Literature Review: Textual Analysis, Monetary policy and FOMC

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My project aims to build a more valid measure of monetary policy shocks by clearing the predictive information that the Federal Reserve considered in decision making, from the targets for the funds rate. Specifically, I use the Latent Dirichlet Allocation (LDA) model to identify potentially relevant topics in the Minutes of Federal Open Market Committee, and compute the sentiment tone scores for each topic. These topic loadings and tone scores serve as proxies for the Federal Reserve's forecast information. As a standard procedure, the new measure of monetary policy shocks will be used in a VAR to assess the response of output and inflation to monetary policies.

Following this outline, my research is mainly related to three strands of the literature – textual analysis in economics and finance (especially topic and sentiment analysis), the measure of monetary policy shocks and VAR analysis, and the informativeness of FOMC documents.

Textual Analysis in Economics and Finance

My employment of LDA to automatically identify topics from FOMC Minutes closely follow the work of Jegadeesh and Wu (2017)[1], which is the first to use LDA in economics and finance literature. Using the eight economic topics extracted by LDA, they examined the informativeness of each of these topics for the stock market and interest rates. Specifically, they regressed the event-window return and the changes in the volatility of SPY (a exchange-traded fund that tracks the S&P 500 index) and LIBOR after the release of FOMC Minutes, on the scores of each topic. They found the Fed's discussion of its policy stance, inflation and employment to be the most informative, while topics such as trade, consumption and investment are not informative.

Prior to Jegadeesh and Wu (2017), works of content and sentiment analysis in economics and finance literature mainly use bag-of-words approaches, ignoring context information. The earliest work is Tetlock (2007)[2], which conducted sentiment analysis on a popular Wall Street Journal column and found that high media pessimism predicts downward pressure on market prices followed by a reversion to fundamentals, and that extremely high or low pessimism is associated with high market trading volume. Hanley and Hoberg (2010)[3] decomposed the content of the initial public offering prospectus into standard

and informative components. They found that more informative content in the prospectus leads to more accurate offer prices and less underpricing, because the informative content serves as a proxy for premarket due diligence. They also found that greater content from high reputation underwriters and issuers contribute to the informativeness of the prospectus. Garcia (2013)[4] studied the effect of sentiment on asset prices during the 20th century. They used the fraction of positive and negative words in two columns of financial news from the New York Times as a proxy for sentiment. They showed that compared to other time periods, sentiment predicts stock returns more accurately during recessions.

While the majority of works of sentiment analysis in economics and finance directly use the fractions of positive and negative words according to the Harvard Dictionary, Loughran and McDonald (2011)[5] found that the Harvard Dictionary misclassify common words in financial text. In a large sample of 10-Ks during 1994 to 2008, almost three-fourths of the words identified as negative by the Harvard Dictionary are typically not considered negative in financial contexts. They thus developed an alternative negative word list to be used in financial text, by linking the words to 10-K filing returns, trading volume, return volatility, fraud, material weakness, and unexpected earnings. In addtion to the adjustment of the sentiment word list, Jegadeesh and Wu (2013)[6] found that the appropriate choice of term weighting is at least as important as, and perhaps more important than, a complete and accurate compilation of the word list. And they proposed to base the term weights on market's reactions to 10-K filings.

The Measure of Monetary Policy Shocks and VAR Analysis

After extracting the features of the information contained in the text of the minutes of FOMC meetings through LDA and sentiment analysis, these features are included in the regression in Romer and Romer (2004)[7] as additional proxies for the Federal Reserve's forecast information. The earliest works in identifying monetary policy shocks and the responses of other macroeconomic variables used the federal funds rate as the proxy for monetary policy shocks. For example, Bernanke (1990)[8] used federal funds rate, together with the three-month Treasury bill rate and the ten-year Treasury bond rate as an aggregate indicator for monetary policy shocks and conducted Granger-causality test to see its predictive power on other macroeconomic variables. They found that federal funds rate itself has stronger predictive power than monetary aggregates or other interest rates. They argued that the reason is that the funds rate sensitively records shocks to the supply of (not the demand for) bank reserves, i.e. the funds rate is a good indicator of monetary policy actions. Kuttner, K. N. (2001)[9] estimated the impact of monetary policy actions on bill, note, and bond yields, using federal funds rate future to separate changes in the target funds rate into

anticipated and unanticipated components. They found that interest rates' response to anticipated target rate changes is small, while their response to unanticipated changes is large, which is consistent with the expectations hypothesis of the term structure.

To better deal with within-period endogeneity, the VAR framework became prevalent starting from Sims (1992)[10], where macroeconomic data from five countries were used to estimate VARs and they found that while certain patterns in the data consistent with effective monetary policy are similar across countries, others, particularly the tendency of interest rate increases to predict high inflation, are harder to reconcile with effective monetary policy. Christiano, Eichenbaum and Evans (1994)[11] used two measures of exogenous shocks to monetary policy: orthogonalized shocks to the federal funds rate and orthogonalized shocks to non borowed reserves. They found that following a contractionary shock to monetary policy, net funds raised by the business sector increases for roughly a year and then begins to fall due to the recession induced by the shock, which is not captured by existing monetary business cycle models. Second, they could not reject that households do not adjust their financial assets and liabilities for several quarters after a monetary shock, which is consistent with existing monetary business cycle models. Based on the VAR framework, Bernanke and Mihov (1998)[12] developed a new measure of monetary policy shocks based directly on estimates of the central bank's operating procedures. The more recent work by Gertler and Karadi (2015)[13] combined the VAR framework with high frequency identification (HFI). Rather than the federal funds rate, they used one-year bond rate, instrumented by funds rate future surprise around FOMC announcements, to measure monetary policy shocks. Through VAR analysis, they found that the responses in output and inflation are typical, and that the resulting "modest" movements in short rates lead to "large" movements in credit costs, due to the reaction of both term premia and credit spreads.

Two works stands out from those VAR based measures. Romer and Romer (2004) argued that while previous works tried hard to avoid endogeneity in the measurement, another problem remained in conventional measures – anticipatory movements. They thus combined the quantitative and narrative records of FOMC meetings to form proxies for the anticipatory information of the Federal Reserve, and regressed the change in the intended funds rate on them, to get a new measure without anticipatory movements. Sims and Zha (2006)[14], on the other hand, argued that the different policy regimes in different time periods should be explicitly considered in the model. Using a multivariate regime-switching model for monetary policy, they found three estimated regimes corresponding roughly to periods when most observers believe that monetary policy actually differed. They also examined the multivariate relations between money supply, the Fed funds rate and real macroeconomic variables, such as GDP and

unemployment under different monetary regimes, using a VAR model.

The Informativeness of FOMC Documents

My research extends Romer and Romer (2004) by extracting more information from the FOMC Minutes, which adds on to the literature that examines the informativeness of FOMC documents. Gurkaynak, Sack and Swanson (2004)[15] examined the effects of monetary policy on asset prices using a high-frequency event-study analysis. They found that along with the current federal funds rate, the future path of policy serves as an important factor in these effects, and is associated with FOMC statements. While both monetary policy actions and statements have important effects on asset prices, statements have a much greater impact on longer-term Treasury yields. Fleming and Piazzesi (2005)[16] found that treasury note yields are highly volatile around FOMC announcements, even though the average effects of fed funds target rate surprises on such yields are fairly modest. They showed that yield changes depend not only on the surprises themselves, but on the shape of the yield curve at the time of announcement. Campbell et al. (2012)[17] examined how FOMC forward guidance can substitute for lower rates when the interest rate reaches the zero bound, by investigating the responses of asset prices and private macroeconomic forecasts to FOMC forward guidance, both before and since the recent financial crisis. They showed that the FOMC has extensive experience successfully telegraphing its intended adjustments to evolving conditions.

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