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Accessing the Impact of Institutional Investors' Active Information Search on Fund Performance

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Abstract: We primarily investigate institutional investors (proxied by mutual fund analysts) in terms of their information search behavior, trading activities, and fund performance. In this paper, we exploit the manually collected conference calls dataset to explore the topic information that investors are interested in. Specifically, based on questions asked by mutual fund analysts during conference calls, we employ a combination of text analysis models such as LDA topic modeling, Word2Vec, and GPT-3.5 to quantify mutual fund information search behavior systematically. We find that institutional investors are primarily interested in information related to number, information timing, financials, company operations, market competition, and 12 other topics. While mutual funds consistently focus on the 16 topics, the extent to which they request related information and whether it influences their portfolio holdings shows considerable variance. On average, mutual funds' attention to the topics of region, operation, R&D, and market competition significantly impacts fund holding behavior. Regression analysis indicates that if a fund adjusts its holdings based on these four categories of topics, it can significantly improve the fund's stock-level returns in the following month.

1. Introduction

Institutional investors such as mutual funds, pension funds, and hedge funds play a key role in the global capital market, and the size of managed assets has also had a significant impact. Their decision-making processes are strongly influenced by the information they receive through formal means such as financial reporting and informal knowledge gained from various relationships. Investors like to look at data on specific topics to help them make decisions. Research consistently shows that institutional investors use data to help assess a company's financial situation, understand market dynamics, and make informed trading decisions[5,7]. Understanding how these investors get information to guide their investment decisions is a key research question[8]. However, the study faces significant challenges, as institutional investors often use proprietary and opaque methods for

gathering information. Furthermore, different levels of attention to this thematic information appear to have a different significant impact on mutual fund equity holdings and subsequent returns. This supports the view that targeted information approaches can enhance investment outcomes.

In this paper, we analyze conference calls about executives and mutual fund analysts, exploring what information fund analysts are more likely to focus on when actively accessing information about companies and how that information affects investors' fund performance. Traditional fund analysis methods rely on quantitative financial data, such as historical returns, asset allocation, and risk indicators, which have a fixed format and content that have been the cornerstone of assessing hedge fund performance[3,4]. In a fast-paced and competitive financial industry, institutional investors are constantly looking for innovative ways to gain an edge and maximize returns for investors. With the rise of big data and advances in text analytics, gathering and analyzing conference calls between executives and mutual fund analysts is one way to explore new ways in which information-search behavior and hedge fund performance timing are farted. Deloitte (2019) said the conference call is a transparent and interactive platform where investors can ask questions directly to company executives, making it a valuable source of insight into specific topics of interest to these investors. These calls provide a platform for institutional investors to raise key issues, gaining insights that aren't always available in public disclosure. The increasing volume of textual data from corporate communications, coupled with advances in text analytics technology, provides us with a unique opportunity to gain a deeper understanding of institutional investors' information preferences and their impact on fund performance.

In this paper, we use advanced natural language processing (NLP) models to systematically analyze the proprietary dataset of questions raised by mutual fund analysts during a conference call. Using techniques such as Potential Dirichlet Allocation (LDA) Topics Modeling, Word2Vec, and GPT-3.5 to classify and quantify topics of interest to fund analysts during a conference call helps to gain a deeper understanding of the role of specific information elements. The importance of advanced analytical methods in revealing these dynamics is emphasized. At the same time, information searches on which topics are most likely to drive changes in institutional investors' positions in order to identify the relationship between information on different topics and changes in fund positions.

Our research extends the existing literature by systematically researching investor information-seeking behavior in conference calls to bridge our understanding of institutional investor information preferences. Barton, Hansen, and Pownall (2010) looked at financial performance indicators that are at the center of the income statement (e.g., operating income, EBITDA) and revealed several key financial attributes such as cash flow correlation, predictability, and smoothness. At present, most of the research on investor information preferences focuses on traditional fund analysis methods[1]. At the same time, the study found that institutional investors could increase the market's response to corporate information by requiring more disclosure, allowing passive investors to also benefit from greater market transparency [2].

This article helps to gain a more detailed understanding of the information preferences of institutional investors when they proactively acquire information and provides actionable insights into how that information impacts investment decisions and performance.

2. Data & Methodology

In order to obtain mutual fund questions, we manually collected US-listed firm conference call transcripts, cleaned and merged it with mutual fund holding data, and identified 13,714 questions asked by mutual fund analysts during company meetings, spanning from 2003 to 2002. Then, we developed a bigram extraction to identify semantic phrases such as stock price and balance sheet

from question texts. By pairing adjacent words, the algorithm enhances contextual understanding and provides a more precise interpretation of the content. Subsequently, we applied Latent Dirichlet Allocation (LDA) to analyze the parsed questions text and identified 16 main topics. The LDA topic model can systematically explore the various topics within a question text and identify seed words for each topic (e.g., the seed words for the debt topic are debt and interest expense). Using the parsed questions to train a Word2Vec similar words in the question corpus (e.g., input the keyword "debt", the model can identify similar words such as lending, credit, bond, lease, borrow, and stock) can be found. Then, we used a GPT-3.5 model to filter out irrelevant words (e.g., excluding the word "stock" from the debt topic) from the expanded topic words above. This process refines the vocabulary, ensuring only the most relevant topic terms are retained. Finally, we compiled 16 comprehensive and clear topic words across categories and labeled all 13,714 mutual fund questions with the relevant topics to facilitate subsequent statistical and regression analysis.

This research employs Horse Race Regression Analysis to identify which topics of information search are most likely to drive changes in fund holdings and to identify relationships between different topics and fund position changes.

In this analysis, the independent variables (x) represent various themes, which include number, information timing, financials, company operations, market competition, and 12 other topics. Meanwhile, the dependent variable (y) reflects changes in fund holding. The number (x1), information timing (x2) and the other 14 topics are sticked (classified) as independent variables in a regression. Eventually we examined which independent variables can better explain variation in y.

Regression Analysis:

$$\Delta Holding_{i,j,t+1} = \sum_{p=1}^{16} \beta_p Topic_{i,p,j,t} + \varepsilon$$

where $Topic_{i,p,j,t}$ represent fund whether fund i ask topic p question for firm j at time t. $\Delta Holding_{i,j,t+1}$ represent the percentage holding change of fund i for firm t at time t+1. A significant positive coefficient β_p indicate that the fund analyst mentioned the topic p is positively associated with changes in the fund portfolio in the following month.

$$Ret_{i,j,t+1} = \sum_{p=1}^{16} \beta_p \Delta Holding_{i,j,t+1} \times Topic_{i,p,j,t} + \varepsilon$$

where $Ret_{i,j,t+1}$ is fund i investment return from firm j at time t+1. A significant positive coefficient β_p indicate that adjust portfolio based on topic *p* would improve fund subsequent month stock level return.

3. Main Findings

Figure 1: Keywords associated with the research and development (R&D) topic

The LDA topic algorithm identified 16 main topics of information that institutional investors

primarily seek. They are Numbers, Time, Accounting, Operation, Region, Competition, Financial Market, Growth, Macroeconomics, Supply Chain, Customer, Debt, Risk, R&D, Sentiment, Government and Regulation.

Figure 1 illustrates that research and development (R&D) activities are predominantly focused on cutting-edge technologies, including blockchain, alongside other key areas such as new product development, investment strategies, hardware advancements (e.g., cloud computing, robotics), patent creation, and cybersecurity. For additional details on the remaining 15 thematic terms, please consult the project website.

In the analysis, we reviewed a considerable number of questions raised by fund managers during earnings conference calls. These questions were processed using bigram extraction techniques to identify and categorize central themes. We subsequently organized these themes into 16 distinct categories: Financial Markets, Debt, Geographic Regions, Financials, Business Operations, Market and Competitive Environment, Technology and Innovation, Clients, Supply Chain, Growth, Timing, Numerical Data, Government and Regulation, Risk, Sentiment, and Macroeconomics.

Each category encapsulates a particular dimension of the information that mutual fund analysts seek. To support a deeper analysis, we generated word clouds for each category, visually representing the most frequently mentioned terms within each thematic area. This method allows for a clear assessment of the relative importance attributed to various topics, shedding light on the focal points of fund managers' inquiries. The systematic categorization and visualization of these themes provide valuable insights into institutional investors' informational priorities and their potential implications for investment strategies and performance outcomes.

A comparative analysis of the similarities and differences in how buy-side institutional investors (mutual funds) and sell-side institutional investors (brokers) acquire information is shown in Figure2.

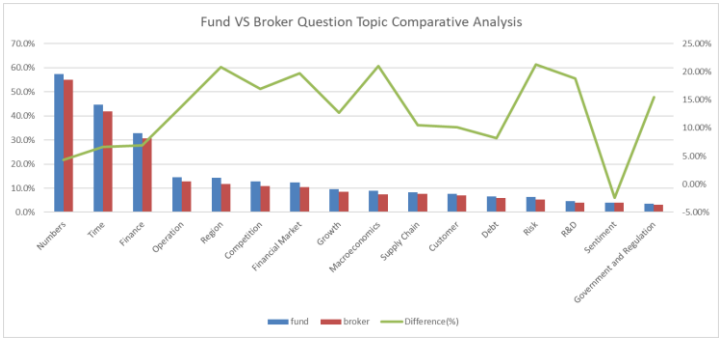

Figure 2: Fund VS Broker Question Topic Comparative Analysis

The findings reveal that, in contrast to traditional financial statement data, which constitutes approximately 30% of inquiries, mutual funds surprisingly focus on specific numerical data and the timing of such information in nearly 50% of their questions.

Although the absolute differences in the type of information sought across the 16 thematic categories by brokers and buy-side analysts are minimal, the relative percentage variations are significant. Notably, mutual funds demonstrate a tendency to inquire more frequently across nearly all professional topics, with the exception of sentiment-related issues.

For brokerage firms, topics related to "Operations" and "Competition" are particularly emphasized, indicating a focus on business dynamics and market positioning. In contrast, mutual funds exhibit a heightened interest in "Timing," underscoring the importance of temporal considerations in their investment decisions. Both sectors show a substantial concern for "Finance" and "Macroeconomics," reflecting the broader economic factors that influence their decision-making processes and overall performance.

We employ percentage differences to compare and analyze the similarities and distinctions in how buy-side institutional investors (mutual funds) and sell-side institutional investors (brokers) acquire information. By charting various terms over time, we can examine the evolving patterns within the word clouds. In the context of research and development (R&D), terms such as "technology," "software," and "new_product" are identified as relevant content for analysis.

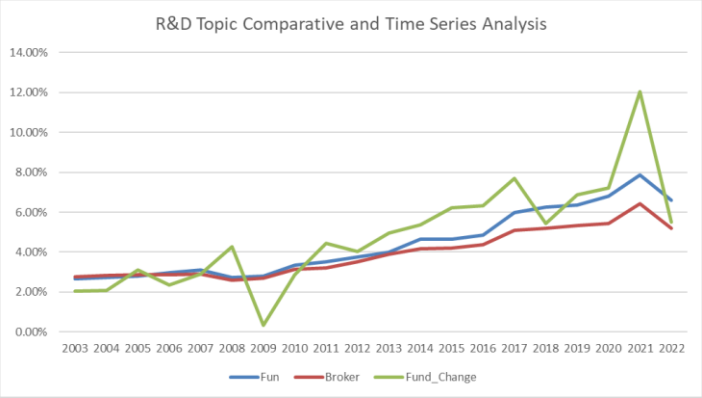

Figure 3: Topic Comparative and Time Series Analysis

Figure 3 further analyses the consistency in the demand for R&D-related information between mutual funds and brokers through a time series analysis. Notably, mutual funds had a greater interest in R&D up until 2017, while brokers' attention to this area gradually diminished. For time series graphs pertaining to the other 15 thematic topics, please refer to the project website.

Despite the steady increase in mutual funds' demand for R&D information, the effect of this information on their portfolio holdings varies considerably. Typically, the influence of R&D information on holdings follows a cyclical pattern, with its impact diminishing in the aftermath of economic crises (e.g., in 2009 and 2022).

Table 1: Question Topic and Fund Trading Behavior

Dep. Var.	**Holding Change**
Region	**6.044****
	(2.326)
Operation	**4.684***
	(1.875)
Competition	**5.253****
	(1.983)
R&D	**16.186*****
	(4.161)
FinancialMarket	-2.082
	(-0.753)
Debt	-1.933
	(-0.513)
Accounting	2.185
	(1.142)
Customer	-3.869
	(-1.129)
Supply_chain	-1.069
	(-0.336)
Growth	-1.271
	(-0.424)
Time	1.348
	(0.782)

Number	0.752
	(0.443)
Gov_Regulation	0.018
	(0.004)
Risk	-1.017
	(-0.279)
Sentiment	-3.163
	(-0.799)
MacroEconomic	-4.330
	(-1.380)
Constant	Yes
N	11,708
Overall. R-sq	0.041

Table 1 utilizes Horse Race Regression Analysis to determine which information search topics are most likely to influence changes in fund holdings. The findings suggest that significant impacts on fund holding behavior are observed primarily when mutual funds concentrate on topics related to geographic regions, business operations, research and development (R&D), and market competition.

To identify the relationship between information topics and changes in fund holdings, we apply Horse Race Regression Analysis. In this model, the independent variables (x) represent various thematic categories, while the dependent variable (y) captures changes in fund holdings.

The regression results indicate that only the top four themes (x) exert a statistically significant impact on fund holdings, all displaying positive coefficients, which suggests that these themes are influential in driving changes in holdings (y).

To further refine our conclusions, we conduct a second regression analysis examining the relationship between fund holdings and returns. When fund holdings are adjusted based on the top four themes, the resulting returns are positive and exhibit marked improvement.

Table 2: Question-Induced Holding Change and Fund Performance

	Fund Return	**Fund Return**	**Fund Return**	**Fund Return**
HoldChange╳Region	**0.174****			
	(2.163)			
HoldChange╳Operation		**0.295*****		
		(4.015)		
HoldChange╳Competition			**0.173*****	
			(2.934)	
HoldChange╳R&D				**0.119****
				(2.046)
Region	-0.130			
	(-0.639)			
Operation		-0.089		
		(-0.446)		
Competition			-0.032	
			(-0.154)	
R&D				-0.108
				(-0.345)
HoldChange	-0.176**	-0.297***	-0.175***	-0.121**
	(-2.187)	(-4.040)	(-2.966)	(-2.078)
Constant	Yes	Yes	Yes	Yes
N	11,708	11,709	11,710	11,711
Overall. R-sq	0.001	0.002	0.001	0.001

Table 2 demonstrates that adjusting fund holdings based on the four key information search

categories can significantly enhance stock-level returns in the subsequent month.

Although mutual funds consistently focus on 16 key topics, the extent to which they seek information and how it influences their holdings varies considerably. On average, mutual funds' attention to topics such as geographic regions, business operations, R&D, and market competition exerts a significant influence on their holding behavior.

While R&D-related information searches are most likely to drive changes in portfolio holdings, adjustments prompted by operations-related queries generate the highest returns for the fund.

The alignment between securities firms and mutual funds regarding topics like R&D remains consistent in the early stages but begins to diverge after 2017. Fluctuations in holdings, as represented by 'Fund_change,' exhibit considerable variability. In specific years, such as 2011 and 2021, fund holdings show heightened sensitivity to certain themes, while in other periods, such as 2009 and 2020, the influence of these themes is less pronounced.

4. Discussion

In this study, we explore how mutual funds acquire information by analyzing a proprietary set of mutual fund inquiries provided by Thomson Reuters. Through a systematic approach, we categorize and quantify 16 key topics, revealing specific areas that attract the attention of institutional investors. Our research not only identifies the themes of interest to mutual funds but also examines the relationships between information acquisition behavior, fund holding adjustments, and subsequent returns. These insights contribute to a deeper understanding of how mutual funds access and process information, with implications for enhancing market efficiency.

A key finding of this research is the trend towards a shift from traditional financial statement analysis to more specific and granular data, such as precise figures and their timing. While financial statement information continues to occupy a substantial portion of analysts' focus, there is a growing emphasis on real-time detailed data, indicating that institutional investors increasingly value information that can guide timely and tactical investment decisions. This shift underscores the evolving information needs of mutual funds as they navigate an increasingly complex and dynamic market environment.

This finding aligns with existing literature; for instance, Smith (2020) notes that analysts are increasingly focused on real-time data, reflecting the market's demand for responsiveness to rapid changes. Conversely, other studies argue that traditional financial information remains central to investment decision-making and will not diminish in importance[6]. The results of this study challenge this viewpoint to some extent, suggesting that as market conditions evolve rapidly, institutional investors are gradually shifting their focus toward more timely information to enhance the effectiveness of their decision-making.

Moreover, the research reveals a strong and complex relationship between information topics and fund performance. Although mutual funds demonstrate a consistent focus on the 16 topics, the degree to which they act on specific information varies significantly. Topics related to regional markets, company operations, R&D activities, and market competition are particularly important. Our findings indicate that funds that adjust their holdings based on these key themes tend to achieve better stock-level returns in the following month. This is consistent with the findings of Chen et al. (2021), who discovered that funds focusing on market competition typically yield higher investment returns, further supporting the theory that emphasizes the relationship between market dynamics and investment performance.

Another noteworthy observation is the subtle herding behavior exhibited by brokers when interacting with mutual fund analysts, particularly evident in the types of questions posed. However, since 2019, we have observed a divergence in topics of interest, indicating a shift in the focus areas

of institutional investors. This change may be driven by variations in market conditions, regulatory updates, or evolving investment strategies, highlighting the dynamic nature of information demands in financial markets. Such changes also challenge existing theories, suggesting that market participants may need to adjust their information acquisition strategies in response to new market environments.

In summary, this study highlights the proactive role of fund analysts in the information acquisition process and emphasizes the significant impact of topic-specific information on investment strategies. Our findings suggest that focusing on specific areas, particularly those related to market dynamics, company operations, and R&D, can significantly enhance mutual funds' investment performance. This discovery not only supports existing theories regarding the importance of information in investment decision-making but also provides new insights into the information acquisition behaviors of fund analysts. Therefore, institutional investors must continuously adjust their strategies to respond to market changes and effectively utilize real-time, detailed information to optimize investment outcomes.

5. Conclusion

This study provides valuable insights into how mutual funds actively acquire information, particularly through the analysis of conference call inquiries. By employing systematic methods such as LDA topic modeling, Word2Vec, and GPT-3.5 to quantify mutual fund information search behavior, we categorized and quantified 16 key topics, identifying specific areas that significantly influence institutional investors' decision-making processes. Additionally, we utilized Horse Race Regression Analysis to determine which of the 16 key topics have the most significant impact on fund performance.

Our research not only contributes to the existing literature on information acquisition behavior but also emphasizes the critical role of topic-specific information in shaping investment strategies. The relationship between information acquisition and fund performance suggests that mutual funds focusing on relevant areas such as regional markets, company operations, and R&D activities can enhance their returns. Furthermore, our findings regarding subtle herding behavior among brokers indicate the dynamic interplay between different market participants.

While our study offers important contributions, we also acknowledge its limitations, such as reliance on a specific dataset from Thomson Reuters. Future research should explicitly explore alternative data sources or methodologies to deepen the understanding of information acquisition nuances and their impact on investment performance. For instance, investigating how different types of information—such as qualitative insights versus quantitative metrics—affect investment decisions could provide more comprehensive insights into the information landscape. Additionally, examining the influence of regulatory changes and macroeconomic shifts on information acquisition behavior is essential, as these factors may shape institutional investors' focus areas.

Overall, this study examines how institutional investors proactively acquire information and the influence of that information on fund performance. It also highlights the necessity for institutional investors to adjust their strategies in response to changing market dynamics, leveraging timely and detailed information to optimize investment outcomes.

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