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German Economic Research Institutes based on
Text Mining Techniques**

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Sharks and minnows in a shoal of words: Measuring latent ideological positions of German economic research institutes based on text mining techniques*

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Abstract

Using corpora of business cycle report sections dealing with monetary and fiscal policy issues from 1999 to 2017 and using methods of unsupervised text scaling (Slapin and Proksch, 2008; Lauderdale and Herzog, 2016), namely *Wordfish* and *Wordshoal* we scale the institutions’ theoretical/ideological position over debates. The results are in line with the findings from descriptive textual analysis. For monetary policy, we observe a strong but short-lived consensus in debate-specific positions at the height of the financial crisis in 2008 and a larger polarization after 2008 compared to the sample period before. For the fiscal policy textual corpus, the polarization was similarly high before and after the crisis. For both policy areas, the institutions DIW Berlin and IfW Kiel define the outer bounds of the observed spectrum of latent ideological positions.

Keywords: Text Scaling Model; Wordfish; Wordshoal; Computational Content Analysis; Hierarchical Factor Model; Bayesian Estimation; Political Economy; Ideology; Polarization; Public Policy; Monetary Policy; Fiscal Policy

JEL classification: E32; E52; E62; H3; C55; D7; P16

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1 Introduction

Economics as a social science rests inevitably on the normative preferences and political standpoints of the involved scientists and, consequently, research institutions like university departments and institutes. The factual or perceived political point of view of social scientists in general and economists in particular is of relevance for a couple of reasons: First, it may influence the research process itself. Economists might be more or less open to new ideas depending on who has proposed them. For example, in an experimental setting, Javdani and Chang (2019) show, that economists' agreement to a statement depends on whether they suppose it stems from a "mainstream" economist or not. Also, Kirchgässner (2011) argues that the interpretation of econometric results strongly depends on a priori beliefs represented by the field the research stems from: economists believe in a deterrence effect of capital punishment, whereas researchers from other fields do not. Second, economists still see themselves to a notable extend as part of theoretical or political schools of thought. In a survey among German forecasters, Döpke et al. (2019) find that a large fraction of the respondents subscribes to a school of thought that is often linked to particular political views, such as the 'Keynesian', 'monetarist', and similar ways of thinking. Recently, van Dalen (2019) surveyed Dutch economists and found that their personal values have an impact on their economic and methodological choices. Third, the ideology of an institution possibly influences how consumers or firms form their expectations. For example, based on a survey among consumers, Bachmann et al. (2019) show that their inflation expectations differ between states, according to changes in the White House occupant and depending on whether Republicans or Democrats dominate the state. More recently, it has become clear that this is not only the case for economic news: In the U.S., according to Cookson et al. (2020), Democrats have been much more concerned about the coronavirus than Republicans, and, therefore, more bullish on stocks. Hence, if the public sees a particular institute at least partially as representing a certain political group or camp (Geiger et al., 2009), the expectations of economic agents will respond differently to the forecast or the policy advice of the institution.

Given the possible importance of the ideology of economists the question arises, as to how this concept can be measured to make it possible to test some of the hypotheses mentioned above empirically. To this end, this paper uses computer-based text analysis methods that have recently been successfully applied to related problems in other fields like political science. In particular, we use *Wordfish*, and *Wordshoal* approaches.

In this study, we refer to institutions that forecast the development of German business cycles. The focus on these institutions is motivated by the crucial role they play in forming macroeconomic expectations and beliefs. For example, Roth and Wohlfart (2019) show in an experimental setting, that individuals respond to changes in professional forecasts by adjusting their own macroeconomic outlook. Carroll (2003) provides a model and time-series evidence that households derive their expectations from the ones taken by professional forecasters transmitted by the media. The concept of narrative economics (Shiller, 2017) suggests the possibility that, for example, the *Great Recession* has been the result of popular narratives on which professional forecasters as prominent fortune-tellers (Friedman, 2013) of our times have a great influence.

Insofar as professional forecasters are important for building expectations and, therefore, for

macroeconomic outcomes, another possibility emerges: “The politics of expectations: Forecasts as politics” (Beckert, 2013, p. 237). In a broader perspective, Hirschman and Berman (2014) emphasize, among other aspects, the role of institutions in explaining the influence of economist on politics, which relates to our focus on the forecasting institutes. Furthermore, they note that reporting, for example, the Gross Domestic Product on a regular basis draws the societies’ attention to certain facets of the world: “no equivalent device brings income inequality, for example, to the forefront of our minds each quarter” (Hirschman and Berman, 2014, p. 800). Therefore, the specifically economic style of reasoning helps to explain the alleged large influence of economics on the choice of policies. Saint-Paul (2013) provides reasoning on how forecasters with a given political agenda (i.e. being more ‘pro state/market’ or ‘contra state/market’) may use models to influence macroeconomic outcomes according to their preferences. Also, from a sociological perspective, Reichmann (2018) analyses the distribution and communication of economic forecasts and its influence on, among other things, governments decisions and developments in a market economy. Saint-Paul (2018) elaborates on the trade-offs that forecasters with political preferences face: on the one hand, they intend to achieve properties of the model that matches their position. For example, a more left-leaning researcher may try to model the economy in a way that implies a large fiscal multiplier or a flat Phillips curve. On the other hand, the model still has to match the data. This leads to certain conditions a model has to match to be coherent.

We apply the selected methods to a sub-corpus of business cycle forecast reports published regularly by 5 German economic research institutes plus the ones by a working group of so-called ‘leading’ research institutes in a joint effort (‘Joint Diagnosis’, *Gemeinschaftsdiagnose*). We apply the methods on those parts of the reports where the institutions analyse monetary and fiscal policy issues including advisory text passages and sections. We define a debate as all reports published in a calendar year by the research institutes and the *Gemeinschaftsdiagnose* consortium. All business cycle departments have a very similar structure and all institutes discuss both policy fields in a macroeconomic context (texts are parts of business cycle reports). Our identification framework, therefore, assumes that there is only one latent dimension by institution which we loosely frame as “ideology”. Given this identification strategy, we analyse how certain debate-specific positions – a linear combination of debate- and institution-specific effects – evolve over time and how this is related to the general policy environment and other factors.

From a methodological perspective, this paper aims at evaluating if the *Wordfish/ Wordshoal* model provides information on the ideological bias of institutions related to economic policy advice. Information about the ideological bias of economic policy texts, in turn, can provide valuable information on the influence of ideology on policy prescriptions (Jelveh et al., 2018). In this regard, the paper adds to the general research on the positions of economists regarding economic policy.

Based on reports from 1999 to 2017 provided by five institutions, we find that on average over the entire sample, text mining results meet the conventional wisdom insofar as the Berlin institute (DIW) and the Kiel institute (IfW) are the institutions ideologically farthest from each other. Looking at the results in more detail, we find a large variation during time: the ideological sound of an institution changes, as the circumstances change. Furthermore, the development of the debate-specific positions differs considerably between texts related to monetary and fiscal policy, respectively. Both results suggest that research relying on the assumption of an “once-and-forever”

ideological tonality of an institution might be over-simplistic. We find an increased polarization of the debates over monetary policy, but not over fiscal policy, where the debates have always been quite polarized.

The remainder of the paper is organised as follows: Section 2, presents a review of the measurement of ideology in economics and neighbouring fields and the role text-mining methods play in this context. Section 3 describes the data used in the study and the criteria used for the text selection. Section 4 gives an overview of the methods used, followed by the findings in section 5. Section 6 presents the conclusion.

2 What is “ideology” and how can it be measured empirically?

2.1 Ideology: a pragmatic perspective on a disputed concept

Based on our own experience, we can say that many economists have difficulties with the claim that in their role as scientists they have political preferences or an “ideology”. This is also supported by academic work. For example, (Fourcade, 2018, p. 5) reports, based on a survey, that academic economists “were anxious to be perceived as apolitical”. This comes as a surprise because economists regularly – for example in the field of political economy – assume that individuals, politicians, or institutions differ in their opinions on policy issues and try to influence respective outcomes accordingly. Naturally, the same should hold for economists as well.

As a rule, economists use the term “ideology” in a rather pragmatic manner, sometimes they do not even bother to explain or define it. The meaning of the phrase is assumed to be self-explanatory or different across papers in economics. Saint-Paul (2018), for example, suggests that “ideological biases” correspond to different values left-wing and more conservative economists give to central macroeconomic parameters such as fiscal multipliers and the slope of short- and long-run Phillips curves. Ngo et al. (2018) also give no formal explanation or definition of the term but use affiliations to political parties or interest groups as an appropriate indicator of ideological differences. Kirchgässner (2011, p. 471) defines the concept laconically ‘ideology or, in other words, the personal convictions of the researchers’. This contrasts with the tradition in other disciplines, say sociology, political sciences, and humanities, in which authors sometimes make large efforts to precisely define the concept of ideology (Slembeck, 2000). It is also noteworthy that for parts of the economics community the term has a decisive negative connotation. Mayer (2001) notes that the term “ideological” is often used as the antithesis to “objective and scientific”. We opt for a rather pragmatic view of ideology, as in (Mayer, 2001, p. 5) , stating simply that in developing models and interpreting results extra-scientific value judgements play a role.

2.2 Attempts to measure ideology in economics

In economics, the analysis of ideological positions on research programmes and policy recommendations has received some attention in recent years. Beyer and Pühringer (2019), for example, analyse signatories of economists to petitions and open letters and conduct a social network analysis. They

find close ties along partisan (‘conservative’, ‘liberal’) lines. In the sub-field of political economy, the literature also provides some approaches in this direction. Some authors try to uncover the political orientation of persons in committees making decisions on monetary policy. For example, Berger and Woitek (1997) argue, that the voting behaviour of members of the German central bank council did not follow partisan lines, as Vaubel (1997) has found. Göhlmann and Vaubel (2007) use biographical information about central bankers to reach conclusions about their political stance on monetary policy. Potrafke (2013) extends the research from decision-making bodies to institutions of policy advice and studies the *German Council of Economic Experts* by analysing the minority positions articulated in its reports. Another strand of the literature uses survey results involving a group of prominent economists to analyse the reasons for consensus and dissent among economists (Gordon and Dahl, 2013) or to investigate latent ideological positions of these persons (Van Gunten et al., 2016). Randazzo and Haidt (2015, p. 49) also argue that ”We believe that economists, as human beings, also possess such narratives, and we expect that, on average (not in all cases), these moral narratives shape economists’ substantive conclusions—positive and normative.”.

2.3 Perspectives from political science and text mining

The analysis of ideology has a long tradition in political science and sociology. Recent developments make it possible to analyse this problem more rigorously. On the one hand, the ‘text as data’ (Gentzkow et al., 2019) revolution provides novel (possibly ‘Big’) data-sets to test related hypotheses. On the other hand, methodological advances in the field of text mining offer additional ways to statistically analyse these data. For example, the evolution of computational text analysis methods in political science offers new possibilities for the large-scale text analysis of ideological viewpoints in economic policy. The method used in this paper can detect and operationalize the stance of ideology in the context of political speeches (Proksch and Slapin, 2010), legislative debates (Lowe and Benoit, 2013) and election manifestos (Lo et al., 2014; Seher and Pappi, 2011; Slapin and Proksch, 2008; Louwerse, 2011) – texts in which ideology is expected to play an important role. It remains to be investigated if the computer-based text analysis methods work for texts in which ideology is less prominent or even discouraged, such as academic texts from economic research. ‘Importantly, detecting ideology in domains where institutions and norms are in place to maintain neutrality is different from predicting ideology in domains where it is overt, such as media or political speech [...]’ (Jelveh et al., 2018, p. 5)

In a recent study, authors attempt to identify the underlying political viewpoints of economic policy texts drawing on the usage of specific ideologically charged words such as ‘austerity’ (Gründler and Potrafke, 2019). Wehrheim (2019) uses topic models to identify the distribution of themes analysed in the annual reports of the *German Council of Economic Experts*. Javdani and Chang (2019) apply an experimental design that tests for ideologically- and authority-biased updating. Their results point to a noteworthy bias with a significant heterogeneity by different aspects such as gender, country, and area of research. In a similar vein, Jelveh et al. (2018) use topic modelling to predict economists’ partisanship from academic papers. They show that the partisanship of economists, imputed from data on their political activities, is correlated with the estimated parameters of the topic model. Bowles and Carlin (2020) apply the topic modelling ap-

proach to economic textbooks to identify their dominant themes. Lüdering and Winker (2016) use text-mining techniques to elaborate on the interaction of topics in an economics-related academic journal and real-world economic development.

This paper adds to the research on economists' ideology by applying a method of unsupervised quantitative text analysis (Poisson regression combined with a latent factor model). Grimmer and Stewart (2013) provide an overview of different methods of computational text analysis, discussing the advantages and pitfalls of the different methods. The authors propose a classification scheme that distinguishes between classification methods and ideological scaling methods, subdividing both strands into unsupervised and supervised methods. Classification methods assign texts to a set of categories. If these categories are known, they can be used in the process, providing additional information. The use of classification schemes is increasingly common in economic research (Gentzkow et al., 2019). Classification approaches such as dictionary methods and topic models find applications in the analysis of central bank communication (Born et al., 2014; Lucca and Trebbi, 2011; Nardelli et al., 2017), economic policy uncertainty (Müller et al., 2018), and other topics (Fritsche and Puckelwald, 2018; Jelveh et al., 2018; Bowles and Carlin, 2020).

In contrast to classification methods, the application of ideological scaling methods is rare in economic research. While classification methods assign texts to a set of categories, ideological scaling methods try to locate the texts in a policy space by retrieving a latent variable that is interpreted as the underlying political position or ideology of the respective text. This implies that ideology dominates the language of the text, which is an important assumption of these methods (Grimmer and Stewart, 2013; Lowe and Benoit, 2013). The most prominent approaches in this sub-field are *Wordscores*, *Wordfish*, and *Wordshoal*.

Wordscores is an automated scaling method put forward by Laver et al. (2003) and has been mainly used in political science so far. It is a supervised method, meaning that the positions of the texts are estimated based on selected reference (training) texts. *Wordfish*, in contrast, makes use of an unsupervised algorithm. This means that the method identifies words that indicate a location on a political spectrum using a parametrically estimated latent variables approach based on a Poisson distribution instead of relying on reference texts. Slapin and Proksch (2008) developed the *Wordfish* model in the context of political science debates. The authors estimated latent policy positions of German political parties from party manifestos from 1990 to 2005 and cross-validated the results with hand-coding, expert surveys, and results from *Wordscores*. A further investigation of the method using Monte-Carlo simulation confirms the robustness of the algorithm and provides guidelines for the use of the *Wordfish* model with respect to German texts (Proksch and Slapin, 2009). Lowe and Benoit (2013) applied the method to legislative debates in Ireland, validating the output from the *Wordfish* model with the results from a hand-coded method. They find a high correspondence of the results with two exceptions that might point to additional dimensions, picked up either by the coders or the *Wordfish* model. Louwerse (2011) uses the *Wordfish* model to investigate the congruence between the party manifestos and parliamentary speeches. The authors categorize the paragraphs of the manifestos and the parliamentary speeches into different issues, such as Foreign Affairs and Economy.

Lauderdale and Herzog (2016) extend the *Wordfish* model by explicitly considering that one or

more further dimension(s) might interfere with the ideological positioning. Specifically, it addresses two key limitations of the traditional *Wordfish* approach, namely that word discrimination parameters are assumed to be the same over debates or time and that topic variation is not considered. Goet (2019) and Wratil and Hobolt (2019) have used the *Wordshoal* model to analyse political debates in the UK or Europe but to the best of our knowledge has never been used in political economy contexts and economics.

3 The Dataset

In this section, we describe the data at hand. In particular, we give an overview on the German economic research institutes we consider in this study, explain the criteria on which we base the selection, and explain, how we extract the texts for the analysis in the paper.

3.1 The German forecasting institutions

For Germany, a broad range of institutions provides research-based economic policy advice. We focus on institutions, that are based in Germany and provide forecasts for the German economy¹. Since we are interested in a possible influence of political positions of research institutions, we restrict our investigation to institutions that are not themselves part of the political decision-making (e.g. the Bundesbank or the Federal ministries which are responsible for the *Annual Economic Report of the German Federal Government*) and that offer forecasts and policy advice as a public good. Also, we are interested in macroeconomic policy and consider institutions with a focus on specific regions or branches. All these criteria lead us naturally to those economic research institutes in Germany that have taken part in the ‘joint diagnosis’. While the institutes forming this group have changed quite a bit over the last couple of years, some major institutes have participated in at least 28 forecasts of the ‘joint diagnosis’ over the last 20 years (compare Figure A1 in the appendix), namely²:

- The German Institute of Economic Research (DIW), Berlin and its texts on the prospects of the German economy published in its regular publication series ‘*DIW Wochenbericht*’
- The Institute for World Economics (IfW), Kiel. In this case, we have collected the texts published in the institute’s journal ‘*Die Weltwirtschaft*’ for the larger part of the sample and on internet publications for more recent texts.
- The ifo institute, Munich, which publishes most of its forecast related texts in the journal “*ifo Schnelldienst*”.
- The RWI - Leibniz Institute for Economic Research, Essen, which publishes most of its business cycle diagnoses in the journal ‘*RWI Konjunkturberichte*’.

¹Therefore, we do not consider, for example, the European Central Bank, which does not provide public forecasts specifically for the German economy

²Other studies on the political position of German economic research institutes refer to a similar selection (see, e.g., Gründler and Potrafke, 2019)

- The IWH - Halle Institute for Economic Research, Halle, which publishes most of its forecasts in the journal ‘*Wirtschaft im Wandel*’.

Furthermore, we considered the bi-annual publications on the state and prospective macroeconomic development of the German economy by the ‘joint diagnosis’ itself for the corpora.

We make use of data from 1999 to 2017. The beginning of the sample is motivated by the introduction of the joint European currency since one of our objectives is to analyse the political view on monetary policy. The introduction of a joint currency also had implications for the institutional framework of fiscal policy. It, therefore, seems justified in our view to analyse both policy fields only from 1999 onwards.

3.2 Criteria for text selection

Referring to Slapin and Proksch (2014), Bunea and Ibenskas (2015) point out four central assumptions that need considering in the context of quantitative content analysis: 1. ‘the dimensionality of the political/policy space’, 2. ‘the informative nature of texts’, 3. ‘the data/text generating process behind analysed documents’ and 4. ‘the comparability of texts’, taking into account the language, the audience addressed and the data generating process (Bunea and Ibenskas, 2015, p. 432). Since the selected reports are written for the same audience and generated in a similar work process, we consider assumptions 2 to 4 to be fulfilled. Concerning the dimensionality of the policy space, we tried to define clearly delineated subjects to retrieve text sections that deal with only one economic policy field.

Apart from the dimensionality of the policy space, it was important to identify a policy field that is covered over a long period and by all six institutions. We, therefore, chose monetary policy and fiscal policy as two separate fields of economic policy forming a substantial part of the economic policy debate. They are part of nearly every economic report while other topics like labour market policy and wage policy are subject to greater fluctuations, depending on the current economic policy debate.

As regards the structure of the reports, institutions, like the DIW, IWH, RWI, and the ‘joint Diagnosis’ follow the same consistent structure over long periods. Their reports contain three chapters: the first describes the world economy and the German economy, the second presents the forecast results for the economic development, and the last chapter focuses on the economic policy conclusions, often entitled ‘economic policy considerations’. The reports of the ifo and the IfW, on the other hand, do not follow a given structure. Rather, their reports rely on a more thematic approach. With their generally assumed supply-side identities (Ngo et al., 2018), both the IfW and the ifo represent an important economic policy position within the German economic policy framework. They furthermore make a substantial part of the ‘joint diagnosis’, being involved in 40 and 34 reports over 20 years, respectively (compare figure A1 in Appendix). Hence, we decided to keep them in our sample even though this might cause some inconsistency within the data.

Concerning the first category of reports, we chose all sections that deal explicitly with monetary or fiscal policy within the chapter on economic policy considerations. Since not all relevant data

were included in these chapters, we additionally started a word search for specific monetary or fiscal policy related words³ and checked whether the sections in question deal dominantly with either monetary or fiscal policy. Information boxes and text passages, entitled ‘Excursus’, which deal with specific or technical aspects, were not included in the corpora.

Finally, this leads us to two corpora with 292 texts for monetary policy and 307 texts for fiscal policy.

4 Methods: *Wordfish* and *Wordshoal*

To measure ideological positions we make use of *Wordshoal*, a parametric scaling model based on Poisson regressions (*Wordfish*, see Slapin and Proksch (2008)) combined with a Bayesian factor decomposition (Lauderdale and Herzog, 2016).

To better grasp the idea of *Wordshoal* as a hierarchical factor model with three dimensions (word, institution/speaker, and debate) one might beforehand refer to its two-dimensional predecessor model *Wordfish* (Slapin and Proksch, 2008). The goal of the unsupervised scaling method *Wordfish* is to measure a single latent factor in the policy space which is typically assumed to measure ideology (Slapin and Proksch, 2014; Bunea and Ibenskas, 2015). To do so, *Wordfish* infers policy positions from word frequencies to compute a scaling coefficient based on similarity/ distance in feature use after controlling for word- and debate-specific fixed effects. By construction, *Wordfish* assumes a two-dimensional dataset with the dimensions word (k) and document/speaker (d). The frequency with which document d contains the word k is drawn from a Poisson distribution:⁴

$$w_{ik} = \text{Poisson}(\mu_{dk}) \quad (1)$$

$$\log(\mu_{dk}) = \nu_d + \lambda_k + \kappa_k \theta_d \quad (2)$$

where μ_{dk} indicates the frequency of the word k used in document d and several latent parameters, namely ν_d as a document-specific fixed effect (sometimes referred to as ‘loquaciousness’ of the respective speaker/document), λ_k as a word-specific fixed effect, θ_d as the latent *position* of the statement of document d in the policy space and κ_k as the relationship of word k to the latent document position. The key idea of the model can be described as follows: controlling for document length and word frequency, words with negative κ_k will tend to be used more often in documents with negative θ_d (and vice versa). Hence, κ_k can be seen as a discrimination parameter of word k for ideological positions expressed in the document (Benoit, 2018, p.37).

After setting an identifying constraint⁵ the *Wordfish* model estimates results in a one-

³For monetary policy we searched for the words and word stems ‘GELDPOL’, ‘ZINS’, ‘EZB’, for fiscal policy we searched for ‘FINANZPOL’, ‘FISKAL’, ‘AUSGABEN’, ‘STEUERN’, and ‘SCHULDEN’

⁴The word ‘poisson’ also means “fish” in French. *Wordfish* could, therefore, and with some nerdy humour be interpreted as *Word-Poisson*. This explains the “fishy” language used for labelling some of methods. The model is arguably appropriate for word frequency analysis as Poisson-distributed variables are bounded between $(0, \infty)$ and only take discrete values $0, 1, 2, \dots$. Due to the exponential transformation word counts are modelled as a function of log document length and word frequency (Benoit, 2018, p. 38)

⁵Benoit (2018) discusses several assumptions to identify the position on a left–right scale. We apply an inequality

dimensional scale θ_d in the document dimension d as a proxy of the ideological position expressed in the respective document (Goet, 2019). The estimation procedure proposed by Slapin and Proksch (2008) is based on a conditional maximum likelihood algorithm. Other possible approaches include Monte-Carlo-Markov-Chain (MCMC) procedures and methods based on variational inference using an expectation-maximization (EM) algorithm (Imao et al., 2016).

The *Wordshoal* model is an extension of the *Wordfish* approach. It assumes that one or more further dimension(s) might interfere with the ideological positioning. Specifically, it addresses two key limitations of the *Wordfish* approach, namely that word discrimination parameters are assumed to be the same over debates or time and that topic variation is not considered.

In the implemented version of *Wordshoal*, we assume three dimensions (Lauderdale and Herzog, 2016, p. 1) – a word dimension, a debate-specific dimension, and a latent institution-specific dimension. Put it differently, the dimension ‘document’ of the established *Wordfish* model is now decomposed into two dimensions – debate-specific effects and a vector of the latent institution-specific positions. The space where the vector of latent positions is located is interpreted as an ‘ideology’ space by Lauderdale and Herzog (2016).

To apply the approach, we first had to decide on the debate classification. For corpora in political science a debate dimension might be easily operationalized (parliament debates, legislative debates, etc.). In our application we opted for a yearly aggregation, i.e. summing up all statements in a calendar year as a “pseudo-debate”. Second, we have to assume an identifying assumption as in the *Wordfish* model. Again we assume to have the latent position of DIW to be left of the position of IfW in early 1999 (first observation of documents for both institutions in our corpora).

The *Wordshoal* model is then implemented as a hierarchical factor model and estimated in a two-step procedure.⁶ In the first stage, a *Wordfish* model is estimated to scale word-use variation in each debate separately. Specifically, at this stage of the model, the frequency that speaker/institution i will use word k in debate j is given by:

$$w_{ijk} = \text{Poisson}(\mu_{ijk}) \quad (3)$$

$$\log(\mu_{ijk}) = \nu_{ij} + \lambda_{jk} + \kappa_{jk}\psi_{ij} \quad (4)$$

where ν_{ij} stands for individual/institution i ’s word usage in debate j , $\lambda_{jk}, \kappa_{jk}$ for word-debate-usage parameters and ψ_{ij} for the speaker/institution i ’s debate-specific position. The estimation is based on the MCMC approach (Lauderdale and Herzog, 2016, p. 6).

In the second stage, a Bayesian factor analysis is applied to decompose the document-specific positions ψ_{ij} into institution- and debate-specific latent factors.⁷ Specifically, the second-stage

constraint for two $\hat{\theta}$ s to specify a left–right direction for the first observable statements of the DIW and IfW in 1999 (see Döpke (2000) for arguments underpinning this view). The assumption is stated in such a way that $\hat{\theta}_{DIW(1999:M01)} < \hat{\theta}_{IfW(1999:M03)}$, i.e. DIW’s position in January 1999 is left of the IfW’s position in March 1999 in relative terms.

⁶Lauderdale and Herzog, 2016, p. 6 argue that a fully hierarchical model estimated in one step would impose more computational difficulties without significant gains in estimation efficiency.

⁷The second-stage factor analysis is performed using the R package *rjags* (Plummer, 2019) as implemented in the R package *quanteda* (Benoit et al., 2018).

model is given by:

$$\psi_{ij} \sim \mathcal{N}(\alpha_j + \beta_j \theta_i, \tau_i) \quad (5)$$

$$\theta_i \sim \mathcal{N}(0, 1) \quad (6)$$

$$\alpha_j, \beta_j \sim \mathcal{N}(0, 0.25) \quad (7)$$

$$\tau_i \sim \mathcal{G}(1, 1) \quad (8)$$

Lauderdale and Herzog (2016, p. 5) argue, that “ ψ can be more or less strongly associated with the aggregate latent dimension θ being estimated across all debates, with either positive or negative polarity for any particular debate. Essentially, this allows the model to select out those debate-specific dimensions that reflect a common dimension (large estimated values of β_j), while down-weighting the contribution of debates where the word usage variation across individuals seems to be idiosyncratic ($\beta_j \approx 0$).” Parameter β_j is, therefore, referred to by Lauderdale and Herzog (2016) as a measure of “polarity”.⁸

Table 1: Quantities of interest and interpretation

Quantity	Unit in Lauderdale and Herzog (2016)	Unit in this paper	Statistic	Description
Position on general scale	Speaker	Institute	θ_i	Latent (ideological) position of institution i on general scale
Debate-specific position	Speaker	Institute	$\psi_{ij} \cdot \beta_j$	Position of institution i on debate j (calibrated to the general scale)
Debate loading	Set of debates	Time period in years	$\sqrt{\frac{\sum_j n_j \cdot \beta_j^2}{\sum_j n_j}}$	Strength of association of debate-scales with general scale across debates/years (root mean square, weighted by number of speeches n_j in each debate j)
Word loading	Word	Word	$\frac{\sum_j n_{kj} \cdot \kappa_k \beta_j}{\sum_j n_{kj}}$	Association of word with general scale across debates (mean, weighted by frequency of word appearance n_{kj} in each debate)
Baseline position	./.	Debate	α_i	Baseline ideological position of debate j (Benoit, 2018, p. 49)
Polarization	./.	Debate	$ \beta_i $	Correlation of debate i with common dimension j as a measure of “polarization” (Lauderdale and Herzog, 2016; Benoit, 2018)

Source: Modified Table 1 from Lauderdale and Herzog (2016, p. 5) and Benoit (2018, p. 49).

Lauderdale and Herzog (2016, p. 5) suggest combining first and second stage parameters to compute quantities of interests. Table 1 compares the main variables of interest in Lauderdale and Herzog (2016) and in the present paper. Specifically, we make use of θ_j which in our view measures the ideological position as a latent debate-invariant common dimension for all institutions, $|\beta_i|$ as

⁸According to Lauderdale and Herzog (2016, p. 5), “priors for θ_i and β_j allow the model to remain agnostic about the relative polarity of individual debate dimensions, while constraining the common latent dimension of interest to a standard normal scale.”

a measure for the ‘polarization’ of debates and α_i as the ‘baseline ideological stance’ of debate i . Furthermore, we use the ‘debate-specific position’ $\psi_{ij} \times \beta_j$ which can be interpreted as the position of institution i on debate j calibrated to the general scale. We also calculate a debate loading as a measure of association of debate-scales with the general scale, as well as some measures of word loadings to measure the strength of association for certain words or groups of words with the general scale across sets of debates.

5 Results

5.1 *Wordfish* results: The impact of the financial crisis

As a starting point, the *Wordfish* model was estimated over both – monetary and fiscal policy – corpora separately but without considering possible debate-specific changes in language features (assuming λ_k and κ_k to be invariant to debates). The results for the document position θ_d are plotted in Figure 1 sorted by years and in descending order within each year.

The results are interesting, because – given the restrictive assumption of a unique debate – we observe a common shift of all institution positions (θ_d in the *Wordfish* specification) during the financial crisis 2008 and the years following it. This is pronounced for the text sections on monetary policy indicating that a shift in the topics and narratives of the debates happened quite fast. Interestingly, the measure seems to drift back to its pre-crisis levels at the end of the sample, possibly reflecting more critical comments on the course of ECB’s monetary policy.

For fiscal policy text sections, a shift in the measured positions is also observable but occurs in a smoother manner over time. Also, the values drift from a positive to a negative θ estimate, i.e. in the opposite direction vis-à-vis the development in monetary policy debates.

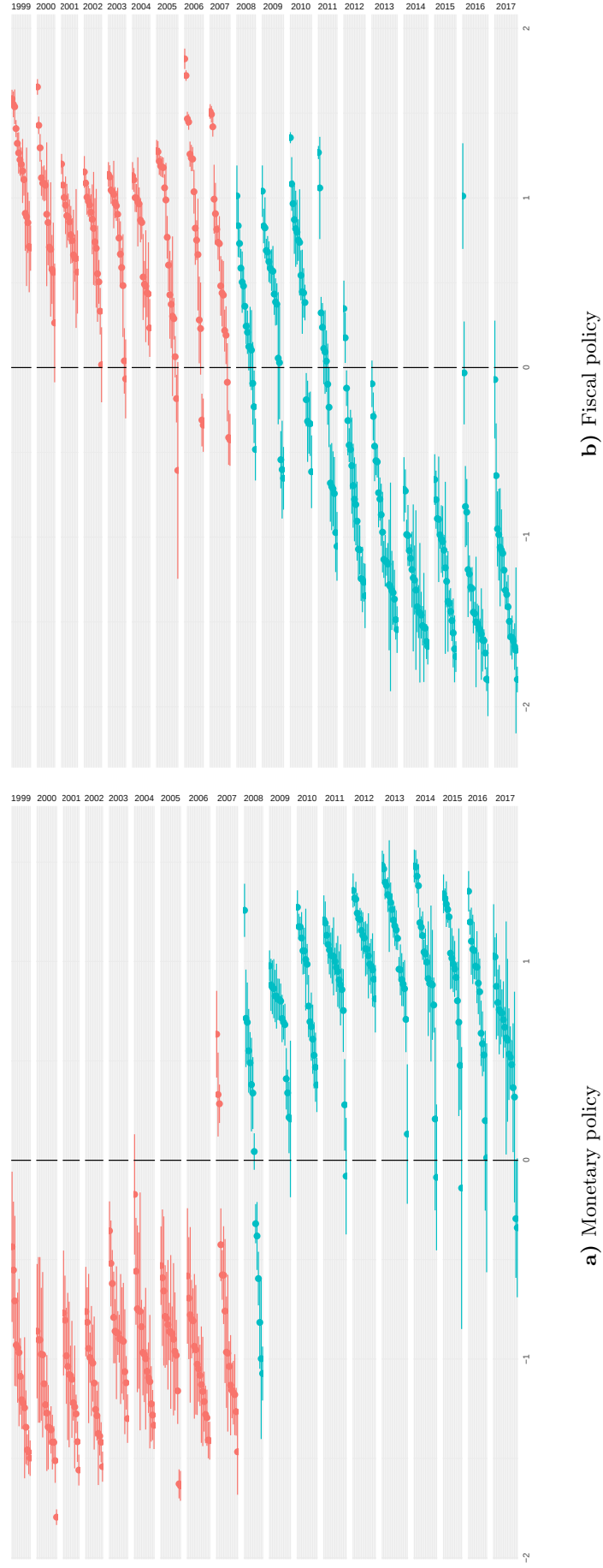
5.2 Discourse over time: a descriptive perspective

In our view, the *Wordfish* results indicate a problem with a shift in the focus of debates for both policy fields. To visualize some aspects of the changing focus of debates or narratives, we used some standard descriptive text mining tools.

As a first exercise, for both monetary and fiscal policy texts, we have split the corpora after December 2007 in pre- and post-2008 corpora and in all cases, we calculated log-likelihood tests over all tokens in the vocabularies.⁹ Figure 2 displays the main results. Words on the right-hand side of the figure indicate significant over-representation for the post-2008 period, words on the left-hand side indicate over-representation for the pre-2008 period. The size of the words is governed by the χ^2 statistic of the log-likelihood test for equally distributed terms across corpora. The larger the word is printed, the higher the respective χ^2 statistic. The distance from the zero point on the x-axis measures the degree of over-/under-representation. The larger the distance of a displayed word to the zero point, the higher is the degree of over-/under-representation.

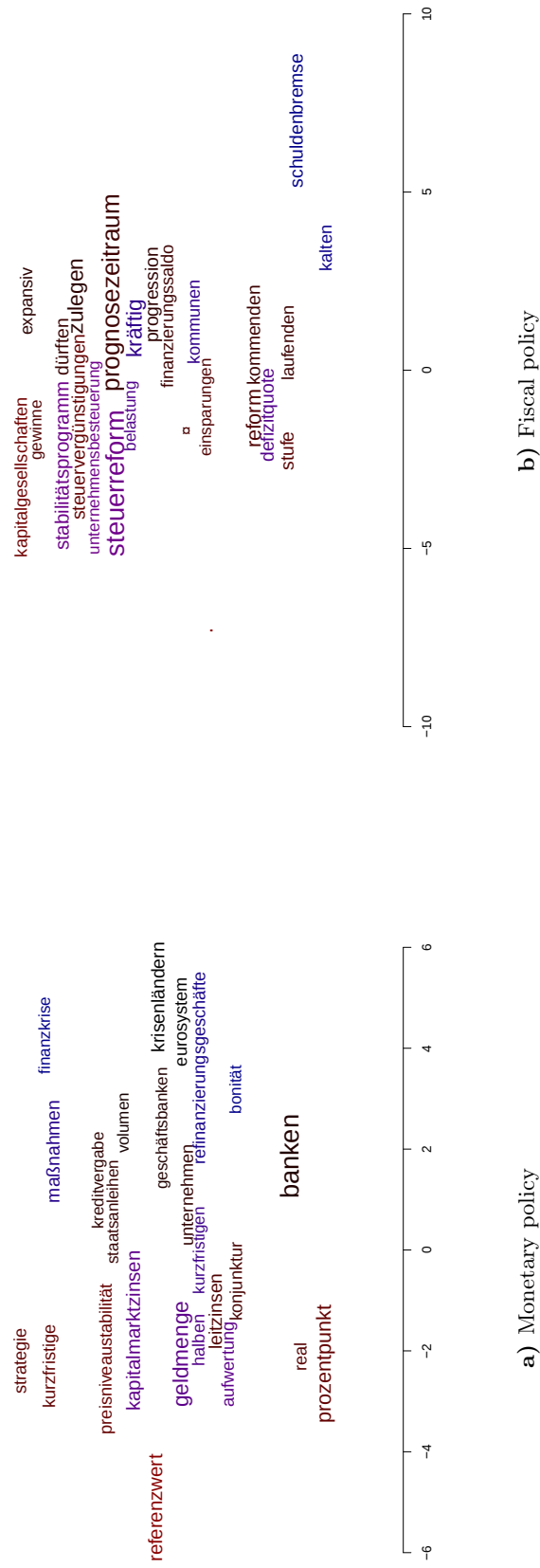
⁹We applied the R packages `corpustools` (Welbers and van Atteveldt, 2020) and `udpipe` (Wijffels, 2019) to use a state-of-the-art German language model for pre-processing and corpus analysis.

Figure 1: *Wordfish* $\hat{\theta}$ results



Source: Authors' own calculation. **Red:** before financial crisis. **Turquoise:** after financial crisis. Results for all documents with ± 1.96 s.e. confidence bounds, grouped by years and descending order of θ_d within each group

Figure 2: Comparison pre-/post-2008 corpora



Source: Authors' own calculation based on Welbers and van Atteveldt (2020). Plot shows the log ratio for over-representation (ratio > 1) as well as under-representation (ratio < 1) from a word-by-word corpora comparison exercise on the x axis, the size of the words are determined by a χ^2 score. Over-representation is defined with respect to the post-2008 period.

For the monetary policy corpus we observe that in the pre-2008 period, discussions were focused on other debates than in the post-2008 period. The corpora are different in the usage of terms as e.g. ‘Geldmenge’ (money supply), ‘Referenzwert’ (reference value), and ‘Preisniveaustabilität’ (stability of price level) which are significantly overrepresented in the pre-2008 sub-corpus. Terms like ‘Krisenländer’ (crisis countries), ‘Finanzkrise’ (financial crisis), and ‘Banken’ (banks) are relatively overrepresented in the post-2008 sub-corpus.

For the fiscal policy corpus, tax reforms played a role in the debates preceding those in 2008. We find ‘Steuerreform’ (tax reform), ‘Unternehmensbesteuerung’ (corporate taxes), and ‘Kapitalgesellschaften’ (corporations) among the overrepresented terms. For the post-2008 corpus, we find terms like ‘expansiv’ (expansionary), ‘kräftig’ (strong), or ‘zulegen’ (increase), which indicate debates related to stabilization policies (possibly after the downturn associated with the financial crisis). Furthermore, we find terms like ‘Finanzierungssaldo’ (budget deficit), ‘Schuldenbremse’ (debt brake), and ‘Kommunen’ (municipalities) as being overrepresented, indicating ongoing discussions on consolidation strategies and the fiscal stance at the municipality level.

Overall, the descriptive analysis points to a general scepticism concerning the assumption of a stable debate over all the years under investigation¹⁰. Probably an important dimension is missing and therefore we turned for further analysis to the *Wordshoal* model.

5.3 *Wordshoal* results

5.3.1 The latent ideological position of the institutes on fiscal and monetary policy

Figure 3 depicts the $\hat{\theta}_i$ values for the institutions at hand based on the whole sample and estimated by the second-stage factor model in *Wordshoal*.

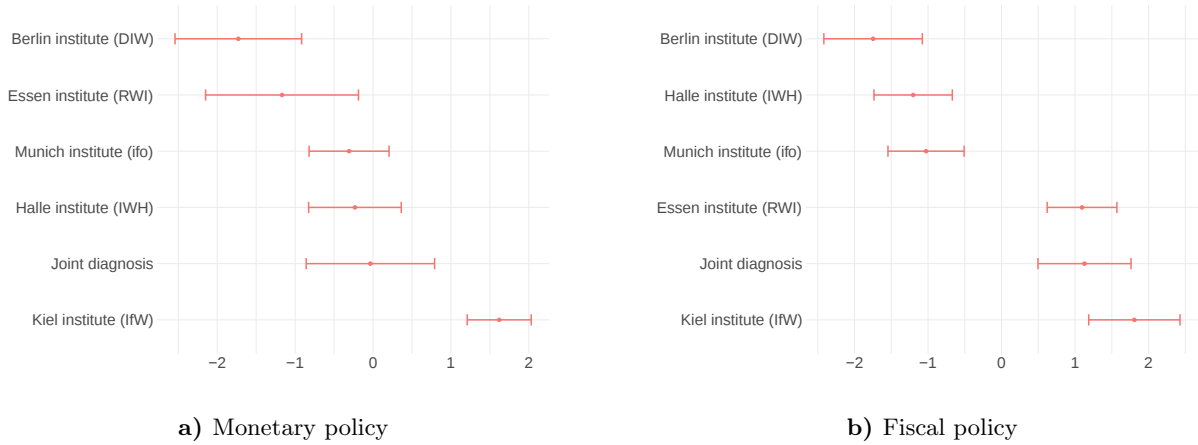
Looking at the results for texts on *monetary policy* first, it appears that they match conventional wisdom (see, for example, Ngo et al., 2018, and the literature cited therein): the DIW and the IfW are the wingers on monetary policy. Interestingly, all other institutions, except the IfW institute, have quite similar $\hat{\theta}$ values even, if the relatively large standard errors of estimation are considered. The estimates come as no surprise, since both institutes representing the largest and highest values, respectively, have been associated with a Monetarist (Kiel) or a Keynesian (Berlin) perspective regarding the role of monetary policy¹¹. Nevertheless, the results are of some importance, since they underlines that textual analysis leads to reasonable results with very modest assumptions on the identification strategy.

Turning to the ideological position estimated out of texts on *fiscal policy* we also find a pattern that is by and large in line with the perception of the institutes’ position in public opinion. Still, one noteworthy difference from the results for monetary policy stands out, as the IfW is in this context joined in its relative position by the RWI and even by the joint diagnosis. By contrast, as it

¹⁰These results are also confirmed by a semantic network analysis – not presented in this paper, but available upon request from the authors – suggesting that the ties between certain keywords of economic analysis have changed markedly after the event.

¹¹For an attribution of a theoretical viewpoint of the institutes, see Ngo et al. (2018) and the literature cited therein.

Figure 3: *Wordshoal* $\hat{\theta}_i$ estimates



Source: Authors' own calculation. $\hat{\theta}_i$ results with ± 1.96 s.e. confidence bounds.

concerns monetary policy the IfW appears to be an outsider as compared to the other institutes.

If we take the two policy areas together, notable differences become apparent: while the IWH is close to the DIW in terms of monetary policy, it is closer to the IfW as regards fiscal policy. While the RWI sides with the DIW on monetary policy, it has a $\hat{\theta}$ more similar to the IfW in case of fiscal policy. Hence, a single ideological position over all policy areas of an institution might be an over-simplification. These results are in line with Ngo et al. (2018), who differentiate between demand-orientated and other minority reports in the ‘Joint diagnosis’. Also, they find some period dummies significant in their specifications, pointing to changes of the ideological positions over time.

5.3.2 Debate-specific positions over time

The text-mining techniques allow going beyond the conventional wisdom by showing that the position of institution i on debate j (calibrated to the general scale after controlling for the debate-invariant latent ideological stance and polarity) moves considerably. Figure 4 shows the debate-specific positions for the institutions under investigation.

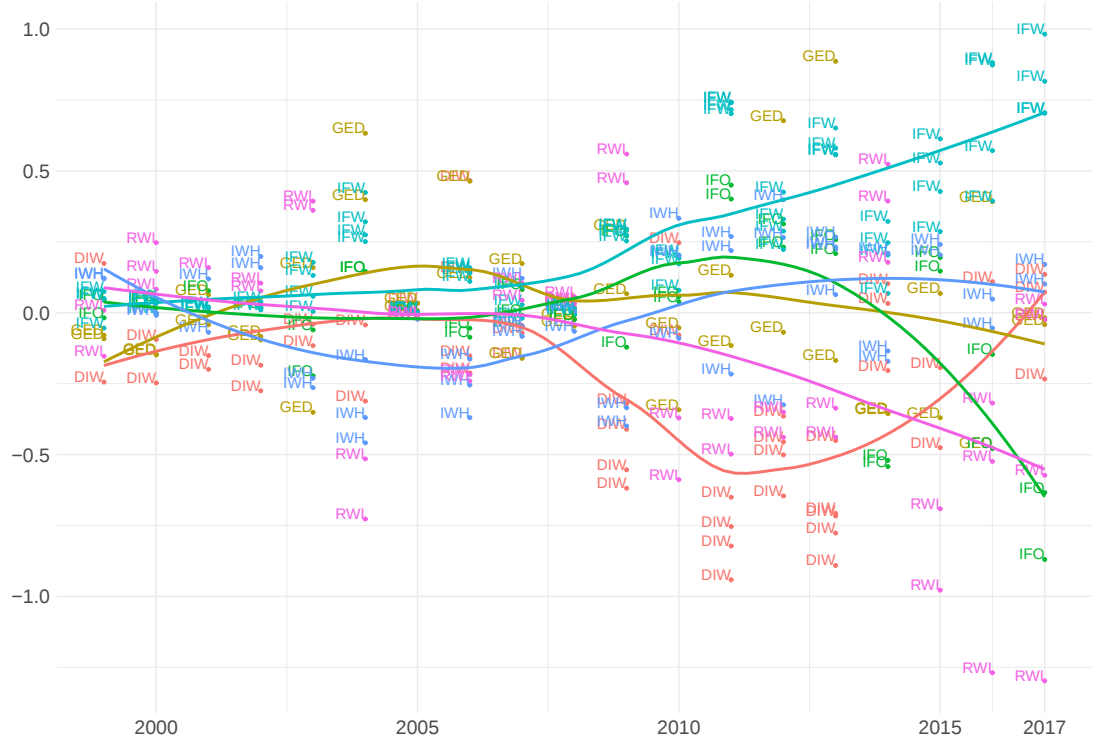
In other words, in some debates, most of the institutions sound more like the average left of the right-wingers of the monetary policy debate: sometimes, economists affiliated with the IfW use a phrase usually more associated with Keynesian leaning texts, while the economists employed in Berlin use a slightly more monetarist wording.

Looking first at the results for texts on *monetary policy*, results seem plausible from the perspective of common sense. In 2016/17, the difference between the IfW and the RWI is quite stark, reflecting in part, that these institutes are relatively outspoken on monetary policy¹².

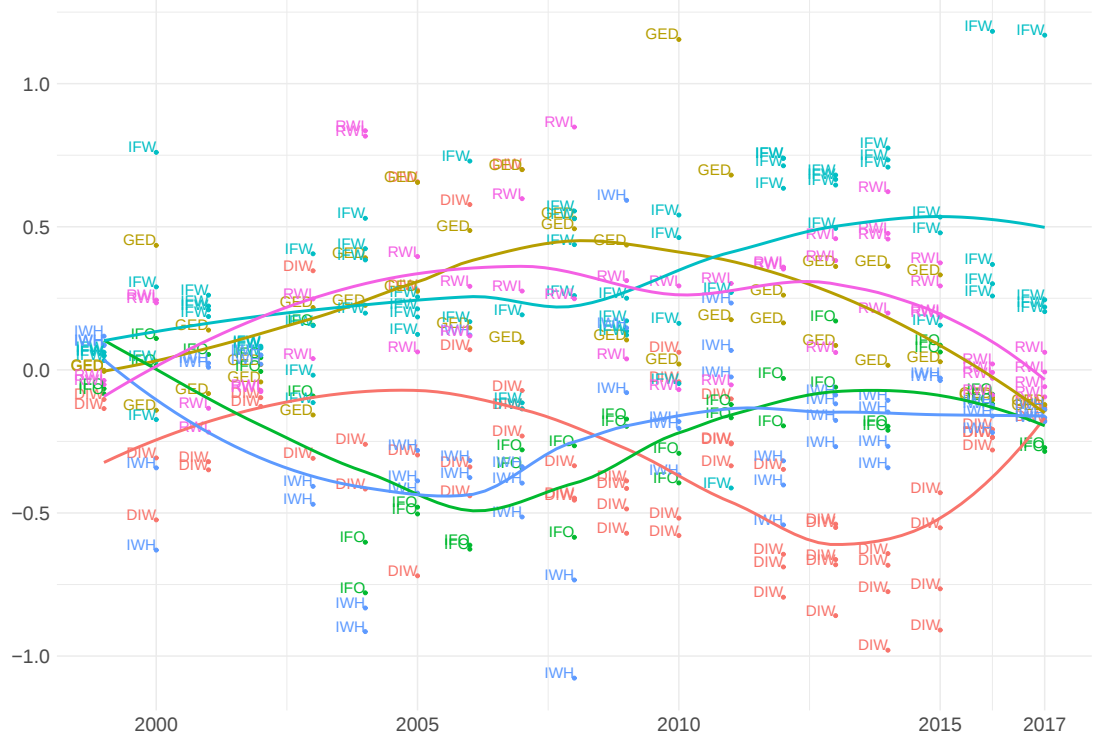
Turning to the change of debate-specific positions over time for each institution separately, at least two institutions have undergone noteworthy changes. The debate-specific position of the

¹²Ngo et al. (2018, p. 44) report that just after the DIW those institutes have the largest share in minority reports on monetary policy in the joint diagnosis.

Figure 4: Debate-specific positions $\hat{\psi}_{ij} \times \hat{\beta}_i$



a) Monetary Policy



b) Fiscal Policy

Source: Authors own calculation based on Table 1

IfW shifted considerably towards a higher positive value. This process begins roughly with texts produced around 2013 or 2014.

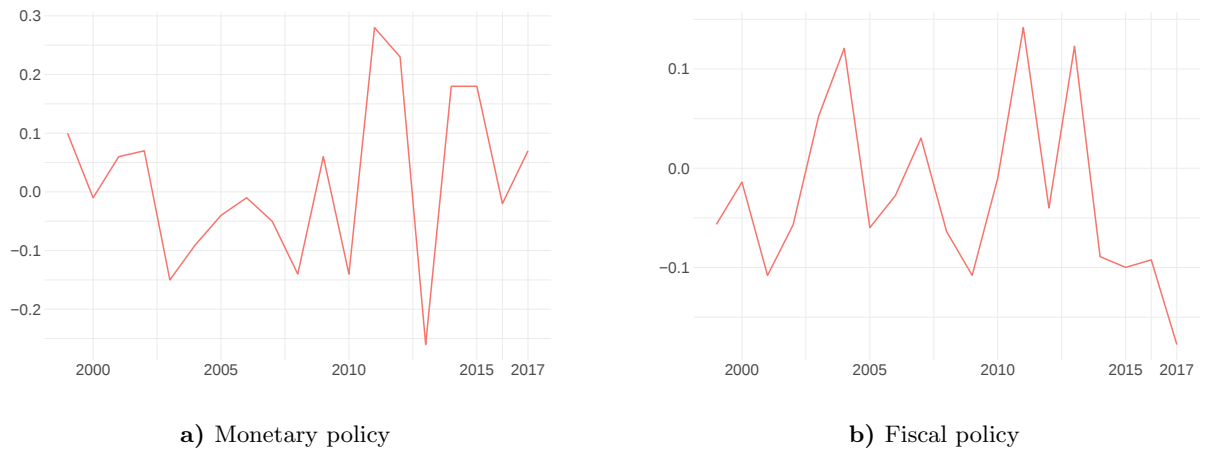
Another change – albeit shorter and less pronounced – is also visible for the Munich (ifo) institute, where the values of the debate-specific position shift towards negative values at the end of the sample. The changes in debate-specific positions call into question the assumption of a static once-and-forever ideological wording of an institute under any circumstances. Rather, the ideological position, which is assumed to be time-invariant, interacts with the baseline orientation and polarity of the current debate. Let us consider a parliamentary debate as an example: while one can safely assume that the orientation of the political parties remains relatively stable, a certain speaker representing this party might sound different in a discussion over other topics, say, social policy or national defence.

Figure 4 suggests that the debate-specific positions on *fiscal policy* do not become more diverse over time as in the case of monetary policy. Furthermore, visual inspection reveals that phases in which a certain institute is consistently found to be left or right in terms of positions are less frequent as in the case of monetary policy. Perhaps the only exception is the DIW during the period from 2012 to 2017.

5.3.3 Baseline ideological position and polarization of debates over time

To get a deeper understanding of the interaction between debates and latent positions, we analyse several quantities of interest. Figure 5 shows the evolution of the baseline ideological position α_i throughout the debates.

Figure 5: Baseline ideological position: $\hat{\alpha}_i$ results



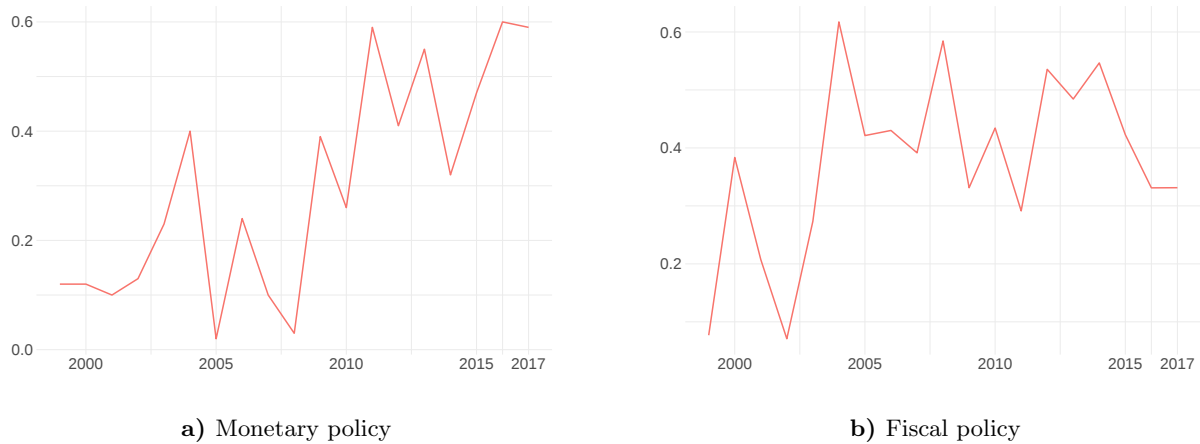
Source: Authors' own calculations.

For the monetary policy corpus, we observe positive but small values before 2008. In the years after 2008, the baseline position strongly moved to the positive side (according to our identification a more conservative/ monetarist position). It came down to pre-crisis values at the end of the sample in 2017.

For the fiscal policy corpus, we observe fluctuations around zero values before and after the

financial crisis until 2014/2015. Thereafter, a shift of the baseline position towards negative values is remarkable (according to our identification of a more Keynesian/ activist position) which would be in line with the argument for an emerging consensus on a more activist role of the government among German economists in the last couple of years. For example, Fricke (2015) surveyed the members of the German Economic Association (‘Verein für Socialpolitik’) and finds what he calls an ‘American shift’ within the profession: ‘What has clearly increased among German economists is the proportion of those who say that government debts can better be reduced at times when the economy is doing reasonably well, as Krugman and others have vehemently pointed out. In the meantime nearly 70% of the German economists agree with this position; in 2010 the rate was just over 60%’. Fricke (2015, unpag.). However, this view on the development of the debate in Germany is not undisputed, Brunnermeier et al. (2018, p. 149 ff.), among others, argue that the thinking became more in line with the German tradition of economic reasoning in early 2010. In a similar vein, Farrell and Quiggin (2017, p. 277) argue that ‘The Keynesian revival was relatively short-lived.’

Figure 6: Polarization: $|\hat{\beta}_i|$ results



Source: Authors’ own calculations.

Turning to polarization, Figure 6 shows the absolute values of the $\hat{\beta}$ coefficients, which Lauderdale and Herzog (2016) interpret as the polarity of a debate. The illustration reveals diverging trends as regards monetary and fiscal policy discussions: While the institutes’ statements about fiscal policy have – with few exceptions – always been quite polarized, the ones about monetary policy show a tendency of larger values towards the end of our sample. A stronger disagreement on this issue is plausible. For example, based on topic modelling, Müller et al. (2018, p. 576) identify phases in the German discourse on monetary policy that fit nicely into the changes in polarity. For example, they identify a so-called ‘uncertainty topic: central bank’, which increased sharply during the ‘new economy bubble’ and the ‘Euro weakness’ before climbing to unprecedented values during a ‘wave of crisis’, namely the financial crisis and the subsequent euro crisis.

5.3.4 Debate and Word Loadings

We also analysed, how sets of debates load on the latent ideological position and how groups of words load on specific debates.

First, Table 2 shows the mean of the debate loadings, i.e. the strength of association of debate-scales with general scale across years/debates (see Table 1) for different periods. In other words, the numbers show, how strongly a set of debates is associated with the overall ideological scale. For both policy areas and relying on the full sample, we find that roughly 40% of the variation in the debate-scales can be attributed to the latent ideological divergence across the institutes. A closer look at Table 2 reveals, however, that debates on monetary policy before the financial crisis were substantially less driven by the general ideological differences between the institutes than afterwards. A change of a similar magnitude cannot be observed for fiscal policy, where the debate loadings are similar for both periods, implying that the debates over fiscal policy have always been relatively polarized.

Table 2: Debate loadings before and after the financial crisis

	Full sample	Pre-financial-crisis sample	Post-financial-crisis sample
Monetary policy	0.37	0.20	0.46
Fiscal policy	0.41	0.36	0.44

Source: Authors' own calculations.

Unlike simple word count or text sentiment approaches, *Wordshoal* does not need a certain word *a priori* to be attributed to an ideological position. Rather, we estimate the full model and are able to calculate the word loadings, i.e. the association of a word to the general (ideological) scale.¹³ Figure 7 shows how some combinations of words load on the scale of latent ideological positions in our sample over different debates.

For the monetary policy corpus, we observe terms like ‘stützung’ (support), ‘stabilisierung’ (stabilization), ‘liquidität’ (liquidity), ‘aufkäufe’ (purchases) to load more to the negative side of the ideological scale (literally left from zero), while terms like ‘geld’ (money), ‘zins’ (interest) and ‘potential’ (potential) load to the positive (literally right side from zero) side of the scale. For the fiscal policy corpus we observe loadings to the negative side of the scale for terms like ‘nachfrage’ (demand) and ‘ausgabe’ (expenditure), whereas terms like ‘reform’ (reform) and ‘konsolidierung’ (consolidation) load more to the other side of the scale. The strength of the word loading however varies much from debate to debate – which supports the arguments for choosing *Wordshoal* approach over *Wordfish* as the main method.

5.4 Some remarks on robustness checks

The approaches outlined and used above call for robustness checks. We do not to present in full here, but to make them available upon request.

¹³Such a word can easily be one, that is normally not interpreted as an ideology-biased one. For example, Lauderdale and Herzog (2016) find that ‘prexist’ and related words became ‘left-wing’ during the debates over Obama-care in the U.S. senate, while ‘tax’ and related words represented the conservative position.

Figure 7: Word loadings



Source: Authors' own calculation based on Table 1. For monetary policy the word loading calculation is based on the words containing 'stützung' (support), 'stabilisierung' (stabilisation), 'liquidität' (liquidity), 'aufkäufe' (purchases) (results in turquoise) and 'geld' (money), 'zins' (interest), 'potential' (potential) (results in red). For the fiscal policy corpus, the calculation is based on the words containing 'reform' (reform), 'konsolidierung' (consolidation) (results in turquoise) and 'nachfrage' (demand), 'ausgabe' (expenditure) (results in red).

First, forecasting reports refer to the year to be forecast rather than to the calendar year, which might more plausibly constitute a debate. We checked, whether defining a debate along these lines changes our results qualitatively. Our main findings, in particular the estimated latent ideological position of the institutions, are quite unaffected. Nevertheless, the debate-specific positions may change considerably.

Second, the identifying restriction in the *Wordshoal* model is admittedly somewhat arbitrary. Hence, we re-estimated the model using the ideological position of the IfW and the DIW at the end the sample as restriction. We find no noteworthy differences in the results.

Third, we estimated *Wordshoal* for two sub-periods covering the period before and after the financial crisis. Although we stress a methodological caveat (the two sub-sections provide too few data to estimate the coefficients precisely), the results are quite robust.

6 Conclusion

To locate the ideological standpoint of six important institutions in the field of economic policy advice and business cycle forecasting, we analysed the wording of texts selected from business cycle reports for the years 1999- 2017. These texts refer either to fiscal or monetary policy. We applied approaches from text mining, specifically *Wordfish* and *Wordshoal*, which make it possible, to empirically assess the question of the relative ideological position of the institutes given different debate-specific effects.

By applying the *Wordfish* approach, we find that the average ideological position of all texts has undergone a notable change after the financial crisis and the subsequent *Great Recession*. Based on the identifying assumption that the DIW was ideologically 'to the left' of the IfW in 1999 the

estimated coefficients (the time-invariant θ s) move in opposite directions for fiscal and monetary policy. The finding of a shift in the wording of the business cycle reports is additionally supported by applying more descriptive techniques. Certain words have been significantly overrepresented in the texts after the crisis as compared to the time before the crisis.

Estimating the more sophisticated *Wordshoal* allows it to control for debate-specific effects. The results show that the debate-specific effect, i.e. the combined effect of a latent ideological position of each institution and the influence of a specific debate, has changed over time. In other words, this approach reveals the conflicting wording of an institution as a response to the changing debates in which the researchers have been engaged.

The latent ideological positions of the institutes identified by *Wordshoal* tally, on average, with conventional wisdom: the DIW, for example, is found to be the 'left-winger' both for monetary and fiscal policy texts, while the IfW is the opponent. Still, it is noteworthy that the results for the policy fields are similar, but not identical: Hence, labelling a certain entire institution as 'liberal' or 'conservative' implies a severe simplification.

Based on the debate-specific positions (which includes both, the latent ideological position and the debate-specific polarization component), we document a notable time-variation of these positions given the different focus of debates. The debate-specific position of an institution changes over time. Again, developments of the positions differ considerably between texts related to monetary and fiscal policy. Furthermore, we find increased polarization in word-usage variation between the documents stemming from institutes in case of monetary, but not for fiscal policy.

Considering the word loadings, we document for monetary policy positive, but small values before 2008, which turn positive after this point in time. According to our identification scheme, this corresponds to a more conservative/ monetarist position. At the end of the sample, however, the values come down to pre-crisis ranges, suggesting a more neutral stance of the institutes. The respective figures for fiscal policy show fluctuations around zero values before and after the financial crisis until 2014/2015. Afterwards, there is a visible shift of the baseline position towards a more Keynesian/ activist position.

Further research may look deeper into this relationship by comparing the texts from research and forecasting institutions directly with similar text (for example, the 'Jahreswirtschaftsbericht', the regular government report on economic issues). Likewise, the interaction with texts from monetary authorities may be of interest. From a more methodological perspective, structural topic models with estimated debate-specific positions as covariates (prevalence and content) might be interesting to investigate.

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Appendix

Figure A1: The institutes forming the “Joint Diagnosis” (*Gemeinschaftsdiagnose*) from 1999 to 2017



Source: Authors' own compilation.