Report on ‘Minimizing post-shock forecasting error through aggregation of outside information’

The paper proposes using estimates of past observed mean shifts in appropriate time series to adjust the forecast in a given time series when it is known that a shock has occurred but the magnitude of the shock is unknown. The adjustment is in the form of an intercept correction whose magnitude is given by a shock effect estimator based on donor pool time series. Three estimators are proposed including averaging, inverse variance weighted averaging and similarity weighting. Theoretical conditions are established showing when correcting the forecast reduces the mean square forecast error relative to an unadjusted forecast. Bootstrap and leave-one-out cross validation procedures are proposed to assess whether the adjusted forecast would be an improvement without needing the realized observation that is being forecast. Extensive simulations are reported to show when the procedure works, and an empirical application applied to the Conoco Phillips stock price is given.

This is a neat idea which has lots of potential. The theory is rigorous and clearly presented. The paper is proposing an intercept correction when a mean shift is anticipated, and the size of the correction is elicited by forming a scenario based on past similar shocks. In practice this is often done by forecasters using their judgement. This paper provides the econometric theory to justify when this should be done. It has a nice solution to the *ex ante* evaluation problem by using bootstrap and leave-one-out cross validation to prospectively assess the method’s performance.

Comments

- The method hinges on the assumption that the time series forming the donor pool are independent from the time series under study prior to the shock. This seems to be a very restrictive assumption. The shocks that the donor pool have undergone in the past must be representative of the shock that the time series of interest is experiencing, but the series are independent. Given this restrictive assumption what practical applications are ruled out?

- It would be helpful to the reader to be very explicit about the timing of when information is realized. Is it correct that the researcher knows at T_1^* that there will be a shock at $T_1^* + 1$, and they know the type of shock that it will be in order to identify the relevant donor pool shocks, but they do not know the magnitude? This is quite an informational advantage over unanticipated shocks. In many situations one could imagine that the shock was unanticipated. Therefore, at $T_1^* + 1$ there is a large forecast error (your model 1) but now information is available about the type of shock, so the proposed methodology of the shock effect estimator is applied at $T_1^* + 2$, yielding gains over the unadjusted forecast. The timing of information is crucial, but the methodology proposed in the paper seems to be applicable in many different timing scenarios.

- Related to the point above, the model applied is an AR(1) with contemporaneous regressors. This structure requires the covariates to be known in the future for *ex ante* forecasts, or for them to be forecast. The set-up assumes θ_1 to be well behaved and the covariates are not subject to shocks if they need to be forecast. Empirically, we could also think of cases where the mean shift $D_{i,t}$ interacted with the covariates which would give an additional forecast error via $\mathbf{x}_{1,T_1^*+1}$. The theoretical results seem to hinge on known $\mathbf{x}_{1,t}$ entering contemporaneously to derive unbiasedness. What are the implications of the covariates needing to be forecast?

- Given the dynamic structure, what happens after $T_1^* + 1$? Couldn't you use the donor pool shocks to estimate the shock transition (e.g. apply the shock effect estimator to the m periods following the shock), and produce an intercept correction dummy for the next m periods? It would be interesting empirically to see if the shock is anticipated to be permanent or transitory. I wonder if the theoretical statements of when forecast risk is minimized may be adapted to assess when transitory shocks die out such that the unadjusted forecast is preferable again?

- While the simulations were useful, I found the discussion in section 4 quite impenetrable. There are so many decisions that a researcher would need to make, including which weighting method and all the bootstrapping and leave-one-out decisions. It would be very helpful to the reader if you could give a summary of all your results stating your preferred user decisions for generic specifications.

- Section 2 is hard to read without defining the terms that come in the second paragraph of section 2.1 (lines 19-23 of p.6). I'd suggest moving this to the beginning of section 2.