

Conference on

Forecasting and Monetary Policy

Berlin, 23-24 March 2009

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**Discussion of „Measuring Forecast Uncertainty by
Disagreement“**

” Measuring Forecast Uncertainty by Disagreement”

by K. Lahiri and X. Sheng, SUNY

Discussion by Øyvind Eitrheim, Norges Bank

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Disclaimer: The views expressed are those of the discussant and do not necessarily reflect those of my colleagues or the official views of Norges Bank

23 March 2009

Author's research agenda: The role of forecast disagreement in understanding forecast uncertainties

- Relates to key topics in macroeconomics and monetary policymaking
- Economic forecasting is indeed important for central bank communication
- Note! MPR 1/09 from Norges Bank is published on Wednesday 25 March at 14pm CET
- Many interesting research topics along these lines
 - ▶ How to interpret and use information from SPF data?
 - ▶ How to construct fan charts to illustrate forecast uncertainty?
 - ▶ What is the optimal degree of transparency? (cf. the debate on the role of public vs. private information)

Author's research agenda (cont'd)

- Long history of research on forecast uncertainty based on survey data, cf. Lahiri et. al (1988), Ivanova and Lahiri (2000, mimeo) + recent work with F. Liu and X. Sheng.
- In a recent paper Lahiri and Sheng (2008, JECTS) analyse the evolution of *forecast disagreement* for output growth in a panel of Consensus Forecast Data
- They find, using a panel of fixed-target, multi-horizon, cross-country data, that *forecast disagreement* varies inversely but non-monotonically with the forecast horizon, showing high *disagreement* for long horizons, and declining *disagreement* for horizons less than 15 months
- The present paper tries to pin down the role of *forecast disagreement* to explain forecast uncertainty

The strategy of the paper

- Old research question: Is *forecast disagreement* a good proxy for forecast uncertainty?
- Previous results following the Zarnowitz and Lambros (1987, JPE) paper are mixed
- YES! Bomberger (1996, JMCB) reported supportive evidence analysing Livingston survey of CPI forecasts using a generalized ARCH model
- NO! Rich and Butler (1998, JMCB) replied that the evidence disappeared when GMM and Newey-West standard errors were applied to overcome overlapping errors problems
- YES! Bomberger (1999, JMCB) replied that it is the evidence on ARCH which is fragile, not the evidence on *disagreement*, but he reports subsample dependencies for the results

The strategy of the paper (cont'd)

- Giordani and Söderlind (2003, EER) support the conclusion that *forecast disagreement* is a good proxy for forecast uncertainty, using a wider range of time series models, including ARCH, GARCH and asymmetric GARCH, and claim that forecasters understate the true uncertainty.
- Simplified model of the relationship between forecast uncertainty U_t and *forecast disagreement* D_t (ignoring the sub-index for the forecast horizon).
- Bomberger (1996, JMCB) uses the decomposition $U_t = \theta^2 + D_t$ focusing on the *consensus forecast error* $A_t - CF_t = ce_t \sim N(0, \theta^2)$ where θ^2 is a measure of *consensus uncertainty* and its hypothesized (constant linear) relationship with *disagreement* measured by the variance of point forecasts D_t leads to
$$\theta^2 = \alpha_0 + \alpha_1 D_t, \Rightarrow U_t = \alpha_0 + (\alpha_1 + 1) D_t$$

The strategy of the paper (cont'd)

- Lahiri and Sheng use a slightly different decomposition $U_t = \sigma_{\lambda,t}^2 + D_t$ where $\sigma_{\lambda,t}^2$ is the variance of common shocks λ_t and disagreement D_t is the average of the individual forecast error variances $D_t = 1/N \sum \sigma_{\varepsilon,it}^2$
- Main idea to express uncertainty as a function of estimated *disagreement* based on survey data, \hat{D}_t , and a model based measure of the variance of common shocks λ_t , estimated by $\hat{\sigma}_{\lambda,t}^2$
- $\hat{U}_t = \hat{\sigma}_{\lambda,t}^2 + \hat{D}_t$ is used as a proxy of uncertainty
- A Bayesian updating framework is used to illustrate how individual forecasters update forecasts and uncertainties F_{it}, U_{it} conditional on public and private signals l_t, s_{it} . This is used to justify that aggregate uncertainty is defined in terms of average individual uncertainties, i.e. $U_t = 1/N \sum U_{it}$

Main findings

- Disagreement and uncertainty typically move together
- Disagreement alone understates forecast uncertainty
- Uncertainty is sticky and shows high persistence and low volatility and appear quite unresponsive to shocks
- Difference between uncertainty and disagreement increase in the forecast horizon
- GDP growth is more difficult to forecast than inflation (larger variance of aggregate shocks $\sigma_{\lambda,t}^2$)
- Volatility of aggregate shocks declined sharply after 1991, shedding some light on the recent debate on the Great Moderation
- Disagreement exceeds uncertainty in some periods, but this vanishes if robust measures of disagreement (e.g., quasi standard deviation or inter quantile range) are used (cf. Giordani and Söderlind 2003, EER)

The strategy of the paper & findings

- The regression

$U_{th} = \beta D_{th} + \rho_1 H_1 + \rho_2 H_2 + \rho_3 H_3 + \rho_4 H_4 + \varepsilon_{th}$ is estimated to investigate jointly the coefficient on disagreement and the difference between uncertainty and disagreement. The horizon dummy variables $H_i, i = 1, \dots, 4$, are used to pin down the hypothesized effect from the variance of aggregate shocks over different forecast horizons.

- \Rightarrow For inflation forecasts, smaller estimates $\hat{\beta}$ over volatile periods (1969-83), but larger effect for the Great Moderation period (1984-2007) (time effect)
- \Rightarrow The difference between uncertainty and disagreement increase monotonically with the forecast horizon (except for the 4-quarter horizon for inflation)
- \Rightarrow Claim that disagreement perform well as a proxy of uncertainty, and more so for longer horizons

The strategy of the paper & findings

- Same regression, but with *ex. post* uncertainty (adding squared consensus forecast error), using $\hat{U}_{th} = (A_t - CF_{th})^2 + D_{th}$ instead of only the disagreement term D_{th} .
- \Rightarrow Adding the squared error in the consensus forecast to disagreement does not help explain survey uncertainty
- \Rightarrow Smaller estimated effect from *ex. post* uncertainty indicates that this measure performs worse as a proxy of uncertainty

The strategy of the paper & findings

- Alternative *ex. ante* measures of uncertainty based on estimated GARCH-models, $\hat{U}_{th} = \hat{\sigma}_{\lambda,th}^2 + D_{th}$
- The underlying model assumes that the mean forecast error $e_t \sim N(0, \sigma_{\lambda,t}^2)$, $\sigma_{\lambda,t}^2 = \alpha_0 + \alpha_1 e_{t-1}^2 + \alpha_2 \sigma_{\lambda,t-1}^2$ where e_t is a mean forecast error corrected for serial correlation using a MA(q) filter
- \Rightarrow Some models generate higher correlation with the survey uncertainty compared with disagreement alone or the *ex. post* measure of uncertainty
- \Rightarrow Uncertainty from GARCH-type models yield less volatile *ex. ante* uncertainty measures compared with the *ex. post* measure of uncertainty

Questions and comments

- Re: Choice of actual data, A_t are taken from the first release of annual inflation and output growth (real-time data available from FRB Philadelphia).
- Abstracting from major SNA revisions, and acknowledging the vast heterogeneity across forecaster's use of models and judgment, couldn't it be more relevant to evaluate forecasts F_{it} against a later revision of A_t , cf. the inferior results for the *ex. post* uncertainty measure? (discussion)

Questions and comments (cont'd)

- Re: Control for individual biases in the sample, $\hat{\phi}_i = 1/T \sum (A_t - F_{it})$ to get forecast disagreement based on unbiased forecasts,
 $e_{it} = \phi_i + \lambda_t + \varepsilon_{it} \Rightarrow e'_{it} = e_{it} - \hat{\phi}_i$
- Mankiw et al. (2003) report multimodal point forecasts following a structural break, causing greater variation among forecasters and extraordinary disagreement as a result. Could try control for structural break to avoid distorting the measured variance of aggregate shocks? (discussion)
- Clarify the justification and effect of pre-whitening the mean forecast errors when estimating the *ex. ante* measures of uncertainty using GARCH-type models on real-time data (discussion)

Questions and comments (cont'd)

- May include more robustness checks for time effects (discussion)
- Would other time series models merit consideration, cf. Giordani and Söderlind (2003, EER)? (discussion)
- Are survey based measures of uncertainty (more) robust against structural breaks and regime changes? (discussion)

Concluding remarks

- Nice paper
- Clarifies the debate in the literature on the role of *disagreement* for forecast uncertainty
- Further work focusing on the role of *disagreement* over different forecast horizons would teach us more about the vast heterogeneity across forecasters
- Further work on whether forecasters' assessment of forecast uncertainty is under- or overestimated is also highly welcome
- Thank you for your attention