When Micro Firms Speak Macro: Evidence on Firms' Macroeconomic Disclosures

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Abstract

In this paper, we develop an annual measure of firms' macroeconomic disclosure based on management's disclosures in their 10-K filing. We find that firms increased their disclosure about macroeconomic conditions over time in line with increases in the role of the macroeconomy in firm performance. Furthermore, we show that the increased disclosure rate is prevalent in all firms, regardless of size or geographic diversification. Our time-varying measure outperforms existing static measures used to identify bellwether firms, signaling the importance of time-varying macroeconomic identification. Finally, we find that analyst forecasts are more accurate in firms with higher levels of macroeconomic disclosure. However, analyst forecasts reduce information asymmetry primarily for that disclose less macroeconomic information.

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1. Introduction

Recent macroeconomic literature examining input and output transaction data finds that U.S. production networks have become more connected over the past 50 years, (Acemoglu and Aza, 2020; Acemoglu, Carvalho, Ozdaglar, and Tahbaz-Salehi, 2012). Acemoglu and Azar (2020) show analytically how technological improvements in a small industry can generate sizable macroeconomic effects, because firms source inputs from an increased number of suppliers over time and constantly alter the optimal combinations of suppliers. Consequently, firms become more connected regardless of their size, relative position in the production network, or level of geographic diversification. What remains unexplored is how the information environments of firms change as a result of this new economic reality, where macroeconomic conditions are more important for firm-level performance (e.g., Sadka, Sadka, and Tseng, 2021; Aobdia, Caskey, and Ozel, 2014).

Our paper fills this gap in the literature by examining firms' disclosures of macroeconomic conditions, and the information environment of firms that provide more macroeconomic disclosures in their financial statements. First, we identify firms that are more likely to be affected by the changing macroeconomic environment using a measure of macroeconomic disclosure. Our measure of macroeconomic disclosure is based on how often macroeconomic conditions are mentioned in a firm's 10-K. The advantage of this measure is that it is constructed annually and does not suffer from survivorship bias like other existing measures. For example, several studies define bellwether firms based on the correlation between firm-level earnings and GDP (e.g., Hutton, Lee, and Shu, 2012; Bonsall, Bozanic, and Fischer, 2013). Employing these correlation-based measures requires several years of data which means that firms with available measures suffer from survivorship bias. In addition, the correlation-based measures do not vary much over

time because these annual measures employ either the full sample or rolling windows with overlapping observations. Since prior studies find that firms' systematic risk is time-varying (e.g., Ang and Chen, 2007; Ball, Sadka, and Sadka, 2009; Ball, Sadka, and Tseng, 2021), a firm-year measure is likely to outperform existing correlation-based measures.

We find that firms increase their macroeconomic disclosures over time, consistent with the documented rise in the role of macroeconomic conditions in firm performance.[1] The results further show that the level of macroeconomic disclosure is rising among all size groups but is most pronounced for larger firms. Consistent with expectations, in regression analysis we find that larger firms with more diversified geographical and business segments are more likely to discuss macroeconomic conditions in their financial statements. Surprisingly, we find that more volatile and less profitable firms are less likely to provide macroeconomic disclosures. These findings imply that managers do not tend to use macroeconomic disclosures as "excuses" when firm-level performance deteriorates.

Our disclosure measure jointly estimates how important macroeconomic conditions are for the firm's performance and managers' decision to provide macroeconomic disclosures. Managers are unlikely to provide macroeconomic disclosures if their firms' performance is largely idiosyncratic and unrelated to macroeconomic conditions. Thus, our measure captures whether a firm's performance is related to macroeconomic conditions *and* whether the firms provided macroeconomic disclosures in its financial statement. To verify that our measure captures the association with macroeconomic conditions, we regress contemporaneous GDP on earnings of portfolios sorted based on our measure. We find that our measure identifies firms whose performance is more strongly related to macroeconomic conditions. Moreover, our measure

[1] The increase over time in macro disclosures is also consistent with Eisdorfer, Froot, Ozik, and Sadka (2021) who find that firms have become more likely over time to discuss competitors in their financial statements.

outperforms other readily available measures used to identify bellwether firms in prior literature (e.g., Hutton et al. 2012; Bonsall, Bozanic, and Fischer, 2013). This finding is particularly interesting, because even though existing measures use firm-level correlations with GDP to identify bellwether firms, our disclosure-based measure outperforms these existing measures. Our findings further indicate that systematic variations in earnings are time varying and highlight the value of a firm-year level measure.

Next, we employ our measure to examine how the information content of analyst forecasts varies with firm's macroeconomic disclosure. Prior studies (e.g., Piotroski and Roulstone, 2004, Kadan et al., 2012, Hutton et al., 2012; Brown et al., 2015; Amiram et al., 2018, and Ali et al., 2021) suggest that analysts have an information advantage with respect to macroeconomic and industry-level information. Hutton et al. (2012) conclude that analysts provide more accurate earnings forecasts than managers when the firm's earnings covary more with macroeconomic factors such as gross domestic product and energy costs. Ali et al. (2021) find that analyst forecasts tend to be more accurate than managers' earnings forecasts when firms operate in industries that are more sensitive to external shocks. Darrough and Russell (2002) show that analysts' forecast of an index are more accurate than the comparable sum of firm-level forecasts. Taken together, these findings suggest that analysts are better at understanding industry and macroeconomic trends than idiosyncratic firm-level performance. Consequently, we expect analyst forecasts to be more accurate for firms that provide more macroeconomic disclosures in their financial statements. Our results are consistent with our prediction. Specifically, absolute analyst forecast errors are lower for firms that are more likely to be affected by changing macroeconomic conditions. That is, analysts provide more accurate forecasts for firms that provide macroeconomic disclosures in their financial statements.

Our findings raise an interesting question related to the impact of analyst forecast releases on information asymmetry (Amiram, Owens and Rozenbaum, 2016). On the one hand, analyst forecasts for firms that provide more macroeconomic disclosures are more accurate. On the other hand, prior studies show that investors are better able to predict aggregate outcomes than firm-level outcomes (Sadka and Sadka, 2009; Choi, Kalay, and Sadka, 2016). Thus, it is not clear how the release of an analyst forecast will affect information asymmetry when the firm provides more macroeconomic disclosures. As we note above, our measure captures both the propensity to disclose macroeconomic conditions as well as how sensitive the firm is to macroeconomic conditions. Thus, our results should be considered as implications of the combined effect rather than providing macroeconomic disclosures per se.

Amiram et al. (2016) find that information asymmetry declines following the release of analyst forecasts. We supplement their study and show that the decline is most pronounced for firms that are less likely to provide macroeconomic disclosures and are less affected by macroeconomic conditions. This change in information asymmetry persists for several weeks. Additionally, these findings are robust to different controls for size and sorting our measure on size. Consistently, we find that the market response to analyst forecasts is higher for firms that provide less macroeconomic disclosures.

Interestingly, while analysts have an information advantage with respect to macroeconomic and industry-level information, the decline in information asymmetry is most pronounced for firms that are less related to overall economic conditions. These finding suggest that while analyst are macro & industry experts, so are investors to some degree. Therefore, information asymmetry declines more for firms that are less related to overall economic conditions and provide less macroeconomic disclosures.

This paper contributes to the literature in several ways. First, to the best of our knowledge, this is the first paper to examine firms' macroeconomic disclosures in 10-Ks and show that these disclosures increase over time in line with increases in the role of the macroeconomy in firm performance. In this sense, we contribute to a growing literature that focuses on the information content of aggregate earnings (Abdalla and Crabias, 2021) and its increase importance over time (Kim, Schonberger, Wasley, and Land, 2020; Sadka, Sadka and Tseng, 2021). Second, we develop a new measure that captures both the propensity to provide macroeconomic disclosures and the firm's exposure to macroeconomic factors. Our firm-year measure provides a significant improvement compared with existing measures.[2] Third, we shed light on the role of analysts in capital markets by examining the association between macroeconomic disclosures and analyst forecasts, and its related implications. Our analyses contribute to the literature that shows that analysts are macroeconomic and industry experts.

2. Hypothesis Development

2.1 Macroeconomic disclosure.

Recent macroeconomic literature documents a rise in the role of macroeconomic conditions in firm performance. (Acemoglu and Azar, 2020; Acemoglu, Carvalho, Ozdaglar, Tahbaz-Salehi, 2012). Consistently, Sadka, Sadka, and Tseng (2020) find that while the relation between idiosyncratic earnings and returns has weakened over time, the relation between firm-level stock returns and aggregate earnings has strengthened. They further find that the serial correlation of firm-level earnings has declined, but its correlation with prior aggregate earnings has intensified, pointing to the increased importance of aggregate earnings in predicting firm-level earnings and

[2] Several recent studies examine the systematic component of firm-level earnings. See e.g., Ball, Sadka and Sadka (2009), Ellahie (2021) and Ball, Sadka and Tseng, (2021).

assessing firm value. Given the increased role of macroeconomic activity and aggregate earnings in explaining firm performance, we ask whether firms provide more disclosure related to macroeconomic activity in their 10-Ks?

The answer to this question is not obvious ex-ante. On the one hand, if firms' performances are more linked to macroeconomic conditions, one would expect managers to provide more macroeconomic related information in their financial disclosures. On the other hand, information intermediaries such as analysts are conjectured to possess superior macroeconomic information. Moreover, prior studies find that aggregate earnings are more predictable than firm-level earnings (Sadka and Sadka, 2009 and Choi, Kalay and Sadka, 2016). If analysts' and investors' macro information production is unrelated to firms' financial disclosures, the demand for macro-disclosures may remain unchanged over time. In this scenario, there may be no correlation between the role of macroeconomic forces in firm performance and macro disclosures. Therefore, the relation is ultimately an empirical question.

2.2 Firms' macro disclosures and the information environment

In addition to examining managers' macro-disclosure, we examine whether variation in macro disclosure is related to the informativeness of analyst forecasts. Analyst forecasts serve as a logical starting point to evaluate the role of macro disclosures on the firm's information environment. First, prior literature shows that analysts rely more on public firm disclosure since the enactment of Regulation FD (e.g., Kross & Suk, 2012). While firm disclosure is available to all investors, prior studies show that analysts incorporate both public and private information helpful to investors. Second, prior studies suggest that analysts are industry and macro experts that possess superior macro-level related information (e.g., Piotroski and Roulstone, 2004; Kadan et al., 2012; Hutton et al., 2012; Ali et al., 2021). Moreover, Darrough and Russell (2002)

show that analyst forecasts of market indexes are more valuable than the sum of comparable firm-level forecasts. Finally, Sadka and Sadka (2009) and Choi, Kalay and Sadka (2016) imply that aggregate earnings are more predictable than firm-level earnings. These results suggest that analysts not only incorporate macroeconomic trends into their projections but also utilize macroeconomic trends to improve their accuracy. Therefore, our first prediction is as follows:

P1: The accuracy of analysts' earnings forecasts is positively related to the amount of firms' macro-disclosures.

Even if analyst forecasts are more accurate when macro-disclosures increase, the effect of their forecasts on the market is not obvious. Amiram et al. (2016) find that on average, analyst forecasts lead to an immediate narrowing of the information gap between sophisticated and unsophisticated investors. Their finding is consistent with analysts providing information to unsophisticated investors that they did not previously possess, which the sophisticated investors previously held privately (Kim and Verrecchia, 1994). The net directional effect of analyst forecasts on announcement-period information asymmetry depends on how the information contained in the release relates to the information previously held by sophisticated investors.

When considering the above arguments in the light of firms' macro-disclosure, the effect of macro-disclosure on the informativeness of analyst forecasts depends on the information possessed by more and less sophisticated investors prior to the announcement. Since analysts are believed to have superior macro-level information it is possible that analysts' forecasts provide new information to both sophisticated and unsophisticated investors. This would result in a relative increase in information asymmetry at announcement for firms with higher levels of macro-disclosures. Alternatively, since aggregate earnings are more predictable, it is possible that investors, and less sophisticated investors in particular, may have an easier time processing macro-

related information. In this scenario, while analyst forecasts are more accurate when macro-disclosures are higher, they may be more informative when macro-disclosures are lower. This potential effect is consistent with the findings of Amiram et al. (2017). They show that in periods of high uncertainty, analysts' forecasts are more timely but less accurate. However, analysts' forecasts are also more informative to the market, which is consistent with investors' demand for timely information, even if it is less accurate. Therefore, the effect of macro-disclosure on the informativeness of analyst forecasts is ultimately an empirical question. Hence, our second prediction is in the null form.

P2: The informativeness of analysts' earnings forecasts is unrelated to the level of firms' macro-disclosures.

3. Measuring Macroeconomic Disclosure and Data

We begin our analysis by constructing a measure of macroeconomic disclosure using textual analysis of a firm's 10-K filing. Many recent studies demonstrate the importance of extracting valuable information from firms' public financial reports (e.g., Li , 2010a, 2010b; Brown and Tucker, 2011; and Hoberg and Phillips, 2016). In particular, Li et al. (2013) and Bushman et al. (2015) use textual analysis to measure a firm's competitive environment by counting the number of occurrences that the firm mentions competition in their 10-K filings. Similarly, to create our measure, we count the number of occurrences of words or phrases that depict macroeconomic conditions (e.g., GDP, macroeconomic, interest rates, currency, bull/bear market, financial markets, and market risk).[3] To control for 10-K length, we scale the total number of occurrences

[3] See Appendix C for full list of words.

of macroeconomic terms by total words in the 10-K. Thus, the resulting measure of macroeconomic conditions is:

$$PctAgg = \frac{NAgg}{NWords}$$

where *NAgg* and *NWords* are the total number of macroeconomic words and the total number of words in the 10-K, respectively.

PctAgg is meant to capture the manager's perception of whether and to what extent current macroeconomic conditions affect their firm's performances. Our measure assumes that a manager is unlikely to discuss current macroeconomic conditions in their 10-K filing if the firm's performances are mainly idiosyncratic. Furthermore, we conjecture that the level of macroeconomic disclosure varies widely between firms and years based on the current macroeconomic conditions. Hence, a distinct characteristic of our measure is it allows for variation in macroeconomic effects across firms in a given year and across years for a given firm. In other words, *PctAgg* is a firm-year measure that varies by firm and year.

We begin the compilation of our sample by downloading all available firm-year filings from the EDGAR database. EDGAR filings are not available before 1995, so our sample spans between 1995 and 2019. We merge the available firm-years with the Compustat annual database based on Compustat's GVKEY and the SEC's Central Index Key and remove all financial firms (SIC codes 6000-6999). Lastly, we remove any firm-year observations missing the necessary firm fundamental or stock price data from Compustat or CRSP. These data limitations produce a sample consisting of 80,193 firm-year observations ranging from years 1995-2019.

Other Compustat based variables employed in our analyses include $Log(Size)_{i,t}$, which is firm *i's* market capitalization for year *t*; $BTM_{i,t}$, which is firm *i's* book-to-market ratio for year *t*; $ROA_{i,t}$, which is firm *i's* return on assets in year *t*; $E/P\ Ratio_{i,t}$, which is firm *i's* earnings-to-

price ratio for year *t;* and $Business\ Segments_{i,t}$ ($Geographic\ Segments_{i,t}$), which is the number of business (geographic) segments that firm *i* operates in in year *t.* We further construct $Annual\ Returns_{i,t}$ and $Annual\ Volatility_{i,t}$ from CRSP, which are firm i*'s* 12-month cumulative abnormal returns and annual return volatility, respectively.

4. Results

4.1. Descriptive statistics and validation tests

Table 1 Panel A presents the descriptive statistics for *PctAgg* and other firm characteristics for our firm-year sample. *PctAgg* has a mean (median) value of 1.4687 (0.9446), with a standard deviation of 1.5559. To put the distribution into context, the mean number of macroeconomic words and total words in our sample are 151 and 80,057, respectively.[4] Similar to Li et al. (2013), both counts increase steadily over the sample period.

Considering the significant variation in *PctAgg* and the rising count of macroeconomic and total words, we plot the yearly mean, median, and standard deviation of *PctAgg* in Figure 1. Although both counts increase throughout the sample, it is unclear whether they are growing at the same rate. Hence, if firms discuss macroeconomic conditions at a higher (lower) rate over time, we should observe a rising (declining) trend in *PctAgg*. Figure 1 shows the level of macroeconomic disclosure increasing steadily over our sample period, with the sharpest increase occurring around fiscal-year 2010. Furthermore, it appears that the increases in *PctAgg* peaked in 2017 and started to level-off during the last few years of our sample.

To verify that the trend displayed in Figure 1 is consistent throughout our sample, we split the sample into quartiles based on the level of *PctAgg* each year and plot the time-series for

[4] Li et al. (2013) sample-wide median number of competition words (total words) is 27 (59,870). Our mean number of total words is presumably larger because Li et al. (2013) sample period ends in 2009.

each quartile-year in Figure 2. If the upward trend is only present in a portion of our sample then it is likely that particular firms increased their macroeconomic disclosure exponentially, while most firms either do not discuss macroeconomic conditions or do not change how commonly they discuss macroeconomic conditions. In this case, we would observe a steep increase in the highest quartile of *PctAgg,* while the plots for the other three quartiles are relatively flat. Alternatively, if the increasing trend observed in Figure 1 is present in all quartiles, then it appears that most firms increased their macroeconomic disclosure rate over the sample. Figure 2 shows that the level of macroeconomic disclosure is rising among all quartiles, suggesting that the trend in Figure 1 is not solely due to the behavior of firms that provide the most macroeconomic disclosure, but rather by a more consistent increase throughout the sample. Furthermore, the results across quartiles show that there is significant variation in *PctAgg* across firms within each year.

While Figures 1 and 2 display a distinct disclosure increase over our sample period, it is unclear whether this trend results from confounding firm characteristics. For example, as firms grow larger or become more geographically diverse, managers may be forced to disclose more information about macroeconomic conditions due to various economic or political incentives. Similarly, firm performance could influence macroeconomic disclosure. Less profitable or more volatile firms might discuss macroeconomic conditions more to signal that the lower performance is partly uncontrollable and not the result of the manager's actions.

Table 2 Panel A (B) provides the Pearson (Spearman) correlations of *PctAgg* with several firm characteristics that likely influence disclosure. As expected, *Log(Size), Business Segments*, and *Geographic Segments* have the most significant positive correlations with *PctAgg,* signaling that *PctAgg* is highly related to larger and more operationally diverse firms. However, contrary

to our expectations, *ROA* (*Annual Volatility*) positively (negatively) correlates with *PctAgg*. These results show that firms do not use macroeconomic conditions, which are most likely outside of the manager's control, as an excuse for lower firm-level performance.

To further assess the relationship between *PctAgg* and particular firm characteristics, Table 3 presents results from estimating the following equation:

$$\begin{aligned} PctAgg_{i,t} = \ & \beta_0 + \beta_1 Log(Size)_{i,t} + \beta_2 BTM_{i,t} + \beta_3 ROA_{i,t} + \beta_4 E/PRatio_{i,t} \\ & + \beta_5 Annual\ Returns_{i,t} + \beta_6 Annual\ Volatility_{i,t} \\ & + \beta_7 Institutional\ Ownership_{i,t} + \beta_8 Business\ Segments_{i,t} \\ & + \beta_9 Geographis\ Segments_{i,t} + \varepsilon_{i,t} \end{aligned} \quad (1)$$

where *PctAgg* is firm *i's* number of macroeconomic-related words per thousand words in year *t's* 10-K filing. The independent variables are from the same year *t* because we calculate the variables as of the fiscal year-end date (e.g., 12/31/19), not the 10-K filing date which is several weeks or months afterwards. All variable definitions are described in detail in Appendix A. We cluster standard errors by firm and include year (industry and year) fixed effects in specification 2 (3).

Largely consistent with the results in Table 2, we find that the coefficients for *Log(Size)*, *Business Segments,* and *Geographic Segments* are positive and significant in all the specifications. These results confirm that larger and more operationally diverse firms are more likely to discuss macroeconomic conditions in their 10-K. Also similar to Table 2, *ROA* (*Annual Volatility*) is positive (negative) and significant, signaling that firms do not seem to use macroeconomic conditions as an excuse for lower performances. Finally, *BTM* is positive and significant, showing that value stocks seem to discuss macroeconomic conditions more than growth stocks. Overall, these findings provide some validation that *PctAgg* is higher for firms that are likely to be more sensitive to macroeconomic conditions.

While expected, the fact that *Log(Size)* and *Geographic Segments* are positively associated with *PctAgg* requires further examination. If managers mechanically have to disclose a higher rate of macroeconomic-related terms as their firm grows, then increasing firm size and geographic diversification could be the primary driver of the increase in *PctAgg.* To further assess the role of *Log(Size)* and *Geographic Segments* in explaining *PctAgg* we sort and split the sample into quartiles based on firm size and the number of geographic segments per year and plot the time-series trend of *PctAgg* for each quartile-year in Figures 3 and 4, respectively.[5] If larger or more diversified firms consistently disclose macroeconomic conditions at the highest rate, we expect the plots in Figures 3 and 4 to be relatively flat. Instead, we find the opposite. Similar to Figures 1 and 2, we find that the upward trend of *PctAgg* is prevalent in all four quartiles. The equivalent figures help assure that increasing firm size or geographic diversification are not the primary drivers of the trends observed for *PctAgg*.

4.2.Identifying bellwether firms using PctAgg

Figures 2, 3, and 4 show that the increasing trend in *PctAgg* is prevalent throughout the sample. Furthermore, the plots indicate that the level of macroeconomic disclosure can vary widely within each year, especially after 2009. However, it remains unclear whether significant variation exists across years for a given firm. The results from Table 3 show that specific firm characteristics, which are generally sticky, are strong predictors of *PctAgg*. Therefore, one can assume that *PctAgg* is also relatively sticky, such that macroeconomic disclosures are essentially boilerplate with minimal variation year-over-year.

[5] Results are similar for *Business Segments*.

On the other hand, prior studies imply and document that firms' systematic risk is time-varying (e.g., Ang and Chen, 2007; Ball, Sadka and Sadka, 2009; Ball, Sadka and Tseng, 2021). Thus, if a manager chooses to discuss macroeconomic conditions based on their private information of the firm's systematic risk, we should observe some variation of *PctAgg* at the firm-level. To test this conjecture, we examine the serial correlation of firm-level *PctAgg* and plot the results in Figure 5. Consistent with firm-level *PctAgg* varying year-over-year, the mean (median) coefficient of *PctAgg* is only 0.576 (0.630), suggesting that just over half of the current year's macroeconomic disclosure level repeats the previous year's disclosure. These results provide initial evidence of managers choosing when to provide macro disclosers.

When managers choose to discuss the macroeconomy, additional analyses can show whether they correctly anticipate if their firm's performance is highly associated with macroeconomic conditions. We assume that a manager is unlikely to discuss macroeconomic conditions if their firm's performance is primarily idiosyncratic. Moreover, previous studies show that information extracted from financial statements provides forward-looking information (e.g., Li et al., 2013; Bushman et al., 2015). Thus, if a manager discloses more about the macroeconomy in year *t-1,* then it is likely that the information disclosed indicates that the firm's future performance is related to the aggregate market performance in year *t*.

To test the relation between future firm performance and the macroeconomy, we first sort and split the sample into terciles based on the level of *PctAgg* in year *t-1*. As noted earlier, our measure allows for variation in the level of macroeconomic disclosure across years for a given firm. Hence, it is not certain that a firm is consistently a high macroeconomic discloser across our sample period. For a given year, we label the firms included in the highest tercile of *PctAgg* as bellwether firms. If our label is correct, we should observe a positive association between

future firms and macroeconomic performance in the highest tercile. After grouping the firm-year observations into terciles, we regress contemporaneous GDP or inflation rate growth on the value-weighted cross-sectional averages of all firm-level changes in operating income and present the results in Table 4.

We find a positive and significant association between changes in operating income and changes in GDP and inflation rate for the highest tercile of *PctAgg*, consistent with the performance of high macroeconomic disclosers being more related to the macroeconomy. Moreover, we observe a monotonic increase in the coefficients and *R*-squared from the smallest *PctAgg* group to the largest. These results suggest that our measure accurately identifies bellwether firms.

While it is novel to identify bellwether firms using textual analysis, it remains unclear whether *PctAgg* outperforms other existing measures used to identify bellwether firms. To examine the relative power of our disclosure-based measure, we compare it to the measure employed in Bonsall et al. (2013), used to identify bellwether firms. Bonsall et al. (2013), estimate the following equation:

$$e = \mu_e + B'M + m$$

where *e* is the firm's earnings realization, μ_e is the constant, B' is the estimated sensitivity of the firm's earnings to the macroeconomic factor, *M,* which is a vector of macroeconomic factor realizations, and *m* is the firm-specific shocks on earnings. This estimation aims to decompose the firm's earnings into two components: 1) a firm-specific shock to earnings, and; 2) the sensitivity of the firm's performance to macroeconomic conditions. Thus, firms with the largest *R*-squared from this regression are the firms with the highest sensitivity to the macroeconomic

conditions. We create a categorical variable, *HiMacro*, equal to one, two, or three if the firm's *R*-squared is in the lowest, middle, or upper tercile, respectively.

Our measure distinctly differs from *HiMacro* because *HiMacro* does not allow for the time-varying identification of bellwether firms. *HiMacro* assumes that a firm's sensitivity to macroeconomic conditions is constant, which may be unrealistic for many firms over a larger sample period. Further, Ball, Sadka, and Tseng (2021) suggest that a firm's systematic risk is time-varying, which signals that a time-varying measure is likely preferable to identify when firms are highly related to the aggregate market. To compare *PctAgg* with *HiMacro*, we rerun the analysis in Table 4 for each tercile of *HiMacro* and present the results in Table 5. If the two measures identify similar firms as bellwether firms then the results in both tables should be similar.

Contrary to the results in Table 4, we do not find a monotonic increase in the coefficients or *R*-squared across the terciles of *HiMacro*. Instead, we find that the earnings of firms with the least sensitivity to the macroeconomic conditions have the highest *R*-squared and related coefficients, suggesting that these firms' earnings are the most correlated with GDP growth. Moreover, according to the *R*-squares, the results in Panel A indicate that the earnings of firms that are the most sensitive to the macroeconomic conditions are the least associated with GDP growth. Taken together, it appears that *PctAgg* better identifies firms whose performance is more related to current macroeconomic conditions.

4.3 Macroeconomic Disclosure and the Firm's Information Environment

Section 4.1 shows that higher values of *PctAgg* implies that the firm's future performance is more strongly related to macroeconomic growth. Furthermore, the results suggest that

macroeconomic disclosure is not boilerplate and can vary year-over-year. Together, these results suggest that *PctAgg* captures whether firms increase their macroeconomic disclosure and whether the managers expect their firm's performance to be more sensitive to the current macroeconomic conditions. In this section, we examine whether and to what extent higher macroeconomic disclosure affects a firm's information environment. Specifically, we focus on how the informativeness of analyst forecasts varies with the level of macro disclosure in the firm.

First, we test whether analyst forecasts are more accurate when the firm has higher levels of macroeconomic disclosure. To execute this analysis, for each analyst-firm pair in our sample, we gather the most recent analyst forecasts issued prior to the related earnings announcement. We then proceed to compute the consensus forecast for each firm's quarterly earnings announcement as the average of all the recent analyst forecasts, and compute the firm-quarter analyst forecast error using the consensus. Finally, we sort and split the sample into terciles according to the level of *PctAgg* each year and compute the average absolute forecast error within each tercile. The related results are tabulated in Table 6.

Consistent with our prediction, the results in Panel A show that the mean absolute forecast error for the highest macroeconomic disclosers is 0.011, which is significantly lower than the absolute forecast error in the remainder of the sample. Moreover, the firm-year observations included in the middle tercile exhibit a significantly lower mean absolute forecast error than the observations in the lowest tercile of macroeconomic disclosure. These results suggest that analysts are better able to forecast earnings for firms that are more affected by macroeconomic conditions. This may occur because analysts incorporate the macroeconomic disclosures into their forecasts, or because they are better at understanding how macroeconomic trends affect firms' performance.

Table 6 Panel B presents the same analyses, but instead of sorting by *PctAgg*, we sort by *HiMacro*. When comparing the results across panels, it is clear that sorting on *HiMacro* does not produce the same results as sorting by *PctAgg* because there is no distinction between the absolute forecast errors across the terciles. This analysis further suggests that *PctAgg* better identifies bellwether firms by capturing the firm-years whose performance is most affected by macroeconomic conditions.

Our findings provide initial evidence that higher macroeconomic disclosure in a firm's 10-K filing improves the firm's information environment. However, it is still unclear how this improvement affects market participants. To examine this question, we analyze how higher macroeconomic disclosure impacts changes in information asymmetry after an analyst forecast is issued. Amiram et al. (2016) show that analyst forecasts significantly decrease information asymmetry immediately after their release, suggesting that analysts successfully consolidate valuable private and public information for unsophisticated investors. Suppose that macroeconomic disclosures represent a crucial piece of data incorporated into analyst forecasts that is helpful to unsophisticated investors. Then, it's reasonable to assume that the decrease in information asymmetry observed by Amiram et al. (2020) is more pronounced for firms with higher macroeconomic disclosure.

On the other hand, suppose investors can individually extract and adjust their beliefs about the firm based on available macroeconomic information. Then, we expect firms with the least amount of macroeconomic disclosure to exhibit the most significant decrease in information asymmetry. Additionally, prior studies suggest that aggregate outcomes are easier to predict than firm-level outcomes (e.g., Sadka and Sadka, 2009; Choi, Kalay, and Sadka, 2016). Thus, it is reasonable to conjecture that investors in firms with higher macroeconomic disclosure levels can

incorporate macroeconomic information better than idiosyncratic firm-level information, limiting the effect of analyst forecasts on information asymmetry.

To test the effects on information asymmetry, we rely on analyses formulated by Amiram et al. (2016). We gather all available quarterly forecasts for the firm-years in our sample and remove any forecasts issued within plus or minus two days of other confounding information releases (i.e., management forecasts, earnings announcements, or other analyst forecasts). After removing confounding information, we focus on trading days [-2,1] of the forecast issue date to examine the information asymmetry effects on day *t* and *t+1* compared to the two days before the issue date. These data limitations compile a sample consisting of 1,117,772 (279,443) distinct firm-day (firm-forecast) observations.

We then estimate the following equation to examine the changes in information asymmetry around a forecast issue date:

$$\begin{aligned} BASpread_{i,d} = {} & PreInfo1_{i,d} + Info0_{i,d} + Info1_{i,d} \\ & + Bottom\ Decile\ of\ PctAgg_{i,t-1} + Top\ Decile\ of\ PctAgg_{i,t-1} \\ & + Bottom\ Decile\ of\ PctAgg_{i,t-1}(PreInfo1_{i,d} + Info0_{i,d} + Info1_{i,d}) \\ & + Top\ Decile\ of\ PctAgg_{i,t-1}(PreInfo1_{i,d} + Info0_{i,d} + Info1_{i,d}) \\ & + X\delta + \varepsilon_{i,t} \end{aligned} \quad (2)$$

where variable subscripts *i*, *d*, and *t*, reference firm, day, and year, respectively. *BASpread* is the daily bid-ask spread calculated from CRSP for trading day *d*. Our primary variables of interest are *Info0* and *Info1*, which are indicator variables equal to one if trading day *d* is the announcement day (day after announcement day) of an analyst forecast, and zero otherwise. *PreInfo1* is an indicator variable equal to one if trading day *d* is the day immediately before the forecast announcement day and equal to zero otherwise. Implicitly, since we are examining days [-2,1] relative to the forecast announcement day, the trading day *d* that is two days before the announcement day, is included in the intercept.

We sort and split the sample into deciles based on the level of *PctAgg* and create the indicator variables *Bottom Decile of PctAgg* (*Top Decile of PctAgg*), which equal one if firm-year *t-1* is in the smallest (largest) decile of the *PctAgg* distribution for year *t-1*. To examine the changes in information asymmetry for firms with the smallest and largest amount of macroeconomic disclosures, we interact the indicator variables *Top Decile of PctAgg* and *Bottom Decile of PctAgg* with *PreInfo1*, *Info0*, and *Info1*. If information asymmetry significantly decreases after an analyst forecast for the highest macroeconomic disclosers, then we expect the coefficients for *Top Decile of PctAgg* * *Info0* or *Top Decile of PctAgg* * *Info1* to be negative and significant. In contrast, if the lowest macroeconomic disclosers experience significantly less information asymmetry following the release of an analyst forecast, then we expect the coefficients for *Bottom Decile of PctAgg* * *Info0* or *Bottom Decile of PctAgg* * *Info1* to be negative and significant.

X is a vector that includes the following variables, all of which are described in detail in the Appendix: $Price_{i,t}$, $Log(Size)_{i,t-1}$, $Volatility_{i,t-1}$, $Turnover_{i,t-1}$, $Volume_{i,t}$, and $AbsCAR_{i,t}$. *X* also includes firm fixed effects. Standard errors are clustered by firm and quarter.

The first column of Table 7 presents the results of estimating equation (2) for the full sample. Surprisingly, we only find evidence of a significant decrease in information asymmetry for firms that disclose the least about the macroeconomy. Specifically, we find that *Bottom Decile of PctAgg* * *Info0* is negative and marginally significant ($p < 0.10$), whereas as *Top Decile of PctAgg* * *Info0* and *Top Decile of PctAgg* * *Info1* are statistically insignificant. Together, these results suggest that on average, investors in firms that belong to the highest macroeconomic disclosure decile incorporate the effect of macroeconomic conditions on firm performance prior to the issuance of analyst forecast. However, investors in firms that belong to the lowest

macroeconomic disclosure decile they do not fully incorporate the information provided by analysts prior to the issuance of a forecast.

To further examine the decrease in information asymmetry, we split the sample into two time periods based on the spike of *PctAgg* in Figure 1. Between 1996 to 2009, *PctAgg* was slowly increasing over the years. However, starting in 2010, there was a significant increase in *PctAgg*.[6] Based on the spike in *PctAgg* after 2009, we rerun equation 2 for the years 1996 to 2009 (2010 to 2019) and present the results in column 2 (3) of Table 7. In column 2, we find no evidence of decreased information asymmetry for any group of firms. However, in column 3, we find that both *Bottom Decile of PctAgg* * *Info0* and *Bottom Decile of PctAgg* * *Info1* are negative and significant ($p < 0.05$). These results show that the increased variation of *PctAgg* after 2009 amplifies the variation in the effect of analyst forecasts on information asymmetry across the top and bottom decile of macroeconomic disclosure.[7]

The previous results show that firms that provide less macroeconomic disclosure experience a larger decrease in information asymmetry following the issuance of an analyst forecast. To ensure that other firm characteristics do not drive the information asymmetry decrease, we double sort the post-2009 sample by firm characteristics which may also affect information asymmetry. We first sort and split the sample into terciles based on either *Log(Size)*, *Geographic Segments*, and *Analyst Coverage*. Then, within each tercile, we sort and split the sample into deciles based on *PctAgg*. If the results presented in Table 7 continue to hold, we expect that the interaction terms *Bottom Decile of PctAgg* * *Info0* and *Bottom Decile of PctAgg* *

[6] Figure 2 also shows a similar trend for the third and fourth quartile of *PctAgg*.
[7] Similar to Table 7, we split the sample into two time periods for our tests preceding Table 7, and present the results in the appendix.

Info1 remain negative and significant. However, if the results disappear, then it appears that confounding firm characteristics amplified the results.

Columns 1, 2, and 3 of Table 8 present the results of re-estimating equation 2 on the post-2009 sample after first sorting by *Log(Size)*, *Geographic Segments*, and *Analyst Coverage*, respectively. For brevity, we do not tabulate control variables. Consistent with Table 7, we continue to find that the lowest macroeconomic disclosing firms experience a significant information asymmetry decrease immediately after an analyst forecast issuance. These results indicate that confounding firm characteristics did not drive the information asymmetry decrease.

4.4 Additional Analyses

First, as a robustness test, we re-estimate Equation 2 using a stacked categorical variable equal to one if the firm-year observation is in the lowest decile of *PctAgg* in year *t*, equal to three if the firm-year observation is in the highest decile of *PctAgg* in year *t*, and equal to two otherwise. This specification allows us to examine the groups of firms in three separate columns for the full sample. Again, for brevity, we do not tabulate the control variables. Consistent with Table 7, we continue to find that the least macroeconomic disclosing firms experienced a significant information asymmetry decrease immediately after an analyst forecast issuance. We do not observe a significant decrease for the other groups of firms.

Second, while the primary analyses from Amiram et al. (2016) analyze the effects of analyst forecasts on short-window information asymmetry, their study also examines the effects over a longer window. Their longer-window analysis shows that the decrease in information asymmetry persists up to ten days after the forecast issuance. Therefore, we predict firms with

the lowest level of macroeconomic disclosure experience less information asymmetry over the longer window.

To test this conjecture, we modify Equation 2 as follows:

$$BASpread_{i,d} = \beta_0 + \sum_{n=3}^{10} \delta_N PreInfoN_{i,d} + \beta_1 PreInfo1_{i,d} + \beta_2 Info0_{i,d} + \beta_3 Info1_{i,d} + \sum_{n=2}^{10} \delta_N PostInfoN_{i,d} + X\delta + \varepsilon_{i,t} \quad (3)$$

where *PreInfoN* is an indicator variable equal to 1 if day *d* is the *N*th trading day preceding an announcement of an analyst forecast and equals zero otherwise. *PostInfoN* is defined analogously. Like Equation 2, the trading day *d* that is two days before the announcement day, is included in the intercept.

To be conservative, we remove any analyst forecasts that have confounding information releases within the 21-day window. Additionally, we only use analyst forecasts issued between 2010-2019, since this is when *PctAgg* varies the most. Finally, for brevity, we estimate Equation (3) on the top and bottom quintile of *PctAgg* to individually examine each group.[8] These data limitations leave us with two subsamples of 35,393 (35,151) firm-day observations for the bottom (top) quintile. The results are presented in Table 10.

Results for firms in the lowest quintile are presented in column (1). We find that *Info0* and most *PostInfoN* days are negative and significant. Further, no *PreInfoN* days are statistically significant. Together, these results are consistent with information asymmetry decreasing immediately after an analyst forecast, with the decrease persisting over a longer window. However, information asymmetry is relatively stable before the releases of the forecast. Additionally, in column (2), information asymmetry is relatively stable throughout the 21-day

[8] The results are qualitatively similar if we estimate Equation 2 on the full post-2009 sample.

window. Taken together, the results presented in Tables 7, 8, 9, and 10 extend the results presented in Amiram et al. (2016) and show that the decrease in information asymmetry is more pronounced for firms with the lowest levels of macroeconomics disclosure.

Our previous results show that low macroeconomic disclosers experience an information asymmetry decrease after an analyst forecast, suggesting that unsophisticated investors learn more from analysts covering these firms. If investors learn more in low macroeconomic-disclosure firms, then we predict investors in such firms to also react more strongly to an analyst forecast issued for a low macroeconomic discloser. To examine this prediction, we first sort and split the sample into terciles based on the level of *PctAgg* in year *t-1*. Then, we calculate the average absolute value of three-day cumulative abnormal returns, centered on the analyst forecast announcement date, within each tercile year ($Abs(CAR_{[-1,1]})$). If investors react more to the new information provided by analysts, then we expect to observe a more significant market reactions to forecasts issued for firms that have less macroeconomic disclosures.

We tabulate the average $Abs(CAR_{[-1,1]})$ for each *PctAgg* tercile in Table 11 Panel A. Consistent with our conjecture, the least macroeconomic disclosers have a significantly larger market reaction immediately after an analyst forecast issuance. Additionally, the reaction monotonically decreases from the bottom tercile to the top. We also perform the same analysis in Panel B but sort the sample by *HiMacro* instead of *PctAgg*. Unlike Panel A, we do not find a similar trend after sorting by *HiMacro*. Collectively, the results presented in Table 11 show that investors react more to analyst forecasts issued for lower macroeconomic disclosers.

5. *Conclusion*

This paper introduces a novel firm-year measure of a firm's macroeconomic disclosure. The measure likely captures both the extent to which firms' performance are associated with macroeconomic conditions and the decision to provide such information in financial statements. Our findings imply that over the last decades firms have increased their propensity to disclose macroeconomic information in their financial statements. These findings show that firms' disclosures reflect changes in economic conditions and are consistent with the findings in recent macroeconomic literature, showing that the U.S. production network has become more connected over the past 50 years (Acemoglu and Azar (2020), Acemoglu, Carvalho, Ozdaglar, Tahbaz-Salehi (2012)).

After conducting several validation tests for our new measure, we examine the association between firms' propensity to provide macroeconomic disclosures in their financial statements and firms' information environment. We show that high macroeconomic disclosers are associated with improved analyst accuracy reflected in lower absolute analyst forecast errors. In addition, we find that information asymmetry around analyst forecast releases is lower for firms that provide less macroeconomic disclosures in their financial statements.

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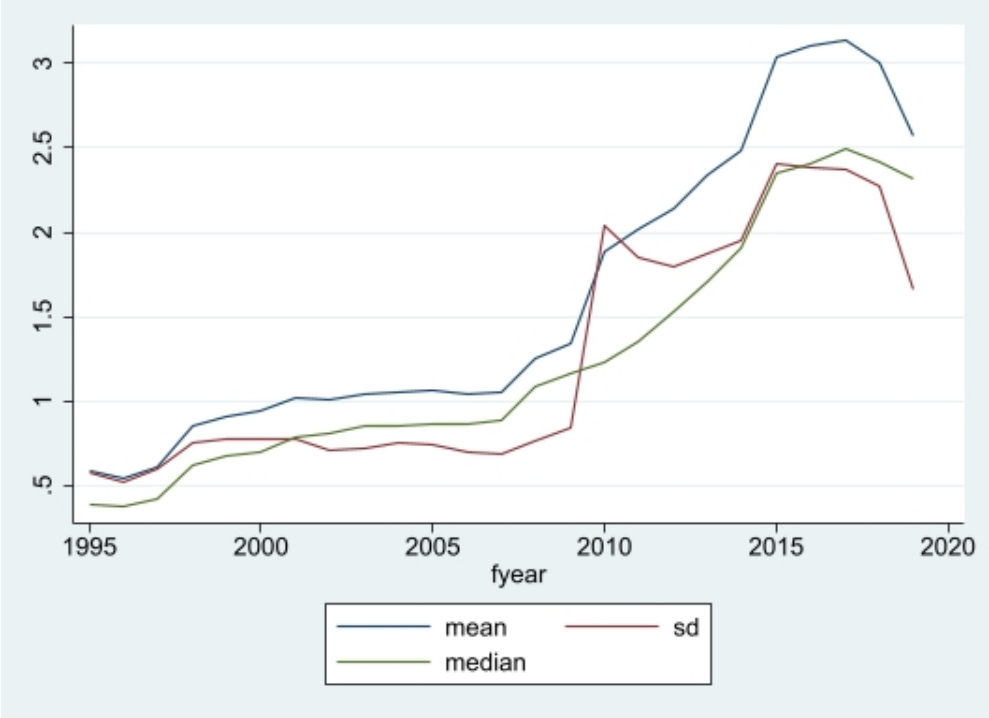

Figure 1: This figure plots the time series of *PctAgg*. *PctAgg* is defined as the total number of aggregate-related words per thousand words in firm *i's* 10-K. The sample consists of 80,913 firm-year observations between 1995 and 2019.

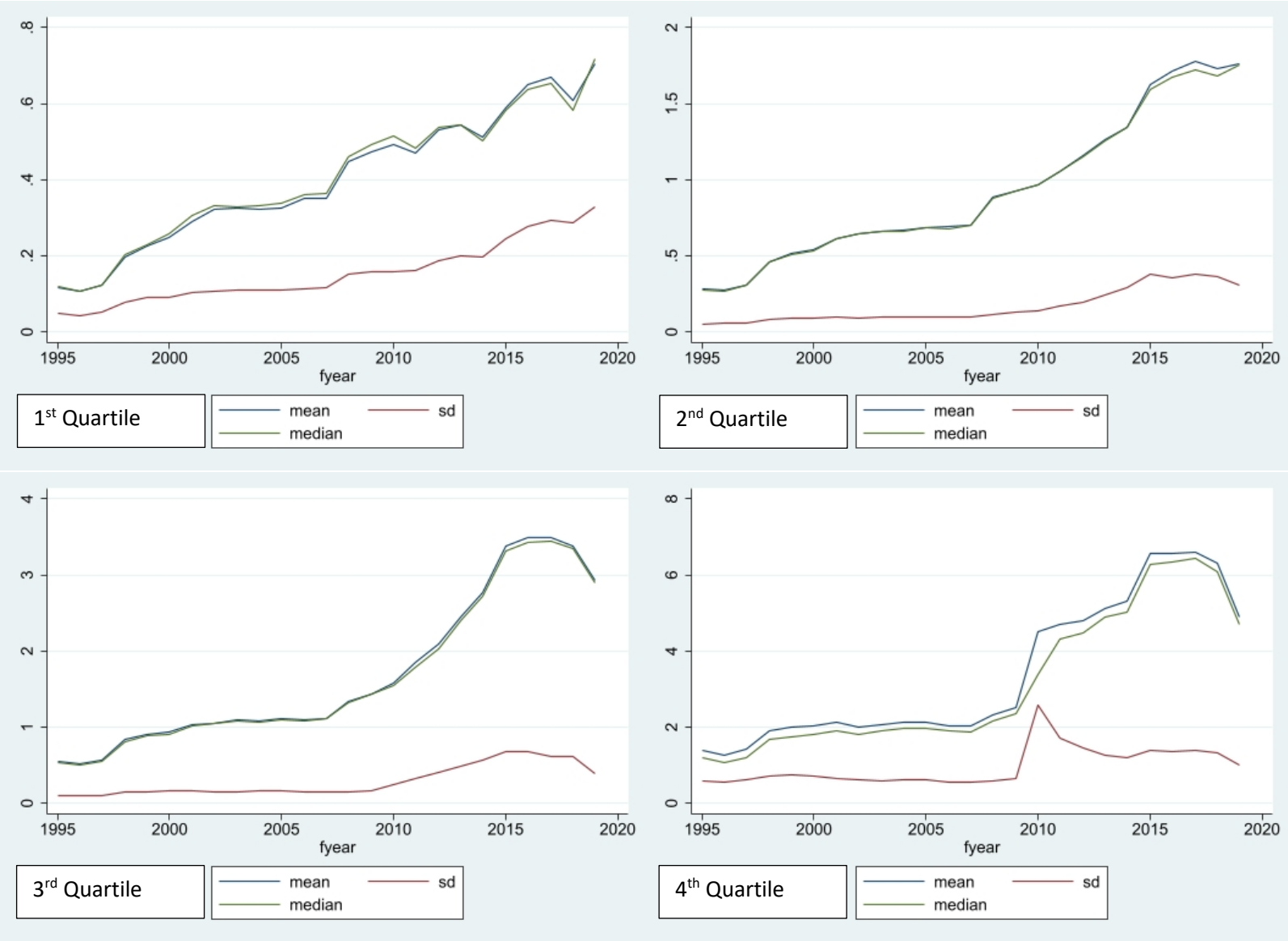

Figure 2: These figures plot the time series of *PctAgg* split into quartiles. *PctAgg* is defined as the total number of aggregate-related words per thousand words in firm *i's* 10-K. The sample consists of 80,913 firm-year observations between 1995 and 2019.

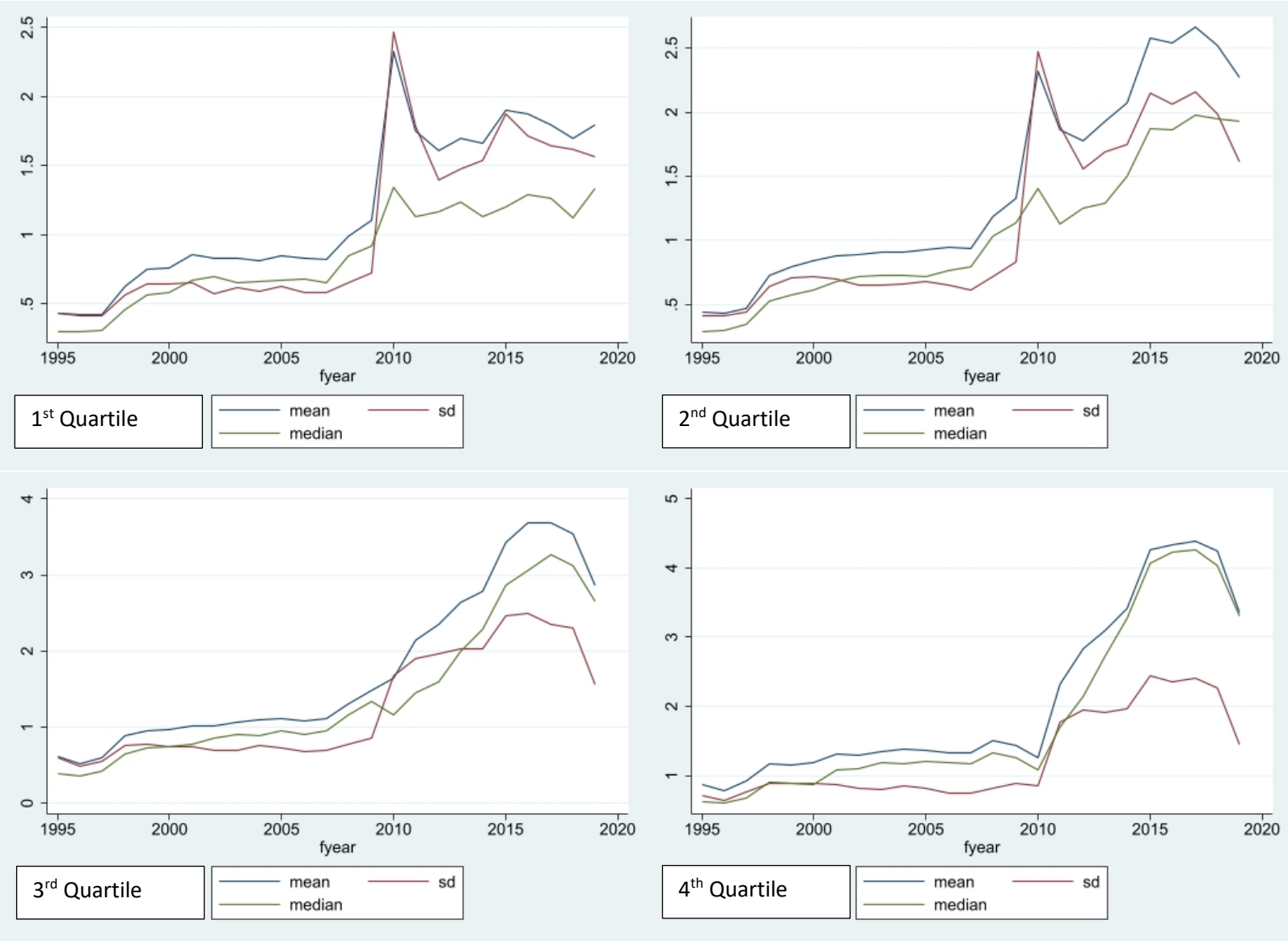

Figure 3: These figures plot the time series of *PctAgg* after sorting observations by *Log(Size)* within each year and then splitting the sample into size quartiles. PctAgg is defined as the total number of aggregate-related words per thousand words in firm i's 10-K. The sample consists of 80,913 firm-year observations between 1995 and 2019.

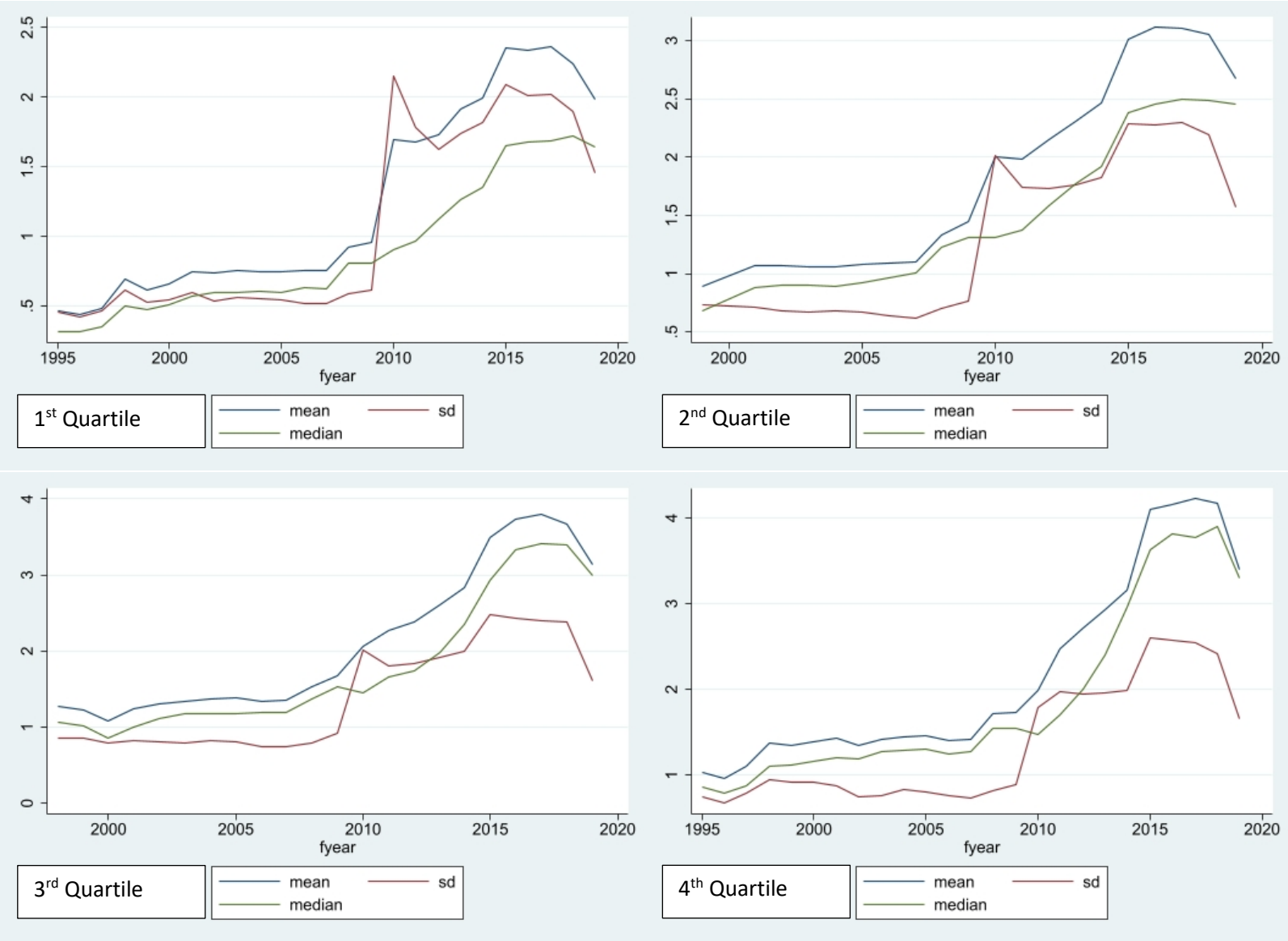

Figure 4: These figures plot the time series of *PctAgg* after sorting observations by the number of *Geographic Segments* each year and then splitting the sample into quartiles. *PctAgg* is defined as the total number of aggregate-related words per thousand words in firm *i's* 10-K. The sample consists of 80,913 firm-year observations between 1995 and 2019.

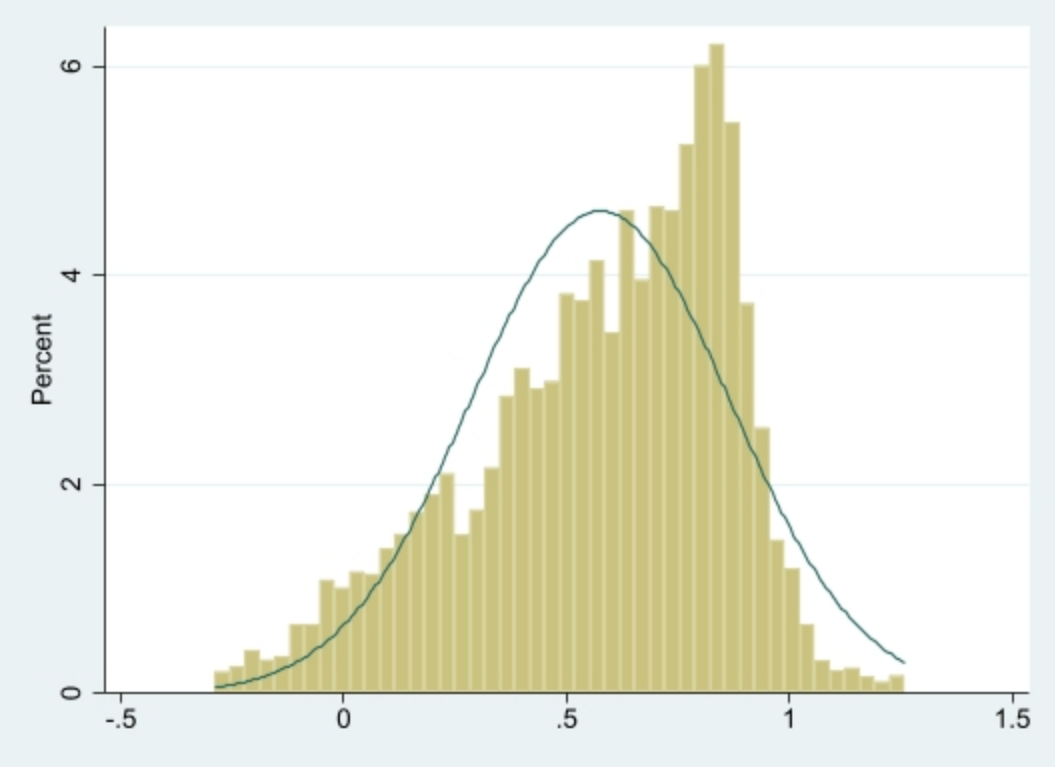

Figure 5: This figure plots the histogram of the coefficients calculated from the following individual firm time-series regressions:

$$PctAgg_{i,t} = \beta_0 + \beta_1 PctAgg_{i,t-1} + \varepsilon_{i,t}$$

where *PctAgg* is the total number of aggregate-related words per 1,000 total words in firm *i's* 10-K for year *t* or year *t-1*. The sample consists of 80,193 firm-year observations ranging from years 1995-2019.

Table 1

Panel A: Descriptive Statistics for Determinants Regression

	N	Mean	SD	P25	P50	P75
PctAgg	80,193	1.4687	1.5559	0.4826	0.9446	1.8052
Log(Size)	80,193	5.9093	2.1049	4.3654	5.8740	7.3391
BTM	80,193	0.6122	0.6502	0.2493	0.4637	0.7852
ROA	80,193	-0.0609	0.2870	-0.0589	0.0277	0.0702
Analyst Coverage	80,193	1.4648	0.9529	0.6931	1.6094	2.1972
E/P Ratio	80,193	-0.1264	0.5530	-0.0682	0.0296	0.0603
Annual Returns	80,193	0.0722	0.5537	-0.2196	0.0413	0.3212
Annual Volatility	80,193	0.0373	0.0222	0.0214	0.0314	0.0467
Institutional Ownership	80,193	0.4544	0.3101	0.1625	0.4568	0.7331
Business Segments	80,193	2.1965	1.7279	1.0000	1.0000	3.0000
Geographic Segments	80,193	2.5977	2.0585	1.0000	2.0000	3.0000

Panel B: Descriptive Statistics for Information Asymmetry Analyses

	N	Mean	SD	P25	P50	P75
PctAgg	1,117,772	1.6960	1.7330	0.5669	1.0944	2.0943
BASpread	1,117,772	0.5994	1.0685	0.0440	0.1343	0.6398
Price	1,117,772	33.7098	32.0832	12.6700	25.0000	43.8600
Log(Size)	1,117,772	9.5433	1.7733	8.2918	9.4620	10.7097
Volatility	1,117,772	0.0291	0.0166	0.0173	0.0249	0.0362
Turnover	1,117,772	0.1039	0.0903	0.0441	0.0773	0.1325
Volume	1,117,772	1.4627	3.0068	0.1410	0.4463	1.3277
AbsCAR	1,117,772	0.0292	0.0330	0.0080	0.0185	0.0375

Panel A of Table 1 presents descriptive statistics for continuous variables used in our determinant's regression. The sample consists of 80,193 firm-year observations ranging from years 1995-2019. Panel B of Table 1 presents descriptive statistics for continuous variables using in our information asymmetry analyses. The sample consists of 1,117,772 firm-day observations ranging from years 1995-2019. Variable definitions are presented in the Appendix A.

Table 2
Panel A Pearson Correlation Matrix

	PctAgg	*Log(Size)*	*BTM*	*ROA*	*Analyst Coverage*	*E/P Ratio*	*Annual Returns*	*Annual Volatility*	*Institutional Ownership*	*Business Segments*	*Geographic Segments*
PctAgg	**1.000**										
Log(Size)	**0.314**	**1.000**									
BTM	**-0.031**	**-0.364**	**1.000**								
ROA	**0.141**	**0.352**	**0.047**	**1.000**							
Analyst Coverage	**0.207**	**0.743**	**-0.237**	**0.203**	**1.000**						
E/P Ratio	**0.072**	**0.345**	**-0.167**	**0.582**	**0.157**	**1.000**					
Annual Returns	**-0.038**	**0.064**	**-0.188**	**0.119**	**-0.085**	**0.223**	**1.000**				
Annual Volatility	**-0.243**	**-0.576**	**0.175**	**-0.485**	**-0.358**	**-0.479**	**0.172**	**1.000**			
Institutional Ownership	**0.227**	**0.553**	**-0.136**	**0.272**	**0.514**	**0.188**	**-0.021**	**-0.399**	**1.000**		
Business Segments	**0.127**	**0.248**	**0.035**	**0.152**	**0.104**	**0.076**	-0.004	**-0.194**	**0.156**	**1.000**	
Geographic Segments	**0.238**	**0.223**	**-0.052**	**0.116**	**0.158**	**0.058**	-0.006	**-0.109**	**0.177**	**0.145**	**1.000**

Panel B Spearman Correlation Matrix

	PctAgg	*Log(Size)*	*BTM*	*ROA*	*Analyst Coverage*	*E/P Ratio*	*Annual Returns*	*Annual Volatility*	*Institutional Ownership*	*Business Segments*	*Geographic Segments*
PctAgg	**1.000**										
Log(Size)	**0.354**	**1.000**									
BTM	0.002	**-0.358**	**1.000**								
ROA	**0.167**	**0.418**	**-0.130**	**1.000**							
Analyst Coverage	**0.236**	**0.756**	**-0.239**	**0.253**	**1.000**						
E/P Ratio	**0.151**	**0.312**	**0.088**	**0.823**	**0.162**	**1.000**					
Annual Returns	-0.007	**0.104**	**-0.231**	**0.163**	**-0.050**	**0.114**	**1.000**				
Annual Volatility	**-0.303**	**-0.609**	**0.088**	**-0.472**	**-0.356**	**-0.448**	**0.070**	**1.000**			
Institutional Ownership	**0.266**	**0.553**	**-0.096**	**0.267**	**0.493**	**0.207**	**0.012**	**-0.391**	**1.000**		
Business Segments	**0.168**	**0.217**	**0.100**	**0.117**	**0.087**	**0.163**	**0.011**	**-0.233**	**0.149**	**1.000**	
Geographic Segments	**0.289**	**0.218**	**-0.048**	**0.134**	**0.157**	**0.065**	**-0.013**	**-0.115**	**0.175**	**0.118**	**1.000**

Panel A (Panel B) presents Pearson (Spearman) correlations among key variables. Variable definitions are presented in the Appendix A. Numbers are bolded if p-value <0.01.

Table 3: Determinants of Macro Disclosures

	(1) *PctAgg*	(2) *PctAgg*	(3) *PctAgg*
Log(Size)	0.172***	0.107***	0.120***
	(0.008)	(0.007)	(0.007)
BTM	0.177***	0.125***	0.106***
	(0.016)	(0.014)	(0.014)
ROA	0.059**	0.540***	0.424***
	(0.028)	(0.028)	(0.030)
E/P Ratio	-0.214***	-0.133***	-0.120***
	(0.014)	(0.012)	(0.013)
Annual Returns	-0.005	-0.015*	-0.021***
	(0.008)	(0.008)	(0.008)
Annual Volatility	-0.803***	-0.215***	-0.132***
	(0.041)	(0.039)	(0.040)
Institutional Ownership	0.209***	0.118***	0.093***
	(0.042)	(0.036)	(0.036)
Business Segments	0.015**	0.021***	0.016**
	(0.007)	(0.006)	(0.006)
Geographic Segments	0.129***	0.116***	0.102***
	(0.007)	(0.006)	(0.006)
Intercept	0.159***	0.457***	0.415***
	(0.051)	(0.049)	(0.050)
Observations	80,193	80,193	80,193
Adjusted R^2	0.147	0.360	0.374
Clustering	Firm	Firm	Firm
Fixed Effects	None	Year	Industry & Year

Table 3 presents the results of estimating the following equation:

$$\begin{aligned} PctAgg_{i,t} = \ & \beta_0 + \beta_1 Log(Size)_{i,t} + \beta_2 BTM_{i,t} + \beta_3 ROA_{i,t} + \beta_4 E/PRatio_{i,t} \\ & + \beta_5 Annual\ Returns_{i,t} + \beta_6 Annual\ Volatility_{i,t} \\ & + \beta_7 Institutional\ Ownership_{i,t} + \beta_8 Business\ Segments_{i,t} \\ & + \beta_9 Geographis\ Segments_{i,t} + \varepsilon_{i,t} \end{aligned}$$

where *PctAgg* is the total number of aggregate-related words per 1,000 total words in firm *i's* 10-K for year *t*. All other variable definitions are presented in the Appendix A. The sample consists of 80,193 firm-year observations ranging from years 1995-2019. Standard errors are clustered by firm.

Table 4 Macro Disclosure Levels and Aggregate News

Panel A: Macro Disclosure and Contemporaneous Earnings and GDP growth

PctAgg Tercile	*Lowest* ΔGDP_t	*Middle* ΔGDP_t	*Highest* ΔGDP_t
$\Delta OI_t/P_{t-1}$	1.885	4.615	7.388***
	(4.889)	(3.995)	(2.377)
Intercept	0.043***	0.038***	0.030***
	(0.005)	(0.006)	(0.005)
Adjusted R^2	-0.038	0.014	0.273

Panel B: Macro Disclosure and Contemporaneous Earnings and Inflation growth

PctAgg Tercile	*Lowest* $\Delta Inflation_t$	*Middle* $\Delta Inflation_t$	*Highest* $\Delta Inflation_t$
$\Delta OI_t/P_{t-1}$	0.573	1.803	2.025**
	(1.658)	(1.341)	(0.865)
Intercept	0.018***	0.016***	0.015***
	(0.002)	(0.002)	(0.002)
Adjusted R^2	-0.040	0.034	0.163

Table 4 presents the results of estimating the following equation stacked by a categorical variable equal to 1 if the firm is in the lowest tercile of *PctAgg* in year *t*, equal to 2 if the firm is in the middle tercile of *PctAgg* in year *t,* or equal to 3 if the firm is in the highest tercile of *PctAgg* in year *t*:

$$Aggregate\ News_t = \beta_0 + \beta_1 \frac{\Delta OI_t}{P_{t-1}} + \varepsilon_{i,t}$$

where $\Delta OI_t/P_{t-1}$ is the value-weighted cross-sectional averages of all firm-level changes in operating income for year *t*, scaled by beginning of the year stock price. *Aggregate News* is either ΔGDP_t, presented in Panel A, which is the annual GDP growth rate for year *t,* or $\Delta Inflation_t$, presented in Panel B, which is the annual inflation growth rate for year *t. PctAgg* is the total number of aggregate-related words per 1,000 total words in firm *i's* 10-K for year *t*.

Table 5 *HiMacro* Firms and Aggregate News

Panel A: *HiMacro* Firms and Contemporaneous Earnings and GDP growth

HiMacro Tercile	*Lowest* ΔGDP_t	*Middle* ΔGDP_t	*Highest* ΔGDP_t
$\Delta OI_t/P_{t-1}$	12.397**	8.966*	5.420*
	(5.332)	(4.412)	(3.011)
Intercept	0.033***	0.036***	0.033***
	(0.006)	(0.005)	(0.007)
Adjusted R^2	0.161	0.120	0.089

Panel B: *HiMacro* Firms and Contemporaneous Earnings and Inflation growth

HiMacro Tercile	*Lowest* $\Delta Inflation_t$	*Middle* $\Delta Inflation_t$	*Highest* $\Delta Inflation_t$
$\Delta OI_t/P_{t-1}$	4.245**	1.658	1.951*
	(1.803)	(1.591)	(1.011)
Intercept	0.015***	0.017***	0.015***
	(0.002)	(0.002)	(0.002)
Adjusted R^2	0.165	0.004	0.106

Table 5 presents the results of estimating the following equation stacked by a categorical variable equal to 1 if the firm is in the lowest tercile of *HiMacro* in year *t*, equal to 2 if the firm is in the middle tercile of *HiMacro* in year *t,* or equal to 3 if the firm is in the highest tercile of *HiMacro* in year *t*:

$$Aggregate\ News_t = \beta_0 + \beta_1 \frac{\Delta OI_t}{P_{t-1}} + \varepsilon_{i,t}$$

where $\Delta OI_t/P_{t-1}$ is the value-weighted cross-sectional averages of all firm-level changes in operating income for year *t*, scaled by beginning of the year stock price. *Aggregate News* is either ΔGDP_t, presented in Panel A, which is the annual GDP growth rate for year *t,* or $\Delta Inflation_t$, presented in Panel B, which is the annual inflation growth rate for year *t. HiMacro* is a categorical variable equal to one, two, or three if firm *i's R*-squared calculated from the following equation is in the lowest, middle, or upper tercile, respectively: $e = \mu_e + B'M + m$ where *e* is the firm's earnings realization, μ_e is the constant, B' is the estimated sensitivity of the firm's earnings to the macroeconomic factor, *M,* which is a vector of macroeconomic factor realizations, and *m* is the firm-specific shocks on earnings.

Table 6 Macro Firms and Analyst Forecast Errors

Panel A: Macro Disclosure and Aggregate Quarterly Forecast Errors

PctAgg Tercile:	*Abs(Forecast Error)*	*Difference*
Bottom Tercile	0.032	
	(0.002)	
Middle Tercile	0.019	-0.013***
	(0.001)	(0.002)
Top Tercile	0.011	-0.008***
	(0.001)	(0.002)

Panel B: *HiMacro* firms and Aggregate Quarterly Forecast Errors

HiMacro Tercile:	*Abs(Forecast Error)*	*Difference*
Bottom Tercile	0.016	
	(0.008)	
Middle Tercile	0.017	0.001
	(0.011)	(0.001)
Top Tercile	0.016	-0.000
	(0.011)	(0.002)

Table 6 presents the mean absolute value of quarterly analyst forecast errors after sorting by *PctAgg* in Panel A, and *HiMacro* in Panel B. *Abs(Forecast Error)* is calculated for each firm as the mean analyst forecast estimate minus the realized earnings for quarter *t,* scaled by beginning of the quarter price. *PctAgg* is the total number of aggregate-related words per 1,000 total words in firm *i's* 10-K for year *t-1*. *HiMacro* is a categorical variable equal to one, two, or three if firm *i's* *R*-squared calculated from the following equation is in the lowest, middle, or upper tercile, respectively: $e = \mu_e + B'M + m$ where *e* is the firm's earnings realization, μ_e is the constant, B' is the estimated sensitivity of the firm's earnings to the macroeconomic factor, *M,* which is a vector of macroeconomic factor realizations, and *m* is the firm-specific shocks on earnings.

Table 7: Analyst Forecasts and Information Asymmetry

Sample Period:	Full Sample	Years 1996-2009	Years 2010-2019
	BASpread	*BASpread*	*BASpread*
PreInfo1	-0.001	-0.002	0.000
	(0.001)	(0.002)	(0.001)
Info0	-0.002	-0.002	-0.001
	(0.002)	(0.003)	(0.001)
Info1	-0.003	-0.003	-0.002**
	(0.002)	(0.003)	(0.001)
$Bottom\ Decile\ of\ PctAgg_{i,t-1}$	0.025	0.060***	-0.014
	(0.015)	(0.021)	(0.009)
$Top\ Decile\ of\ PctAgg_{i,t-1}$	-0.018	-0.045*	-0.002
	(0.015)	(0.022)	(0.005)
$Bottom\ Decile\ of\ PctAgg_{i,t-1}$ * *PreInfo1*	-0.002	-0.001	-0.004
	(0.005)	(0.007)	(0.004)
$\boldsymbol{Bottom\ Decile\ of\ PctAgg_{i,t-1}}$ * ***Info0***	**-0.008***	**-0.008**	**-0.009****
	(0.004)	**(0.006)**	**(0.004)**
$\boldsymbol{Bottom\ Decile\ of\ PctAgg_{i,t-1}}$ * ***Info1***	**-0.005**	**-0.000**	**-0.015*****
	(0.004)	**(0.005)**	**(0.003)**
$Top\ Decile\ of\ PctAgg_{i,t-1}$ * *PreInfo1*	-0.000	0.001	-0.002
	(0.002)	(0.003)	(0.002)
$\boldsymbol{Top\ Decile\ of\ PctAgg_{i,t-1}}$ * ***Info0***	**0.003**	**0.005**	**-0.000**
	(0.003)	**(0.005)**	**(0.002)**
$\boldsymbol{Top\ Decile\ of\ PctAgg_{i,t-1}}$ * ***Info1***	**0.001**	**0.001**	**-0.000**
	(0.004)	(0.005)	(0.002)
$Price_{i,t}$	0.002***	-0.000	0.002***
	(0.000)	(0.001)	(0.000)
$Log(Size)_{i,t-1}$	-0.345***	-0.397***	-0.165***
	(0.026)	(0.031)	(0.008)
$Volatility_{i,t-1}$	10.041***	10.319***	1.664***
	(2.132)	(2.729)	(0.452)
$Turnover_{i,t-1}$	-2.811***	-3.183***	-0.581***
	(0.245)	(0.247)	(0.054)
$Volume_{i,t}$	-0.007**	-0.012**	0.003***
	(0.003)	(0.005)	(0.001)
$AbsCAR_{i,t}$	1.310***	1.664***	0.194***
	(0.184)	(0.211)	(0.058)
Observations	1,117,772	728,744	389,028
Adjusted R^2	0.537	0.518	0.588
Clustering	Firm & Quarter	Firm & Quarter	Firm & Quarter
Fixed Effects	Firm	Firm	Firm

Table 7 presents the results of estimating the following equation:

$$BASpread_{i,d} = PreInfo1_{i,d} + Info0_{i,d} + Info1_{i,d} + Bottom\ Decile\ of\ PctAgg_{i,t-1} + Top\ Decile\ of\ PctAgg_{i,t-1} + Bottom\ Decile\ of\ PctAgg_{i,t-1}(PreInfo1_{i,d} + Info0_{i,d} + Info1_{i,d}) + Top\ Decile\ of\ PctAgg_{i,t-1}(PreInfo1_{i,d} + Info0_{i,d} + Info1_{i,d}) + X\delta + \varepsilon_{i,t}$$

where *BASpread* is bid-ask spread percentage on trading day *d* for firm *i,* measured from CRSP. *PreInfo1* in an indicator variable equal to one if day *d* is the trading day immediately before an analyst forecast announcement concerning firm *i*, or zero otherwise. Our primary variables of interest, *Info0* (*Info1)*, are indicator variables equal to 1 if trading day *d* is on the announcement day (immediately after) an analyst forecast announcement concerning firm *i,* or zero otherwise. *Top Decile of PctAgg* is an indicator variable equal to one if firm i's *PctAgg* in year *t-1* is in the top decile of the *PctAgg* distribution in year *t-1*, or equal to zero otherwise. *Bottom Decile of PctAgg* is defined analogously. *X* is a vector that includes all control variables and firm fixed effects. All control variables are defined in the Appendix A. Standard errors are clustered by firm and quarter.

Table 8: Analyst Forecasts and Information Asymmetry –Double Sorting Observations by Firm Characteristics and Macro Disclosure

Firm Characteristic:	*Log(Size)* *BASpread*	*Geographic Segments* *BASpread*	*Analyst Coverage* *BASpread*
PreInfo1	-0.000	0.000	0.000
	(0.001)	(0.001)	(0.001)
Info0	-0.001	-0.001	-0.001
	(0.001)	(0.001)	(0.001)
Info1	-0.003***	-0.003**	-0.003**
	(0.001)	(0.001)	(0.001)
$Bottom\ Decile\ of\ PctAgg_{i,t-1}$	-0.015**	-0.023***	-0.022***
	(0.006)	(0.007)	(0.007)
$Top\ Decile\ of\ PctAgg_{i,t-1}$	0.018***	0.016***	0.017***
	(0.007)	(0.005)	(0.005)
$Bottom\ Decile\ of\ PctAgg_{i,t-1}$ * *PreInfo1*	-0.004	-0.006	-0.007*
	(0.004)	(0.004)	(0.003)
$\boldsymbol{Bottom\ Decile\ of\ PctAgg_{i,t-1}}$ * ***Info0***	**-0.007****	**-0.009*****	**-0.011****
	(0.003)	**(0.003)**	**(0.004)**
$\boldsymbol{Bottom\ Decile\ of\ PctAgg_{i,t-1}}$ * ***Info1***	**-0.011*****	**-0.014*****	**-0.015*****
	(0.004)	**(0.004)**	**(0.004)**
$Top\ Decile\ of\ PctAgg_{i,t-1}$ * *PreInfo1*	-0.001	-0.001	-0.001
	(0.003)	(0.002)	(0.002)
$\boldsymbol{Top\ Decile\ of\ PctAgg_{i,t-1}}$ * ***Info0***	**-0.001**	**0.000**	**-0.001**
	(0.002)	**(0.002)**	**(0.002)**
$\boldsymbol{Top\ Decile\ of\ PctAgg_{i,t-1}}$ * ***Info1***	**0.001**	**0.002**	**0.001**
	(0.001)	**(0.002)**	**(0.002)**
Observations	389,028	389,028	389,028
Adjusted R^2	0.588	0.589	0.589
Clustering	Firm & Quarter	Firm & Quarter	Firm & Quarter
Fixed Effects	Firm	Firm	Firm

Table 8 presents the results of estimating the following equation:

$$\begin{aligned} BASpread_{i,d} = {} & PreInfo1_{i,d} + Info0_{i,d} + Info1_{i,d} + Bottom\ Decile\ of\ PctAgg_{i,t-1} \\ & + Top\ Decile\ of\ PctAgg_{i,t-1} \\ & + Bottom\ Decile\ of\ PctAgg_{i,t-1}(PreInfo1_{i,d} + Info0_{i,d} + Info1_{i,d}) \\ & + Top\ Decile\ of\ PctAgg_{i,t-1}(PreInfo1_{i,d} + Info0_{i,d} + Info1_{i,d}) + X\delta + \varepsilon_{i,t} \end{aligned}$$

where *BASpread* is bid-ask spread percentage on trading day *d* for firm *i,* measured from CRSP. *PreInfo1* in an indicator variable equal to one if day *d* is the trading day immediately before an analyst forecast announcement concerning firm *i*, or zero otherwise. Our primary variables of interest, *Info0* (*Info1)*, are indicator variables equal to 1 if trading day *d* is on the announcement day (immediately after) an analyst forecast announcement concerning firm *i,* or zero otherwise. *Top Decile of PctAgg* is an indicator variable equal to one if firm i's *PctAgg* in year *t-1* is in the top decile of the *PctAgg* distribution in year *t-1*, or equal to zero otherwise. *Bottom Decile of PctAgg* is defined analogously. *X* is a vector that includes all control variables and firm fixed effects. All control variables are defined in the Appendix A. Standard errors are clustered by firm and quarter.

Table 9: Analyst Forecasts and Information Asymmetry – Robustness Test

PctAgg Decile	*Lowest BASpread*	*Middle BASpread*	*Highest BASpread*
PreInfo1	-0.003	-0.001	-0.002
	(0.005)	(0.001)	(0.002)
Info0	-0.010**	-0.002	0.002
	(0.004)	(0.002)	(0.004)
Info1	-0.008**	-0.003	-0.003
	(0.004)	(0.002)	(0.003)
$Price_{i,t}$	0.001	0.002***	-0.000
	(0.001)	(0.000)	(0.001)
$Log(Size)_{i,t-1}$	-0.340***	-0.345***	-0.266***
	(0.028)	(0.026)	(0.033)
$Volatility_{i,t-1}$	7.211***	10.115***	8.109***
	(1.040)	(2.193)	(2.286)
$Turnover_{i,t-1}$	-1.525***	-2.902***	-3.338***
	(0.144)	(0.251)	(0.396)
$Volume_{i,t}$	-0.006	-0.005*	-0.014***
	(0.005)	(0.003)	(0.005)
$AbsCAR_{i,t}$	0.720***	1.421***	1.172***
	(0.199)	(0.179)	(0.237)
Observations	112,182	893,563	112,022
Adjusted R^2	0.646	0.547	0.563
Clustering	Firm & Quarter	Firm & Quarter	Firm & Quarter
Fixed Effects	Firm	Firm	Firm

Table 9 presents the results of estimating the following equation stacked by a categorical variable equal to 1 if the firm is in the lowest decile of *PctAgg* in year *t*, equal to 3 if the firm is in the highest decile of *PctAgg* in year *t,* or equal to 2 otherwise:

$$BASpread_{i,d} = \beta_0 + \beta_1 PreInfo1_{i,d} + \beta_2 Info0_{i,d} + \beta_3 Info1_{i,d} + X\delta + \varepsilon_{i,t}$$

where *BASpread* is bid-ask spread percentage on trading day *d* for firm *i,* measured from CRSP. *PreInfo1* in an indicator variable equal to one if day *d* is the trading day immediately before an analyst forecast announcement concerning firm *i*, or zero otherwise. Our primary variables of interest, *Info0* (*Info1)*, are indicator variables equal to 1 if trading day *d* is on the announcement day (immediately after) an analyst forecast announcement concerning firm *i,* or zero otherwise. *X* is a vector that includes all control variables and firm fixed effects. All control variables are defined in the Appendix A. Standard errors are clustered by firm and quarter.

Table 10
Analyst Forecasts and Long-Term Information Asymmetry

PctAgg Quintile	Smallest *BASpread*	Largest *BASpread*
Preinfo10	-0.021	0.009
	(0.018)	(0.013)
Preinfo9	-0.016	0.008
	(0.017)	(0.008)
Preinfo8	-0.024	0.002
	(0.017)	(0.009)
Preinfo7	0.002	0.006
	(0.016)	(0.009)
Preinfo6	-0.010	0.008
	(0.016)	(0.010)
Preinfo5	-0.014	-0.009
	(0.015)	(0.010)
Preinfo4	-0.012	0.010
	(0.019)	(0.014)
Preinfo3	-0.000	-0.000
	(0.018)	(0.013)
Preinfo1	-0.016	-0.004
	(0.017)	(0.010)
Info0	-0.034**	-0.003
	(0.015)	(0.009)
Postinfo1	-0.034	0.002
	(0.020)	(0.007)
Postinfo2	-0.040**	0.003
	(0.016)	(0.011)
Postinfo3	-0.036**	-0.005
	(0.014)	(0.011)
Postinfo4	-0.025	0.008
	(0.018)	(0.011)
Postinfo5	-0.033**	-0.001
	(0.016)	(0.007)
Postinfo6	-0.035**	0.003
	(0.015)	(0.013)
Postinfo7	-0.052***	-0.017
	(0.016)	(0.011)
Postinfo8	-0.032*	-0.002
	(0.018)	(0.010)
Postinfo9	-0.028	-0.006
	(0.018)	(0.011)
Postinfo10	-0.041***	0.003
	(0.013)	(0.013)
Observations	35,461	35,214
Adjusted R^2	0.564	0.645
Controls	Yes	Yes
Clustering	Firm & Quarter	Firm & Quarter
Fixed Effects	Firm	Firm

This table presents the results of estimating the following equation stacked by a categorical variable

equal to 1 if the firm is in the lowest quintile of *PctAgg* in year *t*, or equal to 2 if the firm is in the highest quintile of *PctAgg* in year *t*:

$$BASpread_{i,d} = \beta_0 + \sum_{n=3}^{10} \delta_N PreInfoN_{i,d} + \beta_1 PreInfo1_{i,d} + \beta_2 Info0_{i,d} + \beta_3 Info1_{i,d} + \sum_{n=2}^{10} \delta_N PostInfoN_{i,d} + X\delta + \varepsilon_{i,t}$$

where *BASpread* is bid-ask spread percentage on trading day *d* for firm *i,* measured from CRSP. *PreInfoN* is an indicator variable equal to 1 if day *d* is the *N*th trading day preceding an announcement of an analyst forecast, and equals zero otherwise. *PostInfoN* defined analogously. *PreInfo1* in an indicator variable equal to one if day *d* is the trading day immediately before an analyst forecast announcement concerning firm *i*, or zero otherwise. *Info0* (*Info1)*, are indicator variables equal to 1 if trading day *d* is on the announcement day (immediately after) an analyst forecast announcement concerning firm *i,* or zero otherwise. *X* is a vector that includes all control variables and firm fixed effects. All control variables are defined in the Appendix A. Standard errors are clustered by firm and quarter.

Table 11 Macro Firms and the Aggregate Market Response to Analyst Forecasts

Panel A: Macro Disclosure and the Aggregate Market Response to Analyst Forecasts

PctAgg Tercile:	*Abs($CAR_{[-1,1]}$)*	*Difference*
Bottom Tercile	0.044	
	(0.002)	
Middle Tercile	0.036	0.008**
	(0.002)	(0.003)
Top Tercile	0.031	0.005*
	(0.002)	(0.003)

Panel B: *HiMacro* Firms and the Aggregate Market Response to Analyst Forecasts

HiMacro Tercile:	*Abs($CAR_{[-1,1]}$)*	*Difference*
Bottom Tercile	0.037	
	(0.002)	
Middle Tercile	0.038	-0.001
	(0.002)	(0.003)
Top Tercile	0.033	0.005
	(0.000)	(0.003)

This table presents the mean absolute value of $CAR_{[-1,1]}$ after sorting by *PctAgg* in Panel A, and *HiMacro* in Panel B. $CAR_{[-1,1]}$ is calculated for each analyst forecast as the mean cumulative abnormal returns centered on the analyst forecast issue date. *PctAgg* is the total number of aggregate-related words per 1,000 total words in firm *i's* 10-K for year *t-1*. *HiMacro* is a categorical variable equal to one, two, or three if firm *i's R*-squared calculated from the following equation is in the lowest, middle, or upper tercile, respectively: $e = \mu_e + B'M + m$ where *e* is the firm's earnings realization, μ_e is the constant, B' is the estimated sensitivity of the firm's earnings to the macroeconomic factor, *M,* which is a vector of macroeconomic factor realizations, and *m* is the firm-specific shocks on earnings.

Appendix A. Variable Definitions

$PctAgg_{i,t}$	Number of occurrences of aggregate-related words per 1,000 total words in firm *i's* 10-K for year *t.*
$Log(Size)_{i,t}$	Log of firm *i's* market value of equity for period *t.*
$BTM_{i,t}$	Book-to-market, calculated by dividing the book value of equity by the market value of equity.
$ROA_{i,t}$	Returns on assets, calculated by dividing income before extraordinary items by total assets.
$Analyst\ Coverage_{i,t}$	The total number of unique sell-side analysts covering firm *i* for year *t*.
$E/P\ Ratio_{i,t}$	Earnings-to-price ratio, calculated by dividing earnings per share by the ending stock price of year *t.*
$Annual\ Returns_{i,t}$	Firm *i's* 12-month cumulative abnormal returns calculated by using the daily Scholes-William daily model.
$Annual\ Volatility_{i,t}$	Firm *i's* annual return volatility, defined as the standard deviation of firm *i's* daily stock return during year *t*.
$Institutional\ Ownership_{i,t}$	The percentage of firm *i's* shares held by institutions in year *t.*
$Business\ Segments_{i,t}$	Firm *i's* total number of business segments in year *t.*
$Geographic\ Segments_{i,t}$	Firm *i's* total number of geographic segments in year *t.*
$HiMacro_i$	A categorical variable equal to one, two, or three if firm *i's R*-squared calculated from the following equation is in the lowest, middle, or upper tercile, respectively: $e = \mu_e + B'M + m$ where *e* is the firm's earnings realization, μ_e is the constant, B' is the estimated sensitivity of the firm's earnings to the macroeconomic factor, *M,* which is a vector of macroeconomic factor realizations, and *m* is the firm-specific shocks on earnings.
$\Delta OI_t/P_{t-1}$	The value-weighted cross-sectional averages of all firm-level changes in operating income for year *t*, scaled by beginning of the year stock price.
ΔGDP_t	The annual GDP growth rate for year *t.*
$\Delta Inflation_t$	The annual inflation growth rate for year *t.*
$Abs(Forecast\ Error)_t$	The absolute value of the mean analyst forecast errors for quarter *t*, measured as the firm's mean analyst forecast estimate minus realized earnings, scaled by beginning of the quarter price.
$BASpread_{i,d}$	Firm i's bid-ask spread percentage on trading day *d*, measured as the mean daily bid minus ask, scaled by the midpoint, obtained from the daily CRSP file.
$PreInfo1_{i,d}$	An indicator variable equal to one if trading day *d* is the trading day immediately before the announcement day of an analyst forecast concerning firm *i*, and equals zero otherwise.

$Info0_{i,d}$	An indicator variable equal to one if trading day *d* is the trading day on the announcement day of an analyst forecast concerning firm *i*, and equals zero otherwise.
$Info1_{i,d}$	An indicator variable equal to one if trading day *d* is the trading day immediately after the announcement day of an analyst forecast concerning firm *i*, and equals zero otherwise.
$Bottom\ Decile\ of\ PctAgg_{i,t-1}$	An indicator variable equal to one if firm i's *PctAgg* in year *t-1* is in the bottom decile of the *PctAgg* distribution in year *t-1*, or equal to zero otherwise.
$TopDecile\ of\ PctAgg_{i,t-1}$	An indicator variable equal to one if firm i's *PctAgg* in year *t-1* is in the top decile of the *PctAgg* distribution in year *t-1*, or equal to zero otherwise.
$Price_{i,d}$	Firm *i's* stock price on day *d,* obtained from the daily CRSP file.
$Volatility_{i,t-1}$	Firm *i's* return volatility, defined as the standard deviation of firm *i's* daily stock return during quarter *t-1*.
$Turnover_{i,t-1}$	Average daily stock turnover of firm *i* during quarter *t-1*.
$Volume_{i,d}$	Firm *i's* trading share volume on day *d*, obtained from the daily CRSP file.
$AbsCAR_{i,t}$	The absolute value of the cumulative abnormal returns over the two-day announcement period for firm *i's* analyst forecast announcement, where we calculate abnormal returns as firm i*'s* returns less the value-weighted market return.

Appendix B. Additional Analyses

Appendix B Table 1
Panel A: Descriptive Statistics for Determinants Regression - Years 2010 - 2019

	N	Mean	SD	P25	P50	P75
PctAgg	26239	2.5555	2.1193	0.9242	1.8356	3.7027
Log(Size)	26239	6.5216	2.1306	5.0227	6.5888	7.9928
BTM	26239	0.5484	0.6130	0.2147	0.4163	0.7174
ROA	26239	-0.0688	0.2981	-0.0658	0.0267	0.0691
Analyst Coverage	26239	1.6483	0.9248	1.0986	1.7918	2.3026
E/P Ratio	26239	-0.1135	0.5088	-0.0682	0.0274	0.0559
Annual Returns	26239	0.0148	0.4603	-0.2029	0.0200	0.2293
Annual Volatility	26239	0.0303	0.0176	0.0185	0.0258	0.0369
Institutional Ownership	26239	0.5123	0.3472	0.1469	0.5930	0.8346
Business Segments	26239	2.2750	1.7673	1.0000	1.0000	3.0000
Geographic Segments	26239	2.8185	2.3909	1.0000	2.0000	4.0000

Panel B: Descriptive Statistics for Determinants Regression - Years 1995 - 2009

	N	Mean	SD	P25	P50	P75
PctAgg	53954	0.9401	0.7485	0.3903	0.7292	1.2753
Log(Size)	53954	5.6115	2.0264	4.1459	5.5502	6.9476
BTM	53954	0.6433	0.6653	0.2660	0.4860	0.8179
ROA	53954	-0.0571	0.2814	-0.0558	0.0282	0.0708
Analyst Coverage	53954	1.3755	0.9537	0.6931	1.3863	2.0794
E/P Ratio	53954	-0.1327	0.5732	-0.0682	0.0308	0.0626
Annual Returns	53954	0.1001	0.5918	-0.2304	0.0555	0.3739
Annual Volatility	53954	0.0407	0.0234	0.0236	0.0350	0.0514
Institutional Ownership	53954	0.4263	0.2862	0.1664	0.4097	0.6710
Business Segments	53954	2.1583	1.7072	1.0000	1.0000	3.0000
Geographic Segments	53954	2.4903	1.8663	1.0000	2.0000	3.0000

Panel A of Appendix B Table 1 presents descriptive statistics for continuous variables used in our determinant's regression, ranging from years 2010 - 2019. Panel B of Appendix B Table 1 presents descriptive statistics for continuous variables used in our determinant's regression, ranging from years 1995 - 2009. The full sample consists of 80,193 firm-year observations ranging from years 1995-2019. Variable definitions are presented in the Appendix A.

Appendix B Table 2

Panel A: Descriptive Statistics for Information Asymmetry Analyses - Years 2010 - 2019

	N	Mean	SD	P25	P50	P75
PctAgg	389028	2.9271	2.2728	1.0770	2.1954	4.3815
BASpread	389028	0.1604	0.4291	0.0238	0.0492	0.1184
Price	389028	45.1045	42.7416	14.7900	32.5990	60.7700
Log(Size)	389028	10.0301	1.7681	8.8638	10.0117	11.2335
Volatility	389028	0.0245	0.0136	0.0151	0.0209	0.0300
Turnover	389028	0.1094	0.0879	0.0537	0.0837	0.1349
Volume	389028	1.7294	3.1526	0.2384	0.6433	1.7169
AbsCAR	389028	0.0245	0.0293	0.0067	0.0152	0.0307

Panel B: Descriptive Statistics for Information Asymmetry Analyses - Years 1995 - 2009

	N	Mean	SD	P25	P50	P75
PctAgg	728744	1.0388	0.7799	0.4535	0.8258	1.4176
BASpread	728744	0.8338	1.2228	0.0817	0.2864	1.0695
Price	728744	27.6270	22.2998	11.8750	22.6300	37.4900
Log(Size)	728744	9.2835	1.7205	8.0778	9.1551	10.3912
Volatility	728744	0.0316	0.0175	0.0191	0.0273	0.0393
Turnover	728744	0.1010	0.0914	0.0389	0.0729	0.1308
Volume	728744	1.3203	2.9160	0.1056	0.3552	1.1140
AbsCAR	728744	0.0317	0.0345	0.0090	0.0206	0.0413

Panel A of Appendix B Table 2 presents descriptive statistics for continuous variables used in our information asymmetry analyses, ranging from years 2010 - 2019. Panel B of Appendix B Table 2 presents descriptive statistics for continuous variables used in our information asymmetry analyses, ranging from years 1995 - 2009. The full sample consists of 1,117,772 firm-day observations ranging from years 1995-2019. Variable definitions are presented in the Appendix A.

Appendix B Table 3

Panel A: Pearson Correlation Matrix – Years 2010- 2019

	PctAgg	*Log(Size)*	*BTM*	*ROA*	*Analyst Coverage*	*E/P Ratio*	*Annual Returns*	*Annual Volatility*	*Institutional Ownership*	*Business Segments*	*Geographic Segments*
PctAgg	**1.000**										
Log(Size)	**0.286**	**1.000**									
BTM	-0.010	**-0.322**	**1.000**								
ROA	**0.188**	**0.424**	**0.081**	**1.000**							
Analyst Coverage	**0.205**	**0.739**	**-0.224**	**0.210**	**1.000**						
E/P Ratio	**0.078**	**0.389**	**-0.112**	**0.570**	**0.169**	**1.000**					
Annual Returns	**-0.017**	**0.161**	**-0.230**	**0.165**	-0.004	**0.319**	**1.000**				
Annual Volatility	**-0.202**	**-0.604**	**0.122**	**-0.561**	**-0.353**	**-0.515**	**0.044**	**1.000**			
Institutional Ownership	**0.176**	**0.477**	**-0.132**	**0.306**	**0.407**	**0.230**	**0.062**	**-0.388**	**1.000**		
Business Segments	**0.122**	**0.234**	**0.054**	**0.207**	**0.101**	**0.106**	0.004	**-0.234**	**0.135**	**1.000**	
Geographic Segments	**0.201**	**0.206**	**-0.023**	**0.174**	**0.124**	**0.093**	0.004	**-0.167**	**0.148**	**0.154**	**1.000**

Panel B: Pearson Correlation Matrix – Years 1995 - 2009

	PctAgg	*Log(Size)*	*BTM*	*ROA*	*Analyst Coverage*	*E/P Ratio*	*Annual Returns*	*Annual Volatility*	*Institutional Ownership*	*Business Segments*	*Geographic Segments*
PctAgg	**1.000**										
Log(Size)	**0.277**	**1.000**									
BTM	**0.020**	**-0.377**	**1.000**								
ROA	**0.200**	**0.331**	**0.029**	**1.000**							
Analyst Coverage	**0.163**	**0.737**	**-0.233**	**0.206**	**1.000**						
E/P Ratio	**0.094**	**0.332**	**-0.188**	**0.591**	**0.151**	**1.000**					
Annual Returns	0.009	**0.049**	**-0.182**	**0.101**	**-0.103**	**0.193**	**1.000**				
Annual Volatility	**-0.192**	**-0.547**	**0.179**	**-0.487**	**-0.338**	**-0.481**	**0.193**	**1.000**			
Institutional Ownership	**0.255**	**0.585**	**-0.129**	**0.260**	**0.566**	**0.169**	**-0.046**	**-0.394**	**1.000**		
Business Segments	**0.173**	**0.254**	**0.029**	**0.124**	**0.101**	**0.063**	-0.003	**-0.179**	**0.166**	**1.000**	
Geographic Segments	**0.331**	**0.220**	**-0.061**	**0.082**	**0.167**	**0.038**	-0.004	**-0.066**	**0.186**	**0.137**	**1.000**

Appendix B Table 3 presents Pearson correlations among key variables of interest. Panel A presents correlations from years 2010 – 2019, whereas Panel B presents correlations from years 1995 – 2019. Variable definitions are presented in the Appendix A. Numbers are bolded if p-value <0.01.

Appendix B Table 4
Panel A: Determinants Regression – Years 2010- 2019

	(1)	(2)	(3)
	PctAgg	*PctAgg*	*PctAgg*
Log(Size)	0.249***	0.220***	0.220***
	(0.016)	(0.016)	(0.016)
BTM	0.183***	0.208***	0.155***
	(0.038)	(0.038)	(0.038)
ROA	0.605***	0.795***	0.513***
	(0.067)	(0.069)	(0.074)
E/P Ratio	-0.315***	-0.265***	-0.193***
	(0.037)	(0.038)	(0.038)
Annual Returns	-0.172***	-0.123***	-0.133***
	(0.028)	(0.028)	(0.027)
Annual Volatility	-0.070	-0.063	0.195
	(0.132)	(0.135)	(0.132)
Institutional Ownership	0.195***	0.176**	0.191***
	(0.069)	(0.069)	(0.067)
Business Segments	0.030**	0.039***	0.032**
	(0.015)	(0.015)	(0.015)
Geographic Segments	0.119***	0.124***	0.120***
	(0.012)	(0.012)	(0.012)
Intercept	0.357***	0.522***	0.484***
	(0.125)	(0.127)	(0.127)
Observations	26239	26239	26239
Adjusted R^2	0.118	0.163	0.193
Clustering	Firm	Firm	Firm
Fixed Effects	None	Year	Industry & Year

Panel B: Determinants Regression – Years 1995 - 2009

	(1) *PctAgg*	(2) *PctAgg*	(3) *PctAgg*
Log(Size)	0.053***	0.040***	0.058***
	(0.005)	(0.005)	(0.005)
BTM	0.116***	0.072***	0.071***
	(0.008)	(0.008)	(0.008)
ROA	0.264***	0.319***	0.298***
	(0.014)	(0.015)	(0.017)
E/P Ratio	-0.071***	-0.066***	-0.076***
	(0.007)	(0.007)	(0.007)
Annual Returns	0.047***	0.010**	0.009*
	(0.005)	(0.005)	(0.005)
Annual Volatility	-0.170***	-0.374***	-0.335***
	(0.025)	(0.028)	(0.028)
Institutional Ownership	0.227***	0.095***	0.049**
	(0.025)	(0.025)	(0.024)
Business Segments	0.028***	0.010**	0.009**
	(0.004)	(0.004)	(0.004)
Geographic Segments	0.109***	0.106***	0.088***
	(0.004)	(0.004)	(0.004)
Intercept	0.210***	0.501***	0.450***
	(0.031)	(0.034)	(0.033)
Observations	53954	53954	53954
Adjusted R^2	0.190	0.244	0.284
Clustering	Firm	Firm	Firm
Fixed Effects	None	Year	Industry & Year

Panel A (B) of Appendix B Table 4 presents the results of estimating the following equation from years 2010 – 2019 (1995 – 2009):

$$\begin{aligned} PctAgg_{i,t} = \ & \beta_0 + \beta_1 Log(Size)_{i,t} + \beta_2 BTM_{i,t} + \beta_3 ROA_{i,t} + \beta_4 E/PRatio_{i,t} \\ & + \beta_5 Annual\ Returns_{i,t} + \beta_6 Annual\ Volatility_{i,t} \\ & + \beta_7 Institutional\ Ownership_{i,t} + \beta_8 Business\ Segments_{i,t} \\ & + \beta_9 Geographis\ Segments_{i,t} + \varepsilon_{i,t} \end{aligned}$$

where *PctAgg* is the total number of aggregate-related words per 1,000 total words in firm *i's* 10-K for year *t.* All other variable definitions are presented in the Appendix A. The full sample consists of 80,193 firm-year observations ranging from years 1995-2019. Standard errors are clustered by firm.

Appendix B Table 5

Panel A: Analyst Forecasts and Information Asymmetry – Years 2010 - 2019

PctAgg Decile	*Lowest BASpread*	*Middle BASpread*	*Highest BASpread*
PreInfo1	-0.004	0.000	-0.002
	(0.004)	(0.001)	(0.002)
Info0	-0.009**	-0.001	-0.001
	(0.003)	(0.001)	(0.002)
Info1	-0.017***	-0.002**	-0.003
	(0.003)	(0.001)	(0.002)
Observations	39084	310959	38985
Adjusted R^2	0.591	0.602	0.683

Panel B: Analyst Forecasts and Information Asymmetry –Years 1995 - 2009

PctAgg Decile	*Lowest BASpread*	*Middle BASpread*	*Highest BASpread*
PreInfo1	-0.003	-0.002	-0.002
	(0.007)	(0.002)	(0.004)
Info0	-0.010*	-0.002	0.003
	(0.006)	(0.003)	(0.006)
Info1	-0.003	-0.003	-0.003
	(0.006)	(0.003)	(0.005)
Observations	73096	582603	73037
Adjusted R^2	0.643	0.528	0.544

Appendix B Table 6 presents the results of estimating the following equation stacked by a categorical variable equal to 1 if the firm is in the lowest decile of *PctAgg* in year *t*, equal to 3 if the firm is in the highest decile of *PctAgg* in year *t,* or equal to 2 otherwise:

$$BASpread_{i,d} = \beta_0 + \beta_1 PreInfo1_{i,d} + \beta_2 Info0_{i,d} + \beta_3 Info1_{i,d} + X\delta + \varepsilon_{i,t}$$

where *BASpread* is bid-ask spread percentage on trading day *d* for firm *i,* measured from CRSP. *PreInfo1* in an indicator variable equal to one if day *d* is the trading day immediately before an analyst forecast announcement concerning firm *i*, or zero otherwise. Our primary variables of interest, *Info0* (*Info1)*, are indicator variables equal to 1 if trading day *d* is on the announcement day (immediately after) an analyst forecast announcement concerning firm *i,* or zero otherwise. *X* is a vector that includes all control variables presented in Table 9 and firm fixed effects. All control variables are defined in the Appendix A. Standard errors are clustered by firm and quarter.

Appendix B Table 6

Panel A: Analyst Forecasts and Information Asymmetry – Sort by *Log(Size)*

PctAgg Decile	*Lowest BASpread*	*Middle BASpread*	*Highest BASpread*
PreInfo1	-0.003	0.000	-0.002
	(0.003)	(0.001)	(0.003)
Info0	-0.007***	-0.001	-0.002
	(0.003)	(0.001)	(0.002)
Info1	-0.013***	-0.003**	-0.004**
	(0.003)	(0.001)	(0.002)
Observations	37128	293809	36259
Adjusted R^2	0.630	0.595	0.639

Panel B: Analyst Forecasts and Information Asymmetry – Sort by *Geographic Segment*s

PctAgg Decile	*Lowest BASpread*	*Middle BASpread*	*Highest BASpread*
PreInfo1	-0.005	0.001	-0.003
	(0.004)	(0.001)	(0.002)
Info0	-0.008**	-0.001	-0.002
	(0.003)	(0.001)	(0.002)
Info1	-0.014***	-0.002**	-0.004*
	(0.004)	(0.001)	(0.002)
Observations	37031	293897	36267
Adjusted R^2	0.618	0.592	0.693

Panel C: Analyst Forecasts and Information Asymmetry – Sort by *Analyst Coverage*

PctAgg Decile	*Lowest BASpread*	*Middle BASpread*	*Highest BASpread*
PreInfo1	-0.007**	0.001	-0.002
	(0.003)	(0.001)	(0.002)
Info0	-0.011***	-0.001	-0.003
	(0.004)	(0.001)	(0.002)
Info1	-0.016***	-0.002**	-0.003
	(0.003)	(0.001)	(0.002)
Observations	37154	293886	36156
Adjusted R^2	0.607	0.597	0.620

Appendix B Table 7 presents the results of estimating the following equation stacked by a categorical variable equal to 1 if the firm is in the lowest decile of *PctAgg* in year *t*, equal to 3 if the firm is in the highest decile of *PctAgg* in year *t,* or equal to 2 otherwise:

$$BASpread_{i,d} = \beta_0 + \beta_1 PreInfo1_{i,d} + \beta_2 Info0_{i,d} + \beta_3 Info1_{i,d} + X\delta + \varepsilon_{i,t}$$

where *BASpread* is bid-ask spread percentage on trading day *d* for firm *i,* measured from CRSP. *PreInfo1* in an indicator variable equal to one if day *d* is the trading day immediately before an analyst forecast announcement concerning firm *i*, or zero otherwise. Our primary variables of interest, *Info0* (*Info1)*, are indicator variables equal to 1 if trading day *d* is on the announcement day (immediately after) an analyst forecast announcement concerning firm *i,* or zero otherwise.

X is a vector that includes all control variables presented in Table 9 and firm fixed effects. All control variables are defined in the Appendix A. Standard errors are clustered by firm and quarter.

Appendix B Table 7
Analyst Forecasts and Information Asymmetry – Use *HiMacro* instead of *PctAgg*

	(1) *BASpread*	(2) *BASpread*	(3) *BASpread*
PreInfo1	-0.003**	-0.003**	-0.001
	(0.001)	(0.001)	(0.001)
Info0	-0.007***	-0.008***	-0.002
	(0.002)	(0.002)	(0.002)
Info1	-0.006***	-0.006***	-0.004**
	(0.002)	(0.002)	(0.002)
$Bottom\ Decile\ of\ HiMacro_{i,t-1}$	0.001	0.002	0.410***
	(0.024)	(0.015)	(0.071)
$Top\ Decile\ of\ HiMacro_{i,t-1}$	0.028	0.015	-0.122***
	(0.021)	(0.016)	**(0.033)**
$Bottom\ Decile\ of\ HiMacro_{i,t-1}$ * *PreInfo1*	0.001	0.001	0.001
	(0.004)	**(0.004)**	**(0.004)**
$Bottom\ Decile\ of\ HiMacro_{i,t-1}$ * *Info0*	**0.002**	**0.002**	**0.001**
	(0.003)	**(0.003)**	**(0.004)**
$Bottom\ Decile\ of\ HiMacro_{i,t-1}$ * *Info1*	**0.003**	**0.003**	**0.003**
	(0.003)	(0.003)	(0.004)
$Top\ Decile\ of\ HiMacro_{i,t-1}$ * *PreInfo1*	-0.000	-0.001	-0.000
	(0.004)	(0.004)	(0.004)
$Top\ Decile\ of\ HiMacro_{i,t-1}$ * *Info0*	**0.001**	**0.001**	**0.001**
	(0.003)	**(0.003)**	**(0.003)**
$Top\ Decile\ of\ HiMacro_{i,t-1}$ * *Info1*	**0.008****	**0.008****	**0.008****
	(0.004)	**(0.004)**	**(0.004)**
Observations	1093564	1093564	1093564
Adjusted R^2	0.267	0.497	0.531
Clustering	Firm & Quarter	Firm & Quarter	Firm & Quarter
Fixed Effects	None	Quarter	Firm

Appendix C. Target Words

Below are the target words searched for in a firm's 10-K. While not listed, we search for all plural tenses of the necessary words.

- Macro
- Macroeconomic
- Macroeconomy
- Gross domestic product
- Gross national product
- GDP
- GNP
- Bear market
- Bull market
- Recession
- Interest rate
- Currency
- Economic factor
- Economic condition
- Economic climate
- Economic expansion
- Economic growth
- Economic activity
- Economic boom
- Federal reserve
- Global economy
- Capital market
- Credit market
- Financial market
- Foreign exchange
- Market risk