# Editor's Introduction

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**A** policymaker's decision process involves a sequence of evaluations: What is the true state of the economy, why is the economy in this state, and how would policy affect the economy? This "what, why, how" sequence of evaluations requires a complete toolbox from the economist. On October 21 and 22, 2004, the Federal Reserve Bank of St. Louis hosted its Twenty-Ninth Annual Economic Policy Conference under the broad umbrella topic "Productivity, Labor, and the Business Cycle." At the conference, six diverse papers were presented that focused on different aspects of the business cycle. Indeed, these papers exhibited the breadth of the economist's toolbox, ranging from a statistical representation of the business cycle, to an econometric analysis of its driving forces, to a measurement of key indicators, to theoretical models of its causes and effects.

## WHAT IS THE BUSINESS CYCLE?

The notion that the economy inhabits distinct phases traces back to Burns and Mitchell (1946). Recent developments in econometrics have led economists to question whether these phases can be characterized by nonlinear statistical models. In his conference paper, James Hamilton asks whether nonlinear models, specifically Markov-switching models, provide evidence of a "real" business cycle. The advantage of Markov-switching models is they can allow for changes in dynamics across states without imposing strict periodicity.

In a previous paper, Hamilton (1989) consid-

ered a two-state Markov-switching model of U.S. gross domestic product (GDP) and found that the timing of switches roughly coincided with turning points determined by nonstatistical methods (e.g., the NBER Business Cycle Dating Committee). In his paper for this conference, Hamilton posits a three-state Markov-switching intercept model with non-Gaussian innovations for unemployment. This third state is revealed to be one of exceptionally high unemployment, which occurs infrequently and never directly following the expansionary state.

Hamilton also considers nonlinearities in interest rates. His sample includes the latter half of the nineteenth and the beginning of the twentieth centuries and ends before the establishment of the Federal Reserve System. Here, Hamilton employs a model with two-state Markov switching in the variance of the innovation: He shows that, although not every recession seems correlated with an increase in interest rate volatility, several pre-Federal Reserve recessions were nearly coincident with shifts in the variability of interest rates.

In his comments on the Hamilton paper, Mark Watson concentrates on two econometric issues: (i) Are nonlinearities necessary to model business cycles? and (ii) Do nonlinearities aid in forecasting business cycle variables? Watson addresses the first question by considering four series: U.S. GDP and three artificially constructed series simulated from a calibrated AR(2) process. These series illustrate results he attributes to Slutsky (1937)—namely, that the realizations from a linear model can behave in a manner that generates cycles and *appears* nonlinear. Watson's

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conclusion is that nonlinearities are not necessary a priori to have business cycles but in fact govern our characterization of the data.

Watson addresses the second question by investigating whether the filtered probabilities (i.e., the turning points) estimated from Hamilton's three-state Markov-switching model forecast other business cycle variables. Concentrating on the filtered probabilities for unemployment, Watson finds some evidence that Hamilton's estimated turning points forecast business cycle variables such as industrial production and personal income.

## TECHNOLOGY SHOCKS AND THE BUSINESS CYCLE

In a previous paper, Jordi Galí (1999) called into question an assumption of real business cycle theory: that technology shocks are a driving force in cyclical fluctuations. In that paper, Galí estimated a structural vector autoregression (VAR) with the identifying assumption that technology was the only shock that could affect labor productivity in the long run. Among other findings, he discovered that the short-run response of hours to a positive technology shock was negative. However, some recent studies have called into question Galí's specification of hours as an I(1) series in his VAR.

In his paper in this volume, Galí attempts to reconcile the specification of hours as nonstationary by proposing a benchmark balanced-growth model. He shows that the nature of the hours series depends on the (non)stationarity of the consumption share. Moreover, he argues that low-frequency fluctuations can confound estimation of the short-run responses to shocks. He presents evidence from the G7 countries to support his claim that the labor input can/should be modeled as nonstationary. Finally, he reestimates the identified VAR from Galí (1999) for the G7 countries, substituting hours in differences for employment in differences in each country's VAR.

In his discussion of the Galí paper, Chris Sims contrasts the conclusions drawn by the VAR literature with those arising from more-complicated

structural models using Bayesian methods. Sims cautions that small models such as Galí's VAR may not be rich enough to account for low-frequency dynamics. Sims's concerns about the methodology are summarized by two questions: (1) Are long-run restrictions of the kind employed by Galí sufficient to achieve identification? and (ii) How robust are Galí's results to alternative assumptions about the unit-root behavior of hours? Sims concludes that long-run restrictions provide only a weak identification. Moreover, he shows that adjusting the strength of the priors of unit roots in both labor productivity and hours has significant effects on the posterior distributions for the impulse responses and, thus, also on the conclusions that Galí draws.

## UNEMPLOYMENT AND THE BUSINESS CYCLE

One feature that defines the business cycle is the acyclicality of unemployment. The unemployment rate, however, is jointly determined by hires and separations—the flow of workers both between jobs and between employment and unemployment. In his paper in this volume, Robert Shimer constructs a model of employment dynamics with on-the-job search in an effort to determine the cyclicality of job flows. First, he proposes a method to estimate the rates of job finding and separation. He constructs simple accounting rules that can be used on data taken from the Current Population Survey to compute these rates.

Second, Shimer proposes a model with which he can estimate the rate of job-to-job transitions. He argues that workers move from job to job only if the new job is of higher quality (i.e., if the sum of the pecuniary and nonpecuniary benefits is greater). From this theory, Shimer computes theoretical job-to-job transitions rates, which he compares with three measures generated by methods in the current literature and finds they are roughly consistent. Finally, Shimer concludes that it is the rate at which workers, employed and unemployed, find jobs that dictates fluctuations in unemployment.

In his discussion of the Shimer paper, Randy

Wright concentrates on issues of measurement. He acknowledges Shimer's attempts to correct for data problems but points out some instances where data errors may lead to mismeasurement of hiring and separation rates. First, what is the real effect of unmeasured heterogeneity? Wright argues that accounting for race, sex, and other demographic characteristics may be insufficient to correct for all forms of heterogeneity. In particular, he cites laziness as an unobserved quality that would affect productivity but would go unobserved by the econometrician. Second, Wright asks about the potential bias that might arise if erstwhile employees who exit the labor force are not accounted for. Finally, he asks whether time aggregation issues cause biases in the computation of job-to-job transitions. Some of the apparent job-to-unemployment-to-job transitions may actually be job-to-job movements in which the worker intentionally takes time off.

## MONETARY POLICY AND THE BUSINESS CYCLE

The role of monetary policy in either exacerbating or damping cyclical fluctuations is explored in the conference paper by Robert King and Mau-Ting Lin. They investigate the responses of prices and output to shocks to government spending and productivity under alternative interest rate rules. The three policy regimes they consider involve rules in which interest rates respond to (i) inflation only, (ii) inflation and the output gap with weights taken from Taylor (1993), and (iii) inflation, the output gap, and past interest rates with weights taken from estimates constructed by Orphanides and Wieland (1998).

The model employed by King and Lin is similar to the representative agent model of King and Wolman (1996), which appeared in an earlier issue of this *Review*. Similar to that model, King and Lin include capital adjustment costs and monopolistically competitive firms. However, King and Lin do not assume a shopping time constraint and, thus, have no explicit assumption about the demand for money. Their model includes a monetary policymaker who sets interest rates

according to a predetermined rule. It is the nature and effect of this rule that is of interest in this paper. King and Lin show that, in their model, the rule that responds only to inflation amplifies cyclical fluctuations. On the other hand, the two rules that incorporate both inflation and the output gap reduce the magnitudes of cycles. These results are then examined in the context of the previous literature on monetarist policy prescriptions.

In his discussion of the King and Lin paper, Julio Rotemberg cautions that the current framework may have subtle differences from the monetarist ideals. In particular, the monetarists wish to achieve output stability, yet the King and Lin framework will yield output fluctuations upon any innovation to the IS curve (e.g., government purchases). Moreover, Rotemberg questions whether fluctuations in the King and Lin model arise from innovations to the real variables (i.e., technology and government purchases) or whether they are caused by shocks to monetary policy. He argues that government purchase shocks, because they affect markups, may also feed through the innovation in the policy equation. Rotemberg then considers the role of technology shocks in the King and Lin model. He posits that stabilizing output around trend is desirable only if the underlying trend can be ascertained by the central bank.

## MEASURING THE BUSINESS CYCLE

Labor productivity, typically computed as GDP per hour worked, is a commonly cited measure of the welfare of the economy. In their paper in this volume, Ellen McGrattan and Edward Prescott argue that this measure of productivity can be misleading. In particular, they contend that GDP per hour worked may not fully represent the booming productivity growth in the late 1990s and that a true measure of economic productivity for that period should be substantially higher. They contend that this differential arises from an accounting problem in which some investment, which they term intangible investment, is neglected in the measure of GDP.

McGrattan and Prescott propose an alternative measure of economic productivity that accounts for intangible investment. By constructing a rep-

resentative agent model that explicitly accounts for corporate profits, they estimate the average value of intangible capital during the 1990s and, perhaps more importantly, show that intangible capital rose substantially during the late 1990s. By taking seriously this unmeasured economic productivity, the authors characterize the late 1990s as a period of high prosperity, beyond the level held in the conventional view.

In his discussion of the McGrattan and Prescott paper, Ricardo Caballero argues that the introduction of short-run frictions (e.g., investment adjustment costs and labor mobility frictions) can bias computation of intangible capital. In particular, Caballero shows that McGrattan and Prescott's correction for intangible capital may overestimate the acceleration of intangible investment in the late 1990s. He posits an alternative accounting adjustment that characterizes intangible investment in the 1990s as potentially intertemporally substituted away from the mid-1990s to the late 1990s. In other words, the rise in intangible investment in the late 1990s simply compensates for a decline in the mid-1990s. Moreover, this adjustment may mitigate the increase in economic productivity advocated by McGrattan and Prescott.

## ORGANIZATIONAL BEHAVIOR AND THE BUSINESS CYCLE

Recoveries from postwar recessions have generally been characterized by strong employment growth at a one-quarter lag from the turn-around in GDP. In the two most recent recessions (1990 and 2001), however, the decline in employment has been more persistent (i.e., employment has taken substantially longer to recover to pre-recession levels). In their paper in this volume, Kathryn Koenders and Richard Rogerson argue that changes in organizational restructuring may have contributed to the so-called jobless recovery of the past two recessions. They construct a model in which a manager chooses between production and reorganization to reduce organizational inefficiency. They show that this reorganization occurs predominantly in the recession and recovery periods of the business cycle, a time in which the opportunity cost of reorganization is relatively low.

Next, Koenders and Rogerson consider the evidence for jobless recoveries over the past eight postwar recessions. Consistent with their model, they find that productivity drops during the recession, suggesting a period of reorganization. Then, by first detrending employment, they show that the jobless recovery may not be unique to the past two recessions. In fact, a similar persistent decline in employment followed the 1970 recession.

In his discussion of the Koenders and Rogerson paper, Fernando Alvarez extends the model to general equilibrium. His goal is to determine whether the results from the partial equilibrium model are indeed consistent with the reduced-form planning problem that would obtain in a general equilibrium framework. He analyzes the manager's response to an i.i.d. demand shock and shows that reorganization is countercyclical, a result consistent with the partial equilibrium framework outlined in the Koenders and Rogerson paper.

Finally, I would like to thank the authors and discussants for their papers and participation in the conference. In addition, I would like to express my appreciation to all the conference participants. I would also like to thank the Bank's research staff, especially Kristie Engemann, Heidi Beyer-Powe, and Beverly Benham, for their assistance in organizing the conference.

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