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ChatGPT and Corporate Policies

Posted by Baozhong Yang (Georgia State University), on Wednesday, August 9, 2023

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Editor's Note: Baozhong Yang is an Associate Professor of Finance at Georgia State University. This post is based on a recent **article** by Professor Yang, **Manish Jha**, Assistant Professor of Finance at Georgia State University; Jialin Qian, PhD Candidate at Georgia State University; and **Michael Weber**, Associate Professor of Finance at the University of Chicago.

Understanding corporate policies is central to corporate finance. Investment policies, in particular, are key to corporate growth and aggregate fluctuations, with aggregate investment being the most volatile component of GDP. Neoclassical q-theory suggests that Tobin's q can serve as a sufficient statistic to describe firms' investment opportunities and policies (Hayashi, 1982). However, managerial information is typically not available for all firms, despite the availability and usefulness of information for a subset of firms provided by various surveys, e.g., the Duke University/Federal Reserve CFO Surveys and the Conference Board CEO Surveys.

To address this issue, **our paper** harnesses the power of ChatGPT, an advanced AI model developed by OpenAI, capable of processing long and complex questions and providing detailed, expert-level responses. Using ChatGPT, we extract firm-level corporate expectations of future investment policies and answer these questions: Can ChatGPT help understand corporate policies? Does the ChatGPT-extracted investment policy provide unique insights beyond existing measures like Tobin's q or cash flows? How does this information impact asset prices and returns?

Our sample comprises 74,586 conference call transcripts from 3,878 unique companies spanning from 2006 to 2020. These transcripts contain valuable information, including corporate managers' beliefs and expectations about their firms' future capital expenditures. Leveraging ChatGPT, we extract quantitative assessments of future increases and decreases in investment, constructing a firm-level *ChatGPT Investment Score*.

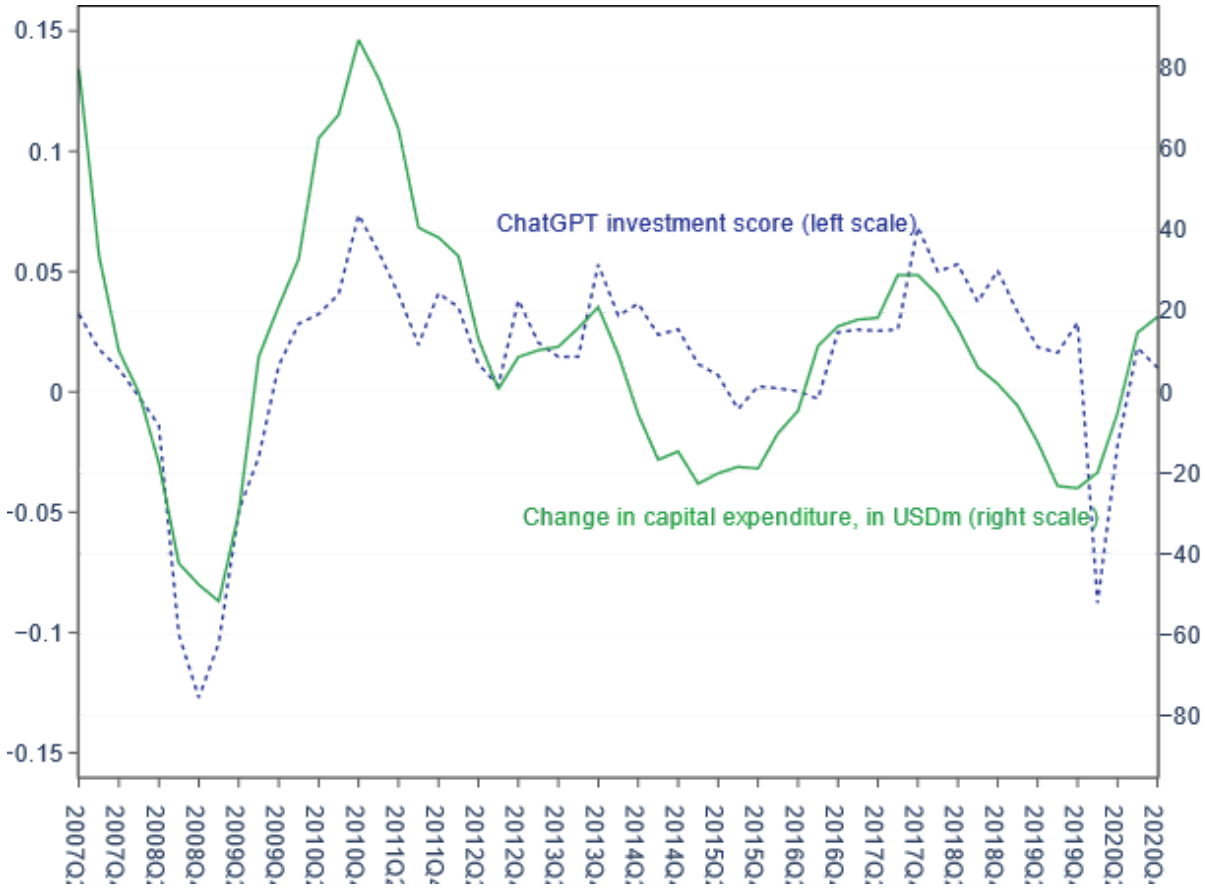

Figure 1. ChatGPT investment score vs. realized investment

This figure plots the time series of average quarterly ChatGPT investment score and average future four-quarter change in capital expenditure.

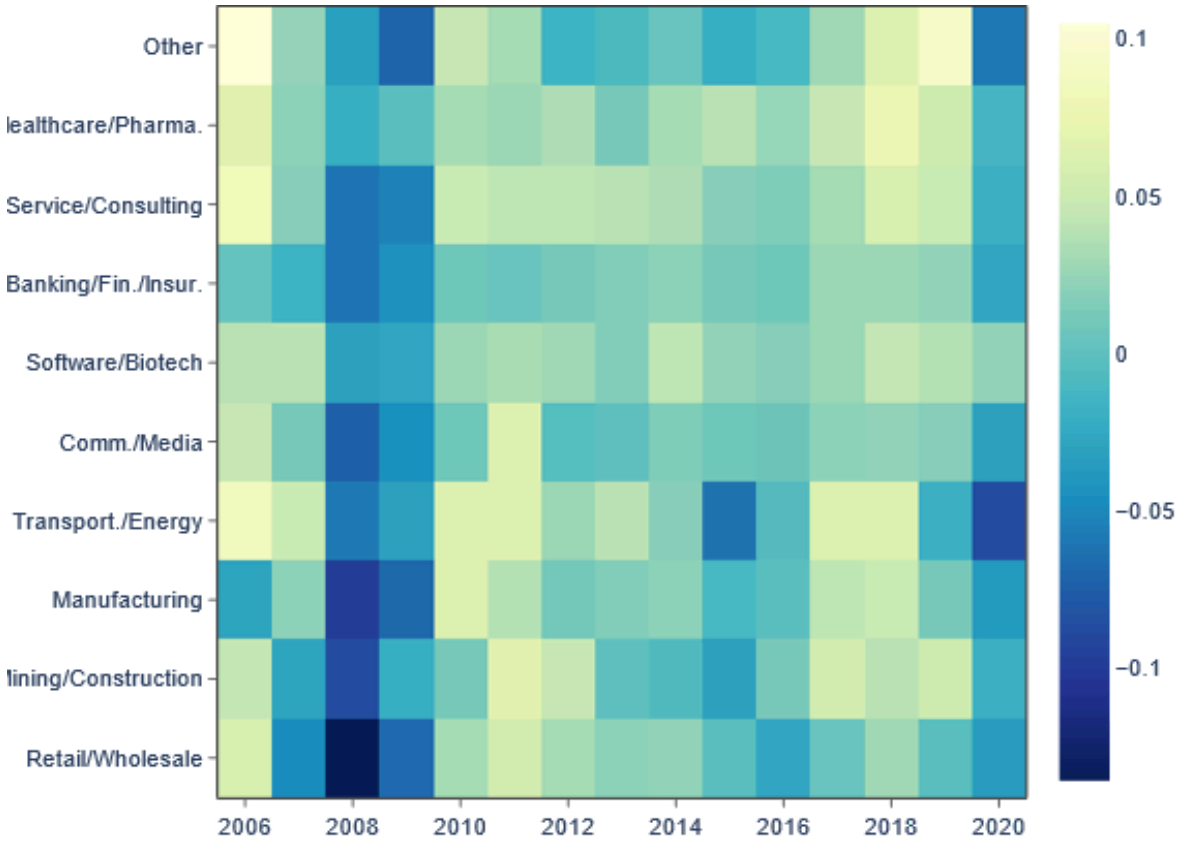

Figure 2. ChatGPT investment score across industries

We validate this measure in several ways. First, we compare our investment score with responses from the Duke CFO surveys which directly elicits a firms' expected capital expenditure for a subset of our sample. Firms that score high in our ChatGPT score also report in surveys their plans to increase investment over the course of the next 12 months. Second, we observe similar trends and alignments between the average investment score in our sample and future changes in capital expenditure over time (Figure 1). Third, the industry-level average investment scores exhibit patterns consistent with major changes in the economy, such as firms in the software/biotech industries expecting increased investment during the Covid pandemic, whereas many other industries expect decreases (Figure 2). Finally, we ask ChatGPT to provide excerpts from conference call transcripts to support its assignment of investment scores, revealing interpretable phrases and sentences. For example, Figure 3 shows that the most frequent bigrams associated with high and low investment scores are consistent with managerial plans to increase or decrease investments.

(a) Bigrams associated with high ChatGPT investment scores.

(b) Bigrams associated with low ChatGPT investment scores.

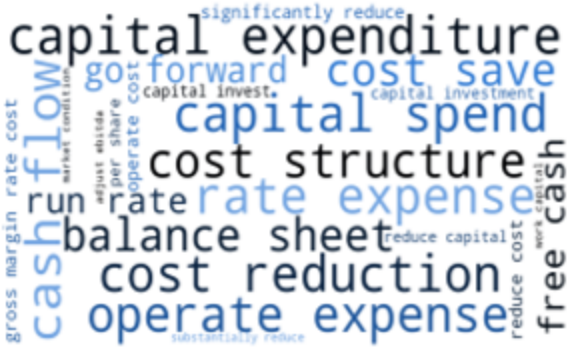

Figure 3. Interpreting ChatGPT investment score

We document that the ChatGPT investment score provides incremental predictive power for future investment when we control for Tobin's q and other firm-level predictors of investment. A one-standard-deviation increase in the investment score is associated with a 0.034 standard-deviation increase in capital expenditure in the quarter after the conference call, about two-thirds of the corresponding sensitivity of capital expenditure to total q, an extended measure of Tobin's q that incorporates intangible capital (Peters and Taylor, 2017). This relation is a robust feature of the data and also holds after we keep constant lagged capital expenditure and add firm and time fixed effects, suggesting that the investment score contains new, incremental information derived from managerial private information and expectations.

The significant predictive power of the investment score persists for up to nine quarters, emphasizing the long-term nature of managers' expectations. Moreover, the ChatGPT investment score not only predicts future physical investment but also forecasts other forms of investment, including intangible investment, research and development, and total investment in both the short and long run.

Furthermore, we explore the relationship between the ChatGPT investment score and expected stock returns. Investment-based asset pricing theory predicts that firms with lower expected returns invest more, because they apply a lower hurdle rate, resulting in more investment projects with a positive net present value. Therefore, we expect high expected investment stocks to experience lower future stock returns. Our tests confirm this hypothesis, as the ChatGPT investment score is significantly and negatively associated with raw returns and factor-adjusted abnormal returns in the subsequent quarter. Similar to investment, the return predictability also persists for up to nine quarters.

In addition to investment policies, we investigate whether our methodology applies to other corporate policies, such as dividend payment and employment policies. We find strong correlations between the ChatGPT-based expected coporate

policies and the expected policies obtained from the Duke CFO Survey responses for the same set of firms, suggesting that our approach can be applied to a wide range of corporate policies.

Overall, our paper makes several key contributions. First, it is the first paper to apply ChatGPT to extract managerial expectations of corporate policies from corporate earnings calls and to validate the AI-based policy measures empirically. Our methodology can be applied to a broad range of policies and expectations and offers researchers a new set of tools and data. Second, our approach provides a new, real-time measure of expected investment. This measure provides valuable insights into firms' future investment opportunities, complementing existing measures and aiding researchers and regulators in understanding corporate investment and its implications for the economy and financial markets. Third, our method can be used to expand and complement existing surveys of executives, which can be especially helpful given the decline in survey response rates in the US in the past decade. Fourth, our approach allows an interpretable application of AI, as humans can read and understand the arguments given by ChatGPT when making decisions.

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