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JEL: E42, E43, E50, E58, C31, C34

Network Structures and Heterogeneity in policy preferences at the FOMC*

Arnab Bhattacharjee
Heriot-Watt University, and National Institute of Economic and Social Research, UK.

Sean Holly
Faculty of Economics, University of Cambridge, UK.

Mustapha Wasseja
King's College London, UK.

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Abstract

Transcripts from the US Federal Open Markets Committee provide, albeit with a lag, valuable information on the monetary policymaking process at the Federal Reserve Bank. We use the data compiled by Chappell et al. (2005b) on preferred interest rates (not votes) of individual FOMC members. Together with information on which monetary policy decisions are based, we use these preferred rates to understand decision making in the FOMC, focussing both on cross-member heterogeneity and interaction among the members of the committee. Our contribution is to provide a method of unearthing otherwise unobservable interactions between the members of the FOMC. We find substantial heterogeneity in the policy reaction function across members. Further, we identify significant interactions between individuals on the committee. The nature of these interdependencies tell us something about information sharing and strategic interactions within the FOMC and provide interesting comparisons with the Bank of England's Monetary Policy Committee.

Keywords: Monetary policy, Interest rates, FOMC decision making, Spatial Weights Matrix, Spatial Lag Model
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1 Introduction

In recent decades, central banking institutions all over the world have shifted to making monetary policy decisions through committees. Recent empirical and theoretical literature on central banking design points to the advantages of a committee set-up as opposed to the 'monetary mystique' of the traditional central banker (Goodfriend (1986); Blinder (2004, 2007)). The key message from this wide literature is that group decision making may be superior to individual decision making because it allows for pooling of knowledge, it offers diversity in views and provide some insurance in mitigating against individuals who might have extreme policy preferences. Thus, group decision-making set-up ensures aggregation of diverse individual member preferences into a collective decision which is typically steered through discussions and deliberations. As Maurin and Vidal (2012) points out, a deliberation process typically involves individuals attempting to influence the votes of other agents especially in committees that are collegial in nature, such as the US Federal Open Market Committee (FOMC), and through this process members are trying to weigh their own preferences against other members' preferences so as to make informed policy decisions.

We study the internal design of the FOMC and provide a theoretical model that helps to explain the heterogeneity in policy preference across individual members of the FOMC as well as the effects of member-to-member interactions which is explained by a connectivity or adjacency matrix that is constructed from the residuals of individual reaction functions following the approach of Bhattacharjee and Holly (2015).[1] We use the connectivity matrix to examine the existence and magnitude of relationships between members of the FOMC. Specifically, our empirical analysis focuses on the periods when Arthur Burns (1970-1978) and Alan Greenspan (1987-1999) were chairmen of the FOMC. This choice is motivated by several factors, firstly, the availability of detailed verbatim transcripts of FOMC meetings from 1976 onwards offers a rich data source for examining communication, voting behaviour, and individual preferences among committee members. This detailed information (obtained from (Chappell et al., 2005a)) allows an investigation of the committee's decision-making processes, providing insights that may not be available at other times. Secondly, the contrasting leadership styles of Burns and Greenspan present an ideal setting to explore the impact of the chairman's role on interactions between FOMC members. Burns was known for his centralizing approach and strong personality, which often dominated the committee's discussions, whereas Greenspan was characterized by a more collegial style that encouraged open debate and differing viewpoints. By comparing and contrasting the committee's dynamics under these two leaders, we can better understand how leadership styles influence FOMC member interactions and decision-making processes. Thirdly, the diverse economic performance during their tenure, which included periods of high inflation, recessions, and financial crises, provide an opportunity to analyse how interactions between FOMC members evolved in response to economic conditions. By examining the data from these periods, we can gain a deeper understanding of the factors that shape FOMC decisions, and how these interactions contribute to policy outcomes (Chappell et al. (1995, 1997, 2005a, 2007)). Lastly, the policy decisions made by the FOMC during the tenures of Burns and Greenspan had significant implications for the U.S. economy and monetary policy. Investigating the interactions between FOMC members during these critical periods will not only contribute to the existing literature but also provide valuable insights for policymakers and academics alike, enhancing our understanding of the dynamics of one of the most influential monetary policy committees in the world.

Our work diverges from related research by utilizing data on voiced preferences rather than

[1] Connectivity matrix here is also referred to as a Spatial Weight matrix, and we use these terms interchangeably.

actual votes to estimate individual members' reaction functions. This approach aligns with Meade (2005), who contended that policy preferences expressed in meetings carry more information than monetary policy committee voting records. This view is also supported by Sibert (2003), who argued that votes generally lack substantial informational content, particularly in groups like the FOMC, where consensus-building is the primary goal. A meticulous examination of minutes records by Swank et al. (2008) revealed that when FOMC members verbally dissented from the chairman's policy proposal, their dissent was sometimes not reflected in their official votes. This suggests that committee members to achieve consensus, occasionally concealed disagreements in their final votes.

To anticipate the conclusions, we find that there exists substantial heterogeneity across individual members of the FOMC. Supporting the theoretical model developed in later sections, this heterogeneity is mainly driven by sectoral representation. Our results also point to significant interdependencies between policy decisions of the different members of the FOMC. The approach we take effectively combines concepts and methods from political economy, spatial econometrics and network topology,[2] to capture these interdependencies in the form of weighted networks. These interdependencies indicate that members can be influenced as well as influencing other members to varying degrees. We also note the existence of significant positive interaction effects between different Bank Presidents and negative interaction effects between Bank Presidents and Governors. This finding complements earlier work by Chappell et al. (2005a) who suggest that the differences between Bank Presidents and Governors could potentially be a result of different appointment procedures or different representation. Our work is also closely related to previous work on the Bank of England's MPC (Bhattacharjee and Holly, 2010, 2013, 2015), but it differs in one significant respect as we use data on voiced preferences and not actual voting data. Further, our analysis focuses on the FOMC which has a different institutional design, compared to the Bank of England, where the FOMC decision-making process is collegial with most decisions being unanimous.

This remainder of the paper is organised as follows. In Section 2, we provide a brief overview of the structure of the Federal Reserve and a discussion of the related literature. Section 3 develops a theoretical framework that provides an economic basis for cross-member heterogeneity and spatial network interactions effects. Section 4 presents the data and the empirical model. The results are discussed in Section 5 and conclusions from our research are finally presented in Section 6.

2 Structure and Operation of the FOMC

The FOMC consists of 12 members[3] as well as select staff and economists from both the Board and the regional Federal Banks. The FOMC is mandated with two key objectives which is to maintain price stability and pursue goals that ensure maximum sustainable economic growth.

FOMC 'deliberation' typically involve two policy 'go-rounds' phases. In the first go-round, Fed Governors and Bank presidents discuss economic and financial conditions in their respective districts, as well as providing an overview of the national economic outlook. Prior to this go-round, policymakers gather information through briefings from their research staff, engagements

[2]For an overview on the economics of networks, see Ioannides (2012); Jackson (2014); Bramoullé et al. (2016).

[3]The FOMC committee is comprised of 12 voting members: the chairman, 7 governors from the Federal Reserve Board appointed by Congress, and 4 regional Fed Presidents. The New York Reserve Bank president is a permanent voting member in the committee. The Reserve Bank presidents of the other regional federal reserve banks only serve a one-year term as voting members on a rotation basis. The chairman of the Board of Governors serves as FOMC chairman and the President of the New York Fed as FOMC vice chairman (The Fed Explained) .

with key business sector executives, and consultations with Board of Directors and Economic Advisory Councils. Reserve Bank presidents then prepare a report, which is a 'summary of commentary on economic conditions' published in the 'Beige Book' approximately two weeks before the FOMC meeting. One Federal Reserve Bank is designated on a rotational basis to provide an overall summary report from all 12 districts.

The first part of the meeting covers valuable information on current economic activity across the country and abroad, ensuring that each region of the US has input on shaping national monetary policy. This segment of the meeting typically concludes with a speech from the FOMC chair summarizing the discussion and offering their view on the economy. Subsequently, the Federal Reserve Board's Director of the Division of Monetary Affairs outlines monetary policy options provided through the *Blue Book*. The *Blue Book* contains information on potential changes in federal funds rate targets, listed as either *no change*, *an increase*, or a *decrease*, each supported by a clear rationale, including pros and cons, as well as a set of communication alternatives for the Committee to relay to the public.

The second part of the FOMC meeting involves Reserve Bank presidents and Governors expressing their policy preferences based on their assessments of the economic conditions in the country and the regions they represent. During this process, they also comment on and suggest modifications to the monetary policy statement. At the conclusion of this meeting, the Chairman summarizes the proposal for the Committee's discussion. Fed Governors and Bank presidents can then assent or dissent to the proposal, which is subsequently voted on. However, as **?** notes, the Committee always endeavors to reach a consensus through deliberations and discussions among FOMC members. This entire deliberative process presents a diverse range of views, reached through a thoughtful and collaborative process.

3 Theoretical Model

Our basic model is motivated by Waller (1992, 2007)'s theory of multi-sector economy which builds upon an earlier model by Duca (1987). Of course, although we focus on sectors there is no reason in principle why the potential heterogeneity may be due also to regional differences or political loyalties.

We consider an economy that is characterised by labour markets being either competitive or unionised sectors. These sectors have differing degrees of nominal wage rigidity and as a result incur different benefits and costs from the central bank's monetary policy options. The sectors therefore desire different degrees of conservatism[4] depending on the cost of output variability. Consequently, this leads to partisan preferences over monetary policy based on the underlying structure of the economy. The committee members are chosen from each sector of the society as part of the central bank constitution.

Each sector incurs a welfare loss from its output gap (deviation from potential output) as well as deviations of inflation from its target. The society's loss function is a weighted average of the sector loss functions, which are modeled like the central bank loss function but with different weights on inflation and output variability. The loss functions are given as:

$$L_C = (y^C - y^P)^2 + \beta(\pi - \pi^T)^2 \tag{1}$$

$$L_U = (y^U - y^P)^2 + \beta(\pi - \pi^T)^2 \tag{2}$$

[4]This is conservatism in the sense of Rogoff (1985)

$$L_S = \omega L_C + (1-\omega) L_U \tag{3}$$

Here, L_C, L_U and L_S denote the competitive, unionised sectors and society's loss functions respectively, and y^C and y^U respectively are output growths for the competitive and unionised sectors. The parameters y^P and π^T are the potential output and inflation target respectively. The parameters ω and $(1-\omega)$ are the weights on the different sectors of the economy. The society loss function L_S is therefore given by:

$$L_S = \omega[(y^C - y^P)^2 + b(\pi - \pi^T)^2] + (1-\omega)[(y^U - y)^2 + \beta(\pi - \pi^T)^2] \tag{4}$$

$$L_S = \omega[(y^C - y^P)^2] + (1-\omega)[(y^U - y^P)^2] + \beta(\pi - \pi^T)^2 \tag{5}$$

The monetary policy loss function in the case of the FOMC (L_{FOMC}) is like society's loss function but with a possibly of a higher weight on inflation deviations and correspondingly lower weight on output variability.

$$L_{FOMC} = \omega[(y^C - y^P)^2] + (1-\omega)[(y^U - y^P)^2] + \phi\beta(\pi - \pi^T)^2 \tag{6}$$

such that $\phi \geq 1$.

The parameter ϕ reflects the degree of conservatism of the central banking institution, as in Rogoff (1985). If $\phi > 1$, the central bank puts more weight on stabilizing inflation than the rest of society, while if $\phi = 1$, it aims to minimize society's loss function.

Following Waller (2007) we show that the optimal monetary policy can be derived from a second-order Taylor series approximation of the welfare measure around the steady-state values of the stationary variables that affect household's utility, as detailed in the seminal work of Woodford and Walsh (2005) and Rotemberg and Woodford (1998). We assume that the central bank is concerned with maximising a quadratic approximation of the expected utility of an equally weighted sum of representative households:

$$W = \mathbb{E}\left\{\sum\nolimits_{t=0}^{\infty} \beta^t U_t\right\} \tag{7}$$

Woodford and Walsh (2005) demonstrate that the objective function of the household could be approximated by a purely quadratic form:

$$\sum\nolimits_{t=0}^{\infty} \beta^t U_t = -\Omega \sum\nolimits_{t=0}^{\infty} \beta^t L_t + t.i.p + \mathcal{O}(||\xi||^3) \tag{8}$$

Where ξ is a constant and L_t denotes the central bank's loss function and $t.i.p$ stands for "terms independent of policy". The objective of the central bank is therefore to minimise a loss function:

$$\min W = \mathbb{E}_0 \left\{\sum\nolimits_{t=0}^{\infty} \beta^t L_t\right\}, \tag{9}$$

subject to a given aggregate supply curve and the IS curve:

$$x_t - \mathbb{E}_t x_{t+1} + \phi(R_t - \mathbb{E}_t \pi_{t+1})) - g_t = 0 \tag{10}$$

$$\pi_t - \lambda x_t - \beta \mathbb{E}_t \pi_{t+1} - \mu_t = 0 \tag{11}$$

Setting up the Lagrangian:

$$\begin{aligned} L = {\pi_t}^2 + \mu_x {x_t}^2 + \mu_r {r_t}^2 + \beta \pi_{t+1}^2 + \beta \mu_x x_{t+1}^2 + \beta \mu_r r_{t+1}^2 - \xi_{1t}(\pi_t - \lambda x_t - \beta \pi_{t+1} - \mu_t) \\ -\xi_{2t}(x_t - x_{t+1} + \phi R_t - \phi \pi_{t+1} - g_t) - \beta \xi_{1t+1}(\pi_{t+1} - \lambda x_{t+1} - \beta \pi_{t+2} - \mu_{t+1}) \\ -\beta \xi_{2t+1}(x_{t+1} - x_{t+2} + \phi R_{t+1} - \phi \pi_{t+2} - g_{t+1}) \end{aligned}$$

The central bank minimises over the whole time period, choosing π_{t+1} , x_{t+1} and r_{t+1}. Taking the first-order conditions and scrolling one-period backwards yields:

$$\pi_t - \phi \beta^{-1} \xi_{1t-1} + \xi_{2t} - \xi_{2t-1} = 0 \tag{12}$$

$$\mu_x x_t + \xi_{1t} - \beta^{-1} \xi_{1t-1} - k \xi_{2t} = 0 \tag{13}$$

$$\mu_r r_t + \phi \xi_{1t} = 0 \tag{14}$$

Together with:

$$\pi_t - k x_t - \beta \pi_{t+1} = 0 \tag{15}$$

$$x_t - E_t x_{t+1} + \phi r_t - \phi \pi_{t+1} - g_t = 0 \tag{16}$$

Solving this dynamic system for R_t we end up with robustly optimal instrument rule [5] which is given by :

$$R_t = (1 + \frac{k\phi}{\beta}) R_{t-1} + \beta^{-1} \Delta R_{t-1} + \frac{k\phi}{\mu_r} \pi_t + \frac{\phi \mu_x}{\mu_r} \Delta x_t \tag{17}$$

$$R_t = \rho_1 R_{t-1} + \rho_2 \Delta R_{t-1} + \phi_\pi \pi_t + \phi_x \Delta x_t \tag{18}$$

Where:

[5] Please see Giannoni and Woodford (2003) for an in-depth overview of robustly optimal instrument rules.

$$\rho_1 = (1 + \frac{k\phi}{\beta}) > 1 \qquad \rho_2 = \beta^{-1} > 1$$

$$\phi_\pi = \frac{k\phi}{\mu_r} \qquad \phi_x = \frac{\phi}{\mu_r}$$

Woodford (2003) argues that the traditional Taylor rule should incorporate a "smoothing" parameter to better align with observed interest rate trajectories. While Bennani et al. (2018a) argue that individuals possess fewer incentives than institutions to exhibit smoothed behavior, implying that individual preferences and decision-making may be more volatile compared to institutional approaches. This idea is supported by Sibert (2006), who emphasizes the significance of committee-based decision-making in central banking and the role of diverse perspectives among individual committee members. The author asserts that accommodating a wide range of opinions is crucial for effective committee decision-making, which in turn suggests that individuals within monetary policy committees may display greater variability in their views relative to the collective institutional stance. Consequently, we exclude an interest rate smoothing parameter from our optimal policy rule. The optimal policy rule is thus formulated as follows:

$$R_{it} = \phi_\pi \pi_{it} + \phi_x \Delta x_{it} + \varepsilon_{it} \tag{19}$$

Factoring in individual preferences we can rewrite our optimal policy rule (19) as:

$$R_{it} = \alpha_i + \phi_{\pi i} \pi_t + \phi_{xi} \Delta x_t + \varepsilon_{it}, \;\; i = 1, ..., n \tag{20}$$

We model the different sectoral representation of the members of the monetary policy committee as belonging to distinct reference groups (Hyman, 1960). We also allow members of the FOMC to belong to multiple reference groups depending on their social affiliations, political affiliations, educational backgrounds, cultural perspectives, gender, race or even their differing views about the prevailing economic and financial conditions which could result in either agreements or disagreements on a given proposed policy based on a members 'reference group'.

One key feature in the mult-sectoral model of Waller (1992, 2007) is that it permits spillovers between sectors which leads in turn to cross-member interactions. We hypothesise that individuals on the FOMC might revise their policy preferences when apprised of the information of other members in the committee or because of the need to pool individual information. With members having different backgrounds, their desired policy preferences evolve typically from different types of public and private information which also reflect different levels of expertise among members. It is therefore natural that if individual i is aware of the policy preferences of each of the other members, member i would revise their own preferences to accommodate the information, expertise, opinions and judgements of the other members of the committee; this is akin to the one-step Kalman adjustment of each member in Bhattacharjee and Holly (2013). It is also possible that since the members of the FOMC aim also for a socially optimal policy preference, we expect that they interact and persuade each other in the policy go-round phases.

4 Data and Empirical Model

4.1 Data

The primary objective of this section is to understand heterogeneity among policy preferences of different members of the committee as well as the cross-member network interactions in the FOMC. Our sample covers the periods when Arthur Burns and Alan Greenspan were chairmen of FOMC. We have a sample of 99 meetings during the Arthur Burns era and 75 meetings during the Alan Greenspan era. The dependant variable in our study is the 'desired' fed fund rates (FFR) of the individual members of the FOMC at each of their meetings.

The variable FFR was obtained from reading the official transcripts of the FOMC meetings. For the years 1987 to 1997 (Alan Greenspan tenure) the data were obtained from **?**. As **?** observe, there are missing observations in the data set. The problem is that sometimes governors and the district bank presidents did not state their preferences explicitly, but they said that they preferred a higher or lower interest rate. For the given years, **?** estimated such preferences as the preference to tighten or to ease, and also estimated a quantitative value for such preferences. We use these estimated values in our research and supplement this with additional information from meeting records in the Memorandum of Discussion and edited FOMC transcripts for both the periods when Arthur Burns and Alan Greenspan were chairmen of the FOMC.

The common approach to studying central bank voting behaviour has used voting data, which usually codes the votes as assent or dissent. Such a data does not, however, reflect the 'true' monetary preferences of the members perfectly as often members assent to the offered monetary directives even if they are averse to these directives, therefore the dissent votes are very rare. This also follows the argument in Meade (2005) that the preferences stated in meeting transcripts has better informational content than the monetary policy committee voting records especially in groups where achieving a consensus is the primary objective as with the FOMC. Voting data also fails to capture the type of target variable in place as it only focuses on whether a member agrees or disagrees with a target. Figure 1 below gives a visual representation of the voting profile frequencies during Arthur Burns and Alan Greenspan tenures which indicates low dissent rates during both periods.

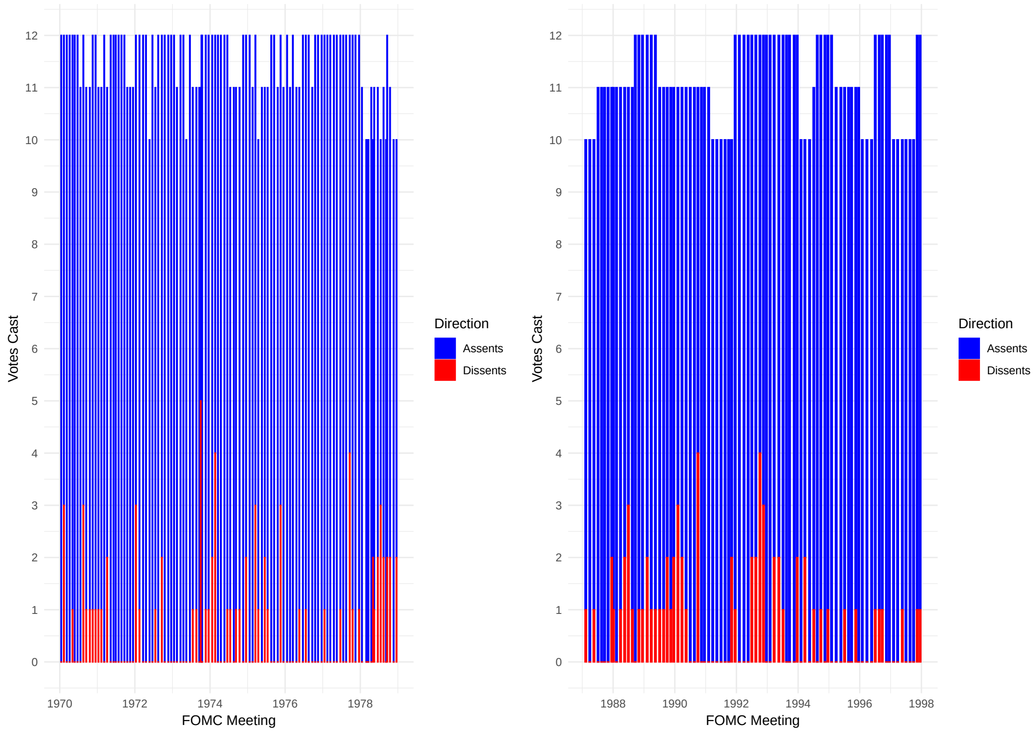

Figure 1: Frequency of Dissent

Data on macroeconomic variables included in our individual reaction functions are obtained from the ‘Green Book’ (also referred to as “Current Economic and Financial Conditions”) that is normally prepared by the staff at the Federal Reserve Board before each FOMC meeting. The Green Book contains detailed analyses of the US economy and provide forecasts for up to four quarters ahead and historical values of several key macroeconomic variables. We use 3 quarters ahead forecasts for Green Book real GNP (RGNP), Green Book Inflation based on GDP deflator (DEFL) and Green Book unemployment (UN).

Based on this, we set up a panel error correction model (Pesaran and Smith, 1995) with potential partial adjustment to a long run equilibrium. The first differences of the Green Book GDP deflator (D.DEFL) and growth rate of real GNP (D.lnRGNP) are tested and confirmed as stationary by panel unit root tests.

4.2 Econometric Model

We begin by writing our optimal policy rule as a reduced-form for each individual FOMC member. The model includes individual heterogeneity in the fixed effects and heterogeneous coefficients for the macroeconomic variables and which are of interest to the Fed. Our dependent variable is the federal fund rates desired by the individual FOMC members for the period between 1970-1978 and 1986-1999 which capture Arthur Burns and Alan Greenspan’s tenure terms, respectively. The individual reaction function for the FOMC is therefore given by:

$$R_{it} = \alpha_i + \beta_i X_t + \varepsilon_{it}, \quad i = 1, ..., n \tag{21}$$

The parameters α_i are the individual specific fixed-effects, β_i is a $1 \times K$ vector of coefficients for individual i,R_{it} is the desired fed fund rate for member i in time t, X_t are the common macroeconomic variables that are presented to the FOMC members in the Green Book which vary across time but not across individuals , ε_{it} are the individual error terms.

These individual specific errors reflect specific expertise and knowledge (about specific sectors and regions) of the FOMC members that are not directly observed but influence their individual policy preferences. However, as discussed above, there is sharing of information and exchange of views between the members through the process of discussion and deliberation within the FOMC; see, for example, Alesina and Stella (2010); Bhattacharjee and Holly (2010, 2013, 2015); Alesina and Grilli (1991). Therefore, following Bhattacharjee and Holly (2013) we allow the individual regression errors to bear unrestricted cross-sectional dependence across the members. We combine our policy reaction function (21) with a spatial autoregressive error process to account for the spatial dependence (and network externalities) among FOMC members.

$$R_{it} = \alpha_i + \beta_i X_t + \varepsilon_{it} \tag{22}$$

$$\varepsilon_{it} = \sum_{i \neq j}^{N} \lambda_i W_{ij} \varepsilon_{it} + \nu_{it} \tag{23}$$

where ν is a zero mean idiosyncratic error, uncorrelated across members and $\mathbf{W}$ is the spatial (or network) weights matrix given by:[6]

$$\mathbf{W} = \begin{pmatrix} \mathbf{w}_{1,1} & \mathbf{w}_{1,2} & \cdots & \mathbf{w}_{1,n} \\ \mathbf{w}_{2,1} & \mathbf{w}_{2,2} & \cdots & \mathbf{w}_{2,n} \\ \vdots & \vdots & \ddots & \vdots \\ \mathbf{w}_{n,1} & \mathbf{w}_{n,2} & \cdots & \mathbf{w}_{n,n} \end{pmatrix}$$

$\mathbf{W}$ is a $N \times N$ matrix of spatial weights with zero entries in the diagonal and unrestricted entries in the off-diagonal and $(\mathbf{I} - \mathbf{W})$ non-singular for identification purposes. The ε_{it} represents a vector of errors that are possibly heteroscedastic across members but homoscedastic across meetings.

Combining the policy reaction function with the error model leads to a spatial error model with autoregressive errors. The spatial error model is discussed in detail elsewhere (Geary (1954); Whittle (1963); Cliff and Ord (1972)).

The spatial weights matrix,$\mathbf{W}$, provides a useful way to model 'structural' dependence between observational units, which in our case are the members of the FOMC. Our interpretation of 'structural' here means that the interactions are exogenously determined by the organization of the observational units in the underlying spatial structure, in this case the network architecture of the FOMC. Then $\mathbf{W}\epsilon$ is a so-called 'spatial lag' of the errors – a linear combination of the errors (shocks) of the neighbouring members in the network, weighted by the connections (spatial weights) of these neighbours with an index member.

[6]In spatial econometrics and network theory, the spatial weights matrix is also referred to as connectivity matrix, these terms can be used interchangeably. λ and W are not identified separately (Bhattacharjee and Jensen-Butler, 2013) and as such we base our inferences on $\lambda W \equiv \mathbf{W}$.

The vast majority of the literature in spatial econometrics works on the assumption that the spatial weights matrix is known a priori. We diverge from this approach and estimate the spatial weights matrices and use this to infer the nature of interactions between members. Bhattacharjee and Jensen-Butler (2013) however point out that the spatial weights matrix under the spatial error model is only partially identified and as such requires further assumptions before it can be estimated or used for inference purposes. Bhattacharjee and Holly (2013) proposed a GMM based estimation procedure that deals with the problem of partial identification of the spatial weight matrix. Their estimation approach involves invoking assumptions based on adequate moment conditions, and therefore does not impose any structural constraints on the elements of the spatial weight matrix. The moment conditions in this context are observation units (FOMC members) at higher spatial lags obtained by drilling down in space or along the network connections (neighbours of neighbours), i.e. peripheral units or units with weak connections. The validity and adequacy of these weak links in providing adequate instruments can be verified using a statistical test for over-identifying restrictions (Hansen, 1982).

The above methods are suitable when there is cross-sectional weak dependence (Pesaran, 2006; Pesaran and Tosetti, 2011) across the FOMC members.[7] In this specific context, this assumption is highly suspect for two reasons. First, around the end of the Great Moderation and particularly during the Global Financial Crisis, global macroeconomic factors have played a key role, in addition to within-country macroeconomic conditions (Bhattacharjee and Holly, 2016). If multiple FOMC members' desired interest rates reflect the influence of global factors, this would likely induce strong dependence in the errors and invalidate the above procedures. Second, and more pertinently in this case, there is a large literature supporting chairman dominance in FOMC decision making (Chappell et al., 2005b). Such chairman dominance would also induce the breakdown of weak dependence. We apply a new approach to account for such chairman dominance as outlined in (Bhattacharjee and Holly, 2015).

4.3 Estimation Procedure

The focus of our approach lies both in the heterogenous policy reaction functions in (22) and inference on the network architecture based on reduced form errors in (23). For the network structure, we follow the IV-GMM methodology in Bhattacharjee and Holly (2013) which relies on regressing reduced form residuals for each FOMC member on the residuals for other members in the same committee, accounting appropriately for endogeneity. As discussed above, the IV strategy here is based on a core-periphery network architecture, where the designation of core and periphery members is aided by tests of instrument validity (Hansen, 1982). The extraction of the (generalized) residuals includes a methodological innovation to allow for the factor structure, or strong cross-section dependence.

Before we can implement this procedure, we need to obtain reduced form generalized residuals. This requires a new methodology because of potential cross-sectional strong dependence. Indeed, our initial estimation of the individual member policy reaction functions (22) did not satisfy the cross-section (spatial) granularity condition (Pesaran and Tosetti, 2011). This indicates that the estimates are not consistent and therefore also the reduced form residuals. For this purpose, we used the Pesaran (2015) CD test[8] to verify the 'no strong dependence'

[7] Weak dependence (or spatial granularity) is akin to stationarity in the time domain. Similar to time series, strong dependence, or violation of weak dependence, induces spurious correlation and regression (Pesaran, 2006).

[8] Pesaran (2015) CD test statistic is given by $CD = \sqrt{\frac{2T}{N(N-1)}} \sum_{i=1}^{N-1} \sum_{j=i+1}^{N} \hat{\rho_{ij}}$ where $\hat{\rho_{ij}}$ denotes the correlation coefficient between residuals for FOMC members i and j. Under the null hypothesis of 'no strong dependence' or 'weak dependence', the statistic has the asymptotic sampling distribution $CD \sim \mathcal{N}(0, 1)$, which is easy to verify. The Stata program *xtcse2* (Ditzen (2021)) implements this procedure.

condition.

As discussed before, this violation of the spatial granularity condition is not unexpected. To satisfy weak cross-sectional dependence, we first followed Bhattacharjee and Holly (2016) and included global macroeconomic factors as additional regressors. The residuals still indicated strong dependence. Next, we included common correlated effects (Pesaran, 2006), that is, the average desired fed fund rates (across all members) and allowed this to have heterogenous slopes; the CD statistics reduced somewhat but weak dependence was still violated. This can be seen to indicate evidence of dominance of individual members of the committee, likely the Chairman, as highlighted in the literature (Chappell et al., 2007). We therefore use both the Chairman's desired fed fund rate and the average desired rates (but now omitting the Chairman), both with heterogenous slopes, in estimating the decision functions of the FOMC members. This approach considers the Chairman as a potential dominant unit (Chudik et al., 2011) and a factor, and the average desired rates across all other members (common correlated effects) to account for additional common factors. With this modification, the Pesaran (2015) CD test statistic finally indicated a failure to reject the null hypothesis of weak dependence.[9]

Next, we make a methodological enhancement to the literature by extracting generalized residuals that account for strong dependence. Essentially, we take the residuals from the above extended model, and add back to the contribution of the Chairman's desired fed funds rate.[10] This modified procedure can be described as follows:

$$R_{Gt} = \alpha_i + X_t\beta_i + \gamma_i\bar{R}_{it} + \mu_{it} \tag{24}$$

$$R_{it} = \alpha_i + X_t\beta_i + \gamma_i\bar{R}_{it} + \delta_i R_{Gt} + \mu_{it}; i \neq G \tag{25}$$

$$\hat{\xi}_{it} = \hat{\mu}_{it} + \hat{\delta}_i R_{Gt}; \hat{\delta}_G = 0 \tag{26}$$

where, R_{Gt} is the desired fed fund rate of the Chairman at time t, $\bar{R}_t$ the average desired fed fund rate without the Chairman, γ_i the individual coefficients of the average fed fund rates and δ_i is the individual coefficients of the Chairman's fed funds rate.

With this modification in place, we can now proceed to estimate each row of $\mathbf{W}$ in turn, where the residual for a "core" FOMC member is regressed on the endogenous residuals for other "core" members in the same committee[11] using the generalized residuals of "peripheral" members and other exogenous variables (lagged macroeconomic variables, etc.) as instruments (Bhattacharjee and Holly, 2015) . The designation of core-periphery status is obtained by tests of instrument validity or overidentifying restrictions. For this purpose, we use the *IVREG2* program in Stata (Baum et al., 2015). Once this process is completed for each "core" chosen FOMC member, the entire interaction weights matrix has been estimated. Finally, we test and find that with the above specification the spatial granularity condition is not violated. The weights matrix is then used to make inferences about the network structure of the "core" FOMC members. We add temporal lags, higher spatial lags, residuals of non-core (peripheral) members and lags of exogenous macroeconomic variables to construct a large pool of potential instruments. We check for the validity of the pool of instruments using the Sargan-Hansen

[9] See Pesaran and Tosetti (2011); Sarafidis and Wansbeek (2012); Bailey et al. (2016); **?** for literature on weak and strong cross-sectional dependence and testing of weak dependence.

[10] In principle, one should adjust the residual also for the inclusion of the cross-section average term $\gamma_i\ \bar{R}_t$. However, because of averaging, this has negligible influence on our results. Hence, we omit this for clarity of exposition.

[11] We take the core and non-core (periphery) members to comprise members of the FOMC who have attended at least 80% and 50% of the FOMC meetings respectively, subject to satisfying instrument validity tests.

J-test for overidentifying restrictions (Hansen, 1982) and weak instruments using the Wald test (Kleibergen and Paap, 2006).

5 Results and Discussion

We use the methods discussed in the previous section to estimate the parameters of the individual reaction functions of each of the members of the FOMC, and capture interaction effects between members. The primary objective of this procedure is to study preference heterogeneity and otherwise hidden interaction within the FOMC. This is done in two stages. In the first stage, we estimate the factor-augmented reaction functions of each member (24-25).[12] Then, we collect residuals from each equation and compute generalized residuals as in (26). Finally, at the second stage, we estimate the spatial (network interactions) weights matrix $\mathbf{W}$ by IV-GMM based on a classification of FOMC members as belonging to either the "core" or the "periphery" of the committee, and using desired rates of the peripheral members as instruments to identify the network structure among the "core" members. The "core-periphery" classification is then validated by tests of overidentifying restrictions (Hansen, 1982).

5.1 Heterogeneity in Policy Preferences

Tables 1 and 2 present the regression estimates for the policy reaction function of the FOMC members for the two periods when Arthur Burns (1970-1978) and Alan Greenspan (1986–1999) were chairmen of the FOMC. We use the same set of explanatory variables for both periods. These are pooled mean group estimates (Shin et al., 1999) which assume a common long run equilibrium policy rule across all members, but with heterogenous partial adjustments and short run dynamics.

The results from both Table 1 and 2 indicate that the policy preferences of individual members of the FOMC are generally consistent with the theory(?????). The point estimates of inflation and unemployment coefficients are usually positive and negative coefficients, respectively, and are statistically significant. There are however occasional exceptions that are characterised by numerically small and statistically insignificant coefficients.

There is strong evidence of partial adjustment to an equilibrium relationship of the Taylor rule form. The Taylor principle is validated, more strongly for the Greenspan era. There is evidence of strong dependence all through, and particularly for dominant members such as the Chairman (Chudik et al., 2011). We also note the substantial heterogeneity in the short run dynamic adjustment which also aligns with our multi-sector theory on heterogeneity, a la Waller (2007). During the Burns era, there is, overall, a relatively weak distaste for inflation. Both Burns and Eastburn have a greater distaste for low output growth while Morris has greater concern for unemployment. Somewhat counterintuitively, Coldwell appears to be the least conservative member of the FOMC. This perhaps highlights the importance to focus on 'desired' rates rather than votes, in which Coldwell earned a reputation for dissent. In Table 2 for the Greenspan era, the results indicate a strong adherence to the Taylor principle with Greenspan (the chairman) showing the greatest distaste for inflation. Both Kelley and Stern have negative and significant coefficient for unemployment. Parry's desired rates responded most positively to changes in inflation, and Boehne proved to be the least conservative member of the FOMC. Overall, the results suggest that individual policy preferences within the FOMC are heterogeneous. These findings support the political economy view that monetary policy

[12] The included factors are: (a) global macroeconomic variables included in X_t; (b) cross-section average $\overline{R}_t$; and (c) Chairman's desired fed funds rate R_{Gt}.

decision making by committee can provide balance against a single conservative central banker and help achieve closer alignment with the social optimum.

Table 1: Regression results

	Burns	Coldwell	Eastburn	Kimbrel	Mayo	Morris
Ec	-0.139***	0.097*	0.161**	0.0381	-0.1334	0.0370
	(0.042)	(0.051)	(0.072)	(0.0587)	(0.0608)	(0.0625)
$\Delta\pi_t$	0.0398	-0.0832	-0.0519	-0.0144	-0.0448	-0.1002
	(0.0529)	(0.0612)	(0.0970)	(0.0716)	(0.0552)	(0.0745)
Δy_t	0.0552	-0.0016	-0.0088	0.0142	0.0098	0.0062
	(0.0198)	(0.0222)	(0.0330)	(0.0254)	(0.0208)	(0.0264)
ΔUn_t	0.0729	-0.3243	-0.5181	-0.1032	-0.1649	-0.5171
	(0.1386)	(0.1464)	(0.1708)	(0.013)	(0.1409)	(0.1756)
$\bar{r_t}$	0.0924	-0.1093	-0.2140	-0.0718	0.0384	-0.0959
	(0.0400)	(0.0510)	(0.0702)	(0.0573)	(0.0558)	(0.0592)
$\bar{r_G}$		0.2956	-1.023	0.2609	0.2048	0.3746
		(0.0750)	(0.1129)	(0.0848)	(0.0722)	(0.0865)
Fixed effects	-0.1220	0.3844	0.8580	0.4796	0.1201	0.3603
	(0.1294)	(0.1626)	(0.2269)	(0.1762)	(0.1596)	(0.1915)
Long-Run Effects	$L\pi_t$	Ly_t				
	0.4079	0.1448				
	(0.0761)	(0.0519)				
CD Statistics	-1.660	(0.332)				

The dependent variable for all the regressions is the desired fed fund rate; standard errors (SE) are in parenthesis; Ec represents the coefficients of the error correction term.

Table 2: Regression results

	Greenspan	Boehne	Kelley	Melzer	Parry	Stern
Ec	-0.9561	-1.009	-0.9501	-0.869	-0.919	-1.029
	(0.0302)	(0.044)	(0.3701)	(0.0587)	(0.0582)	(0.0301)
$\Delta\pi_t$	0.0472	-0.0441	0.0372	0.0092	-0.0794	0.0501
	(0.0242)	(0.0304)	(0.0531)	(0.0363)	(0.0311)	(0.0432)
Δy_t	0.0455	0.0114	0.0432	-0.0102	0.1081	0.0406
	(0.0201)	(0.0110)	(0.0171)	(0.010)	(0.2411)	(0.0451)
ΔUn_t	-0.2322	0.0114	-0.4211	-0.2001	-0.1471	-0.2732
	(0.0822)	(0.011)	(0.1830)	(0.5311)	(0.1501)	(0.2786)
$\bar{r_t}$	0.0901	0.0703	-0.1121	-0.0054	0.0384	-0.0542
	(0.0522)	(0.0078)	(0.0448)	(0.0108)	(0.0558)	(0.1084)
$\bar{r_G}$		0.0682	-0.0544	0.1822	0.2410	0.4011
		(0.2731)	(0.0907)	(0.0915)	(0.0927)	(0.1744)
Fixed effects	-0.3080	-0.3461	-0.2572	-0.1921	-0.3041	-0.2882
	(0.1294)	(0.1626)	(0.2269)	(0.0901)	(0.2031)	(0.1001)
Long-Run Effects	$L\pi_t$	Ly_t				
	0.5201	0.1731				
	(0.1926)	(0.0692)				
CD Statistics	0.9822					
	(0.4986)					

The dependent variable for all the regressions is the desired fed fund rates; standard errors (SE) are in parenthesis; Ec represents the coefficients of the error correction term.

5.2 Network Structure

Members of the committee can both be influenced by, and influence, other members, depending upon which sectors/regions they are representing. We allow for these interactions to be asymmetric with unrestricted signs. Some members are more influenced by others while other members may be more influential and less influenced by others. These patterns of influence are revealed through a graphical representation of each of the two committees under study. Each node in the network graph is a "core" member from the specific FOMC committee. A pair of nodes i and j connected by a directed edge $i \rightarrow j$ indicates that i influences j's decisions through the estimated spatial weights matrix $\mathbf{W_{ij}}$.

We consider the elements (edges) of the spatial weights matrix statistically significant at the 5 percent level to be an indication of significant member-member influence. We take the GMM approach here, and do not impose a structural constraint of a symmetric spatial weights matrix, allowing for the possibility of an asymmetric network structure that makes our analysis much richer. In this context we interpret interactions from the network graph as either negative (conflicts in preferences) indicated by the red edges or positive (like-mindedness or conformity) indicated by the green edges.

As already discussed in the previous section, we obtain generalized residual estimates from the individual level policy reaction functions. Using these residuals, the interaction weights matrix $\mathbf{W}$ is then estimated using the GMM methodology. Identification here is based on moment conditions, for which we need an adequate collection of instruments. There are many potential candidates for such instruments: (*i*) residuals for the other FOMC members not part of the core members or residuals at higher spatial lags; (*ii*) similarly, residuals at higher temporal lags; and (*iii*) lags of exogeneous variables included in the policy reaction function.

	Burns	Coldwell	Eastburn	Kimbrel	Mayo	Morris	J Statistics	K-P Statistics
Burns	0.000	-0.575**	-0.108	-0.217	-0.574**	-0.016	12.648(0.081)	16.72(0.0331)
Coldwell	-0.320**	0.000	0.047	-0.167**	-0.079	0.093	14.717(0.196)	21.85(0.0392)
Eastburn	-0.725	0.378	0.000	1.649**	-2.911**	0.556	5.997(0.424)	13.54(0.026)
Kimbrel	0.189	0.522	-0.029	0.000	0.142	-0.785**	5.546(0.594)	15.72(0.047)
Mayo	-0.211	-0.190	-0.276**	-0.331**	0.000	-0.084	16.106(0.307)	24.92(0.021)
Morris	-0.457**	-0.358**	-0.028	-0.010	-0.548**	0.000	8.862(0.074)	18.74(0.043)

Table 3: Cross-Member Interaction Matrix (Burns Era) These are the estimates of the **W** elements during the Burns era. J Statistics represent the Sargan's J Stat and K-P here represents the Klein and Paap test; p-values are parenthesis; ***, **, and * denote statistical significance at 1%, 5%, and 10% level, respectively.

	Green	Boehne	Kelly	Melzer	Parry	Stern	J Statistics	K-P Statistics
Green	0.000	-0.468*	-0.430	-0.308*	-0.009	-0.001	6.380(0.782)	22.04(0.024)
Boehne	0.166	0.000	-0.495	-0.313	-0.151	-0.099	3.200(0.362)	10.15(0.038)
Kelly	-0.417*	-0.122	0.000	-0.536*	-0.060	0.109	9.139(0.691)	23.05(0.041)
Melzer	-0.417	-0.009	-1.206*	0.000	0.397*	0.269	7.375(0.288)	14.45(0.044)
Parry	-0.442	-0.324	-0.643*	0.424*	0.000	-0.449	5.992(0.200)	11.42(0.044)
Stern	-0.071	-0.174	-0.038	0.415*	-0.390*	0.000	6.701(0.668)	19.84(0.031)

Table 4: Cross-Member Interaction Matrix (Greenspan Era) These are the estimates of the **W** elements during the Greenspan era. J Statistics represent the Sargan's J Stat and K-P here represents the Klein and Paap test; p-values are parenthesis; ***, **, and * denote statistical significance at 1%, 5%, and 10% level, respectively.

Table 5: Montiel-Pflueger Robust Weak Instrument Test (Burns Era)

Effective F Statistic	17.874	
Critical Values	**TSLS**	**LIML**
% of Worst Case Bias		
$\tau = 5\%$	16.72	10.23
$\tau = 10\%$	10.23	6.701
$\tau = 20\%$	6.701	4.749
$\tau = 30\%$	5.421	4.035

Confidence level alpha: 5%

Table 6: Montiel-Pflueger Robust Weak Instrument Test (Greenspan Era)

Effective F Statistic	15.358	
Critical Values	**TSLS**	**LIML**
% of Worst Case Bias		
$\tau = 5\%$	16.72	10.23
$\tau = 10\%$	10.23	6.701
$\tau = 20\%$	6.701	4.749
$\tau = 30\%$	5.421	4.035

Confidence level alpha: 5%

As discussed above, we test both for instrument validity (overidentifying restrictions) and for weak instruments. Having thus obtained estimates of $\mathbf{W}$ for FOMC during each of the two eras, we test for the validity of the spatial granularity condition (Pesaran and Tosetti, 2011). The above process of model selection and validation was continued iteratively until several key conditions were satisfied: (i) the set of instruments did not violate the overidentifying restrictions; and (ii) the instrument set rejected weak instruments hypothesis. Once all the relevant conditions were satisfied, we interpreted the estimated $\mathbf{W}$ as a structural spatial (interaction) weights matrix. The tables below represent the cross-interaction matrix for the Burns and Greenspan Era respectively.

Table 5 and 6 represent the supplementary results of the Montiel-Pflueger Robust Weak Instrument Test for two different eras, the Burns era and the Greenspan era. The effective F-statistic in Table 5 is found to be 17.874, which exceeds the critical values for both Two-Stage Least Squares (TSLS) and Limited Information Maximum Likelihood (LIML) at all levels of worst-case bias. This finding suggests that the instruments used in the model are adequately strong, and the possibility of weak instrument bias is relatively low. Similarly, in Table 6, the effective F-statistic is calculated to be 15.358, which still exceeds the critical values for both TSLS and LIML, irrespective of the level of worst-case bias considered. Thus, the instruments used in the Greenspan model are also found to be robust and strong. Overall, these results further emphasise that the instruments employed in both the Burns and the Greenspan models are powerful enough to address the issue of weak instrument bias effectively.

As described earlier, non-zero spatial weights in our model indicate either positive interaction effects due to deliberation, pooling information or like-mindedness (representing the same sector in the society) while negative spatial entries indicate disagreements or conflicting preferences. The total number of connections is the number of both positive and negative connections across individuals. We measure an individual influence on another member by the entries across the rows and those influenced by entries along the columns. The magnitude of the influence or being influenced by others is measured by the size of the entries in the spatial weight matrix. Using the estimated spatial weights matrices, we map out the network structure for the Arthur Burns and Alan Greenspan periods as given by Figure 2 and 3 respectively.

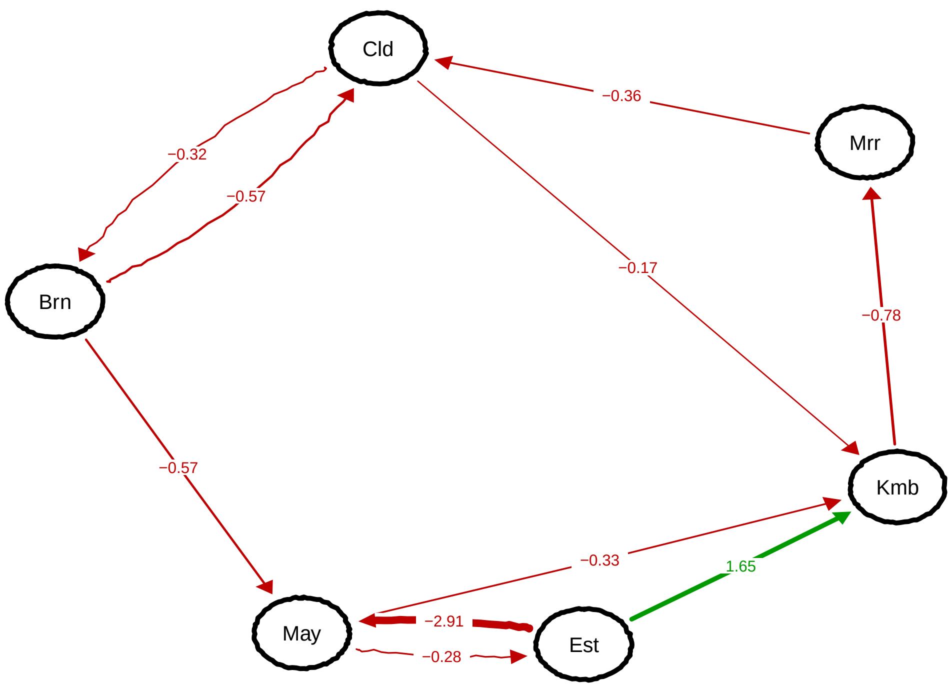

Figure 2: FOMC Network Structure in Burns Era

Figure 2 represents the network structure during the Burns Era. The structure has both Bank Presidents and Governors who are presented as follows: Phillip E. Coldwell - Governor ; Monroe Kimbrel - President; Arthur F. Burns - Chairman Board of Governors; Robert P.Mayo - President; David P. Eastburn - President, Frank E. Morris - President.

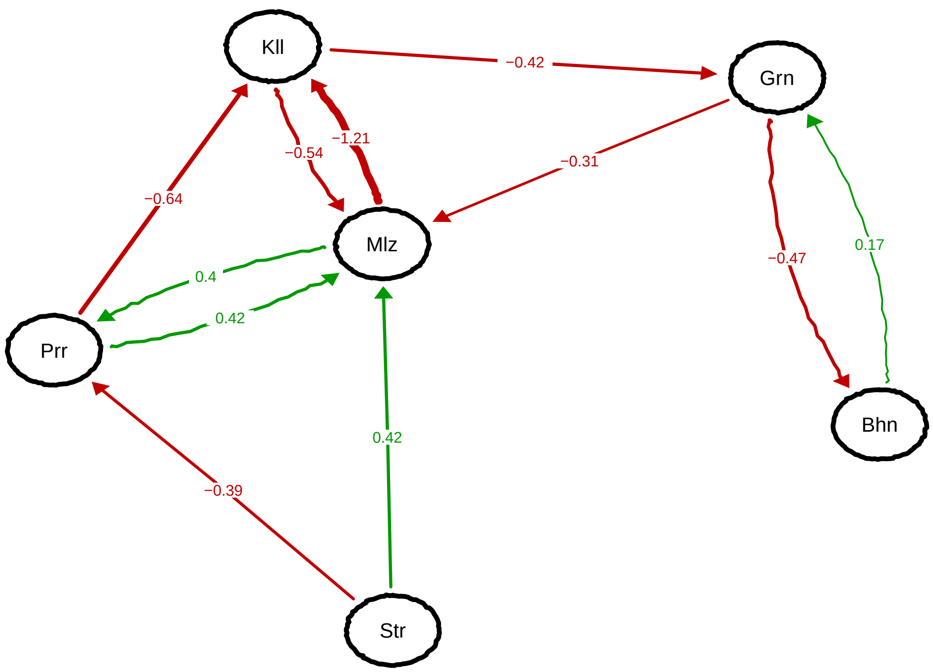

Figure 3: FOMC Network Structure in Greenspan Era
Figure 3 represents the network structure during Alan Greenspan Era. The structure has both Bank Presidents and Governors who are presented as follows: Alan Greenspan - Chairman; Edward G. Boehne - President ;Gary H. Stern - President; Thomas C. Melzer - President; Robert T. Parry - President; Edward W. Kelley Jr. - Governor.

Our network results reveal evidence of strong asymmetry with both positive and negative connections. As outlined, in the monetary policy committee network architecture literature, a negative weight is an indication of conflicting preferences or aspects of strategic interaction while positive weights are an indication of like-mindedness or interactions attributable to deliberation.

First, the estimated networks are quite asymmetric as shown by both Figures 2 and 3. The network graph in Figure 2 appears to be relatively disjointed for the Burns period, with the Chairman showing fewer and weaker connections with other members of the FOMC. One possible explanation for the rather weak connection between Burns and other members is that during his tenure the FOMC responded systematically to the Federal government (executive influences) signal. This severely constrained the ability of FOMC members to act independently, and as such the Chairman may have had a rather difficult relationship with the other FOMC members (Abrams, 2006; Saeki and Shull, 2003). The disagreement or negative connections (red edges) seems to be particularly high during the Burns era, as evidenced by a sparse network structure with some members having stronger negative links. This is in line with Thornton et al. (2014) work that also notes a relatively high dissent rate from the 1970-80 period during which Arthur Burns was the FOMC chairman. These disagreements were related to the economic conditions towards the end of Arthur Burns' term as Chairman, a period that experienced particularly high and sustained levels of both inflation and unemployment as well as a change in the political background with Jimmy Carter elected as president (**??**). There is also evidence of strong network ties between Eastburn (most connected FOMC member – having more significant ties with other members), Kimbrel and Mayo. These were also the members who in most instances spoke last in the FOMC meetings (**?**Chappell et al., 2007)

The network structure as shown above by Figure 3 is comparatively dense. This may be a reflection of increased deliberations with regard to the prevailing economic and financial conditions (Thornton et al., 2014). There is also evidence of a structural hole in the Greenspan era, or an indication of a disconnect. The disconnect between Boehne and Stern in particular implies that there are was no significant discussions between the members that could potentially alter their policy preferences. Melzer appears as the most connected member, which also agrees with political science analyses of FOMC transcripts. Perhaps counterintuitively, Greenspan appears to be relatively less connected, but maintains a closer link with somewhat more peripheral members like Boehne; this could indicate a leadership strategy aimed at greater consensus. There is also evidence of stronger negative interactions between Reserve Bank Presidents and Federal Reserve Governors. This could imply that these two groups had different representation (National versus Regional representation) that at times were at conflict in terms of the primary objective to be pursued. This is consistent with arguments in Havrilesky and Gildea (1995); Tootell (1996, 1999), as well as Bennani et al. (2018b) research on policy preference and disagreements between FOMC members and the staff.

It is noted from voting records that Greenspan's reputation as a competent central banker gradually rose to such a level that no governor or President dared to differ with his proposal and Burns is depicted as a very persuasive chairman. These conjectures imply that the FOMC chairmen were very influential in somehow directing policy decisions towards their proposal. Our results from the network structure are however counter-intuitive indicating that the chairmen as not so influential as suggested by the earlier literature; see, for example, Chappell et al. (2007). One possible explanation lies in our data choice, specifically that we used voiced preferences from the transcripts instead of votes. As indicated earlier, FOMC members tend to disagree on policy preferences during the deliberation process but may vote in favour of a different proposal with an aim to achieve consensus. If we used votes, then we believe that the chairman would appear as influential as reported in the previous empirical literature.

The results from the network structures also support the political economy view that monetary policy decision making by a committee does provide a balance against a single conservative central banker and as such can help achieve a social optimum (Sibert, 2003, 2006; Swank et al., 2008).

6 Conclusions

This paper aimed to explain the sources of heterogeneity in policy preferences and aspects of influential social interactions on the Federal Open Market Committee, under the chairmanship of Arthur Burns and Alan Greenspan. To motivate this, we revisited the theoretical contribution of Waller (1992). Specifically, in a multi-sector economy, he argues that the marginal trade-off is not equal across all sectors of the economy. The sectors that are dominated by nominal wage contracts tend to have more variable output than sectors where labour is procured in more competitive markets when faced by an aggregate supply shock. Waller emphasises that any increase in output variability hits the contracting sector harder resulting in a higher marginal loss. The nore competitive sector will therefore prefer a central banker who favours low inflation rates and allows more fluctuations in output, whereas the contracting sector will prefer a central banker who pursues stability in the levels of output at the cost of higher inflation. These sectoral differences in the preferred policymaker are reflected in the monetary policy preferences espoused by the FOMC members representing the sectors. Policy preference conflicts therefore arises over the best stabilisation policy to be followed. Then, bipartisan appointments to the FOMC can help achieve closer alignment with social optima. These sectoral differences are therefore reflected in heterogeneous policy preferences on the part of individual members of the FOMC. We point out that the institutional structure of the FOMC is therefore designed in such a way to resolve these policy conflicts through deliberation and discussion with an objective of achieving a consensus – hence reaching closer to social optimum through cross-member interactions. Part of the cross-member interactions are also driven by like-mindedness which in this case can be interpreted as representing the same sector/region or conflicting preferences for those representing different sectors. One key feature in Waller (1992, 2007) model is the argument that there are spill-over effects between sectors which we interpret as forces that drive the interrelationships between members of the FOMC.

Taking the theory to the data, our analysis is motivated by empirical observation that dissents are frequent within the FOMC though they are not always fully accounted for by the voting patterns since they do not always align with the voiced preferences. We find substantial heterogeneity in individual policy preferences which are related to the section of society that each FOMC member represents. The results also support Sibert (2003) showing that votes do not always reflect the true preferences of the individual members of the FOMC. We also find that FOMC chairmen are not as influential in 'desired' fed fund rates as as has been suggested by previous analyses based on votes.

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