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Abstract

We study determinants of individual FOMC members disagreement with the decided policy rate. Utilizing a novel dataset of macroeconomic indicators for the Fed districts and preferences revealed by FOMC members in the transcripts, we construct individual reaction functions for each member for the period 1994-2008. Then, we explain the gap between each member's preferred rate and the adopted policy rate by individual background characteristics. First, we find that FOMC members tend to react to regional economic conditions, in particular the unemployment rate. Second, that Professors, and individuals holding a master degree or issued from either private or public sector have a higher propensity to disagree on the dovish side during the meetings, while female members as well as governors nominated by a Democrat President tend to disagree on the hawkish side (as compared to the "reference" member, who is a male, PhD holder, Regional Bank President with experience in the financial sector). Moreover, we show that, under Ben Bernanke, in a period a large economic uncertainty, the propensity to disagree increased for all types of members.

JEL Classification: E43, E58, F36
Keywords: Transcripts, FOMC, Interest Rate, Individual Taylor Rule.

1 Introduction

Although, according to Google Trends, their names do not figure among the most searched for on the Internet, members of the Federal Open Market Committee (FOMC)[1] probably have a larger impact on the real life than most stars, real or virtual. This justifies, if needed, that many studies have focused on the determinants of their behavior. Even though the final decision is collective, FOMC members may have their own policy preferences shaped by their educational and professional backgrounds. Therefore, members of the committee may process the common information differently, and/or may take into account data that are not available to other members (such as their individual macroeconomic projections, see Romer 2010). This may explain why interest rate decisions are not always consensual, with an officialy recorded dissent of 5% (Horvath et al., 2014). Moreover, even if the degree of disagreement does not show up in an officially expressed dissenting vote, several studies have now proven that FOMC members cast their votes about monetary policy while having different considerations from each other.

A driving force for such different perceptions can be the policymakers' personal backgrounds, and notably their education. This has been highlighted as exerting a strong influence, for the long-run growth of countries, as argued by e.g. Besley et al. (2011) and Jones and Olken (2005), as well as for monetary policy performance (Farvaque et al., 2014). A comprehensive theoretical framework analysing the impact of heterogeneity of members with respect to their assessment of economic conditions (output gap) on monetary policy decisions completed by its empirical application to the Bank of England's MPC was presented by Bhattacharjee and Holly (2010). In the specific context of the monetary policy decision within the FOMC, studies by Gildea (1990), Havrilesky and Schweitzer (1990), Havrilesky and Gildea (1991) and Chappell et al. (1995) also reveal that experiences in the government, academia or inside the Federal Reserve Board tend to induce different degrees of "hawkishness". More recently, Eichler and Lähner (2014a)

[1]The FOMC is composed of 12 voting members, of which 7 are the members of the Federal Reserve Board (hereafter designed as Governors) including the Chairperson and the remaining 5 are the Presidents of the 12 regional Federal Reserve Banks (hereafter designed as Presidents). The President of the Federal Reserve Bank of New York has a permanent voting right (and serves as a vice-chairperson) and the remaining 11 Presidents vote according to a rotation scheme. They may, however, participate in discussions during all the FOMC meetings.

have shown that experiences within the financial sector tend to induce a FOMC member to dissent on the tightening side while an NGO career is associated with somewhat more frequent "loosing" dissents.[2] Political connections also are to be considered, as FOMC members appointed by a Democratic president seem to be more "dovish", according to studies by, e.g., Havrilesky and Gildea (1991, 1995), Chappell et al. (1993, 1995), Tootell (1996), Chang (2003) or Meade and Sheets (2005).[3]

The obvious difficulty is that, if such a background influence exists, it has to be disentangled from other sources of disagreement or heterogeneity that may hamper the FOMC's decisions. The most notable source of heterogeneity mentioned in the literature is the presence of a bias related to the regional origin. This comes from the fact that, as several FOMC members are representatives from different economic regions which may, at each point in time, be located at different positions of the business cycle, their favored policy decision may be influenced by the situation in their home district. This assumption has been proven relevant by the literature: Belden (1989), Tootell (1991), Gildea (1992), Meade and Sheets (2005), Chappell et al. (2008) and Eichler and Lähner (2014b), notably, have shown that, among other factors, the regional unemployment rate and the regional price index impact on the Presidents' decisions. Moreover, regional considerations are also noticeable in Presidents' public speeches (Hayo and Neuenkirch, 2013), a result that confirms the more general case of regional favoritism made by Hodler and Raschky (2014). Thus, it seems interesting to identify also the strength of regional influences on the members of the Board of Governors.

In this paper, we thus investigate both the regional and background determinants of the FOMC members' propensity to disagree, to disentangle their relative effects. So doing, one faces, however, a number of difficulties. First, as the Reserve Banks regions do not coincide with the ones of the American States, nor with the Census regions, some data are not available at the adequate level (i.e., the one of the Reserve Banks' districts). As this may have blurred the previous analyses, we choose to build new relevant data at

[2]Dissents are not only characteristic for the FOMC - Harris et al. (2011) provide an account for the Bank of England Monetary Policy Committee

[3]Needless to say, preference heterogeneity is not a distinctive feature of the FOMC, and characterizes any monetary policy committee. See, e.g., Riboni and Ruge-Murcia (2008) or Bhattacharjee and Holly (2015) for the Bank of England and Horvath et al. (2014) who also consider the Czech Republic, Hungary and Sweden.

the Fed's district level to further improve the consistency of our analysis.

An additional potentially strong impediment is the revelation of the preferences of FOMC members. One could use the voting records (as in Chappell and McGregor, 2000, for instance) but, as stated by Meade (2005) and Jung (2013), there may be more shortcomings than gains to use them to derive the members' preferences. This is notably the case if members vote strategically (as evidenced by, e.g., Havrilesky and Gildea 1991, Johnson et al., 2012 or Ellis and Liu, 2013), if only because they do not want to appear on the losing side of a vote, which they can guess from the meetings' inner workings or from before-meeting discussions (Axilrod, 2009).[4] This may, however, not forbid them to express their real views during the meetings, in which case the transcripts are a better source of information. This is because policy go-around are closer to the initial preferences of FOMC members at a specific meeting. Moreover, McCracken (2010) finds that even if dissenting votes are an indication of disagreement, they are a very coarse metric for evaluating how much an individual member of the FOMC disagrees with the proposed policy actions. Thus, we assume the rates favored by the members in transcripts to be closer to their true preferences. Although transcripts are available for voting as well as for non-voting members, this is not as advantageous as it first may appear, if non-voting members attempt to influence their voting colleagues by behaving strategically during the discussions (and this clearly happens, according to the results by Meade, 2006, and Tillmann, 2011). The bottom line is thus that it is safer to err on the conservative side and to consider only preferences expressed by the voting members.[5] Hence, to avoid confusion with the literature that studies dissent in voting, we will use the "disagreement" lexicon in what follows.

Hence, we proceed in four steps. First, we build a dataset of economic aggregates coinciding with each Reserve Bank's area for the period 1994-2008. Second, we use the

[4]This behavior is also indirectly confirmed by higher preferred policy rates at the end of the tenure of Presidents (both voting and non-voting), when the incentives for consensuality tend to fade and, thus, the temptation to reveal the true preferences is less constrained (Johnson et al., 2012).

[5]The minutes of the FOMC meetings are not a useful source of information here, due to their brevity and absence of attribution of the elements of discussions whereas, as stated by Meade (2010): "the published transcripts provide a relatively complete account of FOMC meetings. The transcripts are, for the most part, verbatim, although they have been lightly edited to provide clarification (when necessary) and to excise discussion of specific sources (when release of this information could undermine the FOMC's access to information)" [provided by foreign central banks and governments].

transcripts to derive the preferences of each voting member of the FOMC. Third, we compute Taylor rules-based desired rates for each member. Fourth, we estimate the impact of the FOMC members' background on their preferences, to assess how backgrounds shape preferences.

Our study thus adds at least two contributions to the field. First, it analyzes the influence of FOMC members' local areas key economic variables on their preferred monetary policy. Standardly assuming that FOMC members (at least implicitly) follow a Taylor-like reaction function when deciding on the interest rate, we expect different evolutions of the local economic indicators - i.e., inflation and output - to induce different policy preferences. Second, it points out which personal characteristics of FOMC members tend to increase or decrease the degree of disagreement inside the Committee. Hence, we separate out two effects which are generally confounded in the literature, either because the authors searched for regional economic influences without considering background effects or, on the opposite, were looking for background effects without controlling for regional developments.

The remainder of the paper is structured as follows. We first expose the methodology we have used, before analyzing the results of our empirical estimates, while the concluding section summarizes the findings.

2 Data and methodology

2.1 Justifying Taylor-rule based individual reaction functions

It has been shown that the reaction function of the Fed can be described by a Taylor rule at least since the eighties (Taylor, 1993). For example, Blinder and Reis (2005, p. 14) point out that "monetary policy decisions of the Greenspan era are well described by a Taylor rule". Moreover, Judd and Rudebusch (1998, p. 3) find that a Taylor-rule framework "is a useful way to summarize key elements of monetary policy" in the US during the Burns, Volcker and, for what concerns us (i.e. the 1994-2008 period), the Greenspan periods. More recently, Mehra and Sawhney (2010) find that this has not changed even recently and that deviations from the Taylor rule between 2002 and 2006, and even during the financial crisis, were much smaller than generally believed.

Finally, it is also quite standard to augment the traditional Taylor rule with a "smoothing" parameter to make it correspond even more to the observed pattern of interest rates (Woodford, 2003). However, individuals have much less incentives than institutions to smooth their behavior. As a consequence, it makes sense to assume that individual decision makers do not smooth their desired interest rates.[6] Moreover, it has been demonstrated, by, e.g., Farvaque et al. (2009), that (at least part of) the smoothing behavior is a product of the nature of monetary policy making by committee itself. Hence, everything happens as if the meeting is a two-stage process, with individuals first stating their preferences and then the committee deciding upon the common policy rate. This was for instance the case during the Greenspan era, during which the discussion on interest rates at FOMC meetings occurred in two rounds. The first round served mainly to exchange views between members on the economic situation. The second round was devoted to the discussion of policy options. This was the occasion for Chairman Greenspan to provide his views and policy recommendations, generally followed by the rest of the members.

[6] Sirchenko (2013) analyzes the behavior of the Polish central bankers in a framework that acknowledges that policy decisions by individual members are potentially unrelated from one meeting to another.

2.2 Data issues

Several empirical studies (e.g., Meade, 2005) use policy-makers' interest rate preferences revealed in the policy round when considering preference heterogeneity in the FOMC. We follow this literature and use the FOMC transcripts to obtain information about FOMC members' interest rate preferences.[7] The transcripts contain information on whether a FOMC participant expressed agreement, argued for a higher or a lower federal funds rate with respect to Greenspan's proposal. The data set we build contains the expressed monetary policy preferences of governors and voting regional bank presidents who attended a FOMC meeting between February 1994 and December 2008.[8] This corresponds to 121 meetings, and to the chairmanship of Alan Greenspan (1994-2006) and to the beginning of the one of Ben Bernanke (2006-2008).

While the Federal Reserve publishes what belongs to the widest possible range of data across central banks, strong data limitations remain for the scope of the present analysis. First, individual forecasts of bank Presidents are only available for the sub-sample ranging from 1992 to the end of 2002 and cover exclusively nationwide data. However, Gildea (1992) provides evidence that presidents are more concerned about developments in the districts they represent than with the nation as a whole, while Meade and Sheets (2005) find that regional unemployment rates influence the interest rate setting behavior. Chappell et al. (2008) empirically confirm that regional conditions affect the policy preferences of Fed presidents, and Hayo and Neuenkirch (2013) present additional clues of why they react to regional developments. Hence, national forecasts available for Presidents are not as useful as may have seemed for our purpose. We thus follow this literature and consider that FOMC members may react to changes in the inflation rate, the industrial production index, and the unemployment rate of their respective districts.

The real issue however lies in computing data consistent with the districts monitored

[7] Renshon (2009) provides a further argument of the validity of using public speeches for assessing leaders' beliefs, showing that the analysis of public sources lead to the same outcomes as private sources.

[8] As the Fed itself acknowledges, before 1994, the Transcripts are not real transcripts, which limits the information they convey. And the transcripts are not yet available after 2008. Such a lag explains why they have not so often been used. However, their richness compensates for the potential drawback related to the fact that coding them to get the preference of a member is a sometimes relatively subjective process, when members do not state explicitly their favorite option (see Chappell et al., 2005, Meade, 2005, 2010, Jung, 2013, and El-Shagi and Jung, 2013).

by the Federal Reserve Banks. Concerning output developments, we make use of the Coincident index (based on employment, housing, production, and financial data), published by the Federal Reserve Bank of Philadelphia. However, this indicator is only available at the state level. Hence, to create a Coincident Index at each of the Fed's districts level, we aggregate the Coincident Indexes of the states that stand inside a district's borders, considering that they have a similar weight within the district[9]. As an illustration, for the Boston Fed district, we aggregate the Coincident Indexes of Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island and Vermont. Nevertheless, other districts comprise a unique state, such as the New York district (state of New York) and the Cleveland district (state of Ohio). See Appendix A for the list of states comprised in the Fed districts.

Concerning price developments, there is no state or district-wide consumer price index (CPI) measure available. Only CPI data for metropolitan areas are available from the Bureau of Labor Statistics (BLS), and some districts contain more than one metropolitan area. As Hayo and Neuenkirch (2013) indicate, there is no straightforward way of creating district CPI figures. Therefore, we are forced to rely on aggregating metropolitan CPI data to compute the ones of the districts. For the unemployment rate, data at the district level are provided by the Federal Reserve Bank of St. Louis. Finally, the preferred policy rate of FOMC members are derived from the available Transcripts of the FOMC. All in all, then, we use the most district-consistent data.

2.3 Estimating individual Taylor-like reaction functions using regional data

The dependent variable we consider is the preferred policy rate expressed by the central banker when he/she votes during the period 1994-2008, i_t^p, while the independent variables include the consumer price index, a measure of the relative regional economic position (corresponding to the difference between the regional Coincident index and the national one, which we hereafter call for expositional simplicity the regional cycle gap), and the unemployment rate in his/her district. We choose not to include the national inflation

[9]Considering demographic or GDP weights would not change the essence of the results presented below. Alternative estimates are available from the authors.

and unemployment rates in ordre to avoid multicollinearity with the rest of the dependent variables.

We check whether there is correlation between the CPI, the regional cycle gap, and the unemployment rate, and find no evidence for correlation[10]. We use the heteroskedasticity-consistent estimator (HCE) to control for potential heteroskedasticity, as in Jung (2013). We present the results of the estimated reaction functions for the Federal Reserve districts in the form of individual Taylor-type rules estimated separately for each district's member d, using the frequency of the FOMC meetings (8 regular meetings per year) covering the period 1994-2008 :

$$i^{p}_{d,t} = c_d + \beta\pi_{d,t} + \gamma y_{d,t} + \delta u_{d,t} + \varepsilon_{d,t} \tag{1}$$

where $\pi_{d,t}$ is the (district-based) measure of inflation in the observed district, and $y_{d,t}$ and $u_{d,t}$ are, respectively, the regional cycle gap and unemployment in the same district. Note also that the time index, t designates the voting period of each central banker. Then, t will cover all the meetings during which a FOMC member has voted, like, for example, those of 1997, 2000, 2003 and 2006 for Jack Guynn. Additionally, the available macroeconomic data are averaged to correspond to the frequency of the meetings (i.e. 8 per year): e.g. for the third meeting in 2003, if the data are available at a monthly frequency, we average the monthly macroeconomic records between the second and the fourth meeting. We obtain a set of estimated parameters $\left(\hat{c}, \hat{\beta}, \hat{\gamma}, \hat{\delta}\right)$ for each central banker, which reflects the reaction of each FOMC member for a change in the inflation rate, the industrial index and the unemployment rate of his/her district during his/her voting period. Table 1 presents the results of the estimates of equation (1) for each FOMC member.

[10]Even though the coincident index is constructed using employment related data, there is no risk of doubling up the predictors when we include it in the regression. We check for multicollinearity using the Variance Inflation Factor (VIF), and find no correlation between the dependent variables. We also drop the coincident term from the estimation and find that the results are qualitatively and quantitatively consistent. Alternative results available upon request.

Table 1. Individual Taylor-rule reaction functions

	Position	FED district	Constant	CPI (β)	Cycle gap (γ)	Unemp. (δ)	No of Obs.
Jack Guynn	President	Atlanta	11.7***	0.15	2.07***	-1.70***	30
Cathy Minehan	President	Boston	4.6***	-0.1	1.22***	-0.19	36
Michael H. Moskow	President	Chicago	9.8***	0.39**	0.45	-1.22***	53
Jerry Jordan	President	Cleveland	10.4***	0.48	0.19**	-1.18***	39
Richard W. Fisher	President	Dallas	1.72***	0.03	8.12***	-0.07	14
Robert D. McTeer	President	Dallas	11.7***	-0.21	-0.44	-1.36***	24
Thomas M. Hoenig	President	Kansas city	10.8***	0.37	-0.10	-1.69***	41
Gary H. Stern	President	Minneapolis	9.3***	1.15**	-3.29***	-1.39***	32
Timothy Geithner	President	New York	13.6***	0.16	-0.42	-2.05***	41
William J. McDonough	President	New York	7.5***	-0.14	1.31***	-0.49***	74
Anthony M. Santomero	President	Philadelphia	9.8***	0.14	1.78**	-1.45***	16
Alfred Broaddus	President	Richmond	14.2***	0.21	0.46	-2.3***	24
Robert Parry	President	San Francisco	13.5***	0.93**	-3***	-1.45***	32
William Poole	President	St. Louis	13.6***	0.33	0.03	-1.9***	31
Roger Ferguson	Governor	Boston	9.7***	-0.02	0.73	-1.48***	67
Susan Bies	Governor	Chicago	12.4***	0.12	0.09	-1.68***	42
Susan M. Phillips	Governor	Chicago	7.2***	-0.02	0.48	-0.43***	35
Edward W. Kelley	Governor	Dallas	6.7***	0.16	0.78**	-0.32**	63
Donald Kohn	Governor	Kansas city	9.83***	0.28	1.67***	-1.58***	52
Mark W. Olson	Governor	Minneapolis	4.5***	0.03	0.85	-0.57**	36
Kevin M. Warsh	Governor	New York	14.4***	0.16	-1.27**	-2.12***	23
Alice M. Rivlin	Governor	Philadelphia	4.2***	0.006	0.02	0.20*	24
Randall S. Kroszner	Governor	Richmond	12.6***	-0.38	-1.27**	-1.76***	23
Janet Yellen	Governor	San Francisco	5.1***	-0.25***	0.11***	0.07***	24
Laurence Meyer	Governor	St. Louis	7***	0.31**	-0.1	-0.4***	45

Several results are worth highlighting here. First, there does not seem to be strong differences in the reaction functions of Presidents and Governors. President Gary Stern is a case in point, here, as all the (district-based) variables are strongly significant in his case while, on average, the district-based CPI measure does not seem to influence FOMC members. Second, in the case of output, our regional measure influences both the Presidents and the Governors, confirming the relevance of considering both types of policymakers. Third, the unemployment variable has the expected sign: an increase in the unemployment rate is related to a decrease in the preferred rate[11]. The estimates in Table 1 thus confirm the presence of a regional bias of FOMC members. This result is consistent with the existing literature, built on a district-consistent dataset, and thus probably more precise than the previous results (Gildea, 1992; Meade and Sheets, 2005; Chappell et al., 2008; El Shagi and Jung, 2015). Moreover, while comparing our results with the previous ones is not obvious (given the sample and data building differences), our results deliver a ranking - in terms of degree of relative hawkishness - of the districts that is almost similar to the one that can be derived from Jung (2013, Table 3). Both types of support thus allow us to pursue our investigation.

In a second step, we use the estimated parameters $\left(\hat{c}, \hat{\beta}, \hat{\gamma}, \hat{\delta}\right)$, along with ex-post regional data, to derive the "desired" interest rate for each FOMC member j, $\widehat{i_{j,t}}$ for the full period for which Transcripts are available (i.e., 1994-2008):

$$\widehat{i_{j,t}} = \hat{c}_j + \hat{\beta}_j \pi_{j,t} + \hat{\gamma}_j y_{j,t} + \hat{\delta}_j u_{j,t} \tag{2}$$

where t = 1994Meet1-2008Meet8.

We then derive the difference between the desired interest rate, $\widehat{i_{j,t}}$, and the Fed's actually decided interest rate, i_t, for the period 1994-2008. This difference, $PD_{j,t}$, is thus a measure of the "policy differential" between what the situation of his/her district would have induced a FOMC member j to aim at and the policy implemented during the FOMC meeting. Table A.2 in the Appendix delivers the descriptive statistics of the desired interest rate and of the "policy differential" for the FOMC members during the period under review.

[11] Except for Janet Yellen and Alice Rivlin.

3 Measuring personal backgrounds' influence

In the final step, we assess how much the "policy differential" is related to the biographical data of FOMC members. As explained above, the aim is to assess the influence of the personal characteristics of monetary policy makers on their respective desired interest rate with respect to the actual one, having purged for any regional bias they are also displaying.

The use of the difference $PD_{j,t}$ allows to reveal the impact of FOMC members' biographical features on their propensity of being more hawkish (if, on average, $PD_{j,t} \geq 0$), or more dovish (if, on average, $PD_{j,t} \leq 0$) than the rest of the committee members.[12]

We use the Least Squares Dummy Variables model (LSDV), which allows to bring the unobserved effects explicitly into the model. The unobserved effects are being treated as the coefficients of the dummy variables, i.e., the $\alpha Prof_j$ terms represent fixed effects on the dependent variable $PD_{j,t}$ for the professions of central banker j. Having specified the model in this way, it can be fitted using OLS with robust standard errors. Given the limited number of central bankers ($N = 25$), using the LSDV method is a practical proposition (Hayo and Neumeier, 2014). Finally, we control for the influence of the national macroeconomic variables (CPI, output and unemployment, from the BLS):

$$PD_{j,t} = c_0 + \alpha Prof_j + \lambda Educ_j + \rho Woman_j + \phi Member_j + \upsilon Bernanke_t + \tau X_t + D_{1j,t} + D_{2j,t} + \mu_{j,t} \tag{3}$$

where t = 1994Meet1-2008Meet8, c_0 is a constant, $Prof_j$ and $Educ_j$ indicate, respectively, the career and the educational background of the FOMC member, while $Member_j$ is a dummy variable indicating whether the voting member is a Board member or a Bank president, also controlling for the fact that a member has been appointed by a Democrat or Republican administration. The meaning of the dummy $Woman_j$ is self-explaining, as well as the $Bernanke_t$ one[13]. Finally, X_t is the vector of national macroeconomic

[12] Additionally, this can disclose the determinants of their influence on the decision-making process of the FOMC: given that this influence may have an impact on the value of $PD_{j,t}$, then, the more influential a FOMC member is, the more $PD_{j,t}$ should be close to 0. However, as other factors may influence the value of $PD_{j,t}$, such as the regional business cycle positioning with respect to the national one, we do not pursue this avenue further.

[13] The importance of chairman for the outcomes of a monetary policy committee was highlighted, e.g.,

variables, $D_{1j,t}$ and $D_{2j,t}$ are dummy variables that take the value 1 if, respectively, the regional unemployment rate is higher than the national one, and the national unemployment rate is higher than the NAIRU. This specification allows the regression to be cleanly indicative of regional influences.

We consider five indicators (dummy variables) for the professional experience: financial sector (positions at banks or other financial institutions), non-financial private sector, economic scholars (positions at universities or colleges), central bank (positions at a regional Federal Reserve Bank, except for president), and civil servants (positions in government sector, except for positions at the Federal Reserve System). We classify educational background in five categories: Professors, holders of a Ph.D, an MBA, a MSc., or a Bachelor. As reference for the dummy variables, we consider the variables which appear with the highest frequency. The FOMC member who holds a Ph.D, has previously worked in the financial sector, is male and Bank President thus serves as the reference for the estimations provided in the following tables.

The first regression in Table 2 includes all the variables, while the two following ones intend to check for potential multicollinearity between the biographical data (notably between some educational and professional background indicators). The dependent variable is the policy differential variable, PD, in the first three estimates displayed in Table 2, while the last two ones present estimates for the positive (resp., negative) values of the policy differential. So doing should allow differentiating the influence different types of backgrounds have on a (relative) tendency to disagree on the policy decisions, and the incentive to disagree when the difference between the desired interest rate and the actual one is positive or negative (which would, respectively, signal a degree of hawkishness or dovishness).

As can be seen from Table 2[14], for example, it appears that a background as Professor tends to be associated with a propensity to disagree on the dovish side, as the policy differential is significantly related to this category (column (1)). Even more interestingly, as can be seen from column (4), the propensity to disagree is more significant in case of a

by Claussen et al. (2012).

[14]Given the low number of observations for some central bankers in the first step (i.e., the estimation of the individual reaction functions), like e.g. for Richard Fisher, we have re-estimated eq. (3) using only the desired interest rates of central bankers with a number of observations superior to the median. This delivers results qualitatively similar as the ones displayed in Table 2 (available upon request).

negative differential than in case of a positive one. Hence, this signals a greater dovishness of Professors (relatively to the reference category). Another interesting result holds for MBA holders, who would tend to be more hawkish when the differential is positive, and more dovish when the differential is negative.

Members of the FOMC with experiences in the private or the public sector appear to have a propensity to disagree on the dovish side (with regard to the reference category, i.e., members coming from the financial sector), as their background is negatively related to the policy differential, whatever the sign of this differential. This result is in accordance with the findings of Chappell et al. (1995) and Eichler and Lahner (2014a).[15] Members with a previous experience at the Federal Reserve seem also to be more accommodative through their expressed preferences. The inverse stands for female members of the FOMC, for whom the same pattern is observed, but with the opposite sign for the coefficients. This is in line with previous results on a larger degree of hawkishness from women. This is explained by the fact that women tend, on average, to be more conservative in their monetary policy preferences - possibly in order to establish a reputation -, as exposed in Farvaque et al. (2011, 2014).[16] Members of the Board appointed by a Republican administration tend to be on the dovish side, as a negative sign of the coefficient is associated with the policy differential (interestingly, the results also show that this tendency is even higher when the differential is positive, thus signalling a reduced degree of hawkishness). On this point at least, our results contrast with the general finding of the literature (from at least Havrilesky and Gildea, 1991, to Meade, 2005 or Eichler and Lähner, 2014a). However, this disparity confirms that an incentive to disagree does not always translate in a dissenting vote, especially if members act strategically (as shown by, e.g., Tillmann, 2011).

Finally, the period associated with the chairmanship of Ben Bernanke is associated with a relatively high degree of disagreement, which could mean that the FOMC, under his

[15] Relating this result to the one by Eichler and Lähner (2014a) is not immediate, though, as they focus on dissent while we identify a propensity to disagree. Nevertheless, as they show that FOMC members with longer careers in the public sector are more focused on output stabilization, which can be considered as a sign of dovishness, our results refine and complement their previous one.

[16] Although the number of women in the sample is quite small (5), the effect is a real "gender effect", and not a "Yellen effect", for instance.

chairmanship, has become more "individualistic" (see Meade, 2005, or Blinder, 2007).[17] This can be indirectly confirmed by the increased frequency of dissenting votes in early years of his mandate (especially 2008, see Thornton and Wheelock, 2014). Of course, this can also be related to the period of the financial crisis, characterized by a high degree of uncertainty and thereby during which members exhibited more disagreement as to the nature of the data, understandings of the transmission mechanism, and so on.[18]

Our results thus clearly reveal that there are some influences from FOMC members' backgrounds on their distance between the policy they would favor as representative of their district and the policy implemented by the Federal Reserve. Moreover, our procedure reveals that background influence go beyond the regional bias, and that both have to be taken into account.

It is also worth noting that the macroeconomic variables are strongly significant, in the three regressions. And the coefficient of "Dummy Unemployment" has the expected sign and is strongly significant, thus showing that in case of a positive differencial between the regional unemployment rate and the national one, a FOMC member tends to disagree on the dovish side, as shown also in Meade and Sheets (2005).

[17] As stated by Belden (1989): "differences in the voting records during different chairmanships may reflect differences in the ability of the chairman to exercise control over the other members of the FOMC".

[18] Belden (1989): "A volatile economic environment and uncertainty about the impact of policy actions on monetary aggregates and changes in velocity may heighten dissent".

Table 2. FOMC members' backgrounds influence on the policy differential

	(1)		*(2)*		*(3)*		*(4)*		*(5)*	
	Policy Differential (PD)						*Positive PD*		*Negative PD*	
	Coefficient	*p-value*	*Coefficient*	*p-value*	*Coefficient*	*p-value*	*Coefficient*	*p-value*	*Coefficient*	*p-value*
Constant	-0.14	0.21	-0.45	0.2	-0.44	0.34	-0.34	0.4	-0.07	0.87
Professor	-0.32***	0.001	-0.009	0.9			-0.13	0.4	-0.20**	0.004
MBA	-0.37***	< 0.00001	-0.3***	0.0005			0.22**	0.02	-0.47***	< 0.00001
Master	-0.65***	< 0.00001	-0.78***	< 0.00001			-0.26***	0.003	-0.47***	0.0002
Bachelor	-0.59***	< 0.00001	-0.45***	0.002			0.06	0.58	-0.48***	0.0001
PhD					Ref.					
Academic	0.16	0.3			0.08	0.43	0.12	0.45	-0.009	0.94
Central Bank	-0.29***	0.001			-0.09	0.21	-0.39***	< 0.00001	0.13*	0.08
Private Sector	-0.91***	< 0.00001			-0.69***	< 0.00001	-0.43***	< 0.00001	-0.38***	0.003
Public Sector	-0.92***	< 0.00001			-1.39***	< 0.00001	-0.72***	< 0.00001	-0.50***	0.009
Financial sector					Ref.					
Woman	0.8***	< 0.00001	0.82***	< 0.00001	0.79***	< 0.00001	0.25***	0.003	0.81***	< 0.00001
Man					Ref.					
Board Rep.	-0.31***	0.001	-0.12*	0.08	-0.35***	0.0004	-0.34***	< 0.00001	-0.23**	0.015
Board Dem.	0.39**	0.017	0.34***	0.002	0.46***	0.002	0.23**	0.04	0.12	0.54
President					Ref.					
Bernanke	-0.41***	< 0.00001	-0.43***	< 0.00001	-0.42***	< 0.00001	-0.13***	0.0003	-0.07	0.21
CPI (National)	0.27***	< 0.00001	0.26***	< 0.00001	0.27***	< 0.00001	0.07***	0.0003	0.1**	0.03
Var. Coincident Index (National)	-3.22***	< 0.00001	-3.19***	< 0.00001	-3.2***	< 0.00001	-0.55**	< 0.00001	-1.59***	< 0.00001
Unemp. (National)	0.25***	< 0.00001	0.24***	< 0.00001	0.25***	< 0.00001	0.32***	< 0.00001	-0.05	0.59
Dummy Unemp.	-0.37***	< 0.00001	-0.26***	< 0.00001	-0.37***	< 0.00001	0.05	0.47	-0.35***	< 0.00001
Dummy Nairu	0.013	0.92	0.01	0.89	0.008	0.95	0.52***	< 0.00001	-0.58***	< 0.00001
Observations	2950		2950		2950		1378		1532	

4 Robustness checks

4.1 Simultaneous inclusion of the regional and background effects

To test whether our results are sensitive to the step corresponding to the computation of the desired interest rates for FOMC members, we skip the estimation of eq. (2), and consider in a simultaneous regression eqs. (1) and (3). Hence, we regress the monetary policy preferences of FOMC members directly on their regional and biographical data, to check whether we obtain results consistent with those reported in Table 2. If, by definition, this procedure does not allow to estimate the variation in individual reaction functions among FOMC members as shown in Table 1, it nevertheless permits checking the influence of the regional economic conditions when one wishes to reveal the background effect on FOMC members' preferred policy rates.

We thus run the following panel regression, using OLS with robust standard errors:

$$i^p_{j,t} = c + \eta_j + \beta\pi_{j,t} + \gamma y_{j,t} + \delta u_{j,t} + \alpha Prof_j + \lambda Educ_j + \rho Woman_j + \phi Member_j + \upsilon Bernanke_t + \tau X_t + \mu_{j,t} \quad (4)$$

On the left hand side, $i^p_{j,t}$ represents the preferred policy rate of central banker j during his/her voting period. The right hand-side variables have similar meanings as in the previous regressions (see equations 1 and 3). The additional element, η_j, represents individual fixed effects. We do not include the national inflation and unemployment rates, as the correlation matrix shows that the null hypothesis of no correlation cannot be rejected with the regional inflation and unemployment rates. Table 3 displays the results of the estimation.

Table 3. FOMC members' regional and backgrounds influence on the preferred policy rates

	Preferred policy rate $i^p_{j,t}$	
	Coefficient	*p-value*
Constant	4.74***	< 0.00001
CPI (β)	-0.06	0.24
Output (γ)	0.37**	0.003
Unemp. (δ)	-0.08*	0.07
Professor	-0.86***	< 0.00001
MBA	0.33**	0.01
Master	-0.57***	0.004
Bachelor	-0.37**	0.01
PhD	Ref.	
Academic	0.22	0.34
Central Bank	-0.53***	< 0.00001
Private Sector	-1.33***	< 0.00001
Public Sector	-0.96***	< 0.00001
Financial sector	Ref.	
Woman	0.24*	0.06
Man	Ref.	
Board Rep.	-0.61***	< 0.00001
Board Dem.	0.48***	0.008
President	Ref.	
Bernanke	0.74**	0.017
Var. Coincident Index (National)	3.82***	< 0.00001
Dummy Nairu	-1.40***	< 0.00001
Observations	922	

As shown in Table 3, and consistently with detailed individual results presented in Table 1, the regional cycle gap and the regional unemployment exert a significant influence on the preferred policy rates of the FOMC members. Analogically with the results provided above, they also collectively care about the national growth rate. The sign of the coefficients lies in conformity with what could be expected, i.e., the coefficient linked to the regional unemployment rate and the NAIRU dummy are negative and significant (the higher the regional unemployment rate or the NAIRU, the lower the FOMC member's preferred policy rate).

The results for educational categories are globally consistent with our main empirical strategy: Professors, Masters and Bachelors are more dovish than the reference category of PhD holders. The only different result is for the category of MBA holders: here they appear to be more hawkish than the reference category (as in Göhlmann and Vaubel, 2007), whereas the global result reported in column (1) of Table 2 suggests a higher propensity to be consensual. However, already in column (4) of Table 2 (regression run on positive policy differentials), they were preferring even higher policy rates. This drop of ambiguity suggests that the propensity of MBA holders to disagree is especially visible if they are on the hawkish side of the committee.

The robustness check for professional categories confirms the dovish character of central bankers as well as private and public sector representants as compared to the reference category (of decision-makers issued from the financial sector). The only tiny difference is related to the fact that the results reported in Table 3 now suggest a significant hawkishness of members from the academia.

However, the robustness check indicates rather hawkish than dovish side of disagreement over the policy rate under the Chairman Bernanke. This reveals the interest of our policy differential measure, which delivers finer insights into the dynamics at play inside the FOMC. Nevertheless, qualitative results for the Board members nominated by the Republican and Democratic Presidents, and for the women, are consistent with those reported above and even more pronounced (both in terms of value and significance), and the value of the F-test confirms that there is no behavioral differences between bank Presidents and Governors.

4.2 Using monetary policy voting records instead of monetary policy preferences

As emphasized in section 2.2., FOMC transcripts are supposed to reveal the policy preferences of FOMC members. Thus, one might expect different results in Table 2 if we use the *voted* policy rates rather than the *expressed* policy rates, i.e., a different influence of FOMC members' background characteristics on their policy differential. To show whether this is the case, we re-estimate equation (1) using voted policy rates rather than expressed policy preferences as dependent variables, to check if our results are driven by our interpretation of the Transcripts, or whether we obtain similar results when using the interest rates voted by FOMC members.

The results of the individual reaction functions show that the determinants of policy rates as revealed by the votes are similar quantitatively as well as qualitatively, and with the same significance as for the expressed preferences revealed by transcripts[19].

In the second step, we use the estimated parameters to re-estimate equation 2 and 3 using similar right hand-side variable, the only difference being the value of the new coefficients that are used to compute the desired interest rates. Given that we use votes instead of the stated preferences, we also add a dummy variable that takes the value 1 if there was a dissent vote in the policy meeting, and 0 otherwise.

Table 4 displays the results of estimation (3) with votes as the dependent variables, instead of the preferred policy rates from FOMC transcripts. A first remarkable difference concerns a stronger significance (and higher value) of the constant in the robustness check, which arguably means that our main method of investigation is better able to dismantle the "constant" value into the true preferences and their regional determinants. Otherwise, similarly to the first results, academic members of the FOMC are not significantly different from the reference category. Overall, the significance and the value of the coefficients are stronger when we use the policy preferences revealed by the transcripts than preferences revealed by votes. This is notably reflected on the degree of hawkishness of MBA holders in case of a positive differential, and on members of central bank staff and woman in case of a negative policy differential. Republican governors seem to behave more dovishly when expressing their policy preferences than when voting, in case

[19] Test results available upon request.

of a negative differential. Finally, the coefficients attached to the dissent dummy lie in conformity with the analysis of Thornton and Wheelock (2014), that dissents are not necessarily correlated with macroeconomic variables, but with fundamental disagreement about the policy stance. The significance and sign of the dummy attached to the expression of dissent also tend to signal the presence of strategic voting, and thus reinforces the advantage of using the transcripts instead of the votes.

Therefore, it must be underlined that using the preferences decoded from the transcripts provide better, and more sincere, results for showing FOMC members' background influence on their policy preferences.

Table 4. FOMC members' backgrounds influence on the policy differential as estimated based on votes

	(1)		*(2)*		*(3)*		*(4)*		*(5)*	
	Policy Differential (PD)						*Positive PD*		*Negative PD*	
	Coefficient	*p-value*	*Coefficient*	*p-value*	*Coefficient*	*p-value*	*Coefficient*	*p-value*	*Coefficient*	*p-value*
Constant	-0.69	0.11	-1***	< 0.00001	-1**	0.02	-0.33	0.41	-0.66	0.1
Professor	-0.24**	0.01	0.05	0.6			-0.17	0.18	-0.17 *	0.06
MBA	-0.20***	0.009	-0.12	0.19			0.04	0.42	-0.3***	0.0003
Master	-0.81***	< 0.00001	-0.87***	< 0.00001			-0.52***	< 0.00001	-0.58***	< 0.00001
Bachelor	-0.64***	< 0.00001	-0.45***	0.0001			0.01	0.91	-0.69***	< 0.00001
PhD					Ref.					
Academic	0.06	0.33			0.06	0.32	0.09	0.61	-0.09	0.86
Central Bank	-0.38***	< 0.00001			-0.15**	0.03	-0.47***	< 0.00001	0.01	0.77
Private Sector	-1.07***	< 0.00001			-0.81***	< 0.00001	-0.55***	< 0.00001	-0.58***	0.006
Public Sector	-0.88***	< 0.00001			-1.5***	< 0.00001	-0.38***	< 0.00001	-0.54***	0.006
Financial sector					Ref.					
Woman	0.7***	< 0.00001	0.74***	< 0.00001	0.75***	< 0.00001	0.3***	0.003	0.59***	< 0.00001
Man					Ref.					
Board Rep.	-0.33***	0.001	-0.12*	0.08	-0.38***	0.0004	-0.34***	< 0.00001	-0.17**	0.013
Board Dem.	0.32**	0.03	0.22**	0.04	0.35***	0.002	0.28**	0.017	0.15	0.35
President					Ref.					
Bernanke	-0.41***	< 0.00001	-0.44***	< 0.00001	-0.43***	< 0.00001	-0.06	0.36	-0.18***	0.001
CPI (National)	0.27***	< 0.00001	0.26***	< 0.00001	0.27***	$< 0.0 * 0001$	0.09**	0.01	0.09**	0.02
Var. Coincident Index (National)	-2.63***	< 0.00001	-2.6***	< 0.00001	-2.6***	< 0.00001	-0.29*	0.06	-1.19***	< 0.00001
Unemp. (National)	0.34***	< 0.00001	0.33***	< 0.00001	0.33***	< 0.00001	0.30***	< 0.00001	0.06	0.47
Dummy Unemp.	-0.23***	< 0.00001	-0.09	0.11	-0.20***	< 0.00001	0.07	0.26	-0.27***	< 0.00001
Dummy Dissent	-0.13**	0.03	-0.13**	0.04	-0.13**	0.03	-0.1	0.1	0.08	0.12
Dummy Nairu	-0.04	0.75	-0.03	0.8	-0.04	0.74	0.51***	< 0.00001	-0.69***	< 0.00001
Observations	*2950*		*2950*		*2950*		*1378*		*1589*	

5 Conclusion

This paper uses the FOMC transcripts over the largest period for which they are available (1994 - 2008) and a consistent set of regional (i.e., central bank districts) price and output variables to disentangle the regional and biographical influences on the behavior of its members. The results confirm the assumption present in the literature that regional variables (especially unemployment) play significant role in shaping policy preferences of the monetary policy makers. We also show that FOMC members care about national variables - notably an increase in CPI raises the interest rate prefered by the decision-maker. However, as an increase in the national unemployment rate means a relative improvement of the situation in the home district of a member (supposing no change in the regional unemployment rate), this change is associated with a preference to tighten monetary policy. An analogical pattern holds for the change in the national coincident index.

The results also indicate that professional backgrounds matter for policy preferences and for the propensity to disagree. We document that both a private and a public sector experience, as well as the fact of being a former central bank staff member is associated with disagreement on the dovish side (although for the latter category the effect seems somewhat smaller quantitatively), as compared to the reference category (financial sector). As for the educational levels, all (Bachelors, Masters, Professors and MBA holders) seem to be more dovish than the reference category of PhD holders, the effect being strongest for Bachelors and Masters, whereas MBA holders are revealed as the most reactive. Interestingly, we show that governors nominated by a Republican president tend to disagree on the dovish side, whereas those appointed by a Democrat do it on the hawkish one. Women are consistently shown to have a higher propensity to disagree on the hawkish side.

Finally, we also show that under the chairmanship of Bernanke, the incentives to disagree seem to have increased for all types of members. This may have strenghtened the propensity to disagree that was arising from regional developments, as well as from the idiosyncrasies of the previous experiences (professional and educational) members of the FOMC carry when seating in the meetings. The results are robust to alternative

estimation strategies and the use of votes instead of transcripts. Overall, the paper delivers new insights on the inside of the FOMC in both the Greenspan and Bernanke years, and notably confirms the interest of using Transcripts instead of expressed votes to study policy preferences.

Appendix

Table A.1. U.S. states comprised in the Fed districts

Fed district	States within a district	Fed district	States within a district
Atlanta	Florida	Boston	Connecticut
	Alabama		Massachusetts
	Georgia		Maine
	Tennessee		Vermont
	Louisiana		New Hampshire
Chicago	Illinois		Rohde Island
	Indiana	Kansas City	Wyoming
	Michigan		Colorado
	Wisconsin		Kansas
	Iowa		Nebraska
Cleveland	Ohio		Oklahoma
Dallas	Texas	New York	New York
	New Mexico	Philadelphia	New Jersey
Minneapolis	Minnesota		Delaware
	Montana		Philadelphia
	North Dakota	San Francisco	Alaska
	South Dakota		Arizona
Richmond	Columbia		Hawaii
	Maryland		California
	Virginia		Idaho
	North Carolina		Nevada
	South Carolina		Oregon
	West Virginia		Utah
St. Louis	Arkansas		
	Kentucky		
	Missouri		
	Mississippi		

Table A.2. Descriptive statistics

			Desired interest rate			Desired differential		
	Position	FED district	Average	Median	Standard dev.	Average	Median	Standard dev.
Jack Guynn	President	Atlanta	3.78	3.82	1.56	-0.26	-0.13	1.53
Cathy Minehan	President	Boston	4	3.97	0.5	-0.04	-0.60	1.51
Michael H. Moskow	President	Chicago	4	3.95	1.41	-0.04	-0.02	1.08
Jerry Jordan	President	Cleveland	4.44	4.31	1.22	0.4	0.3	1.35
Richard W. Fisher	President	Dallas	3.06	3.13	0.7	-0.98	-1.32	1.40
Robert D. McTeer	President	Dallas	4	4.25	1.42	-0.04	-0.13	1.35
Thomas M. Hoenig	President	Kansas city	3.78	3.96	1.13	-0.26	-0.42	1.08
Gary H. Stern	President	Minneapolis	3.93	3.88	0.95	-0.11	-0.42	1.51
Timothy Geithner	President	New York	2.42	2.51	1.85	-1.62	-0.92	2.18
William J. McDonough	President	New York	4.79	4.81	0.59	0.75	0.28	1.62
Anthony M. Santomero	President	Philadelphia	2.65	2.87	0.98	-1.39	-1.54	1.55
Alfred Broaddus	President	Richmond	3.72	3.68	1.74	-0.04	-0.04	0.95
Robert Parry	President	San Francisco	5.06	5.32	1.91	1.02	1.06	2.09
William Poole	President	St. Louis	3.95	3?91	1.72	-0.09	-0.23	1.69
Roger Ferguson	Governor	Boston	2.89	2.72	1.68	-1.15	-0.98	1.58
Susan Bies	Governor	Chicago	4.15	4.09	1.8	0.10	0.06	1.14
Susan M. Phillips	Governor	Chicago	4.98	4.93	0.56	0.96	0.54	1.51
Edward W. Kelley	Governor	Dallas	5	5.08	0.48	-0.66	-0.78	0.91
Donald Kohn	Governor	Kansas city	3.38	3.66	1.39	-1.90	-2?3	1.5
Mark W. Olson	Governor	Minneapolis	2.14	2.26	0.58	-1.90	-2.38	1.5
Kevin M. Warsh	Governor	New York	2.96	2.99	1.53	-1.09	-0.68	1.587
Alice M. Rivlin	Governor	Philadelphia	5.28	5.27	0.15	1.23	0.34	1.84
Randall S. Kroszner	Governor	Richmond	4.35	4.33	1.53	0.60	0.47	0.98
Janet Yellen	Governor	San Francisco	5.34	5.3	0.27	1.3	0.37	1.91
Laurence Meyer	Governor	St. Louis	4.87	4.85	0.98	0.83	0.43	1.73

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