

# Evaluating DSGE Models for Monetary and Fiscal Policy Analysis

Abhishek Gupta

This dissertation creates and applies a framework for evaluating the suitability of misspecified dynamic stochastic general equilibrium (DSGE) models for particular tasks. The first essay applies the framework to the task of monetary policy analysis; the second lays out the framework more generally; and the third is a structural VAR exercise regarding fiscal multipliers.

## 1 A Forecasting Metric for Evaluating DSGE Models for Policy Analysis *Job Market Paper*

This paper applies a new Bayesian framework laid out in Faust and Gupta (2009) for evaluating the suitability of DSGE models for the task of monetary policy analysis. It assumes that practical monetary policy analysis deals with determining how intended policy should be revised in light of the structural interpretation of incoming news. The news is defined as the one-step ahead forecast errors and the first and second moments of this news sufficiently summarize its structure for the purposes of monetary policy analysis. To shed light on the structural implications of this news, the paper estimates the implied structural shocks from fitting the DSGE model of Smets and Wouters (2007) to data. The Kalman gains link the news to the structural shocks. The paper then evaluates the first and second moments of both the forecast errors and structural shocks, finding strengths of the model and important shortcomings. The paper finds that the *posterior distribution for the realized value* of the mean and cross-correlations of the structural shocks are typically nonzero. This result is surprising because structural shocks by construction are supposed to be zero-mean and uncorrelated. The results, therefore, identify specific frictions and structural aspects of the model that cause misspecification and suggest areas of improvement for model building.

## 2 Bayesian Evaluation of Misspecified DSGE Models (with Jon Faust), *in progress*

This paper starts with the view that existing DSGE models are seriously misspecified in some dimensions and yet may offer valuable insights in others. The problem, then, is to determine the suitability of the model for a particular use. Conventional Bayesian model comparison tools reveal which model best accounts for *all aspects* of the reduced form of the data. When deciding whether to proceed with a misspecified model (in lieu of an alternative), we argue that tools for evaluating strengths and weaknesses for the task at hand would be more appropriate. Geweke's (2010) approach to analyzing *incomplete models* forms our starting point, but when the task at hand requires causal inference regarding general equilibrium questions, treating the model as *incomplete* becomes problematic. Our proposed tools have the Bayesian interpretation that the analyst has difficult-to-codify prior information on both the structural misspecification of the model and the causal interpretation of events in the sample. The tools are constructive and could thereby be seen as a way to elicit and analyze these priors. Therefore, they provide a natural path to model improvement and/or provide information about what model implications should be discounted until that improvement can be achieved. The main mechanical steps are analyzing the task at hand for "reduced form" and "structural" features and then performing the relatively standard prior and posterior predictive analysis.

## 3 Fiscal Policy Multipliers at the Zero Bound: Analysis of Japan's Lost Decade, *in progress*

This paper estimates fiscal policy multipliers at the zero bound for Japan. As recently formalized New Keynesian models have illustrated, fiscal policy shocks may have different effects when the central bank is unable to accommodate deflationary pressures at the zero bound. The paper is an empirical assessment of how the effects of fiscal shocks differ when an economy is stuck at the zero bound. It estimates a structural VAR on Japanese data, following the Blanchard and Perotti (2002) approach to tax-code-based identification using newly available quarterly Japanese data on income tax, corporation tax, and consumption tax. The paper estimates fiscal policy multipliers for taxes and spending separately for two sample periods—one where the interest rates are not bound at zero (prior to 1995) and one where they are at the zero bound (post 1995).