

Project description

Deanonymizing minutes through machine learning

In 2007, the Swedish central bank, the Riksbank, started to publish attributed minutes, that is, the minutes included information on who of the six board members said what during the policy meeting. For the prior eight years, minutes had been published but the comments of individual board members were not attributed. Instead of revealing the names of the members, their statements were presented as “One member said...” etc.. However, the entire corpus of the minutes are a fair and detailed description of what was said during the meeting by each member, even before 2007; except, of course, for reporting the names of the board members. One could say that compared to other central banks, the Riksbank’s editing process has always been “light,” with exception for the first year or so.

The aim of publishing minutes, and later of attributing them, was fundamentally motivated by a policy of increasing the central bank’s transparency. It is well understood that increases in transparency influences market participants’ perceptions and can in principle help to anchor their expectations more efficiently. But the economic literature has been increasingly providing evidence that publishing the minutes may have also changed the *attitude* of the board members. To what extent this is a positive development is a much debated issue that has been unresolved due to the difficulties of empirically identifying the impact of transparency from existing data. In fact, the only data available so far are the transcripts of the Federal Reserve which in 1993 the Fed Board decided to be made public, albeit with a delay of five years.

Meade and Stavage (2008) among others find that the Federal Reserve increased transparency in 1993 changed the behaviour of the Federal Open Market Committee (FOCM) members towards *less* discussion and more “sticking with the majority”. Hansen et al. (2014) on the other hand find that increased transparency had a positive effect on the policy decision making as it made members to prepare better, i.e. transparency has a discipline effect that tended to dominate.

The Riksbank change in transparency in 2007 provides a unique opportunity for analysing the impact of increased transparency on the behaviour of policy makers, with a detailed dataset over a fairly long period of about 20 years, starting in 1999 when the Riksbank gained its independence. In addition, they are published with only two weeks delay, making any impact of transparency more urgent and relevant.

The key question is whether increasing the transparency of the policy discussions (making the minutes attributed) changes members’ behaviour. And if so, how? More specifically, does the attribution induce members to *commit* stronger than before to their previously stated opinion? Or alternatively, does it reduce their readiness to change their opinion when new information contradicts their previous stance (Falk and Zimmermann, 2018)?

In a companion paper to this one, we have drawn the theoretical foundation on why the commitment effect is relevant and may even tend to dominate (Apel, Blix Grimaldi and Reslow, *forthcoming*), after having established by using text analysis and a new central bank dictionary that the informational content of the minutes is helpful for the predictability of monetary policy and therefore central bank transparency (Apel and Blix Grimaldi, 2014). Also, based on text analysis and machine learning the detailed descriptions of the FED policy meetings have also been investigated to analyse several aspects of transparency and consensus building within the FOCM (Apel, Blix Grimaldi and Hull, *forthcoming* 2019).

It is straightforward to extract an inference on how strongly board members commit over time when the minutes are attributed. To identify members in the non-attributed minutes, machine-learning is essential. If different statements in the minutes can be attributed to specific members,

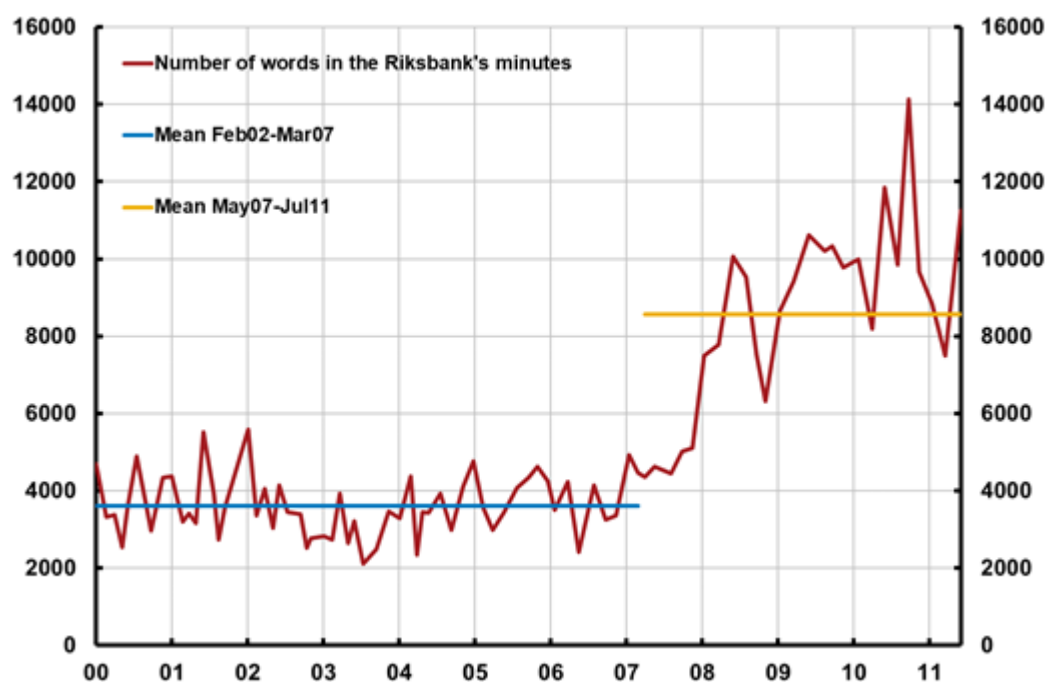
it can be examined how their contributions to the discussion have changed over time. This can be done by computing different individual-based statistics as in, for example, Acosta (2015). If the parts of the minutes from each individual are more similar after minutes became attributed in 2007, this is an indication that members to a larger extent express themselves in a similar way and are using similar arguments during a number of consecutive meetings. In other words, an increased similarity after 2007 suggests a material commitment effect, providing clarity to a much contested issue.

Identifying members in the non-attributed minutes is a challenging task, of course. By using machine learning, we aim to identify patterns in the language used by each individual, for example by identifying the words and the set of arguments that each members tend to use to support their policy decision. A board member, for example, may favour talking about inflation while another would build her arguments talking more about labour market conditions or financial stability.

We have three sets of data that are readily available to us and can help to identify each of the board members effectively:

- Minutes,
- Speeches, and
- Voting records.

The corpus of speeches contains more than 250 written speeches. Voting records have been published since 1999. There are 130 minutes of which about half are attributed. The average length over the entire period is about 7000 words, but with a steep increased since 2007, see figure below. Media interviews and non-written speeches can also easily be collected and included in the data set.



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