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WHAT DETERMINES LOCAL PATENT RATES?

The authors geocode a data set of patents and their citation counts, including citations from abroad. This allows them to examine both the quantity and quality of local inventions. They also refine their data on local academic R&D to explore effects from different fields of science and sources of R&D funding. Finally, they incorporate data on congressional earmarks of funds for academic R&D.

With one important exception, results using citation-weighted patents are similar to those using unweighted patents. For example, estimates of the returns to density (jobs per square mile) are only slightly changed when using citation-weighted patents as the dependent variable. But estimates of returns to city size (urbanization effects) are quite sensitive to the choice of dependent variable.

Local human capital is the most important determinant of per capita rates of patenting. A 1 percent increase in the adult population with a college degree increases the local patenting rate by about 1 percent.

With few exceptions, there is little variation across fields of science in the contribution of academic R&D to patenting rates. The exceptions are computer and life sciences, where the effects are smaller. There is greater variation in the contribution of R&D funded by different

sources — academic R&D funded by the federal government generates smaller increases in patenting rates than R&D funded by the university itself. This effect is somewhat stronger for federally funded applied R&D than for basic R&D. The authors also find small negative effects for cities with greater exposure to academic R&D allocated by congressional earmarks. The authors discuss the implications of these results for policy and future research. *Working Paper 09-12, "What Explains the Quantity and Quality of Local Inventive Activity?" Gerald Carlino, Federal Reserve Bank of Philadelphia, and Robert Hunt, Federal Reserve Bank of Philadelphia*

A NEW CLASS OF CONFIDENCE SETS FOR DSGE MODEL PARAMETERS

The authors show that in weakly identified models (1) the posterior mode will not be a consistent estimator of the true parameter vector, (2) the posterior distribution will not be Gaussian even asymptotically, and (3) Bayesian credible sets and frequentist confidence sets will not coincide asymptotically. This means that Bayesian DSGE estimation should not be interpreted merely as a convenient device for obtaining asymptotically valid point estimates and confidence sets from the posterior distribution. As an alternative, the authors develop a new class of frequentist confidence sets for structural DSGE model

parameters that remain asymptotically valid regardless of the strength of the identification. The proposed set correctly reflects the uncertainty about the structural parameters even when the likelihood is flat, it protects the researcher from spurious inference, and it is asymptotically invariant to the prior in the case of weak identification.

Working Paper 09-13, "Frequentist Inference in Weakly Identified DSGE Models," Pablo Guerron-Quintana, Federal Reserve Bank of Philadelphia; Atsushi Inoue, North Carolina State University; and Lutz Kilian, University of Michigan and CEPR

VACANCIES, HIRES, AND VACANCY YIELDS IN THE JOB OPENINGS AND LABOR TURNOVER SURVEY (JOLTS)

The authors study vacancies, hires, and vacancy yields (success rate in generating hires) using the Job Openings and Labor Turnover Survey, which provides job opening and labor turnover data collected from a large representative sample of U.S. employers. The authors also develop a simple framework that identifies the monthly flow of new vacancies and the job-filling rate for vacant positions, which is the employer counterpart to the job-finding rate for unemployed workers. The job-filling rate moves counter to employment at the aggregate level but rises steeply with employer growth rates in the cross section. It falls with employer size, rises with the worker turnover rate, and varies by a factor of four across major industry groups. The authors' analysis also indicates that more than one in six hires occurs without benefit of a vacancy, as defined by JOLTS. These findings provide useful inputs for assessing, developing, and calibrating theoretical models of search, matching, and hiring in the labor market.

Working Paper 09-14, "The Establishment-Level Behavior of Vacancies and Hiring," Steven J. Davis, University of Chicago and NBER; R. Jason Faberman, Federal Reserve Bank of Philadelphia; and John C. Haltiwanger, University of Maryland and NBER

DETERMINING A FIRM'S EXPORT STATUS

Exporters are few — less than one-fifth among U.S. manufacturing firms — and they are larger than nonexporting firms — about four to five times more total sales per firm. These facts are often cited as support for models with economies of scale and firm

heterogeneity as in Melitz (2003). The authors find that the basic Melitz model cannot simultaneously match the size and share of exporters given the observed distribution of total sales. Instead, exporters are expected to be between 90 and 100 times larger than nonexporters. It is easy to reconcile the model with the data. However, a lot of variation independent of firm size is needed to do so. This suggests that economies of scale play only a minor role in determining a firm's export status. The authors show that the augmented model also has markedly different implications in the event of trade liberalization. Most of the adjustment is through the intensive margin, and productivity gains due to reallocation are halved.

Working Paper 09-15, "Economies of Scale and the Size of Exporters," Roc Armenter, Federal Reserve Bank of Philadelphia, and Miklós Koren, Central European University, IEHAS, and CEPR

CONCENTRATION OF R&D ACTIVITY IN THE U.S.

This study details the location patterns of R&D labs in the U.S., but it differs from past studies in a number of ways. First, rather than looking at the geographic concentration of manufacturing firms (e.g., Ellison and Glaeser, 1997; Rosenthal and Strange, 2001; and Duranton and Overman, 2005), the authors consider the spatial concentration of private R&D activity. Second, rather than focusing on the concentration of employment in a given industry, the authors look at the clustering of individual R&D labs by industry. Third, following Duranton and Overman, the authors look for geographic clusters of labs that represent statistically significant departures from spatial randomness using simulation techniques. The authors find that R&D activity for most industries tends to be concentrated in the Northeast corridor, around the Great Lakes, in California's Bay Area, and in southern California. They argue that the high spatial concentration of R&D activity facilitates the exchange of ideas among firms and aids in the creation of new goods and new ways of producing existing goods. They run a regression of an Ellison and Glaeser style index measuring the spatial concentration of R&D labs on geographic proxies for knowledge spillovers and other characteristics and find evidence that localized knowledge spillovers are important for innovative activity.

Working Paper 09-16, "The Geography of Research and Development Activity in the U.S.," Kristy Buzard, University of California-San Diego, and Gerald Carlino, Federal Reserve Bank of Philadelphia

AGGLOMERATION ECONOMIES' ROLE IN APPLYING NEW KNOWLEDGE TO PRODUCTION

Where does adaptation to innovation take place? The author presents evidence on the role of agglomeration economies in the application of new knowledge to production. All else equal, workers are more likely to be observed in new work in locations that are initially dense in both college graduates and industry variety. This pattern is consistent with economies of density from the geographic concentration of factors and markets related to technological adaptation. A main contribution is to use a new measure, based on revisions to occupation classifications, to closely characterize cross-sectional differences across U.S. cities in adaptation to technological change. Worker-level results also provide new evidence on the skill bias of recent innovations.

Working Paper 09-17, "Technological Adaptation, Cities, and New Work," Jeffrey Lin, Federal Reserve Bank of Philadelphia

TRANSMISSION OF CREDIBLE INFORMATION BY A BENEVOLENT CENTRAL BANK

The authors study credible information transmission by a benevolent central bank. They consider two possibilities: direct revelation through an announcement versus indirect information transmission through monetary policy. These two ways of transmitting information have very different consequences. Since the objectives of the central bank and those of individual investors are not always aligned, private investors might rationally ignore announcements by the central bank. In contrast, information transmission through changes in the interest rate creates a distortion, thus lending an amount of credibility. This induces the private investors to rationally take into account information revealed through monetary policy.

Working Paper 09-18, "Money Talks," Marie Hoerova, European Central Bank; Cyril Monnet, Federal Reserve Bank of Philadelphia; and Ted Temzelides, Rice University

TRADE REFORM POLICIES, TARIFF REDUCTIONS, AND OUTPUT PER WORKER IN KOREA'S MANUFACTURING SECTOR

South Korea's growth miracle has been well documented. A large set of institutional and policy reforms in the early 1960s is thought to have contributed to the country's extraordinary performance. In this paper, the authors assess the importance of one key set of policies — the trade policy reforms in Korea — as well as the concurrent GATT tariff reductions. They develop a model of neoclassical growth and trade that highlights two forces by which lower trade barriers can lead to increased per worker GDP: comparative advantage and specialization, and capital accumulation. The authors calibrate the model and simulate the effects of three sets of tariff reductions that occurred between early 1962 and 1995. Their main finding is that the model can explain up to 32 percent of South Korea's catch-up to the G7 countries in output per worker in the manufacturing sector. The authors find that the effects of the tariff reductions taken together are about twice as large as the sum of each reduction applied individually.

Working Paper 09-19, "How Much of South Korea's Growth Miracle Can Be Explained by Trade Policy?," Michelle Connolly, Duke University, and Kei-Mu Yi, Federal Reserve Bank of Philadelphia

TECHNOLOGY, UNCERTAINTY, AND FLUCTUATIONS IN REAL EXCHANGE RATES

This paper investigates the extent to which technology and uncertainty contribute to fluctuations in real exchange rates. Using a structural VAR and bilateral exchange rates, the author finds that neutral technology shocks are important contributors to the dynamics of real exchange rates. Investment-specific and uncertainty shocks have a more restricted effect on international prices. All three disturbances cause short-run deviations from uncovered interest rate parity.

Working Paper 09-20, "Do Uncertainty and Technology Drive Exchange Rates?" Pablo A. Guerron-Quintana, Federal Reserve Bank of Philadelphia

SECURITIZATION AND THE POOR PERFORMANCE OF MORTGAGES IN THE FINANCIAL CRISIS

The academic literature, the popular press, and policymakers have all debated securitization's contribution to the poor performance of mortgages originated in

the run-up to the current crisis. Theoretical arguments have been advanced on both sides, but the lack of suitable data has made it difficult to assess them empirically. We examine this issue by using a loan-level data set from LPS Analytics, covering approximately three-quarters of the mortgage market from 2003-2007 and including both securitized and nonsecuritized loans. We find evidence that privately securitized loans do indeed perform worse than similar, nonsecuritized loans. Moreover, this effect is concentrated in prime mortgage markets; for example, a typical prime ARM loan originated in 2006 becomes delinquent at a 20 percent higher rate if it is privately securitized, *ceteris paribus*. By contrast, subprime loan performance does not seem to be worse for most classes of securitized loans.

Working Paper 09-21, "Securitization and Mortgage Default: Reputation vs. Adverse Selection," Ronel Elul, Federal Reserve Bank of Philadelphia

HOUSING SHOCKS, HOUSE PRICES, AND DEFAULT: A QUANTITATIVE MODEL FOR EXPLORING THE IMPACT OF THE FORECLOSURE PREVENTION POLICY

The authors construct a quantitative model of the housing market in which an unanticipated increase in the supply of housing triggers default mortgages via its effect on house prices. The decline in house prices creates an incentive to increase the consumption of housing space, but leverage makes it costly for homeowners to sell their homes and buy bigger ones (they must absorb large capital losses). Instead, leveraged households find it advantageous to default and rent housing space. Since renters demand less housing space than homeowners, foreclosures are a negative force affecting house prices. The authors explore the possible effects of the government's foreclosure prevention policy in their model. They find that the policy can temporarily reduce foreclosures and shore up house prices.

Working Paper 09-22, "Foreclosures and House Price Dynamics: A Quantitative Analysis of the Mortgage Crisis and the Foreclosure Prevention Policy," Satyajit Chatterjee, Federal Reserve Bank of Philadelphia, and Burcu Eyigungor, Koç University

BANK CAPITAL REQUIREMENTS AND BUSINESS-CYCLE EFFECTS

This paper attempts to quantify the business-cycle

effects of bank capital requirements. The authors use a general equilibrium model in which financing of capital goods production is subject to an agency problem. At the center of this problem is the interaction between entrepreneurs' moral hazard and liquidity provision by banks as analyzed by Holmstrom and Tirole (1998). They impose capital requirements on banks and calibrate the regulation using the Basel II risk-weight formula. Comparing business-cycle properties of the model under this procyclical regulation with those under hypothetical countercyclical regulation, the authors find that output volatility is about 25 percent larger under procyclical regulation and that this volatility difference implies a 1.7 percent reduction of the household's welfare. Even with more conservative parameter choices, the volatility and welfare differences under the two regimes remain nonnegligible.

Working Paper 09-23, "Time-Varying Capital Requirements in a General Equilibrium Model of Liquidity Dependence," Francisco Covas, Federal Reserve System Board of Governors, and Shigeru Fujita, Federal Reserve Bank of Philadelphia

MORTGAGE SALES, MORTGAGE INVENTORIES, AND TRADE

Consider the sale of mortgages by a loan originator to a buyer. As widely noted, such a transaction is subject to a severe adverse selection problem: The originator has a natural information advantage and will attempt to sell only the worst mortgages. However, a second important feature of this transaction has received much less attention: Both the seller and the buyer may have existing inventories of mortgages similar to those being sold. The authors analyze how the presence of such inventories affects trade. They use their model to discuss implications for regulatory intervention in illiquid markets.

Working Paper 09-24, "Why Do Markets Freeze?" Philip Bond, University of Pennsylvania, and Yaron Leitner, Federal Reserve Bank of Philadelphia

IMPLICATIONS OF RELAXED BORROWING CONSTRAINTS IN THE PRESENCE OF HYPERBOLIC DISCOUNTING

Is the observed rapid increase in consumer debt over the last three decades good news for consumers? This paper quantitatively studies macroeconomic and welfare implications of relaxing borrowing

constraints when consumers exhibit a hyperbolic discounting preference. In particular, the author constructs a calibrated general equilibrium life-cycle model with uninsured idiosyncratic earnings shocks and a quasi-hyperbolic discounting preference and examines the effect of relaxation of the borrowing constraint, which generates increased indebtedness. The model can capture the two contrasting views associated with increased indebtedness: the positive view, which links increased indebtedness to financial-sector development and better insurance, and the negative view, which associates increased indebtedness with consumers' over-borrowing. He finds that while there is a welfare gain as large as 0.4 percent of flow consumption from a relaxed borrowing constraint, which is consistent with the observed increase in aggregate debt between 1980 and 2000 in the model with standard exponential discounting consumers, there is a welfare loss of 0.2 percent in the model with hyperbolic discounting consumers. This result holds in spite of the observational similarity of the two models; the macroeconomic implications of a relaxed borrowing constraint are similar between the two models.

Cross-sectionally, although consumers of high and low productivity gain and medium productivity consumers suffer due to a relaxed borrowing constraint in both models, the welfare gain of low-productivity consumers is substantially reduced (and becomes negative in the case of strong hyperbolic discounting) in the hyperbolic discounting model due to the welfare loss from over-borrowing. Finally, the author finds that the optimal (social welfare maximizing) borrowing limit is 15 percent of average income, which is substantially lower than both the optimal level implied by the exponential discounting model (37 percent) and the level of the U.S. economy in 2000 implied by the model (29 percent).

Working Paper 09-25, "Rising Indebtedness and Hyperbolic Discounting: A Welfare Analysis," Makoto Nakajima, Federal Reserve Bank of Philadelphia

A STUDY OF BANKING USING MECHANISM DESIGN

The authors study banking using the tools of mechanism design, without a priori assumptions about what banks are, who they are, or what they do. Given preferences, technologies, and certain frictions — including limited commitment and imperfect

monitoring — they describe the set of incentive feasible allocations and interpret the outcomes in terms of institutions that resemble banks. The bankers in the authors' model endogenously accept deposits, and their liabilities help others in making payments. This activity is essential: If it were ruled out, the set of feasible allocations would be inferior. The authors discuss how many and which agents play the role of bankers. For example, they show that agents who are more connected to the market are better suited for this role, since they have more to lose by renegeing on obligations. The authors discuss some banking history and compare it with the predictions of their theory.

Working Paper 09-26, "Banking: A Mechanism Design Approach," Fabrizio Mattesini, University of Rome Tor-Vergata; Cyril Monnet, Federal Reserve Bank of Philadelphia; and Randall Wright, University of Wisconsin, and Visiting Scholar, Federal Reserve Bank of Philadelphia

IMPLEMENTING MONETARY POLICY: STANDING FACILITIES AND OPEN MARKET OPERATIONS

The authors compare two stylized frameworks for the implementation of monetary policy. The first framework relies only on standing facilities, while the second framework relies only on open market operations. They show that the Friedman rule cannot be implemented when the central bank uses standing facilities, while it can be implemented with open market operations. For a given rate of inflation, the authors show that standing facilities unambiguously achieve higher welfare than just conducting open market operations. They conclude that elements of both frameworks should be combined. Also, their results suggest that any monetary policy implementation framework should remunerate both required and excess reserves.

Working Paper 09-27, "Monetary Policy Implementation Frameworks: A Comparative Analysis," Antoine Martin, Federal Reserve Bank of New York, and Cyril Monnet, Federal Reserve Bank of Philadelphia

ASSESSING THE PRECISION OF ECONOMIC PREDICTIONS: EARLY RELEASE DATA AND DEFINITIONAL CHANGES

In this paper, the authors empirically assess the extent to which early release inefficiency and definitional change affect prediction precision. In

particular, they carry out a series of ex-ante prediction experiments in order to examine the marginal predictive content of the revision process, the trade-offs associated with predicting different releases of a variable, the importance of particular forms of definitional change, which the authors call “definitional breaks,” and the rationality of early releases of economic variables. An important feature of their rationality tests is that they are based solely on the examination of ex-ante predictions, rather than on in-sample regression analysis, as are many tests in the extant literature. Their findings point to the importance of making real-time datasets available to forecasters, as the revision process has marginal predictive content, and because predictive accuracy increases when multiple releases of data are used when specifying and estimating prediction models.

The authors also present new evidence that early releases of money are rational, whereas prices and output are irrational. Moreover, they find that regardless of which release of their price variable one specifies as the “target” variable to be predicted, using only “first release” data in model estimation and prediction construction yields mean square forecast error (MSFE) “best” predictions. On the other hand, models estimated and implemented using “latest available release” data are MSFE-best for predicting all releases of money. The authors argue that these contradictory findings are due to the relevance of definitional breaks in the data-generating processes of the variables they examine. In an empirical analysis, they examine the real-time predictive content of money for income, and they find that vector autoregressions with money do not perform significantly worse than

autoregressions when predicting output during the past 20 years.

Working Paper 09-28, “Real-Time Datasets Really Do Make a Difference: Definitional Change, Data Release, and Forecasting,” Andres Fernandez, Rutgers University and Universidad de Los Andes, and Norman R. Swanson, Rutgers University, and Visiting Scholar, Federal Reserve Bank of Philadelphia

TESTING THE ACCURACY OF PREDICTIVE DENSITIES DERIVED FROM DIFFUSION MODELS

This paper develops tests for comparing the accuracy of predictive densities derived from (possibly misspecified) diffusion models. In particular, the authors first outline a simple simulation-based framework for constructing predictive densities for one-factor and stochastic volatility models. Then, they construct accuracy assessment tests that are in the spirit of Diebold and Mariano (1995) and White (2000). In order to establish the asymptotic properties of their tests, the authors also develop a recursive variant of the nonparametric simulated maximum likelihood estimator of Fermanian and Salanié (2004). In an empirical illustration, the predictive densities from several models of the one-month federal funds rates are compared.

Working Paper 09-29, “Predictive Density Construction and Accuracy Testing with Multiple Possibly Misspecified Diffusion Models,” Valentina Corradi, University of Warwick, and Norman R. Swanson, Rutgers University, and Visiting Scholar, Federal Reserve Bank of Philadelphia