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**Editorial, NBER
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In 2004, as the world continues its steady emergence from the global slowdown, several questions loom over the policy world: the aggressive countercyclical U.S. fiscal policy was clearly a significant factor in softening the global recession. But if the federal government continues to pile up large deficits, what will be the long-term effect on U.S. and global interest rates? As the world looks ahead to the day when Alan Greenspan is no longer chair of the Federal Reserve Board, can economic science offer an algorithm for capturing the Fed's complex nuanced readings of the economy? And how important is monetary policy anyway? Is the world driven by Schumpeterian technology shocks more than financial factors, and as prices and wages become more flexible, is monetary policy becoming more impotent? As is well known to long-time readers of the NBER *Macroeconomics Annual*, there is an intense debate among academic macroeconomists about the role of real factors, as opposed to Keynesian demand shocks, in driving business cycles. What about emerging markets and developing countries, many of whom experienced severe macroeconomic distress during the downturn, with seemingly very little scope for countercyclical policy? Is there anything they can do now, during the upturn, to prepare for the inevitable next slowdown? This volume of the NBER *Macroeconomics Annual* features a range of papers by leading researchers aimed at providing coherent and informative answers to these important questions.

Eric M. Engen and R. Glenn Hubbard's paper, "Federal Government Debt and Interest Rates," reveals a truly remarkable emerging empirical consensus on the effects of budget deficits on interest rates. It is especially remarkable given the empirical controversy that has dogged the field for many years in the wake of Robert Barro's classic paper suggesting that the baseline effect ought to be zero. The "NBER

Macroeconomics Annual consensus” estimates appear to be that a \$110 billion increase in government debt (equal to 1% of GDP) raises real U.S. interest rates by approximately 3.5 basis points, and reduces the U.S. \$30 trillion capital stock by approximately .4%, or \$120 billion. Engen and Hubbard’s critical survey of the literature appears to support this conclusion, as does the new theoretical and empirical research they present here. Given the wide range of perspectives provided by authors and discussants, and the lack of any previous recognized consensus in the literature, the consensus produced here is notable. Thus, a back-of-the-envelope calculation suggests that if cumulative deficits had been \$2 trillion lower over the first four years of the Bush administration (where Hubbard served from 2000–2002 as chair of the Council of Economic Advisers), real interest rates would be approximately 70 basis points lower than they are today. The consensus breaks down, however, when it comes to extrapolating welfare effects. Just because the change in interest rates is modest does not mean that the cumulative loss in output—coming from having a capital stock that may remain over \$1 trillion lower for a sustained period—is necessarily small. Though the welfare analysis does not end in a clear consensus, the reader should find the debate highly illuminating, both in showing the key policy questions and the direction of future research.

It is widely recognized that the United States Federal Reserve staff’s Greenbook forecasts of growth and inflation—on which Federal Open Market Committee interest rate decisions are based—far outperform what can be achieved mechanically with any standard econometric model based on publicly available information. In an extremely ambitious exercise, Domenico Giannone, Lucrezia Reichlin, and Luca Sala attempt to find a way to match Greenbook forecasts, using reasonably straightforward econometric methods and, more important, real-time data, that is, data that was actually available at the time the Greenbook was published rather than later revised data. Interestingly, they find that for a panel of Greenbook forecasts dating from 1970–1996, the bulk of the dynamics of inflation and output, as well as Greenbook forecasts of these same variables, can be explained by two shocks, one nominal and one real. Output appears to be driven mainly by the real shock and inflation by the nominal shock. This finding, if it stands up to later challenges, including points raised by their discussants, suggests that the stochastic dimension of the U.S. economy is relatively small, in turn implying that relatively simple rules (e.g., Taylor rules) can potentially be very effective. Indeed, their findings suggest that

one may well be able to find other relatively simple rules that outperform the Taylor rule since by tracking any forecastable measure of real activity and price dynamics, the central bank can effectively track all the macroeconomic fundamentals of an economy.

Jordi Galí and Pau Rabanal's paper, "Technology Shocks and Aggregate Fluctuations: How Well Does the Real Business Cycle Model Fit Postwar U.S. Data?" extends a significant recent literature (including several early papers by Galí) that poses a challenge to the Kydland–Prescott real business cycle view of the world. The authors' answer to the rhetorical question posed in their paper is, quite simply, no. Their claim, simply put, is that technology shocks cannot explain 75% of output volatility as Prescott claimed, but rather one-third or less, with preference shocks (demand shocks) being far more important, and accounting for well over half the variance of output. To arrive at their conclusion, Galí and Rabanal rely primarily on a direct econometric estimation rather than on calibration and matching of variances, as in conventional real business cycle analyses. Galí and Rabanal argue that, even if technological shocks *were* more important than their estimates suggest, the most important variety is likely to be sector-specific rather than the kind of aggregate production shocks emphasized in the RBC model. Galí and Rabanal's conclusions, while exceptionally stark, are not totally at odds with recent perspectives in the literature. Robert Lucas's famous monetary neutrality result in 1972, while leading much of the profession to temporarily abandon Keynesian-style sticky-price and sticky-wage models for almost two decades, no longer seems as compelling in an era where businesspeople and investors hang on every word uttered by central bank officials. Nevertheless, the question for researchers now is whether the pendulum has now swung back too far in the other direction. Certainly, both the discussants in our volume think so, including Valerie Ramey and, even more so, Ellen R. McGrattan. The discussants make a spirited attempt to show that Galí and Rabanal take their rejection of RBC models too far. This is clearly the kind of fundamental methodological issue the *Macroeconomics Annual* was created to deal with, and we anticipate further discussions in later issues.

Paul Gomme, Richard Rogerson, Peter Rupert, and Randall Wright, in their paper "The Business Cycle and the Life Cycle," also attempt to cast doubt on the growing consensus that nominal wage and price rigidities must play a central role in business cycles. The essence of their claim is that real business cycles do a decent job in accounting for

employment fluctuations among 45- to 64-year-old workers, and without resorting to the extreme labor supply elasticities that have undermined the credibility of most previous RBC models of labor market cycles. Their life-cycle RBC model confronts problems only in explaining employment fluctuations among the younger group. Their paper, which is innovative both methodologically (in its treatment of the life cycle in an RBC context) and in terms of the micro data set they use, would appear to develop a new stylized fact that both sides of the debate must seek to explain. Can the answer be that, for older workers, it is easier for employers to vary other parameters of the employment contract (pensions, health care, etc.) than for younger workers, making the constraints of nominal wage contracting less severe? Or do young workers have much higher employment volatility due to union seniority rules, greater matching problems, or other issues? This paper, together with Robert Shimer's 1998 NBER *Macroeconomics Annual* paper on cohort effects and employment fluctuations, show that the representative agent model may be highly misleading when it comes to understanding business and employment cycles.

In their paper "When It Rains, It Pours: Procyclical Capital Flows and Macroeconomic Policies," Graciela L. Kaminsky, Carmen M. Reinhart, and Carlos A. Végh systematically tackle the question of whether macroeconomic policy is really more procyclical in developing countries, and why. Gavin and Perotti had written on this very same topic eight years ago for the *Macroeconomics Annual*, though their paper did not cover developing countries; Kaminsky, Reinhart, and Végh appear to be the first to do so. Also, Gavin and Perotti looked only at fiscal policy and not monetary policy. Consistent with conventional wisdom, they find that fiscal policy is procyclical in developing countries, and highly positively correlated with the capital inflow cycle. For monetary policy, policy is highly procyclical for developing countries that are emerging markets, that is, countries that have significant access to, and engagement with, international capital markets. One interesting nuance that comes out of the monetary policy analysis is that developing countries with more flexible exchange rate systems appear to have more countercyclical monetary policy than do countries with inflexible exchange rates. The authors also show that fiscal policy is less universally countercyclical in Organization for Economic Cooperation and Development (OECD) countries than is commonly supposed. In particular, countries like Belgium and Italy, with extremely high public debts exceeding over 100% of gross domestic product (GDP), find it difficult

to conduct countercyclical policy, perhaps for similar reasons as those for developing countries: they would like to run bigger deficits during recessions, but with cumulated past debts already extremely high, they would have to face a very high interest rate penalty. This point was highlighted by Roberto Rigobon in his discussion. Gita Gopinath, in her discussion, argued that the significant component of the different fiscal policy and capital flow cycles one sees in OECD countries versus emerging markets comes from the fact that output shocks are much more transitory in the former group. For emerging markets, the cycle is the trend, so that sharp responses are rational. Her analysis, of course, raises the question of whether emerging market government policy is partly responsible for the apparent unit root nature of output in those countries, as Kaminsky, Reinhart, and Végh suggest.

Finally, David K. Backus, Bryan R. Routledge, and Stanley E. Zin provide an extremely user-friendly guide to "Exotic Preferences for Macroeconomists." Over the past twenty years, problems such as the equity premium puzzle, the generation of adequate persistence in standard macroeconomic simulation models, and the inability to explain saving behavior adequately have driven macroeconomists to search for richer varieties of preferences on which to base the microeconomic foundations of their models. Under the label *exotic*, the authors include departures from expected utility, nonlinear aggregators of preferences over time, hyperbolic discounting, and other frameworks. They illustrate the models in the context of a variety of problems, including asset pricing, portfolio allocation, consumption, and saving. Backus, Routledge, and Zin's clear and elegant exposition of alternative preference structures should make their application less daunting to macroeconomists who are considering trying out these new tools.

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Mark Gertler and Kenneth Rogoff

Abstracts

“When It Rains, It Pours: Procyclical Capital Flows and Macroeconomic Policies”
GRACIELA L. KAMINSKY, CARMEN M. REINHART, AND CARLOS A. VÉGH

Based on a sample of 104 countries, we document four key stylized facts regarding the interaction among capital flows, fiscal policy, and monetary policy. First, net capital inflows are procyclical (i.e., external borrowing increases in good times and falls in bad times) in most Organization for Economic Cooperation and Development (OECD) and developing countries. The procyclicality of net capital inflows is particularly strong for middle-high-income countries (emerging markets). Second, fiscal policy is procyclical (i.e., government spending increases in good times and falls in bad times) for the majority of developing countries. Third, for emerging markets, monetary policy appears to be procyclical (i.e., policy rates are lowered in good times and raised in bad times). Fourth, in developing countries—and particularly for emerging markets—periods of capital inflows are associated with expansionary macroeconomic policies and periods of capital outflows with contractionary macroeconomic policies. In such countries, therefore, when it rains, it does indeed pour.

“Federal Government Debt and Interest Rates”
ERIC M. ENGEN AND R. GLENN HUBBARD

Does government debt affect interest rates? Despite a substantial body of empirical analysis, the answer based on the past two decades of research is mixed. While many studies suggest, at most, a single-digit rise in the interest rate when government debt increases by 1% of gross domestic product (GDP), others estimate either much larger effects or find no effect. Comparing results across studies is complicated by differences in economic models, definitions of government debt and interest rates, econometric approaches, and sources of data.

Using a standard set of data and a simple analytical framework, we reconsider and add to empirical evidence about the effect of federal government debt and interest rates. We begin by deriving analytically the effect of government debt on the real interest rate and find that an increase in government debt equivalent to 1% of GDP would be predicted to increase the real interest rate by about two to three basis points. While some existing studies estimate effects in this range, others find larger effects. In almost all cases, these larger estimates come from specifications relating federal deficits (as opposed to debt) and the level of interest rates or from specifications not controlling adequately for macroeconomic influences on interest rates that might be correlated with deficits.

We present our own empirical analysis in two parts. First, we examine a variety of conventional reduced-form specifications linking interest rates and government debt and

other variables. In particular, we provide estimates for three types of specifications to permit comparisons among different approaches taken in previous research; we estimate the effect of an expected, or projected, measure of federal government debt on a forward-looking measure of the real interest rate; an expected, or projected, measure of federal government debt on a current measure of the real interest rate; and a current measure of federal government debt on a current measure of the real interest rate. Most of the statistically significant estimated effects are consistent with the prediction of the simple analytical calculation. Second, we provide evidence using vector autoregression analysis. In general, these results are similar to those found in our reduced-form econometric analysis and are consistent with the analytical calculations.

Taken together, the bulk of our empirical results suggests that an increase in federal government debt equivalent to 1% of GDP, all else being equal, would be expected to increase the long-term real rate of interest by about three basis points (though one specification suggests a larger impact), while some estimates are not statistically significantly different from zero. By presenting a range of results with the same data, we illustrate the dependence of estimation on specification and definition differences.

"Monetary Policy in Real Time"

DOMENICO GIANNONE, LUCREZIA REICHLIN, AND LUCA SALA

We analyze the panel of the Greenbook forecasts (sample 1970–1996) and a large panel of monthly variables for the United States (sample 1970–2003) and show that the bulk of dynamics of both the variables and their forecasts is explained by two shocks. A two-factor model that exploits, in real time, information on many time series to extract a two-dimensional signal produces a degree of forecasting accuracy of the federal funds rate similar to that of the markets and, for output and inflation, similar to that of the Greenbook forecasts. This leads us to conclude that the stochastic dimension of the U.S. economy is two. We also show that dimension two is generated by a real and nominal shock, with output mainly driven by the real shock, and inflation mainly driven by the nominal shock. The implication is that, by tracking any forecastable measure of real activity and price dynamics, the central bank can track all fundamental dynamics in the economy.

"Technology Shocks and Aggregate Fluctuations: How Well Does the Real Business Cycle Model Fit Postwar U.S. Data?"

JORDI GALÍ AND PAU RABANAL

Our answer: not so well. We reach that conclusion after reviewing recent research on the role of technology as a source of economic fluctuations. The bulk of the evidence suggests a limited role for aggregate technology shocks, pointing instead to demand factors as the main force behind the strong positive comovement between output and labor input measures.

"Exotic Preferences for Macroeconomists"

DAVID K. BACKUS, BRYAN R. ROUTLEDGE, AND STANLEY E. ZIN

We provide a user's guide to exotic preferences: nonlinear time aggregators, departures from expected utility, preferences over time with known and unknown probabilities, risk-sensitive and robust control, hyperbolic discounting, and preferences over sets (temptations). We apply each to a number of classic problems in macroeconomics and finance, including consumption and saving, portfolio choice, asset pricing, and Pareto optimal allocations.

"The Business Cycle and the Life Cycle"

PAUL GOMME, RICHARD ROGERSON, PETER RUPERT, AND RANDALL WRIGHT

Our paper documents the differences in the variability of hours worked over the business cycle across several demographic groups and shows that these differences are large. We argue that understanding these differences should be useful in understanding the forces that account for aggregate fluctuations in hours worked. In particular, it is well known that standard models of the business cycle driven by technology shocks do not account for all of the variability in hours of work. This raises the following question: To what extent can the forces in this model account for the differences across demographic groups? We explore this in the context of hours fluctuations by age groups by formulating and analyzing a stochastic overlapping generations model. Our analysis shows that the model does a good job of accounting for hours fluctuations for prime-age workers but not for young or old workers. We conclude that a key issue is to understand why fluctuations for young and old workers are so much larger.

