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Assessing DSGE Model Nonlinearities

The authors develop a new class of nonlinear time-series models to identify nonlinearities in the data and to evaluate nonlinear DSGE models. U.S. output growth and the federal funds rate display nonlinear conditional mean dynamics, while inflation and nominal wage growth feature conditional heteroskedasticity. They estimate a DSGE model with asymmetric wage/price adjustment costs and use predictive checks to assess its ability to account for nonlinearities. While it is able to match the nonlinear inflation and wage dynamics, thanks to the estimated downward wage/price rigidities, these do not spill over to output growth or the interest rate.

Working Paper 13-47. S. Borağan Aruoba, University of Maryland, Federal Reserve Bank of Philadelphia Visiting Scholar; Luigi Bocola, University of Pennsylvania; Frank Schorfheide, University of Pennsylvania, National Bureau of Economic Research, Federal Reserve Bank of Philadelphia Visiting Scholar.

Natural Amenities, Neighborhood Dynamics, and Persistence in the Spatial Distribution of Income

The authors present theory and evidence highlighting the role of natural amenities in neighborhood dynamics, suburbanization, and variation across cities in the persistence of the spatial distribution of income. The authors' model generates three predictions that they confirm using a novel database of consistent-boundary neighborhoods in U.S. metropolitan

areas, 1880-2010, and spatial data for natural features such as coastlines and hills. First, persistent natural amenities anchor neighborhoods to high incomes over time. Second, downtown neighborhoods in coastal cities were less susceptible to the suburbanization of income in the mid-20th century. Third, naturally heterogeneous cities exhibit spatial distributions of income that are dynamically persistent.

Working Paper 13-48. Sanghoon Lee, University of British Columbia; Jeffrey Lin, Federal Reserve Bank of Philadelphia.

Competition, Syndication, and Entry in the Venture Capital Market

There are two ways for a venture capital (VC) firm to enter a new market: initiate a new deal or form a syndicate with an incumbent. Both types of entry are extensively observed in the data. In this paper, the author examines (i) the causes of syndication between entrant and incumbent VC firms, (ii) the impact of entry on VC contract terms and survival rates of VC-backed start-up companies, and (iii) the effect of syndication between entrant and incumbent VC firms on the competition in the VC market and the outcomes of incumbent-backed ventures. By developing a theoretical model featuring endogenous matching and coalition formation in the VC market, the author shows that an incumbent VC firm may strategically form syndicates with entrants to maintain its bargaining power. Furthermore, an incumbent VC firm is less likely to syndicate with entrants as the incumbent's expertise increases. The author finds that entry increases the likeli-

hood of survival for incumbent-backed start-up companies while syndication between entrants and incumbents dampens the competitive effect of entry. Using a data set of VC-backed investments in the U.S. between the years 1990 and 2006, the author finds empirical evidence that is consistent with the theoretical predictions. The estimation results remain robust after she controls for the endogeneity of entry and syndication.

Working Paper 13-49. Suting Hong, Federal Reserve Bank of Philadelphia.

A Tale of Two Commitments: Equilibrium Default and Temptation

The author constructs the life-cycle model with equilibrium default and preferences featuring temptation and self-control. The model provides quantitatively similar answers to positive questions such as the causes of the observed rise in debt and bankruptcies and macroeconomic implications of the 2005 bankruptcy reform, as the standard model without temptation. However, the temptation model provides contrasting welfare implications, because of overborrowing when the borrowing constraint is relaxed. Specifically, the 2005 bankruptcy reform has an overall negative welfare effect, according to the temptation model, while the effect is positive in the no-temptation model. As for the optimal default punishment, welfare of the agents without temptation is maximized when defaulting results in severe punishment, which provides a strong commitment to repaying and thus a lower default premium. On the other hand, welfare of agents with temptation is maximized when weak punishment leads to a tight borrowing constraint, which provides a commitment against overborrowing.

Working Paper 14-1. Makoto Nakajima, Federal Reserve Bank of Philadelphia.

The Perils of Nominal Targets

A monetary authority can be committed to pursuing an inflation, price-level, or nominal output target yet systematically fail to achieve the specified goal. Constrained by the zero lower bound on the policy rate, the monetary authority is unable to implement its objectives when private-sector expectations stray from the target in the first place. Low-inflation expectations become self-fulfilling, resulting in an additional Markov equilibrium in which both nominal and real variables are typically below target. Introducing a stabilization goal for long-term nominal rates anchors private-sector expectations on a unique Markov equilibrium without fully compromising the policy responses to shocks.

Working Paper 14-2/R. Roc Armenter, Federal Reserve Bank of Philadelphia.

Recall and Unemployment

Using data from the Survey of Income and Program Participation (SIPP) covering 1990-2011, the authors document that a surprisingly large number of workers return to their previous employer after a jobless spell and experience more favorable labor market outcomes than job switchers. Over 40% of all workers separating into unemployment regain employment at their previous employer; over a fifth of them are permanently separated workers who did not have any expectation of recall, unlike those on temporary layoff. Recalls are associated with much shorter unemployment duration and better wage changes. Negative duration dependence of unemployment nearly disappears once recalls are excluded. The authors also find that the probability of finding a new job is more procyclical and volatile than the probability of a recall. Incorporating this fact into an empirical matching function significantly alters its estimated elasticity and the time-series behavior of matching efficiency, especially during the Great Recession. The authors develop a canonical search-and-matching model with a recall option where new matches are mediated by a matching function, while recalls are free and triggered by both aggregate and job-specific shocks. The recall option is lost when the unemployed worker accepts a new job. A quantitative version of the model captures well the authors' cross-sectional and cyclical facts through selection of recalled matches.

Working Paper 14-3. Shigeru Fujita, Federal Reserve Bank of Philadelphia; Giuseppe Moscarini, Yale University, National Bureau of Economic Research.

Shrinkage Estimation of High-Dimensional Factor Models with Structural Instabilities

In high-dimensional factor models, both the factor loadings and the number of factors may change over time. This paper proposes a shrinkage estimator that detects and disentangles these instabilities. The new method simultaneously and consistently estimates the number of pre- and post-break factors, which liberates researchers from sequential testing and achieves uniform control of the family-wise model selection errors over an increasing number of variables. The shrinkage estimator only requires the calculation of principal components and the solution of a convex optimization problem, which makes its computation efficient and accurate. The finite sample performance of the new method is investigated in Monte Carlo simulations. In an empirical application, the authors study the change in factor loadings and emergence of new factors during the Great Recession.

Working Paper 14-4. Xu Cheng, University of Pennsylvania; Zhipeng Liao, University of California, Los Angeles; Frank Schorfheide, University of Pennsylvania, National Bureau of Economic Research, Federal Reserve Bank of Philadelphia Visiting Scholar.