-5.168)	(-2.166)
Quintiles × $EBITDA_{Ind}$ × *EBITDA_FirmDisclose*	0.310***	-0.081	-0.117
	(6.300)	(-1.276)	(-1.399)
Quintiles × *EBITDA_FirmDisclose*	-1.816***	-2.209***	-2.230***
	(-8.562)	(-8.524)	(-9.071)
$EBITDA_{Ind}$	0.035	0.235***	0.167***
	(1.133)	(6.669)	(4.637)
EBITDA_FirmDisclose	1.497***	1.640***	1.610***
	(8.947)	(7.959)	(7.993)
$EBITDA_{Ind}$ × *EBITDA_FirmDisclose*	-0.282***	-0.128***	-0.080
	(-7.836)	(-3.042)	(-1.619)
Constant	-1.324***	-2.110***	-1.919***
	(-7.460)	(-9.540)	(-9.367)
Observations	195,196	195,196	195,196
Adj. R-squared	0.131	0.114	0.087

This table examines whether the predictive ability of EBITDA differs depending on whether firms disclose EBITDA (*EBITDA_FirmDisclose*). We rank firms into quintiles based on *EBITDA* or *Net Income* for each quarter within Fama-French 12 industries for observations where *EBITDA_FirmDisclose* is not missing. We then examine whether the predictive ability of *EBITDA* relative to *Net Income* differs depending on whether firms disclose EBITDA. $EBITDA_{Ind}$ indicates whether the rank for a given observation is based on *EBITDA* (when $EBITDA_{Ind}$ = 1) or *Net Income* (when $EBITDA_{Ind}$ = 0). The variables of interest are highlighted in grey. All variables are defined in Appendix B. We report *t*-statistics in parentheses below coefficient estimates. Standard errors are clustered by firm and the calendar quarter of the earnings announcement date (e.g., Q1 2019). ***, **, and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.