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Rules vs. Discretion: Decoding FOMC Policy Deliberations*

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This study provides evidence on the usage and preferences of Federal Reserve's Federal Open Market Committee (FOMC) regarding the balance between rules and discretion in policy decisions. Analyzing FOMC transcripts over 40 years, we find that while Discretion has been a consistent feature in the language of the FOMC, the use of the language of Rules surged notably in the mid-1990s, aligning with theoretical advancements in monetary policy. We identify that a rise in Discretion terminology occurs during economic downturns and periods of heightened uncertainty. In contrast, a rise in the language of Rules is supported by higher references to terms such as "credibility" and "commitment," and is more prevalent among hawkish FOMC members. Our findings link the increased use of the language of Rules (Discretion) language to tighter (easier) monetary policy, revealing a significant role of this debate in shaping policy outcomes, in particular periods.

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1 Introduction

The modern literature in monetary economics models monetary policy as rules-based, typically using a simple equation linking interest rates to economic conditions. This approach is best exemplified by the Taylor rule, following Taylor (1993)'s description of the Federal Reserve's Federal Open Market Committee (FOMC) interest rate decisions. While some Taylor rule variants align closely with FOMC actions in certain periods, significant deviations occur in others. Critics argue that such deviations contributed to events like the mid-2000s housing bubble or the Fed "falling behind the curve" during the 2021 inflation surge.[1]

In the U.S. political environment, there have been recent efforts to legislate rules-based decision making into the Fed's framework.[2] While some academics and former FOMC members supported these initiatives, others, including then-Fed Chair Janet Yellen, opposed them, calling such measures a "grave mistake".[3] Similarly, Bernanke (2015) emphasized that the Fed already operates within a rule-based framework, but one guided by broader policy objectives rather than strict adherence to prescriptive models like the Taylor rule,

> "*The Fed has a rule. The Fed's rule is that we will go for a two percent inflation rate. We will go for the natural rate of unemployment. We will put equal weight on those two things. We will give you information about our projection, our interest rates. That is a rule.*"

This debate highlights the tension between theoretical descriptions of policy, external demands for rules, and the Fed's practical decision-making. Despite its importance, there is limited quantitative evidence on Fed policymakers' preferences regarding the balance between commitment, rules, and discretion. This study aims to address this gap.

Our contributions are threefold. First, we construct measures to capture the language of rules and discretion in FOMC deliberations finding that while discretion has been a constant feature of this deliberation, the rules terminology surged

[1] See Taylor (2007, 2022); Bullard (2022); Bordo and Levy. (2023); Tatar and Wieland (2024).

[2] Recent examples include the 2014 Federal Reserve Accountability and Transparency Act and the 2015 Fed Oversight Reform and Modernization Act, both of which sought to institutionalize rules-based policy. Initiatives in the past, like the House Concurrent Resolution 133 of 1975 and the Federal Reserve Reform Act of 1977, required the Fed to report on money growth targets. Note that economists have advocated for rules since the early 19th-century. The Currency School favored a rule for the Bank of England to automatically adjust its liabilities based on gold reserves (Bordo, 2019). In the 20th century, Henry Simons advocated for a price-level rule (Simons, 1936), and Milton Friedman proposed a k% rule for money supply (Friedman, 1960).

[3] In support see Taylor (2011, 2015) and a letter signed by Hansen, Lucas, Prescott and others (House of Representatives, 2016). Against, see Blinder (2014); Yellen (2015); Kocherlakota (2016).

in the mid-1990s, aligning with developments in the optimal monetary policy literature. Second, we find that Discretion terminology rises during economic downturns and uncertainty, while Rules language, tied to terms like "credibility" and "commitment," is more prevalent among hawkish FOMC members. Finally, we show that this language evolution helps to assess FOMC decisions, with Rules language linked to tighter policy and Discretion to a more accommodative stance.

Our approach to the rules and discretion debate focuses on the language used in FOMC deliberations rather than specific numerical indicators like the federal funds rate or the money supply. This approach offers several advantages. It allows us to examine the broader debate between rules (commitment) and discretion, not only in terms of policy instruments but also in relation to policy objectives and targets, an area often underexplored in the empirical literature. As Svensson (2016) argues, real-world commitments of central banks focus on achieving goals rather than following strict instrument rules. Language analysis also provides valuable insights into the context of discussions, the diversity of perspectives among policymakers, and how these arguments evolve over time. However, this approach presents challenges, such as maintaining precision when studying language, tracing its evolution, and distinguishing actual preferences for rules or discretion from language choices. However, we will employ tools to address these limitations and extract meaningful insights from the FOMC discussions.

To quantify the FOMC's Rules versus Discretion debate, we employ a textual analysis approach, starting with the construction of a keyword dictionary based on FOMC transcripts. This method, widely used in social sciences, utilizes predefined term sets to quantify information in text documents (Gentzkow et al., 2019), with established examples that include media sentiment (Tetlock, 2007), financial sentiment (Loughran and McDonald, 2011), and economic policy uncertainty (Baker et al., 2016). Dictionary-based methods are effective when prior information is strong (a clear understanding of the concepts or themes one wants to measure), and data that are labeled and used as training for more complex machine learning methods is scarce.[4] Since no existing dictionary captures the language of Rules versus Discretion in central bank discussions, our first contribution is to develop one. We manually analyzed FOMC transcripts, identifying key terms in quotes that reflect the preferences for commitment or discretion in policy making. Typical quotes (and related keywords in bold) are as follows,

[4]More complex methods require large, well-labeled datasets for training. In our context, training datasets would consist of a large number of monetary policy deliberations with statements labeled as rules, discretion, or neither. When lacking such data, a dictionary-based approach can be a practical alternative, leveraging on human knowledge to identify relevant terms.

"Mr. Chairman, let me say at the outset that I think that our course for policy at the moment–of using ***discretionary*** *policy rather than a slavish adherence to any of the aggregates or to any other intermediate target–is quite appropriate."* Forrestal, FOMC Feb. 1988, pg 34

"Yet Committee participants likely differ on their loss functions and their policy ***rules****. I would welcome having a discussion about loss functions and policy* ***rules*** *to see if we could reach some consensus. This could help us decide on a more* ***systematic*** *approach to policy."* Plosser, FOMC Jan. 2012, pg 198

We conducted manual checks for each identified keyword to assess their robustness in various contexts within the FOMC transcripts, aiming to minimize false positives and false negatives. This process refined our list of keywords from over 150 to approximately 50. Our measures for Rules and Discretion are then based on the frequency that these keywords are mentioned by FOMC participants during the policy round, relative to the total number of words spoken in the same round.

Our analysis shows that, while discretion has been a consistent feature in the discourse of the FOMC, rules terminology surged in the mid-1990s. With the exception of Alan Greenspan, other Federal Reserve Chairs have used the Rules and Discretion terminology similarly to the rest of the FOMC members. Over time, this terminology has become more prevalent among both new and existing FOMC members. Furthermore, the language of Rules and Discretion is more characteristic of FOMC members than that of the Federal Reserve Board staff who spoke at FOMC meetings. Although the language of Rules began appearing in staff-prepared policy alternatives in the late 1990s, its prominence increased dramatically with the appointments of Ben Bernanke and Janet Yellen as Fed Chairs.

Additionally, we find that the increased use of the language of Rules aligns with developments in the optimal monetary policy literature. Specifically, mentions of prominent figures (e.g., Barro, Friedman, Gordon, and Kydland) and concepts (e.g., inflationary bias, credibility, commitment) in FOMC transcripts correlate positively with our Rules measure. This suggests that the FOMC's discussion and preference for rules reflect and are informed by theoretical arguments in the literature on rule-based policies.

Our analysis of the drivers behind the language of Rules versus Discretion reveals several key findings. After controlling for FOMC members' fixed effects and their macroeconomic outlook, we observe that members are more likely to favor the terms of discretion such as "flexibility" during periods of severe economic downturns

and heightened uncertainty. In contrast, an increase in mentions of terms such as "credibility" and "commitment" correlates with a higher use of Rules language terminology than Discretion terminology. Additionally, FOMC members with a Ph.D. in Economics are more inclined to use the Rules language compared to those trained as lawyers or economists without a Ph.D.. They tend to use Discretion language more frequently. Furthermore, our results indicate that hawkish FOMC members, as classified by their policy preferences into Hawk, Dove and Swinger as in Istrefi (2019) and Bordo and Istrefi (2023), use the language of Rules more extensively than others.

Finally, we link our Rules versus Discretion language indicator to policy outcomes in two ways. First, we compare our measures (adjusted for trends) with periods classified as rules-like or discretion-like based on deviations of the Federal Funds rate from various Taylor-type rules, as reported in the Federal Reserve's Monetary Policy Report (Taylor, 2007; Nikolsko-Rzhevskyy et al., 2014; Cochrane et al., 2020). Our analysis reveals that periods characterized as rules-based (1985-2000) show higher usage of Rules terminology, while discretionary periods (1976-1985 and 2001-2013) exhibit greater use of Discretion terminology.

Second, we estimate a forward-looking Taylor-type rule to investigate how our Rules versus Discretion language indicator relates to FOMC's decisions on the Federal Funds target rate. We find that during Alan Greenspan's tenure (1986- 2006), increased use of the language of Rules is linked to tighter monetary policy, while increased use of the terminology of Discretion correlates with a more accommodative stance. We also find that hawkish members drive the tightening effect of Rules terminology, whereas doves and swingers influence the easing effect of Discretion terminology. Our analysis also shows that the FOMC policy rule is adjusted in response to extreme values of the Rules versus Discretion language indicator. Specifically, a lower value of the indicator is associated with a lower inflation coefficient and a higher output growth coefficient, whereas a higher value of the indicator is associated with a higher inflation coefficient in the Taylor rule.

Overall, our findings demonstrate that the use of the language of Rules and Discretion as captured by our indicator is closely tied to periods of significant deviations from rules-based policy and to shifts between tighter and easier monetary policies.They suggest that, in certain periods, the language of Rules may be a code language for tighter policy and the language of Discretion for easier policy. Moreover, rules-based language may have helped to make monetary policy more credible to guard against the inflationary bias as emphasized in the literature. At least, during the Volcker-Greenspan era. This connection highlights the influence of the

Rules versus Discretion debate in shaping the FOMC's policy outcomes.

Through the lens of empirical rules, only the FOMC in Alan Greenspan's tenure (1987-2006) appears to support its policy decisions with the language of the Rules versus Discretion debate. However, as noted earlier, evaluating the Fed's policy solely through Taylor-type rules is restrictive. Blinder (2016) emphasizes that comparing imperfect rules with imperfect discretion requires human judgment, highlighting that mathematics alone cannot resolve the rules-versus-discretion debate in monetary policy. Hence, our contribution is quantifying the FOMC's narrative on this debate. In fact, over the past 30 years, institutional changes, such as improved communication and transparency, have curtailed FOMC discretion and promoted greater commitment, exemplified by the formal adoption of a 2% inflation target in January 2012. In future work, we will explore how these features align with our Rules and Discretion measures to further assess their impact on FOMC decision-making and the public's policy and inflation expectations.

We draw on both the theoretical and empirical literature that explores commitment, rules, and discretion in monetary policy. Rather than offering a standalone literature review, we connect our work with related research throughout the paper. A key distinction of our study is its focus on the debate of policy makers, rather than academic discussion.[5] Our approach offers a broader view of the FOMC's commitment versus discretion debate, capturing the context, diverse perspectives, and evolving arguments over time.

The paper is organized as follows. Section 2 describes how we measure the Rules and Discretion terminology in the FOMC transcripts. In Section 3 we discuss who uses the Rules and Discretion language; and in Section 5 the motivations for the use of the language and how it affects policy decisions. Finally, Section 6 concludes.

2 Measuring the Rules versus Discretion language

We use textual analysis to identify the presence of the Rules and Discretion language in FOMC monetary policy deliberations.

As explained by Gentzkow et al. (2019), textual analysis techniques can be used to transform text documents, in our case the set of FOMC meeting transcripts which we denote as D, into numerical arrays that allow us to extract specific attributes from

[5] A few studies have examined FOMC deliberations to assess the role of the Taylor rule specifically in shaping policy. For instance, Kahn (2012) shows how the Taylor rule became integrated into macroeconomic models between 1995 and 2003, influencing some FOMC members, while others remained skeptical. Similarly, Kocherlakota (2016) highlights how the FOMC's policy stance in 2009-10 was shaped by Taylor rule considerations, potentially limiting its expansionary efforts.

the text. Each transcript d_t in D represents a meeting, where the use of language may be rules-based, discretionary, or neither. We define v_t as the characterization of each meeting in terms of these attributes.

However, v_t is not directly observable. Thus, we implement a dictionary approach that estimates c_t, a numerical representation of d_t, to proxy for v_t, where c_t contains counts of pre-identified keywords. The assumption is that v_t is a function of c_t plus an error term ϵ_t, representing unexplained variation:

$$v_t = f(c_t) + \epsilon_t \tag{1}$$

For this paper, first, we construct a dictionary of keywords linked to *Rules* or *Discretion* by reading a subset of D. Second, we estimate c_t by counting occurrences of Rules and Discretion keywords in each transcript d_t. Specifically, $c_t = \{c_t^r, c_t^d\}$, where c_t^r represents the count of Rules keywords, and c_t^d represents the count of Discretion keywords. We posit that a higher frequency of c_t^d suggests a stronger presence of Discretion in that meeting while a higher frequency of c_t^r is indicative of a rules-based deliberation.

An alternative to the dictionary approach is to use the information from our reading of the subset of D as training data for more advanced machine learning methods. However the sample is small for such an exercise, as these methods require large, well-labeled datasets for training. In absence of such data, a dictionary-based approach is a practical alternative, leveraging human knowledge to identify relevant terms. Moreover, dictionary methods are appropriate in cases where prior information is strong, meaning that we have a clear understanding of the concepts and themes we want to measure. Finally, each term or keyword directly links to the concept being measured, making it simple to trace and explain the results, unlike more opaque machine learning models.

In the following we describe in detail how we construct the sample of documents D, how we build the dictionary, and we present the algorithm to calculate C.

2.1 Sample Construction

To construct the set of raw texts D, we start with the FOMC transcripts. These documents represent the most detailed record of the proceedings of the FOMC meeting. The FOMC convenes regularly at scheduled meetings, and, much less frequently, at unscheduled meetings, which are typically conducted via teleconference calls. At these meetings, the Committee reviews economic and financial conditions, determines the appropriate stance of monetary policy, and assesses the risks to its

long-run goals of price stability and sustainable economic growth. Since the early 1980s regular FOMC meetings occur eight times per year.

Regular FOMC meetings, generally, are divided into three main parts. One section consists of the discussion of Federal Reserve operations such as those in domestic open markets and foreign currency markets, as well as the approval of the minutes of the previous FOMC meeting. In another section, the Board staff presents the economic outlook and forecasts. This is followed by a discussion round where FOMC members present their own national and regional outlooks, and ask questions regarding the Board staff outlook. In a third section, commonly referred to as the *policy round*, FOMC members discuss and vote on the monetary policy directive. This directive can refer to long-run or short-run instruments depending on the monetary policy regime and on the meeting within each calendar year.

FOMC transcripts transcribe word for word every statement made by the individuals present at the respective meeting, mainly an FOMC member or Federal Reserve Board staff.[6] Each speaker is identified by name at the beginning of each statement. Although the list of attendees is available at the start of each transcript, we define that an individual was present only if he/she spoke, at least once, throughout the meeting. This is consistent with the focus of this paper on explicit deliberation. Therefore, given their structure, we break down the transcripts into sentences to construct D. In our sample, an element d_i corresponds to sentence i for which we know when it was said (meeting t), during which section of the meeting (section j), and who said it (speaker s). More specifically, t takes the value of the year and month of when the meeting was held; j can be either the economic outlook round, the policy round or other; and for s active FOMC members are identified by name including the Chair, while Board staff statements are encompassed under Staff.

Our sample of FOMC meetings transcripts runs from April 1976 to December 2015. To differentiate sections, we use the partition done by Hansen et al. (2018) for the period 1987 to 2011. For the remaining meetings between 1976-1987 and 2011-2015, we manually partitioned each FOMC transcript ourselves. Our sample consists of 664,534 sentences stated throughout 333 transcripts by 327 unique individuals, of which 94 are FOMC members. Looking at the *policy round* alone, we have about 214,164 sentences, of which 87% are said by FOMC members.

[6]Unless specified, we will use the term FOMC members to denote all FOMC participants, the seven members of the Board of Governors and the 12 Federal Reserve Bank presidents (voters and non-voters). In some meetings, other people were present or discussed topics of interest for the FOMC.

2.2 Rules and Discretion Dictionaries

In the following, we describe how we construct our Rules and Discretion dictionary (RD) based on our reading of a subset of FOMC transcripts and several rounds of audit. We refer to this step as *the Expert Reading Phase*.

To optimize the informativeness of the FOMC meeting to the cost of reading time of the FOMC transcripts, we focused on the transcripts of the first FOMC meeting in a given year. This meeting is important as it is the annual organizational meeting and a part of the FOMC's discussion is dedicated to reviewing longer-run goals and monetary policy strategy. Therefore, unlike other meetings during the year, not only is the load of policy discussion higher but also the context should be more informative for the Rules versus Discretion debate. For instance, in the early years in our sample, in the first meeting, the FOMC discussed and voted on a longer-run policy for the year, consisting of a reaffirmation of policy goals and setting target ranges for the growth of broad monetary aggregates. Later in the sample, in 2012, the FOMC adopted the *Statement on Longer-Run Goals and the Monetary Policy Strategy*, which it reviews every year during the first FOMC meeting of the year. This statement is important because it explains how the FOMC interprets its congressional mandate, articulates its approach to monetary policy, and serves as the basis for its policy actions. Quantitatively, the first meeting of each year is also longer. On average for the whole period of analysis, transcripts of the first meeting of each year have about 129 pages while transcripts for the rest of the year have less than 100 pages.

We began by reviewing several FOMC transcripts to identify statements that an expert might interpret as indicating a preference for either Rules-based or Discretionary approaches. Our guideline classified any expression favoring commitment to goals and to clear, transparent, and forward-looking policies as Rules-based, reflecting a broader focus on the debate between commitment and discretion, not only in policy instruments, but also in policy objectives and targets. In contrast, any expression emphasizing the need for flexibility and adaptability in decision-making was categorized as Discretion-based.

We read 20 FOMC transcripts, which account for 7.6% of the sentences in D.[7] Each transcript is read by two readers (by the authors), recording the Rules and Discretion sentences or statements, speaker name, transcript page, and context of

[7]We read the transcripts of meetings held on (year-month):1982-2, 1984-1, 1986-2, 1988-2, 1990-2, 1992-2, 1994-2, 1996-1, 1998-2, 2000-2, 2002-1, 2004-1, 2005-2, 2005-3, 2006-1, 2008-1, 2010-1, 2012-1, 2013-12, 2014-1. In addition to the first meeting of the year, once in two years, we also read the transcripts of the first two meetings of 2005 and the last meeting of 2013, as important meetings with a high load on policy discussion relevant to our investigation.

the meeting.[8] For each statement, the reader also records whether in this statement there is a term or phrase (the keyword) that suggests Rules or suggests Discretion. In the end, sentences that are categorized similarly by two readers are accepted as such. All other cases are discussed among the three readers.

In this phase, we classified 728 unique statements, of which 394 statements are classified as Rules, 334 as Discretion statements, and 166 keywords. Figure 1 presents the most frequent words for statements classified in the Rules and in the Discretion category. We observe words like "credibility", "inflation","policy", "rule", as top words under Rules and "flexibility", "policy", "economy" under Discretion statements.[9]

Figure 1: *Expert Reading Phase*: Word clouds

(a) Rules

(b) Discretion

Note: This figure presents the most frequent words for the statements classified in the Rules and in the Discretion category from the Expert Reading Phase.

Finally, we use the corpus of identified keywords from the Rules and Discretion statements to build our RD dictionaries. We performed manual checks for each keyword to assess i) which are more robust to various contexts that they could be used in the FOMC transcripts, thus minimizing the false positive error rates and ii) which are more representative over the whole sample to minimize the false negative error rates. This process reduced the number of keywords from 166 to 47. For instance, in the initial keyword list there are important keywords, like commit, judgment, discrete, binding, clear path and credibility, among others, that we decided to leave out as they are used often in other contexts as well.

We present the list of the final keywords in our RD dictionaries in Table 1,

[8] A statement can be comprised of several sentences. During the reading phase, we also classified the statements because they provided more context to the reader.

[9] A *Bag of Words* exercise suggests that the words *rule*, *communication*, and *credibility* have the highest weight in predicting that a statement is Rules while the words *flexibility*, *data*, and *insurance* do the same for Discretion statements as classified in the expert reading phase.

separately for Rules and for Discretion. Within each list there are three types of keywords:

1. terms that are used in statements that express explicitly a preference for Rules or for Discretion, i.e., systematic, rule vs. discretion, constrained policy, opportunistic strategy. For instance: *What I do think could be at risk, if only marginally, is the balance and yes* ***discretion*** *that is vital to policymaking.* Minehan, February 2005, pg 30.

2. terms that relate to the reason why there is a preference for Rules or for Discretion, i.e., predictability vs. flexibility. These terms are useful in cases where the context clearly indicates a Rules versus Discretion discussion but there are no direct keywords used as in case #1. For instance: *I think there is a need for* ***flexibility*** *both because of the lack of dependability of the aggregates and also the uncertainties in the economy.* Boehne, February 1988, p. 29.

3. terms that are used to express a critique for either Rules or Discretion, i.e., corset, tie our hands, formulaic vs. ad hoc, cave in to pressure. For instance: *I'm very uncomfortable with the elaborate* ***formulaic*** *announcements largely because I think they will force us into rigid forms of communication. [...] I think it is going to require us to be flexible in our language and in our approach.* Greenspan, January 2004, p. 20.

In Table 1, within each subgroup, keywords that satisfy conditions #1 and #2 are assigned under the Positive column, and those that satisfy condition #3 under the Negative column.

2.3 An algorithm to construct Rules and Discretion measures

We implement an algorithm to construct a numerical representation, denoted by matrix C, of the raw text D, with the intention to capture the Rules and the Discretion attributes of the deliberation of monetary policy (V) from FOMC transcripts. Below we describe the main steps of this algorithm. A more detailed description can be found in the Appendix.

As standard in textual analysis, we start with the pre-processing of the text to reduce the dimensionality of the raw data (Gentzkow et al., 2019). First, we eliminate numbers, symbols, and stop words in each sentence. Then, we convert each remaining word to its root form by the process of *stemming*.[10]

[10]This process converts word variants to one *common root form* by eliminating widely used prefixes and suffixes in the english language. For example, words such as "dancing", "dancer", "danced", and 'dances" are all reduced to the root *dance*.

Table 1: The Rules vs. Discretion Dictionary based on FOMC transcripts

Discretion		**Rules**	
Positive	Negative	Positive	Negative
constrained policy	*captive*	time-consistent	*ad hoc*
opportunistic approach	*corset*	consistency	*cave in to pressure*
opportunistic strategy	*fixed notions*	clear criterion	*lack of framework*
gradualism	*ironclad*	concrete path	
gradualist	*locked in*	discipline	
pragmatic	*not be able to adhere*	continuity of policy	
flexible/flexibility	*precommit*	stick with	
maneuver	*preset course*	systematic	
powder dry	*too programmed*	rule	
open mind	*trapped*	operating strategy	
optionality	*tie our hands*	policy guide	
fine tuning	*formulaic*	simplicity	
	mechanistic	transparency	
		accountability	
		predictability	
		long-run goals	
		long-term objective	
		objective function	
		policy strategy	

Note: The dictionary is based on the core keywords identified by the *Expert Reading Phase* of FOMC transcripts.

In the second step, we use the RD dictionary to count the keywords for Rules and for Discretion, for each sentence i. Here we account for negations (no, not, don't, don't, don't, hasn't, havent, won't, shouldn't, did not, wouldn't, without) up to 10 words before the keyword. If there is negation, we reclassify the initial keyword to the opposite category. Additionally, in the *Expert Reading Phase* we identified a list of expressions that contain our keywords that are commonly used in other contexts, such as "rule out", "liquidity trap" or "rule of thumb". The last step of the algorithm controls this list and removes the counts that belong to this category.

With this algorithm, we calculate $c_i = \{c_i^r, c_i^d, w_i\}$ for each sentence i where c_i^r is the number of occurrences of keywords categorized as Rules, c_i^d the count for Discretion keywords, and w_i the total number of words in the sentence.

2.3.1 An algorithm Audit

To assess the performance of our dictionary and our algorithm, we perform two audits. The first uses the sample of identified Rules and Discretion statements in our *Expert Reading Phase* to assess how well the counts from the algorithm match the coding from experts. The second uses a random sample of sentences that are classified by the algorithm and compares this classification with expert coding

ex post. More formally, earlier we presented equation 1 establishing a positive relationship between the matrices C and V. We now audit the algorithm to quantify how *good* is C as a proxy for V.

At this point, it should be noted that the algorithm provides *counts* of keywords at the sentence level. Thus, in order to evaluate the algorithm against a reader classification, we construct an algorithm classification as follows: a sentence is Rules (Discretion) if the number of Rules (Discretion) keywords is greater than zero and greater than the number of Discretion (Rules) keywords. A sentence is not classified in either category if it does not contain any keyword or it registers the same number of counts between Rules and Discretion keywords.[11]

Audit 1. The first audit makes use of the 728 unique statements identified in the *Expert Reading Phase*. A few details are important to discuss ahead of this exercise. During the reading phase, the context of the discussion was the most important element to assess the Rules versus Discretion debate. Context could be expressed in one or several sentences and not all sentences had a corresponding keyword. Moreover, we performed manual checks for each keyword and kept those that were more robust to various contexts, reducing the number of keywords from 166 to 47. As such, by construction, a large number of sentences classified by hand cannot be identified by our final dictionary and algorithm. We apply the algorithm to this sample to obtain the counts of Rules and Discretion keywords for each statement, and then we construct the algorithm classification as described above.

In general, unsurprisingly, the algorithm classifies only 239 out of the 728 statements (33%) as Rules or as Discretion. However, of the classified statements of the algorithm, 89% match the expert classification. The correlation between these two latter classifications is high, at the 0.78 level.

Audit 2. In a second exercise, we evaluate the algorithm *"out-of-sample"*. For this audit, we randomly select 224 sentences from the whole corpus of the *policy round* that contained at least one keyword from our RD dictionary. We apply the algorithm to this sample to obtain keyword counts for each sentence.[12] Using these counts, we construct an algorithm classification. We then compare the classification of the algorithm with an expert classification.

In this random sample, each sentence may be categorized by readers in one of

[11] One could classify sentences by categorizing as Rules those sentences with only positive Rules counts and zero Discretion keywords counts. Similarly for Discretion. The main results of the audits would remain similar if we were to use such a classification.

[12] Since the algorithm includes the analysis of negations and phrasal verbs, it is possible that the algorithm produces c_j equal to zero, even if keywords are present in the sentence.

three groups, Rules, Discretion or Neither. Three readers categorized these sentences, following a majority rule. Of the 224 sentences, 136 sentences were assigned by the three readers the same attribute, while 81 sentences were assigned to a category by a 2 to 1 ratio. For just seven sentences there was a disagreement between readers, therefore, we dismissed these sentences from our analysis.

In this second audit, we classified 69 sentences as Rules, 115 as Discretion, and 40 into the Neither category. The correlations between the readers and the algorithm classification are significant and equal to 0.58 and 0.56 for the Rules and Discretion sentences, respectively. Additionally, the mismatch between the two classifications (either due to a false positive or a false negative by the algorithm) is around 22% for both the Rules and the Discretion sentences.

In Appendix A.5, we present an additional evaluation of the algorithm. We evaluate Equation 1 using the two subsamples of Audit 1 and 2. We show that a higher count of the Rules (Discretion) keywords increases (decreases) the probability that the statement is classified by experts as Rules.

Overall, the audits results provide evidence that numerical representations of the FOMC transcripts produced by our algorithm are an appropriate proxy for the Rules and Discretion attributes as contained in the FOMC's monetary policy deliberation.

3 Evolution of the Rules and Discretion debate

In the following, we employ our dictionary algorithm to construct measures of the use of the Rules and Discretion terminology for each FOMC meeting. We then discuss how these measures evolved over time, who uses the Rules and Discretion terminology, and how it relates to the evolution of economic ideas on optimal monetary policy.

3.1 Evolution of language

We calculate four measures to evaluate the evolution of this language in monetary policy deliberations: a Rules Index (R_t), a Discretion Index (D_t), a Rules plus Discretion Index (RD_t) and Rules versus (minus) Discretion Index (RvD_t). These indices are defined as follows

$$R_t = 100 \cdot \frac{c_t^r + c_t^d}{w_t}, \qquad D_t = 100 \cdot \frac{c_t^d + c_t^d}{w_t}$$
$$RD_t = R_t + D_t, \qquad RvD_t = R_t - D_t,$$

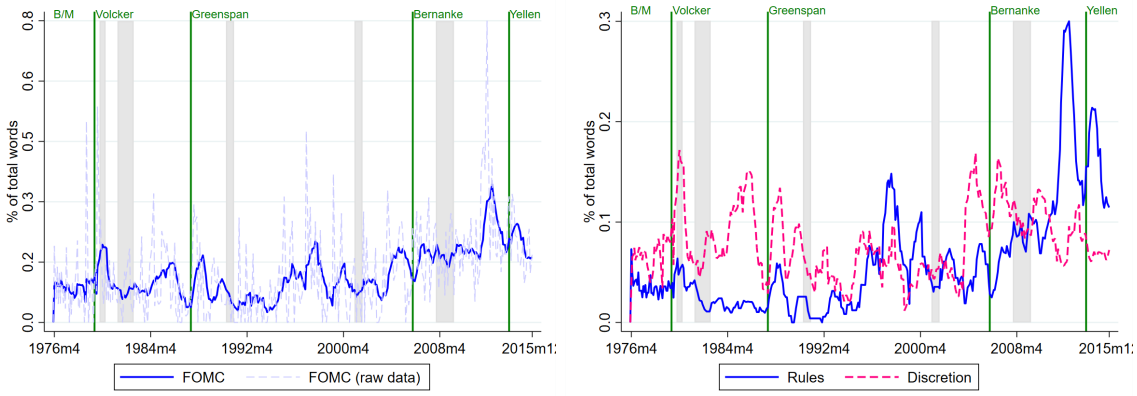
where c_t^r (c_t^d) results from summing up all Rule (Discretion) keyword counts

made by the FOMC members during the *policy round*, and w_t are the total number of words stated by the FOMC members during the *policy round* of meeting t.

Figure 2 shows the evolution of the RD_t measure on the left and the Rules (R_t) and Discretion (D_t) separately, on the right. In general, there is a large variation in the usage of the RD language over time, with a slight upward trend after 2000. Focusing closely on Rules (R_t) and then on Discretion (D_t), we observe varying intensity within and across these categories. Interestingly, relative to Rules, Discretion appears as a more constant feature of FOMC language in the deliberation of monetary policy. In addition, we observe that the Rules language takes off in the mid-1990s, and then again more forcefully post-Great Financial crisis.

Figure 2: Evolution of Rules and Discretion in the FOMC

(a) RD_t (b) R_t and D_t



Note: Panel a) shows the evolution of the total of the Rules and Discretion language measure (RD) where the solid line is an 8 meeting moving average of the corresponding index winsorized at 0% and 99% of raw data. Panel b) shows the Rules and Discretion indices, 8 meeting moving average, separately. Vertical lines indicate the change in Fed Chair. B/M denotes the tenure of Burns and Miller as Fed Chairs. Shaded periods indicate NBER recession dates.

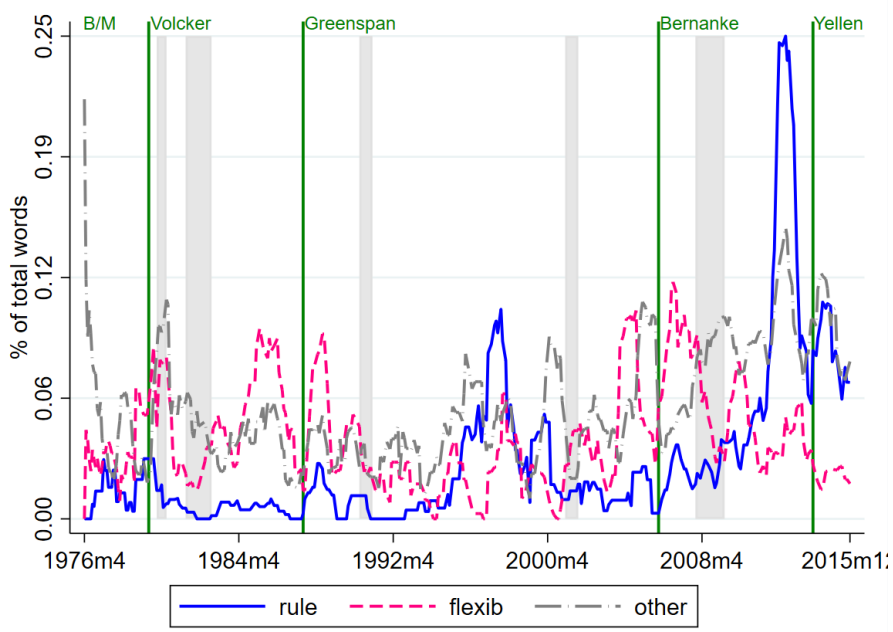
Figure 3 shows the evolution of the two most frequent keywords from the Rules and Discretion dictionary. These terms are "rule" and "flexibility".[13] The intensity of "flexibility" exhibits higher magnitudes and volatility on average than does "rule". Conversely, "rule' exhibits a strong intensity in the mid-1990s and around 2012. The jump in the mid-1990's corresponds with an increase to references to academic work on monetary policy rules, such as, McCallum (1988) and Taylor (1993).[14] For instance, the term "Taylor Rule" was first mentioned in the meeting of February 1995 by Janet Yellen (Board of Governors), as follows,

[13]More precisely, the most frequent term from the Discretionary dictionary is "flexib" which is the stem version flexibility. However, "flexib" is also the root form of other keywords such as flexible. For clarity, hereafter, we use the term flexibility to refer to the counts of the word flexibility and its derivatives, such as flexible.

[14]In the meeting of 16 December 1987, W. Lee Hoskins, the president of the Federal Reserve Bank of Cleveland, stated the following "*We just had a paper presented at the Cleveland Bank by Ben McCallum that you might want to take a look at*".

A couple of years ago, John Taylor, a Stanford professor who was a member of the Council of Economic Advisers, devised a very simple monetary policy rule that I look at to provide a rough sense of whether or not the funds rate is at a reasonable level. FOMC, February 1995, p. 104

Figure 3: Top keywords in using the terminology of Rules and Discretion



Note: Lines are the 8 meeting moving average of the counts for each keyword. Vertical lines indicate the change in Fed Chair. B/M stands for Burns and Miller as Chairs of the Federal Reserve. Gray bars indicate NBER recession periods.

The last wave of high-intensity use of the term "rule" occurs around 2011 and 2012. In this period, the Federal Reserve was still constrained by the zero lower bound, and was conducting policy through forward guidance on interest rates and asset purchases. In these meetings, the FOMC had extensive presentations on the issues of policy rules as well as alternative frameworks for monetary policy. It was finalized in 2012 with the FOMC announcing to the public an explicit inflation target in its *Statement on Longer-Run Goals and Monetary Policy Strategy and Frameworks*.[15]

[15]For instance, the FOMC meeting held in November of 2011 started with a presentation of a research project 'Alternative Monetary Policy Frameworks" done by Chris Erceg, Michael Kiley, David López-Salido. This presentation was followed by a Q&A round from all FOMC members. Examples of other staff presentations during 2012 and 2013 are: Consensus statement on longer-run goals and policy strategy, Material for Alternative Scenarios for Contingency Planning, Simple rules for monetary policy, Options for continuation of asset purchases, Exit strategy principles and Statement on Longer-Run Goals and Monetary Policy. Although these discussions are not included in the calculation of our FOMC measures of this index, it is possible that the use of technical language spilled over to the policy round discussion as well.

To understand the context in which these two keywords are used, we looked at the top words that are the closest neighbor to "flexibility" and "rule", respectively. The terms "greater", "maintain" and "preserve" consistently appear more often as neighbors for the keyword "flexibility" (see Figure B.1 in Appendix). This suggests that the argument in favor of *flexibility* is associated with discussions on how current policy affects the ability of the FOMC to act in the future. For instance, some FOMC members have argued for flexibility due to uncertainty, i.e., Governor Mishkin, in June 2008, argues that *"going forward, we should not lock ourselves into what our policy is going to be, in either direction. We need to preserve flexibility because we could be very surprised."*. With regard to "rule" , before 1993, the top association seemed to be "ground rules", "operating rules", "mechanic or mechanistic rules". After 1993, the most frequent terms are "Taylor rule", "policy rule", and "simple rule" (see Figure B.2, in Appendix).

3.2 Who uses the language?

The observed variation in the Rules and Discretion language, captured through RD_t, could reflect several factors that relate to the FOMC participants (i.e. who is leading the FOMC discussion, changes in the composition of the FOMC, the input of the staff into the policy discussion) and/or the economic and political context at the time of the meeting. We discuss these different factors below.

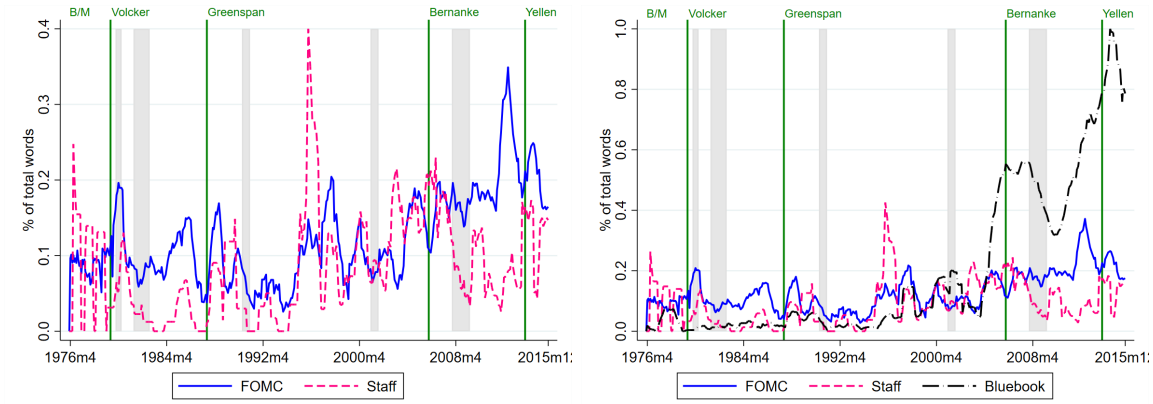
Staff vs FOMC. First, we compare the RD_t language coming from the FOMC members and coming from the staff of the Board of Governors within the *policy round*. For the staff we also construct this measure from the Bluebook, officially entitled "Monetary Policy Alternatives," which provides the background and the context on monetary policy alternatives that the FOMC could consider at an upcoming meeting. This material is distributed in advance of the meeting to the FOMC participants. These alternatives are read out loud at the start of the *policy round*, providing the initial setup for each policy discussion.[16]

We present the RD_t measures for the staff and the FOMC in Figure 4. Overall, panel a) shows that this is mainly the language of the FOMC, with the staff occasionally surpassing the FOMC in its use during the meetings. In particular, the spike in the staff measure in the mid-1990s captures discussions between FOMC

[16]Bluebooks have been prepared from 1965 to 2010. In June 2010, the Tealbook replaced both the Greenbook (staff forecasts) and the Bluebook. Tealbook A provides the economic analysis similar to the Greenbook while Tealbook B registers the monetary policy alternatives as had been the role of the Bluebook. We webscrapped the Bluebooks, Greenbooks, and Tealbooks for every FOMC meeting in our sample, and we count in these documents our RD dictionary keywords. We construct two time series of word counts: one for Bluebooks+Tealbooks B, another for Greenbooks+Tealbooks A.

Figure 4: Rule and Discretion language - Staff vs FOMC

(a) FOMC Meetings (b) with Bluebook



Note: Panel a) shows the Rules and Discretion measure in FOMC transcripts for both the staff and FOMC members. Panel b) adds the Rules and Discretion measure registered in Bluebooks. Vertical lines indicate the change in Fed Chair. B/M stands for Burns and Miller as Fed Chairs. Gray bars indicate NBER recession periods. Lines present the 8 meeting moving average of the counts for each measure.

members and staff (more precisely, Donald Kohn, acting as Secretary of the FOMC at the time), discussing the opportunistic approach to disinflation.[17] For instance,

> *"I am not sure, President Parry. I agree that at least in concept putting out a mathematically precise rule would be clearer than something as vague as an opportunistic strategy. [...] You would have to judge whether acting in the way you think is best as circumstances change over time is better for the economy than putting out some rule that might describe your actions over some period of time. I would think that inevitably you would have to violate that rule sometimes."* Kohn, FOMC Transcript January 1996, pg 51

Similarly, panel b) shows that the RD_t language has been consistently part of the FOMC discussions but not of the policy alternatives in the Bluebook until the late 1990s. The picture changes dramatically with the appointment of Ben Bernanke and later Janet Yellen as Fed chairs, as indicated by the equivalent RD_t indicator for Bluebooks, which increased eightfold on average compared to previous chairs.[18]

[17]The literature shows that some FOMC members had been advocating for this approach in the early 1990s and that in the mid-1990s, the FOMC had settled on an "opportunistic approach" to inflation policy (Orphanides and Wilcox, 2002; King and Lu, 2022). Kohn defines an opportunistic strategy as "lean hard against shocks in one direction, take a more measured approach to shocks in another direction" FOMC transcript December 1995, pg 32.

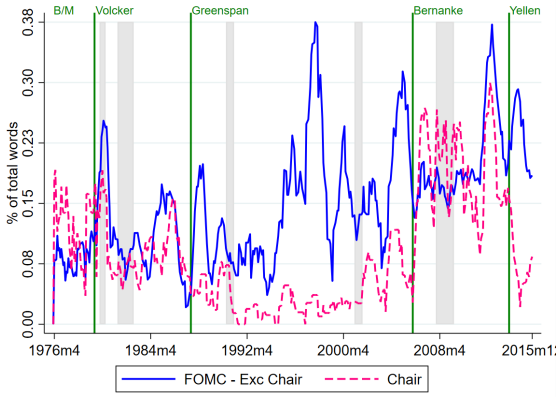
[18]The Rules and Discretion language indicator in the Bluebook (panel b - black line) captures the introduction of prescriptions for a policy path from simple Taylor rules in January 2004. This type of analysis was formally introduced in the Bluebook later in 2006 as "Two new exhibits related to policy rules". Since then, prescriptions for simple policy rules have been explicitly included in the Bluebook.

Looking at the top keywords “rule” and “flexibility", we observe that it is the usage of the word “rule” rather than the word “flexibility" that defines the evolution of the RD_t measures in the Bluebook (see Figure B.3 in Appendix). As such, we find that the discussion on Rules was first initiated by FOMC members around mid-1990, and only post 2006 does it become part of the policy prescriptions prepared by the staff for the FOMC. Conversely, throughout the period, the word “flexibility” is the language used by the FOMC rather than coming from the staff’s recommendations.

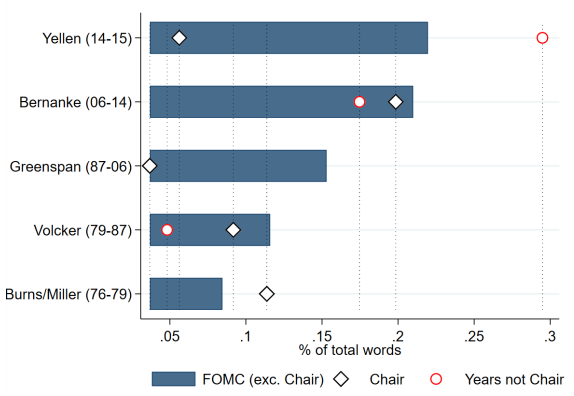
Within the FOMC. Next we look at the usage of the RD indicators of language only across the FOMC members. We first compare the evolution of these measures for the Fed Chair versus the rest of FOMC. Figure 5 shows that, except for Alan Greenspan, other Fed Chairs have used this language as frequently as the rest of the FOMC. Interestingly, Janet Yellen as a Fed Chair used this terminology less compared to her FOMC, although she had been the top user of the RD language when not a Fed Chair (see panel b of Figure 5). We also observe that while there is variation in the usage of RD by Fed Chairs, on average, its usage has increased over time for the rest of the FOMC, as well.

Figure 5: Rule and Discretion - Chair vs other FOMC members

(a) Across Time



(b) Average by Fed Chair regime



Note: Panel a) shows the Rules and Discretion measure (8 meeting moving average) in FOMC transcripts for the Fed chair and the rest of FOMC, separately. Vertical lines indicate the change in Fed Chair. B/M stands for Burns and Miller as Fed chairs. Gray bars indicate NBER recession periods. Panel b) shows the average use of Rules and Discretion language by the rest of the FOMC during each Fed chair regime in bars, by Fed chairs when in this position in diamond shape, and by Fed chairs when they were a regional Fed president (case of Volcker and Yellen) or member of the Board of Governors position (case of Bernanke and Yellen).

When looking at the extensive use of RD_t, we observe that, over time, it became the language of many FOMC members (see Figure B.4 in Appendix). Moreover, the increase in the usage of RD does not only reflect the language of new appointments, but also of incumbents, who seem to have adopted this language over time (see Figure B.5 in Appendix).

3.3 The role of economic ideas

Below we study the role that economic ideas played in the evolution of the Rules and Discretion debate in the FOMC.[19] Following the perceived success of Paul Volcker's Fed in taming inflation, an interest resurfaced in academic circles to understand the conduct of monetary policy. According to Clarida et al. (1999), this topic caught wind due to the appearance of empirical evidence against the neutrality of money and the improvement of theoretical general equilibrium frameworks to evaluate policy.

The emergence of the *optimal monetary policy literature* occurs within our period of analysis. Building on Kydland and Prescott (1977) and Calvo (1978), this literature highlighted how rules and discretion affected the conduct of monetary policy, highlighting the inflationary bias problem of discretionary policy and the role played by rules for expectations management.[20] For example, McCallum (1999) already pointed out in the 1990s how this body of research was catching the attention of central banks.

To study the role that economic ideas had in the Rules versus Discretion language in the FOMC, we first searched all FOMC transcripts for mentions of names of people who have contributed to the literature on this debate, i.e., Barro, Friedman, Gordon, and Kydland, among others.[21] Figure 6 shows that Taylor is the most frequent mention, followed by Friedman. Across Fed Chair regimes, first mentions occur during Volcker's tenure and correspond mainly to Milton Friedman. The high frequency of the word "Taylor" corresponds to the high frequency of the word "rule", which picked up in the mid 1990s, during Greenspan's term, as described previously. A few other economists, such as McCallum and Orphanides are also often mentioned in the FOMC with regard to their rules as discussed in McCallum (1988); McCallum and Nelson (1999); Orphanides (2001).

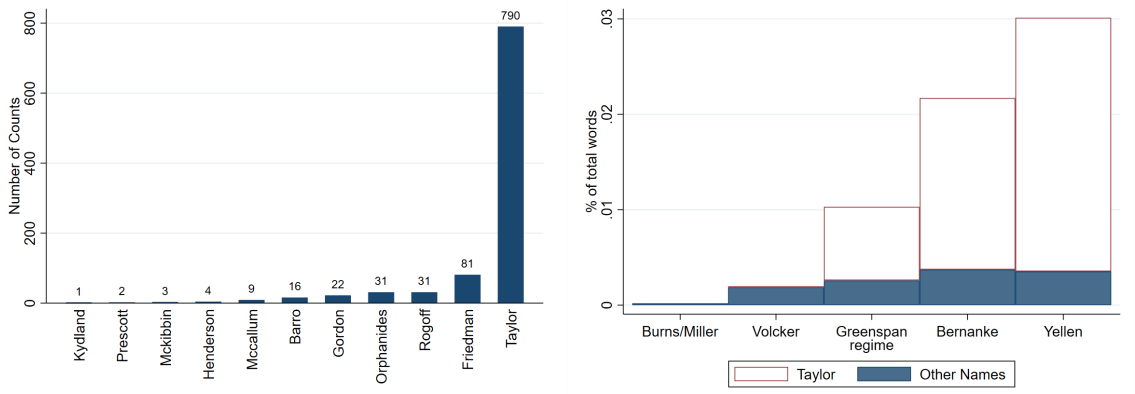
[19] Bordo and Prescott (2019) discuss the role of the Federal Reserve Banks in generating and processing new ideas on monetary and financial policy.

[20] See Galí (2015).

[21] The full list of names consists of Barro, Calvo, Friedman, Gordon, Henderson, Kydland, McCallum, Mckibbin, Orphanides, Prescott, Rogoff and Taylor. We performed the search over the entire FOMC transcript. Figure B.6 in the Appendix presents the time series for each name separately.

Figure 6: The frequency of mentions of the main names in the RD literature

(a) Total count (b) Count by Fed Chair regime



Note: Panel a) shows the number of counts of the list of names that relate to the rules versus discretion debate in the literature. Panel b) shows the share of counts of these names per each Fed chair regime, distinguishing the counts for Taylor versus others.

Table 2: Optimal Monetary Policy Literature - Keywords

Targets	Eco. Concepts
inflation target	optimal
price level target	inflationary bias
nominal GDP target	credibility
money supply target	commitment
	expectations
	Phillips curve
	reaction function

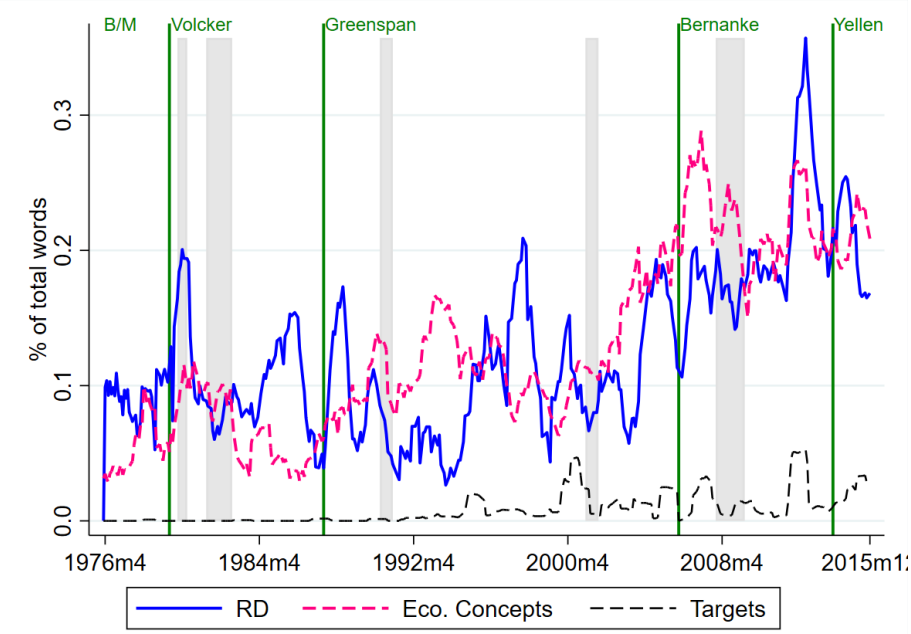
In a second exercise, we construct a list of keywords that represent knowledge of the optimal monetary policy literature (Table 2).[22] We categorize each keyword into two groups: the first group refers to monetary policy *targets* identified as optimal by this literature, while the second group comprises *economic concepts* that either emerged from or were theoretically grounded in this literature. We then estimate two indices—the targets index and the economic concepts index—calculated as the total number of occurrences of keywords from each group, expressed as a percentage of the total words in the transcript for each FOMC meeting.

Figure 7 shows the evolution of the Economic Concepts and Targets indices compared to the RD_t indicator over our period of analysis. *Economic concepts* are mentioned during FOMC meetings in every Fed Chair regime and reach a peak under Bernanke's tenure, led mainly by a surge in the use of the term *expecta-*

[22]See Clarida et al. (1999) for a complete overview of the literature. We don't include terms in the economic concepts and targets list that are in our rules and discretion dictionary.

tions. Differently, *Targets*, led by the term *inflation target*, start to first show up in Greenspan's tenure and reach their peak in Yellen's tenure.[23] This result is in line with our finding that FOMC members appointed later in our sample register greater use of the Rules language, likely as a result of their being more exposed to research at the frontier (see Figure B.5 in Appendix).

Figure 7: RD_t, Economic Concepts, and Targets Indices



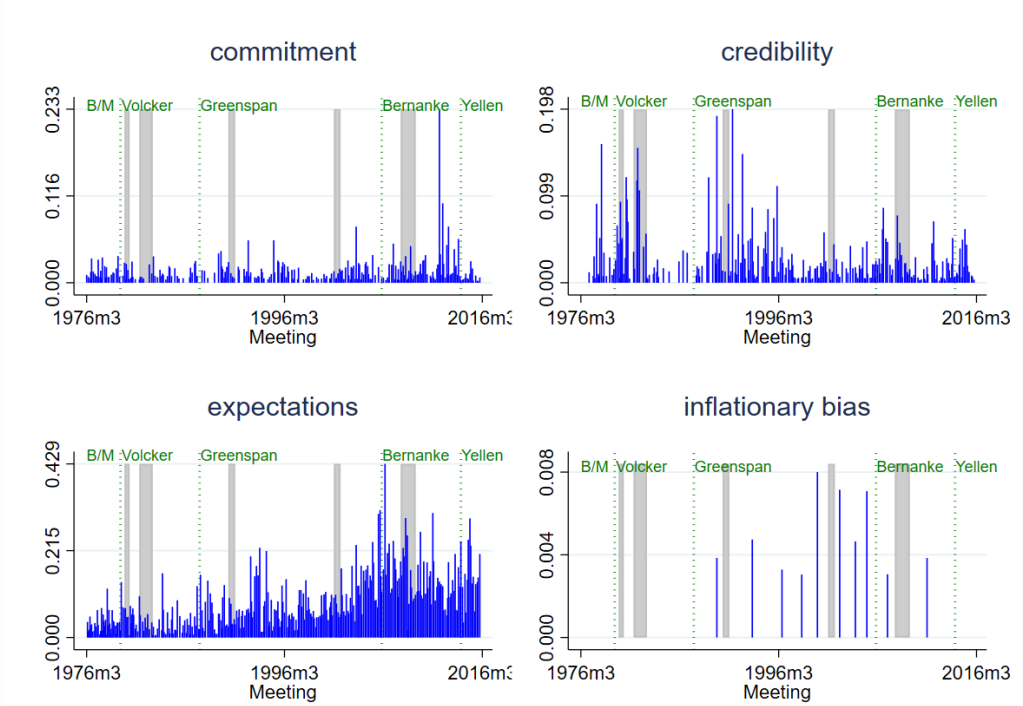
Note: Rules and Discretion measure (RD_t), the Eco. Concepts index, and the targets index are all eight meeting moving average. Vertical lines indicate the change in Fed Chair. B/M stands for Burns and Miller as Chairs of the Federal Reserve. Gray bars indicate NBER recession periods.

Moreover, Figure 7 also shows an earlier pick up of *Economic Concepts* during Greenspan's tenure relative to the RD_t measure. Figure 8 shows the evolution of specific words, highlighting that *credibility*, *commitment* and *expectations* have been a concern of the FOMC since the beginning of our sample, with the last two showing a clear rising trend after 2000. Interestingly, *inflationary bias* has been a concern mainly for Greenspan's FOMC.

In addition, Table B.2 shows that *Names*, *Economic Concepts* and *Targets* indices have a positive correlation with our RD measures, mainly driven by a positive correlation with the Rules measure (R_t). This result suggests that the FOMC has accompanied the discussion and preference for rules with arguments that the literature considers as providing theoretical backing to rules-based policy.

[23] See Figure B.7 for individual counts of each term in the list.

Figure 8: Counts of Economic Concepts



Note: Share of counts of selected words under the Economic Concepts list, as defined in Table 2. Vertical lines indicate the change in Fed Chair. B/M stands for Burns and Miller as Chairs of the Federal Reserve. Gray bars indicate NBER recession periods.

4 Evolution of the Rules *versus* Discretion debate

In this section, we examine the evolution of Rules versus Discretion (RvD) language in monetary policy deliberations and explore the potential factors driving its use. The goal is to better understand the motivations behind the FOMC's preference for using Rules or Discretion-related terms when making policy decisions.

Figure 9 shows that the RvD language of the FOMC has tended toward Discretion, with some specific periods where Rules dominate - the mid-1990s to 2000, and after the Great Financial Crisis.

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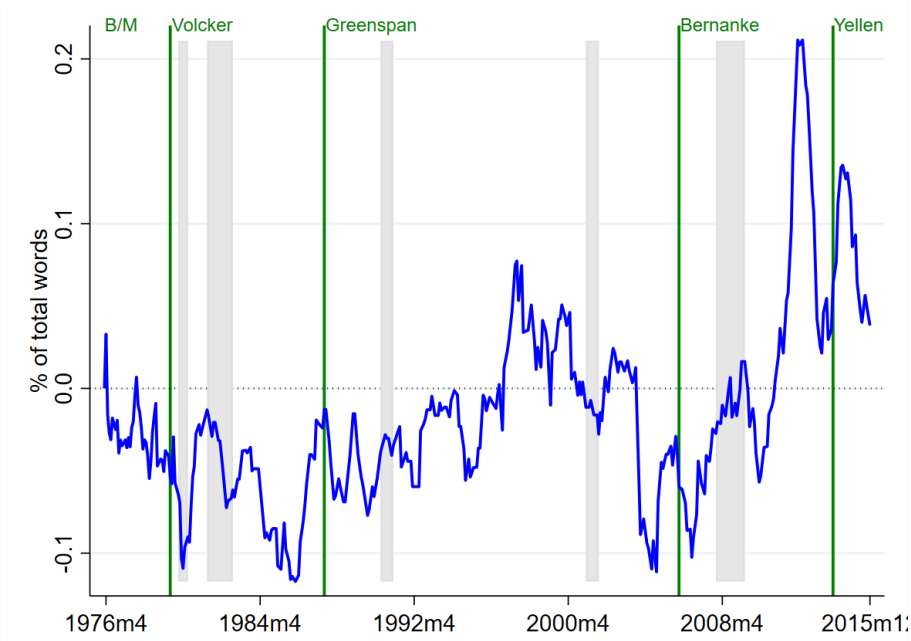
4.1 The usage and preference for Rules rather than for Discretion

In the following, we present two exercises. First we investigate how do the macroeconomic outlook and economic ideas affect the usage of the language at the individual level, when controlling for members fixed effects. The objective is to tease out the context under which there is a higher or lower preference for Rules or for Discretion. Second, we investigate how the FOMC member's background affects the usage

Figure 9: A Rules versus Discretion Index



Note: Line is the 8 meeting moving average of the RvD_t. Vertical lines indicate the change in Fed Chair. B/M stands for Burns and Miller as Chairs of the Federal Reserve. Gray bars indicate NBER recession periods.

of Rules versus Discretion terminology to determine whether there is a predisposition for certain characteristics that relate more with a preference for Rules or for Discretion.

We start by estimating equation 2, as follows

$$RvD_{jt} = \alpha_M Macro_t + \alpha_I Eco.Concepts_t + \alpha^j + \alpha^r + \varepsilon_{jt} \tag{2}$$

whereby RvD_{jt} is the Rules versus Discretion language indicator for FOMC speaker j in meeting t, and α^j and α^r are speaker fixed effects and Fed Chair regime fixed effects, respectively.

Vector $Macro_t$ is comprised by five variables: Greenbook forecasts for inflation, output growth and the output gap, a dummy variable for NBER recessions and a text-based measure of uncertainty. The Greenbook forecasts are produced by the Federal Reserve Board staff and made available to FOMC members about a week before each meeting. We use four-quarters ahead forecasts for inflation, current-quarter forecasts for real GDP growth, and the output gap. Our measure of uncertainty is based on the dictionary of Cieslak et al. (2021), reflecting the percentage of sentences that discuss risk and uncertainty during the economic outlook rounds at each FOMC meeting.

Lastly, we include $Eco.Concepts_t$ in Equation 2 as a proxy of the use and famil-

iarity of the *optimal monetary policy* literature in the FOMC. As described above, $Eco.Concepts_t$ is a text measured index equal to the counts of previously chosen economic concepts (Table 2) as a percentage of total words.[24]

Table 3 shows that a higher communication of uncertainty is negatively correlated with the RvD_{jt} and positively correlated with the use of Discretion terminology (Columns 1 and 3). This suggest that a preference for Discretion is motivated by the perceived increased uncertainty of the FOMC members. In recession periods RvD_{jt} falls, mainly reflecting a reduced use of the Rules language during dire times. Thus, once we control for FOMC member's fixed effects and the expected macroeconomic outlook, FOMC speakers tilt toward favoring discretion in policy in periods with heightened uncertainty or deep economic downturns.

Moreover, we find no significant statistical relationship between the overall usage of our *economic concepts* keywords during FOMC meetings and an individual member's use of the terminology of Rules versus Discretion. However, we find a statistically significant relationship when focusing on a core subset of *economic concepts*: "commitment" and "credibility" (as shown in Columns (4) to (6)). After controlling for individual fixed effects and the macroeconomic outlook, we observe that greater mentions of the terms "credibility" and "commitment" are strongly associated with an increase in our Rules versus Discretion indicator (RvD_{jt}).

We next turn to an analysis of the effect of the composition of the FOMC by identifying how individual member's characteristics (Z_j) relate to the usage of the Rules versus Discretion (RvD_{jt}) indicator, controlling for meeting fixed effects (γ^t), as in the equation 3 below

$$RvD_{jt} = \gamma Z_J + \gamma^t + \upsilon_{jt} \tag{3}$$

With regard to FOMC member's characteristics we focus on information that relates to their educational and professional background, such as the subject of their studies in university (i.e., economics, law or other), the degree (i.e., master, PhD or other) and their last job before joining the FOMC (i.e., academia, Federal Reserve or other). Moreover, we consider the policy preference of FOMC members, expressed as a hawk, a dove, or a swinger type as in Istrefi (2019) and Bordo and Istrefi (2023), whereby hawks are those members perceived to be more concerned with inflation, while doves are members who are more concerned with employment

[24] As done by Cieslak et al. (2021) for their uncertainty index, we exclude counts that occurred during monetary policy discussions when calculating $Eco.Concepts_t$ of Equation 2. We do so because we interpret $Eco.Concepts_t$ as a proxy of FOMC members familiarity with the optimal monetary policy, and not as another measure for *rules* versus *discretion* language in policy deliberations.

Table 3: Rules versus Discretion, macroeconomic outlook and Ideas

	Main Spec.			Core Economic Concepts		
	(1) RvD_{jt}	(2) R_{jt}	(3) D_{jt}	(4) RvD_{jt}	(5) R_{jt}	(6) D_{jt}
$E\pi_{q+4\|t}$	0.002	0.000	-0.002	-0.001	0.000	0.001
	(0.007)	(0.003)	(0.007)	(0.007)	(0.003)	(0.006)
$y_{q\|t}$	-0.005	-0.001	0.004	-0.005	-0.001	0.003
	(0.003)	(0.002)	(0.003)	(0.003)	(0.002)	(0.003)
$x_{q\|t}$	-0.002	-0.002	0.001	-0.002	-0.002	0.000
	(0.003)	(0.001)	(0.003)	(0.003)	(0.001)	(0.003)
Uncertainty and Risk Index	-0.003**	-0.000	0.003**	-0.003*	-0.000	0.002**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
NBER Recession (Dummy)	-0.049**	-0.029***	0.020	-0.050**	-0.029***	0.022
	(0.020)	(0.009)	(0.019)	(0.020)	(0.009)	(0.019)
Economic Concepts Index	-0.000	0.045	0.046			
	(0.064)	(0.048)	(0.042)			
Credibility+Commitment Index				0.284**	0.087	-0.197***
				(0.128)	(0.105)	(0.075)
Observations	5528	5528	5528	5528	5528	5528
R-Squared	0.039	0.072	0.027	0.040	0.072	0.028

Note: *** p<0.01, ** p<0.05, * p<0.10. Robust standard errors are in parentheses. Regressions include fixed effects by speaker and regime.

and growth. Swingers are those members who are perceived to change their type over their tenure.[25] While background information like education and subject might indicate who is more predisposed to speak the Rules or the Discretion language, the policy preference, e.g. a hawk, may signal the use of language in support of Rules rather than in support of Discretion. In order to tease the latter more, we also consider the schools of economic thought ("freshwater" vs. "saltwater") where FOMC members received their Ph.D. Bordo and Istrefi (2023) has shown that this dimension is a significant factor shaping FOMC members formation as hawks and doves, as well as for the Fed's policy outcomes.

Table 4: Rules versus Discretion - Background and Policy Preferences

	Policy Preferences			Degree and Previous Job			Ideology by Education		
	(1) RvD_{jt}	(2) R_{jt}	(3) D_{jt}	(4) RvD_{jt}	(5) R_{jt}	(6) D_{jt}	(7) RvD_{jt}	(8) R_{jt}	(9) D_{jt}
Hawk	0.04**	0.03**	-0.01						
	(0.02)	(0.01)	(0.01)						
Dove	-0.02	0.00	0.02						
	(0.03)	(0.02)	(0.03)						
Economics				-0.05	-0.00	0.05			
				(0.03)	(0.01)	(0.03)			
Law/Law & Econ				-0.06**	-0.02	0.04*			
				(0.03)	(0.02)	(0.02)			
Ph.D.				0.07**	0.03**	-0.04			
				(0.03)	(0.02)	(0.03)			
Academia				-0.00	-0.02	-0.02			
				(0.02)	(0.02)	(0.02)			
Federal Reserve				-0.01	-0.01	0.00			
				(0.02)	(0.01)	(0.02)			
Saltwater Ph.D.							0.07**	0.01	-0.06**
							(0.03)	(0.02)	(0.02)
Freshwater Ph.D.							0.10***	0.02	-0.08***
							(0.03)	(0.02)	(0.02)
Observations	5695	5695	5695	5704	5704	5704	3636	3636	3636
R-Squared	0.090	0.091	0.086	0.093	0.097	0.087	0.122	0.115	0.117

Note: *** p<0.01, ** p<0.05, * p<0.10. Standard errors clustered by pair speaker meeting. Regressions include fixed effects by meeting.

Table 4 presents the estimates of Equation 3. Column (1) shows that being a hawk correlates positively with a higher usage relative to doves and swingers of the

[25] Istrefi (2019) constructs a measure of the perceived policy preference (a hawk, a dove or a swinger) for each FOMC member that has served in the FOMC from 1960 through 2014. Underlying this classification are U.S. media articles and business reports of Fed watchers, available in news archives like ProQuest Historical Newspapers and Factiva, mentioning individual FOMC members with regard to their policy preferences.

language of Rules versus Discretion (RvD_{jt}). Column (2) shows that this is driven by a higher inclination of hawks to use the Rules language. Columns (4) to (6) focus on the education (subject and degree) and professional background, showing that FOMC members with a Ph.D. degree (predominantly in Economics) have a greater usage than others of the Rules versus Discretion language than others. Instead, those that studied law, economists (without a PhD), and those with a joint (master) degree tend to have a higher use of the terminology of Discretion. In contrast, we do not find any effect of the professional background on this language. Finally, in columns (7) to (8) we find that FOMC members with a Ph;D. from either a Saltwater or a Freshwater university have a higher use of RvD language than FOMC members with Ph.Ds from other universities. This result is explained by a lower use of the Discretion language. The estimate for Freshwater PhDs is greater than the estimate for Saltwater PhDs, albeit a non-statistically significant difference.

Overall, these results suggest that the education degree signals sophistication in who uses more the Rules versus Discretion language compared to others, while the policy preference indicates who favors Rules rather than Discretion.

5 Rules versus Discretion and Monetary Policy

Finally we explore how the RvD debate relates with the monetary policy decisions of the FOMC. First, to understand how the evolution of the RvD language is correlated with policy outcomes, we evaluate the use of language during the rule-like and discretion-like periods identified in the literature. Second, we estimate augmented forward Taylor rules with our measures to understand how the Rules versus Discretion debate feeds into policy decisions.

5.1 Deviations from Rules in the Fed's Reports

A large body of literature has used Taylor-type rules prescriptions to examine periods where these prescriptions deviate from the chosen policy rate in order to understand when there is a better economic performance, in rules-based or discretionary periods. For example, using a broad historical approach, Meltzer (2012) and Taylor (2012) find that the period from 1985 to 2003 was rule- like while the years before and after were discretionary, noting that economic performance was better in the 1985–2003 period.[26] Taylor (2007) and Taylor (2021) have also argued that the FOMC deviated

[26] Using qualitative tools rather than statistical ones, in these studies policy was deemed rules based if it was predictable and strategic, while policy was discretionary if it was mostly tactical with few strategic elements (see the discussion in Cochrane et al. (2020)).

from simple policy rules between 2003 and 2005 and kept interest rates too low.

Similarly, using prescriptions from several rules reported in the Fed's Monetary Policy Report, Cochrane et al. (2020) show large deviations from the rules in the 1970s, with discretion being small in most of the 1980s and 1990s and growing again in the early 2000s. Nikolsko-Rzhevskyy et al. (2014) also calculate deviations from a variety of Fed's rules, delineating the 'rule-based' and 'discretionary' eras with a statistical test.[27] For example, using the original Taylor rule, they characterize monetary policy in the US as discretionary between 1974 and 1985, as rules-based from 1985 to 2000, and as discretionary from 2001 to 2013. In general, all these studies find that economic performance is better during rules-based eras than during discretionary eras.[28]

Below we examine how our Rules versus Discretion (RvD) measure matches with the rules-based and discretionary periods discussed above. Note that, our RvD is a real-time measure based on a broader debate of the FOMC that is not confined to policy instruments only. In contrast, the rule-based and discretionary periods identified in the literature are based on ex-ante estimations of specific reaction functions that relate one policy instrument (the Federal funds rate) with macroeconomic data.

To proceed, we calculate a Rules versus Discretion language measure net of its trend to clean it from the visible rising trend in the use of Rules as discussed above. Concretely, we construct gap measures for RvD_t, R_t, and D_t, respectively, as the difference between the value of the corresponding measure at the meeting t and its moving average of eight meetings at the meeting $t-1$. High (low) values of the gap measure indicate a greater (lower) use of language relative to its use over the previous year. For clarity, we denote these measures with tilde ($\tilde{RvD}_t$, $\tilde{R}_t$, and $\tilde{D}_t$).

In Figure 10 we show the use of Rules versus Discretion language measures (net of its trend) in rules and discretion periods identified in the literature. The left panel focuses on the periods identified by Nikolsko-Rzhevskyy et al. (2014). We observe that the rules-based era exhibits greater $\tilde{RvD}_t$, on average, while the opposite holds true for the discretionary era. This result is mainly explained by a lower use, on average, of discretionary language during the rules-based era. However, a Kolmogorov–Smirnov test for equality of distributions indicates that the $\tilde{R}_t$ index gap observed in the rules-based era comes from a distribution that produces greater values than the distribution behind the $\tilde{R}_t$ index observed during discretionary years.

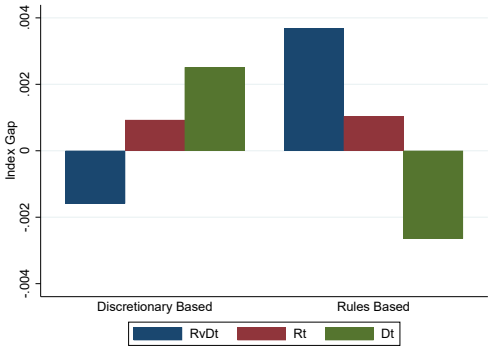
[27] Nikolsko-Rzhevskyy et al. (2014) identify monetary policy eras using Bai and Perron (1998) and Perron and Qu (2006) tests for multiple structural breaks.

[28] Hetzel (2023) argues that the performance of the U.S. economy under Volcker and Greenspan in what he calls the regime of "Leaning Against the Wind with Credibility" i.e. following a rule-like policy, was superior to the preceding regime of "Leaning against the regime with Tradeoffs" under Chairpersons Martin, Burns and Miller, i.e. discretion-like.

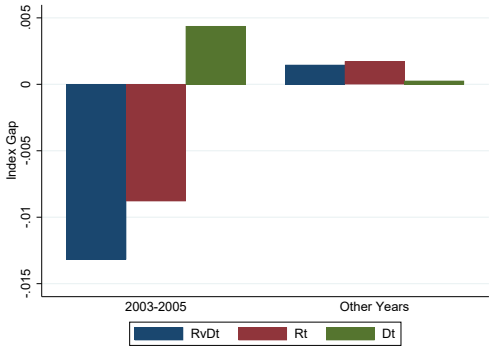
Thus, the rule-based era of Nikolsko-Rzhevskyy et al. (2014) was characterized by a higher use of Rules and a lower use of Discretion language than during discretionary years.

Figure 10: Distribution of $R\tilde{v}D_t$, $\tilde{R}_t$, *and* $\tilde{D}_t$ (net of trend)

(a) Nikolsko-Rzhevskyy et al. (2014) eras



(b) Taylor (2007)'s discretion era



Note: Each bar represents the period average for each index. Nikolsko-Rzhevskyy et al. (2014) characterize discretion-based era between 1974 to 1985 and 2001 to 2013 and as rules-based era from 1985 to 2000. Taylor (2007) characterizes 2003-2005 as discretion era.

The right panel of Figure 10 focuses on the 2003-2005 period, identified as discretionary by Taylor (2007), along others. We observe that this period exhibits, on average, lower levels of $R\tilde{v}D_t$ and $\tilde{R}_t$, and greater levels of $\tilde{D}_t$ relative to the rest of the sample. Thus, again, a period when the FOMC decisions deviated from simple policy rules is characterized by a lower use of Rules language and a greater use of Discretion language.

5.2 A Taylor rule augmented with the Rules vs Discretion indicator

Next, we consider a forward looking Taylor-type rule to investigate more precisely how does our Rules versus Discretion language indicator relate to the FOMC decisions on the Federal Fund target rate. We start with the specification as in Coibion and Gorodnichenko (2011), augmented with a Rules versus Discretion net of its trend measure ($R\tilde{v}D_t$), as below

$$i_t = \rho_1 i_{t-1} + (1-\rho_1)\left[\phi_\pi E_t \pi_{q+j|t} + \phi_y E_t y_{q|t} + \phi_x E_t x_{q|t}\right] + \beta_1 R\tilde{v}D_t + \upsilon_t \qquad (4)$$

where i_t is the Federal Funds target rate chosen at the meeting t, $E_t\pi_{q+j|t}$ is the Greenbook inflation j quarters ahead forecast, $E_t y_{q|t}$ and $E_t x_{q|t}$ are, respectively, the Greenbook forecasts for GDP growth rate and the output gap for the same quarter

when meeting t is held, and the $\tilde{RvD}_t$ denotes the gap measure of the RvD_t. We estimate this regression for the full sample 1976 to 2015 and for three subsamples that correspond with the tenures of different Fed chairs: the Burns, Miller, and Volcker regimes (1976-1987); the Greenspan regime (1987-2006); and the Bernanke and Yellen regimes (2006-2015). We choose subsamples with the goal to take into account Fed chair regimes while, at the same time, running regressions with a fair number of observations. For the period in which the Federal Funds rate was stuck at the zero lower bound, we use the shadow rate estimated by Wu and Xia (2016).

Table 5 presents our results, where for each sample we first present the Taylor-rule regression estimates without $\tilde{RvD}_t$ indices and then the estimates with these indices. We observe that the inflation coefficient (ϕ_π) satisfies the Taylor principle for all except the years when Bernanke and Yellen were Fed chairs. The GDP growth and the output gap have positive estimates, however they are significant only for the Greenspan sub-sample. In terms of our variable of interest, the estimate for RvD_t is significant only during the Greenspan regime. We find for that regime that a greater use of Rules versus Discretion terminology is associated with a higher Federal Funds rate than what macroeconomic forecasts would suggest. Specifically, a one standard deviation increase of RvD_t would correspond to a 5 basis points higher Federal Funds rate.

To further understand how a higher Rules versus Discretion language indicator contributes to a tighter policy, we perform two exercises, focusing on the Greenspan regime. First, we run the Equation 4 for different breakdowns of $\tilde{RvD}_t$ based on who spoke the language, the FOMC hawks, doves or swingers. Figure 11 compares the estimates for $\tilde{RvD}_t$ from the main specification (column 6 in Table 5) with estimates for the Rules and Discretion measures (net of their respective trends) for two additional specifications. The first includes the Rules and Discretion measures separately based on all FOMC members. The second one uses the respective measures distinguishing whether they are from hawks, doves, or swingers. Complete results are available in Appendix C.

We find that a greater use of the Rules language indicator is associated with a tighter policy. In contrast, a higher use of the Discretion language indicator is correlated with an easier monetary policy. Moreover, when taking into account the policy preference of FOMC members, we find that the tightening effect of the Rules indicator is driven by hawks only, whose estimate of R_t is positive and statistically significant. In contrast, the easing effect of Discretion is driven by doves and swingers, whose estimates of D_t are negative and statistically significant.

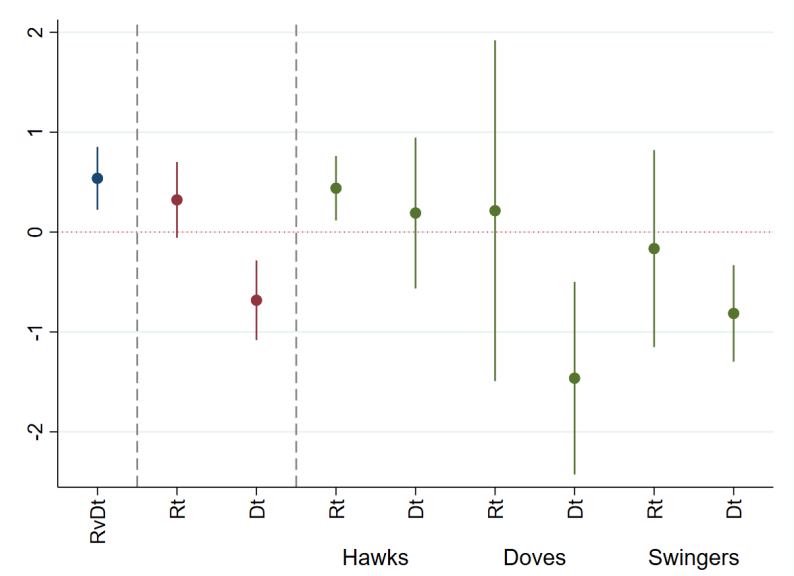
The above results for hawks suggest that as hawks care more about inflation,

Table 5: Forward-looking Taylor Rule augmented with Rules vs Discretion

	1976-2015		B&M&V		Greenspan		Ber&Yel	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ϕ_π	2.48***	2.47***	2.49**	2.24*	2.27***	2.34***	-2.36	-2.80
	(0.44)	(0.45)	(1.23)	(1.27)	(0.36)	(0.38)	(6.29)	(7.06)
ϕ_y	0.93**	0.92**	0.70	0.56	1.24***	1.50***	1.02	1.13
	(0.45)	(0.44)	(0.69)	(0.60)	(0.34)	(0.43)	(0.97)	(1.18)
ϕ_x	0.54***	0.54***	0.15	0.21	0.65***	0.65***	1.29	1.37
	(0.16)	(0.16)	(0.39)	(0.38)	(0.11)	(0.12)	(1.38)	(1.52)
ρ_1	0.93***	0.93***	0.92***	0.91***	0.92***	0.93***	0.96***	0.97***
	(0.02)	(0.02)	(0.04)	(0.04)	(0.02)	(0.02)	(0.02)	(0.02)
RvD_t		-0.28		-1.93		0.54***		-0.22
		(0.39)		(1.90)		(0.19)		(0.30)
Observations	332	332	104	104	149	149	79	79
R-Squared	0.976	0.976	0.897	0.898	0.991	0.991	0.988	0.988

Note: This table presents estimates for ϕ_π, ϕ_y, and ϕ_x obtained through non-linear combinations of estimates from a Newey regression of Equation 4, standard errors with 5 lags. We divide the initial respective estimate for each variable with $(1-\rho_1)$. Results of the initial Newey regression available in Appendix C. Standard errors of these combinations in parenthesis. *** p<0.01, ** p<0.05, * p<0.10.

Figure 11: Estimates of $R\tilde{v}D_t$, $\tilde{R}_t$, and $\tilde{D}_t$ for all FOMC and for different types



Note: This graph presents the estimated coefficients during the Greenspan regime for Rules versus Discretion (RvD_t), Rules ($\tilde{R}_t$) and Discretion ($\tilde{D}_t$) from three different variants of Equation 4. The first is the baseline specification as in equation 4 (column 6 in Table 5). The second is the same forward looking Taylor rule specification augmented with $\tilde{R}_t$ and $\tilde{D}_t$ indices while the third one is augmented with $\tilde{R}_t$ and $\tilde{D}_t$ indices for hawks, doves, and swingers instead. Vertical dashed gray lines separate estimates by regressions. Confidence intervals at 90%. The classification of hawks, doves, and swingers as in Istrefi (2019). Full regression results are available in Appendix C.

their support for Rules rather than Discretion would imply that the inflation coefficient receives a higher weight in the rule. In contrast, as doves care more about growth, their support for Discretion rather than Rules would imply that the output growth or the output gap coefficient receives a higher weight in the rule. To understand this mechanism, we investigate how the Rules versus Discretion indicator interacts with the estimates for Greenbook inflation, output growth, and the output gap. To this end we modify Equation 4 by excluding $R\tilde{v}D_t$ and, instead, including interactions of the Greenbook forecasts with dummies (D_t^j) that take the value of one if the $R\tilde{v}D_t$ was relatively *high* or relatively *low*.

$$i_t = \rho_1 i_{t-1} + (1-\rho_1)\left[\phi_\pi E_t \pi_{q+j|t} + \phi_y E_t y_{q|t} + \phi_x E_t x_{q|t}\right] + (1-\rho_1)\sum_{j=low,high}\left[D_t^j\left(\phi_\pi^j E_t \pi_{q+j|t} + \phi_y^j E_t y_{q|t} + \phi_x^j E_t x_{q|t}\right)\right] + \varepsilon_t \quad (5)$$

To be more precise, we construct dummies $\{D_t^j\}_{low,high}$ as follows: i) we divide our sample of FOMC meetings in percentiles according to their $R\hat{v}D_t$; ii) we define a set of thresholds $\{\alpha_{low}, \alpha_{high}\}$ iii) Dummy D_t^{low} takes the value of 1 if the percentile of meeting t is less or equal to α_{low}, zero otherwise, while dummy D_t^{high} takes the value of 1 if the percentile of meeting t is greater or equal to α_{high}, zero otherwise.

As a result, Equation 4 teases out potentially different augmented Taylor rules for meetings with different intensities of the RvD_t indicator. For instance, the estimated policy response to inflation forecasts is equal to $\phi_\pi + \phi_\pi^{low}$ when $R\hat{v}D_t$ is low (percentile below α_{low}), ϕ_π when $R\hat{v}D_t$'s percentile is between α_{low} and α_{high}, and $\phi_\pi + \phi_\pi^{high}$ when $R\hat{v}D_t$ is high (percentile is greater than α_{high}).

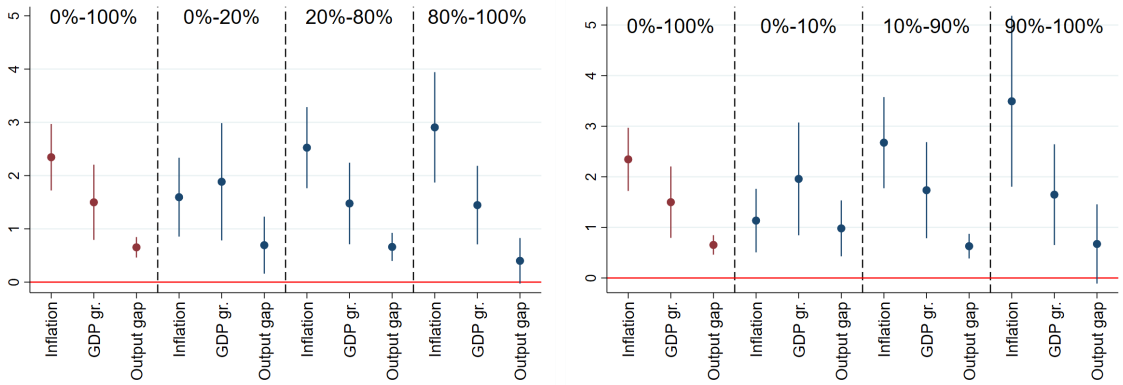
Figure 12 presents the results of this exercise for the Greenspan period as Fed chair. Panel a) shows the results for thresholds $\{20\%, 80\%\}$, and Panel b) does the same for $\{10\%, 90\%\}$.[29] Each graph is divided into four sets of estimates where each set has, first, the corresponding estimate for inflation, followed by the estimate for GDP growth, and, lastly, the estimate for the output gap. In both panels, for comparability, we start with the results registered in Table 5 Column (6). The second set of results correspond to the scenario when D_t^{low} is equal to one, that is, when the usage of the Rules versus Discretionary language is low. The third set are the estimates when both D_t^{low} and D_t^{high} are equal to zero, and the last set is the case when D_t^{high} is equal to one.

[29] Although we run the regression only for meetings during Greenspan's regime, $\{D_t^j\}$ dummies are still defined using the whole distribution.

Consistent with our results about hawks, doves and swingers of Figure 11, we observe that during Greenspan's regime a lower usage of the $R\tilde{v}D_t$ language indicator in a meeting is associated with a weaker policy response to inflation paired with a stronger reaction to output growth with respect to baseline results. In contrast, a very high usage of the $R\tilde{v}D_t$ indicator would imply a higher inflation coefficient in the Taylor rule and no statistically significant response to the output gap. Thus, the FOMC's policy rule appears to be different when policy deliberation exhibits extreme levels of the Rules versus Discretion indicator.

Figure 12: Estimates from Augmented Taylor Rule with interactions

(a) 20% (low), 80% (high) (b) 10% (low), 90% (high)



Note: This graph presents the estimated coefficients $\phi_z + \phi_z^j$ where $z = \pi, y, x$ and j can be low ($D_t^{low} = 1, D_t^{high} = 0$), high ($D_t^{low} = 0, D_t^{high} = 1$), and the rest ($D_t^{low} = D_t^{high} = 0$). Panel a) shows the results thresholds at 20% and 80% while panel b) at 10% and 90%. Full regression results are available in Appendix C.

Overall, our findings demonstrate that the use of Rules and Discretion language is closely tied to periods of significant deviation from rules-based policy and to shifts between tighter and easier monetary policies. This connection highlights the influence of the Rules versus Discretion debate on shaping FOMC's policy outcomes.

5.3 Discussion

Through the lens of empirical rules, only the FOMC during Alan Greenspan's tenure (1987-2006) appears to use the language of the Rules versus Discretion debate to support its policy decisions. As noted earlier, much of this period aligns with what the literature has identified as rule-like behavior, based on the deviations of the Federal Funds rate from empirical rules (Meltzer, 2012; Taylor, 2007, 2012, 2021; Nikolsko-Rzhevskyy et al., 2014; Cochrane et al., 2020). Thus, our findings provide consistent evidence supporting the role of the Rules versus Discretion debate in policy-making.

How do we interpret these results? One possible reason could be that estimating the Taylor rule is most appropriate for the Greenspan period, as the Federal Funds rate was clearly the primary policy tool of the Federal Reserve, unlike during the earlier and later Fed Chair regimes. In the late 1970s and early 1980s, the FOMC was targeting non-borrowed reserves and in the post-Great Financial Crisis, it shifted to forward guidance on rates and balance sheet policies, making the standard Taylor rule less applicable. As a result, studies analyzing the Fed's decisions using Taylor rules typically limit their sample to the period between 1987 and 2007 or 2008 (see Malmendier et al. (2020); Bordo and Istrefi (2023); Cieslak et al. (2021), among others).

Another explanation could be that the Rules versus Discretion (RvD) language we document only began to emerge in the late 1970s and 1980s, permeating FOMC discussions by the 1990s (Figure 2, panel b). Interestingly, this language evolved differently among various FOMC members. The right panel of Figure 13 illustrates the RvD measure for each FOMC member-meeting pair, highlighting instances where an individual member's RvD value deviates by four standard deviations from the overall mean. These outliers tend to lean toward Discretion until Greenspan's tenure. While many FOMC members shifted toward Rules language in the mid-1990s, several continued using extensively the Discretion terminology, widening the gap between the Rules and Discretion clusters (compared to both pre- and post-Greenspan periods). The post-Greenspan transition reflects a more unified shift of FOMC members toward using the Rules terminology.[30] Some FOMC members scoring high on the Rules side in the last part of our sample are Kocherlacota, Plosser, Williams and Bullard.

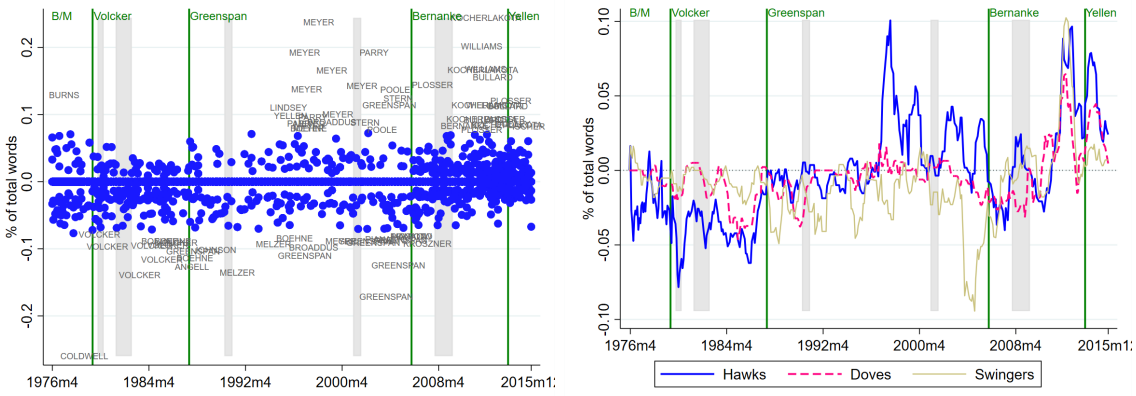
The divergence in the use of Rules versus Discretion terminology among FOMC members during Greenspan's tenure is also evident when examining the evolution of RvD by member type—hawks, doves, and swingers (see the right panel of Figure 13). Until the mid-1990s, all three groups were, on average, on the Discretion side. However, from that point onward, hawks began shifting toward Rules, while others continued to lean toward Discretion. After the Great Financial Crisis (GFC), the terminology used by all three groups moved toward Rules. This suggests that our RvD measure may more accurately reflect preferences for Rules or Discretion during Greenspan's tenure. In later periods, as Rule-based language became more "universal," it is harder to distinguish between actual usage and genuine preference.

Finally, our findings align with the extensive historical narratives provided by

[30]For instance, Greenspan's years are characterized by the highest standard deviation for RvD_t paired with a negative mean, while Bernanke and Yellen's tenures have positive mean of RvD_t and a standard deviation that falls back to levels observed before Greenspan's tenure. See Table B.1.

Figure 13: Rules versus Discretion Index

(a) Individual member RvD_{jt} (b) RvD_t for Hawks, Doves and Swingers



Note: The vertical lines indicate the change in the Fed Chair. B/M stands for Burns and Miller as Chairs of the Federal Reserve. The gray bars indicate NBER recession periods.The right panel presents the RvD_{jt}, weighted by the share of total words of each speaker in the respective meeting, for each FOMC member present at meeting t. We highlight by name those FOMC members with an RvD_{jt} index four standard deviations away from the historical mean. Hawks, doves and swingers as in Istrefi (2019).

Meltzer (2010), Nelson (2020), Hetzel (2023), and Blinder (2022), among others, regarding the different regimes of Fed chairpersons, suggesting an additional interpretation of our results. While RvD language may have been present in FOMC debates, it may not have always aligned with the implicit mandates or priorities of successive Fed chairs, nor with the prevailing economic conditions. It's possible that the language of Rules and Discretion was occasionally used to reinforce a policy stance or was ignored by different chairs or FOMCs, some of whom were more versed in this language.

Burns and Miller, who served before the emergence of modern RvD language, were less committed to low inflation and to following explicit rules, despite being mandated to their money growth targets (Meltzer, 2010; Hetzel, 2023). The new paradigm for Rules began in 1977 with Kydland and Prescott (1977) and became influential in the economics profession by 1993, with the introduction of the Taylor Rule. Volcker, who became chair in 1978, had a clear mandate to lower inflation. Historical accounts suggest he was not particularly an advocate for rules but rather a pragmatist (Blinder, 2022; Hetzel, 2023; Volcker and Harper, 2018; Silber, 2012). We also show in Figure 13 that Volcker's terminology clusters with a high usage of the Discretion indicator. His FOMC was mainly composed of inflation hawks (and swingers) who generally supported his mission (Istrefi, 2019; Bordo and Istrefi, 2023). Some of them knew the RvD language which may have helped him amplify his message of a determination to kill high inflation (see panel b of Figure 5).

Alan Greenspan, also a pragmatist, aimed to solidify Volcker's achievements,

restore credibility for low inflation, and establish a new fiat money-based nominal anchor comparable to the classical gold standard (Woodward, 2001; Greenspan, 2008; Mallaby, 2016). Although Greenspan was not particularly fond of theoretical models or their jargon, he was recognized as a skilled economist (Blinder, 2022; Mallaby, 2016; Woodward, 2001). Most of his FOMC, similar to Volcker's, consisted of hawks and swingers who shared his mission. While Greenspan himself did not frequently use the *RvD* language, many of his FOMC members did (see Figures 5 and 13). As our results indicate, this usage may have influenced the monetary policy outcomes during his tenure.

Ben Bernanke was an academic economist well versed in the language of RvD and many of his FOMC were also academic economists. The prevailing narrative suggests that he conducted FOMC meetings much like a macroeconomics seminar, where *RvD* terminology was frequently used. However, not all members favored strict rules; some used the language to argue for flexibility. Bernanke himself was an advocate of "constrained discretion." In a 2003 speech as a member of the Board of Governors, he stated that "constrained discretion attempts to strike a balance between the inflexibility of strict policy rules and the potential lack of discipline and structure inherent in unfettered policymaker discretion." Similarly, Janet Yellen was an academic economist well versed in the modern RvD language (see panel b of Figure 5). The Fed under her tenure introduced the publication of five variants of Taylor-type rules in the Fed's quarterly reports, as guidelines to policy.

Overall, our analysis shows that the Rules versus Discretion language influenced the FOMC's dialogue and, in certain periods, even shaped its policy decisions. However, this debate may have impacted other aspects of Fed policy that are not covered here. Over the past 30 years, the Fed has improved its communication and transparency to promote greater commitment and better manage economic expectations. A key example is the formal adoption of a 2% inflation target in January 2012. It would be valuable to assess how these developments align with our Rules and Discretion measures.

6 Conclusions

We examined the usage and preferences of the FOMC regarding the balance between rules and discretion in policy decisions, over the period 1976 to 2015. Our analysis reveals that while Discretion has been a consistent feature, Rules terminology surged notably in the mid-1990s and post-Great Financial Crisis, reflecting broader trends in the optimal monetary policy literature. This shift aligns with increased mentions

of key authors and concepts associated with rule-based policies.

Drivers of this shift in language show that FOMC members prefer discretion during economic downturns and uncertainty, while the use of Rules language is associated with increased references to concepts like "credibility" and "commitment," and is more prevalent among Ph.D. economists and hawkish members.

Furthermore, our analysis indicates that a higher usage of Rules language corresponds to tighter monetary policy, whereas a higher use of Discretion language aligns with more accommodative policy stances. Extreme values of the Rules versus Discretion language indicator also correlate with adjustments in the FOMC's policy rule.

We recognize that evaluating the Fed's success solely through policy rules is limiting. In future work, we will explore how institutional changes, such as increased communication and transparency, align with our Rules and Discretion measures and their influence on decision making as well as public expectations of policy and inflation.

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Appendix A Algorithm

In this document, we present the algorithm used in this project. We used Python 3.5 with Jupyter Notebook. All the IPYNB files are available upon request.

A.1 Webscrapping

We used webscrapping to download Federal Open Market Committee transcripts of regular meetings and conference calls from April, 1976 to December, 2015 from the Federal Reserve official website.[31]

Through this process, we build an initial dataset with the information about each transcript (Date, type of meeting, URL) and the complete body of text available.

A.2 1st Stage of Pre-processing - Transcripts

Transcripts are documents that start with a brief description of who is attending the regular meeting or who is part of the conference call. There are different type of attendees which include FOMC members, alternates, Federal Reserve Board staff, and, in occasion, special guests, among others.

Following this initial description, the rest of the document consists of a transcription of the statements made during the meeting. Some transcripts include within the document the transcription of the staff reports, while others state "[See Appendix]".

First, to each transcript, we assigned a unique ID which corresponds to the date in format "YYYYMMDD". This ID is sufficient to identify separately each transcript. For meetings that lasted more than one day, the date of the last day of the meeting was used as ID.

Second, we eliminated numbers, questions marks, parentheses, and underscores from the text. Since we are interested in the discussions and not the numbers themselves, these characters do not provide any useful information to the project.

Third, we brake down by statements the corpus of each transcript. That is, we divided each transcript j into N_j number of statements. To do so, we used the fact that in every transcript each statement starts with the last name of the respective speaker in uppercase letters. This is the only time in a transcript that the last name of a person is completely in uppercase letters.

Thus, we produce a second dataset that consists of J transcripts and N_j statements per transcript. Thus, this dataset has $\sum_{j=1}^{J} N_j$ rows. Each statement is identified with an ID number that is unique within each transcript. Thus, it is possible to identify each statement uniquely by using the transcript ID and the statement ID ("ID Text").

An example of a statement present in this dataset is the following:

> MR. EASTBURN. *I'm not arguing the numbers at all, Paul. I'm arguing the basic philosophy of proceeding [with] a gradual reduction. All right, that's the first point. The second point is that I feel strongly that we should not announce that strategy and specifically that we should not*

[31] https://www.federalreserve.gov/monetarypolicy/fomc$_h istorical_y ear.html$

announce numbers. I think we have a credibility problem and I believe expectations hinge basically on policy performance and not what we say, because nobody will believe what we say until we perform. So, I think we should have this as our philosophy but should not announce any specific numbers. We can talk about this being our intent. Third, we should reserve flexibility for change in case we want to change our strategy as circumstances develop. I was struck, for example, at the precision that's incorporated later in the Bluebook in the forecast of interest rates, assuming various alternatives and combinations and permutations. That may be an interesting exercise but I think its accuracy is greatly in question. What we should do is remain flexible enough so that we can change and depart from this strategy if and when circumstances require it. But that should be the basic idea unless we see reason to change. (FOMC meeting January 9, 1980)

We apply our algorithm to each sentence, thus, the fourth step breaks down each statement into sentences. Therefore, we produce a fourth dataset that consists of J transcripts, N_j statements per transcript, and $S_{j,n}$ sentences per transcript-statement. The total number of observations in this dataset is $\sum_{j=1}^{J} \sum_{n=1}^{N_j} S_{j,n}$.

Once again, we create a unique counter for each sentence within statement. This implies that sentence $s_{j,n}$ of statement n_j in transcript j is uniquely identified using the transcript ID, statement ID per transcript, and sentence ID per transcript-statement.

Additionally, we segment each sentence. We apply the *segment* command from the *TextBlob* library. This library is trained to recognized when two words are written as one word. This allows us to correct for any potential mistakes in the text derived from the webscrapping process.

Table A.1 presents how the example statement of above is broken down into sentences and the effect of segmentation on the text.

Sentence ID	Segment Text
0	im not arguing the numbers at all paul
1	im arguing the basic philosophy of proceeding with a gradual reduction
2	all right thats the first point
3	the second point is that i feel strongly that we should not announce that strategy and specifically that we should not announce numbers
4	i think we have a credibility problem and i believe expectations hinge basically on policy performance and not what we say because nobody will believe what we say until we perform
5	so i think we should have this as our philosophy but should not announce any specific numbers
6	we can talk about this being our intent
7	third we should reserve flexibility for change in case we want to change our strategy as circumstances develop
8	i was struck for example at the precision thats incorporated later in the blue book in the forecast of interest rates assuming various alternatives and combinations and permutations
9	that may be an interesting exercise but i think its accuracy is greatly in question
10	what we should do is remain flexible enough so that we can change and depart from this strategy if and when circumstances require it
11	but that should be the basic idea unless we see reason to change

Table A.1: Statement in Sentences

We denote the final dataset as the main dataset of the project.

A.2.1 2nd Stage of Pre-Processing - Algorithm

Before implementing the algorithm, we further pre-processed the text in the final dataset. First, we remove words with only one character as well as those considered as stop words in the english language[32]. These words do not provide any useful

[32]We used a smaller list of stopwords given that this set usually include negative words which our necessary for our purpose. The final list of stopwords used is the following {'i', 'me', 'my',

information about the discussion. Additionally, we stem each sentence such that words are reduced to a root to prevent matching errors due to plurals or verbs conjugation.

As an example of the result of the stemming and stop words procedure, the sentence

> *'third we should reserve flexibility for change in case we want to change our strategy as circumstances develop'* (Sentence ID #7)

turns into

> *third should reserv flexibl chang case want chang strategi circumst develop*

A.3 Dictionaries

We upload the rules and discretion dictionaries separately. Moreover, we stem each entry by implementing the PorterStemmer function from the NLTK library.

A.4 Algorithm Description

The algorithm produces for each sentence i a quantitative vector c_i with three elements: the counts or frequency of *rule* keywords (c_i^r), the counts or frequency of discretionary keywords (c_i^d), and the total number of words (w_i). The process is straight forward.

First, we search in the stem text of each sentence for each stem word present in the dictionaries. More precisely, we search for the exact stem keyword. When keyword is found in a sentence, we create a *finding* which is initially classified in the category consistent with the corresponding keyword.

After this first step, each sentence has either no findings, one finding, or multiple findings (since multiple keywords can be part of a same sentence). Moreover, a sentence can have some findings classified as discretion, other findings as rules.

The second step of the process is to control for negative use of keywords. To do so, we reclassify each finding from rules to discretion or vice versa, with the help of a list of negative words.[33] More precisely, we reclassify a finding if the negative word lies up to ten characters before the finding's corresponding keyword.

We find that for some keywords the use of negations before them does not imply a reclassification. Thus, we exclude from this reclassification process findings that

'myself', 'we', 'our', 'ours', 'ourselves', 'you', "youre", "youve", "youll", "youd", 'your', 'yours', 'yourself', 'yourselves', 'he', 'him', 'his', 'himself', 'she', "shes", 'her', 'hers', 'herself', 'it', 'its', 'itself', 'they', 'them', 'their', 'theirs', 'themselves', 'what', 'which', 'who', 'whom', 'this', 'that', "thatll", 'these', 'those', 'am', 'is', 'are', 'was', 'were', 'be', 'been', 'being', 'have', 'has', 'had', 'having', 'do', 'does', 'did', 'doing', 'a', 'an', 'the', 'and', 'but', 'if', 'or', 'because', 'as', 'until', 'while', 'of', 'at', 'by', 'for', 'with', 'about', 'against', 'between', 'into', 'through', 'during', 'before', 'after', 'above', 'below', 'to', 'from', 'up', 'down', 'in', 'on', 'off', 'over', 'under', 'again', 'further', 'then', 'once', 'here', 'there', 'when', 'where', 'why', 'how', 'all', 'any', 'both', 'each', 'few', 'more', 'most', 'other', 'some', 'such','only', 'own', 'same', 'so', 'than', 'too', 'very', 's', 't', 'can', 'will', 'just', 'now', 'd', 'll', 'm', 'o', 're', 've', 'y', 'ma','also','was'}

[33] List of negative stem words: {'no' , 'not' , 'dont' , 'doesnt' , 'hasnt' , 'havent' , 'wont' , 'shouldnt' , 'didnt' , 'wouldnt' , 'without'}

were generated by the following keywords: 'transparency', 'flexib', 'precommit', 'discipline', 'keep options open', 'bind'.

Some keywords, or the stem version of them, are used either in common English phrasal verbs or are part of economic expressions. Thus, for the third step of the algorithm, we eliminate findings that were identified when keywords were part of phrasal verbs or economic expressions.[34]

The last step consists of using these classified findings to produce c_i. Element c_i^r corresponds to the number of findings that are categorized as rules, c_i^d is equal to the number of findings that are categorized as discretion, and, lastly, w_i is the total number of stem words for each sentence.

A.5 Algorithm Audit

The appropriateness of C could be evaluated by running

$$v_i = \gamma_0 + \gamma_1 c_i^r + \gamma_2 c_i^d + \epsilon_i \tag{6}$$

where v_i is a variable that captures the attribute of sentence i (rules, discretion, or neither) and c_i^r, and c_i^d are the counts of keywords for rules and discretionary, respectively, in sentence i.

The problem is that v_i is a latent variable for most of d_i, thus, we cannot run Equation 6 directly. However, we can take advantage of two sub-samples for which we do know V to audit the construction of C.

The **first sub-sample** consists of the statements identified in the *expert reading phase*. We read more than 20 transcripts and classified 728 unique statements as either rules or discretion. We denote this subsample as the expert reading sample (ERS).

For statement j in ERS, we use the expert classification to construct v_j as a dummy variable that takes the value of 1 if statement j was classified by experts as rules, and zero if it was classified as discretion. Then, we estimate c_j for each statement j in ERS by implementing the algorithm.

Since for each statement j, we have v_j and c_j, we run a probit of Equation 6. Given the structure of v_j, we expect for γ_1 to be positive and γ_2 to negative.

The first column of Table A.2 presents the results for ERS. As expected, a marginal increase in *rule* keywords in this sub-sample increases the likelihood of a statement being *rules* by close to 43%. In contrast, if a statement has a positive count on discretionary keywords, then the likelihood that is classified as *rules* is close to 0.

The Second Audit sub-sample (SAS) comprises the 224 randomly selected sentences from monetary policy deliberations. Given that the expert classification of this sub-sample could fall in one of three possible categories (rules, discretion, neither), we run Equation 6 for two different dependent variables. The first dependent variable is a dummy v_j^r that takes the value of one if sentence j was expertly clas-

[34]The expressions in their stem version are: {'liquid trap', 'deflat trap','bind constraint', 'woodford trap', 'expect trap', 'rule thumb', 'anti growth trap', 'broad rang', 'rule out', 'fine tune languag'}

Table A.2: Algorithm Audit - Equation 6 - Marginal Effects

	ERS	SAS	
	rule (v_j)	rule (v_j^r)	discretion (v_j^d)
Rules (c_i^r)	0.439***	0.250***	-0.103
	(0.0693)	(0.0688)	(0.0851)
Discretion (c_i^d)	-0.538***	-0.347***	0.546***
	(0.0543)	(0.0793)	(0.101)
Observations	728	224	224
Unconditional Prob.	0.540	0.207	0.527

Note: Standard errors in parentheses * p<0.05, ** p<0.01, *** p<0.001

sified as rules, and zero otherwise. For v_j^r, we expect γ_1 to be positive and γ_2 to be non-positive.

The second dependent variable is a dummy v_j^d that takes the value of one if sentence j was classified by experts as discretion. Note that since a sentence could be neither rules or discretion, it is possible to have $v_j^r = v_j^d = 0$. For the exercise with v_j^d as dependent variable, we expect for γ_2 to be positive and γ_1 to be non-positive.

Columns 2 and 3 in Table A.2 present the results for SAS. For v_j^r (column 2), results are as expected with $\gamma_1 > 0$ and $\gamma_2 < 0$. In contrast, for v_j^d (column 3), we obtain that $\gamma_2 > 0$ in line with expectations but γ_1 is not different from zero. That is, counts of rules keywords do not change the probability that a statement is classified as discretionary.

Appendix B Additional Tables and Figures

Figure B.1: Closest Neighbor to keyword *"flexible"*

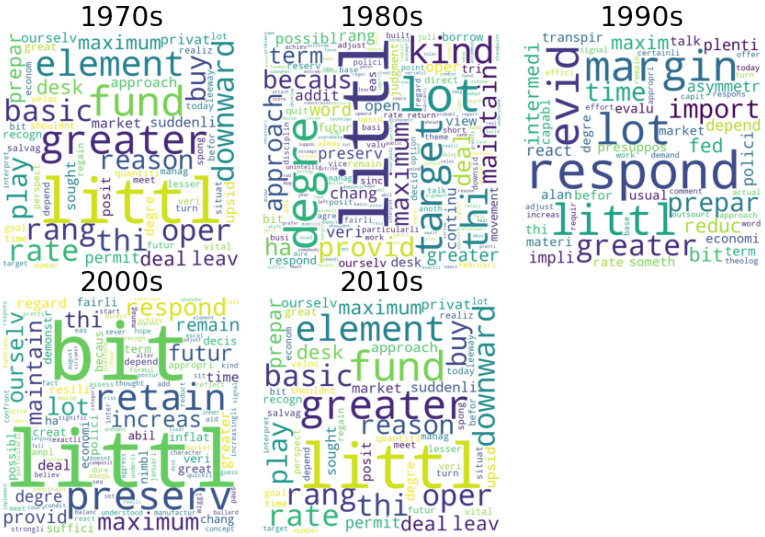
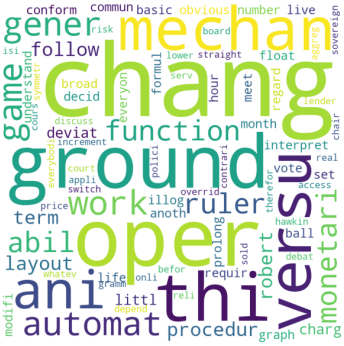


Figure B.2: Closest Neighbor to keyword *"rule"*

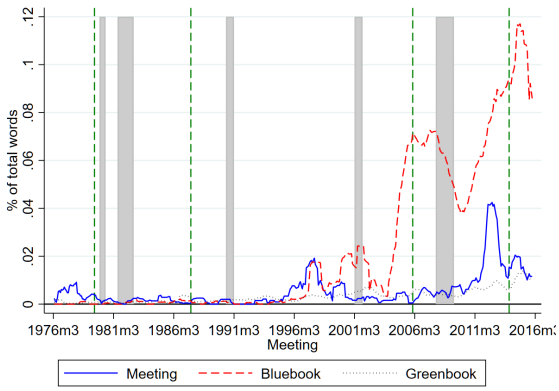
(a) Before Dec 1993



(b) After Dec 1993

Figure B.3: Rule and Discretion language - Staff vs FOMC

(a) Keyword "rule"



(b) Keyword "flexib"

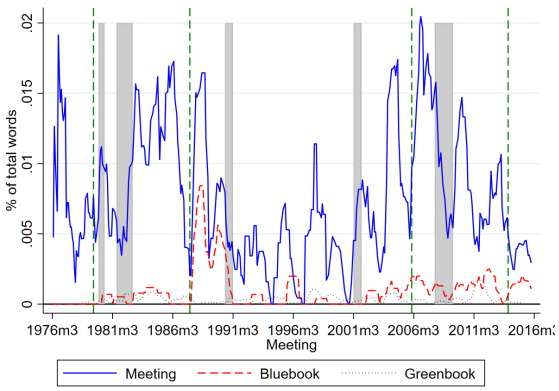
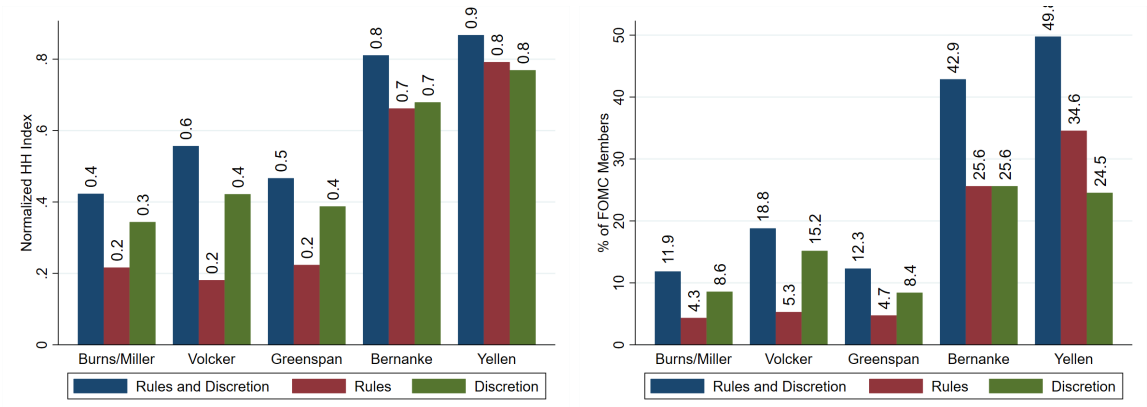


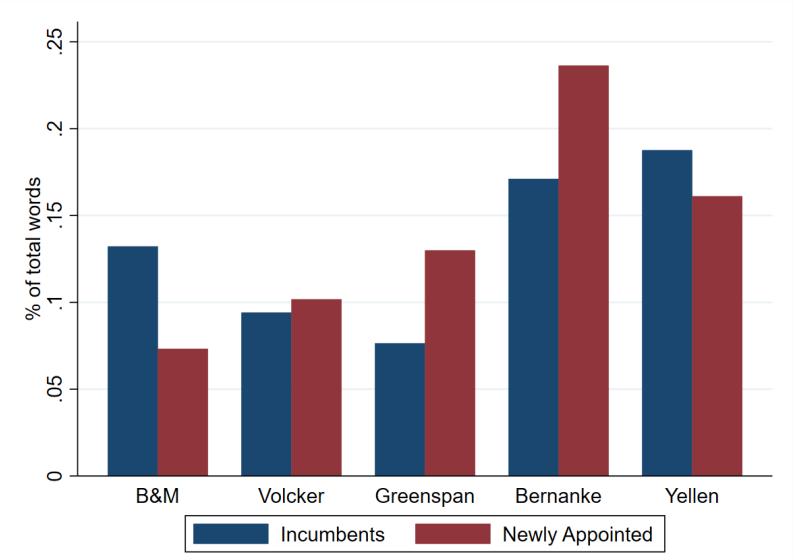
Figure B.4: Rules and Discretion Language by FOMC members - Average by Regime

(a) Extensive language Usage (EU_t) (b) FOMC stating at least one keyword (%)



Note: Panel a) presents the average by regime of an extensive language use index, denoted by EU_t. This index lies between zero and one where values closer to one suggest a more broad and extensive language use among FOMC members during meetings. This index is calculated as follows $EU_t = 1 - \frac{HHI_t - \frac{1}{S}}{1 - \frac{1}{S}}$ where HHI_t is equal to the quadratic sum of each FOMC member's *market share* in keyword occurrences for meeting t, and HHI_t is equal to $\sum_{s \epsilon S} \left(\frac{KW_{s,t}}{KW_t}\right)^2$

Figure B.5: Rules and Discretion Index - Incumbents vs Newly Appointed



Note: RD average index by regime for incumbents and newly appointed. Incumbents are FOMC members whose first meeting was during a previous regime while Newly appointed are FOMC whose first meeting was during the same regime.

Table B.1: Rules versus Discretion Indices Statistics - by FOMC member

Chairman	RvD Index		Rules Index		Discretion Index	
	Mean	Std	Mean	Std	Mean	Std
Burns/Miller	-0.05	0.39	0.02	0.15	0.07	0.36
Volcker	-0.07	0.37	0.02	0.14	0.09	0.35
Greenspan	-0.04	0.57	0.04	0.29	0.08	0.49
Bernanke	0.01	0.39	0.11	0.30	0.09	0.23
Yellen	0.06	0.32	0.14	0.27	0.07	0.18

Table B.2: Rules and Discretion and Ideas - Correlations

Indices	RD_t	R_t	D_t
Names	0.3672	0.5357	-0.0147
	(0.00)	(0.00)	(0.79)
Exc.	0.1876	0.2371	0.0303
Taylor	(0.00)	(0.00)	(0.58)
Targets	0.2006	0.2870	-0.0023
	(0.00)	(0.00)	(0.96)
Eco.	0.2812	0.3451	0.0560
Concepts	(0.00)	(0.00)	(0.30)

Note: We calculate the indices for names, eco. concepts, and targets, equal the number of occurrences for each group as percentage of total words in each transcript for each FOMC meeting and estimate their pairwise correlation with RD_t, R_t, and D_t. P-values in parenthesis for the null hypothesis of a pairwise correlation equal to zero.

Figure B.6: Counts of Leading Experts Names

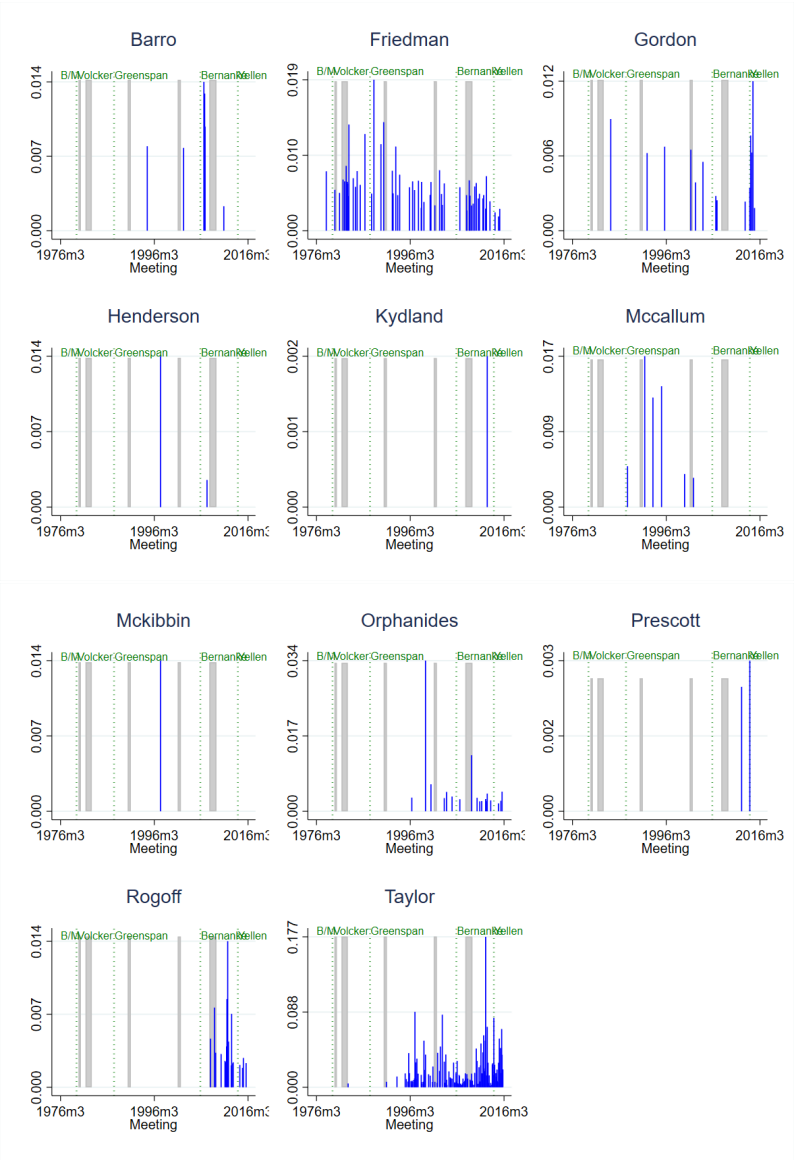
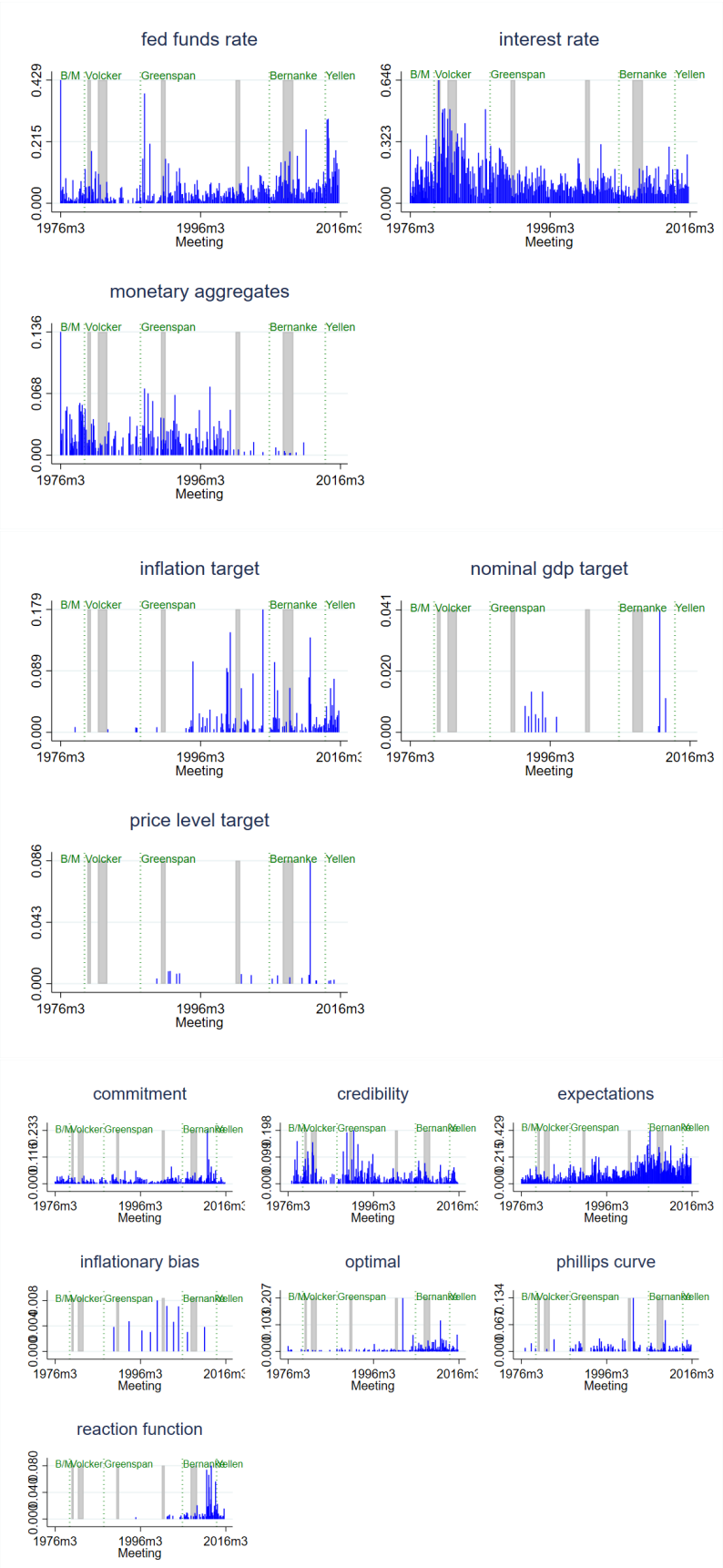


Figure B.7: Counts of Economic Concepts



Appendix C Regression Results

Table C.1: Simple Monetary Policy Rule - Full Regression Results

	1976-2015		B&M&V		Greenspan		Ber&Yel	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$E\pi_{q+4\|t}$	0.17***	0.17***	0.21***	0.20***	0.18***	0.17***	-0.08	-0.09
	(0.05)	(0.05)	(0.07)	(0.08)	(0.04)	(0.04)	(0.20)	(0.21)
$Ex_{q\|t}$	0.04***	0.04***	0.01	0.02	0.05***	0.05***	0.05	0.05
	(0.01)	(0.01)	(0.03)	(0.03)	(0.01)	(0.01)	(0.04)	(0.04)
$Ey_{q\|t}$	0.06**	0.06**	0.06	0.05	0.10***	0.11***	0.04*	0.04
	(0.03)	(0.03)	(0.05)	(0.05)	(0.01)	(0.02)	(0.02)	(0.02)
RvD_t		-0.28		-1.93		0.54***		-0.22
		(0.39)		(1.90)		(0.19)		(0.30)
ρ_1	0.93***	0.93***	0.92***	0.91***	0.92***	0.93***	0.96***	0.97***
	(0.02)	(0.02)	(0.04)	(0.04)	(0.02)	(0.02)	(0.02)	(0.02)
Observations	332	332	104	104	149	149	79	79

Note: *** p<0.01, ** p<0.05, * p<0.10. Newey-West HAC standard errors in parenthesis.

Table C.2: Simple Monetary Policy Rule - R_t, D_t

	1976-2015	B&M&V	Greenspan	Ber&Yel
	(1)	(2)	(3)	(4)
$E\pi_{q+4\|t}$	0.17***	0.20***	0.17***	-0.09
	(0.05)	(0.08)	(0.04)	(0.21)
$Ex_{q\|t}$	0.04***	0.02	0.05***	0.05
	(0.01)	(0.03)	(0.01)	(0.04)
$Ey_{q\|t}$	0.06**	0.05	0.11***	0.04*
	(0.03)	(0.05)	(0.02)	(0.02)
R_t	0.14	-0.07	0.32	-0.12
	(0.30)	(3.60)	(0.23)	(0.33)
D_t	0.58	1.99	-0.68***	0.40
	(0.59)	(1.89)	(0.24)	(0.60)
ρ_1	0.93***	0.91***	0.93***	0.97***
	(0.02)	(0.04)	(0.02)	(0.03)
Observations	332	104	149	79

Note: *** p<0.01, ** p<0.05, * p<0.10. Newey-West HAC standard errors in parenthesis.

Table C.3: Simple Monetary Policy Rule - Chair and Not Chair Indices

	1976-2015	B&M&V	Greenspan	Ber&Yel
	(1)	(2)	(3)	(4)
$E\pi_{q+4\|t}$	0.17***	0.20**	0.17***	-0.08
	(0.05)	(0.08)	(0.04)	(0.21)
$Ex_{q\|t}$	0.04***	0.02	0.05***	0.04
	(0.01)	(0.03)	(0.01)	(0.04)
$Ey_{q\|t}$	0.06**	0.04	0.10***	0.04*
	(0.03)	(0.04)	(0.02)	(0.02)
RvD_t FOMC	-0.27	-1.75	0.23**	-0.15
	(0.47)	(2.14)	(0.10)	(0.28)
RvD_t Chair	-0.21	-0.80	0.33*	-0.07
	(0.18)	(0.73)	(0.20)	(0.16)
ρ_1	0.93***	0.91***	0.93***	0.97***
	(0.02)	(0.04)	(0.02)	(0.02)
Observations	332	104	149	79

Note: *** p<0.01, ** p<0.05, * p<0.10. Newey-West HAC standard errors in parenthesis.

Table C.4: Simple Monetary Policy Rule - Hawks, Doves, and Swingers

	1976-2015		B&M&V		Greenspan		Ber&Yel	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$E\pi_{q+4\|t}$	0.17***	0.17***	0.20**	0.20**	0.17***	0.16***	-0.11	-0.10
	(0.05)	(0.05)	(0.08)	(0.08)	(0.04)	(0.04)	(0.19)	(0.20)
$Ex_{q\|t}$	0.04***	0.04***	0.02	0.02	0.05***	0.04***	0.05	0.04
	(0.01)	(0.01)	(0.04)	(0.03)	(0.01)	(0.01)	(0.03)	(0.04)
$Ey_{q\|t}$	0.06**	0.06**	0.05	0.06	0.11***	0.11***	0.04*	0.04**
	(0.03)	(0.03)	(0.05)	(0.05)	(0.02)	(0.02)	(0.02)	(0.02)
RvD_t Hawks	-0.27		-0.30		0.32		-0.59	
	(0.42)		(1.53)		(0.20)		(0.43)	
RvD_t Doves	-0.82		-3.86		0.98*		-0.46	
	(0.73)		(3.04)		(0.56)		(0.46)	
RvD_t Swingers	0.21		-7.06		0.63**		1.00**	
	(0.40)		(6.18)		(0.28)		(0.45)	
R_t Hawks		0.51		1.75		0.44**		-0.18
		(0.40)		(3.46)		(0.20)		(0.42)
D_t Hawks		1.60		1.49		0.19		2.13
		(1.17)		(2.52)		(0.46)		(1.55)
R_t Doves		-1.11		-8.37		0.21		-0.53
		(0.83)		(8.41)		(1.04)		(0.55)
D_t Doves		0.30		2.96		-1.46**		-0.23
		(0.90)		(2.60)		(0.59)		(0.71)
R_t Swingers		0.15		-3.95		-0.17		0.55
		(0.61)		(15.19)		(0.60)		(0.54)
D_t Swingers		-0.32		6.75		-0.81***		-1.76
		(0.50)		(6.00)		(0.29)		(1.39)
ρ_1	0.93***	0.93***	0.91***	0.91***	0.93***	0.93***	0.97***	0.96***
	(0.02)	(0.02)	(0.04)	(0.04)	(0.02)	(0.02)	(0.02)	(0.02)
Observations	332	332	104	104	149	149	79	79

Note: *** p<0.01, ** p<0.05, * p<0.10. Newey-West HAC standard errors in parenthesis.

Table C.5: Simple Monetary Policy Rule with Interactions - Greenspan Years

	0%-100%	20%,80%	10%,90%
	(1)	(2)	(3)
ρ_1	0.93***	0.93***	0.94***
	(0.02)	(0.02)	(0.02)
$E\pi_{q+4\|t}$	0.17***	0.17***	0.17***
	(0.04)	(0.04)	(0.04)
$Ex_{q\|t}$	0.05***	0.05***	0.04***
	(0.01)	(0.01)	(0.01)
$Ey_{q\|t}$	0.11***	0.10***	0.11***
	(0.02)	(0.01)	(0.01)
RvD_t	0.54***		
	(0.19)		
ϕ_π^{high}		0.03	
		(0.02)	
ϕ_π^{low}		-0.06*	
		(0.04)	
ϕ_x^{high}		-0.02	
		(0.02)	
ϕ_x^{low}		0.00	
		(0.02)	
ϕ_y^{high}		-0.00	
		(0.02)	
ϕ_y^{high}		0.03	
		(0.03)	
ϕ_π^{high}			0.05
			(0.03)
ϕ_π^{low}			-0.10***
			(0.03)
ϕ_x^{high}			0.00
			(0.03)
ϕ_x^{low}			0.02
			(0.02)
ϕ_y^{high}			-0.01
			(0.03)
ϕ_y^{high}			0.01
			(0.02)
Observations	149	149	149
R-Squared		0.991	0.992

Note: *** p<0.01, ** p<0.05, * p<0.10. Newey-West HAC standard errors in parenthesis.