The Information Content of Discretionary Disaggregation

by

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Abstract

I examine the information content embedded in firms' decision to disaggregate financial statement line items. I find that the level of disaggregation predicts both current and future performance. I also find that significant changes in discretionary disaggregation are indicative of weak fundamentals. In particular, I document a hump-shaped pattern such that both increases and decreases in discretionary disaggregation are negatively associated with measures of performance. Investors do not unravel this information at the time of filing, resulting in predictable return patterns over time. Together, these findings are consistent with discretionary disaggregation providing an informative—but low saliency—signal regarding firms' fundamental performance.

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1 Introduction

In this paper, I study the information content embedded in firms' decision to disaggregate financial statement line items into their component parts. Managers who are actively involved in a firm's daily activities possess superior private information regarding the firm's economic state compared to shareholders outside the firm ([14]). Financial reporting allows managers to ease this informational imbalance by providing a channel with which to credibly communicate the firm's financial position. Numerous accounting standards have arisen intended to ensure that the financial statements released by management be representative of the underlying economic activities of the firm. However, within the bounds set by these standards, firms possess an element of discretion in determining the content and presentation of the reports.

In this paper, I examine the information content contained in firms' decisions to provide (withhold) additional information in the annual report via disaggregation. Effective disclosure provides accurate and precise information which allows outsiders to better understand the firm's economic position. On the one hand, firms seeking to increase the effectiveness of disclosure may attempt to make financial reports easier to understand, allowing outsiders to more efficiently process the information content. On the other hand, firms seeking to slow the flow of information may attempt to make financial reports harder to understand by introducing unnecessary complexity. This decision is rooted in the incomplete revelation hypothesis presented by [2] which states that due to the costly nature of information acquisition, firms have incentives to obfuscate information during times of poor performance.[1] Recent work has shown that firms experiencing poor performance incorporate more complex language, making reports more difficult to read ([21]). In addition, [12] note that firms may have complex financial statements due to complex accounting standards or transactions. They find that firms with strong fundamental performance go to greater lengths to mitigate the negative effects of financial statement complexity through the use of voluntary disclosure than those with weak fundamental performance. Thus, it appears that managers are aware of financial statement complexity and its ability to impact the information environment.

[1] See also [11]

The ability of complexity to impact the effectiveness of disclosure calls for a closer look into firms' decision to provide more granularity in financial statements. Typically, it is thought that finer, more granular, information is of higher quality ([1]). However, to the extent that granularity impacts complexity, there may exist a tradeoff between the two. Previous studies have considered this tradeoff in terms of how language or lexical properties impact complexity, however, an element which has received less consideration is the extent to which managers disaggregate within mandatory financial reports. Disaggregation is a way of providing more granular information by creating more specific categories within a given line item and is one of the primary channels through which firms may alter the level of detail provided in their core financial statements. It is reasonable to believe that firms possess sufficient information to provide highly disaggregated financial statements, however we observe considerable variation in both the cross-section and the time-series.

A large portion of disaggregation is driven by firm-specific characteristics and complex transactions, however, roughly 20% of the variation in firms' disaggregation is unaccounted for. This discretionary level of disaggregation is similar to voluntary disclosure in that it provides additional, non-required information to shareholders. Voluntary disclosure has been shown to increase when fundamental performance is strong ([25]). Viewing disaggregation under this lens, I expect that firms will disaggregate more when underlying performance is strong. This increase in disaggregation has several benefits such as increasing management's credibility and lowering information asymmetry ([16], [3]). However, on the other hand, disaggregation is not without costs. Increasing disaggregation carries with it proprietary costs as it may provide competitors with detailed information regarding specific expenditures and investment. It is unclear whether the benefits outweigh the costs and, as such, I begin by investigating the contemporaneous relationship between discretionary disaggregation and firm fundamentals. To the extent that the benefits do outweigh the costs, I predict that discretionary disaggregation will be positively related to fundamental performance.

Much of financial statements' usefulness resides in their ability to provide comparable information. Typically, financial statement users draw value from comparing information provided in the current year to that of some benchmark, perhaps that of a previous year or a close competitor. This element of comparability gives the user a sense for the operational ef-

ficiency and growth of the company and allows them to see how the firm's economic position has shifted relative to the benchmark. If firms significantly alter the level of discretionary disaggregation from year to year, it may have a considerable impact on financial statement comparability. This reduction in comparability is akin to increasing the complexity of the financial statements as it may reduce the effectiveness of the disclosure as a source of information. Moreover, this reduction in comparability can be achieved by either increasing or decreasing the level of disaggregation. [17] find that disaggregating earnings items with homogenous characteristics can increase complexity and lead investors to rely on insignificant signals. Thus, in accordance with [2] and [21], firms experiencing poor performance may have incentives to significantly alter the level of discretionary disaggregation in order to obfuscate information. I predict that firms changes in the level of discretionary disaggregation will be negatively related to fundamental performance.

If firms are indeed attempting to obfuscate information by changing the level of discretionary disaggregation from year to year, they must believe that investors are unable to fully unravel the information embedded in this change. Time and attention are both limited resources and, as a result, investors may allocate their time rationally to that information which appears to be most salient. ([15]) With a wealth of information available, low saliency signals often go unnoticed. [4] demonstrates that investors are slow to unravel changes in the language of financial statements due to limited attention. Although changes in overall disaggregation are likely to be obvious, changes in discretionary disaggregation are less so and, as such, are not processed immediately. Over time, investors will begin to unpack this information and prices will update accordingly. Because investors underreact at the time of the filing, I expect predictable return patterns to emerge in subsequent periods. In addition, because this signal is tied to fundamental performance, I do not expect these returns to reverse.

In testing the first prediction, I draw on recent work by [3] who develop a measure of disaggregation quality (DQ) which captures the number of non-missing Compustat line items. I obtain my measure of discretionary disaggregation by taking the residual of their DQ measure after controlling for fundamental drivers of disaggregation.[2] I measure performance

[2]Specifically, I control for seven fundamental drivers of the level of disaggregation: asset restructuring,

using two metrics, ROA and the Piotroski-So $FSCORE$ ([28]). The latter measure will be explained in more detail in 3, and is intended to capture the underlying strength of firms' fundamentals in a given year by measuring elements of profitability, efficiency, and liquidity. I find that both ROA and $FSCORE$ are positively correlated with discretionary disaggregation. This result tends to be stronger in the balance sheet than in the income statement.

In testing the second prediction, I obtain a measure of year-over-year changes in discretionary disaggregation using two different designs. In the first design, I calculate changes in discretionary disaggregation as the difference between the previously-obtained residuals in the current year and the prior year. In the second design, I calculate changes in discretionary disaggregation by using first differences and taking the residual from performing the regression on the first differences equation. Both of these measure are intended to capture within-firm variation in discretionary disaggregation and each provides similar results. I find that changes in discretionary disaggregation negatively predicts firms' fundamental performance. Sorting firms by changes in discretionary disaggregation, I find that both current and future ROA and $FSCORE$ follow a hump-shaped pattern. Firms that both increase and decrease discretionary disaggretation have relatively low fundamental performance compared to those who maintain a similar level of discretionary disaggregation. This pattern is strongest in the balance sheet and is robust to the inclusion of various control variables.

In testing the third prediction, I draw on the fact that significant changes in the level of disaggregation, both positive and negative, are indicative of weak subsequent performance. I form portfolios by taking a long (short) position in firms with the lowest (highest) absolute change in discretionary disaggregation and find that this portfolio delivers size-adjusted returns of up to 5.4% annually, roughly 45 basis points per month, with the majority of the returns accruing several months after the announcement. In addition, I run Fama-MacBeth regressions, controlling for several factors which are known to influence returns, and find that my results are robust to the inclusion of these variables, although the economic magnitude

M&A activity, special items, volatility, total assets, operational complexity, and size. I also include industry and year fixed effects in the regression. In total, these drivers account for roughly 75% of the variation in DQ. Including firm fixed effects in place of industry fixed effects accounts for roughly 85% of the variation in DQ. This indicates that a large portion of the firm-specific variation can be captured at the industry level.

shrinks. I find no evidence of reversals in these returns, indicating that investors initially underreact to the information content of changes in the level of discretionary disaggregation and that these changes are indeed tied to fundamental performance.

Overall, this study provides new evidence that discretionary disaggregation in the balance sheet and the income statement is predictive of performance. A growing literature suggests that firms are aware of and manage financial statement complexity, often by altering the language or lexical properties of the documents. My findings complement these by highlighting an additional channel through which firms may manage complexity—altering the level of discretionary disaggregation. In addition, there are predictable return patterns following these alterations in disaggregation, suggesting that investors may not fully unravel this information.

The remainder of the paper proceeds as follows. In Section 2, I provide a review of related literature and develop the main hypotheses. In Section 3, I discuss the data generating process as well as the measures used in the supporting analyses. Section 4 contains a discussion of the results of my empirical tests. Finally, in Section 5, I conclude with a summary of my findings as well as a discussion of future tests that will add robustness to the preceding analysis.

2 Hypothesis Development

Disclosure provides a channel through which firms can credibly communicate information to outside shareholders. Mandatory reporting requirements require that public companies release financial statements on a regular basis, providing an element of monitoring. Moreover, accounting standards are established with the intent of providing an accurate mapping of the underlying economics of various transactions to measurable, accounting numbers. Thus, by analyzing firms' financial statements, shareholders can better understand the economic activity of the firm, reducing the informational imbalance that arises as a result of the principal-agent relationship. The effectiveness of firms' financial statements resides in their ability to provide accurate and precise information to shareholders who can, in turn, update their beliefs about firm value. The effectiveness of disclosure is important to both standard

setters and shareholders. In 2013, the SEC announced the undertaking of the "Disclosure Effectiveness Initiative" intended to simplify various standards and regulations regarding mandatory filings. Speaking about this initiative, Rick Fleming noted, "Investors are not clamoring for rules that are unnecessarily burdensome, needlessly complex, or that result in distracting clutter...investors do want disclosure rules that get companies to produce all the information that is important".[3]

Although accounting standards are intended to provide a uniform way to measure economic activity, they do not account for every contingency and, as a result, firms have some discretion over the content and presentation of mandatory financial statements. These discretionary choices can have an impact on the firms' information environment. Recent research provides evidence that managers are aware of their ability to influence the information environment, and sometimes act opportunistically ([2], [21]). One way in which firms may exercise discretion and influence the information environment is through the use of language. Language that is difficult to understand can add unnecessary complexity to financial statements which increases shareholder's costs of information acquision. [24] documents that longer, less readable filings result in less trading activity and [20] find that less readable reports are associated with a greater demand for analyst reports and increased analyst forecast dispersion. Firms may obfuscate information when performance is poor by using complex language ([21]). These studies contribute to a growing literature which supports the notion that complex language can negatively impact the information environment.

Another discretionary choice which may influence firms' information environment is the level of disaggregation provided in the core financial statements, such as the balance sheet and the income statement. Disaggregation is a way of providing additional granularity by splitting line items into more specific subcategories. Under US GAAP, firms have considerable freedom when evaluating what level of disaggregation to provide in the financial statements. Generally, prior research supports the idea that disaggregation provides incremental information, increasing the effectiveness of disclosure. Disaggregation increases the usefulness of reports ([9]) In addition, using disaggregated components of earnings provides

[3] https://www.sec.gov/news/speech/moving-forward-with-the-disclosure-effectiveness-initiative.html#_edn1

better forecasting power of future ROE ([22], [7]) and increases credibility ([23], [16]). [3] link higher levels of disaggregation to lower analyst forecast errors and lower bid-ask spreads. Collectively, these results suggest that firms can positively influence the information environment by increasing disaggregation. Nevertheless, there still exists significant variation in the level of disaggregation that firms choose to provide.

A large portion of disaggregation is driven by observable firm-specific characteristics and complex transactions, however, roughly 25% of the variation in firms' disaggregation is unaccounted for. This discretionary level of disaggregation is similar to voluntary disclosure in that it provides additional, non-required information to shareholders. The determinants of voluntary disclosure are complex, however, it is relatively well established that firms tend to be more forthcoming with good news than bad news and tend to increase voluntary disclosure when performance is strong ([25], [19], [18], [5]). On the one hand, viewing discretionary disaggregation under this lens, it is reasonable to assume that firms will increase disaggregation in the financial statements when performance is strong. However, on the other hand, it may be that the benefits of disaggregation do not exceed the proprietary costs of providing a detailed breakdown of expenditures and investments to competitors. This leads to my first testable prediction, stated in the null form.

H1: There is no relationship between discretionary disaggregation and fundamental performance.

A firm that is experiencing growth would like to communicate this as clearly as possible. One valuable aspect of the financial statements is their ability to provide comparability. Typically, in isolation, a firms' financial statements can provide only limited inference. The information content becomes richer when comparing to a benchmark such as the previous year or a close competitor. Significantly altering the level of disaggregation from year to year may have a considerable impact on financial statement comparability. Both increasing and decreasing disaggregation may increase financial statement complexity by making it difficult for shareholders to assess how the firms' economic position has shifted. [17] find that disaggregating earnings numbers into items with homogenous characteristics causes investors to rely on insignificant signals. While firms that have experienced a positive shift would like to maintain comparability, firms that have experienced a negative shift may

want to reduce comparability. Thus, in the event that firms perform poorly, they may try to obfuscate information by significantly altering the level of discretionary disaggregation, reducing comparability and increasing complexity. This, in turn, will raise the cost to acquire the information and increase the likelihood that it may go unnoticed. This leads to my second set of testable predictions,

H2: Firms that significantly alter the level of discretionary disaggregation will have weak fundamental performance relative to those that maintain a similar level of discretionary disaggregation.

Attention and time are limited resources which shareholders must allocate carefully when engaging in information acquisition ([15]). Firms with weak fundamental performance only obfuscate information if they believe that investors will not fully unravel the information content at the time of revelation. Prior research has found that in certain instances, investors tend to react more to information when it is presented in a vivid manner ([27], [13]) and that investors tend to underreact to low saliency news. For example, investors do not fully react to the passage of time when assessing the likelihood of merger completion ([10]). Although the overall level of disaggregation is a visible signal, the discretionary component is less so. Investors may not be able to parse out changes in the level of discretionary disaggregation resulting in an initial underreaction at the time of filing. As time passes, this information should begin to manifest itself in prices, resulting in predictable return patterns. Because this signal is related to future fundamental performance, these returns should be persistent and should not reverse. This leads to my final testable prediction.

H3: A portfolio consisting of long (short) position in the lowest (highest) decile of absolute changes in the level of discretionary disaggregation will generate positive excess returns.

3 Research Design

3.1 Measuring discretionary disaggregation and fundamental performance

My first objective is to measure firms' level of discretionary disaggregation in the financial statements. I draw on the work of [3] who develop a measure which they term disaggregation quality, (DQ). DQ is calculated by determining the number of nonmissing Compustat items on the balance sheet and income statement. The counts are isolated within nesting groups[4] and are calculated in percentage terms and scaled by their relative magnitudes.[5] The final summary measure, DQ, is computed by averaging the score for the balance sheet (DQ_BS) and income statement (DQ_IS). This measurement of disaggregation has the advantage that it is readily available for the entire universe of firms listed in Compustat.

In this paper, I am not interested in the overall level of disaggregation (DQ), but rather the *discretionary* component. The overall level of disaggregation is largely influenced by certain business activities or fundamentals. Chen, Miao, and Shevlin identify six drivers of DQ: asset restructuring, M&A activity, special items, volatility, total assets, and the number of business segments. In addition, they find that DQ varies significantly across industries and over time. I measure the level of discretionary disaggregation by taking the residual of DQ after controlling for these fundamental drivers and including industry and year fixed effects. This residual represents the level of disaggregation that is not attributable to observable drivers of disaggregation, but rather to management's discretion. It should be noted that DQ is bounded by 0 and 1. In order to ensure that the regression used to obtain the residual is well-specified, I map DQ to the real line by performing a logit transformation,

[4] In their paper, the authors note that items may be missing in Compustat simply because they are irrelevant for the firm being studied. Using the nesting feature of the financial statements, that is, the idea that subaccounts must add up to the total, the authors ensure that irrelevant items are coded as nonmissing. The authors identify 13 nesting groups on the Balance Sheet and 7 on the Income Statement.

[5] After identifying the nesting groups, the authors construct DQ by taking the following linear combination: $\sum_{k=1}^{13} \left\{ \left(\frac{\#\ Nonmissing\ Items}{Total\ Items} \right)_k * \frac{Assets_k}{Total\ Assets_k} \right\} \div 2$ which yields a value between 0 and 1. When computing the DQ score for the income statement, nesting groups are equally-weighted in order to avoid biasing the measure towards the top line items

following [26].[6]. Moving forward, I will restrict my discussion to analysis of the transformed variable, PQ.

$$PQ_{it} = log\left(\frac{DQ_{it}}{1 - DQ_{it}}\right) \tag{1}$$

Using this transformed measure, I estimate the following regression:

$$\begin{aligned} PQ_{it} = \beta_0 + \beta_1 Restructure_{it} + \beta_2 M\&A_{it} + \beta_3 SI_{it} + \beta_4 Volatility_{it} \\ + \beta_5 LogTA_{it} + \beta_6 LogNSeg_{it} + IndustryFE + YearFE + \varepsilon_{it} \end{aligned} \tag{2}$$

where ε_{it} represents the level of discretionary disaggregation (ResPQ).[7].

The results of this regression are reported in Table 1 Panel B. All coefficients have been multiplied by 100 to ease interpretation. The results obtained here are similar to those obtained by [3].[8] Most notable is the high R^2 in this regression. A substantial amount of variation in PQ is due to firm-specific, observable characteristics.[9] Despite the high R^2, the remaining 25% warrants additional investigation.

I employ two measures of fundamental performance in this paper. The first is return on assets (ROA) which provides an overall indication of firms' ability to generate income, scaled by assets and is widely used. The second is the Piotroski-So $FSCORE$ which draws from [28] and [8] to classify firms based on nine fundamental signals. This measure is designed to capture three essential elements of firms' financial condition: profitability, liquidity, and operational efficiency. Within the profitability dimension there are four indicator variables corresponding to the following conditions: return on assets is positive, change in return on assets is positive, cash flow from operations is positive, accruals are negative. Within the liquidity dimension there are three indicator variables corresponding to the following conditions: change in the debt ratio is negative, change in the current ratio is positive, the

[6]All results are extremely similar regardless of whether I use DQ or the logit transformation, PQ.

[7]I obtain measures of discretionary disaggregation for both the balance sheet and income statement by running this same regression, but substituting PQ_BS and PQ_IS as the dependent variables, respectively.

[8]The most notable exception is that my coefficient for M&A is positive while theirs is negative. This does not represent a major concern for two reasons: (1) in their paper, the authors predict a positive relationship between DQ and M&A activity and (2) it is not unreasonable to think that engaging in M&A activity would potentially increase reporting requirements and, as such, the overall level of required disaggregation in the financial statements.

[9]In untabulated analyses, I run the above regression substituting firm fixed effects for industry fixed effects. Under this specification, the adjusted R^2 increases to .85. This modest increase indicates that the majority of the variation in DQ can be isolated to the industry level.

firm did not issue common equity. Within the efficiency dimension there are two indicator variables corresponding to the following conditions: the change in the gross margin ratio is positive, the change in asset turnover is positive. The indicator variables are set equal to 1 if the conditions are met and are then summed to obtain a score between 0 and 9, where 9 represents strong fundamental performance.

Sample Selection

One of the virtues of the DQ measure is that it is available for all firms listed in Compustat. I download all firm-years available in the Compustat database and eliminate those with insufficient information to calculate $FSCORE$, leaving me with 229,081 firm-year observations. I then calculate buy-and-hold size-adjusted returns using the CRSP database and merge this with the data obtained from Compustat, further reducing the sample to 151,544 firm-year observations. Next, I obtain information regarding M&A activity using Thomson Reuter's SDC database and merge this to my sample. Then, using Compustat, I compute the DQ measure following [3] and exclude firms with a score not between 0 and 1. This leaves me with 136,204 firm-year observations. Finally, I restrict my analysis to the years 1980 to 2016, leaving me with a sample of 118,323 firm-year observations. Descriptive statistics for the sample can be found in Table 1, Panel A.

4 Results

In the first set of tests, I investigate the contemporaneous relationship between the level of discretionary disaggregation and firm fundamentals. I obtain a measure of the level of discretionary disaggregation by taking the residual of PQ after controlling for fundamental drivers of disaggregation. I refer to this residual as $ResPQ$ and obtain similar measures, $ResPQ\_BS$ and $ResPQ\_IS$, for the balance sheet and income statement components of PQ, respectively. Each year, I rank firms into deciles based on $ResPQ$[10]. Figure 1 Panel A provides a quick look at the relationship between deciles of discretionary disaggregation and firm fundamentals, measured by ROA and FS. In these graphs, the mean ROA and FS

[10] I do the same for $ResPQ\_BS$ and $ResPQ\_IS$, but will refrain from mentioning them for brevity

are plotted for deciles of levels of discretionary disaggregation. A clear positive relationship emerges, suggesting that firms with strong fundamentals tend to have higher levels of discretionary disaggregation. Table 2 Panel A presents the mean values ROA and FS in each decile of $ResPQ$. This relationship is consistently positive in the summary measure and the balance sheet measure. On average, firms in the highest decile of $ResPQ$ have an ROA that is 2.1% higher and FS that is .24 higher than those in the lowest decile.

Next, I examine the relationship between the level of discretionary disaggregation and one-year ahead fundamentals. Figure 1 Panel B illustrates the relationship between deciles of discretionary disaggregation and one-year ahead fundamentals. In these graphs the mean ROA_{t+1} and $FSCORE_{t+1}$ are plotted across deciles of discretionary disaggregation. Here, a positive relationship emerges, although it appears to be weaker than the contemporaneous relationship. Table 2 Panel B presents the mean values of ROA_{t+1} and $FSCORE_{t+1}$ across deciles of $ResPQ$. On average, firms in the highest decile have an ROA_{t+1} that is 1.5% higher and FS_{t+1} that is .07 higher than those in the lowest decile. This result appears to be strongest in the balance sheet.

As an additional test, I investigate whether this result is robust to the inclusion of additional control variables. Table 3 Panel A presents the results of panel regressions which investigate the effect of discretionary disaggregation on ROA in both the current period and the next. Interestingly, there exists a positive relationship between balance sheet disaggregation and ROA and a negative relationship between income statement disaggregation and ROA. This could be a result of firms disaggregating in the income statement in order to reduce fixation on earnings ([6]). It appears that after controlling for other drivers of ROA, the level of discretionary disaggregation has little predictive power for one-year ahead ROA. Panel B presents a similar analysis for FS. A consistent positive correlation emerges in the contemporaneous relationship. In contrast to ROA, the positive relationship between discretionary disaggregation and one-year ahead FS persists after including controls. Collectively, this evidence is sufficient to reject the null hypothesis that there is no contemporaneous relationship between the level of discretionary disaggregation and firm fundamentals, however, the relationship between the level of disaggregation and future fundamentals requires further investigation.

In the next set of tests, I investigate the contemporaneous relationship between changes in the level of discretionary disaggregation calculated as $(ResPQ_t - ResPQ_{t-1})$ and firm fundamentals. Each year I rank firms into deciles based on $\Delta ResPQ$. Figure 2 Panel A provides a quick look at the relationship across deciles of changes in discretionary disaggregation for both current and future fundamentals. In these graphs, the mean ROA_t and FS_t as well as ROA_{t+1} and FS_{t+1} are plotted across deciles of changes in discretionary disaggregation. Note that the x-axis has been transformed to ease interpretation. Because we are looking at changes in discretionary disaggregation, firms in the 50th percentile are those that changed the least and are represented by a 0. Those that decreased disaggregation are on the left and those that increased disaggregation are on the right. As predicted, a hump-shaped pattern emerges for both ROA_t and FS_t. Although, slightly less dramatic at the ends, the hump-shaped pattern continues into the future for ROA_{t+1} and FS_{t+1}, indicating that significant changes in the level of disaggregation provide a signal regarding future performance. Having established the existence of this hump-shaped pattern, I investigate whether the magnitude of changes is predictive of future performance. Figure 2 Panel B shows the emergence of a negative relationship between absolute changes in discretionary disaggregation ($|\Delta ResPQ|$) and ROA_{t+1} and FS_{t+1}.

Having documented the hump-shaped pattern across deciles of changes in disaggregation, I focus now on the relationship between absolute changes in discretionary disaggregation and one-year ahead fundamentals. Table 4 presents the mean values of ROA_{t+1} and FS_{t+1} across deciles of absolute changes. An almost monotonic negative relationship emerges in the summary measure for both ROA_{t+1} and FS_{t+1}. On average, firms in the highest decile of absolute changes have an ROA_{t+1} that is 3.2% lower and an FS_{t+1} that is .18 lower than those in the lowest decile of absolute changes. These results hold across both the balance sheet and the income statement; the effect is strongest in the balance sheet. I now investigate whether this result is robust to the inclusion of additional control variables. Table 5 presents the results of panel regressions of ROA_{t+1} and FS_{t+1} on $|\Delta ResPQ|$ and several other control variables. In both the summary measure and the income statement measure, a statistically significant negative relationship exists between firm fundamentals and absolute changes in discretionary disaggregation. Collectively, this evidence is consistent

with my prediction that firms experiencing poor performance significantly alter the level of discretionary disaggregation in an attempt to obfuscate information.

My final set of tests investigate whether investors are able to fully unravel the information content embedded in firms' decision to significantly alter the level of discretionary disaggregation. Each year I rank firms into deciles based on $|\Delta ResPQ|$ and calculate the average 12-month buy-and-hold size-adjusted returns across each decile. I then average this over the time series. Table 6 presents average 12-month buy-and-hold size-adjusted returns across deciles of absolute changes in discretionary disaggregation. A portfolio formed by taking a long (short) position in firms in the lowest (highest) decile of absolute change results in size-adjusted returns of 3% annually in the summary measure and up to 5.4% annually in the balance sheet measure, equivalent to roughly 45 basis points per month.

In order to ensure that these returns are not due to known risk factors and anomalies, I perform Fama-MacBeth regressions regressing the 12-month buy-and-hold size-adjusted returns on $|\Delta ResPQ|$ and other known control variables. I standardize all variables for ease of interpretation. Table 7 presents the results of these regressions. In both the summary measure and the balance sheet measure, absolute changes have a negative and significant impact on returns. This impact is economically smaller than many of the other risk factors. This evidence supports the notion that investors underreact to the information content of changes in discretionary disclosure at the time of filing, leading to predictable return patterns over time. To the extent that this is true, future research employing the DQ measure to investigate how disclosure quality affects measures such as the equity cost of capital and information asymmetry, to name a couple, should be aware of this relationship.

In future tests, I will seek to identify situations where the relationship between disaggregation and fundamental performance may be stronger (weaker) in order to add robustness to the preceding analyses. for instance, I expect this relationship to be stronger in different industries depending on the average DQ within industry. Also, the rules regarding disaggregation are stricter under IFRS than under US GAAP and may provide an opportunity to study a setting where managing the information environment via disaggregation is more difficult.

5 Conclusion

There are various incentives for firms to manage the information environment. One way in which they might do so is by altering the effectiveness of disclosure as a source of information. To the extent that disaggregation can impact the effectiveness of disclosure, it represents another channel through which firms can influence the information environment. In this paper, I investigate the relationship between discretionary disaggregation in the balance sheet and income statement and fundamental performance.

Discretionary disaggregation provides additional, non-required information to shareholders and can be viewed similarly to voluntary disclosure. As such, firms that have strong performance are likely to be associated with a high level of discretionary disaggregation. In the first set of tests, I examine the contemporaneous and leading relationship between the level of discretionary disaggregation and fundamental performance. I use two measures of fundamental performance, ROA and Piotroski-So $FSCORE$ which captures three dimensions of fundamental performance: profitability, liquidity, and efficiency. I find that there is a positive contemporaneous relationship between fundamentals and discretionary disaggregation. I find that this relationship persists in the future for FS, but not ROA. This relationship is stronger in the balance sheet than the income statement. I also find a hump-shaped pattern emerges wherein firms that significantly change the level of discretionary disaggregation perform significantly worse in the current year compared to those who maintain a similar level. This relationship persists in the future, supportive of the idea that changes in the level of discretionary disaggregation contain a negative signal regarding future performance. Firms in the lowest decile of changes have an ROA which is 3.2% higher than those in the highest decile of change. A long (short) position in firms in the lowest (highest) decile of absolute changes yields annual buy-and-old size-adjusted returns of up to 5.4%, roughly 45 basis points per month, and suggests that investors do not fully impound this information at the time it is released.

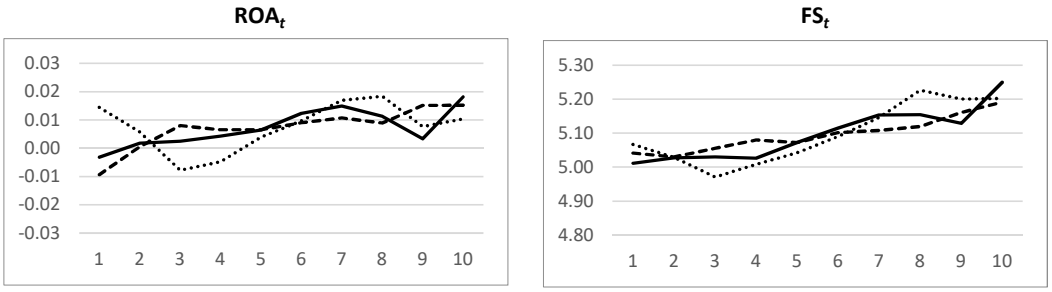
As a whole, my results highlight the importance of considering granularity as a determinant of the information environment. Typically, it is thought that more granular information is of higher quality and should be preferred. However, to the extent that providing addi-

tional granularity increases complexity, it may reduce the effectiveness of disclosure as a source of information. Significant alterations in the level of disaggregation reduce comparability, thereby increasing complexity. As such, firms experiencing poor performance may be able to obfuscate information by significantly altering disaggregation.

Figure 1

This figure illustrates the contemporaneous and leading relationship between firms' level of discretionary disaggregation and fundamental performance. *ResPQ* measures the level of discretionary disaggregation, and is obtained by taking the residual from a regression of *PQ* on six fundamental drivers of disaggregation, and including year and industry fixed effects. *ResPQ_BS* and *ResPQ_IS* are obtained by replacing *PQ* with *PQ_BS* and *PQ_IS,* and represent the level of discretionary disaggregation in the blaance sheet and income statement, respectively. Panel A presents *ROA* and *FS* across deciles of *ResPQ, ResPQ_BS,* and *ResPQ_IS.* Panel B presents *ROA* and *FS* across deciles of *ResPQ,ResPQ_BS,* and *ResPQ_IS.* Decile averages are calculated by taking the mean *ROA* or *FS* in each decile each year and then taking the time-series average of each decile. Results remain qualitatively similar when using median values.

Panel A: Current fundamentals across deciles of *ResPQ (Solid) , ResPQ_BS (Dashed) , ResPQ_IS (Dotted)*



Panel B: One-year ahead fundamentals across deciles of *ResPQ (Solid) , ResPQ_BS (Dashed) , ResPQ_IS (Dotted)*

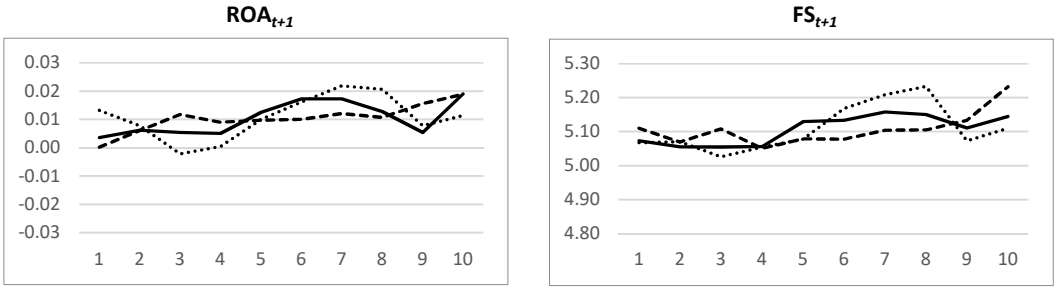
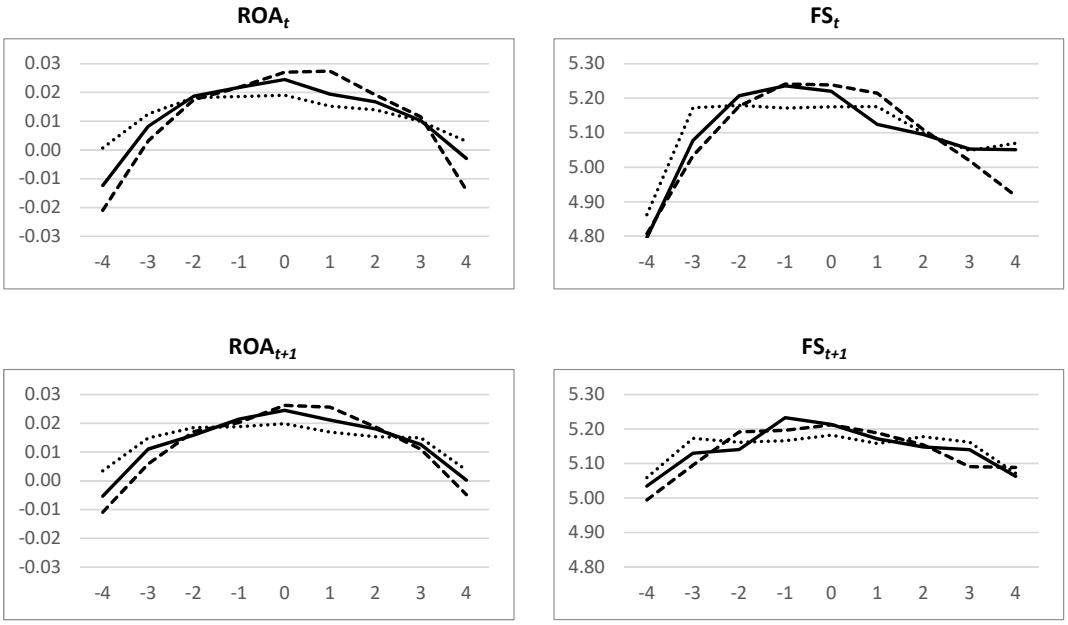


Figure 2

This figure illustrates the contemporaneous and leading relationship between changes and absolute changes in the level of discretionary disaggregation and fundamental performance. *ResPQ* measures the level of discretionary disaggregation, and is obtained by taking the residual from a regression of *PQ* on six fundamental drivers of disaggregation, and including year and industry fixed effects. *ResPQ_BS* and *ResPQ_IS* are obtained by replacing *PQ* with *PQ_BS* and *PQ_IS,* and represent the level of discretionary disaggregation in the balance sheet and income statement, respectively. *Chg_ResPQ* is calculated as ($ResPQ_t$ -$ResPQ_{t-1}$). Panel A presents ROA_t and ROA_{t+1} as well as FS_t and FS_{t+1} across deciles of Chg_*ResPQ,* Chg_*ResPQ_BS,* and Chg_*ResPQ_IS.* Note that the x-axis has been transformed such that firms which exhibited very little change (50th percentile) are labeled at 0. Deviations to the right increased disaggregation while deviations to the left decreased disaggregation. Panel B presents one-year ahead fundamentalsacross deciles of *Abs_Chg_ResPQ, Abs_Chg_ResPQ_BS,* and *Abs_Chg_ResPQ_IS.*

Panel A: Current and one-year ahead fundamentals across deciles of changes in discretionary disaggregation: *Chg_ResPQ* (Solid), *Chg_ResPQ_BS* (Dashed), *Chg_ResPQ_IS* (Dotted).



Panel B: One-year ahead fundamentals across deciles of absolute changes in discretionary disaggregation: *Abs_Chg_ResPQ* (Solid), *Abs_Chg_ResPQ_BS* (Dashed), *Abs_Chg_ResPQ_IS* (Dotted).

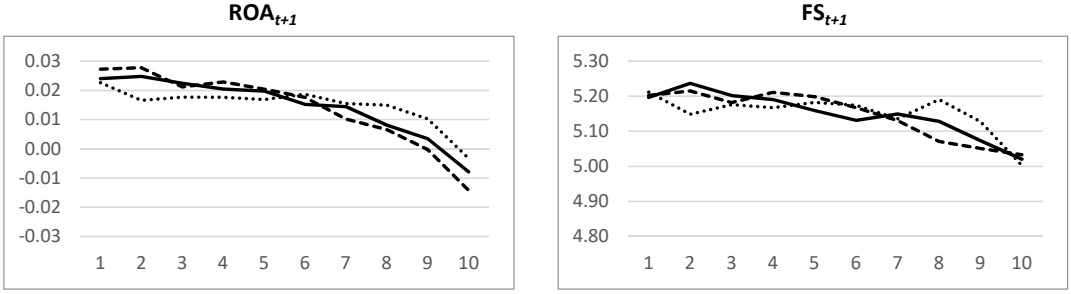


Table 1

Descriptive Statistics Panel A contains descriptive statistics for several key variables. Panel B demonstrates the regression used to obtain $ResPQ$, my measure of discretionary disaggregation. DQ is a measure of disaggregation quality obtained following the methodology of [3]. DQ_BS and DQ_IS represent the disaggregation score for the balance sheet and income statement, respectively. PQ, PQ_BS, and PQ_IS are obtained by taking the logit transformation of DQ, DQ_BS, and DQ_IS, respectively. $ResPQ$ is obtained by taking the residual after regressing PQ on fundamental drivers of disaggregation. FS represents the Piotroski-So $FSCORE$ measure and ranges from 0 to 9 with higher values representing stronger fundamentals. ROA is return on assets. $Restructure$ is equal to 1 if restructuring costs are nonzero. $M\&A$ is equal to 1 if the firm engaged in M&A activity. SI is special items scaled by total assets. $Volatility$ is the standard deviation of the past twelve months' returns. TA represents total assets. $NSegs$ is the number of business segments. GP is gross profit scaled by total assets. BTM is book to market. MM is the past 12-month buy-and-hold return. $Size$ is the natural log of market capitalization.

Panel A: Summary Statistics

Variable	N	Median	Mean	STD	Min	Max
DQ	118,323	0.59	0.62	0.11	0.25	0.92
DQ_BS	118,323	0.75	0.75	0.12	0.19	1.00
DQ_IS	118,323	0.44	0.48	0.13	0.19	0.90
PQ	118,323	0.38	0.52	0.53	-1.11	2.51
$ResPQ$	114,684	-0.01	0.00	0.24	-1.59	1.43
$\Delta ResPQ$	100,426	0.00	0.00	0.17	-1.44	1.39
FS	118,323	5.00	5.07	1.68	0.00	9.00
ROA	118,323	0.04	0.00	0.17	-1.12	0.26
$Restructure$	118,323	0.00	0.10	0.30	0.00	1.00
$M\&A$	118,323	1.00	0.79	0.41	0.00	1.00
SI	114,698	0.00	0.02	0.10	0.00	9.76
$Volatility$	118,295	0.11	0.13	0.07	0.03	0.41
TA	118,323	139	1,401	6,751	0.00	290,479
$NSegs$	118,323	1.00	1.60	1.19	0.00	20.00
GP	118,323	0.35	0.38	0.23	-0.16	0.94
BTM	118,323	0.51	0.68	0.69	0.00	28.33
MM	118,323	-0.07	0.05	0.79	-1.35	42.73
$Size$	118,323	11.84	11.97	2.06	5.21	20.34

Panel B: Regression used to obtain discretionary disaggregation following [3]

$$PQ_{it} = \beta_0 + \beta_1 Restructure_{it} + \beta_2 M\&A_{it} + \beta_3 SI_{it} + \beta_4 Volatility_{it} + \beta_5 LogTA_{it} + \beta_6 LogNSeg_{it} + IndustryFE + YearFE + \varepsilon_{it}$$

	$Restructure$	$M\&A$	SI	$Volatility$	$LogTA$	$LogNSeg$
Coefficients	1.587***	0.393***	0.479	-3.963***	-0.191**	-0.830**
(t-stats)	(7.85)	(3.78)	(1.47)	(-4.94)	(-3.53)	(-3.04)
$Adj.R^2$	0.773					

Table 2

Firm Fundamentals across Portfolios of Discretionary Disaggregation This table presents the contemporaneous and leading relationship between firms' level of discretionary disaggregation and fundamental performance. I obtain a measure of discretionary disaggregation for each firm-year by regressing PQ on six fundamental drivers of disaggregation. As PQ varies across industries and over time, I include year and industry fixed effects in this regression as well. I then rank firms into deciles based on the level of discretionary disaggregation and take the mean ROA and FS across deciles each year and compute the average over the time-series. I repeat this process for PQ_BS and PQ_IS. Panel A examines the contemporaneous relationship and presents ROA and FS across deciles of discretionary disaggregation. Panel B examines the leading relationship and presents ROA_{t+1} and FS_{t+1} across deciles of discretionary disaggregation. *, **, and *** indicate statistical significance at less than 10%, 5%, and 1% levels, respectively.

Panel A: Current fundamentals sorted by levels of discretionary disaggregation

Decile	**Var**	1	2	3	4	5	6	7	8	9	10	**H-L**	**t-stat**
ResPQ	ROA_t	-0.003	0.002	0.002	0.004	0.006	0.012	0.015	0.011	0.003	0.018	**0.021*****	**(6.06)**
	FS_t	5.01	5.03	5.03	5.03	5.07	5.11	5.15	5.15	5.13	5.25	**0.24*****	**(7.82)**
ResPQ_BS	ROA_t	-0.009	0.001	0.008	0.007	0.007	0.009	0.011	0.009	0.015	0.015	**0.025*****	**(5.61)**
	FS_t	5.04	5.03	5.06	5.08	5.07	5.10	5.11	5.12	5.16	5.19	**0.15*****	**(4.32)**
ResPQ_IS	ROA_t	0.014	0.006	-0.008	-0.005	0.004	0.010	0.017	0.018	0.008	0.010	**-0.004**	**(-1.26)**
	FS_t	5.07	5.03	4.97	5.01	5.04	5.09	5.15	5.23	5.20	5.20	**0.14*****	**(5.57)**

Panel B: Future fundamentals sorted by levels of discretionary disaggregation

Decile	**Var**	1	2	3	4	5	6	7	8	9	10	**H-L**	**t-stat**
ResPQ	ROA_{t+1}	0.004	0.006	0.005	0.005	0.013	0.017	0.017	0.013	0.005	0.019	**0.015*****	**(4.98)**
	FS_{t+1}	5.07	5.06	5.05	5.06	5.13	5.13	5.16	5.15	5.11	5.14	**0.07****	**(2.24)**
ResPQ_BS	ROA_{t+1}	0.000	0.006	0.012	0.009	0.010	0.010	0.012	0.011	0.016	0.019	**0.019*****	**(6.02)**
	FS_{t+1}	5.11	5.07	5.11	5.05	5.08	5.08	5.10	5.10	5.13	5.23	**0.12*****	**(3.79)**
ResPQ_IS	ROA_{t+1}	0.013	0.008	-0.002	0.000	0.010	0.016	0.022	0.021	0.008	0.011	**-0.002**	**(-0.69)**
	FS_{t+1}	5.07	5.07	5.03	5.05	5.08	5.17	5.21	5.23	5.07	5.11	**0.04***	**(1.58)**

Table 3

Firm Fundamentals and Discretionary Disaggregation This table presents the results from estimating the contemporaneous and one-year ahead relationship between firm fundamentals and the level of discretionary disaggregation, controlling for factors which may affect firm fundamentals. Panel A presents the results of tests of the relationship between ROA and discretionary disaggregation. Columns (1) - (3) examine the contemporaneous relationship between ROA_t and levels of discretionary disaggregation, while columns (4) - (6) examine the leading relationship between discretionary disaggregation and ROA_{t+1}. Panel B repeats this analysis for FS. $ResPQ$, $ResPQ\_BS$, and $ResPQ\_IS$ measure the level of discretionary disaggregation. $Size$ is the log of market capitalization. $Turnover$ is calculated as trading volume scaled by shares outstanding. $Volatility$ is the standard deviation of the prior 12 months' returns. $LagROA$ is the previous year's ROA. $LagFS$ is the previous year's FS. *, **, and *** indicate statistical significance at less than 10%, 5%, and 1% levels, respectively.

Panel A: ROA

	Current ROA (ROA_t)			Future ROA (ROA_{t+1})		
	(1)	(2)	(3)	(4)	(5)	(6)
$ResPQ_t$	0.00297			0.00183		
	(1.15)			(0.63)		
$ResPQ\_BS_{t+1}$		0.00584***			0.00117	
		(3.85)			(0.59)	
$ResPQ\_IS_{t+1}$			-0.00393*			0.0000822
			(-2.52)			(0.05)
Controls	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
Industry FE	Y	Y	Y	Y	Y	Y
$Adj.R^2$	0.52	0.52	0.52	0.51	0.51	0.51
Observations	118,440	118,440	118,440	115,717	115,717	115,717

Panel B: FSCORE

	Current FSCORE (FS_t)			Future FSCORE (FS_{t+1})		
	(1)	(2)	(3)	(4)	(5)	(6)
$ResPQ_t$	0.155***			0.0804		
	(3.78)			(1.90)		
$ResPQ\_BS_{t+1}$		0.0689**			0.0238	
		(2.98)			(0.92)	
$ResPQ\_IS_{t+1}$			0.117***			0.0816**
			(3.84)			(2.82)
Controls	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
Industry FE	Y	Y	Y	Y	Y	Y
$Adj.R^2$	0.10	0.10	0.10	0.08	0.08	0.08
Observations	118,440	118,440	118,440	115,717	115,717	115,717

Table 4

Firm Fundamentals across Portfolios of Changes in Discretionary Disaggregation This table presents the relationship between the magnitude of firms' changes in discretionary disaggregation and next year's fundamental performance. I obtain a measure of discretionary disaggregation for each firm-year by regressing PQ on six fundamental drivers of disaggregation. As PQ varies across industries and over time, I include year and industry fixed effects in this regression as well. I then rank firms into deciles based on absolute changes in the level of discretionary disaggregation calculated as $|ResPQ_t - ResPQ_{t-1}|$. I obtain decile averages by first taking the mean of ROA_{t+1} and FS_{t+1} across deciles each year and then taking the average over the time-series for each decile. I repeat this process for PQ_BS and PQ_IS. *, **, and *** indicate statistical significance at less than 10%, 5%, and 1% levels, respectively.

Decile	**Var**	1	2	3	4	5	6	7	8	9	10	**L-H**	**t-stat**
$\|\Delta ResPQ\|$	ROA_{t+1}	0.024	0.025	0.022	0.020	0.020	0.015	0.014	0.008	0.003	-0.008	**0.032*****	**(7.26)**
	FS_{t+1}	5.20	5.24	5.20	5.19	5.16	5.13	5.15	5.13	5.07	5.02	**0.18*****	**(5.78)**
$\|\Delta ResPQ\_BS\|$	ROA_{t+1}	0.027	0.028	0.021	0.023	0.020	0.018	0.010	0.007	0.000	-0.014	**0.041*****	**(8.75)**
	FS_{t+1}	5.20	5.22	5.18	5.21	5.20	5.17	5.13	5.07	5.05	5.03	**0.17*****	**(4.72)**
$\|\Delta ResPQ\_IS\|$	ROA_{t+1}	0.023	0.017	0.018	0.018	0.017	0.019	0.015	0.015	0.010	-0.003	**0.026*****	**(5.74)**
	FS_{t+1}	5.21	5.15	5.18	5.17	5.18	5.17	5.14	5.19	5.13	5.00	**0.21*****	**(7.14)**

Table 5

Firm Fundamentals and Absolute Changes in Discretionary Disaggregation This table presents the results from estimating the relationship between absolute changes in the level of discretionary disaggregation and firms' future fundamentals, controlling for factors which may affect future fundamentals. Columns (1) - (3) examine the relationship between absolute changes in discretionary disaggregation: $Abs\_\Delta ResPQ$, $|\Delta ResPQ\_BS|$, $|\Delta ResPQ\_IS|$ and one-year ahead ROA. Columns (4) - (6) repeat this analysis for one-year ahead FS. $Size$ is the log of market capitalization. $Turnover$ is calculated as trading volume scaled by shares outstanding. $Volatility$ is the standard deviation of the prior 12 months' returns. $LagROA$ is the previous year's ROA. $LagFS$ is the previous year's FS. *, **, and *** indicate statistical significance at less than 10%, 5%, and 1% levels, respectively.

Panel A: ROA

	Future ROA (ROA_t)			Future FSCORE (FS_{t+1})		
	(1)	(2)	(3)	(1)	(2)	(3)
$\|\Delta ResPQ_t\|$	-0.00641**			-0.120***		
	(-2.87)			(-3.53)		
$\|\Delta ResPQ\_BS_{t+1}\|$		0.0000926			-0.0294	
		(0.04)			(-1.10)	
$\|\Delta ResPQ\_IS_{t+1}\|$			-0.00465**			-0.0918***
			(-2.03)			(-3.64)
$ResPQ_t$	0.000769			0.0597		
	(0.28)			(1.48)		
$ResPQ\_BS_{t+1}$		0.000150			0.0203	
		(0.08)			(0.81)	
$ResPQ\_IS_{t+1}$			0.000173			0.0614*
			(0.09)			(2.07)
Controls	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
Industry FE	Y	Y	Y	Y	Y	Y
$Adj.R^2$	0.50	0.50	0.50	0.08	0.08	0.08
Observations	104,495	104,495	104,495	104,495	104,495	104,495

Table 6

Returns to Strategies Conditional on Absolute Changes in Discretionary Disaggregation This table presents one-year buy-and-hold size-adjusted returns to portfolios created using absolute changes in the level of discretionary disaggregation calculated as $|ResPQ_t - ResPQ_{t-1}|$ where $ResPQ$ is the level of discretionary disaggregation obtained by taking the residual component of PQ after controlling for fundamental drivers of disaggregation. One-year buy-and-hold size-adjusted returns for each decile are obtained by first computing the average across deciles each year and then taking the average of the time-series for each decile. The final column presents the one-year buy-and-hold size-adjusted return for a portfolio taking a long (short) position in firms in the lowest (highest) decile of absolute changes in discretionary disaggregation. *, **, and *** indicate statistical significance at less than 10%, 5%, and 1% levels, respectively.

Decile	1	2	3	4	5	6	7	8	9	10	**L-H**
$\|\Delta ResPQ\|$	0.023	0.022	0.011	0.018	0.021	0.018	0.011	0.010	-0.002	-0.007	**0.030****
	(2.45)	(2.28)	(1.41)	(1.97)	(2.19)	(1.50)	(1.13)	(1.02)	(0.25)	(0.52)	**(2.38)**
$\|\Delta ResPQ\_BS\|$	0.027	0.033	0.016	0.009	0.023	0.010	0.010	0.010	0.001	-0.026	**0.054*****
	(2.95)	(3.48)	(1.49)	(0.88)	(2.49)	(0.97)	(1.01)	(0.90)	(0.05)	(2.91)	**(4.89)**
$\|\Delta ResPQ\_IS\|$	0.017	0.014	0.009	0.023	0.013	0.015	0.009	0.018	-0.008	0.003	**0.014**
	(1.94)	(1.41)	(0.94)	(2.38)	(1.41)	(1.73)	(1.03)	(1.87)	(0.86)	(0.21)	**(1.17)**

Table 7

Fama-MacBeth Regressions, Absolute Changes in Discretionary Disaggregation This table presents the results of Fama-MacBeth regressions of returns on absolute changes in the level of discretionary disaggregation calculated as $|ResPQ_t - ResPQ_{t-1}|$ where $ResPQ$ is the level of discretionary disaggregation obtained by taking the residual component of PQ after controlling for fundamental drivers of disaggregation. These regressions control for known risk factors and anomalies which may contribute to the return patterns. GP is scaled gross profit. BTM is book to market. MM is the previous 12-month buy-and-hold return. ACC is accruals scaled by total assets. ROA is return on assets. SUE is the earnings surprise calculated as a random walk $(EPS_t - EPS_{t-1})$ scaled by price. $Turnover$ is trading volume scaled by shares outstanding. $Size$ is the log of market capitalization. $Volatility$ is the standard deviation of the previous 12 months' returns. *, **, and *** indicate statistical significance at less than 10%, 5%, and 1% levels, respectively.

	12-Month Size-Adjusted Returns ($BHSAR_{[t,t+12]}$)		
	(1)	(2)	(3)
$\|\Delta ResPQ\|$	-0.005*		
	(-1.94)		
$\|\Delta ResPQ\_BS\|$		-0.007*	
		(-1.94)	
$\|\Delta ResPQ\_IS\|$			-0.003
			(-1.09)
GP	0.031***	0.031***	0.031***
	(-5.07)	(-4.94)	(-5.08)
BTM	0.024***	0.024***	0.024***
	(-2.86)	(-2.81)	(-2.88)
MM	0.014**	0.014**	0.014**
	(-2.24)	(-2.25)	(-2.21)
ACC	-0.022***	-0.023***	-0.022***
	(-4.48)	(-4.60)	(-4.49)
ROA	0.013	0.013	0.014
	(-1.32)	(-1.29)	(-1.34)
SUE	0.002	0.002	0.002
	(-0.31)	(-0.31)	(-0.31)
$Turnover$	-0.024***	-0.024***	-0.024***
	(-5.59)	(-5.62)	(-5.61)
$Size$	0.000	0.000	0.000
	(-0.06)	(-0.05)	(-0.03)
$Volatility$	-0.01	-0.01	-0.01
	(-1.35)	(-1.33)	(-1.36)
$Intercept$	0.008	0.008	0.008
	(-1.04)	(-1.05)	(-1.03)
$Adj.R^2$	.0467	.0469	.0467

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