18th World IMACS / MODSIM Congress, Cairns, Australia 13-17 July 2009
http://mssanz.org.au/modsim09

How Good Are FOMC Forecasts?

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Abstract: The purpose of the paper is to answer the following two questions regarding the performance of the influential Federal Open Market Committee (FOMC) of the Federal Reserve System, in comparison with the forecasts contained in the "Greenbooks" of the professional staff of the Board of Governors: (i) Does the FOMC have expertise? (ii) Can the FOMC forecast better than the staff? The FOMC forecasts that are analyzed in practice are non-replicable forecasts. In order to evaluate such forecasts, this paper develops a model to generate replicable FOMC forecasts, and compares the staff forecasts, non-replicable FOMC forecasts, and replicable FOMC forecasts, considers optimal forecasts and efficient estimation methods, and presents a direct test of FOMC expertise on non-replicable FOMC forecasts. The empirical analysis of Romer and Romer (2008) is re-examined to evaluate whether their criticisms of the FOMC's forecasting performance should be accepted unreservedly, or might be open to alternative interpretations.

1. Introduction

> "Misguided, unsuccessful, inappropriate, effectively zero, fail to add, counterproductive, failure, apparently useless, ineffective, mistakes, negative value."

Such powerful criticisms of the influential Federal Open Market Committee (FOMC) of the Federal Reserve System by Romer and Romer (2008) present a timely, challenging and controversial empirical assessment of the FOMC's purportedly deeply flawed forecasts of inflation, unemployment and real growth, in comparison with the forecasts contained in the "Greenbooks" of the professional staff of the Board of Governors. Taken at face value, the message is clear and disturbing: The FOMC's forecasting performance has been decidedly unimpressive, at best. This paper examines whether the FOMC has what might be called latent expertise, and thereby re-examines the forecasting performance of the Board of Governors staff and the FOMC to determine if the critical assessment in Romer and Romer (2008) should be accepted unreservedly, or might be open to alternative interpretations.

The primary purpose of this paper is to answer two questions regarding the FOMC and staff forecasts: (i) Does the FOMC have expertise? (ii) Can the FOMC forecast better than the staff? In order to answer these questions, we develop a model to generate replicable FOMC forecasts, and compare the replicable and non-replicable FOMC forecasts using efficient estimation methods. A direct test of FOMC expertise on the FOMC forecast is also given.

2. Model Specifications

2.1 Staff Model

The variable of interest, X_t, in Romer and Romer (2008) is given as

$$X_t = a + bS_t + cP_t + e_t, \tag{1}$$

where S_t is the Staff forecast of X_t, P_t is the Policymaker (or FOMC) forecast of X_t, and *a*, *b* and *c* are constant parameters, where the notation is the same as in their paper. Although Romer and Romer (2008, p. 231) state that "Our main interest is in whether c is positive", it is clear that a finding of $c \neq 0$ will reject the null hypothesis, $c = 0,$ that the staff forecast alone is needed to predict X_t.

If the econometric model underlying the staff forecast is correctly specified, Ordinary Least Squares (OLS) will be consistent and efficient, and hence optimal in estimation. In addition, under the assumption of mean squared error (MSE) loss, the optimal forecast of X_t, given the information set available to the staff, is its conditional expectation (see Patton and Timmermann (2007a, 2007b)). However, if the staff forecast of X_t is not replicable because it is not based on an econometric model, it is neither optimal in estimation nor is the conditional expectation of X_t optimal with respect to a MSE loss function.

2.2 FOMC Forecasts and Replicable FOMC Forecasts

The staff forecasts of X_t, that is, S_t, are made available to the FOMC, which is expected to improve on the forecast through adding information to S_t. The FOMC expertise is latent, but it can be estimated. Therefore, an important issue to be addressed is whether the FOMC forecast can be replicated. Let P represent the FOMC forecast, where the relationship between the FOMC forecast and latent FOMC expertise is given as

$$P = P^* + \eta, \qquad \eta \sim (0, \sigma_\eta^2 I), \tag{2}$$

where P, P^* and η are (T x 1) vectors, P^* represents the latent FOMC expertise, η is the measurement error, and P^* and η are assumed to be uncorrelated. Let the FOMC forecast be given as

$$P = W\delta + \eta, \qquad \eta \sim (0, \sigma_\eta^2 I), \tag{3}$$

where the (T x k) matrix W is in the information set available to the FOMC at time t-1, and the first column of W is the unit vector. It is assumed that E($W'\eta$) = 0, δ is a (k x 1) vector of constant parameters, $W = \{S, W_1\} \subset I_{-1}^E$, which is the information set of the FOMC at time t-1, W_1 is (T x (k-1)), and S is available to the FOMC before it announces P.

If the model in (3) is correctly specified, under the assumption of a MSE loss function, the optimal replicable FOMC forecast of P, given the information set I_{-1}^E, is its conditional expectation, so the FOMC forecast is optimal. It follows from (3) and I_{-1}^E that

$$\mathrm{E}(P \mid I_{-1}^E) \equiv P^* = W\delta, \tag{4}$$

so that W denotes expertise as P^* is a linear combination of the columns of W. The rational expectations estimate of $\mathrm{E}(P \mid I_{-1}^E)$, which is a replicable FOMC forecast, is given as

$$\hat{P}* = \hat{P} = W\hat{\delta} = W(W'W)^{-1}W'P, \tag{5}$$

so that the estimate of FOMC expertise, P^*, is equivalent to the estimate of the FOMC forecast, P.

The FOMC model for forecasting X is given by

$$X = ai + \delta_0 S + \beta P^* + u, \qquad u \sim (0, \sigma_u^2 I), \tag{6}$$

where a, δ_0 and β are scalar parameters, and i is a vector of unit elements. As P^* is latent, an observable, and hence estimable, version of (6) is given as

$$X = ai + \delta_0 S + \beta\hat{P} + \varepsilon, \tag{7}$$

$$\varepsilon = u - \beta \mathrm{P}_W \eta \tag{8}$$

and $P_W = W(W'W)^{-1}W$. As the measurement error, η, enters (9), the covariance matrix of ε is not proportional to the identity matrix, and ε is serially correlated and heteroskedastic. However, OLS estimation of the parameters in (8) will be consistent (see Franses et al. (2009) for a general discussion).

2.3 Efficient Estimation

Franses et al. (2009) established the conditions under which OLS estimation of the parameters in a more general version of (7) is efficient by appealing to Kruskal's Theorem, which is necessary and sufficient for OLS to be efficient (see Fiebig et al. (1992) and McAleer (1992) for further details). In the context of OLS estimation of (8), the necessary and sufficient conditions for OLS to be efficient will be satisfied if either the variables used to obtain the staff forecast are contained in the information set of the FOMC, or are orthogonal to the variables in the information set of the FOMC. Of the two alternative necessary and sufficient conditions, it is more likely that the former condition will hold. It was also shown by Franses et al. (2008) that, if the incorrect downward biased OLS standard errors are used, then the incorrect OLS t-ratios will be biased upward. They suggest that the correct OLS covariance matrix in (8) should be estimated consistently using the Newey-West HAC standard errors.

2.4 A Direct Test of FOMC Expertise on FOMC Forecast

Substituting for P^* from (3) into (7) gives

$$X = ai + \delta_0 S + \beta P + (u - \beta\eta) . \qquad (9)$$

Equation (9) is equivalent to (1), with $e = u - \beta\eta$. It is clear that OLS will be inconsistent in (9) as P is correlated with η . Therefore, IV or GMM estimation should be used whenever the non-replicable FOMC forecast is used to forecast X . Romer and Romer (2008) used OLS to estimate the parameters in (9). The effect of FOMC expertise on the non-replicable FOMC forecast can be tested directly by testing appropriate hypotheses in (4), which may be rewritten as

$$P = W\delta + \eta = \delta_0 S + W_1\delta_1 + \eta, \qquad \eta \sim (0, \sigma_\eta^2 I) . \qquad (10)$$

A direct test of FOMC expertise, namely whether the FOMC adds any additional information to S in formulating the FOMC forecast, P , is given by

$$H_0 : \quad \delta_1 = 0 . \qquad (11)$$

If the null hypothesis in (11) is not rejected using a Wald or F test, FOMC expertise does not add significantly to the staff forecast in determining the FOMC forecast. As a special case of (10), the auxiliary regression equation to correlate the FOMC and staff forecasts is given by

$$P = ai + \delta_0 S + v . \qquad (12)$$

In comparison with (10), it is clear that OLS applied to (12) omits W_1 (apart from an intercept term), which denotes FOMC expertise. As it is likely that W_1 and S are correlated, OLS will be inconsistent and inferences will be invalid. It is also likely that v in (12) will be serially correlated, especially if the omitted W_1 contains lagged values of variables. Therefore, inferences based on (12) will be biased and invalid.

3. Empirical Analysis

We now turn to a detailed analysis of the Romer and Romer (2008) empirical results, and add some insights. The data are described in Romer and Romer (2008, pp. 230-231), and are available in an appendix on the AEA website (http://www.aeaweb.org/articles/issues_datasets.php). Equation (1) in Romer and Romer (2008) will be estimated for the inflation rate, unemployment rate and rate of real growth.

As discussed in Romer and Romer (2008, pp. 230-231), the FOMC prepares forecasts in February and July each year. The February forecasts for inflation and the growth rate are for the four quarters ending in the fourth quarter of the current year, and the unemployment rate forecast is for the fourth quarter of the current year. The July forecasts are for the same variables for both the current and next year. The sample is from 1979 to 2001, with 22 February forecasts and 46 July forecasts, giving a total of 68 observations. The staff and FOMC forecasts are very similar, but it is also clear that they are not particularly close to the actual rates they are forecasting. The similarity in the two sets of forecasts is supported by the correlations in Table 1 between the staff and FOMC forecasts, which are obviously very similar.

The similarity in forecast performance is also shown in Table 2, which reports the mean and median squared prediction errors for the staff and FOMC forecasts for the three variables. The staff is clearly better than the FOMC in forecasting the inflation rate, the reverse holds in forecasting the real growth rate, and it is too close to call for the unemployment rate, with the staff only slightly better (worse) than the FOMC in terms of the mean (median) squared prediction error. In terms of forecasting performance, therefore, it would be fair to call the outcome a tie.

In terms of formal tests of the forecasting performance of the staff and the FOMC, the OLS and GMM estimates of equation (1) (equivalently, equation (9), which shows that P is correlated with the error term), are given in Table 3. The inconsistent OLS estimates correspond to those in Table 1 in Romer and Romer (2008), where it was inferred that the staff forecasts dominated those of the FOMC for inflation and the unemployment rate, though not for the real growth rate. It is instructive that the GMM estimates indicate that the staff is better than the FOMC in forecasting inflation, but not in forecasting the unemployment rate or the growth rate, where the effects of both the staff and FOMC forecasts are insignificant. The OLS estimates of equations (3) (equivalently, equation (10), which makes the role of the staff forecast explicit) and (12), which deletes the effect of the FOMC expertise, are given in Table 4.

In the absence of FOMC expertise, the inconsistent OLS estimates for (12) might seem to suggest that the effect of the staff forecast on the FOMC forecast is very close to unity for all three variables. However, the inclusion of FOMC expertise, as approximated by one-period lagged inflation, unemployment and real growth rates, shows that the effect of the staff forecast, while remaining significant, is considerably less. The F test of the significance of FOMC expertise makes it clear that expertise does matter, and significantly so, in obtaining the non-replicable FOMC forecast, P. In short, the FOMC has statistically significant expertise. This answers our first question.

The empirical performance of the staff and replicable FOMC forecasts are compared in Table 5. Although OLS is efficient and the forecast is MSE optimal for equation (7), the standard errors are not proportional to the identity matrix, so the Newey-West HAC standard errors are also given. The staff is seen to dominate the FOMC for the inflation rate, but both the staff and FOMC forecasts are insignificant for the unemployment and real growth rates. Although the goodness of fit of the OLS estimates in Tables 3 and 5 are virtually identical, the corresponding coefficient estimates are markedly different. However, the sums of the estimated staff and FOMC marginal effects in Table 5 are very similar to their OLS counterparts in Table 3, at 1.01, 0.95 and 0.98 for inflation, unemployment rate and real growth rate, respectively.

In summary, in a comparison with the staff forecasts, the use of FOMC forecasts and replicable FOMC forecasts yield considerably different empirical results. The answer to our second question, therefore, is that the FOMC does not forecast well, but neither does the staff!

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Table 1. Correlations between Staff Forecasts and FOMC Forecasts

Variable	Correlation
Inflation	0.99
Unemployment	0.99
Real growth	0.97

Table 2. A Comparison of Staff Forecasts and FOMC Forecasts

	Squared Prediction Errors			
	Mean		Median	
Variable	Staff	FOMC	Staff	FOMC
Inflation	0.71	0.89	0.19	0.28
Unemployment	0.54	0.57	0.16	0.15
Real growth	2.10	1.99	1.22	1.04

Table 3. A Comparison of Staff and FOMC Forecasts in Predicting Actual Values

Estimation method	Intercept	Staff (S_t)	FOMC (P_t)	R^2
		Inflation		
OLS	-0.20	1.10**	-0.10	0.86
	(0.22)	(0.39)	(0.37)	
GMM	-0.26	4.77**	-3.64	0.64
	(0.34)	(2.32)	(2.26)	
		Unemployment		
OLS	0.26	0.97*	-0.03	0.79
	(0.41)	(0.38)	(0.40)	
GMM	-0.37	3.41	-2.40	0.64
	(0.76)	(2.78)	(2.87)	
		Real growth		
OLS	0.43	0.25	0.63	0.44
	(0.36)	(0.49)	(0.52)	
GMM	-0.22	1.70	-0.51	0.31
	(0.83)	(3.61)	(3.42)	

Note: * and ** denote significance at the 5% and 1% levels, respectively.

Table 4. Testing the Effect of Expertise on Expert Opinion

		Inflation			Unemployment		Real growth		
Variables		(4)	(13)		(4)	(13)		(4)	(13)
Intercept	-0.18	0.01		-0.00	0.19		-0.22	0.28	
		(0.16)	(0.07)		(0.13)	(0.12)		(0.20)	(0.08)
Staff Forecast, S_t	0.91**	1.03**		0.77**	0.96**		0.86**	0.93**	
		(0.06)	(0.02)		(0.06)	(0.02)		(0.04)	(0.03)
P_{t-1}		0.38**			0.32**			0.33**	
		(0.12)			(0.12)			(0.12)	
S_{t-1}		-0.26*			-0.14			-0.19	
		(0.13)			(0.12)			(0.11)	
Inflation_{t-1}		-0.03			-0.00			0.02	
		(0.04)			(0.02)			(0.03)	
$\text{Unemployment}_{t-1}$	0.04			0.04			0.03		
		(0.03)			(0.05)			(0.03)	
Real growth_{t-1}		0.01			0.01			0.02	
		(0.02)			(0.02)			(0.03)	
R^2		0.99	0.98		0.98	0.98		0.96	0.94
F test			4.86**			5.79**			5.87**

Note: * and ** denote significance at the 5% and 1% levels, respectively.

Table 5. Staff and Replicable FOMC Forecasts in Predicting Actual Values

Estimation method	Intercept	Staff (S_t)	FOMC (P_t)	R^2
		Inflation		
OLS	-0.20	1.89**	-0.88	0.85
	(0.23)	(0.72)	(0.70)	
HAC	[0.25]	[0.55]	[0.56]	
		Unemployment		
OLS	0.22	0.80	0.15	0.79
	(0.42)	(0.67)	(0.69)	
HAC	[0.67]	[0.71]	[0.71]	
		Real growth		
OLS	0.10	-0.28	1.26	0.45
	(0.45)	(0.84)	(0.91)	
HAC	[0.48]	[1.07]	[1.06]	

Note: ** denotes significance at the 1% level.