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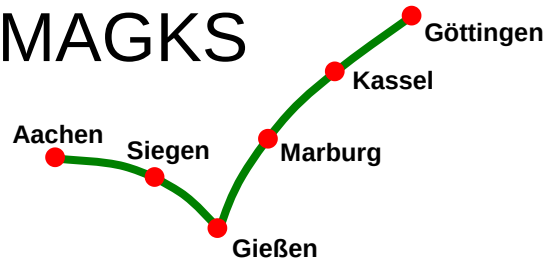

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Do Federal Reserve Presidents Communicate with a Regional Bias?

Abstract

In this paper, we analyze the determinants of U.S. monetary policy stance as expressed in speeches by Federal Reserve (Fed) officials over the period January 1998 to September 2009. Econometrically, we use a probit model with regional and national macroeconomic variables to explain the content of these speeches. Our results are, first, that Fed governors and presidents follow a Taylor rule when expressing their opinions: a rise in inflation or the Leading Index makes a hawkish speech more likely. Second, when Fed presidents make a speech in their home district, its content is influenced by both regional and national macroeconomic variables, whereas speeches given outside the home district are influenced solely by national information. Third, the influence of regional variables increases during (i) Ben Bernanke's tenure as Fed Chairman, (ii) recessions, and (iii) the financial crisis. Finally, speeches by nonvoting presidents reflect regional economic development to a greater extent than those by voting presidents.

JEL: D72, E52, E58

Keywords: Central Bank Communication, Disagreement, Federal Reserve, Monetary Policy, Regional Representation, Speeches

1. Introduction

U.S. monetary policy is set by the Federal Open Market Committee (FOMC), which consists of 19 members. Seven of these are the members of the Board of Governors (BOG) and have voting rights at every FOMC meeting. The other 12 are the presidents of the regional Federal Reserve (Fed) Banks and share the remaining five votes: the president of the New York Fed votes on a continuous base; the other presidents rotate the remaining four voting seats on an annual basis.[1]

By law, all members of the FOMC are committed to the Fed's main goals: maximum employment and stable prices. However, in practice, it is questionable whether presidents focus solely on national interests. For instance, Meade and Sheets (2005) show that policymakers take regional unemployment into consideration when voting on monetary policy. An FOMC member representing a district in which unemployment is 1 percentage point above the national average will oppose tighter policy 2.4 percentage points less frequently than an FOMC member from a district in which unemployment is at the national average. Gildea (1992) provides evidence that presidents are more concerned about developments in the regions they represent than with the nation as a whole. He finds an increase in the probability of voting in favor of more expansionary monetary policy if regional unemployment is high relative to the national rate.[2]

However, Gerlach-Kristen and Meade (2010) show that dissents occurred infrequently during Alan Greenspan's tenure as chairman: members cast dissenting votes only when they strongly disagreed with a proposed directive and cast assenting votes when they disagreed only weakly. In the latter case, the five voting presidents (and, obviously, the seven nonvoting presidents) must rely on other channels if they want to express their opposition to the interest rate proposal.[3]

The first of these channels is voiced disagreement in internal Committee discussions: Meade (2005) illustrates that the rate of disagreement in Committee discussions (a transcript of these is publicly available) about interest rate setting was about 30 percent. In a more recent paper, Meade (2010) shows that bank presidents (voters and nonvoters) are more likely to voice disagreement with a given policy proposal than are governors. One potential source

[1] The presidents of (i) Boston, Philadelphia, and Richmond, (ii) Cleveland and Chicago, (iii) Atlanta, St. Louis, and Dallas, (iv) Minneapolis, Kansas City, and San Francisco, respectively, alternate the voting seats.

[2] Another branch of the literature focuses on policymakers' inflation aversion. For instance, Belden (1989) finds that presidents are more likely to favor tighter monetary policy than are governors. Furthermore, they dissent more often in the direction of tighter monetary policy, whereas governors' dissent is more balanced. Havrilesky and Gildea (1995) confirm that presidents prefer less expansionary monetary policy than do governors.

[3] During our sample period (January 1998–October 2009), 74 decisions were taken unanimously; in only 26 cases did one or two of the 12 FOMC members vote against the rate proposal.

of this disagreement is concern over regional economic development, which does not necessarily coincide with the overall national situation. Presidents should react sensitively to regional developments, as they (i) mainly live in the district they represent, (ii) talk frequently with local businesspeople about their needs and problems, (iii) rely on expert input from members of a local staff, and (iv) are selected by the district board of directors, members of which represent banking, industrial, or other interests in their region. However, the Board of Governors has veto power over nominations made by regional banks' boards,[4] which might limit the scope of regional bias. Nevertheless, Chappell et al. (2008) empirically confirm that regional conditions affect the policy preferences of Fed presidents. There is some weak evidence that regional developments also influence governors. However, when considering all FOMC members, the authors find that national conditions matter more than regional ones.[5]

The second channel for expressing opposition to a specific FOMC position is strategic forecasting: Based on a dataset of individual forecasts, Tillmann (2011) shows that nonvoters systematically overpredict inflation relative to the consensus forecast when they favor tighter policy, and underpredict inflation when they favor looser policy. This strategic forecasting is used to influence policy deliberation within the FOMC.[6] Banternghansa and McCracken (2009) discover that the most significant forecast disagreements are between the regional presidents and the vice chairman, even though the vice chairman tends to be one of the most consensus-oriented members of the FOMC. Yet, there is no evidence that strategic forecasting is due to regionally-driven motives.

A third channel for voicing dissatisfaction with Fed monetary policy is via communication. Over the past two decades, the Fed (and other central banks) has increasingly relied on informal communication with the public. Speeches by Fed officials are an additional means of airing the bank's view on economic outlook and the future course of monetary policy. Fed speeches significantly affect financial market expectations (see, e.g., Ehrmann and Fratzscher, 2007; Hayo et al., 2008) and also help explain and predict target rate decisions (Hayo and Neuenkirch, 2010). Therefore, it is of particular interest to analyze the determinants underlying these speeches.

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[4] For instance, under Paul Volcker's tenure as Fed Chairman, regional board of director nominations in Atlanta and St. Louis were vetoed.

[5] There is also similar empirical evidence for countries other than the United States. Berger and de Haan (2002) show that economic differences across the German Länder affected the voting behavior of regional representatives on the Bundesbank Governing Council in the period 1948–1961. Heinemann and Huefner (2004) report that country-specific economic considerations affected ECB policy outcomes during the early years of the euro.

[6] However, Tillmann (2011) does not claim that strategic forecasting by nonvoting presidents has been successful in influencing actual Fed decisions.

Presidents have two incentives to use speeches to express their disagreement with the current or expected policy rate. First, speeches are nonbinding; even voting presidents can "oppose" an FOMC position publicly but still vote in line with the Fed's proposal (in case of minor disagreement) for reasons described below. Second, central bankers can express their views on an ad hoc basis at any time (except during the blackout period seven days before and three days after FOMC meetings).

We expect presidents to express more concern over regional economic development and the future course of monetary policy in their speeches than is reflected in their actual voting behavior, for two reasons.[7] First, the vast majority of presidents' speeches are delivered in their home districts, where the audience is mostly regionally oriented. Second, speeches by presidents receive far less national media attention than do speeches by governors (Neuenkirch, 2009) or interest rate decisions and accompanying discussion. Thus, emphasizing a regional point of view likely generates support by regionally-oriented audiences and does not receive much attention (if any) from the national media.

To the best of our knowledge, this is the first paper analyzing the determinants of Fed presidents' speeches and testing the hypotheses put forward above. Econometrically, we use a probit model with regional and national macroeconomic variables to explain the content of these speeches. We focus on four research questions. First, do Fed presidents use national and/or regional economic information when expressing a tightening (easing) inclination in their speeches? Second, do presidents adjust the contents of their speeches depending on whether they are speaking inside or outside their home district or under different chairmen (Greenspan vs. Bernanke)? Third, do presidents' speeches react to different phases of the business cycle (contractions vs. expansions) or the recent financial crisis? Fourth, are there significant differences in the content of speeches made by voting presidents, nonvoting presidents, and BOG members? Our contribution to the literature is twofold. First, we utilize a newly constructed dataset that covers all speeches by Fed officials over the period January 1998 to September 2009. Second, we believe this is the first study to investigate determinants of central bank speeches, a belief supported by a comprehensive literature survey conducted by Blinder et al. (2008).

The remainder of this paper is organized as follows. In Section 2, we describe the coding of central bank communication and explain the econometric methodology. Section 3

[7] An example of disagreement manifested in communication can be observed during the Fed's tightening cycle between June 2004 and June 2006. At each meeting the interest rate was increased by 25 bps. During that period, the vast majority of speeches hinted at interest rate hikes in line with the chosen policy direction. At the same time, Cathy Minehan, President of the Boston Fed, emphasized the below national average economic conditions in her district during several speeches.

presents the empirical results for all presidents. Section 4 studies whether the factors determining the thrust of the speech are affected by (i) the location of the speech, (ii) the current chairman, (iii) the phase of the business cycle, and (iv) the recent financial crisis. In Section 5 we differentiate between the determinants of speeches by voting presidents, nonvoting presidents, and governors. Section 6 concludes with some policy implications.

2. Data and Econometric Methodology

Federal Reserve Speeches

We use the dataset introduced by Hayo et al. (2008), which includes subjectively coded indicator variables for all speeches by Fed officials. The speeches are sorted into two categories based on whether they indicate likely increases or decreases in the Federal Funds target rate.[8] Speeches referring directly to monetary policy are easily interpreted. For example, when the Fed states that *"the Federal Funds rate must rise at some point to prevent pressures on price inflation from eventually emerging"* (Greenspan, 2004), a target rate hike is imminent. However, other statements are not so straightforward. For example, speeches stressing potentially inflationary pressures can be seen as indirect signs of a future rate hike. Speeches presenting a bright economic outlook (in terms of GDP growth or positive employment news) can also be read as an indication of rising interest rates because in good economic times the Fed needs to take steps to prevent the economy from overheating. Hayo and Neuenkirch (2010) point out that the Fed typically does not talk extensively about rate cuts; thus, a speech conveying a negative economic outlook is a particularly informative signal. In total, there are 612 speeches coded as either tightening or easing indications: 194 by voting presidents, 267 by nonvoting presidents, and 151 by BOG members.[9]

The following simple framework motivates our empirical approach (Meade and Sheets, 2005). Central bankers choose their wording according to nation-wide economic and regional economic conditions:[10]

[8] In our analysis, we focus on speeches indicating the future direction of interest rates. Speeches that take a "neutral" view of the economic outlook and the future course of monetary policy are excluded from the analysis, as are speeches with no particular information on either topic. Even during a tightening period (e.g., Q2/2004–Q2/2006) or easing period (e.g., Q1/2001–Q4/2001 or Q3/2007–Q4/2008) presidents often refrain (or are forced to refrain during the blackout period around policy meetings) from making comments about the economy and/or the future stance of monetary policy. Including these additional speeches and employing, for example, ordered probit estimations would introduce additional noise into the data, as these speeches should not be treated as actually neutral, and lead to both biased estimators and increased standard errors. We thus focus on speeches indicating a clear tightening or easing tendency.

[9] Table A1 in the Appendix shows the frequency of these events. Note that other forms of communication are not included: post-meeting statements and monetary policy reports express the view of the whole committee rather than an individual opinion, as do congressional hearings, which, in addition, are not scheduled autonomously.

[10] Many macroeconomic variables are not forecastable beyond a random walk (see, e.g., Stock and Watson, 2007 for U.S. inflation forecasts). As a consequence, we employ realized macroeconomic announcements rather than

(1) $speech_{i,t} = f(N_t, R_{i,t})$,

where $speech_{i,t}$ denotes a speech by a central banker representing district i at time period t. N_t represents national economic conditions available at the time of the speech and $R_{i,t}$ represents the macroeconomic conditions in that president's district. A linear representation of this function illustrates two sources of potential disagreement:

(2) $speech_{i,t} = \alpha_i N_t + \beta_i R_{i,t} + \mu_{i,t}$.

First, regional economic conditions $R_{i,t}$ vary across the 12 Fed districts. Second, responsiveness to regional and national economic conditions could vary across central bankers, that is, $\alpha_{ij} \neq \alpha_{ik}\ and/or\ \beta_{ij} \neq \beta_{ik}$, with j and k indicating different persons.[11] However, we can show for our sample that individual central bankers' preferences are (nearly) uncorrelated with regional or national economic conditions.[12] Thus, we interpret coefficients α_i and β_i as weights of national and regional information, respectively.

Macroeconomic Data

In our empirical specification, we examine whether central bankers follow a modified Taylor rule when phrasing their speeches. Thus, nation-wide inflation,[13] as well as nation-wide and regional real indicators, should contribute to this "reaction function." The real-time consumer price index (CPI) inflation rate is employed as a price indicator. As an indicator of real economic activity we utilize the Philadelphia Fed's six-month-ahead Leading Index. The Leading Index is provided at the national and state levels and is based on employment,

forecasts. However, robustness tests employing expected consumer price index inflation and expected unemployment confirm our results using realized indicators. Results are available on request.

[11] Individual macroeconomic assessments by FOMC members are released with a time lag of 10 years (Romer, 2010). Thus, we are not able to assign each member her/his own set of macroeconomic variables and must assume that the central bankers employ the same information set.

[12] Our results are robust to the inclusion of individual-specific effects in the estimation of α_i and β_i. As part of a robustness test, we add to Equation (3) person-specific dummy variables for all central bankers in our sample who made 20 or more speeches. Only in case of Janet Yellen (President of the San Francisco Fed during the period June 2004–October 2010) do we find a significant person-specific effect. The negative coefficient is in line with her reputation for being "dovish." Results are available on request.

In the literature, direct measures of preference are put forward, but they have at least one major drawback. For example, the well-known index by Meade (2005) is constructed on the basis of past voting behavior and voiced disagreement within the FOMC, which in turn is determined by a combination of the individual degree of inflation aversion and national and regional economic conditions. Thus, using such indicators in the empirical analysis makes it impossible to identify these conceptionally different effects.

[13] Data source: St. Louis Fed. Unfortunately, there is only national CPI data, no state- or district-wide CPI data. The Fed's Beige Book cannot be used as a source of information of regional prices because (i) it does not regularly contain an assessment of price developments in the districts and (ii) even if it does, the assessment is typically only qualitative.

housing, production, and financial data. GDP weights of the respective states and counties are used to create real-time Leading Indices for the 12 Fed districts.[14]

Econometric Methodology

Econometrically, we use a pooled setup of these speeches over all Fed districts. A pooled setup is helpful for obtaining a larger number of observations, as 12 of the 22 bank presidents in our sample made fewer than 20 speeches. Furthermore, any remaining potential biases due to region- or president-specific effects are reduced in a pooled setup.[15] We use a probit model to take into account the discrete nature of the speeches. Central bankers discuss either an easing inclination (coded 0) or a tightening inclination (coded 1). Our specification is as follows:

$$(3)\ speech^*_{i,t} = \alpha\pi_t + \beta\ National\ LI_t + \gamma\ Regional\ LI_t + \varepsilon_{i,t},$$

where $speech^*_{i,t}$ is the latent continuous variable representing the binary choice. Our "Taylor rule" includes three explanatory variables: national inflation, national Leading Index, and regional Leading Index.[16] The residuals ε_t are assumed to follow a standard normal distribution, which implies that the probabilities of the different outcomes can be written as:

$$\Pr\left[speech_{i,t} = 1 \middle| z_{i,t}\right] = \Phi\left(z_{i,t}'\delta\right) \text{ and } \Pr\left[speech_{i,t} = 0 \middle| z_{i,t}\right] = 1 - \Phi\left(z_{i,t}'\delta\right),$$

where Φ denotes the cumulative standard normal distribution, $z_{i,t}$ is a vector of explanatory variables, and δ a vector of coefficients. The probit models are estimated by maximum likelihood.

3. Determinants of Presidents' Speeches

In this section, we present the results of our empirical estimations employing different variations of Equation (3). Column (1) of Table 1 shows the model based on inflation and the national Leading Index, Column (2) uses regional data for the Leading Index and inflation, and the specification in Column (3) incorporates all three variables.

[14] As national financial data are part of both the national and the regional indexes, we subtract the national index from the regional index to create a purely regional series: $\text{Regional Index}^*_{i,t} = \text{Regional Index}_{i,t} - \text{National Index}_t$.

[15] We assume that presidents' preferences are distributed over a hawkish-dovish continuum. We cannot precisely observe the degree of a president's hawkishness independently from the regional economic conditions (see also note 12). Thus, by using a pooled setup, rather than individual regressions, we reduce the potential bias in the estimated coefficients, as the influence of hawkish or dovish preferences is, at least partly, averaged out over all presidents.

[16] Table A2 in the Appendix sets out descriptive statistics for the explanatory variables.

Table 1: Explaining Presidents' Speeches with Inflation and Leading Index

	(1) All Speeches	(2) All Speeches	(3) All Speeches
Coefficients			
Inflation Rate	0.099 **	0.201 **	0.134 **
Leading Index	0.415 **	—	0.405 **
Regional Leading Index	—	0.503 **	0.453 **
Marginal Effects			
Inflation Rate	0.029 **	0.068 **	0.038 **
Leading Index	0.122 **	—	0.115 **
Regional Leading Index	—	0.171 **	0.128 **
Observations	461	461	461
LR Statistic	143.3 **	82.6 **	147.5 **
Pseudo Log-Likelihood	–242.1	–275.4	–231.8
Pseudo-R^2	0.134	0.015	0.171
Correct Predictions	73.8%	66.2%	75.9%

Note: * and ** indicate significance at a 5 percent and 1 percent level, respectively. Huber (1967)/White (1980) robust standard errors are used.

The inflation rate has a positive effect on the likelihood of indicating an interest rate hike in a speech, but its quantitative impact varies across different specifications. The probability of giving a hawkish speech increases by 2.9 percentage points (pp) when inflation rises by 1 pp in the model employing the national Leading Index (Model (1)), whereas it rises by 6.8 pp in the model using the regional Leading Index (Model (2)). This difference could be explained by the fact that the national Leading Index contains financial information in the form of the spread between 10-year and three-month bond yields. Such a term spread indicator is often used as a proxy for inflation (and monetary policy) expectations and therefore partly crowds out the impact of the inflation rate itself. In the case of a higher Leading Index we find a significantly positive effect as well, which we interpret as the Fed preparing the ground for an interest rate hike, with the aim of preventing the economy from overheating. A one unit increase in the national Leading Index increases the likelihood of a hawkish speech by 12.2 pp (see Model (1)), whereas an increase in the regional Leading Index results in a larger response of 17.1 pp (see Model (2)). Thus, the results suggest that regional Fed presidents follow a modified "Taylor rule" when phrasing their speeches: a rise in inflation or the Leading Index makes a hawkish speech more likely. Model fit in terms of pseudo-R^2 and correct predictions is better for Model (1) employing the national Leading Index (0.13 and 74%) than for Model (2) using the regional Leading Index (0.02 and 66%).

The results of estimating a joint model containing national and regional Leading Indexes (see Model (3)) reveal that both Leading Indexes remain significant and the model

has the best fit among all three specifications (pseudo-R^2: 0.17; correct predictions: 76%). The marginal effect of a rise in inflation is now 3.8 pp. The marginal effect of the regional Leading Index is slightly larger than that of the national one (12.8 pp vs. 11.5 pp), but statistically this difference is equal to zero. This result stands in contrast to Chappell et al. (2008), who find that national developments clearly outweigh regional conditions in the context of interest rate discussions. However, presidents' speeches are the least "costly" channel of expressing concern and are targeted primarily at local audiences, which could explain the predominance of regional information in this context.

4. Determinants of Presidents' Speeches in Different Subsamples

In this section, we analyze if the factors determining the thrust of the speeches are affected by whether they are delivered (i) inside or outside the home district, (ii) under different chairmen (Greenspan vs. Bernanke), (iii) during different phases of the business cycle (contractions vs. expansions), and (iv) before or during the recent financial crisis. First, we expect presidents to be even more focused on regional information when the audience is from their home district. Second, based on narrative evidence that Chairman Bernanke tolerates more public discussion than former Chairman Greenspan, we investigate whether this difference between the two chairmen is reflected in the emphasis presidents give to the regional economy compared to the national economy. Finally, during contractions and the financial crisis, we anticipate that presidents will increasingly express concern about economic developments in their home districts, with the aim of reassuring the residents of those districts that their concerns are understood and being taken into account.

Table 2 presents the results for speeches delivered inside and outside the presidents' home districts. The fit of Model (4), referring to home district speeches, is much better in terms of pseudo-R^2 (0.20 vs. 0.06) and slightly better in terms of correct predictions (77% vs. 75%) than Model (5), which considers speeches made outside the home district. Reflecting the results for all speeches (Model (3) in Table 1), speeches delivered inside the home district are based on both Leading Indexes and inflation information. A 1 pp rise in inflation increases the likelihood of a hawkish speech by 3.4 pp, whereas a 1 pp increase in the national and the regional Leading Indexes significantly lower the probability of such a speech, by 12.2 pp and 12.9 pp, respectively. In contrast, hawkish speeches outside the home district are 5.7 pp more likely when inflation increases by 1 pp. A 1 pp hike in the national Leading Index drives up the likelihood of a speech mentioning tighter monetary policy by 7.6 pp; the regional Leading Index plays no role outside the home district.

Table 2: Explaining Speeches in Different Locations

	(4) Inside Home District		(5) Outside Home District	
Coefficients				
Inflation Rate	0.122	**	0.188	**
Leading Index	0.442	**	0.250	*
Regional Leading Index	0.467	**	0.327	
Marginal Effects				
Inflation Rate	0.034	**	0.057	**
Leading Index	0.122	**	0.076	**
Regional Leading Index	0.129	**	0.099	
Observations	390		71	
LR Statistic	124.6	**	21.9	**
Pseudo Log-Likelihood	–192.2		–37.8	
Pseudo-R^2	0.196		0.059	
Correct Predictions	76.9%		74.7%	

Note: * and ** indicate significance at a 5 percent and 1 percent level, respectively. Huber (1967)/White (1980) robust standard errors are used.

Table 3 differentiates the determinants of the contents of speeches in our sample by whether they are delivered during Alan Greenspan's tenure as Fed chairman (until January 2006) or during Ben Bernanke's tenure (since February 2006). The explanatory power of the model is better for the Bernanke subsample (pseudo-R^2: 0.25; correct predictions: 80%) than for the Greenspan subsample (pseudo-R^2: 0.18; correct predictions: 79%). The impact of inflation on the tone of a speech does not depend on who is chairman. A 1 pp increase in inflation increases the likelihood of a hawkish speech by 4 pp. However, we find statistically significant differences in the determinants of speeches when it comes to the Leading Indexes. During Greenspan's tenure as chairman (Model (6)), a 1 pp hike in the national Leading Index significantly affects the probability of delivering a hawkish speech by 11.9 pp, whereas the regional Leading Index is insignificant. In contrast, we find both indexes to influence the tone of speeches by Fed presidents during the Bernanke subsample (Model (7)). A 1 pp rise in the regional Leading Index increases the likelihood of a hawkish speech by 27.6 pp; the same increase in the national Leading Index results in a 9.1 pp increase in the likelihood of this type of speech. This difference is large and statistically significant ($Chi^2(1) = 10.6$**). Finally, the greater importance of regional concerns during the Bernanke chairmanship is further illustrated by the finding that the regional Leading Index coefficient is significantly higher in the second subsample ($z = 3.6$**).

Table 3: Explaining Speeches Under Greenspan and Bernanke

	(6) Greenspan		(7) Bernanke	
Coefficients				
Inflation Rate	0.151	**	0.139	**
Leading Index	0.445	**	0.323	**
Regional Leading Index	0.158		0.980	**
Marginal Effects				
Inflation Rate	0.040	**	0.039	**
Leading Index	0.119	**	0.091	**
Regional Leading Index	0.042		0.276	**
Observations	286		175	
LR Statistic	103.5	**	55.5	**
Pseudo Log-Likelihood	–139.6		–82.6	
Pseudo-R^2	0.176		0.247	
Correct Predictions	78.7%		80.0%	

Note: * and ** indicate significance at a 5 percent and 1 percent level, respectively. Huber (1967)/White (1980) robust standard errors are used.

Table 4 displays estimates for speeches given during expansions of the economy (Model (8): January 1998–February 2001, November 2001–November 2007, and June 2009–September 2009) as well as contractions (Model (9): March 2001–October 2001 and December 2007–May 2009) as measured by the National Bureau of Economic Research. Model fit does not vary in terms of correct predictions (79%), but the pseudo-R^2 is higher for the contractionary periods (0.26 vs. 0.17). The influence of a 1 pp increase in the inflation rate raises the likelihood of a hawkish speech by 3.9 pp during expansions and by 4.5 pp during contractions. This is economically very similar and statistically we cannot reject the hypothesis that the response is the same across the two phases of the business cycle. Thus, our estimates suggest that independently of the business cycle phase, price developments are analyzed carefully and affect the monetary policy inclination expressed in presidents' speeches. However, the reverse is found when considering the two Leading Indexes, as the size of their influence is dependent on business cycle phase. During contractions, presidents put much more emphasis on regional information than on national data. A 1 pp increase in the regional Leading Index increases the probability of a hawkish speech by 28.6 pp, whereas the effect is only 6.2 pp in the case of such an increase in the national index. This difference is not only economically but also statistically significant ($Chi^2(1) = 10.9$**). During expansions, in contrast, a marginal increase in the national Leading Index raises the likelihood of a hawkish speech by 12.1 pp, whereas as a comparable increase in the regional index yields an increase in such probability of only 6.9 pp. The difference across subsamples is statistically significant for both the national Leading Index ($z = 2.3$*) and the regional Leading Index ($z = 3.0$**).

Table 4: Explaining Speeches Over the Business Cycle

	(8) Expansions		(9) Contractions	
Coefficients				
Inflation Rate	0.144	**	0.149	**
Leading Index	0.453	**	0.206	*
Regional Leading Index	0.256	*	0.946	**
Marginal Effects				
Inflation Rate	0.039	**	0.045	**
Leading Index	0.121	**	0.062	*
Regional Leading Index	0.069	*	0.286	**
Observations	339		122	
LR Statistic	121.0	**	42.8	**
Pseudo Log-Likelihood	–164.3		–59.7	
Pseudo-R^2	0.167		0.257	
Correct Predictions	78.8%		78.7%	

Note: * and ** indicate significance at a 5 percent and 1 percent level, respectively. Huber (1967)/White (1980) robust standard errors are used.

Table 5 shows the outcome for speeches given before (January 1998–June 2007) and during the financial crisis (August 2007–September 2009).[17] Model (10) for the pre-financial crisis subsample is superior to Model (11) for the financial crisis subsample (pseudo-R^2: 0.19 vs. 0.07; correct predictions: 85% vs. 67%). Before the financial crisis, speeches are influenced by all three variables: a 1 pp increase in the inflation rate makes a hawkish speech more likely by 1.8 pp, whereas a corresponding change in the national (regional) Leading Index increases the likelihood by 15.7 (10.5) pp. During the financial crisis, the regional Leading Index increases the probability of a hawkish speech by 17.4 pp, whereas the effect of the national Leading Index is insignificant.[18] The marginal effect for inflation becomes negative during the financial crisis. Despite the fact that inflation (and its forecasts) did not decline during that period, except in the aftermath of the Lehman crash, presidents put much more emphasis on real economic and financial conditions. Arguably, this reflects the fear of monetary policymakers that the crisis might turn into a persistent deflation. Finally, the differences across subsamples are not only economically relevant when considering the point estimates, but also statistically significant (inflation rate: z = 3.0**; national Leading Index: z = 6.7**).

[17] Restricting the financial crisis subsample to the period after the Lehman crash leaves us with too few observations.

[18] The difference between the regional and the national Leading Index is statistically significant ($Chi^2(1)$ = 7.3**).

Table 5: Explaining Speeches Made Before and During the Financial Crisis

	(10) Pre-Financial Crisis		(11) Financial Crisis	
Coefficients				
Inflation Rate	0.084	*	–0.113	*
Leading Index	0.748	**	–0.045	
Regional Leading Index	0.502	**	0.501	**
Marginal Effects				
Inflation Rate	0.018	*	–0.039	*
Leading Index	0.157	**	–0.016	
Regional Leading Index	0.105	**	0.174	**
Observations	342		119	
LR Statistic	137.0	**	18.9	**
Pseudo Log-Likelihood	–128.2		–72.1	
Pseudo-R^2	0.185		0.067	
Correct Predictions	85.1%		67.2%	

Note: * and ** indicate significance at a 5 percent and 1 percent level, respectively. Huber (1967)/White (1980) robust standard errors are used.

To summarize, in line with our expectations, presidents put relatively more weight on regional information when speaking in their home districts. Under Alan Greenspan's tenure as chairman, the content of presidents' speeches is based on national macroeconomic data, whereas under Ben Bernanke, regional economic information dominates. Furthermore, presidents express their concern about economic developments in their home districts much more strongly during recessions and during the financial crisis. Inflation plays a subordinate role in presidents' speeches during the crisis period.

5. Analyzing Different Groups in the FOMC

In this section, we study speeches by different groups in the FOMC. Not all presidents have voting rights at all times and nonvoting presidents need to rely on other instruments to express their views and exert (regionally motivated) influence on policy discussion. Nonvoting presidents can also more easily at least appear to act in their own region's interest as they never have to take public action in support of these interests. Therefore, we expect nonvoting presidents to be even more concerned with regional developments in their speeches than are voting presidents. To test for these potential differences, we split the presidents into "voting"[19] and "nonvoting" groups and also compare these two subgroups to the group of governors.

[19] The New York Fed President has voting rights all the time. We can show that omitting this president's speeches from the voting group does not change the results. Results are available on request.

Rather than setting interest rates based on current information only, typically the FOMC decides on a path for the Federal Funds target rate, which implies a significant degree of persistence when estimating Taylor rules (Clarida et al., 1998). To test to what extent the current interest rate path is represented in speeches by different groups of FOMC members, we add to Equation (3) an indicator, "Monet. Policy Direction," to capture the current interest rate direction. This indicator is given the value –1 if the last interest rate *change* was a cut and the value of 1 in the event of a hike. Thus, including "Monet. Policy Direction" implies that the other explanatory variables capture deviations from the current interest rate trend. Column (12) of Table 5 examines all presidents, Column (13) voters, Column (14) nonvoters, and Column (15) governors.

Table 6: Explaining Speeches with Inflation, Leading Index, and an Interest Rate Trend

	(12) Presidents	**(13) Voters**	**(14) Nonvoters**	**(15) Governors**
Coefficients				
Inflation Rate	0.172 **	0.142 **	0.200 **	–0.007
Leading Index	0.332 **	0.436 **	0.261 **	0.463 **
Regional Leading Index	0.414 **	0.278	0.523 **	–––
Monet. Policy Direction	0.248 **	0.116	0.340 **	–0.134
Marginal Effects				
Inflation Rate	0.048 **	0.038 **	0.056 **	–0.002
Leading Index	0.093 **	0.117 **	0.073 **	0.147 **
Regional Leading Index	0.115 **	0.075	0.147 **	
Monet. Policy Direction	0.069 **	0.031	0.095 **	–0.043
Observations	461	194	267	151
LR Statistic	135.2 **	62.8 **	71.0 **	32.5 **
Pseudo Log-Likelihood	–227.3	–91.9	–132.9	–84.3
Pseudo-R^2	0.187	0.199	0.193	0.056
Correct Predictions	75.9%	77.8%	76.8%	72.9%

Note: * and ** indicate significance at a 5 percent and 1 percent level, respectively. Huber (1967)/White (1980) robust standard errors are used.

The fit of Models (12)–(14) is much better than that of the governor model (Model (15)) in terms of pseudo-R^2 (0.19 vs. 0.06) and slightly better in terms of correct predictions (77% vs. 73%). However, the latter model includes no regional Leading Index.[20] In general,

[20] In some of the literature, governors are assigned particular regional affiliations (e.g., Meade and Sheets, 2005; Chappell et al., 2008). However, there are some obvious problems with this approach. (1) The Fed sometimes defines formal district affiliations to meet the legal requirement of regional diversity and these affiliations do not necessarily coincide with the governor's true origin (some examples of this are provided by Chappell et al., 2008). (2) The governors live and work in the capital and do not have regular contact with businesspeople from their "home" districts. (3) The governors rely on input from the nationally-oriented Board staff.

presidents speak in line with the current monetary policy trend: a one unit increase in this variable increases the probability of a hawkish speech by 6.9 pp. When compared to Model (3) of Table 1, the inclusion of the trend variable in Model (12) has only a small effect on the other coefficients: its inclusion increases the influence of inflation to 4.8 pp but reduces the impact of the national and the regional Leading Index, which are now 9.3 pp and 11.5 pp, respectively.

Given that the same variables are significant, it appears that the results for Model (12) are primarily driven by nonvoting presidents (Model (14)): a 1 pp increase in inflation increases the likelihood of a hawkish speech by 5.6 pp, whereas a one unit hike in the Leading Indexes raises this probability by 7.3 pp (national) and 14.7 pp (regional). The current monetary policy direction exerts a marginal effect of 9.5 pp. In contrast, voting presidents react only to inflation and the national Leading Index, with an increase in the likelihood of a hawkish speech by 3.8 pp and 11.7 pp, respectively. The regional Leading Index and the trend variable are statistically insignificant. Governors react only to the national Leading Index; their likelihood of making a hawkish speech goes up by 14.7 pp.[21]

Thus, in their speeches, nonvoting presidents pay more attention to regional economic developments than do voting presidents. Furthermore, their talk is more in line with the current monetary policy trend. Voting presidents and governors are more concerned with national economic conditions and seemingly less backward-looking in their wording.

6. Conclusions

In this paper, we analyze the determinants of U.S. monetary policy stance as expressed in speeches by FOMC members over the period January 1998–September 2009. Econometrically, we use a probit model with regional and national macroeconomic variables to explain speeches. Our analysis provides answers to four research questions.

First, do Fed presidents use national and/or regional economic information when expressing a tightening (easing) inclination in their speeches? Presidents follow a modified Taylor rule when phrasing their speeches. If there is a rise in inflation, they tend to choose more hawkish words. An increase in the Leading Index makes it significantly more likely that the rhetoric will indicate a tightening of monetary policy. The regional Leading Index is at least as important in influencing speeches as the national Leading Index in a model employing both variables. This result contradicts Chappell et al. (2008), who find, in the context of disagreement during interest rate discussions, that national developments outweigh regional

[21] Note that the national Leading Index contains information about the yield curve spread, which is often used as proxy for inflation expectations.

ones. However, as argued above, speeches are the least "costly" channel of expressing (regional) concern, which might explain the importance of regional information in the content of presidents' speeches.

Second, do presidents adjust the contents of their speeches depending on whether they speak inside or outside their home district or under different chairmen (Greenspan vs. Bernanke)? In line with our expectations, presidents put relatively more weight on regional information when speaking in their home districts. Speeches delivered outside the home district are affected only by national data. Under Alan Greenspan's tenure as chairman, the content of presidents' speeches is based on national macroeconomic data, whereas under Ben Bernanke's tenure, regional economic information dominates. Thus, we confirm the impression that under Greenspan, Fed presidents tend to "speak with one voice," whereas Bernanke allows more diversity in the discussion of U.S. monetary policy.

Third, do presidents' speeches react to different phases of the business cycle (contractions vs. expansions) or the recent financial crisis? In times of contraction and during the financial crisis, presidents craft their speeches to reflect economic developments in their home districts, possibly in an effort to address concerns of the local audience. Moreover, in the August 2007–September 2009 subsample, inflation plays a subordinate role in the content of Fed communications.

Fourth, are there significant differences in the content of speeches made by voting presidents, nonvoting presidents, and BOG members? In their speeches, nonvoting presidents pay more attention to regional economic development than do voting presidents. This group of presidents has to rely on instruments other than voting to express views and exert influence on policy. Furthermore, nonvoting presidents' speeches are more in line with the current monetary policy trend than are those of either voting presidents or governors. Speeches by voting presidents and governors are influenced by national data and seemingly less backward-looking in the wording.

Our results have some interesting political economy implications. In general, speeches are an important part of the Fed's interest rate decision-making process, as they allow all FOMC members to express disagreement without having to dissent in the actual vote on monetary policy. We find regional information to be particularly important for speeches (i) delivered inside the home district, (ii) during Ben Bernanke's tenure as Chairman, (iii) during contractions of the economy, (iv) during the financial crisis, and (v) by nonvoting presidents.

Presidents seem to adjust the gist of their speeches—which significantly affect financial market expectations (see, e.g., Ehrmann and Fratzscher, 2007; Hayo et al., 2008) and

help predict target rate decisions (Hayo and Neuenkirch, 2010)—to the intended audience. If a speech is delivered inside their home district, they put more emphasis on regional information than they do in speeches made outside the home district. Thus, a speech made outside the home district could be a better indication of a president's actual voting behavior. Furthermore, during economic contractions and the financial crisis, presidents primarily address specific concerns in their home districts. The results for nonvoting presidents are very interesting, too: these presidents cannot directly influence policy decisions and thus express their sensitivity to local developments through speeches. Their focus on regional information is a way of showing their interest in the conditions prevalent in their home districts. Not incidentally, this focus may also help their chances of reelection, as presidents are selected by the district board of directors, members of which represent banking, industrial, and other interests in the home region. In contrast, voting presidents are relatively more concerned about national economic developments. Thus, they adjust their wording during their voting tenure and their speeches are similar to those given by governors. This behavioral change might be caused by increasing nation-wide media attention during their voting tenure, triggering a higher sensitivity to national developments.

Our paper also has some implications for the European System of Central Banks. Its decision-making body, the Governing Council, is dominated by the 17 national central bank presidents (in contrast to six members of the Executive Board in Frankfurt). Our finding that regional information has a substantial influence on the phrasing of central bank speeches by regional representatives may be even more true in the Euro area, which is much more heterogeneous than the United States. On the one hand, speeches may allow national central bank presidents to speak to, and on behalf of, their local audience in their respective home countries without having to dissent from actual decisions. On the other hand, since the ECB does not publish its voting records, speeches by national central bank presidents and the Executive Board members could be used as a proxy to measure potential disagreement due to regional factors in the Euro area, which would be an interesting topic for future research. Preliminary evidence by Hayo and Méon (2011), based on simulated counterfactual interest rate paths using national Taylor rules, suggests that decision making in the ECB's Governing Council reflects a bargaining process by nationally-oriented central bankers. However, their analysis rests on a number of restrictive assumptions that raise concern about the robustness of their finding. Thus, studying determinants of speeches by ECB representatives could shed more light on this important issue from a different angle.

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Appendix

Table A1: Frequency of Speeches

	Tightening	Easing	Total
Voting Presidents	139	55	194
Nonvoting Presidents	186	81	267
Presidents (Total)	325	136	461
Governors	109	42	151

Table A2: Descriptive Statistics of Macroeconomic Variables

	Mean	Std. Dev.	Skewness	Minimum	Maximum	Corr.
CPI Inflation						
National	2.4950	1.29	–0.69	–1.89	5.52	——
Leading Index						
National	0.7977	1.25	–1.51	–3.58	2.36	——
Atlanta	–0.3191	0.62	–0.71	–2.00	0.96	0.25
Boston	–0.0113	0.53	0.06	–1.09	1.24	–0.05
Chicago	–0.6049	0.68	–0.14	–2.13	0.75	0.18
Cleveland	–0.4557	0.54	0.16	–1.73	1.05	–0.01
Dallas	0.1359	0.70	0.20	–1.38	1.91	–0.02
Kansas City	–0.1229	0.58	–0.42	–1.80	1.22	0.17
Minneapolis	–0.2081	0.55	–0.20	–1.57	1.26	–0.48
New York	–0.0289	0.63	0.26	–1.59	1.92	–0.48
Philadelphia	–0.1757	0.42	0.01	–1.38	0.81	–0.18
Richmond	–0.1443	0.58	–0.20	–1.43	1.15	0.27
San Francisco	0.0969	0.52	–0.25	–1.07	1.25	0.41
St. Louis	–0.4265	0.42	–0.08	–1.57	0.81	0.02

Notes: Std. Dev. = Standard deviation; Corr. = Correlation with the respective national variable.