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Shocking language: Understanding the macroeconomic effects of central bank communication ☆

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ABSTRACT

We explore how the multi-dimensional aspects of information released by the FOMC has effects on both market and real economic variables. Using tools from computational linguistics, we measure the information released by the FOMC on the state of economic conditions, as well as the guidance the FOMC provides about future monetary policy decisions. Employing these measures within a FAVAR framework, we find that shocks to forward guidance are more important than the FOMC communication of current economic conditions in terms of their effects on market and real variables. Nonetheless, neither communication has particularly strong effects on real economic variables.

1. Introduction

It is now widely accepted that many aspects of modern monetary policy aim to manage inflation expectations (King et al., 2008). This is because economic agents forward-looking decisions typically depend on expected real interest rates over reasonably long horizons (up to, and beyond, 20 years for major investment decisions). Given that the central bank controls nominal interest rates only at very short maturities, private sector economic agents must take a view on both the likely future developments in the economy, as well as the reaction of the central bank to these developments, in order to establish their expectations of longer-term real interest rates.

Central bank communication has emerged as a key tool for central banks in their attempts to control inflation expectations. The Federal Open Market Committee (FOMC) first accompanied their decision with a statement in February 1994 and although statements were ad-hoc for most of the 1990s, they are now a regular and closely-monitored FOMC release. Blinder et al. (2008), in their survey of the large literature that has developed examining different aspects of communication by monetary authorities, define central bank communication broadly as the information that the central bank makes available about its current and future policy objectives, the current economic outlook, and the likely path for future monetary policy decisions. An important and open area in monetary policy is how to design central banks to optimise their policy outcomes (Reis, 2013), and the question of optimal communication strategy is central to this discussion.

Before we can study optimal communication by central banks, we need to understand the effects of different strategies on a variety of macroeconomic and market variables. The novel empirical approach taken in this paper is to use techniques from computational linguistics, applied to the statements of the FOMC, to measure the extent to which the information provided is about the current outlook for the economy, and to what extent it provides a guide for the future. This allows us to focus on multi-dimensional monetary policy and we can contribute answers to two major questions in the literature. First, we use our extracted measures of communication as variables in a Factor-Augmented VAR

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(FAVAR, due to Bernanke et al. (2005), Stock and Watson (2005) and Marcellino et al. (2005)) to examine the effect of central bank communication on macroeconomic and financial variables. Second, we examine which specific dimensions of monetary policy communication drive these effects.

To be more precise on the dimensions of monetary policy that we have in mind, consider a central bank that, on average, makes decisions that are well-described by a rule for nominal interest rates in the spirit of Taylor (1993):

$$i_t = \phi \times \Gamma_t + \epsilon_t \quad (1)$$

where ϕ is the vector of reaction coefficients, Γ_t is the vector of economic inputs to the rule and ϵ_t is the deviation from that rule at time t. Agents can use their knowledge of this rule, together with expectations of the inputs to the decision, in order to form their beliefs on future decisions and future interest rates.

When the central bank announces its decision at time t, it reveals i_t. It is the behaviour of this interest rate variable that attracts most attention in the analysis of the effects of monetary policy. We consider that the central bank can also communicate through its statement, and we consider that this communication adds two additional dimensions to monetary policy. Since we will empirically measure these two aspects that the central bank can communicate about, we will be in a unique position to study the dynamic effects of central bank communication. The two additional dimensions of monetary policy that we consider are communication about:

State of Economy: the FOMC's belief about the current and expected economic outlook Γ_t.
Forward Guidance: the FOMC's expected deviations from this average rule (ϵ_t), or a commitment to follow some path that may deviate from the average rule.

Our main finding in this paper is that, at least in the US in the last 18 years, central bank communication on future interest rates (forward guidance) seems to have been much more important than their communication of current economic conditions. However, we find that neither communication has particularly strong effects on real economic variables in our FAVAR, especially relative to the effect of the actual policy stance.

Of course, issues of central bank communication have been studied before in both theoretical models (for example, the model-based evaluation of central bank communication strategies in Eusepi and Preston (2010)), and there is also an emerging empirical literature. For example, Ehrmann and Fratzscher (2007) examine the communication strategies of the ECB, Bank of England and the Federal Reserve; Ranaldo and Rossi (2010) examine the financial market effects of Swiss National Bank announcements; Hayo and Neuenkirch (2010) consider the predictability of future Fed rates using information in announcements; Berger et al. (2011) look at the ECB and media reaction; and Hayo et al. (2012) focus on asset market reactions to Fed communications.

A key motivating paper for this literature is Gürkaynak et al. (2005) (GSS). They show, using an event study approach analysing movements in financial markets data around FOMC interest rate decisions, that central bank announcements move markets.[1] In fact, the statement accounts for most of the movements in 5- and 10-year Treasury yields. They conclude that expectations of future decisions are key and that the statements are what help to affect investor expectations.[2]

While GSS is an important paper which indicates that central bank communication reveals information to investors and thereby influences their expectations, a downside of their methodology is that they do not measure the communication. Instead, the effects of policy, and their identified 'path factor' are revealed from the immediate response of particular asset prices. Though they find that "FOMC actions were priced into the federal funds futures market almost immediately", the detail and complexity of the FOMC statement have increased substantially since the financial crisis and especially since the deployment of unconventional monetary policy (Hernández-Murillo and Shell, 2014).[3] This means that if the full understanding and reaction took longer (days), and the immediate response was only transitory, we might get a very misleading view of the effects of the statements from this methodology. A second downside is that we do not learn *what* information is being revealed to investors (Woodford, 2012). Given that we measure two specific aspects of the central bank communication directly, we can use these measures to assess the importance of each dimension. As such, we view our work as highly complementary to the GSS event-study methodology.

The major empirical challenge for the analysis of central bank communication, and one we address head on in this paper, is to convert the raw communication, which is typically words, into meaningful quantities which we can systematically analyse. Some approaches simply only focus on quantitative communication (such as released central bank forecasts), while others use counts of some pre-selected keywords (as in Rosa and Verga (2008)) to measure content. The main methodological contribution in this paper is to use computational linguistics, and particularly the combination of topic modelling and dictionary methods, in order to examine the content of what central banks are trying to communicate to the markets and the public.

The first obvious advantage of the use of automated techniques rather than a purely narrative approach to study the statements is scalability without concerns about consistency of the application of the method. With automated methods it is then easy to extend the sample to include more recent data, other sources of communication such as FOMC speeches, or to extend it to other central banks. The second advantage is precisely that the researcher does not have to worry that too much prior knowledge of the big announcements is allowed to determine the choices made in creating the indices. Of course, narrative methods might be able to pick up some of the nuance of statements more precisely. We make use of both in this paper.

In terms of the computational approaches, we use Latent Dirichlet Allocation (LDA) and dictionary methods to extract the content of official interest rate communications (statements) by the Federal Reserve. LDA is widely used in linguistics, computer science, and other fields; the article that introduced it, Blei et al. (2003), has over 10,000 citations in 10 years. While computational linguistic models are used in the political science literature, their use is still mainly descriptive; for example, Quinn et al. (2010) use a topic model similar to LDA to study congressional speeches to see what congress is talking about. We believe that the approach of using computational linguistics to create measures of communication from large

[1] Specifically, they decompose the effects of FOMC announcements on financial markets into different factors and reject that a single factor related to the policy actions sufficiently explains the movements. Instead, they identify two factors in their analysis of FOMC statements from 1990 to 2004.

[2] They write: "our results do not indicate that policy actions are secondary so much as that their influence comes earlier when investors build in expectations of those actions in response to FOMC statements (and perhaps other events, such as speeches and testimony by FOMC members)."

[3] This is measured by both the length of the statement, which increased from 50–200 words in the early 1990s, to more than 800 words in the first five meetings of Janet Yellen as Chair. This is reflected in the estimated Flesch–Kincaid Grade Level increasing from a range of 9–14 to 18–19.