

# Talking Monetary Policy: Are Central Banks communicating what they should?

Term Paper<sup>\*</sup>

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## Abstract

Since the cost of living crisis, central bank communications have gotten increased attention. This paper argues that central banks have duties to inform the general public on policy within their primary and further mandates, as well as the downstream consequences of their policy. For the Federal Reserve System of America, an empirical investigation is conducted to determine if the central bank adheres to this. Using Natural Language Processing, this is evaluated with topic modeling techniques, specifically BERTopic. The data is all speeches and press statements by the Federal Reserve since 1998.

*Keywords:* Central Banks, Natural Language Processing, Communication.

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# 1 Introduction

There is one issue, however, on which I can be decisive today: we must explain much better to the general public what we are doing and why, and we must talk to people that we do not normally reach. This imperative has to cascade through all the elements of our review: our inflation aim, our inflation measure, our tools and their effectiveness, and how we take into account new challenges that people care about, like climate change or inequality. - Lagarde (2020)

As Christine Lagarde, President of the European Central Bank, admits, central banks have much to improve in terms of communication with the general public. It has been argued that this topic received too little attention in the academic literature in the past (Haldane and McMahon (2018)). However, there seems to be a changing trend, both from the banks' side but also from the academic side (Hansen, Lin, and Mano (2023)). The academic analysis does however rely on anecdotal evidence, citing only a few speeches. My aim in this paper is twofold: Firstly, I want to complement this mostly economic literature by reasoning that central banks need to communicate more from a philosophical angle. Secondly, I want to empirically investigate if claims like Hansen's and promises like Lagarde's are accurate. This will be done with a large data sample of all speeches and press releases by the Federal Reserve System of America since 1997 and a topic model.

This paper proceeds as follows: Section 2 presents an argument for why and what central banks should communicate. Section 3 follows by checking if central banks adhere to this framework. Following this, section 4 discusses. Finally, 5 concludes.

## 2 Argument for Central Bank Communication

In the following, I will present two arguments in favour of central bank communication on policy and consequences of policy. The first will be from a theory of state, the second on effectiveness of policy and trust.

### 2.1 Philosophical Argument for Communication

Summarized, my argument will be as follows:

P1) Central banks are a democratic governing body.

- P2) Democratic governing bodies' policies need to be publicly justifiable.
  - P3) For public justification of policies, the public needs an epistemic basis.
  - P4) This epistemic basis needs to be provided by the respective governing body.
  - P5) The epistemic basis includes effects of policies.
- ∴ Central banks need to publicly communicate effects of their policies.

**P1) Central banks are a democratic governing body.**

Since central banks are not a classical part of the democratic government, due to their independence, I see the need to establish this. The degree of independence has however changed over time, especially since the Global Financial Crisis (Dietsch, François, and Clément (2018)). Avoiding this temporal problem, I will follow the account of Mas (2023) who argues that central bank independence should not be seen as binary. This view eases my argument as, resulting from this, central banks will be seen as not fully independent.<sup>1</sup> Since my empirical evaluation focuses on the Federal Reserve System, I will simplify this problem by focusing on the Fed in my analyzed time frame. Concretely, I refer to repeated statements by the Fed itself, in which it states itself as a part of the government (Federal Reserve Bank of San Francisco (2003), Board of Governors of the Federal Reserve System (2017)). Data on central bank independence also further alleviates concerns about changes in autonomy. Indexes constructed to specifically measure this do not change much over our observed period for the Fed (Romelli (2022)).

**P2) Democratic governing bodies' policies need to be publicly justifiable.**

This premise is central to non-instrumental accounts of democracy. For example, Habermas' account of the state relies on communication between deliberative bodies and the public (Habermas (1994), p. 417). Joshua Cohen has also argued for the necessity of mutually accepted reasons for justification of laws (Cohen (1997)). Because of the limited scope of this paper, I will only refer to these well reasoned accounts and not go into detail myself.

**P3) For public justification of policies, the public needs an epistemic basis.**

This is quite intuitive. In order for citizens to be able to reason for and against policies, those arguments need a basis.

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<sup>1</sup>Mas also argues that central banks "can be legitimate if their institutional design accommodates current concerns about economic and climate justice." (Mas (2023), p.16). I will come back to this point in my empirical analysis later.

**P4) This epistemic basis needs to be provided by the governing body.**

This follows from P2) and P3).

**P5) The epistemic basis includes effects of policies.**

This again seems less controversial, especially with central banks. This is because central bank policy is very much based on desired effects, so that reasons and effects are very aligned. As laid out before, the reasons for a policy are definitely to be communicated, so in our case the effects should be treated likewise.<sup>2</sup>

Based on this, I conclude that central banks have the duty to communicate effects of their policies. However, the extent of what they need to communicate is still unclear from my argument. Here, without getting lost in the details, I would reason that this includes both desired results as well as expected secondary effects that are well researched.

## **2.2 Further Arguments**

A good summary of my argument from the angle of epistemic justice can be found in Dieleman (2015). She argues, drawing on Miranda Frickers account of epistemic injustice, for the necessity of dialogical spaces:

An account of deliberative democracy that is subject to judgmental and dialogical constraints made more robust by the ideal of epistemic justice is, of course, itself an ideal. Yet because it is an ideal, it provides a scale against which we can measure the successes and failures of actual deliberative spaces. [...] Another way to productively read the book [In reference to Fricker (2007)] is as a piece of the puzzle for establishing democratic legitimacy (Dieleman (2015), p. 806f.)

I would interpret that these constraints need to include a basis for reasoning for and against certain policies. These arguments often concern effects that policies have. Thus I conclude that a central bank in a deliberative democracy that is as epistemically just as possible should report effects of interest rate policies such as economic growth and inequality.

Another account that very much aligns with my point is the right to an explanation as developed by Vredenburg (2022).

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<sup>2</sup>See, for example, how the Fed or the ECB reason for raising interest rates: Federal Reserve System (2023), European Central Bank (2022)

Before proceeding to the empirical section, I quickly want to mention another argument for central bank communication, namely one of trust. Haldane and McMahon (2018) identify that increased communication, especially as more digestible content, increases understanding of policy. Moreover, they find that this will also improve trust in the central bank. This effect has also been demonstrated in relation to other central banks (for example see Hayo and Neuenkirch (2014)).

### 3 Empirical Evaluation

In the following section, I will describe my empirical analysis to evaluate if central banks adhere to the previously outlined communication requirements. Specifically, I want to focus on areas that have been argued to be necessary in communication in other research as well. The main two topics are climate and economic inequality (Mas (2023)). As quoted before, the ECBs President has also alluded to the importance of these two topics (Lagarde (2020)). In line with my main argument, I will look at these secondary effects that are well established in the literature. Research has examined effects of monetary policy on inequality (see Coibion, Gorodnichenko, Kueng, and Silvia (2017) or Colciago, Samarina, and de Haan (2019) for example). More recently, Hansen, Lin, and Mano (2023) also conclude that inequality should be a factor in central banks decision. For climate change, there seems to be consensus on both existence of impact and necessity of factoring in decision making (Drudi (2021) and Campiglio, Dafermos, Monnin, Ryan-Collins, Schotten, and Tanaka (2018)). Alongside this, I will evaluate more primary effects that are explicitly within the central banks mandate.

I will proceed by describing my data and arguing why this is the right data for my research question. Following this, I will explain the method used and analyze the results.

#### 3.1 Data

The data is comprised of public communications by the Federal Reserve System. The public is conventionally addressed with press statements and speeches.<sup>3</sup> The difference between the two communication forms is primarily that press statements function as a statement from the policy making committee, while speeches are just from a single person, usually a member of the committee. Ehrmann and Fratzscher (2005) outline this and effects of the two communication

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<sup>3</sup>While social media plays an ever increasing role in outreach of central banks to the public, I would not expect social media to cover anything not covered in press statements and speeches.

forms. They argue that the difference lies mainly in the degree of public representation of diversity of views within policy committees. They also note the decision of how much information central banks publish in total. Both of these aspects are important for this analysis. The more central banks communicate, the more they are also able to go into smaller topics. And if the form of communication allows for more diversity (more speeches compared to press statements), more niche topics can be addressed. Of course this is not mechanically true, but it seems plausible.

To be clear, there is one important condition for my previous argument to apply here and thus for my empirical analysis to match the argument: My text sample needs to reach the public or at least be the communications that would reach them, were people interested. While generally not all that much of central banks communication seem to be received (see Ehrmann and Wabitsch (2021) for an overview), there is especially little reception directly from the central bank (Gardt, Angino, Mee, and Glöckler (2022)). People seem to receive news about central banks primary via classical press outlets like TV and newspapers. Older surveys have found similar results. (van der Crujsen, Jansen, and de Haan (2015)).<sup>4</sup> So for this to be the right data, it needs to be perceived by the press and relayed to the public.

The data is obtained by webscraping the website of the Fed. A statistical breakdown of the resulting 91.315 documents can be found in Table 3 Appendix. They are comprised of about 7 million words. The analyzed time frame is between 1996 and 2023. The topic model requires relatively little preprocessing. The only steps taken are to remove any documents that are very short (below 50 characters), as well as documents that only contain notes for the website reader and are not actual content of the communication. The embedding model will truncate any document with more than 256 words, and works best with one or few sentences. To account for this, I scrape the data in paragraph form, utilizing the existing division by content. While the Feds speeches are relatively equally distributed, their statements nearly double in the years 2008 to 2010. Otherwise, the sample is quite balanced.

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<sup>4</sup>Van der Crujsen et al. have conducted their survey in 2009. Older studies are important for my analysis since the sample spans a long time frame.

## 3.2 Method

To evaluate if central banks adhere to the previously outlined framework, I conduct a topic model analysis of the previously described data sample. For this, BERTopic, by Grootendorst (2022) is used. The model first creates document embeddings, then reduces dimensionality with UMAP and finally clusters the documents into topics using hdbscan. To represent the topics accurately with terms that best characterize them, words are tokenized and selected with a class based term frequency score (c-TF-IDF). In the following, I will describe in more detail what the individual parts of the model do.

To start, the documents get numerical representations by the embedding model from Reimers and Gurevych (2019). For this application, all-MiniLM-L6-v2 from the sentence transformers library is used. The embedding model is a model that was trained using machine learning to predict sentence pairs from a very large dataset. It can predict how similar sentences or short documents are to each other. This semantic similarity is captured by a numerical representation of the documents by positioning them all in a 384 dimensional vector space. Note that the documents are positioned in the same space, in order to be able to calculate distances between them.

With all documents having a numerical representation as a position, the next step is dimensionality reduction. Because of the high dimensionality of the embeddings, computational loads are very high. To counteract this, Uniform Manifold Approximation and Projection for Dimension Reduction (UMAP) by McInnes, Healy, and Melville (2020) is utilized to approximate the multidimensional structure of the data in very few dimensions. Figure 1 illustrates this.<sup>5</sup>

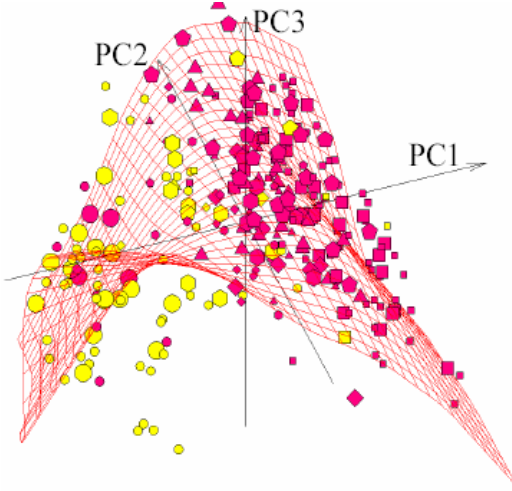
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<sup>5</sup>Gorban and Zinovyev (2008) use an elastic maps approach, but the illustration still serves to visualize UMAP in this case.

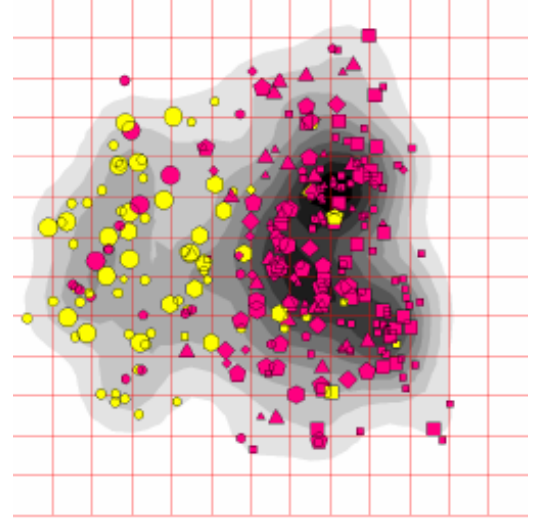


Figure 1: Visualization of nonlinear dimensionality reduction from Gorban and Zinovyev (2008)

(a) Raw Data, illustrated with 6 dimensions  
(3 dimensional coordinate system, color, size, shape)



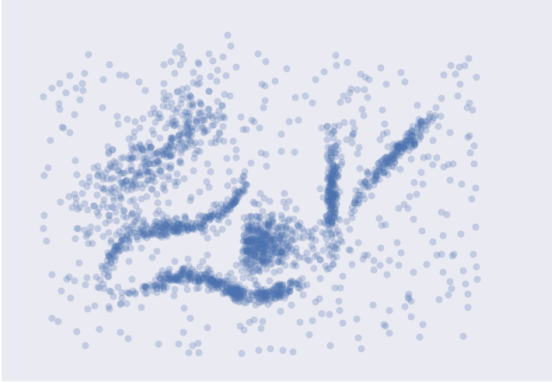
(b) Nonlinear dimensionality reduction onto two-dimensional plane



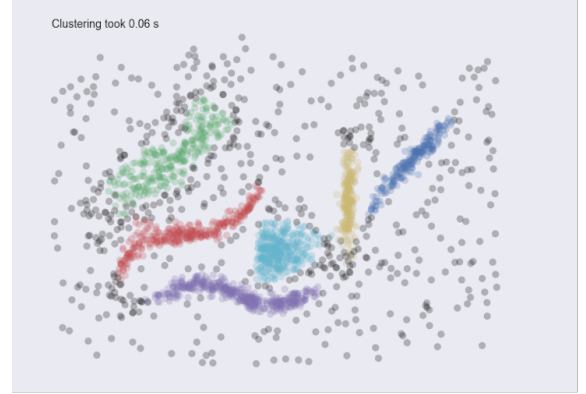
Using the document-level similarity reduced to fewer dimensions, the model now determines topics by clustering. The hierarchical density based scanning algorithm (hdbscan) by McInnes, Healy, and Astels (2017) is used to detect groups of similar documents, which are close to each other. The algorithm does this based on the method by Campello, Moulavi, and Sander (2013), accounting for hierarchical structures and density. The algorithm is also able to detect outliers which do not belong to any clusters, dealing with noisy data efficiently. An illustration of this is shown below in Figure 2. One important feature of hdbscan algorithm that BERTopic uses is soft clustering. Instead of just matching one point to one cluster, the probability of each point belonging to all found clusters is calculated. Hdbscan requires one important tuning parameter for the model which is the minimum cluster size. It specifies the minimum number of points (in our case documents) a cluster (in our case topics) has to contain. For high values, resulting number of topics will be little, but they will be large. Low values will result in very many topics that are more concise. Since a large number of topics will be hard to interpret, I will start with a model with a higher minimum topic size and interpret the output directly. After this, the model is fitted again with a smaller minimum topic size and I will process the output data further and interpret afterwards.

Figure 2: Visualization of hdbscan clustering by Leland McInnes (2016)

(a) Raw Data, generated with 6 clusters of different forms



(b) hdbscan clustering, correctly identifying all 6 clusters. Outliers are colored in grey.



After this step, BERTopic generates the topic representations. These are words meant to best describe the topic clusters. Very briefly speaking, words are weighed by their relative importance for the topic compared to the whole corpus. The ones achieving the highest score will then be chosen to describe the topic. The precise process is less relevant for this application compared to other steps of the model, so I will not go into further detail.<sup>6</sup>

To summarize, the input of the BERTopic topic model I focus on are the dataset and the parameter for minimum topic size. The main desired output are the topics and probability matrix.

### 3.3 Initial Analysis

Table 1 displays the shortened results of the topic model. Below the top ten topics, topics relating to inequality and climate are reported, as well as inflation as a comparison. Table 6 in the appendix contains the full result. The output shows very little relation to climate or inequality. Inflation is a recurring topic that gets mentioned a lot. In terms of consequence of policy, unemployment and growth are addressed most. Specifically, the output does not show any mention of inequality. Topic 59 is the only reference to climate change, making up a total of 0.289% of the total documents.

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<sup>6</sup>More specifically, c-TF-IDF Frequencies are used. For further reference, see Grootendorst (2022).

Table 1: Shortened Topic Table

| Topic | Frequency | Terms most strongly associated with topic          |
|-------|-----------|----------------------------------------------------|
| 0     | 4752      | proposal, approval, board, company                 |
| 1     | 2224      | productivity, equipment, growth, investment        |
| 2     | 2066      | basel, capital, ii, risk                           |
| 3     | 2053      | thank, conference, economics, diversity            |
| 4     | 1518      | stress, capital, tests, test                       |
| 5     | 1789      | payments, payment, check, electronic               |
| 6     | 2352      | small, community, businesses, business             |
| 7     | 2199      | rule, final, comptroller, office                   |
| 8     | 1684      | speech, delivered, conference, sponsored           |
| 9     | 1050      | order, issuance, penalty, civil                    |
| 10    | 1612      | labor, unemployment, participation, force          |
| ...   |           |                                                    |
| 21    | 1131      | inflation, core, pce, energy                       |
| 22    | 1326      | growth, spending, expansion, year                  |
| 46    | 400       | targeting, inflation, mishkin, frederic            |
| 54    | 554       | targeting, inflation, inflation targeting, central |
| 59    | 263       | climate, climate related, risks, change            |
| 71    | 593       | labor, productivity, inflation, costs              |
| 102   | 223       | phillips, curve, inflation, flatter                |
| 107   | 1128      | inflation, price, stability, stabilizing           |

**Note:** Topic lists the output number of the Topic (Not sorted by frequency, due to reassignment of clusters). Frequency lists how many documents are within the respective topic. The third column lists terms that score the highest topic specific c-TF-IDF frequency. The full table (130 Topics) can be found in the appendix. Total number of documents is 91355. Below the top ten topics, topics relating to inequality and climate are reported, as well as inflation as a comparison.

### 3.4 Analysis over Time

Claims cited in the beginning (Hansen, Lin, and Mano (2023)) argue that central banks have changed their coverage of these topics. To analyze this trend over time, I develop a score. One further problem with the previous analysis that I will try to address here is that smaller topics will not be picked up by the model. By letting the output contain more topics, this issue is reduced. This allows me to assess if the Fed has changed behaviour over time.

For this section the BERTopic model is rerun on a minimum topic size of 25, resulting in about 600 topics, which are reported in Table 7 in the appendix.

To allow for this more data-driven identification of which topics correspond to which part of the communications framework, I utilize the embeddings model to calculate similarity of topics to specific key terms. These terms are meant to best represent exactly what the central

bank should communicate in a specific area. Specifics are reported in Table 2. These words are then passed to the embeddings model, which compares their embeddings to the 25 most similar topics embeddings, outputting a similarity score (cosine similarity). This is done via a semantic search. These similarity scores, computed between all terms that characterize the search topic (e.g. climate change) of interest ( $m$ ) and topics ( $t$ ), are then used as a weights vector ( $w_t^m$ ).

This is used to weigh the main output of my topic model, namely the lists of documents with their assigned topics. The output is then grouped by year and summed. The resulting matrix ( $a_{t,y}$ ) contains the number of documents for each topic in each year. Equation 1 thus displays calculation of my score in mathematical notation.

$$score_y^m = \sum_t w_t^m * a_{t,y} \quad (1)$$

To alleviate concerns that an outlier term drives the results, I use multiple terms and average the score (See Equation 2). For each part of the framework, five terms are selected both by hand, as well as prompting ChatGPT (OpenAI (2023)) to receive words that best characterize this part of the communications ( $k$ ). The results of this scoring are reported in Table 2 and graphically displayed in Figure 4.

$$score_y^m = \sum_t \left( \frac{1}{k} \sum_k w_{k,t}^m \right) * a_{t,y} \quad (2)$$

As a robustness check, I provide calculations for different numbers of most similar topics can be found in Table 4 in the Appendix. The table also contains a different method of calculating scores. Briefly stated, the results stay mostly the same.

As a small validation exercise, I plot actual inflation data against my topic score for the inflation topic, with a decently matching results. The result can be found in Figure 3.

This result aligns with the previous analysis in that both topics receive relatively little coverage. Using this scoring method, figure 4 shows time trends in these four topics.<sup>7</sup>

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<sup>7</sup>In this plot, i control for total number of documents in the respective year by dividing. Thus the score of a specific year is calculated with  $score_y^m = \frac{1}{\sum_y n_y} \sum_t \left( \frac{1}{k} \sum_k w_{k,t}^m \right) * a_{t,y}$  with  $n_y$  as number of documents in the respective year.

Table 2: Key Terms for topic areas with scores.

| Category           | Score | Key Terms (k)                                                                                      |
|--------------------|-------|----------------------------------------------------------------------------------------------------|
| Maximum Employment | 1860  | "maximum employment", "labor market", "unemployment", "job market", "employment rate"              |
| Stable Prices      | 4232  | "inflation", "deflation", "core inflation", "price level", "stable prices"                         |
| Inequality         | 1167  | "wealth redistribution", "wealth gap", "social inequality", "wage inequality", "economic mobility" |
| Climate            | 1810  | "climate change", "climate risks", "rising temperature", "fossil fuels", "green transition"        |
| Dummy Topic        | 1430  | Average of multiple sets of 5 x 2 random word phrases.                                             |

**Note:** Topic lists the topic area of interest. Score gives the average score over the 5 different Key Terms, summed over all years ( $score^m = \sum_y \sum_t (\frac{1}{k} \sum_k w_{k,t}^m) * a_{t,y}$ ). Key Terms lists the terms given to the embedding model to compare. For the Dummy Topic, the phrases are one random word accompanied by an associated word. (e.g. random word: "manager" - phrase: "office manager" These two word phrases were completed by ChatGPT by OpenAI (2023).

### 3.5 Results

Initial analysis leads to the conclusion that central banks do in fact not talk very much about either climate or inequalities. When looking at time trend, there seems to be an improvement for climate in recent years, but none for inequality. However, in both analyses, both climate as well as inequality show up very little compared to classical topics of the central bank.

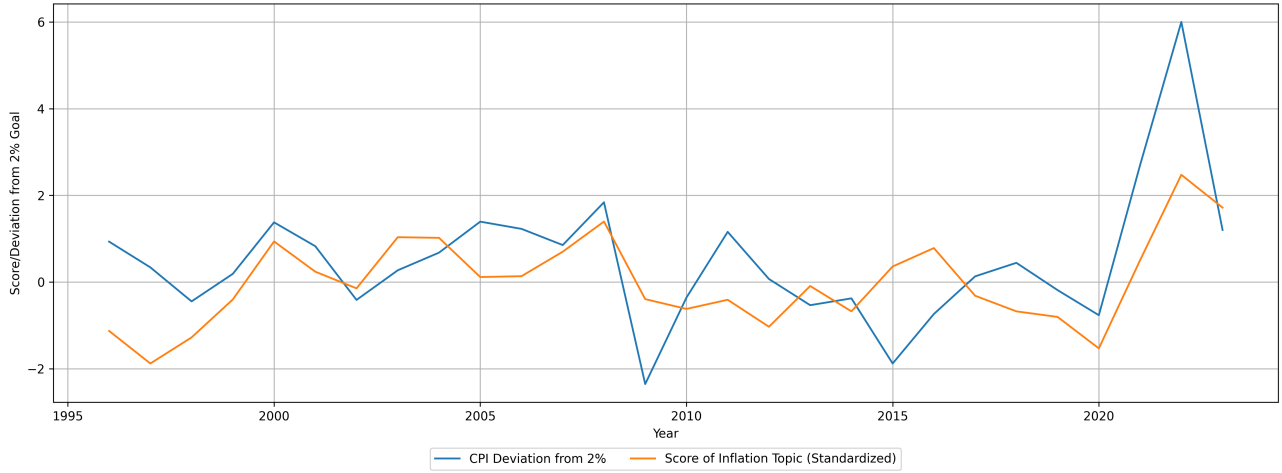
The visualization shows no clear trend for inequality, in contrast to statements in the literature (Hansen, Lin, and Mano (2023)). For climate, there is a upward trend since 2019, with a jump in 2021. Especially remarkable is that after this spike follows a equal drop. 2023 shows a slight upwards trend. An explanation for this could be that climate would have continued as a larger topic for the Fed, but sustained inflation required more attention and speaking time. The newest increase raises hopes for more climate facing central banking communications in the future. From the initial analysis, I conclude that the Federal Reserve does not talk enough about climate change and economic inequalities. From my scoring analysis I conclude that the Fed has significantly improved in addressing climate, but not in addressing economic inequalities.

## 4 Discussion

### 4.1 Discussion of the Method

First of all, I want to discuss drawbacks of the method. One valid criticism brought up by Gauthier and Widmer (2023) is that the sentence embedding method does not capture all

Figure 3: Time-trend: Score of Inflation Topic vs Deviation from 2% Inflation



Note: Data on inflation is US CPI from The World Bank (2023) with 2023 projection from Derby (14 July 2023). The score is a standardized version of the score used in Section 3.5. The most major trend deviation in 2015 could be explained with the Fed communicating about being significantly below the 2% goal (Federal Open Market Comittee (27/28 October 2015)).

forms of context.<sup>8</sup> Specifically, due to splitting the data in sentences, context that is carried between sentences is not captured in my results. This should however not be a large problem for my application. This is because only sentences that do not mention anything in relation to a certain topic (but do relate to this topic via neighboring sentences) will be observed as not within that topic.

In the second part of my analysis, I developed a score. In trying to keep this simple, my calculation of the score is relatively basic, but as a result also likely not optimal. The distribution of the similarity scores varies by how many topics the similarity is calculated for and by the mathematical calculation. As a solution, for example, calculating weights by punishing equally distributed embedding similarity to filter very general terms might be a good idea.<sup>9</sup> Limited interpretability is a further problem. More analysis on this is needed to create a robust score with more theoretical foundation.

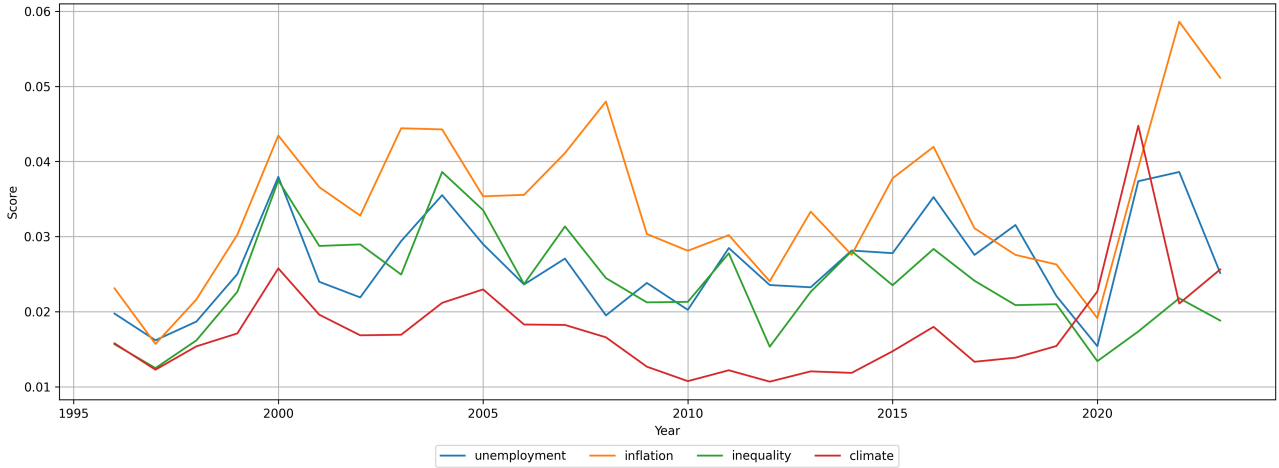
## 4.2 Discussion beyond the Method

One problem beyond the method is accessibility: As Haldane (2017) points out, readability with central bank statements is mostly beyond a level that the general public understands. Central banks are even accused of using "market-tested code words" (Blinder, Ehrmann, de Haan, and

<sup>8</sup>Technically, this point is made for word and not sentence embeddings, but the point sill applies, albeit on a different level.

<sup>9</sup>Calculation via  $score_m = \sum_t \sum_i (\frac{n_t}{\sum_t s_{k,t}^m} * \frac{1}{k} \sum_k s_{k,t}^m * P_t^i)$  (n as the number of topics) or alternatively normalizing or standardizing weights might be an approach for this.

Figure 4: Time-trends in Scores of Analyzed Topics



Jansen (forthcoming), p.2) that are intended for experts and financial markets, not the average layman. A counterargument to this could be that central banks face complexity constraints and are not able to communicate simply due to difficult factual connections, as Woodford (2005) argues. Nonetheless, if the text sample I am analyzing is not readable for a normal person, central banks would still fail to adhere to my argument, even if they would cover the topic.

Another point to mention is less direct communications. One type of publication that my corpus omits is datasets. For example, datasets on inequality are regularly published by Federal Reserve Bank of St. Louis (2023). One could argue that these publications might be sufficient and journalists are responsible to relay the information to the public in a digestible way.

A further question is how relevant communications about inequality or climate could be in practice, since the public picks up very little of what central banks communicate (Assenmacher, Glöckler, Holton, and Trautmann (2021)).

## 5 Conclusion

This paper argues that central banks need to communicate on effects of their policies. This is the case for both intended as well as secondary consequences. The argument is based on accounts of theory of state. Secondary consequences include topics like – most importantly – climate change and economic inequality. This supplies a basis for evaluating central banks.

The following empirical analysis uses novel topic modeling techniques to evaluate if the Federal Reserve System has adhered to this. The finding is that both climate change as well as economic inequality are underrepresented in communications. Climate change has most recently gone up

in coverage, while inequality has no clear trend. For inequality, this stands conversely to claims brought up in the beginning of this paper, who argued that there is a substantive clear upward trend. Statements about increasing coverage of climate seem to be valid.

Further research could include a comparison between different central banks on performance in communications. An analysis of the correlation of communications geared towards the public to time trends in trust in central banks could also be an interesting question.

I will close by citing J. Powell, Chair of the Federal Reserve System:

Second, the Fed must continuously earn that independence by [...] providing transparency to facilitate understanding and effective oversight by the public. -Powell (2023)

In alignment with this perspective, I posit that while the Fed is making strides in enhancing transparency regarding climate change, there remains room for improvement, particularly in addressing economic inequality.



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# Appendix

Table 3: Number of Press Statements and Speeches

| Year | Press Statements | Paragraphs | Speeches | Paragraphs |
|------|------------------|------------|----------|------------|
| 1996 | 37               | 1011       | 19       | 532        |
| 1997 | 210              | 3749       | 45       | 1437       |
| 1998 | 188              | 3012       | 56       | 1879       |
| 1999 | 182              | 2224       | 68       | 2095       |
| 2000 | 188              | 1078       | 62       | 1874       |
| 2001 | 205              | 1151       | 56       | 1783       |
| 2002 | 123              | 863        | 71       | 1994       |
| 2003 | 179              | 1108       | 71       | 2185       |
| 2004 | 196              | 1370       | 98       | 3460       |
| 2005 | 192              | 923        | 84       | 2647       |
| 2006 | 191              | 721        | 73       | 2323       |
| 2007 | 190              | 781        | 73       | 3095       |
| 2008 | 336              | 1141       | 72       | 2672       |
| 2009 | 399              | 1245       | 54       | 1872       |
| 2010 | 400              | 1303       | 60       | 1849       |
| 2011 | 236              | 1159       | 48       | 1782       |
| 2012 | 209              | 1135       | 42       | 1712       |
| 2013 | 216              | 1206       | 53       | 2322       |
| 2014 | 253              | 1477       | 41       | 1654       |
| 2015 | 230              | 1186       | 54       | 2300       |
| 2016 | 211              | 859        | 44       | 2034       |
| 2017 | 224              | 840        | 55       | 2734       |
| 2018 | 221              | 856        | 44       | 1594       |
| 2019 | 204              | 813        | 78       | 2889       |
| 2020 | 220              | 983        | 53       | 1703       |
| 2021 | 145              | 541        | 68       | 2348       |
| 2022 | 147              | 522        | 46       | 1393       |
| 2023 | 75               | 299        | 48       | 1597       |
| Sum  | 5807             | 33556      | 1636     | 57759      |

**Note:** Year lists the year a document is from, Press Statement and Paragraphs the number of press statement and the number of paragraphs in these press statements by the Federal Reserve System in the given year. Speeches lists the number of speeches and Paragraphs the number of paragraphs in these speeches. Note that 1996 has relatively few documents since the archive starts recording late in the year. For 2023 documents are few because they were scraped in August.

## Robustness of the Scoring from Section 3.4

First, Table 4 checks robustness depending on number of compared topics.

Table 4: Robustness: Score depending on Number of most Similar Topics

| Topic              | Nr. of Similar Topics |      |       |       |       |
|--------------------|-----------------------|------|-------|-------|-------|
|                    | 5                     | 25   | 100   | 250   | 618   |
| Maximum Employment | 747                   | 1860 | 5101  | 11688 | 20948 |
| Price Stability    | 1220                  | 4232 | 10601 | 20178 | 32945 |
| Inequality         | 348                   | 1167 | 5278  | 10296 | 21415 |
| Climate Change     | 699                   | 1810 | 6995  | 12792 | 22799 |
| Dummy Topic        | 255                   | 1430 | 4748  | 10758 | 22954 |

**Note:** Topic lists the topic area that is being scored. The following columns list scores depending on the number of compared topics.

Now I will explain a different score calculation and display results for. The results are displayed in Table 5. The difference between this and the score from Section 3.4 is the use of the probability matrix. The probability matrix ( $P_t^i$ ) contains a probability of a document (i) belonging to a certain cluster, in our specification topic (t). I then weigh this matrix by the previously calculated vector ( $w_t^m$ ) and sum all probabilities in the multiplied matrix to receive a score on how much these key terms and similar narratives are used.

In other words, each documents probability of belonging to a topic is weighted by the similarity of that topic to key terms of an area of communication. The result is a document-specific relevance-likelihood score of being connected to key terms. In mathematical notation, the score is calculated as follows:

$$w_t^m = \frac{1}{k} \sum_k s_{k,t}^m \quad (3)$$

$$score_m = \sum_t \sum_i w_t^m * P_t^i \quad (4)$$

Table 5: Robustness: Probabilities Score (Equation 4) depending on Number of most Similar Topics

| Topic              | Nr. of Similar Topics |      |      |       |       |
|--------------------|-----------------------|------|------|-------|-------|
|                    | 5                     | 25   | 100  | 250   | 618   |
| Maximum Employment | 304                   | 1033 | 3100 | 6880  | 13336 |
| Price Stability    | 406                   | 1715 | 5271 | 10956 | 20587 |
| Inequality         | 247                   | 902  | 3137 | 6612  | 13848 |
| Climate Change     | 279                   | 1059 | 3668 | 7537  | 14502 |
| Dummy              | 208                   | 902  | 3126 | 7075  | 14934 |

**Note:** Topic lists the topic area that is being scored. The following columns list the probabilities scores (Equation 4) depending on the number of compared topics.

Table 6: Topics from model with minimum topic size of 100

| Topic Nr               | Count | Top Words by c-TF-IDF (excl. Stopwords)       |
|------------------------|-------|-----------------------------------------------|
| 0                      | 4752  | proposal, approval, board, company            |
| 1                      | 2224  | productivity, equipment, growth, investment   |
| 2                      | 2066  | basel, capital, ii, risk                      |
| 3                      | 2053  | thank, conference, economics, diversity       |
| 4                      | 1518  | stress, capital, tests, test                  |
| 5                      | 1789  | payments, payment, check, electronic          |
| 6                      | 2352  | small, community, businesses, business        |
| 7                      | 2199  | rule, final, comptroller, office              |
| 8                      | 1684  | speech, delivered, conference, sponsored      |
| 9                      | 1050  | order, issuance, penalty, civil               |
| 10                     | 1612  | labor, unemployment, participation, force     |
| 11                     | 1487  | text, return, see, 2015                       |
| 12                     | 2079  | rate, funds, fomc, neutral                    |
| 13                     | 1221  | housing, house, homes, home                   |
| 14                     | 768   | inquiries, media, call                        |
| 15                     | 828   | register, comments, publication, days         |
| 16                     | 1589  | exchange, economies, countries, flows         |
| 17                     | 655   | relating, attached, action, order             |
| 18                     | 809   | cra, community, communities, development      |
| 19                     | 880   | derivatives, clearing, hedge, ccps            |
| 20                     | 781   | internal, audit, controls, governance         |
| 21                     | 1131  | inflation, core, pce, energy                  |
| 22                     | 1326  | growth, spending, expansion, year             |
| 23                     | 637   | education, college, skills, students          |
| 24                     | 669   | president, executive, chief, officer          |
| 25                     | 747   | dated, agreement, written, terminated         |
| 26                     | 501   | digital, cbdc, stablecoins, ledger            |
| 27                     | 495   | chair, renamed, chief, executive              |
| 28                     | 626   | execution, written, agreement, registered     |
| 29                     | 1304  | liquidity, window, discount, facilities       |
| 30                     | 1550  | spreads, corporate, debt, markets             |
| 31                     | 1442  | supervision, umbrella, supervisor, functional |
| 32                     | 527   | oil, energy, gas, prices                      |
| 33                     | 628   | necessarily, views, represent, remarks        |
| 34                     | 758   | families, wealth, income, households          |
| 35                     | 589   | copy, submission, attached, written           |
| 36                     | 640   | fiscal, budget, spending, tax                 |
| Continued on next page |       |                                               |

**Table 6 – continued from previous page**

| <b>Topic Nr</b>        | <b>Count</b> | <b>Top Words by c-TF-IDF (excl. Stopwords)</b>     |
|------------------------|--------------|----------------------------------------------------|
| 37                     | 817          | account, deficit, current, saving                  |
| 38                     | 896          | mortgage, borrowers, loan, consumers               |
| 39                     | 432          | kelley, greenspan, meyer, voting                   |
| 40                     | 578          | exports, economies, trade, china                   |
| 41                     | 1223         | pp, vol, journal, economic                         |
| 42                     | 441          | y2k, year, readiness                               |
| 43                     | 519          | education, literacy, financial, students           |
| 44                     | 512          | social, security, retirement, benefits             |
| 45                     | 999          | pp, monetary, vol, journal                         |
| 46                     | 400          | targeting, inflation, mishkin, frederic            |
| 47                     | 773          | independence, transparency, central, accountabi... |
| 48                     | 758          | development, community, neighborhoods, communities |
| 49                     | 552          | subprime, mortgage, mortgages, delinquencies       |
| 50                     | 390          | member, chairman, dr, oath                         |
| 51                     | 431          | resolution, plans, plan, agencies                  |
| 52                     | 796          | sheet, reserves, balance, securities               |
| 53                     | 584          | trade, globalization, barriers, free               |
| 54                     | 554          | targeting, inflation, inflation targeting, central |
| 55                     | 896          | resolution, too big to fail, firm, firms           |
| 56                     | 387          | search, enforcement, actions, reserve              |
| 57                     | 406          | director, division, university, board              |
| 58                     | 489          | shadow, liquidity, funding, banking                |
| 59                     | 263          | climate, climate related, risks, change            |
| 60                     | 340          | currency, counterfeiting, notes, note              |
| 61                     | 680          | enforcement, termination, announced, listed        |
| 62                     | 490          | council, cac, mr, advisory                         |
| 63                     | 495          | vice, president, respectively, presidents          |
| 64                     | 249          | snc, classified, credits, commitments              |
| 65                     | 453          | hmnda, data, mortgage, lending                     |
| 66                     | 1536         | risk, management, supervisors, riskmanagement      |
| 67                     | 406          | secrecy, privacy, fincen, laundering               |
| 68                     | 334          | cra, performance, convenience, record              |
| 69                     | 373          | soviet, rights, capitalism, law                    |
| 70                     | 390          | ranking, data, june                                |
| 71                     | 593          | labor, productivity, inflation, costs              |
| 72                     | 287          | gold, depression, standard, schwartz               |
| 73                     | 603          | disclosure, accounting, disclosures, information   |
| 74                     | 704          | term, facility, tdf, deposit                       |
| Continued on next page |              |                                                    |



**Table 6 – continued from previous page**

| <b>Topic Nr</b>        | <b>Count</b> | <b>Top Words by c-TF-IDF (excl. Stopwords)</b>     |
|------------------------|--------------|----------------------------------------------------|
| 75                     | 349          | interest, laubach, measuring, natural              |
| 76                     | 414          | affairs, division, governors, messrs               |
| 77                     | 402          | bubbles, bubble, asset, prices                     |
| 78                     | 736          | fomc, meeting, communication, policy               |
| 79                     | 1962         | governors, washington, board, system               |
| 80                     | 270          | import, passthrough, globalization, prices         |
| 81                     | 336          | bulletin, affd, assn, cir                          |
| 82                     | 288          | japan, deflation, japanese, japans                 |
| 83                     | 302          | servicers, foreclosure, borrowers, servicing       |
| 84                     | 325          | pandemic, virus, covid19, coronavirus              |
| 85                     | 358          | taylor, rule, rules, rate                          |
| 86                     | 431          | billion, income, treasury, securities              |
| 87                     | 642          | yield, yields, premium, term                       |
| 88                     | 401          | fsb, vulnerabilities, covid, g20                   |
| 89                     | 878          | minutes, committee, released, meeting              |
| 90                     | 329          | bound, zero, michael, lower                        |
| 91                     | 348          | consumer, spending, sales, motor                   |
| 92                     | 348          | attached, ratified, relating, transactions         |
| 93                     | 187          | consummated, delegated, date, shall                |
| 94                     | 366          | swap, dollar, central, liquidity                   |
| 95                     | 277          | immediately, discount, approved, directors         |
| 96                     | 176          | talf, abs, loans, assetbacked                      |
| 97                     | 203          | gses, gse, freddie, fannie                         |
| 98                     | 200          | commitments, connection, conditioned, hereby       |
| 99                     | 158          | libor, arrc, contracts, reference                  |
| 100                    | 290          | foreclosure, foreclosures, properties, vacant      |
| 101                    | 243          | comments, affording, expired, filing               |
| 102                    | 223          | phillips, curve, inflation, flatter                |
| 103                    | 172          | persons, presiding, testify, meeting               |
| 104                    | 307          | cre, estate, concentrations, guidance              |
| 105                    | 181          | voting, chairman, dudley, vice                     |
| 106                    | 221          | html, register, notice, pdf                        |
| 107                    | 1128         | inflation, price, stability, stabilizing           |
| 108                    | 254          | lmi, loans, star, examiners                        |
| 109                    | 154          | hoepa, loans, hearings, lending                    |
| 110                    | 350          | listed, enforcement, terminations, wwwfederalre... |
| 111                    | 748          | forecasts, forecast, uncertainty, forecasting      |
| 112                    | 241          | meeting, agreed, next, held                        |
| Continued on next page |              |                                                    |

**Table 6 – continued from previous page**

| <b>Topic Nr</b> | <b>Count</b> | <b>Top Words by c-TF-IDF (excl. Stopwords)</b> |
|-----------------|--------------|------------------------------------------------|
| 113             | 167          | worldwide, 1997, consolidated, reports         |
| 114             | 213          | html, register, kb, notice                     |
| 115             | 157          | indian, native, tribal, country                |
| 116             | 168          | instructed, execute, accordance, authorize     |
| 117             | 303          | insurance, bba, iaia, naic                     |
| 118             | 188          | effective, order, 1998, 1999                   |
| 119             | 213          | m2, m3, nonfinancial, upper                    |
| 120             | 280          | tila, disclosures, respa, disclosure           |
| 121             | 245          | examiners, examinations, examination, onsite   |
| 122             | 511          | members, policy, stance, easing                |
| 123             | 158          | lcr, hqla, liquidity, nsfr                     |
| 124             | 502          | committee, mandate, expects, consistent        |
| 125             | 196          | secretariat, affairs, assistant, ms            |
| 126             | 405          | regulatory, consumer, 2004, 2005               |
| 127             | 343          | text, return, see, note                        |
| 128             | 174          | nairu, unemployment, estimate, shortrun        |
| 129             | 283          | euro, european, currency, union                |

**Note:** Topic lists the output number of the Topic (Not sorted by frequency, due to reassignment of clusters). Frequency lists how many documents are within the respective topic. The third column lists terms that score the highest topic specific c-TF-IDF frequency. Total number of documents is 91355.

**Table 7: Topics from model with minimum topic size of 25**

| <b>Topic Nr</b>        | <b>Count</b> | <b>Top Words by c-TF-IDF (excl. Stopwords)</b> |
|------------------------|--------------|------------------------------------------------|
| 0                      | 1372         | stress, tests, ccar, test                      |
| 1                      | 972          | basel, ii, capital, pillar                     |
| 2                      | 757          | cra, community, reinvestment, communities      |
| 3                      | 814          | text, return, see, 2015                        |
| 4                      | 616          | 2024522955, inquiries, media, call             |
| 5                      | 672          | president, executive, chief, officer           |
| 6                      | 533          | relating, attached, action, order              |
| 7                      | 897          | acquire, approval, inc, company                |
| 8                      | 649          | derivatives, clearing, hedge, ccps             |
| 9                      | 614          | deposits, county, representing, controlling    |
| 10                     | 504          | chair, renamed, chief, executive               |
| 11                     | 589          | education, college, skills, students           |
| 12                     | 509          | dated, terminated, agreement, written          |
| Continued on next page |              |                                                |

**Table 7 – continued from previous page**

| <b>Topic Nr</b>        | <b>Count</b> | <b>Top Words by c-TF-IDF (excl. Stopwords)</b>     |
|------------------------|--------------|----------------------------------------------------|
| 13                     | 456          | oil, gas, energy, crude                            |
| 14                     | 665          | housing, house, homes, construction                |
| 15                     | 507          | pce, core, inflation, cpi                          |
| 16                     | 463          | budget, fiscal, tax, deficits                      |
| 17                     | 416          | targeting, princeton, pp, mishkin                  |
| 18                     | 473          | independence, transparency, central, accountabi... |
| 19                     | 722          | gdp, recovery, quarter, growth                     |
| 20                     | 405          | education, literacy, students, personal            |
| 21                     | 391          | execution, written, agreement, registered          |
| 22                     | 353          | 2000, y2k, readiness, year                         |
| 23                     | 505          | resolution, toobigtofail, firm, firms              |
| 24                     | 376          | you, your, my, economics                           |
| 25                     | 327          | laubach, natural, interest, williams               |
| 26                     | 323          | director, division, he, university                 |
| 27                     | 321          | search, enforcement, actions, reserve              |
| 28                     | 452          | deficit, account, saving, current                  |
| 29                     | 511          | sheet, reserves, balance, balances                 |
| 30                     | 426          | electronic, payment, payments, cards               |
| 31                     | 413          | subprime, mortgages, mortgage, borrowers           |
| 32                     | 273          | climate, climaterelated, change, risks             |
| 33                     | 403          | vice, presidents, respectively, president          |
| 34                     | 462          | liquidity, facilities, emergency, funding          |
| 35                     | 747          | productivity, growth, per, output                  |
| 36                     | 272          | oath, dr, chairman, his                            |
| 37                     | 435          | trade, globalization, barriers, free               |
| 38                     | 977          | funds, fomc, target, rate                          |
| 39                     | 265          | copy, attached, written, agreement                 |
| 40                     | 388          | fomc, meetings, presidents, communication          |
| 41                     | 361          | targeting, inflationtargeting, inflation, target   |
| 42                     | 376          | spreads, corporate, bonds, bond                    |
| 43                     | 252          | gold, depression, standard, schwartz               |
| 44                     | 239          | snc, classified, credits, commitments              |
| 45                     | 660          | unemployment, labor, job, jobs                     |
| 46                     | 468          | delivered, speech, symposium, hole                 |
| 47                     | 289          | resolution, plans, plan, agencies                  |
| 48                     | 217          | voting, kelley, meyer, rivlin                      |
| 49                     | 269          | social, security, retirement, medicare             |
| 50                     | 254          | equipment, nonresidential, spending, construction  |
| Continued on next page |              |                                                    |

**Table 7 – continued from previous page**

| <b>Topic Nr</b>        | <b>Count</b> | <b>Top Words by c-TF-IDF (excl. Stopwords)</b>     |
|------------------------|--------------|----------------------------------------------------|
| 51                     | 270          | cra, performance, record, convenience              |
| 52                     | 501          | small, businesses, business, owners                |
| 53                     | 258          | check, checks, electronic, processing              |
| 54                     | 597          | supervision, regulation, supervisory, regulatory   |
| 55                     | 239          | phillips, curve, inflation, flatter                |
| 56                     | 264          | nontraditional, mortgage, borrowers, mortgages     |
| 57                     | 813          | management, risk, supervisors, riskmanagement      |
| 58                     | 379          | development, neighborhood, community, neighborh... |
| 59                     | 800          | governors, washington, system, discussion          |
| 60                     | 194          | servicers, foreclosure, servicing, borrowers       |
| 61                     | 197          | billion, totaled, income, treasury                 |
| 62                     | 228          | swap, dollar, arrangements, swiss                  |
| 63                     | 224          | bubbles, bubble, asset, speculative                |
| 64                     | 252          | umbrella, functional, supervisor, holding          |
| 65                     | 249          | establish, representative, approval, application   |
| 66                     | 423          | yield, yields, longterm, premium                   |
| 67                     | 226          | japan, japanese, deflation, japans                 |
| 68                     | 299          | china, economies, emerging, chinas                 |
| 69                     | 413          | expectations, inflation, anchored, measures        |
| 70                     | 568          | crisis, crises, financial, global                  |
| 71                     | 247          | pandemic, virus, covid19, covid                    |
| 72                     | 216          | expansion, forecast, anticipated, members          |
| 73                     | 221          | fsb, covid, fsbs, g20                              |
| 74                     | 160          | talf, abs, assetbacked, cmbs                       |
| 75                     | 219          | disclosures, tila, respa, truth                    |
| 76                     | 199          | shadow, banking, system, regulated                 |
| 77                     | 250          | taylor, rule, output, rate                         |
| 78                     | 335          | technologies, productivity, technological, tech... |
| 79                     | 158          | decreasing, discount, directors, approved          |
| 80                     | 159          | libor, arrc, contracts, reference                  |
| 81                     | 397          | community, local, banks, customers                 |
| 82                     | 285          | disclosure, disclosures, discipline, accounting    |
| 83                     | 200          | cre, estate, concentrations, commercial            |
| 84                     | 154          | voting, chairman, dudley, william                  |
| 85                     | 238          | internal, audit, controls, auditors                |
| 86                     | 195          | bulletin, 82, 81, 83                               |
| 87                     | 205          | lmi, examiners, loans, star                        |
| 88                     | 189          | insurance, bba, iais, naic                         |
| Continued on next page |              |                                                    |

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| <b>Topic Nr</b>        | <b>Count</b> | <b>Top Words by c-TF-IDF (excl. Stopwords)</b>     |
|------------------------|--------------|----------------------------------------------------|
| 89                     | 249          | exports, foreign, demand, imports                  |
| 90                     | 256          | affairs, division, divisions, messrs               |
| 91                     | 189          | gses, gse, freddie, fannie                         |
| 92                     | 273          | latin, asian, economies, asia                      |
| 93                     | 143          | m2, m3, nonfinancial, aggregates                   |
| 94                     | 211          | publication, days, register, 60                    |
| 95                     | 396          | monetary, policy, stability, macroeconomic         |
| 96                     | 151          | hoepa, hearings, loans, lending                    |
| 97                     | 259          | members, easing, stance, tightening                |
| 98                     | 177          | effective, register, rule, final                   |
| 99                     | 196          | examiners, examinations, examination, onsite       |
| 100                    | 394          | liquidity, funding, wholesale, shortterm           |
| 101                    | 237          | euro, european, currency, europe                   |
| 102                    | 542          | central, macroprudential, stability, tools         |
| 103                    | 129          | assistance, preparing, andrew, thank               |
| 104                    | 258          | debt, household, households, income                |
| 105                    | 166          | soviet, capitalism, rights, property               |
| 106                    | 129          | crypto, cryptoasset, cryptoassets, cryptoassetr... |
| 107                    | 194          | site, web, website, statistical                    |
| 108                    | 179          | necessarily, views, own, my                        |
| 109                    | 325          | flows, countries, capital, developing              |
| 110                    | 154          | secrecy, fincen, laundering, bsaaml                |
| 111                    | 180          | women, men, womens, mothers                        |
| 112                    | 215          | hmnda, data, mortgage, lending                     |
| 113                    | 269          | capital, accord, basle, internal                   |
| 114                    | 128          | grateful, represent, preparing, assistance         |
| 115                    | 149          | managerial, resources, notificant, undue           |
| 116                    | 142          | fednow, service, instant, payment                  |
| 117                    | 125          | indian, native, tribal, indigenous                 |
| 118                    | 193          | bankers, association, dc, annual                   |
| 119                    | 152          | glb, grammleachbliley, merchant, fhcs              |
| 120                    | 170          | foreclosures, foreclosure, properties, vacant      |
| 121                    | 132          | volcker, 619, proprietary, rule                    |
| 122                    | 141          | dc, association, washington, webcast               |
| 123                    | 139          | allegations, consented, admitting, alleged         |
| 124                    | 257          | projections, forecast, sep, fomc                   |
| 125                    | 326          | labor, costs, pressures, increases                 |
| 126                    | 141          | fx, unsafe, barclays, unsound                      |
| Continued on next page |              |                                                    |

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| <b>Topic Nr</b>        | <b>Count</b> | <b>Top Words by c-TF-IDF (excl. Stopwords)</b>     |
|------------------------|--------------|----------------------------------------------------|
| 127                    | 115          | consummated, delegated, fifteenth, date            |
| 128                    | 211          | committee, seeks, mandate, foster                  |
| 129                    | 137          | note, bill, redesigned, notes                      |
| 130                    | 141          | dealing, bankineligible, underwriting, 20          |
| 131                    | 236          | safety, net, subsidy, moral                        |
| 132                    | 110          | 1200, 1997, notification, posted                   |
| 133                    | 198          | compliance, compliancerisk, enterprisewide, org... |
| 134                    | 142          | html, register, notice, pdf                        |
| 135                    | 216          | vulnerabilities, systemic, interconnectedness, ... |
| 136                    | 171          | discount, window, primary, stigma                  |
| 137                    | 166          | mergers, local, concentration, charters            |
| 138                    | 251          | thank, you, your, look                             |
| 139                    | 113          | commitments, connection, conditioned, hereby       |
| 140                    | 162          | desist, cease, consent, order                      |
| 141                    | 174          | task, force, faster, payment                       |
| 142                    | 148          | nairu, unemployment, shortrun, estimate            |
| 143                    | 215          | families, wealth, income, median                   |
| 144                    | 116          | text, return, see, eg                              |
| 145                    | 253          | guidance, forward, fomc, explicit                  |
| 146                    | 123          | cbdc, digital, cbdcs, payments                     |
| 147                    | 114          | shall, currency, arrangements, foreign             |
| 148                    | 128          | released, minutes, wednesday, held                 |
| 149                    | 111          | bound, zero, gauti, eggertsson                     |
| 150                    | 237          | release, press, statement, fomc                    |
| 151                    | 107          | bancshares, dated, terminated, agreement           |
| 152                    | 101          | emes, eme, flows, inflows                          |
| 153                    | 120          | 1998, reservable, liabilities, 30                  |
| 154                    | 254          | energy, prices, oil, inflation                     |
| 155                    | 102          | votes, mcdonough, messrs, gramlich                 |
| 156                    | 210          | host, foreign, cooperation, supervisors            |
| 157                    | 197          | repo, money, triparty, funds                       |
| 158                    | 154          | vol, pp, journal, minsky                           |
| 159                    | 97           | termination, listed, thursday, enforcement         |
| 160                    | 137          | necessarily, views, my, colleagues                 |
| 161                    | 144          | payments, study, noncash, card                     |
| 162                    | 327          | technology, products, services, innovation         |
| 163                    | 141          | imf, crises, countries, international              |
| 164                    | 199          | consummation, proposal, relevant, concludes        |
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| <b>Topic Nr</b>        | <b>Count</b> | <b>Top Words by c-TF-IDF (excl. Stopwords)</b>     |
|------------------------|--------------|----------------------------------------------------|
| 165                    | 94           | html, minutes, open, pdf                           |
| 166                    | 222          | neutral, rate, funds, estimates                    |
| 167                    | 93           | auction, taf, auctions, facility                   |
| 168                    | 98           | ccyb, countercyclical, buffer, buffers             |
| 169                    | 177          | comptroller, office, commission, currency          |
| 170                    | 106          | georgia, registered, execution, bancshares         |
| 171                    | 134          | milton, friedman, friedmans, 1968                  |
| 172                    | 117          | nonfarm, payroll, employment, manufacturing        |
| 173                    | 204          | managerial, resources, facts, prospects            |
| 174                    | 129          | sustainable, downside, attainment, foreseeable     |
| 175                    | 139          | comments, affording, expired, filing               |
| 176                    | 118          | surcharge, surcharges, gsib, systemic              |
| 177                    | 88           | daylight, intraday, psr, overdrafts                |
| 178                    | 150          | forecasts, chip, blue, gdp                         |
| 179                    | 137          | compensation, incentive, employees, incentives     |
| 180                    | 106          | retirement, 401k, plans, workers                   |
| 181                    | 109          | agreed, meeting, held, next                        |
| 182                    | 93           | intermeeting, yields, indexes, period              |
| 183                    | 89           | passthrough, import, exchange, prices              |
| 184                    | 147          | tier, bhcs, holding, companies                     |
| 185                    | 256          | san, francisco, boston, conference                 |
| 186                    | 108          | awarded, mature, settle, stopout                   |
| 187                    | 85           | 2257, 22525c, commitments, evasion                 |
| 188                    | 94           | appraisal, appraisals, threshold, higherpriced     |
| 189                    | 96           | issuance, penalty, civil, consent                  |
| 190                    | 110          | desist, dated, terminated, cease                   |
| 191                    | 135          | accounting, iasb, standards, trustees              |
| 192                    | 106          | iai, mutual, distributor, funds                    |
| 193                    | 100          | hearing, commenters, commenter, record             |
| 194                    | 96           | reviewed, suggested, had, remained                 |
| 195                    | 95           | ai, machine, artificial, intelligence              |
| 196                    | 244          | my, views, outlook, discuss                        |
| 197                    | 85           | 900, offices, dc, tuesday                          |
| 198                    | 245          | comptroller, office, currency, corporation         |
| 199                    | 99           | counterfeiting, currency, counterfeiters, count... |
| 200                    | 82           | termination, listed, tuesday, enforcement          |
| 201                    | 157          | dollar, currencies, yen, tradeweighted             |
| 202                    | 79           | meetings, released, tuesday, minutes               |
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| <b>Topic Nr</b>        | <b>Count</b> | <b>Top Words by c-TF-IDF (excl. Stopwords)</b>     |
|------------------------|--------------|----------------------------------------------------|
| 203                    | 280          | interim, final, rule, rules                        |
| 204                    | 90           | submission, bids, opening, bid                     |
| 205                    | 90           | discount, minutes, released, tuesday               |
| 206                    | 408          | maximum, mandate, employment, dual                 |
| 207                    | 122          | 10000, rounded, awards, rounding                   |
| 208                    | 97           | allowance, accounting, cecl, losses                |
| 209                    | 207          | imf, fund, international, washington               |
| 210                    | 164          | listens, fed, events, review                       |
| 211                    | 163          | nonbank, nonbanks, intermediation, banks           |
| 212                    | 202          | cambridge, mass, nber, bureau                      |
| 213                    | 129          | home, refinancing, equity, extraction              |
| 214                    | 215          | lending, loan, credit, loans                       |
| 215                    | 107          | outweigh, incident, 4c8, proper                    |
| 216                    | 85           | html, kb, register, notice                         |
| 217                    | 191          | securitization, mortgages, originators, mortgage   |
| 218                    | 138          | deposits, margins, interest, deposit               |
| 219                    | 79           | 2024522955, inquiries, media, call                 |
| 220                    | 119          | facility, paper, cpff, commercial                  |
| 221                    | 134          | privacy, customer, notices, information            |
| 222                    | 157          | manufacturing, production, industrial, capacity    |
| 223                    | 94           | debit, interchange, card, issuers                  |
| 224                    | 86           | ledger, distributed, technology, ledgers           |
| 225                    | 97           | hhi, postmerger, 1800, justice                     |
| 226                    | 95           | imports, quarter, exports, goods                   |
| 227                    | 75           | inventoriesales, inventories, stocks, ratio        |
| 228                    | 89           | bulletin, thrift, 743, calculations                |
| 229                    | 96           | assetsize, exemption, cutoff, nonexempt            |
| 230                    | 114          | diversity, profession, economics, inclusion        |
| 231                    | 101          | ach, fedwire, sameday, posting                     |
| 232                    | 243          | consumers, card, disclosures, credit               |
| 233                    | 95           | prohibition, former, issuance, institutionaffil... |
| 234                    | 170          | spending, consumer, household, sales               |
| 235                    | 121          | fdic, deposit, insurance, corporation              |
| 236                    | 123          | homeownership, home, ownership, housing            |
| 237                    | 115          | england, london, central, tercentenary             |
| 238                    | 109          | rating, ratings, composite, camels                 |
| 239                    | 72           | gsibs, gsib, tlac, surcharge                       |
| 240                    | 73           | presiding, persons, testify, facsimile             |
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| <b>Topic Nr</b>        | <b>Count</b> | <b>Top Words by c-TF-IDF (excl. Stopwords)</b>                                                                                    |
|------------------------|--------------|-----------------------------------------------------------------------------------------------------------------------------------|
| 241                    | 162          | range, target, committee, funds                                                                                                   |
| 242                    | 73           | twelve, producer, ended, hourly                                                                                                   |
| 243                    | 144          | minutes, ordinarily, descriptions, scheduled                                                                                      |
| 244                    | 125          | strategy, longerrun, goals, statement                                                                                             |
| 245                    | 97           | network, networks, atm, honor                                                                                                     |
| 246                    | 162          | leveraged, leverage, clos, investors                                                                                              |
| 247                    | 115          | jobs, outsourcing, trade, abroad                                                                                                  |
| 248                    | 172          | wages, wage, productivity, nominal                                                                                                |
| 249                    | 69           | listed, execution, thursday, enforcement                                                                                          |
| 250                    | 140          | flexibility, imbalances, flexible, decades                                                                                        |
| 251                    | 91           | turned, intermeeting, discussion, ahead                                                                                           |
| 252                    | 71           | <a href="http://www.federalreserve.gov/monetarypolicy/fomccalen...">http://www.federalreserve.gov/monetarypolicy/fomccalen...</a> |
| 253                    | 130          | rural, population, areas, west                                                                                                    |
| 254                    | 238          | journal, vol, pp, levine                                                                                                          |
| 255                    | 159          | bankers, community, banker, you                                                                                                   |
| 256                    | 140          | civil, penalty, assessment, money                                                                                                 |
| 257                    | 65           | listed, terminations, enforcement, <a href="http://www.federalre...">www.federalre...</a>                                         |
| 258                    | 202          | comment, requested, invited, proposed                                                                                             |
| 259                    | 245          | purchases, mbs, securities, treasury                                                                                              |
| 260                    | 129          | commodity, commodities, prices, futures                                                                                           |
| 261                    | 83           | tuesday, execution, enforcement, following                                                                                        |
| 262                    | 77           | cdfis, cdfi, development, community                                                                                               |
| 263                    | 72           | secretariat, assistant, ms, affairs                                                                                               |
| 264                    | 130          | 2001, announcements, consumer, regulatory                                                                                         |
| 265                    | 90           | mobile, phones, phone, smartphone                                                                                                 |
| 266                    | 227          | saving, save, retirement, personal                                                                                                |
| 267                    | 75           | remitted, mitigation, civil, penalty                                                                                              |
| 268                    | 276          | conference, kansas, city, st                                                                                                      |
| 269                    | 93           | pandemic, prepandemic, labor, job                                                                                                 |
| 270                    | 182          | consolidation, mergers, interstate, banking                                                                                       |
| 271                    | 65           | lindsey, associate, messrs, stockton                                                                                              |
| 272                    | 163          | leverage, ratio, supplementary, riskbased                                                                                         |
| 273                    | 114          | tarullo, daniel, delivered, speech                                                                                                |
| 274                    | 192          | fiscal, policy, policies, monetary                                                                                                |
| 275                    | 73           | teams, finals, college, challenge                                                                                                 |
| 276                    | 91           | brochure, copies, mail, 20551                                                                                                     |
| 277                    | 92           | inventory, inventories, sales, accumulation                                                                                       |
| 278                    | 72           | corrective, prompt, directive, action                                                                                             |
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| <b>Topic Nr</b>        | <b>Count</b> | <b>Top Words by c-TF-IDF (excl. Stopwords)</b>                                                                       |
|------------------------|--------------|----------------------------------------------------------------------------------------------------------------------|
| 279                    | 100          | auction, 28day, conducted, facility                                                                                  |
| 280                    | 121          | investment, hightech, equipment, capital                                                                             |
| 281                    | 70           | finances, kennickell, moore, survey                                                                                  |
| 282                    | 222          | community, development, communities, affairs                                                                         |
| 283                    | 70           | reporting, requirements, encounter, hakkio                                                                           |
| 284                    | 83           | affected, prudent, modifications, constructively                                                                     |
| 285                    | 62           | qis4, ii, basel, results                                                                                             |
| 286                    | 115          | his, said, yellen, chair                                                                                             |
| 287                    | 157          | thank, pleasure, you, join                                                                                           |
| 288                    | 150          | consolidated, worldwide, supervision, country                                                                        |
| 289                    | 84           | amendments, cc, restructuring, appendix                                                                              |
| 290                    | 170          | survey, norc, payroll, surveys                                                                                       |
| 291                    | 88           | nominations, subcommittee, chairman, feasible                                                                        |
| 292                    | 79           | subordinated, debt, discipline, holders                                                                              |
| 293                    | 166          | reform, agenda, regulatory, reforms                                                                                  |
| 294                    | 74           | thirdparty, diligence, relationships, fintech                                                                        |
| 295                    | 82           | fcra, reporting, fair, creditors                                                                                     |
| 296                    | 77           | lsaps, lsap, premium, treasury                                                                                       |
| 297                    | 133          | import, globalization, prices, domestic                                                                              |
| 298                    | 223          | exchange, fixed, rates, floating                                                                                     |
| 299                    | 73           | electronic, ebt, transfer, transfers                                                                                 |
| 300                    | 122          | basel, supervision, switzerland, committee                                                                           |
| 301                    | 165          | 2005, regulatory, consumer, banking                                                                                  |
| 302                    | 76           | sales, vehicles, spending, motor                                                                                     |
| 303                    | 70           | overdraft, fees, consumers, overdrafts                                                                               |
| 304                    | 134          | money, velocity, aggregates, m2                                                                                      |
| 305                    | 77           | stablecoins, stablecoin, digital, payment                                                                            |
| 306                    | 68           | ipac, threeyear, terms, members                                                                                      |
| 307                    | 71           | monopoly, lessen, outweighed, proposal                                                                               |
| 308                    | 68           | lowinflation, 93666, amherst, gamble                                                                                 |
| 309                    | 70           | fintech, aggregators, developers, data                                                                               |
| 310                    | 84           | termination, listed, enforcement, below                                                                              |
| 311                    | 103          | macroeconomics, vol, pp, journal                                                                                     |
| 312                    | 141          | community, profitability, assets, banks                                                                              |
| 313                    | 117          | website, <a href="https://www.federalreserve.gov/monetarypolicy/">https://www.federalreserve.gov/monetarypolicy/</a> |
| 314                    | 88           | affected, hurricane, publishing, facilities                                                                          |
| 315                    | 105          | 30, june, 1997, 1996                                                                                                 |
| 316                    | 87           | notes, free, specie, 1863                                                                                            |
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| <b>Topic Nr</b>        | <b>Count</b> | <b>Top Words by c-TF-IDF (excl. Stopwords)</b>    |
|------------------------|--------------|---------------------------------------------------|
| 317                    | 127          | administration, union, comptroller, office        |
| 318                    | 144          | community, burden, regulations, regulatory        |
| 319                    | 82           | minutes, addendum, projections, presidents        |
| 320                    | 131          | fair, value, accounting, fasb                     |
| 321                    | 93           | stearns, lehman, bear, aig                        |
| 322                    | 118          | operates, owns, shares, engages                   |
| 323                    | 78           | instructed, execute, authorize, accordance        |
| 324                    | 76           | rd, property, intellectual, rights                |
| 325                    | 88           | discrimination, racial, higherpriced, disparities |
| 326                    | 88           | wage, hourly, compensation, eci                   |
| 327                    | 174          | rules, simple, prescriptions, rule                |
| 328                    | 100          | mutual, institutional, shareholder, activism      |
| 329                    | 73           | ppp, paycheck, ppplf, protection                  |
| 330                    | 85           | adults, wellbeing, okay, financially              |
| 331                    | 128          | 1970s, 1960s, inflation, volcker                  |
| 332                    | 57           | bulletin, 155, bayerische, vereinsbank            |
| 333                    | 192          | governance, corporate, management, controls       |
| 334                    | 58           | independence, cukierman, alex, summers            |
| 335                    | 57           | checks, appendix, routing, office                 |
| 336                    | 59           | tdf, term, operation, familiarity                 |
| 337                    | 116          | institute, peterson, economics, stanford          |
| 338                    | 77           | starts, sales, singlefamily, homes                |
| 339                    | 53           | racial, cajner, radler, vidangos                  |
| 340                    | 92           | foia, commentary, revisions, regulation           |
| 341                    | 56           | begins, computation, maintenance, tranche         |
| 342                    | 112          | alan, senate, greenspan, urban                    |
| 343                    | 142          | spillovers, economies, foreign, global            |
| 344                    | 160          | bureau, statistics, bls, labor                    |
| 345                    | 63           | met, remains, received, household                 |
| 346                    | 77           | comment, extended, period, friday                 |
| 347                    | 109          | inflation, persistently, averages, longerrun      |
| 348                    | 80           | deflation, nominal, zero, inflation               |
| 349                    | 70           | officers, executive, affiliate, insiders          |
| 350                    | 61           | flood, answers, insurance, questions              |
| 351                    | 77           | predatory, lending, borrowers, lenders            |
| 352                    | 63           | hearing, hearings, openmike, oral                 |
| 353                    | 51           | listed, execution, tuesday, enforcement           |
| 354                    | 157          | capital, requirements, minimum, regulatory        |
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| <b>Topic Nr</b>        | <b>Count</b> | <b>Top Words by c-TF-IDF (excl. Stopwords)</b>     |
|------------------------|--------------|----------------------------------------------------|
| 355                    | 56           | redundancies, hours, realtime, materials           |
| 356                    | 107          | fintech, innovation, partnerships, community       |
| 357                    | 53           | attached, relating, order, boards                  |
| 358                    | 74           | ranking, 31, asset, data                           |
| 359                    | 71           | million, transaction, assessed, accounts           |
| 360                    | 64           | erm, enterprisewide, coso, management              |
| 361                    | 54           | governors, see, 2019b, text                        |
| 362                    | 160          | chicago, ed, press, university                     |
| 363                    | 51           | comments, affording, expired, notice               |
| 364                    | 163          | volatility, premiums, premium, equity              |
| 365                    | 54           | aig, aigs, facility, preferred                     |
| 366                    | 93           | workers, displaced, lowwage, autor                 |
| 367                    | 65           | doddfrank, systemic, wall, reform                  |
| 368                    | 84           | leasing, cpiw, truth, thresholds                   |
| 369                    | 81           | agreements, repurchase, paragraph, dealers         |
| 370                    | 48           | execution, thursday, enforcement, following        |
| 371                    | 158          | treasury, trading, trace, department               |
| 372                    | 85           | branch, district, processing, head                 |
| 373                    | 88           | census, bureau, population, survey                 |
| 374                    | 111          | settlements, bis, switzerland, international       |
| 375                    | 47           | mr, secretary, economist, counsel                  |
| 376                    | 63           | 1999, effective, order, governors9                 |
| 377                    | 57           | cyber, cybersecurity, attacks, ransomware          |
| 378                    | 137          | forecasting, model, models, forecast               |
| 379                    | 110          | 2004, regulatory, consumer, banking                |
| 380                    | 141          | register, notice, attached, published              |
| 381                    | 78           | directors, appoints, designates, appointees        |
| 382                    | 71           | largescale, damico, gagnon, remache                |
| 383                    | 88           | small, businesses, business, microenterprise       |
| 384                    | 51           | consummated, delegated, acting, pursuant           |
| 385                    | 69           | small, businesses, jobs, business                  |
| 386                    | 71           | statistical, statistics, data, agencies            |
| 387                    | 46           | psaf, priced, imputed, privatesector               |
| 388                    | 78           | ettin, statistics, division, mr                    |
| 389                    | 49           | rightleft, arrows, forwards, video                 |
| 390                    | 45           | httpswwwfederalreserveorgarrowarrowwebhomedo, t... |
| 391                    | 48           | shall, clearances, authorization, open             |
| 392                    | 48           | caption, enterreturn, onoff, buttons               |
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| <b>Topic Nr</b>        | <b>Count</b> | <b>Top Words by c-TF-IDF (excl. Stopwords)</b>     |
|------------------------|--------------|----------------------------------------------------|
| 393                    | 105          | panic, 1913, panics, 1907                          |
| 394                    | 73           | continuity, businesscontinuity, backup, telecom... |
| 395                    | 48           | 13745, 13742, cra, 54                              |
| 396                    | 76           | elb, makeup, strategies, targeting                 |
| 397                    | 86           | requests, approved, discount, cleveland            |
| 398                    | 65           | contingent, work, gig, workers                     |
| 399                    | 48           | cdiac, councils, advisory, council                 |
| 400                    | 48           | accessing, awards, notificationparticipants, fa... |
| 401                    | 46           | auction, facility, wwwfederalreservegovmonetary... |
| 402                    | 62           | fee, schedules, priced, services                   |
| 403                    | 135          | activities, 4c8, bhc, closely                      |
| 404                    | 52           | license, authority, supplant, parallels            |
| 405                    | 144          | output, gap, potential, orphanides                 |
| 406                    | 48           | surveybased, marketbased, met, measures            |
| 407                    | 51           | awarded, 2014, mature, settle                      |
| 408                    | 63           | novo, de, formation, charter                       |
| 409                    | 50           | projections, summaries, released, table            |
| 410                    | 59           | moritz, schularick, gilchrist, 102                 |
| 411                    | 64           | council, exercise, matters, responsibilities       |
| 412                    | 84           | bias, domestic, home, correlation                  |
| 413                    | 49           | html, register, pdf, notice                        |
| 414                    | 66           | mobility, chetty, raj, hendren                     |
| 415                    | 59           | firststar, lmi, chase, branch                      |
| 416                    | 70           | margin, swap, swaps, noncleared                    |
| 417                    | 81           | servicers, servicing, servicer, modifications      |
| 418                    | 60           | prohibition, consent, former, employee             |
| 419                    | 73           | lcr, nsfr, liquidity, funding                      |
| 420                    | 137          | payments, role, payment, retail                    |
| 421                    | 47           | deems, assurances, waivers, committed              |
| 422                    | 61           | currencies, contracts, foreign, outstanding        |
| 423                    | 84           | unemployment, african, groups, racial              |
| 424                    | 71           | statements, audited, llcs, auditing                |
| 425                    | 166          | comments, comment, proposed, categories            |
| 426                    | 54           | fisher, manager, mr, account                       |
| 427                    | 42           | geographies, nonmetropolitan, middleincome, ffiec  |
| 428                    | 80           | inviting, thoughts, you, thank                     |
| 429                    | 202          | asset, prices, equity, movements                   |
| 430                    | 209          | stability, price, inflation, stabilizing           |
| Continued on next page |              |                                                    |

**Table 7 – continued from previous page**

| <b>Topic Nr</b>        | <b>Count</b> | <b>Top Words by c-TF-IDF (excl. Stopwords)</b>     |
|------------------------|--------------|----------------------------------------------------|
| 431                    | 59           | income, earned, amounted, acquired                 |
| 432                    | 56           | call, cdr, report, ffiec                           |
| 433                    | 68           | technologies, creative, old, schumpeter            |
| 434                    | 47           | happiness, satisfaction, life, wellbeing           |
| 435                    | 44           | tentative, schedule, meeting, open                 |
| 436                    | 48           | loantodeposit, step, ratio, statewide              |
| 437                    | 70           | 3d, interstate, approve, bhc                       |
| 438                    | 79           | reputation, trust, reputations, word               |
| 439                    | 49           | wwwfrbservicesorgcentralbanktermdepositfacility... |
| 440                    | 69           | relating, attached, action, order                  |
| 441                    | 104          | foreclosure, foreclosures, servicers, borrowers    |
| 442                    | 42           | companys, whichever, 1966, principally             |
| 443                    | 86           | modernization, legislation, banking, loopholes     |
| 444                    | 91           | thank, conference, organizers, inviting            |
| 445                    | 69           | notification, 1000, edt, date                      |
| 446                    | 56           | 2270, 63, framework, tetlow                        |
| 447                    | 78           | corporation, inc, mellon, america                  |
| 448                    | 48           | benefitcost, analysis, project, pollution          |
| 449                    | 44           | circulation, newspaper, comments, affording        |
| 450                    | 43           | hqla, lcr, liquid, clf                             |
| 451                    | 45           | 202, deaf, tdd, contact                            |
| 452                    | 106          | zero, nominal, bound, interest                     |
| 453                    | 48           | adjusted, clerical, index, earners                 |
| 454                    | 62           | ranges, fourth, aggregates, tentative              |
| 455                    | 124          | operational, operationalrisk, ama, risk            |
| 456                    | 52           | productivity, stiroh, jorgenson, ho                |
| 457                    | 42           | 22528b1, cfr, 12, 7i                               |
| 458                    | 47           | willis, history, allan, meltzer                    |
| 459                    | 134          | settlement, clearing, clearinghouses, payment      |
| 460                    | 68           | represent, views, necessarily, remarks             |
| 461                    | 44           | governors, agency, courier, protection             |
| 462                    | 72           | unconventional, 2015005, engen, david              |
| 463                    | 37           | text, return, see, wwwverizonenterpriseomdbir2015  |
| 464                    | 63           | option, expensing, grants, options                 |
| 465                    | 53           | execution, actions, following, tuesday             |
| 466                    | 46           | ratified, transactions, unanimous, manager         |
| 467                    | 64           | meetings, released, discount, minutes              |
| 468                    | 102          | cycle, cycles, watson, business                    |
| Continued on next page |              |                                                    |

**Table 7 – continued from previous page**

| <b>Topic Nr</b>        | <b>Count</b> | <b>Top Words by c-TF-IDF (excl. Stopwords)</b>                                                                          |
|------------------------|--------------|-------------------------------------------------------------------------------------------------------------------------|
| 469                    | 46           | revenue, orders, 61, bankineligible                                                                                     |
| 470                    | 63           | contacted, edt, winning, error                                                                                          |
| 471                    | 97           | kb, attachment, pdf, attached                                                                                           |
| 472                    | 44           | assn, nom, affd, cir                                                                                                    |
| 473                    | 144          | participation, force, primeage, labor                                                                                   |
| 474                    | 97           | liquidity, trading, market, markets                                                                                     |
| 475                    | 63           | viewed, minutes, <a href="http://www.federalreserve.gov/moneta...">httpwwwfederalreservegovmoneta...</a>                |
| 476                    | 93           | gertler, jordi, clarida, mark                                                                                           |
| 477                    | 53           | survey, statistical, letter, finances                                                                                   |
| 478                    | 48           | revenues, incidental, ineligible, incidents                                                                             |
| 479                    | 55           | riskless, principal, brokerage, agent                                                                                   |
| 480                    | 79           | inequality, income, wealth, opportunity                                                                                 |
| 481                    | 129          | approving, nonbanking, engage, order                                                                                    |
| 482                    | 62           | inclusion, unbanked, access, accounts                                                                                   |
| 483                    | 73           | pension, liabilities, plans, db                                                                                         |
| 484                    | 66           | tender, description, parameters, operation                                                                              |
| 485                    | 44           | encompassed, shortly, sentence, inclusion                                                                               |
| 486                    | 43           | remittances, immigrants, remittance, immigrant                                                                          |
| 487                    | 39           | winn, assistant, mr, office                                                                                             |
| 488                    | 50           | aaronson, stephanie, wascher, brookings                                                                                 |
| 489                    | 57           | list, stocks, etc, margin                                                                                               |
| 490                    | 39           | oliner, associate, statistics, struckmeyer                                                                              |
| 491                    | 43           | herbert, herb, stein, lecture                                                                                           |
| 492                    | 45           | fees, priced, fedwire, check                                                                                            |
| 493                    | 39           | affiliates, commitments, 1818, application                                                                              |
| 494                    | 50           | searched, enforcement, here, found                                                                                      |
| 495                    | 70           | budget, congressional, cbo, office                                                                                      |
| 496                    | 45           | attended, portion, relating, meeting                                                                                    |
| 497                    | 62           | cac, advisory, council, experts                                                                                         |
| 498                    | 70           | handbook, john, robustness, williams                                                                                    |
| 499                    | 39           | fintech, lael, brainard, stack                                                                                          |
| 500                    | 38           | tradeweighted, currencies, intermeeting, g10                                                                            |
| 501                    | 74           | delivered, speech, warsh, kevin                                                                                         |
| 502                    | 56           | guarantee, applications, guarantees, loan                                                                               |
| 503                    | 84           | structured, investors, products, rating                                                                                 |
| 504                    | 96           | consolidation, study, g10, studys                                                                                       |
| 505                    | 54           | matters, invites, initiated, discussed                                                                                  |
| 506                    | 53           | <a href="http://www.federalreserve.gov/monetarypolicy/tdfhtml">httpwwwfederalreservegovmonetarypolicytdfhtml</a> , n... |
| Continued on next page |              |                                                                                                                         |

**Table 7 – continued from previous page**

| <b>Topic Nr</b>        | <b>Count</b> | <b>Top Words by c-TF-IDF (excl. Stopwords)</b>                                                          |
|------------------------|--------------|---------------------------------------------------------------------------------------------------------|
| 507                    | 49           | minutes, release, press, open                                                                           |
| 508                    | 50           | orphanides, athanasios, williams, 63363                                                                 |
| 509                    | 50           | de, la, el, en                                                                                          |
| 510                    | 52           | associations, savings, context, 30                                                                      |
| 511                    | 37           | covid19, indian, tribal, feir                                                                           |
| 512                    | 145          | journal, vol, pp, dynamics                                                                              |
| 513                    | 82           | normalization, principles, plans, sheet                                                                 |
| 514                    | 61           | council, matters, initiated, invites                                                                    |
| 515                    | 75           | supervisory, guidance, letter, sr                                                                       |
| 516                    | 86           | health, care, healthcare, medical                                                                       |
| 517                    | 110          | brookings, papers, roberts, kiley                                                                       |
| 518                    | 48           | rent, rents, leases, rental                                                                             |
| 519                    | 33           | comptroller, office, advices, oaths                                                                     |
| 520                    | 86           | alternate, messrs, broaddus, parry                                                                      |
| 521                    | 71           | secretary, mr, economist, assistant                                                                     |
| 522                    | 44           | iba, enhancement, establish, representative                                                             |
| 523                    | 41           | decision, attached, final, relating                                                                     |
| 524                    | 44           | vault, accounts, depository, correspondent                                                              |
| 525                    | 45           | room, building, martin, terrace                                                                         |
| 526                    | 103          | foreign, prudential, ihc, standards                                                                     |
| 527                    | 86           | savings, companies, depository, insured                                                                 |
| 528                    | 55           | economy, prosperity, people, 2001                                                                       |
| 529                    | 42           | spillovers, fratzscher, marcel, straub                                                                  |
| 530                    | 58           | resolution, orderly, distress, wills                                                                    |
| 531                    | 58           | carnegierochester, 195214, discretion, 39                                                               |
| 532                    | 72           | directive, asymmetric, members, symmetry                                                                |
| 533                    | 71           | minimis, acquisition, competition, nonbanking                                                           |
| 534                    | 32           | operation, <a href="http://www.frb.org/services/centralbank/terms">httpwwwfrb.orgcentralbankterm...</a> |
| 535                    | 58           | commissions, infrastructures, iosco, cpss                                                               |
| 536                    | 57           | thursday, execution, announced, enforcement                                                             |
| 537                    | 53           | price, unit, measurement, indexes                                                                       |
| 538                    | 32           | withdrawal, 075000, forfeiture, 1200                                                                    |
| 539                    | 46           | creditworthy, office, statement, joint                                                                  |
| 540                    | 87           | directive, intermeeting, acceptable, m3                                                                 |
| 541                    | 42           | sichel, olinier, stephen, daniel                                                                        |
| 542                    | 86           | convenience, needs, served, merger                                                                      |
| 543                    | 60           | sanctions, penalties, violation, metlife                                                                |
| 544                    | 56           | smith, smiths, adam, invisible                                                                          |
| Continued on next page |              |                                                                                                         |



**Table 7 – continued from previous page**

| <b>Topic Nr</b>        | <b>Count</b> | <b>Top Words by c-TF-IDF (excl. Stopwords)</b> |
|------------------------|--------------|------------------------------------------------|
| 545                    | 40           | geographies, distressed, list, underserved     |
| 546                    | 104          | ben, bernanke, speech, delivered               |
| 547                    | 104          | manager, open, account, currencies             |
| 548                    | 56           | cash, depository, depot, currency              |
| 549                    | 51           | properties, reo, rental, sale                  |
| 550                    | 69           | balances, excess, maintenance, depository      |
| 551                    | 52           | 23a, 23b, affiliates, sections                 |
| 552                    | 49           | glut, lecture, sandridge, homer                |
| 553                    | 48           | appendix, described, discussed, kb             |
| 554                    | 136          | uncertainty, policymakers, policy, about       |
| 555                    | 55           | managers, management, risk, strategic          |
| 556                    | 82           | unanimous, vote, approved, minutes             |
| 557                    | 108          | models, model, modeling, formal                |
| 558                    | 33           | multinet, netting, multinet, clearinghouse     |
| 559                    | 50           | accounting, auditors, corporate, governance    |
| 560                    | 60           | iba, 3105d34, representative, 12               |
| 561                    | 32           | unemployment, tight, valleta, fujita           |
| 562                    | 33           | cac, instructions, announce, selection         |
| 563                    | 46           | prepare, originally, comments, analyze         |
| 564                    | 35           | fisher, selection, kos, manager                |
| 565                    | 49           | minorityowned, minority, program, mdis         |
| 566                    | 92           | digital, currencies, currency, central         |
| 567                    | 49           | farm, farmers, agricultural, acre              |
| 568                    | 71           | agency, mortgagebacked, holdings, securities   |
| 569                    | 86           | rural, urban, community, number                |
| 570                    | 50           | brazil, mexico, inflation, argentina           |
| 571                    | 46           | recover, imputed, costs, priced                |
| 572                    | 32           | listed, execution, enforcement, actions        |
| 573                    | 28           | termination, listed, thursday, enforcement     |
| 574                    | 41           | views, expressed, necessarily, own             |
| 575                    | 49           | student, education, debt, loan                 |
| 576                    | 35           | orders, limitations, modification, reservation |
| 577                    | 40           | advise, councils, topics, advice               |
| 578                    | 32           | operation, floatingrate, 1030, deposits        |
| 579                    | 91           | mortgage, lending, loans, community            |
| 580                    | 31           | release, minutes, scheduled, beige             |
| 581                    | 40           | abn, amro, stichting, nv                       |
| 582                    | 36           | fire, shleifer, 737, vishny                    |
| Continued on next page |              |                                                |

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| Topic Nr | Count | Top Words by c-TF-IDF (excl. Stopwords)        |
|----------|-------|------------------------------------------------|
| 583      | 81    | egrpra, paperwork, regulations, reduction      |
| 584      | 39    | silicon, svb, valley, 2023                     |
| 585      | 66    | keynes, london, macmillan, theory              |
| 586      | 168   | deposit, insurance, corporation, loantodeposit |
| 587      | 50    | internet, ecommerce, distribution, eliminated  |
| 588      | 59    | 109, prohibits, branches, purpose              |
| 589      | 43    | sfts, firesales, externalities, sft            |
| 590      | 33    | compliant, tenders, automatically, complete    |
| 591      | 37    | globalization, filardo, borio, ihrig           |
| 592      | 47    | chairs, names, chairmen, deputy                |
| 593      | 29    | photo, attendees, building, identification     |
| 594      | 45    | macroprudential, feldberg, bis, elliott        |
| 595      | 33    | tootell, ratified, geoffrey, brookings         |
| 596      | 37    | properties, foreclosed, vacant, foreclosures   |
| 597      | 277   | york, new, club, marketeers                    |
| 598      | 27    | relating, attached, action, order              |
| 599      | 42    | oecd, organisation, cooperation, paris         |
| 600      | 50    | noncompetitive, 10000, submitted, increments   |
| 601      | 61    | 1934, sec, nasd, seq                           |
| 602      | 75    | street, main, california, nonprofit            |
| 603      | 101   | decided, target, open, keep                    |
| 604      | 27    | tuesdaywednesday, 2014, 2829, 1617             |
| 605      | 26    | termination, listed, tuesday, enforcement      |
| 606      | 35    | tiac, council, thrift, advisory                |
| 607      | 29    | flood, violations, civil, penalty              |
| 608      | 29    | skidmore, assistant, special, mr               |
| 609      | 48    | swap, exceeding, operation, drawing            |
| 610      | 48    | stat, ann, pub, code                           |
| 611      | 127   | wealth, consumption, effect, stock             |
| 612      | 45    | identity, theft, fraud, flags                  |
| 613      | 56    | texas, establish, dallas, amsouth              |
| 614      | 44    | monetarism, model, consensus, money            |
| 615      | 46    | vacancies, beveridge, curve, unemployment      |
| 616      | 41    | operation, term, fixedrate, 026000             |

**Note:** Topic lists the output number of the Topic (Not sorted by frequency, due to reassignment of clusters). Frequency lists how many documents are within the respective topic. The third column lists terms that score the highest topic specific c-TF-IDF frequency. Total number of documents is 91355.

## Further Material

Further Material included in this submission are:

- `scraping_fed.rmd` (R Markdown Script) scrapes the corpus and produces statistical summaries.
- `topic_model.py` (Python Script, Python 3.10.9) runs the BERTopic model and produces most tables and figures. Hdbscan parameter to be replaced for rerun is in line 69. Information for running the script can be found at the top of the script.