

Abstracts of Articles Accepted in Journals, Books, and Conference Volumes*

Government Consumption Expenditures and the Current Account

Michele Cavallo

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Management* 7(1) (2007).

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This paper focuses on the effects on the current account of changes to two distinct components of government consumption expenditures, expenditure on goods and expenditure on hours worked. I find that changes to government expenditure on hours do not directly affect the current account and that their effect is considerably smaller—one order of magnitude—than the effect of changes to government expenditure on goods. These findings indicate that considering government consumption as entirely expenditure on goods can lead to overestimating its role in accounting for movements in the current account balance.

Cross-National Trends in Earnings Inequality and Instability

**Mary C. Daly
Robert G. Valletta**

Forthcoming in *Economics Letters*.

We compare trends in earnings inequality in the United States, Germany, and Great Britain. Estimation of a heterogeneous growth model of permanent and transitory earnings variation reveals substantial convergence in the permanent component of inequality in these countries during the 1990s.

Optimal Policy in Rational Expectations Models: New Solution Algorithms

Richard Dennis

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This paper develops methods to solve for optimal discretionary policies and optimal commitment policies in rational expectations models. These algorithms, which allow the optimization constraints to be conveniently expressed in second-order structural form, are more general than existing methods and are simple to apply. We use several New Keynesian business cycle models to illustrate their application. Simulations show that the procedures developed in this paper can quickly solve small-scale models and that they can be usefully and effectively applied to medium- and large-scale models.

*The abstracts are arranged alphabetically by FRB San Francisco authors, whose names are in boldface.

Robust Control with Commitment: A Modification to Hansen-Sargent

Richard Dennis

Forthcoming in *Journal of
Economic Dynamics and Control*.

This paper examines the Hansen and Sargent (2003) formulation of the robust Stackelberg problem and shows that their method of constructing the approximating equilibrium, which is central to any robust control exercise, is generally invalid. The paper then turns to the Hansen and Sargent (2007) treatment, which, responding to the problems raised in this paper, changes subtly, but importantly, how the robust Stackelberg problem is formulated. This paper proves, first, that their method for obtaining the approximating equilibrium is now equivalent to the one developed in this paper, and, second, that the worst-case specification errors are not subject to a time-inconsistency problem. Analyzing robust monetary policy in two New Keynesian business cycle models, the paper demonstrates that a robust central bank should primarily fear that the supply side of its approximating model is misspecified and that attenuation characterizes robust policymaking. Depending on how the robust Stackelberg problem is formulated, this paper shows that the Hansen-Sargent approximating equilibrium can be dynamically unstable and that robustness can be irrelevant, i.e., that the robust policy can coincide with the rational expectations policy.

Learning and Optimal Monetary Policy

Richard Dennis, with

Federico Ravenna,
University of California, Santa Cruz

Forthcoming in *Journal of
Economic Dynamics and Control*.

To conduct policy efficiently, central banks must use available data to infer, or learn, the relevant structural relationships in the economy. However, because a central bank's policy affects economic outcomes, the chosen policy may help or hinder its efforts to learn. This paper examines whether real-time learning allows a central bank to learn the economy's underlying structure and studies the impact that learning has on the performance of optimal policies under a variety of learning environments. Our main results are as follows. First, when monetary policy is formulated as an optimal discretionary targeting rule, we find that the rational expectations equilibrium and the optimal policy are real-time learnable. This result is robust to a range of assumptions concerning private sector learning behavior. Second, when policy is set with discretion, learning can lead to outcomes that are better than if the model parameters are known. Finally, if the private sector is learning, then unannounced changes to the policy regime, particularly changes to the inflation target, can raise policy loss considerably.

Trend Breaks, Long-Run Restrictions, and Contractionary Technology Improvements

John G. Fernald

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Economics* 54(8) (November 2007)
pp. 2,467–2,485.

Structural vector autoregressions with long-run restrictions are extraordinarily sensitive to low-frequency correlations. Recent literature finds that the estimated effects of technology shocks are sensitive to how one treats hours per capita. However, after allowing for (statistically and economically significant) trend breaks in productivity, results are much less sensitive: hours fall when technology improves. The issue is that the common high-low-high pattern of productivity growth and hours (i.e., the low-frequency correlation) inevitably leads to a positive estimated response. The trend breaks control for this correlation. This example suggests a practical need for care in using long-run restrictions.

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Information and Communications Technology as a General Purpose Technology: Evidence from U.S. Industry Data

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8(2) (May 2007) pp. 146–173.

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Many people point to information and communications technology (ICT) as the key for understanding the acceleration in productivity in the United States since the mid-1990s. Stories of ICT as a general purpose technology (GPT) suggest that measured total factor productivity (TFP) should rise in ICT-using sectors (reflecting either unobserved accumulation of intangible organizational capital, spillovers, or both), but with a long lag. Contemporaneously, however, investments in ICT may be associated with lower TFP as resources are diverted to reorganization and learning. We find that U.S. industry results are consistent with GPT stories: the acceleration after the mid-1990s was broad-based—located primarily in ICT-using industries rather than ICT-producing industries. Furthermore, industry TFP accelerations in the 2000s are positively correlated with (appropriately weighted) industry ICT capital growth in the 1990s. Indeed, as GPT stories would suggest, after controlling for past ICT investment, industry TFP accelerations are negatively correlated with increases in ICT usage in the 2000s.

This article is published in this volume, pp. 1–15.

Global Price Dispersion: Are Prices Converging or Diverging?

Reuven Glick, with
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University of California, Davis

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This paper documents significant time variation in the degree of global price convergence over the last two decades. In particular, there appears to be a general U-shaped pattern with price dispersion first falling and then rising in recent years, a pattern which is remarkably robust across country groupings and commodity groups. This time-variation is difficult to explain in terms of the standard gravity equation variables common in the literature, as these tend not to vary much over time or have not risen in recent years. However, regression analysis indicates that this time-varying pattern coincides well with oil price fluctuations, which are clearly time-varying and have risen substantially since the late 1990s. As a result, this paper offers new evidence on the role of transportation costs in driving international price dispersion.

A Model of Endogenous Nontradability and Its Implications for the Current Account

Reuven Glick, with
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University of California, Davis

Published in *Review of International Economics* 15(5) (November 2007)
pp. 916–931.

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This paper studies how nontraded goods limit the ability of a country to finance current account deficits. It uses an intertemporal model of the current account for a small open economy where goods are endogenously nontraded due to explicit trade costs. The economy has an endowment of two goods with differing trade costs, either of which can be traded or nontraded in equilibrium. The model implies that current account deficits impose a cost, in the form of raising the effective interest rate in the country. The findings differ from some recent studies: first, in that the interest rate rises even for countries with modest current account deficits; secondly, the interest rate cost eventually reaches an upper bound as current account deficits grow, and progressively more nontraded goods become traded to service the debt. Panel regression analysis of interest rate and current account data are consistent with our conclusions.

Tradability, Productivity, and International Economic Integration

Reuven Glick, with
Paul Bergin,
University of California, Davis

Published in *Journal of International
Economics* 73(1) (September 2007)
pp. 128–151.

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This paper develops a model of endogenously tradable goods to study the implications of international integration for price dispersion and pricing to market. A distinctive feature of the model is heterogeneity in both trade costs and productivity. The model highlights the role of heterogeneity in shaping how new entrants at the extensive margin differ from incumbent traders, thereby giving extensive margin movements distinctive implications relative to the intensive margin. In particular, the model predicts that international integration mainly along the extensive margin should be associated with a more limited degree of price convergence. This prediction finds support in cross-sectional regressions on European data and offers insight into recent integration episodes.

Bonds or Loans? The Effect of Macroeconomic Fundamentals

Galina B. Hale

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The costs of debt crises are not invariant to the foreign debt instrument composition: bank loans or bonds. The lending boom of the 1990s witnessed considerable variation over time and across countries in the debt instrument used by emerging market (EM) borrowers. This article tests how macroeconomic fundamentals affect the composition of international debt instruments used by EM borrowers. Analysis of micro-level data using an ordered probability model shows that macroeconomic fundamentals explain a significant share of variation in the ratio of bonds to loans for private borrowers but not for the sovereigns.

Sovereign Debt Crises and Credit to the Private Sector

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Carlos Arteta,
Federal Reserve Board of Governors

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Economics* 74(1) (January 2008)
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We use micro-level data to analyze emerging markets' private sector access to international debt markets during sovereign debt crises. We find that these crises are systematically accompanied by a decline in foreign credit to domestic private firms, both during debt renegotiations and for over two years after restructuring agreements are reached. This decline is large, statistically significant, and robust. We find that this effect is concentrated in the nonfinancial sector and is different for firms in the exporting and in the non-exporting sectors. We also find that the magnitude of the effect depends on the type of debt restructuring agreement.

The Decision to First Enter the Public Bond Market: The Role of Firm Reputation, Funding Choices, and Bank Relationships

Galina B. Hale, with
João Santos, *FRB New York*

Forthcoming in
Journal of Banking and Finance.

This paper uses survival analysis to investigate the timing of a firm's decision to issue for the first time in the public bond market. We find that firms that are more creditworthy and have higher demand for external funds issue their first public bond earlier. We also find that issuing private bonds or taking out syndicated loans is associated with a faster entry to the public bond market. According to our results, the relationships that firms develop with investment banks in connection with their private bond issues and syndicated loans further speed up their entry to the public bond market. Finally, we find that a firm's reputation has a U-shaped effect on the timing of a firm's bond IPO. Consistent with Diamond's (1991) reputational theory, firms that establish a track record of high creditworthiness as well as those that establish a track record of low creditworthiness enter the public bond market earlier than firms with intermediate reputation.

Using Securities Market Information for Bank Supervisory Monitoring

John Krainer
Jose A. Lopez

Forthcoming in
International Journal of Central Banking.

Bank supervisors in the United States conduct comprehensive on-site inspections of bank holding companies (BHCs) and assign them a supervisory rating meant to summarize their overall condition. We develop an empirical forecasting model of these ratings that combines supervisory and securities market data. We find that securities market variables, such as BHC stock returns and bond yield spreads, improve the model's in-sample fit. We also find that debt market variables provide more information on supervisory ratings for BHCs closer to default, while equity market variables provide more information for those further from default. In out-of-sample forecasting, we find that the accuracy of the model with both equity and debt variables is little different from the accuracy of a model based on supervisory information alone. However, the model with securities market data identifies additional ratings downgrades, which supervisors would probably value enough to warrant the use of this extended model for off-site monitoring purposes.

Using County-Based Markets to Support and Federal Reserve Markets to Implement Bank Merger Policy

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Published in *Journal of Competition Law and Economics* 3(1) (March 2007)
pp. 127–148.

In this paper, we consider three issues raised by the apparent inconsistency between the current research practice of using county-based markets (metropolitan statistical areas (MSAs) and non-MSA counties) to investigate the validity of the theoretical underpinnings of bank merger policy and the current regulatory practice of using Federal Reserve (FR) banking markets, which often do not follow county lines, to implement that policy. Using a national sample of bank and thrift branch deposit data, we find that county-based areas cannot simply substitute for FR markets in the implementation of bank merger policy. For example, numerous potential mergers would raise competitive issues in county-based areas, but not in FR markets, and vice versa. We also conclude that, because of the relative difficulty of assembling demographic data for non-county-based areas, it is impractical to consistently use FR markets in bank merger policy research. However, we do find that, despite the inconsistencies between the two types of markets, analysis that uses county-based areas is relevant for bank merger policy that is implemented with FR markets. For example, we find that profitability regression results using variables based on FR markets are similar to those found using variables based on MSAs and non-MSA counties.

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Maintenance Expenditures and Indeterminacy under Increasing Returns to Scale

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Foreign Bank Lending and Bond Underwriting in Japan During the Lost Decade

Jose A. Lopez
Mark M. Spiegel

Forthcoming in *Proceedings of the 2006 Asian Pacific Economic Association Conference*, eds. Kar Yiu Wong and Yin Wong Cheung. London: Routledge.

Macroeconomic Implications of Changes in the Term Premium

Glenn D. Rudebusch, and
Eric T. Swanson, with
Brian P. Sack, *Macroeconomic Advisers*

Published in the *FRB St. Louis Review* 89(4) (July/August 2007) pp. 241–269.

This paper develops a one-sector real business cycle model in which competitive firms allocate resources for the production of goods, investment in new capital, and maintenance of existing capital. Firms also choose the utilization rate of existing capital. A higher utilization rate leads to faster capital depreciation, and an increase in maintenance activity has the opposite effect. We show that as the equilibrium ratio of maintenance expenditures to GDP rises, the required degree of increasing returns for local indeterminacy declines over a wide range of parameter combinations. When the model is calibrated to match empirical evidence on the relative size of maintenance and repair activity, we find that local indeterminacy (and belief-driven fluctuations) can occur with a mild and empirically plausible degree of increasing returns: approximately 1.08.

We examine foreign intermediation activity in Japan during the so-called “lost decade” of the 1990s, contrasting the behavior of lending by foreign commercial banks and underwriting activity by foreign investment banks over that period. Foreign bank lending is shown to be sensitive to domestic Japanese conditions, particularly Japanese interest rates, more so than their domestic Japanese bank counterparts. During the 1990s, foreign bank lending in Japan fell, both in overall numbers and as a share of total lending. However, there was marked growth in foreign underwriting activity in the international yen-denominated bond sector. A key factor in the disparity between these activities is their different clientele: While foreign banks in Japan lent primarily to domestic borrowers, international yen-denominated bond issuers were primarily foreign entities with yen funding needs or opportunities for profitable swaps. Indeed, low interest rates that discouraged lending activity in Japan by foreign banks directly encouraged foreign underwriting activity tied to the so-called “carry trades.” Regulatory reforms, particularly the “Big Bang” reforms of the 1990s, also play a large role in the growth of foreign underwriting activity over our sample period.

Linearized New Keynesian models and empirical no-arbitrage macro-finance models offer little insight regarding the implications of changes in bond term premiums for economic activity. This paper investigates these implications using both a structural model and a reduced-form framework. The authors show that there is no structural relationship running from the term premium to economic activity, but a reduced-form empirical analysis does suggest that a decline in the term premium has typically been associated with stimulus to real economic activity, which contradicts earlier results in the literature.

Accounting for a Shift
in Term Structure Behavior
with No-Arbitrage
and Macro-Finance Models

Glenn D. Rudebusch, with
Tao Wu, *FRB Dallas*

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and Banking* 39(2–3) (March–April 2007)
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This paper examines a shift in the dynamics of the term structure of interest rates in the U.S. during the mid-1980s. We document this shift using standard interest rate regressions and using dynamic, affine, no-arbitrage models estimated for the pre- and post-shift subsamples. The term structure shift largely appears to be the result of changes in the pricing of risk associated with a “level” factor. Using a macro-finance model, we suggest a link between this shift in term structure behavior and changes in the dynamics and risk pricing of the Federal Reserve’s inflation target as perceived by investors.

A Macro-Finance Model of the
Term Structure, Monetary Policy,
and the Economy

Glenn D. Rudebusch, with
Tao Wu, *FRB Dallas*

Forthcoming in *The Economic Journal*.

This paper develops and estimates a macro-finance model that combines a canonical affine no-arbitrage finance specification of the term structure with standard macroeconomic aggregate relationships for output and inflation. From this new empirical formulation, we obtain several important results: (1) the latent term structure factors from finance no-arbitrage models appear to have important macroeconomic and monetary policy underpinnings, (2) there is no evidence of monetary policy inertia or a slow partial adjustment of the policy interest rate by the Federal Reserve, and (3) both forward-looking and backward-looking elements play important roles in macroeconomic dynamics.

Offshore Financial Centres:
Parasites or Symbionts?

Mark M. Spiegel, with
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University of California, Berkeley

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This article analyses the causes and consequences of offshore financial centres (OFCs). While OFCs are likely to encourage bad behavior in source countries, they may also have unintended positive consequences, such as providing competition for the domestic banking sector. We derive and simulate a model of a home country monopoly bank facing a representative competitive OFC which offers tax advantages attained by moving assets offshore at a cost that is increasing in distance to the OFC. Our model predicts that proximity to an OFC is likely to be pro-competitive. We test and confirm the predictions empirically. OFC proximity is associated with a more competitive domestic banking system and greater overall financial depth.

Market Price Accounting and Depositor Discipline: The Case of Japanese Regional Banks

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Real Wage Cyclicity in the Panel Study of Income Dynamics

Eric T. Swanson

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Inflation Targeting and the Anchoring of Inflation Expectations in the Western Hemisphere

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Andrew T. Levin, *Federal Reserve Board*
Andrew N. Marder, *Princeton University*

Published in *Series on Central Banking, Analysis, and Economic Policies X: Monetary Policy under Inflation Targeting*, eds. F. Mishkin and K. Schmidt-Hebbel. Santiago, Chile: Central Bank of Chile, 2007.

We examine the determinants of Japanese regional bank pricing-to-market decisions and their impact on the intensity of depositor discipline, in the form of the sensitivity of deposit growth to bank financial conditions. To obtain consistent estimates, we first model and estimate the bank pricing-to-market decision and then estimate the intensity of depositor discipline after conditioning for that decision. We find that banks were less likely to adopt market price accounting the larger were their unrealized securities losses. We also find statistically significant evidence of depositor discipline among banks that elected to price to market. Our results indicate that depositor discipline was more intense for the subset of banks that adopted market price accounting.

Previous studies of real wage cyclicity have made only sparing use of the micro-data detail that is available in the Panel Study of Income Dynamics (PSID). The present paper brings to bear this additional detail to investigate the robustness of the previous results and to examine whether there are important cross-sectional and demographic differences in wage cyclicity. Although real wages were procyclical across the entire distribution of workers from 1967 to 1991, the wages of lower-income, younger, and less-educated workers exhibited greater procyclicity. However, workers' straight-time hourly pay rates have been acyclical, suggesting that more variable pay margins such as bonuses, overtime, late shift premia, and commissions have played a substantial if not primary role in generating procyclicity.

We investigate the extent to which long-run inflation expectations are well anchored in three western hemisphere countries—Canada, Chile, and the United States—using a high-frequency event-study analysis. Specifically, we use daily data on far-ahead forward inflation compensation—the difference between forward rates on nominal and inflation-indexed bonds—as an indicator of financial market perceptions of inflation risk and the expected level of inflation at long horizons. For the United States, we find that far-ahead forward inflation compensation reacts significantly to macroeconomic data releases, implying that long-run inflation expectations are not completely anchored. In contrast, the Canadian inflation compensation data do not exhibit significant sensitivity to either Canadian or U.S. macroeconomic news, confirming that inflation targeting in Canada has been successful in anchoring long-run inflation expectations. Finally, while the requisite data for Chile is only available for a limited sample period (2002–2005), our results are consistent with the hypothesis that inflation targeting in Chile has also succeeded in anchoring long-run inflation expectations.

Market-Based Measures of Monetary Policy Expectations

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A number of recent articles have used different financial market instruments to measure near-term expectations of the federal funds rate and the high-frequency changes in these instruments around Federal Open Market Committee announcements to measure monetary policy shocks. This article evaluates the empirical success of a variety of financial market instruments in predicting the future path of monetary policy. All of the instruments we consider provide forecasts that are clearly superior to those of standard time series models at all of the horizons considered. Among financial market instruments, we find that federal funds futures dominate all the other securities in forecasting monetary policy at horizons out to six months. For longer horizons, the predictive power of many of the instruments we consider is very similar. In addition, we present evidence that monetary policy shocks computed using the current-month federal funds futures contract are influenced by changes in the timing of policy actions that do not influence the expected course of policy beyond a horizon of about six weeks. We propose an alternative shock measure that captures changes in market expectations of policy over slightly longer horizons.

Futures Prices as Risk-Adjusted Forecasts of Monetary Policy

Eric T. Swanson, with
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Forthcoming in
Journal of Monetary Economics.

Many researchers have used federal funds futures rates as measures of financial markets' expectations of future monetary policy. However, to the extent that federal funds futures reflect risk premia, these measures require some adjustment. In this paper, we document that excess returns on federal funds futures have been positive on average and strongly countercyclical. In particular, excess returns are surprisingly well predicted by macroeconomic indicators such as employment growth and financial business cycle indicators such as Treasury yield spreads and corporate bond spreads. Excess returns on eurodollar futures display similar patterns. We document that simply ignoring these risk premia significantly biases forecasts of the future path of monetary policy. We also show that risk premia matter for some futures-based measures of monetary policy shocks used in the literature.

On Using Relative Prices to Measure Capital Specific Technological Progress

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Forthcoming in
Journal of Macroeconomics.

Recently, Greenwood, Hercowitz, and Krusell (GHK) have identified the relative price of (new) capital with capital-specific technological progress. In a two-sector growth model, however, the relative price of capital equals the ratio of the productivity processes in the two sectors. Restrictions from this model are used with data on wages and prices to construct measures of productivity growth and test the GHK identification, which is easily rejected by the data. This raises questions about various measures of the contribution that capital-specific technological progress might make to the economy. This identification also induces a negative correlation between the resulting measures of capital-specific and economy-wide technological change, which potentially explains why papers employing this identification find that capital-specific technological change accelerated in the mid-1970s. We impose structure on the productivity measures based on their long-run behavior and find evidence of a slowdown in productivity in the 1970s that is common to both sectors and an acceleration in the mid-1990s that is exclusive to the capital sector.

Statistical Nonlinearities in the Business Cycle: A Challenge for the Canonical RBC Model

Diego Valderrama

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Learning and Shifts in Long-Run Productivity Growth

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Inflation Targeting under Imperfect Knowledge

John C. Williams, with
Athanasios Orphanides,
Central Bank of Cyprus

Published in *Series on Central Banking, Analysis, and Economic Policies X: Monetary Policy under Inflation Targeting*, eds. F. Mishkin and K. Schmidt-Hebbel. Santiago, Chile: Central Bank of Chile, 2007, pp. 77–123.

The cyclical components of U.S. macroeconomic time series exhibit significant nonlinearities. Standard equilibrium models of business cycles cannot replicate nonlinear features of the data. Applying the efficient method of moments (Gallant and Tauchen, 1996, *Econometric Theory*) to build an algorithm that searches over the model's parameter space establishes the parameterization that best allows replication of all statistical properties of the data. The results show that under this parameterization, the model captures nonlinearities in investment but fails to account for observed properties of consumption.

An extensive literature has analyzed the macroeconomic effects of shocks to the level of aggregate productivity; however, there has been little corresponding research on sustained shifts in the growth rate of productivity. In this paper, we examine the effects of shocks to productivity growth in a dynamic general equilibrium model where agents do not directly observe whether shocks are transitory or persistent. We show that an estimated Kalman filter model using real-time data describes economists' long-run productivity growth forecasts in the United States extremely well and that filtering has profound implications for the macroeconomic effects of shifts in productivity growth.

A central tenet of inflation targeting is that establishing and maintaining well-anchored inflation expectations are essential. In this paper, we reexamine the role of key elements of the inflation targeting framework towards this end, in the context of an economy where economic agents have an imperfect understanding of the macroeconomic landscape within which the public forms expectations and policymakers must formulate and implement monetary policy. Using an estimated model of the U.S. economy, we show that monetary policy rules that would perform well under the assumption of rational expectations can perform very poorly when we introduce imperfect knowledge. We then examine the performance of an easily implemented policy rule that incorporates three key characteristics of inflation targeting: transparency, commitment to maintaining price stability, and close monitoring of inflation expectations, and find that all three play an important role in assuring its success. Our analysis suggests that simple difference rules in the spirit of Knut Wicksell excel at tethering inflation expectations to the central bank's goal and in so doing achieve superior stabilization of inflation and economic activity in an environment of imperfect knowledge.

Robust Monetary Policy with Imperfect Knowledge

John C. Williams, with
Athanasios Orphanides,
Central Bank of Cyprus

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We examine the performance and robustness properties of monetary policy rules in an estimated macroeconomic model in which the economy undergoes structural change and where private agents and the central bank possess imperfect knowledge about the true structure of the economy. Policymakers follow an interest rate rule aiming to maintain price stability and to minimize fluctuations of unemployment around its natural rate but are uncertain about the economy's natural rates of interest and unemployment and how private agents form expectations. In particular, we consider two models of expectations formation: rational expectations and learning. We show that in this environment the ability to stabilize the real side of the economy is significantly reduced relative to an economy under rational expectations with perfect knowledge. Furthermore, policies that would be optimal under perfect knowledge can perform very poorly if knowledge is imperfect. Efficient policies that take account of private learning and misperceptions of natural rates call for greater policy inertia, a more aggressive response to inflation, and a smaller response to the perceived unemployment gap than would be optimal if everyone had perfect knowledge of the economy. We show that such policies are quite robust to potential misspecification of private sector learning and the magnitude of variation in natural rates.

Beggar Thy Neighbor? The In-State, Out-of-State, and Aggregate Effects of R&D Tax Credits

Daniel J. Wilson

Forthcoming in
Review of Economics and Statistics.

The proliferation of research and development (R&D) tax incentives among U.S. states in recent decades raises two important questions: (1) Are these tax incentives effective in achieving their stated objective, to increase R&D spending within the state? (2) To the extent the incentives do increase R&D within the state, how much of this increase is due to drawing R&D away from other states? In short, this paper answers (1) “yes” and (2) “nearly all,” with the implication that the net national effect of R&D tax incentives on R&D spending is near zero. The paper addresses these questions by exploiting the cross-sectional and time-series variation in R&D tax credits, and in turn the user cost of R&D, among U.S. states from 1981 to 2004 to estimate an augmented version of the standard R&D factor demand model. I estimate an in-state user cost elasticity around -2.5 (in the long-run), consistent with previous studies of the R&D cost elasticity. However, the R&D elasticity with respect to costs in neighboring states, which has not previously been investigated, is estimated to be around $+2.5$, suggesting a zero-sum game among states and raising concerns about the efficiency of state R&D credits from the standpoint of national social welfare.

**IT and Beyond:
The Contribution
of Heterogeneous Capital
to Productivity**

Daniel J. Wilson

Forthcoming in *Journal of
Business and Economic Statistics*.

This paper explores the relationship between capital composition and productivity using a unique and highly detailed data set on firm-level investment in the U.S. I develop a succinct methodology for modeling the separate effects of a large number of capital types in a production function framework. I then use this methodology, combined with recently developed techniques for accounting for unobserved productivity, to identify these effects and back out the implied marginal products of each capital type. The results indicate that information and communications technology (ICT) capital—specifically, computers, software, and communications equipment—are positively and statistically significantly associated with output, even after conditioning on total capital, labor, and various proxies for unobserved productivity. I compare the implied marginal products for different capital types to official data on rental prices and find that the marginal products of the ICT capital types are substantially above their measured rental prices. Last, I provide evidence of complementarities and substitutabilities, both among capital types—a rejection of the common assumption of perfect substitutability—and between certain capital types and labor.

**State Investment Tax Incentives:
What Are the Facts?**

Daniel J. Wilson, with
Robert S. Chirinko, *Emory University*

Forthcoming in *Proceedings of the
99th Annual Conference on Taxation*,
National Tax Association.
Also forthcoming as “State Investment
Tax Incentives: A Few Facts”
in *State Tax Notes*.

There is an ongoing debate in the United States among policymakers and the courts concerning the practical effects of state investment tax incentives. However, this debate often suffers from a lack of clear information on the extent of such incentives among states and how these incentives have evolved over time. This paper takes a first step toward addressing this shortcoming. Compiling information from all 50 states and the District of Columbia over the past 40 years, we are able to paint a picture of the variation in state investment tax incentives across states and over time. In particular, we document three stylized facts: (1) Over the last 40 years, state investment tax incentives have become increasingly large and increasingly common among states; (2) these incentives, as well as the level of the overall after-tax price of capital, are to a large extent clustered in certain regions of the country; and (3) states that enact investment tax credits tend to do so around the same time as their neighboring states.