Understanding the Federal Reserve
What is the price of a word?

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Abstract

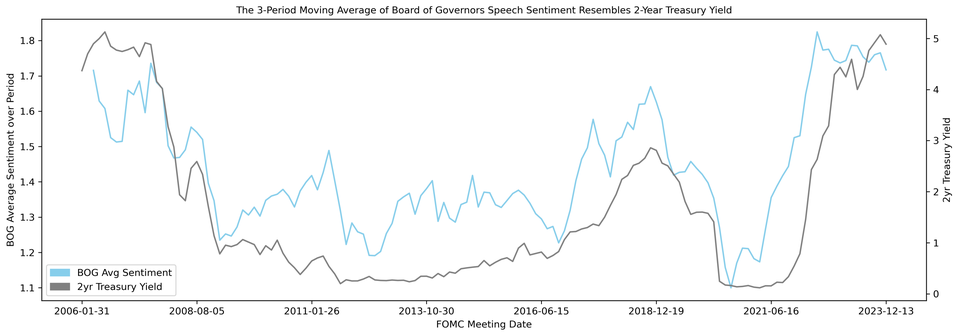
Sentiment analysis, a machine learning method, is applied to predict Federal Open Market Committee interest rate decisions. By analyzing FOMC actions, we can better understand its "reaction function", namely, participants' projections and the actions they feel are necessary to meet policy goals. From the perspective of the Fed, transparency and communication is necessary for the effective transmission of monetary policy.x

Method

Textual data, web-scraped from policymaker's public speeches, is used to glean attitude and implied monetary policy stance of committee members.

A long short-term (LSTM) recurrent neural network was trained to estimate the FOMC interest rate decision (raise/hold/lower) using the preceding period's average sentiment, and economic data (44 additional economic indicators) available at the time of the meeting as inputs. Please feel free to view the model performance metrics to the right.

Results



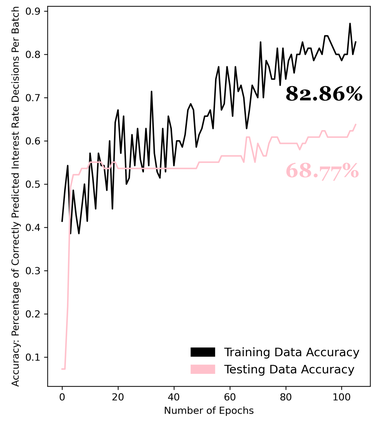
Web-scraped speeches made by Federal Reserve officials are categorized based on the intermeeting period they are spoken within. All intermeeting text is classified based on its hawkish/dovish lean. Hawkish statements hint at tight monetary policy and higher borrowing costs and place emphasis on lowering inflation. Dovish statements argue for the opposite, and favor lower borrowing costs, citing the need to maintain a healthy labor market.

As shown in the above graph, Board of Governors' sentiment changes with their evolving economic outlook; falling during economic recession and rising during overheating. The sentiment for each meeting period was assigned using a classifier model created by Shah et al.[1], which was trained on Federal Reserve statements, press conferences, and speech data to distinguish between hawkish/dovish sentiment. It is often argued that the two-year Treasury yield is one of the most monetary policy-sensitive interest rates. The relationship shown above reinforces this thought as policymaker sentiment leads the two-year Treasury prior to interest rate hiking campaigns. All told, sentiment lags shocks outside of FOMC control, such as the 2020 pandemic and accompanying recession.

The preliminary model shows 63.8% accuracy on unseen data in predicting the following period's interest rate decision given earlier data/sentiment.

A simple regression used in complement appears to suggest that sentiment may have a larger effect on decision-making during downturns, and less of an influence before hiking campaigns.

One argument in favor of the above hypothesis is that the penalty of raising interest rates is so high that policymakers become entirely data dependent. In contrast, the cost of prolonging economic hardship incentivizes quick action, attributing present sentiment a heavier weight in the decision-making process. History supports this. Following the 2020 reopening of the economy, committee members emphasized the need to see durable recovery in labor market conditions before raising rates to combat inflation. The risk of slipping into a deeper downturn was higher than the risks posed by above-target inflation given the recency of the COVID-19 induced hardship.



Works cited

1. Shah, Agam, et al. "Trillion Dollar Words: A New Financial Dataset, Task & Market Analysis." ACL Anthology, ACL Anthology 2023, 13 May 2023, aclanthology.org/2023.acl-long.368.pdf.
2. Governor Kugler speaking at the Weidenbaum Center on the Economy, Government, and Public Policy, 2024.
3. Vice Chair Ferguson speaking at the Bay Area Council 2001 Outlook Conference, 2001.

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Further information

Example of "hawkish" in the context of the Fed: "*We still have a ways to go. Until then, I support continued rate increases and ongoing reductions in the Fed's balance sheet to restrain aggregate demand.*"[2]

Example of "dovish" in the context of the Fed: "*In its most recent announcement, the FOMC indicated that risks remain weighted toward economic weakness.*"[3]