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## EXTENDING THE SCOPE OF THE EU'S INNOVATION UNION

The Innovation Union initiative of the European Union focuses on product and process innovation for tangible goods. The authors argue that it is essential to extend the scope of the initiative to include innovation for financial sector products, processes, and regulatory approaches. They make this argument using examples of financial sector innovations in the United States following the Great Depression and on the basis of an examination of the 2008 financial crisis.

*Working Paper 12-17, "Building the Innovation Union: Lessons from the 2008 Financial Crisis," Alice O. Nakamura, University of Alberta School of Business; Leonard I. Nakamura, Federal Reserve Bank of Philadelphia; and Masao Nakamura, University of British Columbia, Sauder School of Business*

## ANALYZING CREDIT RISK UNDER ECONOMIC STRESS CONDITIONS

The authors develop an empirical framework for the credit risk analysis of a generic portfolio of revolving credit accounts and apply it to analyzing a representative panel data set of credit card accounts from a credit bureau. These data cover the period of the most recent deep recession and provide the opportunity to analyze the performance of such a portfolio under significant economic stress conditions. The

authors consider a traditional framework for the analysis of credit risk where the probability of default (PD), loss given default (LGD), and exposure at default (EAD) are explicitly considered. The unsecured and revolving nature of credit card lending is naturally modeled in this framework. Their results indicate that unemployment, and, in particular, the level and change in unemployment, plays a significant role in the probability of transition across delinquency states in general and the probability of default in particular. The effect is heterogeneous and proportionally has a more significant impact for high credit score and for high-utilization accounts. The authors' results also indicate that unemployment and a downturn in economic conditions play a quantitatively small, or even irrelevant, role in the changes in account balance associated with changes in an account's delinquency status and in the exposure at default specifically. The impact of a downturn in economic conditions, in particular, changes in unemployment, on the recovery rate and loss given default is found to be large. These findings are of particular relevance for the analysis of credit risk regulatory capital under the IRB approach within the Basel II capital accord.

*Working Paper 12-18, "Credit Risk Analysis of Credit Card Portfolios Under Economic Stress Conditions," Piu Banerjee, Federal Reserve Bank of New York, and José J. Canals-Cerdá, Federal Reserve Bank of Philadelphia*

## PRIVATE VS. PUBLIC MONETARY SYSTEM

The author shows the existence of an inherent instability associated with a purely private monetary system due to the role of endogenous debt limits in the creation of private money. Because the banker's ability to issue liabilities that circulate as a medium of exchange depends on beliefs about future credit conditions, there can be multiple equilibria. Some of these equilibria have undesirable properties: Self-fulfilling collapses of the banking system and persistent fluctuations in the aggregate supply of bank liabilities are possible. In response to this inherent instability of private money, the author formulates a government intervention that guarantees that the economy remains arbitrarily close to the constrained efficient allocation. In particular, the author defines an operational procedure for a central bank capable of ensuring the stability of the monetary system.

*Working Paper 12-19, "On the Inherent Instability of Private Money," Daniel R. Sanches, Federal Reserve Bank of Philadelphia*

## ANALYZING THE GROWTH OF U.S. MANUFACTURING EXPORTS

The authors study empirically and theoretically the growth of U.S. manufacturing exports from 1987 to 2007. They identify the change in iceberg costs with plant-level data on the intensity of exporting by exporters. Given this change in iceberg costs, the authors find that a GE model with heterogeneous establishments and a sunk cost of starting to export is consistent with both aggregate U.S. export growth and the changes in the number and size of U.S. exporters. The model also captures the nonlinear dynamics of U.S. export growth. A model without a sunk export cost generates substantially less trade growth and misses out on the timing of export growth. Contrary to the theory, employment was largely reallocated from very large establishments, those with more than 2,500 employees, toward very small manufacturing establishments, those with fewer than 100 employees. Allowing for faster productivity growth in manufacturing, changes in capital intensity, and some changes in the underlying shock process makes the theory consistent with the changes in the employment size distribution. The authors also find that the contribution of trade to the contraction in U.S. manufacturing employment is small.

*Working Paper 12-20, "Do Falling Iceberg Costs Explain Recent U.S. Export Growth?," George Alessandria,*

*Federal Reserve Bank of Philadelphia, and Horag Choi, Monash University*

## DISTRIBUTIONAL EFFECTS OF MONETARY POLICY ACROSS SOCIO-ECONOMIC GROUPS

The authors build a New Keynesian model in which heterogeneous workers differ with regard to their employment status due to search and matching frictions in the labor market, their potential labor income, and their amount of savings. They use this laboratory to quantitatively assess who stands to win or lose from unanticipated monetary accommodation and who benefits most from systematic monetary stabilization policy. They find substantial redistribution effects of monetary policy shocks; a contractionary monetary policy shock increases income and welfare of the wealthiest 5 percent, while the remaining 95 percent experience lower income and welfare. Consequently, the negative effect of a contractionary monetary policy shock to social welfare is larger if heterogeneity is taken into account.

*Working Paper 12-21, "Monetary Policy with Heterogeneous Agents," Nils Gornemann University of Pennsylvania; Keith Kuester, formerly Federal Reserve Bank of Philadelphia; Makoto Nakajima, Federal Reserve Bank of Philadelphia*

## USING DISTANCE-BASED ECONOMETRIC TECHNIQUES TO ANALYZE THE SPATIAL CONCENTRATION OF R&D LABS

The authors study the location of more than 1,000 research and development (R&D) labs located in the Northeast corridor of the U.S. Using a variety of spatial econometric techniques, they find that these labs are substantially more concentrated in space than the underlying distribution of manufacturing activity. Ripley's K-function tests over a variety of spatial scales reveal that the strongest evidence of concentration occurs at two discrete distances: one at about one-quarter of a mile and another at about 40 miles. They also find that R&D labs in some industries (e.g., chemicals, including drugs) are substantially more spatially concentrated than are R&D labs as a whole.

Tests using local K-functions reveal several concentrations of R&D labs that appear to represent research clusters. The authors verify this conjecture using significance maximizing techniques (e.g., SATSCAN) that also address econometric issues related to "multiple testing" and spatial autocorrelation.

The authors develop a new procedure for identify-

ing clusters – the multiscale core-cluster approach, to identify labs that appear to be clustered at a variety of spatial scales. Locations in these clusters are often related to basic infrastructure such as access to major roads. There is significant variation in the industrial composition of labs across these clusters. The clusters the authors identify appear to be related to knowledge spillovers: Citations to patents previously obtained by inventors residing in clustered areas are significantly more localized than one would predict from a (control) sample of otherwise similar patents.

*Working Paper 12-22, “The Agglomeration of R&D Labs,” Gerald A. Carlino, Federal Reserve Bank of Philadelphia; Robert M. Hunt, Federal Reserve Bank of Philadelphia; Jake K. Carr, Ohio State University; and Tony E. Smith, University of Pennsylvania*

### **DEVELOPING NARRATIVE MEASURES OF FEDERAL GRANTS-IN-AID PROGRAMS**

Because of lags in legislating and implementing fiscal policy, private agents can often anticipate future changes in tax policy and government spending before these changes actually occur, a phenomenon referred to as fiscal foresight. Econometric analysis that fails to model fiscal foresight may obtain tax and spending multipliers that are biased. One way researchers have attempted to deal with the problem of fiscal foresight is by examining the narrative history of government revenue and spending news. The Great Recession and efforts by the federal government through the American Recovery and Reinvestment Act of 2009 (ARRA) to stimulate the economy returned fiscal policy, and in particular the role of state and local governments in such policies, to the center of macro-economic policy-making. In a companion paper, the authors use federal grants-in-aid to state and local governments to provide an evaluation of the effectiveness of the ARRA. The purpose of this paper is to develop narrative measures of the federal grants-in-aid programs beginning with the Federal Highway Act of 1956 through the ARRA of 2009. The narrative measures the authors develop will be used as instruments for federal grants-in-aid in their subsequent analysis of the ARRA.

*Working Paper 12-23, “A Narrative Analysis of Post-World War II Changes in Federal Aid,” Gerald Carlino, Federal Reserve Bank of Philadelphia, and Robert Inman, Wharton School, University of Pennsylvania, and Visiting Scholar, Federal Reserve Bank of Philadelphia*

### **DO THE SOURCES OF ECONOMIC AND FINANCIAL CRISES DIFFER FROM NONCRISIS BUSINESS CYCLE FLUCTUATIONS?**

This paper explores the hypothesis that the sources of economic and financial crises differ from noncrisis business cycle fluctuations. The authors employ Markov-switching Bayesian vector autoregressions (MS-BVARs) to gather evidence about the hypothesis on a long annual U.S. sample running from 1890 to 2010. The sample covers several episodes useful for understanding U.S. economic and financial history, which generate variation in the data that aids in identifying credit supply and demand shocks. The authors identify these shocks within MS-BVARs by tying credit supply and demand movements to inside money and its intertemporal price. The model space is limited to stochastic volatility (SV) in the errors of the MS-BVARs. Of the 15 MS-BVARs estimated, the data favor an MS-BVAR in which economic and financial crises and noncrisis business cycle regimes recur throughout the long annual sample. The best-fitting MS-BVAR also isolates SV regimes in which shocks to inside money dominate aggregate fluctuations.

*Working Paper 12-24, “Business Cycles and Financial Crises: The Roles of Credit Supply and Demand Shocks,” James M. Nason, Federal Reserve Bank of Philadelphia, and Ellis W. Tallman, Oberlin College and Federal Reserve Bank of Cleveland*

### **DEVELOPMENT CONSTRAINTS AND LAND RENTS**

A tractable production-externality-based circular city model in which both firms and workers choose location as well as intensity of land use is presented. The equilibrium structure of the city has either (i) no commuting (“mixed-use” form) or (ii) a central business district (CBD) of positive radius and a surrounding residential ring. Regardless of which form prevails, the intra-city variation in all endogenous variables displays the negative exponential form:  $x(r) = x(0)e^{-\phi_x r}$  (where  $r$  is the distance from the city center and  $\phi_x$  depends only on preference and technology parameters). An application is presented wherein it is shown that population growth may lead to a *smaller* increase in land rents in cities that cannot expand physically because these cities are less able to exploit the external effect of greater employment density.

*Working Paper 12-25, “A Tractable Circular City*

*Model with an Application to the Effects of Development Constraints on Land Rents,” Satyajit Chatterjee, Federal Reserve Bank of Philadelphia, and Burcu Eyigungor, Federal Reserve Bank of Philadelphia*

### **EXPLAINING FIRMS’ ENTRY, EXIT, AND RELOCATION DECISIONS IN AN URBAN ECONOMY WITH MULTIPLE LOCATIONS**

The authors develop a new dynamic general equilibrium model to explain firm entry, exit, and relocation decisions in an urban economy with multiple locations and agglomeration externalities. The authors characterize the stationary distribution of firms that arises in equilibrium. They estimate the parameters of the model using a method of moments estimator. Using

unique panel data collected by Dun and Bradstreet, the authors find that their model fits the moments used in estimation as well as a set of moments that they use for model validation. Agglomeration externalities increase the productivity of firms by about 8 percent. Economic policies that subsidize firm relocations to the central business district increase agglomeration externalities in that area. They also increase economic welfare in the urban economy.

*Working Paper 12-26, “Estimating a Dynamic Equilibrium Model of Firm Location Choices in an Urban Economy,” Jeffrey Brinkman, Federal Reserve Bank of Philadelphia; Daniele Coen-Pirani, University of Pittsburgh; and Holger Sieg, University of Pennsylvania and NBER*