A Reliable Technique for Accurately Computing Unconditional Variances in Non Linear DSGE Models: A Perturbation Method Approximation

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Abstract

This paper provides formulae for computing perturbation method approximations of unconditional variances of variables in nonlinear DSGE models. Kim[Kim et al., 2005] and others have described how spurious higher order terms that creep into multi-step ahead forecasts can produce explosive time paths frustrating traditional approaches to estimating unconditional covariances. They have developed a "pruning" solution to preempt this specious explosive behavior. This paper outlines a more direct approach to approximating unconditional covariances.

By, in effect, explicitly including long forecast of powers of endogenous variables (ie $\hat{\sigma_x^2} = (\mathcal{E}(x_{t+k}^2) - (\mathcal{E}x_{t+k})^2)$, among the DSGE model equations, one can obtain perturbation method approximations for the covariances along with the other Taylor series approximation equations. The formulae presented in[Anderson, 2005] for computing perturbation solutions for models with multiple leads makes including such long horizon forecasts computational feasible. Furthermore, in this formulation, the coefficients associated with the initial conditions for the state variables provide useful diagnostic information about the accuracy of the unconditional variance approximation.

This paper

1. applies the technique to linear models, where explicit formulae for unconditional covariances are available, to motivate and validate the performance of the technique.
2. contrasts and compares the accuracy, computational, efficiency and tractability for this method and the "pruning method."

References

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