Regional Economic Conditions and the FOMC Votes of District Presidents

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It is often argued that the institutional structure of the Federal Reserve System influences the formulation and attainment of national monetary policy goals. Havrilesky (1987, 1990), Havrilesky and Gildea (1990), and Belden (1989), for example, assert that Presidential appointment of members of the Board of Governors produces monetary policy sensitive to current political conditions. Conversely, the same literature, going back to Clifford (1965), also maintains that the power and independence of District Bank presidents remove them from accountability. As a result, some describe the Bank presidents as "too conservative," while others depict them as too sensitive to regional economic conditions. The first of these descriptions of Bank president behavior is examined in Tootell (1990b). The latter characterization is investigated here: does the decentralization of the Federal Reserve System (Fed) produce national monetary policy overly responsive to regional performance? This article quantifies the influence of regional conditions on District Bank voting by analyzing the monetary policy actually advocated by individual members of the Federal Open Market Committee (FOMC). The results indicate that District Bank presidents set policy dependent on national, not their regional, conditions.

District Bank presidents do play a major role in the formulation of monetary policy. The Federal Reserve Bank of New York always has one of the twelve votes at the policy-making FOMC meetings, and four of the remaining eleven votes rotate among the other Bank presidents. The enfranchisement of the Bank presidents is historical, perhaps an attempt to allay regional fears that monetary policy would accommodate the interests of the money center banks, although this article will suggest other reasons why the regional structure endures. Empowering regional institutions, however, could breed internecine squabbling at FOMC policy meetings. Whenever significant deviation between local and national interests occurs, or, in other words, when large variation exists in the economic performance of different regions, the potential for

regional conflict at the FOMC exists. Tootell (1990a) and Rosengren (1990) reveal the extent of the disparity in regional economic performance. The imperfect correlations between regional and national conditions permit an exploration of whether local interests play a disproportionately important role in the determination of Bank presidents' FOMC voting.

This article tests whether regional economic performance excessively influences the votes of District presidents. To explore the issue effectively, section I contains detailed analysis of why Bank presidents might vote on the basis of regional economic conditions. Because the empirical issues are complicated, a model of FOMC member behavior is carefully articulated. Section II discusses why the data used and the methodology chosen best examine the policy intentions of the FOMC. Section III presents the evidence concerning the effect of regional economic conditions on Bank president voting. A variety of tests consistently rejects the hypothesis that regional economic performance determines District policy-making. In fact, the results may highlight certain benefits to the current FOMC structure. A conclusion is provided in section IV.

I. Bank Presidents and the Regional Economy

Economic theory advises that regional economic conditions should have no effect on national policy independent of their impact on national performance. It is inefficient to use a national instrument, such as monetary policy, solely to influence regional economic performance. As an example, assume that real income in Region A declines while the rest of the country is fully employed. If the Fed eases policy, income may rise in A, but national inflation increases. Using a national instrument to affect a local target is like shooting a fly with a howitzer; one may be rid of the insect, but the collateral damage can be extensive. Employing a tool with less general effects, like a government works project in that area, would raise Region A's output without producing economywide inflation. Efficient use of policy, therefore, dictates that regional data should not affect Bank president FOMC votes outside of their influence on the national numbers. The national data correctly weight the importance of the regional variables in the economywide objectives of monetary policy, and thus, the votes of Bank presidents should only depend on the national figures.

A simple economic model can be applied to analyze the choices the FOMC makes. Since several subtle but important characteristics of this model will be highlighted, care is given to its exposition. All FOMC members are assumed to maximize their utility,

$$\underset{MP}{\text{Max}}\ U(\dot{Q}^E, \dot{P}^E), \tag{1}$$

by selecting the optimal monetary policy, MP, subject to two constraints,

$$\dot{Q}^E, \dot{P}^E = f_1(MP_t, \Omega_t) \tag{2}$$

and

$$MP = f_2(\text{Institutional Constraints}), \tag{3}$$

where $\dot{Q}^E$ is the expected growth in real activity, $\dot{P}^E$ is expected inflation, and Ω_t represents all the information possessed by the FOMC member at the time policy is determined. Utility is assumed to be a function of the policymaker's expectation of output growth and inflation; it depends on the expectations of these variables since monetary policy affects future, not current, conditions.[1] If other variables are of concern to the policymaker, they can also be included in the utility function. FOMC members choose the monetary policy that makes them as well-off as possible.

However, two constraints affect their policy selection. Equation 2 describes how the policymaker formulates his or her expectations of the goals. The expectations of output growth and inflation are the FOMC member's best forecasts of these variables given both the information they possess at the time and the monetary policy they initiate. The f_1 function translates MP_t and Ω_t into these best estimates. In essence, f_1 is the policymaker's model of the economy; it transforms the values of known economic variables, such as the money supply, interest rates, wages, fiscal policy, and the like, into future inflation and output growth. In fact, this model may differ among FOMC members; for a given monetary policy, two different policymakers with identical information sets can expect different values of future inflation and output growth if they possess different f_1s.

The second constraint represents the institutional factors that may limit policymakers' choices. For example, political pressures might affect FOMC votes. Either the Congress, which created the Federal Reserve System, or the Administration, which appoints Board governors, could influence the behavior of the FOMC.

Equation 3 introduces potential institutional costs to selecting the monetary policy that the FOMC finds optimal when equation 2 is the only constraint.

Although theory suggests that Bank presidents should not set policy contingent on regional economic conditions independent of their effect on national performance, the above paradigm illustrates three broad explanations for why they might. Bank presidents may care disproportionately about regional economic performance, thus injecting regional variables into their utility functions. Alternatively, the information sets, or the models, of the Bank presidents may be overly weighted toward regional variables. And finally, equation 3 emphasizes that Bank presidents may have institutional constraints on their behavior that could depend on regional conditions. Each explanation is discussed in detail below. Note, however, that the same methodology could be used to analyze Board governors. Regional variables would probably not be relevant in that case, but different models, f_1s, or institutional constraints might be important.

The procedure for appointment of District Bank presidents, as well as other aspects of the institutional structure of the regional Banks, could produce a constraint, represented by equation 3 in the above model, that binds District presidents to vote based on regional conditions. The Board of Directors of the District Bank plays an important role in selecting the Bank's president, even though the Board of Governors must approve the nominations. Furthermore, the Directors, in conjunction with the Board, also determine the president's salary. In fact, they also recommend changes in the discount rate. Although Bank presidents have considerable latitude in their FOMC voting, they wish to maintain good relations with their local Board. The Board of Directors consists of three local bankers, three local businessmen, and three other citizens. Their interests are generally more closely connected to regional economic conditions than to national performance.[2] It is, therefore, easy to conceive of the regional concerns of the Directors influencing the president's choice of monetary policy. If the District Boards do care inordinately about the local economy and Bank presidents' obligations to their District Boards do produce a different opportunity set, District presidents might vote dependent on regional economic performance.

On the other hand, Bank president utility functions could contain expectations of regional activity as well as the national goals included in equation 1. These utility functions may be skewed toward regional conditions because the directors who nominate Bank presidents might be biased toward individuals with such concerns. A prerequisite for nomination might be that one care disproportionately about local economic performance. Perhaps a more intuitive explanation for excessive regional concerns, however, relies on the local nature of the experiences and relationships of the Bank presidents. Their continual contact with the local community could make them overly sympathetic to their region's predic-

If presidents' votes are excessively sensitive to regional performance, the resulting monetary policy is suboptimal.

ament.[3] If presidents' votes are excessively sensitive to regional performance, because of differences in their constraint sets or utility functions, the resulting monetary policy is suboptimal.

Finally, regional variables may influence District Bank votes because their information sets or their models include a large share of regional data. Information sets and models are examined together because the two are so difficult to disentangle. The importance of the Ω_t can best be illustrated by examining the behavior of Bank presidents in relation to Board governors. Assume each District president has an information set before the FOMC meeting that differs from the information sets of the other presidents and that of the Board governors. Bank presidents could conceivably possess superior information on their regional economy because of both their knowledge of variables that are not aggregated into national figures and the lags that occur in data collection and aggregation. Conversely, Board governors could be more closely in tune with the national numbers since the large Board staff meticulously compiles and analyzes these data. If the two groups share information perfectly during the FOMC meeting and they possess identical models, f_1s, they will have the same expectations of output growth and inflation. Identical information sets, along with the same models and tastes, would produce identical votes. However, if they imperfectly share information, their votes could diverge even though their goals and constraints are identical. Monetary policy is inefficient, but

the root of the problem is the imperfectly shared information.

Not only might all FOMC members not possess the same information, they also need not possess the same model. In fact, certain District Banks are associated with certain paradigms. These various models, or f_1 functions, may emphasize different pieces of information and produce different expectations of the same goals. One would think, however, in the long run, different models could not be a source of divergent votes. If, for example, one regional Bank's model is a superior predictor of future GNP growth and inflation, then the FOMC should eventually recognize and share it. That model would then be vital to all FOMC members, and their forecasts would tend to converge.[4] Furthermore, any reliance of a Bank model upon a regional indicator beyond its ability to predict national performance would be inefficient. If regional economic developments do not help forecast the variables of interest to the Fed, or the FOMC members do not believe that they do, then these variables would have to be included in the utility functions of the Bank presidents in order to be significant in determining FOMC votes. Utilizing the model outlined in equations 1 to 3, the following two sections scrutinize the data to examine whether regional variables do influence Bank presidents' voting.

II. The Data and Methodology

Examining FOMC votes is both the only way to separate the monetary policy intentions of Board governors from those of Bank presidents, necessary when testing the effect of regional variables, and the superior method to analyze the determinants of that policy. The traditional reaction function literature, in McNees (1986), Havrilesky (1987), and Alesina and Sachs (1988), for example, measures the response of an assumed Fed intermediate target, such as the federal funds rate or the money supply, to assorted variables, like the growth rate of real GNP and the rate of inflation. Yet, using the movement of an assumed Fed intermediate target to proxy for the intentions of monetary policy not only fails to distinguish between the policy advocated by regional Bank presidents and Board governors but also creates serious problems in interpreting policy intentions.

In the context of the model outlined in section I, this methodology would substitute equation 3′ for 3, as monetary policy intentions are not directly measured but only approximated by the behavior of an assumed intermediate target, I_t.

$$I_t = f_3(\text{structural equations, institutional constraints, shocks, . . .}). \quad (3')$$

In the original model, changes in monetary policy were due to shifts in tastes or constraints. As discussed in Abrams, Froyen, and Waud (1980), unexpected movements in the Fed's intermediate target can, however, occur for reasons not associated with the variables of concern to the Fed. Because the "structural equations" for this instrument can change, one cannot be certain that monetary policy has shifted when the intermediate target that proxies for monetary policy intentions moves. The value of the intermediate target can change without a change in monetary policy intentions, and monetary policy can shift without movement in I_t.

An example best illustrates this side effect of using an intermediate target as a yardstick of monetary policy. Assume I_t is the money supply. An anticipated and accommodated movement in money demand unrelated to the variables of concern to the Fed will alter the money supply without changing Fed intentions. This shock affects I_t through the f_3 function in equation 3′, yet monetary policy remains constant. The traditional reaction function analysis interprets the change in money supply as either expansionary or contractionary monetary policy. In fact, during the 1970s and early 1980s institutional changes in banking caused unexpected movements in money realizations.[5] Since the relationship between the level of the instrument and the course of monetary policy is, in reality, unstable, the methodology represented by (3′) makes impossible any investigation of monetary policy intentions, as well as

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any attempt to disentangle the various roles constraints and tastes play in the formation of monetary policy.

The measure of the intention of monetary policy used in this paper does not suffer from the problems encountered by the intermediate target proxy. The actual vote of each member of the FOMC, whether for policy loosening, tightening, or no change, is recorded in the policy directives issued six weeks after every FOMC meeting. In these directives, FOMC members clearly discuss their votes in the context of their goals, and, in fact, the directives are fairly clear about when policy and intermediate targets diverge. FOMC votes, therefore, allow the separation of the movement in the intermediate target from the monetary policy intentions of each member of the FOMC. For this reason, the goals in equation 1, $\dot{Q}^E$ and $\dot{P}^E$, do not include any intermediate targets. Money, for example, is absent from the utility function in equation 1 even though many are "concerned" about it, because it is only an instrument to attain the goals of high GNP growth and price level stability. Counting the votes that dictate the direction of policy, not the movement of some intermediate target of the Fed's, winnows out most of the structural fluctuations unrelated to changes in policy intentions.[6]

Furthermore, directly measuring the votes of the FOMC members avoids the problem of deciding which intermediate target the Fed is using. If the incorrect target is examined, then no inferences about the direction of monetary policy are possible, no matter how stable the tool. This issue is discussed in detail in Luckett and Potts (1978, 1980) and Tootell (1990b). Since FOMC votes indicate the direction of policy, not which tool is used to accomplish that directive, this methodology circumvents another difficulty found in the traditional literature.

Accordingly, this article investigates the effect of current and expected economic conditions on FOMC voting by estimating the influence of certain explanatory variables, many examined in the traditional reaction function literature, on the probability of voting for tightening, loosening, or no change in policy.[7] The ability to distinguish between the votes of Bank presidents and Board governors also allows an examination of whether regional variables affect the probability of District presidents voting for certain policies. The regional indicators used here are economic data for each Fed district. If these variables significantly affect the votes of the District Bank presidents, then regional variables are influencing their monetary policy, whether because of different constraints or different utility functions.

Deciphering the intentions of policy from the directives is, of course, somewhat subjective. Although disagreements could arise over any one member's intentions at a particular meeting, the directives are usually clear; thus, votes are as good a proxy for members' policy desires as exist. Over the 1965–85 sample, approximately 58 percent of the votes cast were for no change in policy, 25 percent were for tightening, and 17 percent were for loosening. The large proportion of votes for no change illustrates the deliberate nature of monetary policy; the Fed was not constantly attempting to fine-tune the economy. Furthermore, episodes of tightening and loosening tended to be clumped together, indicating a "gradualism" in policy tightening or easing. As Brainard (1967) points out, doubts about the magnitude of the effect of changing policy provide a justification for relatively small policy moves at one time; the Fed preferred a series of slight policy changes in the same direction to a large single jump.

The "Green Book," circulated to FOMC members before each meeting, contains the Board staff's expectations of the future paths of output growth, inflation, and unemployment.

Both actual and forecasted data are used to examine the effect on FOMC voting of national and regional variables. Unfortunately, testing the effect of regional conditions on Bank president voting is inhibited by the dearth of economic data collected at the state level. This study aggregated the statewide data that were available into Fed District figures.[8] Contemporaneous values of regional and national employment growth rates and unemployment rates, national inflation rates, and dummies for the deviations in growth of real per-capita gross regional product were used in the analysis.[9] Alternatively, since the lags in the effects of Fed policy require the FOMC to react to its expectations about future economic variables, the

sensitivity of FOMC voting to forecasts of national unemployment, real GNP growth, and inflation were also examined. The "Green Book," which is circulated to FOMC members before each meeting, contains the Board staff's expectations of the future paths of output growth, inflation, and unemployment. The contemporaneous data provide proxies for the regional economic conditions while the Green Book forecasts furnish good measures of the Board staff's expectations of the national variables.[10]

Because policy decisions depend so heavily on the exact information available at the time, care must be given in each estimation procedure to the timing of the data. The frequency of the explanatory variables found in the Green Book exactly coincides with the FOMC votes, and these forecasts are updated before each FOMC meeting. The independent variables that are not found in the Green Book, however, have a frequency different from the Green Book forecasts and the FOMC votes. Employment growth, for example, is released monthly, while the FOMC has met from eight to twelve times a year over the sample period investigated in this article. To account for this problem, the most recent employment growth figure available before the FOMC meeting is used as an explanatory variable for that meeting's vote. The tests in this paper are constructed to ensure that the independent variables contain the most recent additions to each member's information set.

Table 1
Regional Effects on the Simple Model

	(1) All FOMC Members	(2) All FOMC Members	(3) Board Only	(4) Banks Only	(5) Banks Only
Tightening					
C	−2.241	−2.371	−2.75	−2.023	−2.145
	(13.21)	(13.65)	(11.21)	(8.07)	(8.38)
$\dot{Q}^E$	.136	.078	.038	.087	.027
	(8.07)	(4.11)	(1.33)	(3.32)	(.88)
$\dot{P}^E$	.163	.157	.172	.135	.129
	(7.30)	(7.01)	(5.58)	(4.12)	(3.92)
$\dot{RL}$		.118		.08	.028
		(7.01)		(4.19)	(1.21)
$\dot{USL}$			.213		.164
			(6.63)		(4.06)
Loosening					
C	.175	.190	.176	.206	.215
	(.97)	(1.04)	(.73)	(.72)	(.74)
$\dot{Q}^E$	−.211	−.176	−.129	−.208	−.138
	(11.79)	(8.59)	(4.34)	(6.87)	(3.85)
$\dot{P}^E$	−.177	−.176	−.164	−.190	−.186
	(6.12)	(6.04)	(4.27)	(4.18)	(4.02)
$\dot{RL}$		−.057		−.030	.028
		(3.12)		(1.31)	(1.00)
$\dot{USL}$			−.115		−.167
			(3.65)		(3.50)

Note: t statistics in parentheses. $\dot{Q}^E$ is the forecast of real output growth and $\dot{P}^E$ is the forecast of inflation. $\dot{USL}$ is the rate of national employment growth, $\dot{RL}$ the regional rate. $\dot{RL}$ in equation (2) uses the District employment growth rate for Bank presidents and the national rate for the Board governors.

III. The Results

This section begins with the empirical results of the simple model described in section I. The effects of regional variables on District president voting are then examined. A variety of indicators of District conditions are tested and all reject any effect of regional variables on Bank voting. Next is shown the robustness of the result when adding other national variables, consistent with the past work on Fed reaction functions. Complicating the voting function in no way alters the rejection of regional effects. Finally, the coefficients are interpreted as functions of tastes and constraints.

Regional Variables in the General Model

Table 1 presents the results using multinomial logit estimation for the simplest model in section I. The equations in Table 1 are derived from the utility function given in the model; the FOMC sets monetary policy in order to attain its output growth and inflation targets. The first equation in Table 1 provides the coefficients for the effect on the probability of voting to tighten (top panel) and loosen (bottom panel) relative to a vote of no change, given the Green Book forecasts of the change in real GNP and inflation.[11] The coefficients on all these forecasts are of the expected sign and are statistically significant. As expected real GNP growth increases, the probability of voting for tightening rises while the probability of voting for loosening declines.[12] Similarly, an increase in expected inflation raises the probability of tightening and decreases the probability of loosening. This result supports the hypothesis that the Fed attempts to maintain a balance between output growth and inflation.

As employment growth is one of the best indi-

cators of regional economic conditions, it is the first component of regional information tested. Equation (2) of Table 1 adds a regional employment growth rate to the first equation in Table 1. Since this equation examines the FOMC as a whole, the employment growth rate uses the regional employment for each District Bank and national employment for the Board of Governors. The coefficients on all the variables in the second equation are statistically significant and of the anticipated sign. When employment growth rises, the probability of voting for tighter policy rises and for looser policy falls. Similarly, when the expected inflation rate increases, the probability of tightening rises and the probability of loosening declines. The magnitudes of the coefficients on the Green Book forecasts of real GNP growth decrease, but they remain statistically significant. Again, these coefficients are consistent with the belief that the Fed attempts to balance off the performance of the real economy, proxied by employment growth, and inflation.

The employment data suggest that Bank presidents vote on national, not regional, variables.

The significance of the employment variable is of central concern to this article. Equation (2) in Table 1 suggests the potential importance of regional variables. However, since the regional employment variable for the FOMC as a whole combines the District employment growth faced by the Bank presidents with the national employment growth faced by the Board governors, the finding of a significant effect on voting for this variable could be due to the overwhelming significance of the national employment figures for the Board governors. To test this hypothesis, the regression is divided into a Board equation (3) and a Bank equation (4). Although the magnitude of the regional employment growth coefficients fall slightly when examining the Bank equation, (4), versus the FOMC equation, (2), the coefficient for loosening is correctly signed and statistically significant while that for tightening is correctly signed.[13] An increase in employment growth in a given Fed District increases the probability of that District's president voting for tighter policy and decreases the probability that he or she will vote for loosening. The significance of the regional employment growth coefficient for the Bank presidents seems to suggest that District Bank presidents do vote based on regional economic conditions.

However, once the national employment growth rate is accounted for in the Bank presidents' voting function, the regional variable loses all significance. Including the national employment growth in the Bank presidents' equation, equation (5) of Table 1, tests whether the regional variable helps explain District Bank voting beyond its correlation with its national counterpart. Both the statistical significance and the magnitude of the coefficient on regional employment growth collapse, while the coefficient for national employment growth is statistically significant and large. Although the regional and national employment growth rates are far from perfectly correlated, they move together sufficiently so that the change in regional employment was given credit for the change in national employment when the national rate was omitted in equation (4); the regional employment growth in equation (4) merely captures the effect of changes in national employment on Bank president voting. In fact, the employment data suggest that Bank presidents vote based on national, not regional, variables.

Robustness Using Other Measures of Regional Activity

Other proxies for regional economic performance are also investigated to ensure that regional conditions are being captured effectively. It is possible that District employment growth is not the best indicator of local conditions. Therefore, the effect of District unemployment rates, although available in sufficient length only for the larger states, is tested under the identical procedure used in Table 1.[14] The pattern of results using regional and national unemployment rates is similar to that using regional and national employment growth; although the regional unemployment rate shows some statistical significance in an estimation including the Green Book forecasts of real GNP growth and inflation alone, when the national unemployment rate is included, the regional figure loses all significance. Again, regional unemployment is only acting as a proxy for the movement in the national number.

Another possible measure of regional conditions is a dummy variable derived from an estimate of Gross District Product. The effect on voting of deviations of the Fed District product from its trend

growth rate is examined.[15] Again, this different measure of District conditions basically replicates the results using regional employment growth. Equations consisting of this dummy variable and the Green Book forecasts of real GNP growth and inflation find slight significance for the dummy, but all the significance disappears when this variable's national counterpart is included. Thus, the rejection of the importance of regional economic conditions is extremely robust to different proxies for regional economic conditions.

Robustness of Results Using Other National Variables

The omission of other variables of interest to the Fed could affect the outcomes of these tests; inclusion of these other variables might reverse the finding of insignificant regional effects. These variables, mentioned throughout the traditional reaction function literature, could be other goals of the Fed, or other important indicators besides the Green Book forecasts. For example, some District Banks are believed to emphasize the growth of the monetary aggregates more than others. These Banks may believe that the money supply is a better predictor of long-run inflation, and thus weight it more heavily than the other FOMC members. Although an exhaustive test of all the variables hypothesized to be of interest to the Fed is beyond the scope of this article, the robustness of the rejection of regional concerns is examined for different specifications for the Fed's behavior.

The Fed may be concerned with real variables besides output growth. Table 2 contains the coefficient estimates of the basic voting function, equation (1) of Table 1, when first the national employment growth rate, then the Green Book forecast of the change in the unemployment rate, and finally both variables are added to the regression. Using either of these two measures clearly reduces the size of the coefficient on the Green Book forecast of GNP growth. And, when all three are included in the same equation, both the forecast of GNP growth and the forecast of unemployment rate changes tend to lose significance and importance. Essentially the three variables are attempting to measure the same thing, the Fed's concern about the performance of the real side of the economy; as a result, each variable's effect on voting is difficult to disentangle from the others'. For this reason only one such measure of real activity, the Green Book forecast of real GNP growth, will be used subsequently.[16]

Tests were performed to ensure that the rejection of the regional variables is robust to the use of these other proxies for the FOMC's national goals. In equation (5) of Table 1 the importance of regional employment is rejected when both national employment growth and real GNP forecasts are considered. In fact, when the GNP forecasts are dropped from that equation, regional employment still produces no statistically significant effect on Bank president voting; when only inflation expectations and regional employment are considered, regional employment is important, but when national employment is added to the equation the regional variable loses all significance. Furthermore, replacing the Green Book forecast of output growth in equation (1) of Table 1 with its prediction of national unemployment rate changes produces the identical result; the change in regional unemployment is somewhat significant when only it and inflation forecasts are included in the regression,

Table 2
Alternative Targets of Real Activity

	(1) All FOMC Members	(2) All FOMC Members	(3) All FOMC Members
Tightening			
C	−2.464	−2.154	−2.594
	(13.95)	(11.67)	(13.09)
$\dot{Q}^E$	.032	.115	.057
	(1.53)	(4.56)	(2.14)
$\dot{USL}$	.202		.212
	(8.69)		(8.74)
Δune^E		−.265	.336
		(1.25)	(1.46)
$\dot{P}^E$	.152	.160	.154
	(6.76)	(7.19)	(6.83)
Loosening			
C	.202	−.428	−.239
	(1.05)	(1.97)	(1.07)
$\dot{Q}^E$	−.133	−.07	−.052
	(5.83)	(2.21)	(1.62)
$\dot{USL}$	−.125		−.092
	(5.10)		(3.55)
Δune^E		1.33	.962
		(5.18)	(3.55)
$\dot{P}^E$	−.173	−.161	−.164
	(5.87)	(5.43)	(5.51)

Note: t statistics in parentheses. $\dot{Q}^E$, $\dot{P}^E$, *and* Δune^E *are the Green Book forecasts of output growth, inflation and change in the unemployment rate.* $\dot{USL}$ *is the growth rate of national employment.*

but regional unemployment loses all significance when its national counterpart is included. The previous results are, therefore, robust to alternative specifications of the national goals of monetary policy. Using national employment growth or unemployment expectations as Fed goals rather than real GNP growth still produces a rejection of the hypothesis that District Bank presidents are overly concerned about regional performance.

Other variables frequently hypothesized as important to the Fed were also examined. For example, some of the traditional reaction function literature includes money supply growth since it is believed to be an intermediate Fed target. The Fed attempts to achieve some rate of money growth in order to attain its goals for GNP and inflation. Basically, the Fed may be thought to use the rate of growth in the money supply as an accurate indicator of future nominal output growth. Yet, for money growth to be important in equations that include the Green Book forecasts of inflation and output growth, FOMC members must either believe money growth is not adequately considered in these forecasts, or care about horizons different from the Green Book forecasts and believe that money growth helps predict GNP growth and inflation at these different horizons, or care about money for its own sake. Furthermore, the traditional literature has also hypothesized that the Fed is concerned with smoothing interest rates. The lagged change in the federal funds rate might be an important determinant of FOMC votes and is, therefore, also added to the basic voting equation.[17] The FOMC equations are used to test the importance of money growth and lagged changes in the interest rate since they are national, not regional, variables.

Equation (1) of Table 3 includes the rate of growth in the money supply. It is statistically significant and of the expected sign; when money growth is high (low) the probability of tightening (loosening) increases. The coefficient is, however, quite small, between one-seventh and one-tenth the magnitude of the other coefficients. Equation (2) in Table 3 adds the lagged change in the federal funds rate to equation (1) of that table.[18] The coefficients for this variable are large and also statistically significant. The probability of tightening (loosening) rises (falls) after a recent change in the federal funds rate.

Yet, rather than capturing concerns over interest rate smoothing, the lagged federal funds rate is probably illustrating certain time series properties of FOMC policy. The Fed tends to tighten or loosen slowly; that is why similar votes are clumped together. The lagged change in the federal funds rate is merely a surrogate for last month's monetary policy. In fact, when a dummy variable of various lags was used to capture lagged policy, the change in the federal funds rate lost all significance and magnitude.[19] Both the money growth rate and the lagged change in the federal funds rate are statistically significant in Table 3, but the added information they provide appears less important; the coefficient on money is small relative to the other coefficients, and the lagged federal funds rate simply seems to be catching the serial correlation of policy votes.

What is essential to this study, however, is that neither variable affects the coefficients for the original equation. The Green Book forecasts of inflation and output growth remain essentially the same when these additional variables are included. Running the identical test of the regional effects using equation (2)

Table 3
Alternative National Targets

	(1) All FOMC Members	(2) All FOMC Members
Tightening		
C	−2.439	−2.535
	(12.88)	(12.66)
$\dot{Q}^E$	.139	.132
	(8.18)	(7.29)
$\dot{P}^E$	.170	.110
	(7.53)	(4.4)
$\dot{M}$	.022	.06
	(2.44)	(6.05)
ΔFF		.921
		(8.82)
Loosening		
C	.335	.329
	(1.74)	(1.68)
$\dot{Q}^E$	−.21	−.150
	(11.68)	(7.90)
$\dot{P}^E$	−.179	−.179
	(6.20)	(6.01)
$\dot{M}$	−.024	−.063
	(2.50)	(5.43)
ΔFF		−1.21
		(10.51)

Note: t statistics in parentheses. $\dot{Q}^E$ and $\dot{P}^E$ are the Green Book forecasts of output growth and inflation. $\dot{M}$ is the growth rate of M1. ΔFF is the lagged change in the federal funds rate.

of Table 3 as the base equation again rejects the hypothesis that regional performance affects FOMC voting. Even when that test is performed for Bank presidents only, the hypothesis is rejected. Using any of the possible specifications in this article, it appears that District presidents did not vote dependent on regional employment growth.

As a final test, contemporaneous data at the quarterly frequency are examined. Reducing the frequency is an attempt to capture the most recent trends in economic conditions while filtering out the noise in the monthly data. Quarterly data also account for the inertia inherent in monetary policy. Various lag structures were studied using the contemporaneous data, since the timing of the information with quarterly observations is more complicated.[20] Table 4 includes employment growth and Green Book inflation forecasts; it is basically a quarterly version of Table 1. In fact, the results in Table 1 are completely replicated. The volatility of the employment figures is clearly not driving the rejection of the regional variables. The more slow-moving quarterly data produce the same results as the perhaps noisier FOMC frequency figures.

Table 4
Contemporaneous Quarterly Data

	(1) All FOMC Members	(2) Banks Only	(3) Board Only	(4) Banks Only
Tightening				
C	−1.19	−1.02	−1.41	−1.19
	(19.25)	(12.29)	(14.40)	(11.65)
$\dot{RL}$	.625	.33		−.155
	(3.88)	(1.70)		(.63)
$\dot{USL}$			1.169	1.181
			(4.12)	(3.11)
$\dot{P}$	.758	.714	.783	.675
	(4.87)	(3.13)	(3.66)	(2.93)
Loosening				
C	−1.11	−1.33	−.908	−1.14
	(19.54)	(14.99)	(12.00)	(12.30)
$\dot{RL}$	−2.289	−1.276		−.277
	(12.71)	(7.34)		(.90)
$\dot{USL}$			−3.06	−3.012
			(11.08)	(6.95)
$\dot{P}$	−.687	−.973	−.446	−.769
	(3.66)	(3.28)	(1.84)	(2.57)

Note: t statistics in parentheses. $\dot{USL}$ is the growth rate in national employment. $\dot{P}$ is the acceleration of actual inflation. $\dot{RL}$ in equation (1) uses the District employment growth rate for Bank presidents and the national rate for the Board governors.

Models versus Constraints

Can judgments be made concerning the tastes of the FOMC members from the results in this paper? Discerning tastes is essential if judgments are to be made about the course of policy or the origin of possible side effects of certain appointment procedures. In the previous literature, tastes could not be discerned. As the model in the first section of this article highlights, it is uncertain whether changes in policy are driven by tastes or constraints. For example, if expected GNP growth increases, members of the FOMC could vote to tighten policy either because they do not care much about output growth yet have a tremendous distaste for inflation or because they believe any excess output growth will greatly increase inflation. In the first case their tastes are revealed, in the second their models. Under special circumstances, however, these tastes can be distinguished. If the FOMC members' actual expectations are known, and the FOMC members are not constrained as in equation 3 of the model, the results using these expectations would reveal their tastes. Model differences would not affect the coefficients, as the actual expectations would already incorporate the models that produced them. Thus, if the Green Book forecasts actually are the FOMC members' expectations of real GNP growth and inflation, their coefficients provide information on the relative tastes of the FOMC for these two variables.[21]

On the other hand, if the Green Book forecasts do not perfectly represent FOMC members' expectations of these variables, then their tastes cannot be so easily discerned. To examine this issue, actual GNP growth and inflation minus their Green Book forecast values are added to the regression in Table 1. If these two new variables are statistically significant and of the expected sign, then the FOMC members seem to be adding to the expectations of the Green Book.[22] As seen in Table 5, the Green Book forecast error terms have the predicted effect on the votes to tighten and are almost always statistically significant. As actual GNP growth or inflation exceeded its Green Book forecast, the FOMC was more likely to tighten. The coefficient on the residuals for the real GNP growth for policy loosening is correctly signed, though insignificant. Only the coefficient on inflation for the probability of loosening is the wrong sign and statistically significant.

To ensure the robustness of the importance of

these errors, a slightly different methodology is also employed. An ordered probit is performed in which it is assumed that as real GNP growth or inflation decreases, the probability of a vote moves constantly away from tightening, through no change, and toward loosening; the coefficients are, thus, assumed to be constant.[23] The ordered probit results suggest that actual real GNP growth beyond the Green Book forecast has the expected effect on FOMC policy; members are more likely to vote for tightening (loosening) when GNP grows faster (slower) than the Green Book forecast. The inflation forecast error has no statistically significant effect in the ordered probit.

Table 5
Forecasts and Expectations

	(1) All FOMC Members	(2) All FOMC Members
Tightening		
C	−2.26	−2.54
	(13.15)	(12.46)
$\dot{Q}^E$	.129	.124
	(7.47)	(6.67)
$\dot{P}^E$	.158	.107
	(7.00)	(4.19)
$(\dot{Q} - \dot{Q}^E)$	.063	.064
	(3.44)	(3.35)
$(\dot{P} - \dot{P}^E)$	.104	.111
	(2.94)	(3.01)
$\dot{M}$		.057
		(5.67)
ΔFF		.929
		(8.89)
Loosening		
C	.011	.197
	(.06)	(.98)
$\dot{Q}^E$	−.221	−.164
	(11.81)	(8.21)
$\dot{P}^E$	−.160	−.172
	(5.47)	(5.67)
$(\dot{Q} - \dot{Q}^E)$	−.019	−.003
	(.82)	(.12)
$(\dot{P} - \dot{P}^E)$	.165	.147
	(4.36)	(3.79)
$\dot{M}$		−.056
		(4.77)
ΔFF		−1.17
		(10.17)

Note: t statistics in parentheses. $\dot{Q}^E$ and $\dot{P}^E$ are forecasts of output growth and inflation. $\dot{M}$ is the M1 growth rate and ΔFF is the change in the federal funds rate. $(\dot{Q} - \dot{Q}^E)$ and $(\dot{P} - \dot{P}^E)$ are the errors in the Green Book forecasts of output growth and inflation.

The importance of the real output forecast error seems robust; thus, the FOMC members were apparently bringing information beyond that contained in the Green Book.

One possible explanation for the significance of the prediction error is that different Banks bring different, perhaps superior, "models" to the meeting. In fact, different economic models are often associated with different District Banks. If diverse models are driving regional Bank behavior, then individual Banks should be reacting differently to the independent variables in this study. In Tootell (1990b) a variety of tests were performed on various equations comparing single Banks, and even a group of reputedly conservative Banks, with the remaining District Banks. The hypothesis that all Banks vote identically can almost never be rejected.[24] The similarity of the Banks is a somewhat surprising result considering the diversity of the paradigms associated with different Banks. Either the models are, in essence, not all that different, the votes of the Bank presidents are not dictated by these diverse paradigms, or a consensus and reconciliation is worked out in the FOMC meeting. The similarity among Banks also justifies an empirical assumption made throughout the article: since all Banks react alike, it is not a problem to lump them all together and constrain them to have the same coefficients in the above tests.

The hypothesis that all Banks vote identically can almost never be rejected.

Because of the uncertainty about the exact regional variable to test, many different ones are examined. Using all of these various regional indicators, the evidence strongly rejects the hypothesis that Bank presidents relied disproportionately on regional economic conditions. Yet the FOMC members did seem to bring important information to the meetings. Tootell (1990b) reveals the similarity in voting whether measured between different Banks or between Bank and Board; thus, this information was shared among all FOMC members. Information was brought to the table but it was not regional in nature and no regional disputes occurred over it.

IV. Conclusion

The conclusion that Reserve Bank presidents have different concerns than Board governors has become a common assumption. In one view, these presidents are trapped by their constituencies, the District Boards of Directors, who somehow constrain or influence the presidents to protect local interests. Yet, the evidence presented here indicates that presidents did not manipulate monetary policy to help their own regional economies. Either the directors took a broader view than the hypothesis asserts or the presidents were more independent than assumed. Comparing the FOMC votes to the discount rate votes would be one way to test which of these alternatives was more probable. A different view postulates that Fed Bank presidents are too politically independent, and thus, far more likely to be for tighter policy. Although some differences between Banks were perceptible, Tootell (1990b) used the methodology presented in this article to reject the hypothesis that Bank presidents were any more conservative, or prone to "tight" policy, than the Board governors. Since they voted the same, their choice of monetary policy was identical, both their models and their tastes were close to identical.

A consensus-forming tendency could be the force that drives out any differences in tastes or models. The improvement in the Green Book forecasts suggested in this paper was probably the result of information added by the interaction among FOMC members before the vote. No evidence has been found to support the contention that this information was regional. Furthermore, this added information was most likely shared as all members tended to vote alike. In fact, perhaps the ability to capture and utilize different information is the reason the regional diversity endures at the Fed. Yet, the exact appointment procedure, or institutional structure, does not seem to affect the voting behavior of FOMC members. Assumed differences within the Fed cannot be used as a reason to alter the institution.

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[1] For ease of exposition, the policymaker is maximizing utility with respect to the expected values of inflation and output growth instead of the expected utility of the actual realization of these variables. These two approaches are equivalent if the monetary authority is risk neutral. Altering the approach does not change any of the analysis essential to this paper.

[2] The nine directors of each District Bank will, in general, have much closer ties to the regional economy. Businesses whose products are nationally distributed are certainly less apt to be disproportionately concerned with local conditions, but producers of non-traded goods and providers of regional services will be overly dependent on regional economic performance.

[3] A rigorous example of such a situation would model an altruistic president. His or her utility would depend on those in closest proximity, those he or she has the most contact with. As a result, the president would overly weight the utility of local residents versus the rest of the country and tend to vote dependent on regional performance.

[4] The change of operating procedures and instruments through the 1970s and 1980s signifies a change in models dominating the Fed.

[5] In "The Case of the Missing Money" Goldfeld (1976) examines in detail the extent of the unexpected shortfall in money demand produced by any traditional money demand function before that time.

[6] Dissents are sometimes made in FOMC voting for technical reasons. The explanations for these technical dissents are articulated in the minutes of the directives. Maintaining the example in the body of the paper, if only one FOMC member believes the money demand function has shifted for reasons unrelated to changes in income or inflation, he or she might make a technical dissent for changing the money supply while keeping policy constant. Thus, these dissents were not included as disagreements with policy in this paper.

[7] Qualitative analysis is the method used for estimation. As there are three alternative policy responses, the results shown in the paper derive from multinomial logit procedures. The coefficients represent the change in the probability of choosing either to tighten or loosen relative to the choice of no change in policy at given values of the independent variables. Ordered probits were also performed and are mentioned only on the rare occasion when they do not corroborate the logit results.

[8] All data were aggregated using a weighted average. For example, employment growth was weighted by the state's share in total District employment. One complication, however, is that several Fed Districts include parts of states. These states were incorporated into the District that contained the larger share of that state. This problem is not serious as the divided states are usually quite small relative to each District.

[9] The employment data were seasonally adjusted using the Census X-11 procedure. Inflation was measured using the Consumer Price Index (CPI). The Gross State Product numbers are published by the U.S. Bureau of Economic Analysis (BEA) and were aggregated, like the employment data, into District figures.

[10] The sample periods on the two data sets do not perfectly coincide. The contemporaneous sample ranges from 1963–86, while the Green Book data cover 1966–85. The Green Book sample is shorter because the forecasts were not begun until the mid-1960s and because the data are not available until five years after a given FOMC meeting. When both types of measures are used in the same estimation procedure, the sample is constrained by the shorter Green Book period.

[11] All results presented here use the Green Book's one-quarter-ahead forecast. The results are basically identical when the two-quarters-ahead forecast is used.

[12] Various measures of the output variable were examined in various forms of the voting function. Deviations from de-trended

output, output growth with drift, and growth that included dummies for the post-1974 sample all produced essentially the same coefficients and significance levels.

[13] In regressions that drop the output growth variable in order to avoid the potential collinearity problem faced by including output growth and employment growth in the same equation, both regional employment growth coefficients are statistically significant for the Bank equations.

[14] Because unemployment rates are not available for all states over much of the sample, the state where the District Bank is located is used as the regional unemployment rate. This proxy permits a longer sample period. Unemployment levels and changes were examined, in an attempt to capture movements from some full employment level.

[15] The total Fed District product is derived from the BEA's gross state product series. The regional output is de-trended and the residuals are used; these deviations from trend derive from Tootell (1990a). As gross state product is an annual series, the value of this residual is the same over the entire year.

[16] That the lag of an actual, known, variable, the employment growth rate, tends to perform better than the Green Book forecast of real GNP growth suggests that forecasts are less important than actual recent figures. However, when testing measures of inflation this result is reversed; generally only the Green Book forecast of price level changes is significant, not actual, past inflation. Because of both the difficulties of interpreting coefficients when there is multicollinearity and the results using the inflation forecasts, the Green Book forecast of real activity is used in the remainder of the paper.

[17] The Fed might be concerned about the volatility of the bond market; thus, the FOMC will not allow the interest rates to change radically.

[18] The money growth rate is for M1. The lagged change in the federal funds rate is the monthly average of the month before the FOMC meeting.

[19] The dummy variable took the value of zero if the previous vote were to tighten, one if it were for no change, and two if the vote was to loosen. Including a single lag of policy decreased the size and significance of the lagged change in the federal funds rate by about 40 percent. Including two lags eliminated the coefficient and its significance completely.

[20] The complication over the timing of the lag structure is due to the uncertainty about information flows. For example, using fourth-quarter growth in real GNP to explain the first-quarter FOMC vote is suspect since information on output is received over the course of the entire quarter. However, using contemporaneous real GNP growth assumes information not yet officially received. Regressions with different lags of the independent variables were investigated and found to be fairly consistent whether contemporaneous or lagged values are used. Note this is only a problem with the contemporaneous quarterly data, not the Green Book forecasts.

[21] This statement is true if the utility horizon is the same as the Green Book forecasts. Also, risk neutrality is still being assumed. These assumptions allow one to factor out all the models, constraints, and the like, to get straight to the concerns of the FOMC members.

[22] It is possible that FOMC concerns over other variables, correlated with national conditions, could produce statistically significant forecast error coefficients. It is doubtful that tastes are the cause of these results, however. A large enough percentage of the FOMC would have to care about the same unusual variable for the coefficient on the entire FOMC to be significant. Secondly, the coefficient of any such variable, the stock market or the dollar for example, need not result in the correct sign of the voting coefficient; what exactly is driving movements of that variable can be negatively or positively correlated with national conditions, and this correlation can change given different circumstances or shocks. Furthermore, if this variable is an instrument, like the money supply or the federal funds rate, it is "cared about" by definition only in its relation to its targets, like GNP and inflation. Traditionally when one assumes some FOMC member "cares" too much about a variable, that member believes the Green Book or other forecasting tools are not considering the informational content of that variable sufficiently. This is simply a difference in models, not a difference in utility functions. Finally, including many of these variables, like the money supply and the interest rate, failed to remove the significance of the forecast error so the error was not picking up any utility effects from these variables. Thus, although the significance of the error is possibly due to a lucky correlation, it seems unlikely. The problem is the variable selected to be the instrument for expectations, not that the model is misspecified.

[23] This test is the only time the ordered probit produces a slightly different result than the multinomial logit. Using this methodology, the problem with the wrong signed coefficient on the inflation error disappears.

$$P(\text{loosen}) = \underset{(20.9)}{1.70} - \underset{(17.12)}{.125(\dot{Q}^E)} - \underset{(10.04)}{.11(\dot{P}^E)}$$

$$- \underset{(3.14)}{.027(\dot{Q} - \dot{Q}^E)} + \underset{(1.48)}{.023(\dot{P} - \dot{P}^E)}$$

The coefficient on the error in real GNP is correctly signed, so the probability of loosening decreases with a rise in the GNP growth rate forecast error, and is statistically significant. The coefficient on the inflation error term is insignificant.

[24] Only the Federal Reserve Bank of St. Louis comes close to a rejection when using the model in Table 2, while both Boston and St. Louis reject using the second equation in Table 3. The St. Louis Bank votes tended to depend on money more than the votes of the other Banks. The Boston votes depended more on money, forecast errors, and the lagged change in the federal funds rate than the others.

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