Incorporating Textual Information of FOMC Meetings in Measuring Monetary Shocks

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Abstract

Using LDA, I dissect the Minutes of FOMC into 8 economic topics. I measure the tone of each topic, finding that the sentiment scores are procyclical. The topic loadings and tone scores, as additional proxies for the Fed's forecast information, are used to construct a new measure of monetary policy shocks. Compared to my more comprehensive proxy set, the measure of Romer and Romer (2004) generally underestimates the magnitude of the monetary policy shocks, but overestimates several major negative shocks before 2004. I also estimate VAR models using the industrial output and PPI. The magnitude of the rise in price level during the first 10 months of monetary shock is smaller, showing that the "price puzzle" is mitigated.

Motivation

Traditional measure of monetary policy, the federal funds rate, has two major flaws.

- Endogenous movements: The federal funds rate moves a lot along with the economic conditions, especially when the Fed was not closely targeting the federal funds rate.
- Anticipatory movements: Based on its information about the ecoonmy, the Fed tries to anticipate the future movement of the economy and make countercyclical targeted funds rate to smooth out fluctuations.

Data

- FOMC Minutes from Feb. 1993 to Jun. 2012
- Financial stop words developed by Loughran and McDonald (2011)
- Monthly Industrial Production Index, Producer Price Index for All Commodities

LDA

LDA views each paragraph as a mixture of topics, whose distribution is a Dirichlet distribution. For each word in the paragraph, the distribution over the words is also Dirichlet. After training the LDA model by all the paragraphs from FOMC Minutes, the model can estimate a topic loading vector for each paragraph θ_{ti}. I weighted each paragraph by its proportion of words in the document, and sum across all paragraphs to get a topic loading vector for a document. Specifically, for the Minutes of the meeting at date t, the topic loading vector is:

$$\theta_t = \sum_{i=1}^{I_t} \theta_{ti} \frac{N_{ti}}{\sum_{i=1}^{I_t} N_{ti}}$$

Sentiment Analysis

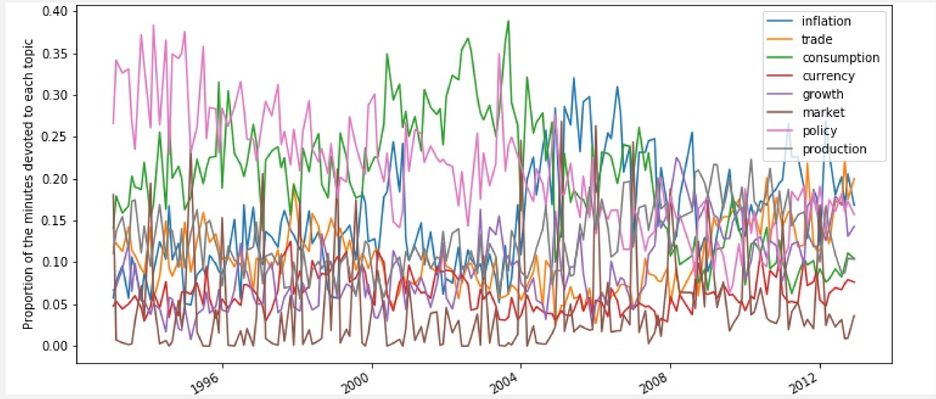
For each paragraph, the sentiment score is $Pos_{ti} - Neg_{ti}$. Combining this with the topic loading vector of this paragraph, we can get the sentiment score for each topic in this paragraph:

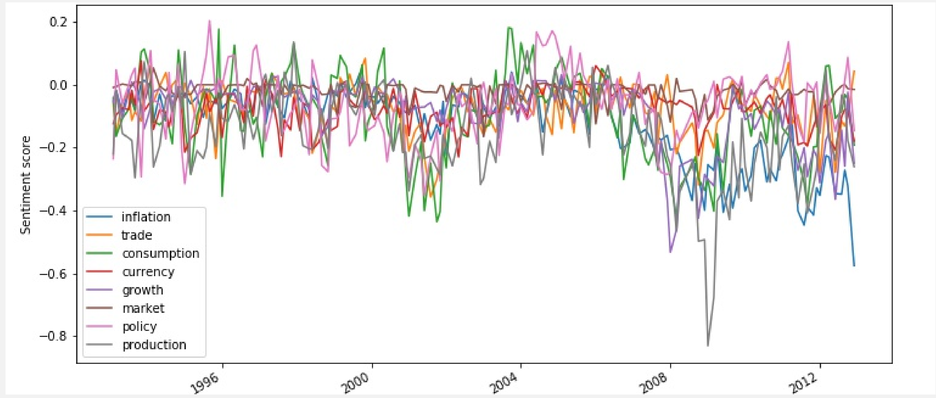
$$Score_{ti,k} = \theta_{ti,k}(Pos_{ti} - Neg_{ti})$$

Then weighting each paragraph by the reciprocal of its length (because the strength of the sentiment expressed by longer paragraphs is weaker), I sum the sentiment score over all the paragraphs in each FOMC Minutes and get the sentiment scores for the Minutes:

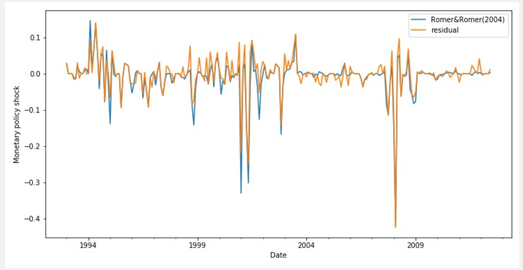
$$Score_{t,k} = \sum_{i=1}^{I_t} Score_{ti,k} \frac{1}{N_{ti}}$$

Topic Loadings & Sentiment

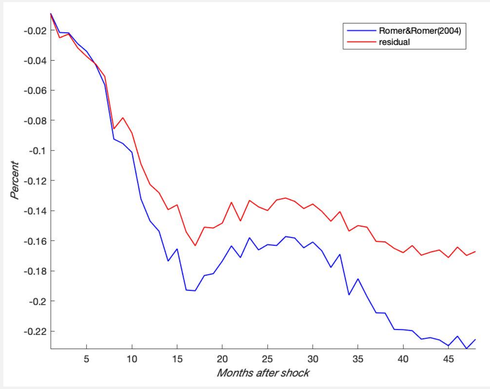




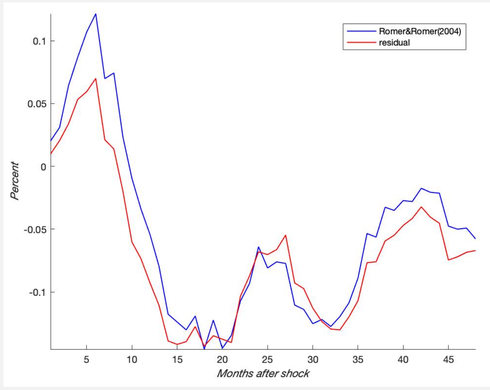
New Measure of Monetary Shocks



Impulse Response of Output



Impulse Response of PPI



Contact Information

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