RETHINKING STABILIZATION POLICY

A Symposium Sponsored by
The Federal Reserve Bank of Kansas City

Jackson Hole, Wyoming
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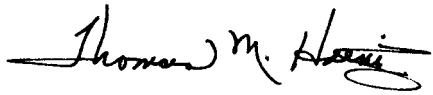
Foreword

For some time, the use of monetary and fiscal policies to smooth business cycle fluctuations has taken a back seat to longer-term objectives of restoring price stability and fiscal balance. Many policymakers and academic economists have held the view that fiscal policy had little or no short-run stabilization role and that monetary policy should give priority to maintaining price stability. More recently, however, weaker economic performance in some of the world's economies, most notably in Japan and the United States, has led to renewed interest in the use of short-run stabilization policy.

The Federal Reserve Bank of Kansas City sponsored a symposium, "Rethinking Stabilization Policy," at Jackson Hole, Wyoming, on August 29-31, 2002. The symposium brought together a distinguished group of central bank officials, academic economists, and business economists to discuss the potential scope for stabilization policy in today's new environment. Our goal for this symposium was straightforward, although hardly simple. It was to provide a forum to discuss the roles of monetary and fiscal stabilization policies, their effectiveness, and their limitations. And finally, so as not to lose sight of a consensus from earlier meetings, we analyzed these stabilization policies' compatibility with long-run price stability and fiscal sustainability, which are critical to the success of any economy—industrial or emerging.

Over the years, we believe the symposium has been valuable in illuminating key policy issues and in identifying solutions to complex problems facing policymakers around the world. Its success is due to the important contributions made by participants and by the efforts of the staff of the Federal Reserve Bank of Kansas City. We appreciate the efforts of all those who took part in the symposium, including authors, discussants, panelists, and audience members. Special thanks go to Craig Hakkio, Gordon Sellon, and other members of the Bank's Research Division who helped develop the program.



Thomas M. Hoenig
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The Contributors

Alan J. Auerbach, *Professor,*
University of California at Berkeley

Mr. Auerbach is the Robert D. Burch Professor of Economics and Law at the University of California at Berkeley. He also is director of the Burch Center for Tax Policy and Public Finance, a research associate at the National Bureau of Economic Research, and a fellow of the American Academy of Arts and Sciences and the Econometric Society. He previously served as deputy chief of staff for the U.S. Joint Committee on Taxation and was a faculty member at the University of Pennsylvania and Harvard University. Since 2000, Mr. Auerbach has been a member of the advisory committee of the U.S. Department of Commerce Bureau of Economic Analysis. He is the author of numerous research articles and has contributed frequently to journals and books.

Alan S. Blinder, *Professor,*
Princeton University

Mr. Blinder is the Gordon S. Rentschler Memorial Professor of Economics and co-director of the Center for Economic Policy Studies at Princeton University where he has been a member of the faculty since 1971. He also is vice chairman of the G-7 Group. Previously, he was a visiting fellow at the Brookings Institution. Between June 1994 and January 1996, he was vice chairman of the Board of Governors of the Federal Reserve System. Before joining the Board, he was a member of President Clinton's Council of Economic Advisers where he was in charge of macroeconomic forecasting and also worked on budget, international trade, and health care issues. Mr. Blinder is the

author or co-author of twelve books and scores of articles on such topics as fiscal policy, monetary policy, and the distribution of income. He is a governor of the American Stock Exchange, a trustee of the Russell Sage Foundation, and a member of the American Philosophical Society and the American Academy of Arts and Sciences.

Matthew B. Canzoneri, *Professor,*
Georgetown University

Mr. Canzoneri has been professor of economics at Georgetown University since 1985. From 1991 to 1994, he served as chair of the economics department. He also served on the staff of the Board of Governors of the Federal Reserve System and was a consultant at the International Monetary Fund, the Bank of England, and the Bank of Spain. Mr. Canzoneri has published extensively on monetary policy and on the coordination of policy between countries. He also has testified before the U.S. House Subcommittee on Domestic Monetary Policy on the implications of European monetary integration for U.S. economic interests.

Robert E. Cumby, *Professor,*
Georgetown University

Mr. Cumby is professor of economics in the School of Foreign Service at Georgetown University. Prior to joining the Georgetown faculty in 1994, he was on the faculty of the Stern School of Business of New York University from 1982 to 1994. Prior to that, he was an economist at the International Monetary Fund. During the 1993-1994 academic year, Mr. Cumby served as senior economist on the Council of Economic Advisers. From 1998 to 2000, he was deputy assistant secretary for economic policy at the United States Department of the Treasury. Mr. Cumby's primary research interests are in international finance, macroeconomics, and applied econometrics. He has served as an associate editor and co-editor of the *Journal of International Economics* and is a research associate of the National Bureau of Economic Research.

Behzad Diba, *Professor,*
Georgetown University

Mr. Diba is professor of economics at Georgetown University, where he has been a faculty member since 1988. Previously, he was an economist at the Federal Reserve Bank of Philadelphia and a lecturer in the finance department of The Wharton School. From 1985 to 1987, he was a visiting assistant professor of economics at Brown University and was assistant professor of economics at Tulane University from 1983 to 1985. Mr. Diba's primary research interests are in macroeconomics and international finance. He has taught courses on macroeconomics, financial markets, international finance, and applications of mathematical methods. He has published numerous articles in academic journals and professional publications.

David A. Dodge, *Governor,*
Bank of Canada

Mr. Dodge was appointed to a seven-year term as governor of the Bank of Canada in 2001. He also is chairman of the board of directors of the bank. In 1998, he was appointed deputy minister of health, where he served until being appointed to his current position. During his career in public service, Mr. Dodge has held senior positions in the Central Mortgage and Housing Corporation, the Anti-Inflation Board, and the Department of Employment and Immigration. After serving in a number of increasingly senior positions at the Department of Finance, including that of G-7 deputy, he was appointed deputy minister of finance in 1992. In that role, he served as a member of the bank's board of directors until 1997. During his academic career, he taught at Queen's University, Johns Hopkins University, the University of British Columbia, and Simon Fraser University. He also served as director of the international economics program at the Institute on Research in Public Policy.

Sebastian Edwards, *Professor,*
University of California at Los Angeles

Mr. Edwards is the Henry Ford II Professor of International Business Economics at the Anderson Graduate School of Management at the University of California at Los Angeles. From 1993 to 1996, he was chief economist for the Latin America and Caribbean region of

the World Bank. He is a research associate of the National Bureau of Economic Research, a member of the advisory board of Transnational Research Corporation, co-chairman of the Inter-American Seminar on Economics, and president of the Latin American and Caribbean Economic Association. He is Professor Extraordinario at the IAE, Austral University, Buenos Aires, Argentina, and has been a consultant to a number of multilateral institutions, including the Inter-American Development Bank, the World Bank, the International Monetary Fund, and the Organization for Economic Cooperation and Development, and several national and international corporations. Mr. Edwards has written more than 200 articles on international economics, macroeconomics, and economic development.

Martin Feldstein, *President and Chief Executive Officer, National Bureau of Economic Research*

Mr. Feldstein is the George F. Baker Professor of Economics at Harvard University, as well as president and CEO of the National Bureau of Economic Research. He is a fellow of the Econometric Society and the National Association of Business Economists; a corresponding fellow of the British Academy; and a member of the American Philosophical Society, the Trilateral Commission, the Council on Foreign Relations, and the American Academy of Arts and Sciences. The recipient of several honorary degrees, Mr. Feldstein is an economic adviser to businesses in the United States and abroad, and in 2000 he received the Corporate America's Outstanding Directors Award. From 1982 to 1984, he was chairman of President Reagan's Council of Economic Advisers. In 1977, he received the John Bates Clark Medal of the American Economic Association. Mr. Feldstein has published more than 300 scientific papers and is the author or editor of several books.

Stanley Fischer, *Vice Chairman, Citigroup*

Mr. Fischer assumed his post as vice chairman of Citigroup in 2002. Previously, he was special adviser to the managing director of the International Monetary Fund from September 2001 to January 2002, and he served as first deputy managing director of the IMF from 1994 to 2001. Prior to taking his positions at the IMF, Mr. Fischer was the

Elizabeth and James Killian Class of 1926 Professor and the head of the Department of Economics at the Massachusetts Institute of Technology. From 1988 to 1990, he served as vice president, development economics, and chief economist at the World Bank. He was assistant professor of economics at the University of Chicago until 1973, when he returned to the MIT Department of Economics as an associate professor. He became professor of economics in 1977. He has held visiting positions at the Hebrew University, Jerusalem, and at the Hoover Institution at Stanford. Mr. Fischer is the author of *Macroeconomics* (with Rudiger Dornbusch), and several other books. He has published extensively in the professional journals.

Jacob A. Frenkel, *Chairman,*
Merrill Lynch International

Mr. Frenkel joined Merrill Lynch in January 2000, after serving two terms as governor of the Bank of Israel from 1991 to 2000. He was economic counselor and director of research at the International Monetary Fund from 1987 to 1991. From 1973 to 1990, he was the David Rockefeller Professor of International Economics at the University of Chicago. He also was a member of the faculty at Tel Aviv University. Mr. Frenkel has served as chairman of the Board of Governors of the Inter-American Development Bank and vice chairman of the Board of Governors of the European Bank for Reconstruction and Development. He is a member of the G-7 Council, the Advisory Committee of the Institute for International Economics, and the Group of Thirty. He also is a fellow of the Econometric Society and a foreign honorary member of the American Academy of Arts and Sciences. In the academic year 2001-2002, Mr. Frenkel was awarded the Israel Prize for economic research by the Israel Ministry of Education. In 2002, he was awarded Italy's highest decoration, Cavaliere di Gran Croce (Knight of the Grand Cross) of the order of Merit, in recognition of his contribution to the Italian economy and binational trade and commerce between Italy and Israel.

Alan Greenspan, *Chairman,*
Board of Governors of the Federal Reserve System

Mr. Greenspan was appointed in 2000 to a fourth four-year term as chairman of the Federal Reserve Board of Governors. He also serves

as chairman of the Federal Open Market Committee. Previously, he was chairman and president of the New York economic consulting firm of Townsend-Greenspan and Co., Inc., chairman of President Ford's Council of Economic Advisers, chairman of the National Commission of Social Security Reform, and a member of President Reagan's Economic Policy Advisory Board. Mr. Greenspan was also a senior adviser to the Brookings Institution's Panel on Economic Activity, a member of *Time* magazine's board of economists, and a consultant to the Congressional Budget Office. His previous presidential appointments include the President's Foreign Intelligence Advisory Board, the Commission on Financial Structure and Regulation, the Commission on an All-Volunteer Armed Force, and the Task Force on Economic Growth. Mr. Greenspan has served as chairman of the Conference of Business Economists, president and fellow of the National Association of Business Economists, and director of the National Economists Club.

Fumio Hayashi, *Professor,*
University of Tokyo

Mr. Hayashi assumed his current position as professor of economics at the University of Tokyo in 1997. He is also a research associate of the National Bureau of Economic Research, a fellow of the Econometric Society, and co-editor of the *Journal of the Japanese and International Economies*. His current research covers such areas as private transfers, Japan's savings rate, the pure theory of money, the test of altruism, and the interbank market in Japan. He has served on the faculty at Columbia University; the University of Pennsylvania; Northwestern University; the University of Tsukuba, Japan; and Osaka University, Japan. The author of numerous publications, Mr. Hayashi was awarded the Japan Academy Prize and the Imperial Prize in 2001. In 1995, he was awarded the Nakahara Prize, an honor given to the most distinguished economist under age 45, by the Japanese Association of Economic Theory and Econometrics. In 1993, he was named co-winner of the Enjoji Jiro Economics Articles Prize in commemoration of the fiftieth anniversary of the Japan Center for Economic Research.

Otmar Issing, *Member of the Executive Board, European Central Bank*

Mr. Issing assumed his current position as member of the executive board of the European Central Bank in June 1998. Previously, he was a member of the board of the Deutsche Bundesbank. From 1988 to 1990, he was a member of the Council of Experts for the Assessment of Overall Economic Trends at the German Federal Ministry of Economics. Mr. Issing was professor of economics at the Universities of Nuremberg and Würzburg. In addition to holding several honorary degrees, he is a member of several academic and professional bodies, including the Association for Economic and Social Sciences, the American Economic Association, the List Society, the Working Party on European Integration, the Academy of Sciences and Literature, and the European Academy of Sciences and Arts. Apart from his numerous contributions to professional journals and collected volumes, Mr. Issing has written a number of books, including two leading textbooks on monetary economics.

Frederic S. Mishkin, *Professor, Columbia University*

Mr. Mishkin is the Alfred Lerner Professor of Banking and Financial Institutions at the Graduate School of Business, Columbia University. He is a research associate of the National Bureau of Economic Research and an academic consultant to and serves on the Economic Advisory Panel of the Federal Reserve Bank of New York. He has taught at the University of Chicago, Northwestern University, and Princeton University. From 1994 to 1997, he was executive vice president and director of research at the Federal Reserve Bank of New York. He has been a consultant to the Board of Governors of the Federal Reserve System, the World Bank, the Inter-American Development Bank, and the International Monetary Fund, as well as to many central banks throughout the world. He was also a member of the International Advisory Board to the Financial Supervisory Service of South Korea. Mr. Mishkin's research focuses on monetary policy and its impact on financial markets and the aggregate economy. He has served on the editorial board of the *American Economic Review*, was associate editor at the *Journal of Business and Economic Statistics* and *Journal of Applied Econometrics*, and is a member of the

editorial board at seven academic journals. In addition to writing numerous books and articles, Mr. Mishkin is the author of a best-selling textbook, *The Economics of Money, Banking and Financial Markets*.

Guillermo Ortíz, *Governor,*
Bank of Mexico

Mr. Ortíz assumed his current position as governor of the Bank of Mexico in January 1998. Previously, he served as secretary of finance and public credit in Mexico, and he served briefly as secretary of telecommunications and transportation. From 1988 to 1994, he was under secretary of finance and public credit, during which time he was also president of the Banking Privatization Committee of the Ministry of Finance. From 1984 to 1988, he was executive director at the International Monetary Fund. He has also served as manager and deputy manager in the Economic Research Bureau of the Bank of Mexico, and he was an economist in the Ministry of the Presidency of Mexico. Prior to his career in public service, Mr. Ortíz taught at universities in Mexico and the United States. He is the author of two books and numerous papers on economics and finance.

Christina D. Romer, *Professor,*
University of California at Berkeley

Ms. Romer joined the faculty of the University of California at Berkeley in 1988 and was appointed the Class of 1957 Garff B. Wilson Professor of Economics in 1997. She also served on the faculty at Princeton University. She is a research associate of the National Bureau of Economic Research, a member of the executive committee of the American Economic Association, and serves on the editorial board of the *Review of Economics and Statistics*. Ms. Romer has also served on the Research Advisory Board of the Committee for Economic Development and was a member of the Brookings Panel on Economic Activity. She has published extensively in academic journals on such topics as monetary policy, the history of business cycles, and the causes of the Great Depression. She is the recipient of numerous grants and fellowships.

David H. Romer, *Professor,*
University of California at Berkeley

Mr. Romer has been a member of the Berkeley faculty since 1988 where he is the Herman Royer Professor in Political Economy. He was also a faculty member at Princeton University and a visiting professor at Stanford University and the Massachusetts Institute of Technology. A research associate of the National Bureau of Economic Research, Mr. Romer is the author of *Advanced Macroeconomics*, which is now in its second edition and has been translated into seven languages. He also is the author of numerous articles on monetary policy, inflation, economic growth, and stock-market volatility. He is the recipient of numerous grants and fellowships and serves on the editorial advisory boards of several economic journals.

Thomas J. Sargent, *Professor,*
Stanford University and Senior Fellow, Hoover Institution

Mr. Sargent is the Donald Lucas Professor of Economics at Stanford University where he has been a member of the faculty since 1998. Since 1987, he has been senior fellow at the Hoover Institution. He also is an adviser to the Federal Reserve Banks of Minneapolis and San Francisco, and is a research associate of the National Bureau of Economic Research. Previously, he was David Rockefeller Professor of Economics at the University of Chicago, a faculty member at the University of Pennsylvania and the University of Minnesota, a member of the Brookings Panel on Economic Activity, and was a first lieutenant and captain in the U.S. Army. In 1983, Mr. Sargent was elected a fellow of the National Academy of Sciences and a fellow of the American Academy of Arts and Sciences. He has written numerous books and articles and has served as associate editor of several industry journals.

Lars E.O. Svensson, *Professor,*
Princeton University

Mr. Svensson is professor of economics at Princeton University. Prior to joining the Princeton faculty in 2001, he was professor of international economics at Stockholm University's Institute for International Economic Studies. He is a member of the prize committee for the Alfred Nobel Memorial Prize in Economic Sciences, a

member of the Royal Swedish Academy of Sciences, a member of Academia Europae, a foreign member of the Finnish Academy of Science and Letters, a foreign honorary member of the American Academy of Arts and Sciences, a fellow of the Econometric Society, a research associate of the National Bureau of Economic Research, and a research fellow of the Centre for Economic Policy Research in London. He is an adviser to the Bank of Sweden and regularly consults for international, U.S., and Swedish agencies and organizations. He has published extensively in scholarly journals on monetary economics and monetary policy, exchange rate theory and policy, and general international macroeconomics.

John B. Taylor, *Under Secretary for International Affairs, United States Department of the Treasury*

Mr. Taylor was sworn in as under secretary for International Affairs at the United States Department of the Treasury in June 2001. He serves as the principal adviser to the secretary on a wide range of international issues and leads the development of policies and guidance of the department's activities in the areas of international finance, economic, and monetary affairs; trade and investment policy; international debt; and United States' participation in international financial institutions. Mr. Taylor also helps to coordinate U.S. economic policies with finance ministries of the G-7 industrial nations. He is a Mary and Robert Raymond Professor of Economics at Stanford University, a senior fellow of the Hoover Institution, director of the monetary policy program at the Stanford Institute for Economic Policy Research, and a research associate of the National Bureau of Economic Research. He is a fellow of the American Academy of Arts and Sciences, a fellow of the Econometric Society, and was selected vice president of the American Economic Association in 2000. He previously served as a member of the Council of Economic Advisers under President George H.W. Bush and was a delegate to the Uruguay Round of trade negotiations.

Matti Vanhala, *Governor,*
Bank of Finland

Mr. Vanhala began his career at the Bank of Finland in 1970. Over the years, he has held a number of increasingly senior positions at the bank, including head of the Foreign Exchange Department, member of the board, and chairman of the board. Mr. Vanhala has been a member of the governing council of the European Central Bank since 1998 and has been governor at the International Monetary Fund for Finland since 1998. From 1977 to 1978, he served as alternate executive director of the International Monetary Fund, and from 1979 to 1980, he was executive director of the IMF. Previously, he was an economist with the Ministry of Finance. He has also been a member of the Monetary Committee of the European Community, member of the Committee of Alternates of the European Monetary Institute, alternate governor of the International Monetary Fund, chairman of the board at Helsinki Money Market Center, Ltd., vice chairman of the board at the Securities Association, chairman of the Nordic Financial Committee, and member of the supervisory board of the Finnish Guarantee Board.

Yutaka Yamaguchi, *Deputy Governor,*
Bank of Japan

Mr. Yamaguchi was named deputy governor of the Bank of Japan in 1998. He began his career at the Bank of Japan in 1964. He was named chief manager of the Policy Planning Department in 1983 and general manager of the Yokohama Branch in 1985. In 1987, he was named deputy director of the Information System Services Department and adviser for the Management and Budget Control Department. In 1989, he became the Bank of Japan's chief representative in the Americas in New York. Mr. Yamaguchi served as director of the Research and Statistics Department from 1991 to 1992, director of the Policy Planning Department from 1992 to 1996 and was executive director from 1996 to 1998.

Rethinking Stabilization Policy—An Introduction to the Bank's 2002 Economic Symposium

Gordon H. Sellon, Jr.

After a period of prominence in the 1960s, the view that fiscal and monetary stabilization policies should be used to actively smooth business cycles fell out of favor among many policymakers and academic economists over the next two decades. Indeed, in many countries, short-run economic stabilization was often overshadowed by longer run objectives of restoring price stability and fiscal balance. Over time, a new view emerged that fiscal policy had little or no short-run stabilization role, and monetary policy, while it could be used for stabilization purposes, should give priority to maintaining price stability.

Recently, however, there has been increased interest in and more active use of discretionary, counter-cyclical monetary and fiscal policies in a number of countries, most notably in Japan and the United States. At the same time, considerable controversy has surrounded the use of these policies as policymakers have been criticized both for policy actions taken in some situations and for the lack of action in other situations.

In light of these developments, the Federal Reserve Bank of Kansas City sponsored a symposium "Rethinking Stabilization Policy," at Jackson Hole, Wyoming, on August 29-31, 2002. The symposium brought together a distinguished group of central bankers, academics, and business and financial economists to reexamine the role of macroeconomic stabilization policy. The papers presented and ensuing

discussion focused on a number of key issues including: reasons for a renewed emphasis on stabilization policy, whether and when stabilization policy can be effective, limitations on the use of stabilization policy, and whether the use of stabilization policy to reduce business cycle fluctuations conflicts with the pursuit of long-run price stability and fiscal sustainability.

This introduction provides some brief background information on how views about stabilization policy have evolved over time, highlights two key themes that emerged in the symposium discussion, and summarizes some of the main points of agreement and disagreement among symposium participants.

Evolving views about stabilization policy

The term "stabilization policy" has traditionally been used to describe the use of monetary and fiscal policy to smooth business cycle fluctuations. These policies generally encompass both *discretionary* changes in fiscal and monetary policy resulting from specific policy decisions and *automatic* stabilizers that occur when taxes and spending respond to changes in economic activity. According to traditional views of stabilization policy, monetary and fiscal policy can moderate the business cycle by offsetting changes in aggregate demand by consumers and businesses that would otherwise cause inflationary pressures or weaker economic activity.

In the late 1950s and early 1960s, belief in the efficacy of stabilization policy to moderate business cycle fluctuations was widespread among policymakers and academics and resulted in a number of attempts to use fiscal policy to increase or slow the pace of economic activity. By the early 1970s, however, optimism about stabilization policy began to wane, and by the early 1980s, few policymakers or academics remained enthusiastic about its use.

There are a number of possible explanations for this turn of events. One reason is that, in practice, stabilization policy appeared to be less effective than anticipated. For example, studies of the response of consumer and business spending to discretionary tax changes in the 1960s

and 1970s reached differing conclusions about the effectiveness of these policies. Moreover, in the early 1970s, restrictive monetary policy did not appear to be successful in lowering inflation. A second reason is that the nature of the shocks hitting the economy was somewhat different in the early 1970s. Increases in food and energy prices and a slowdown in productivity growth meant that aggregate supply factors became more important determinants of economic activity. Such shocks are not as amenable to traditional stabilization policies. A third reason is that new academic research, in particular the development of the literature on "rational expectations," undercut some of the theoretical justification for the active use of stabilization policy. Moreover, by the early 1980s, the focus of fiscal policy had changed from short-run stabilization to issues of growth and economic efficiency. Finally, policymakers faced a different set of policy challenges from the mid-1970s on, as high inflation and rising government deficits and debt levels caused policymakers to give priority to restoring price stability and fiscal balance.

In light of these developments, it is perhaps surprising that there has been a renewed interest in the use of stabilization policy over the past decade, most notably in Japan and the United States. Monetary and fiscal policies have been aggressively employed in both countries in recent years to counter persistent weakness in economic activity and episodes of financial instability. The revival of stabilization policy has not been universal, however. In contrast to the United States and Japan, the countries in the European Monetary Union have been more reluctant to endorse an active use of stabilization policy as a prescription for weaker economic activity. Moreover, some other countries, such as Canada, have made increased use of discretionary monetary policy while continuing to eschew the use of discretionary fiscal policy.

Key themes

A principal objective of this year's symposium was to develop an understanding of the renewed interest in stabilization policy and the differing views as to its effectiveness. In the course of the discussion, two key themes emerged: the relationship between short-run stabilization policy and longer run objectives of price stability and fiscal

balance and the challenges for stabilization policy posed by a changing economic environment.

Consistency of stabilization policy with longer run objectives

Much of the symposium discussion revolved around the questions of whether and how short-run stabilization policy can be reconciled with maintaining price stability and fiscal balance. That is, does active use of stabilization policy potentially compromise achievement of price stability and fiscal balance? Alternatively, does maintaining price stability and fiscal balance constrain the scope for stabilization policy?

A general conclusion that emerged from the symposium papers and discussion is that while there is still an important role for short-run stabilization policy, its scope is definitely limited by the need to maintain price stability and fiscal balance over the longer term. Moreover, the role that stabilization policy can play is likely to vary from country to country depending on the nature of shocks and the economic structure, whether a country has a credible record of achieving price stability and a sustainable fiscal policy, and the institutional form of formal commitments to price stability and fiscal balance.

A good illustration of the limited scope for stabilization policy can be found in discussions about fiscal policy. Most symposium participants expressed a rather pessimistic view of the potential for discretionary fiscal policy, except in cases of prolonged economic stagnation, such as in Japan. In this situation, there are few alternative options, and the weaknesses of discretionary fiscal policy are less important. In addition, a number of participants noted that the scope for stabilization policy was likely to be limited regardless of whether a country had formal long-run inflation and fiscal constraints. Thus, a country with inflation and fiscal imbalances might find itself unable to employ expansionary fiscal and monetary policies because of the potential negative reaction of financial markets and foreign exchange markets. Moreover, a country in the process of building a credible commitment to price stability and fiscal balance might be especially constrained in its use of stabilization policy in the event of an economic downturn for fear of losing credibility in its longer run objectives.

At the same time, several participants stressed that formal commitments to price stability and fiscal balance do not eliminate a role for stabilization policy. For example, a formal inflation-targeting regime allows an easing of monetary policy in response to weaker economic activity to the extent that there is an associated lessening of inflationary pressures. Similarly, policy might respond to asset price movements to the extent they are expected to influence future inflation. Indeed, to the extent that inflation targets are viewed symmetrically, a central bank would alter policy in response to both inflationary pressures and to disinflationary or deflationary pressures.

At the same time, participants noted that the specific institutional form of long-run restrictions may constrain the use of stabilization policy. For example, a country with an inflation-targeting framework that includes a short and inflexible targeting horizon may have less leeway for conducting stabilization policy. Similarly, a country with an inflexible fiscal rule may reduce the scope for discretionary fiscal policy and automatic stabilizers and may also place a heavier burden on monetary policy to stabilize the economy.

Stabilization policy in a changing economic environment

A second theme that emerged in the course of the symposium discussion was the challenge of conducting stabilization policy in a changing economic environment. Successful use of stabilization policy requires knowledge of the structure of the economy as well as an understanding of the nature of the shocks hitting the economy.

Several presentations highlighted the implications of a changing economic structure for stabilization policy. In his opening remarks to the symposium, Chairman Greenspan emphasized the need for structural changes in the economy to be incorporated into models used by policymakers. He noted the U.S. economy had experienced much greater stability in real variables and increased volatility in financial variables in recent years, but these changes had not been adequately incorporated into models used by policymakers. As a consequence, policymakers have faced greater uncertainty in assessing the need for stabilization policy and its likely effect on the economy. In another

presentation, Otmar Issing discussed the challenges facing the European Central Bank with the creation of the European Monetary Union. According to Issing, successful implementation of monetary policy by the ECB required an enormous undertaking in the measurement, collection, and analysis of aggregate data for the new economic entity. In addition, he argued that the ECB's firm commitment to price stability was necessary to establish policy credibility to help smooth the transition to the new economic structure. A third presentation highlighting the importance of structural change was made by Bank of Mexico Governor, Guillermo Ortiz. He noted that several emerging economies, after adopting inflation targeting and flexible exchange rates, had experienced a significant reduction in the pass through of exchange rate changes to domestic prices. According to Ortiz, this structural change has increased the flexibility of central banks in these countries to conduct countercyclical monetary policy.

Stabilization policy also requires an understanding of the nature of economic shocks affecting the economy. As noted earlier, traditional stabilization policy is best-suited to dealing with large and persistent aggregate demand shocks. In contrast, aggregate supply shocks and financial market shocks pose more difficult issues for policymakers. One problem is these shocks may be difficult to identify in a timely fashion. A good example is the productivity slowdown in the U. S. and some other countries in the 1970s and early 1980s. In their paper on the history of U.S. stabilization policy, Christina and David Romer argued that failure to identify this structural shift led policymakers to overestimate potential output and underestimate inflationary pressures. Furthermore, policymakers may not have a good understanding of how these shocks are likely to affect the economy or how the economy might behave if policy responds to the shock. Bank of Canada Governor, David Dodge, noted that a central bank might be able to ignore small and temporary changes in energy and food prices but may need to respond to large and persistent changes that feed into inflationary expectations. Similarly, in discussing the appropriate policy response to asset price bubbles, a number of symposium participants emphasized the difficulties of identifying a bubble and determining an appropriate policy response.

Areas of agreement and disagreement

Over the course of the symposium, participants discussed and debated a wide range of issues relating to the use of stabilization policy. This introduction concludes with a brief summary of some of the main areas of agreement and disagreement.

Areas of agreement

As noted earlier, most participants did not believe that the passage of time had improved the prospects for discretionary fiscal policy. In additional to well-known difficulties in timing fiscal actions, participants also emphasized continuing uncertainty about the impact of fiscal actions on consumer and investment spending and interest rates. In contrast, most participants viewed automatic stabilizers more favorably because they avoid the timing problems faced by discretionary policy. However, it was noted that the role of automatic stabilizers could be reduced by restrictive fiscal balance rules, such as the deficit limits embodied in the European Union's Stability and Growth Pact. In addition, institutional features of the tax system may complicate or even reduce their usefulness as automatic stabilizers. For example, Alan Auerbach pointed out that tax law asymmetries limited the stabilization properties of the U.S. corporate income tax. In contrast to fiscal policy, most symposium participants viewed monetary policy as better suited to short-run stabilization policy, largely because monetary policy actions can be implemented and removed more quickly. The only case in which monetary policy is likely to be ineffective as a stabilization device is the situation in which the zero bound on nominal interest rates is reached as in Japan.

Areas of disagreement

Although symposium participants generally agreed that monetary policy could be used as a stabilization device, there was less consensus about how monetary policy should be used. One controversial issue was the weight that policymakers should place on short-run output stabilization and whether this weight and other elements of policy strategy should be publicly disclosed. A second issue was whether

inflation targeting or a Taylor rule represents a better framework for conducting monetary policy. A third issue was whether central banks should respond systematically to factors other than inflation and output, specifically to asset price bubbles or indicators of financial stress.

Participants also expressed differing views as to how stabilization policy should be conducted when monetary policy was limited by the zero bound on nominal interest rates. Some participants advocated greater use of fiscal policy, while others recommended relying more on exchange rate depreciation.

Finally, participants discussed how the relationship between fiscal sustainability and price stability might affect the potential for stabilization policy. There was general agreement that a responsible fiscal policy was necessary for monetary policy to pursue both longer term price stability and short-run stabilization objectives. However, participants expressed differences of opinion about the necessity for formal fiscal rules, the specific form that fiscal rules should take, and how much of a constraint specific fiscal rules placed on monetary policy. Consequently, while some countries were viewed as having overly restrictive fiscal rules, others were seen as needing stronger restrictions on fiscal policy.

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Alan Greenspan

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Endnotes

1 [illegible] *changes* [illegible]

2 [illegible] 22, 1999.

3 [illegible] $k\,(E/P) = r + b\,g$, [illegible] k [illegible] E [illegible] P [illegible] r [illegible] b [illegible] g [illegible] k [illegible] 0.6, [illegible] 1990s [illegible] r [illegible] b [illegible] g [illegible] 0.02 [illegible]

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5 [illegible] 2000, [illegible]

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$D/P \quad r = b \quad g$.

The Evolution of Economic Understanding and Postwar Stabilization Policy

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Introduction I

Over the past fifty years, there have been large changes in aggregate demand policy in the United States, and, as a consequence, substantial changes in economic performance. In the 1950s, monetary and fiscal policy were somewhat erratic, but moderate and aimed at low inflation. As a result, inflation was indeed low, and recessions were frequent but mild. In the 1960s and 1970s, both monetary policy and fiscal policy were used aggressively to stimulate and support rapid economic growth, and for much of the period unemployment was remarkably low. But inflation became a persistent problem, and periodic severe recessions were necessary to keep inflation in check. In the 1980s and 1990s, aggregate demand policy became more temperate and once again committed to low inflation. Not surprisingly, inflation has been firmly under control for almost twenty years now, and the American economy experienced two decade-long expansions at the end of the twentieth century, interrupted only by one of the mildest postwar recessions.

Given the consequences of these changes in policy, it is important to understand what has caused them. Our contention is that the fundamental source of changes in policy has been changes in policymakers' beliefs about how the economy functions. We find that while the basic

objectives of policymakers have remained the same, the model or framework they have used to understand the economy has changed dramatically. There has been, as our title suggests, an evolution of economic understanding. However, the evolution of economic understanding that has occurred is not one of linear progression from less knowledge to more. Rather, it is a more interesting evolution from a crude but fundamentally sensible model of how the economy worked in the 1950s, to more formal but faulty models in the 1960s and 1970s, and finally to a model that was both sensible and sophisticated in the 1980s and 1990s.

The evolution of economic understanding fundamentally changed what policymakers believed aggregate demand policy could accomplish. In the 1950s, policymakers had a sensible view of potential output and a model of the economy in which inflation certainly did not lower long-run unemployment and quite possibly raised it. As a result, they believed that the most aggregate demand policy could do was keep output close to potential and inflation low. In the early 1960s, policymakers adopted the view that very low unemployment was an attainable long-run goal and that there was a permanent tradeoff between inflation and unemployment. This view led them to believe that expansionary policy could permanently reduce unemployment with little cost. In the 1970s, monetary and fiscal policymakers acknowledged the fundamental insight of the Friedman-Phelps natural-rate hypothesis—in the long run, expansionary policy only produces higher inflation; it does not lower unemployment below the natural rate. But for much of the decade, estimates of the natural rate were so low that policymakers continued to believe that further expansion would improve economic performance. Also, policymakers were so pessimistic about the ability of high unemployment to reduce inflation that they largely disavowed the conventional inflation-control policies of monetary and fiscal contraction. Only at the end of the decade was the Friedman-Phelps framework coupled with a realistic view of the natural rate and faith that slack would eventually reduce inflation. As a result, policymakers in the last two decades of the twentieth century believed that policy could bring inflation down, and then keep it low by holding output close to potential.

We document this evolution of economic understanding in two ways. First, we consider narrative evidence. In particular, we use the records of the Council of Economic Advisers (CEA) and the Federal Reserve to examine the model of the economy underlying the actions of fiscal and monetary policymakers in various eras. We find strong evidence that the model used by policymakers changed dramatically over the postwar era. In particular, there were fundamental changes in the 1960s and 1970s. However, perhaps the most interesting characteristic of this evolution of beliefs is that core beliefs ended the century at much the same point that they began the postwar era.

Second, we look at the Federal Reserve's internal forecasts, the "Greenbook" forecasts. We examine both the forecast errors for inflation and the estimates of the natural rate of unemployment implicit in the forecasted behavior of inflation and unemployment. We find that the forecasts of inflation were consistently too low in the 1960s and 1970s, but improved dramatically in the 1980s and 1990s. Even more tellingly, we find that the Federal Reserve's forecasts of inflation and unemployment in the late 1960s and the 1970s are consistent with a natural-rate model only if one assumes an extremely low natural rate, while the implicit estimates of the natural rate in the Volcker and Greenspan years are much more reasonable. This suggests that the Board staff in the 1960s and 1970s (and presumably the policymakers for whom they worked) had implausible estimates of the natural rate, or, for at least part of the period, little concept of a natural rate at all.

We then consider the link between this evolution of economic understanding and policy. We look at two key measures of aggregate-demand policy—the real federal funds rate and the high-employment surplus. We present narrative evidence that movements in these policy indicators in key periods were motivated by the economic model being used by policymakers at the time. We find, for example, that policymakers in the late 1950s undertook aggressive monetary contraction because they felt that inflation was very costly. On the other hand, policymakers in the late 1960s and early 1970s adopted very expansionary policies because they were convinced that unemployment was above its sustainable level. And later in the 1970s, policymakers looked to non-standard remedies for inflation, such as wage and price

controls and incomes policies, because they were so pessimistic about the effectiveness of slack in reducing inflation. In contrast, after 1979 policymakers pursued very tight policy because they were convinced that the natural rate of unemployment was relatively high, that slack was necessary to reduce inflation, and that the costs of inflation were substantial.

We supplement this narrative analysis of the link between beliefs and policy actions with estimates of a simple monetary policy rule. We compare the predicted values of a rule estimated over the post-1979 period with what actually happened in the first three decades of the postwar era. The estimates suggest that had Paul Volcker or Alan Greenspan been confronted with the inflation of the late 1960s and 1970s, they would have set the real federal funds rate nearly 4 percentage points higher than did Arthur Burns and G. William Miller. On the other hand, William McChesney Martin set interest rates on average in the 1950s in much the same way Volcker or Greenspan would have, though with substantially larger variation. This suggests that the economic beliefs of the 1960s and 1970s resulted in policy choices very different from those that came either before or after.

The idea that policymakers' beliefs affect the conduct of policy is obviously an old one. The previous studies most directly related to ours are those by DeLong (1997) and Mayer (1998). Both authors use historical evidence to investigate the causes of the inflation of the late 1960s and the 1970s. DeLong argues that the legacy of the Great Depression imparted an expansionary bias to views of appropriate policy, and thereby made it inevitable that there would be inflation at some point. Mayer argues that the influence of academic economists' ideas on monetary policymakers' views was central to the inflation.[1] Our focus is both narrower and broader than DeLong's and Mayer's. It is narrower in that we concentrate on documenting policymakers' beliefs and their impact on policy choices, but do not attempt to address the issue of the sources of those beliefs. Our evidence supports DeLong's and Mayer's contentions that policymakers had highly optimistic views of sustainable output and unemployment in the 1960s and early 1970s, and that they were skeptical of the ability of aggregate demand policies to combat inflation for much of the 1970s. Our focus is broader than DeLong's and Mayer's in that we look at the entire

postwar period and examine the beliefs of fiscal as well as monetary policymakers. In doing so, we put the beliefs of monetary policymakers in the late 1960s and 1970s in context, and provide wider evidence of the impact of beliefs on policy choices.

Narrative evidence on the evolution of economic beliefs II

Perhaps the best way to determine what policymakers in different eras believed about how the economy worked is to examine the narrative record. Policymakers are often required (or simply desire) to explain the motivations for their policy actions. By analyzing their views about the economic conditions and relationships that warranted policy actions, it is often possible to get a sense of policymakers' understanding of the economy at the time decisions were made.

Sources A

Contemporaneous discussions of economic relationships are typically a better indicator of the framework being used at the time than interviews or memoirs written years later. Subsequent economic developments and changes in economic theory cannot help but alter recollections of the economic models that were used in the past. For this reason, we restrict our analysis to policy discussions around the times that actions were taken. The two main contemporaneous sources that we examine are the *Economic Report of the President* and the *Minutes of the Federal Open Market Committee*.

The *Economic Report of the President* (abbreviated in subsequent citations as *EROP*) is available twice a year in the early 1950s and annually thereafter. Since the executive branch plays a crucial role in setting the fiscal policy agenda, the *Economic Reports* can provide evidence of the model of the economy being used by fiscal policymakers in different eras. And indeed, we find that the *Economic Reports* are often quite detailed in their discussion of economic relationships. The key disadvantage of the *Economic Reports* is that they are designed for public distribution, and so they surely contain elements of selectivity and circumspection. But, the prospect of public scrutiny may also tend to limit the publication of economic claims that policymakers did not actually believe.

The *Minutes of the Federal Open Market Committee* (abbreviated as *Minutes* in subsequent citations) are detailed summaries of the discussions at FOMC meetings. The *Minutes* were kept through mid-1976, and were replaced with verbatim *Transcripts of Federal Open Market Committee* meetings (abbreviated as *Transcripts*). The *Transcripts* are currently available for 1981 to 1996. These two sources obviously provide insight regarding what members of the Federal Reserve's key policymaking committee believed about economic relationships in various eras. While members of the FOMC rarely frame their remarks in terms of economic models or theories, their statements often provide information about how they believe the economy works. One obvious benefit of the *Minutes* is that they were not intended for broad public dissemination. For the first part of the postwar period, the FOMC intended them to be confidential; later the Committee adopted a policy of releasing the *Minutes* with a five-year lag. Thus, members of the FOMC could be fairly frank in their comments. We also use the brief, rapidly released summaries of FOMC meetings contained in the *Record of Policy Actions of the Federal Open Market Committee* (abbreviated as *RPA*).[2] These short summaries are helpful for directing our reading of the *Minutes* and for giving a sense of what contemporary observers and participants thought were the key issues and the essence of the discussion.

B *The 1950s*

Monetary and fiscal policymakers in the 1950s held similar views about how the economy worked. One feature of the 1950s model was a realistic view of capacity and full employment. Policymakers believed that inflation began to rise at moderate rates of overall unemployment. A more important feature of the model was a definite belief that attempting to push the economy above full employment would be self-defeating. Such policies would lead to inflation, which would in turn lower long-term growth and possibly precipitate a recession. Thus, if anything, the 1950s model held that there was a *positive* long-run relationship between inflation and unemployment.[3]

The notion that there was a level of production and employment above which wages and prices started to rise was well accepted in the 1950s. For example, in 1955 one FOMC member said, "The economy

was moving nearer capacity in many respects, and as this point approached less efficient means of production would be utilized and prices would tend to rise." (*Minutes*, October 4, 1955, p. 8.) Similarly, the 1957 *Economic Report* stated: "When production, sales, and employment are high, wage and price increases in important industries create upward pressure on costs and prices generally." (*EROP*, 1957, p. 44.) In describing what happened in 1955, the 1956 *Economic Report* gave a detailed description of why prices rise at high employment. It stated:

> The increase of overtime at premium rates of pay, higher wage rates and fringe benefits, greater resort by business firms to older and less efficient units of equipment in order to meet the pressing requirements of their customers, and the growing difficulties in finding suitable workers, all served to increase unit labor costs. Their advance ... exerted persistent and increasing pressure on both profit margins and prices. (*EROP*, 1956, p. 23.)

The level of unemployment at which 1950s policymakers thought these effects would result was not particularly low. In August 1955, one member of the FOMC indicated that at the current rate of unemployment rate of 4 percent:[4]

> We can all agree that the economic situation is ebullient and presses on the comfortable capacity of the economy. It can thus be concluded that the apparent present trends in the economy simply extend themselves to over-reach comfortable capacity and that, accordingly, an inflation is inevitable. (*Minutes*, August 2, 1955, p. 23.)

The 1956 *Economic Report* suggested a similar view when it discussed "the attainment of practically full employment in the Nation at large" during the previous year. (*EROP*, 1956, p. v.) "Practically full employment" was the term used in the 1950s *Economic Reports* for the lowest sustainable rate of unemployment, and in 1955 the average unemployment rate was 4.4 percent. In 1959, the chief economist of the Board of Governors said that "[t]he economy is approaching the limits of resource utilization" when the current unemployment rate was

5 percent. (*Minutes*, June 16, 1959, p. 6.) The 1958 *Economic Report*, while not giving a specific number, expressed a particularly cogent view of full employment. It discussed the likely scenario "[w]hen economic resources are close to being fully used, even though there may be slack in some sectors of the economy." (*EROP*, 1958, p. 3.)

More interesting than the realistic notion of capacity are the beliefs policymakers in the 1950s held about what would happen if aggregate demand policy tried to push unemployment below its full employment level. The most optimistic belief was that the effort would have no impact on unemployment and would only cause inflation to increase. The 1958 *Economic Report*, after giving the sensible definition of full employment above, continued: "Efforts to accelerate growth under these conditions may succeed only in generating inflationary pressures." (*EROP*, 1958, p. 4.)

A much more common view was that the inflation that would result from overexpansion would eventually raise unemployment, not lower it. Federal Reserve Chairman William McChesney Martin said in 1958:

> If inflation should begin to develop again, it might be that the number of unemployed would be temporarily reduced to four million [from the current level of five million], or some figure in that range, but there would be a larger amount of unemployment for a long time to come. If inflation should really get a head of steam up, unemployment might rise to ten million or fifteen million. (*Minutes*, August 19, 1958, p. 57.)

The chief economist of the Board of Governors was even more direct in seeing a link between over-expansion and downturn. He said:

> Increasing demands after mid-1955 resulted in relatively small increases in output but marked advances in prices .... Distortions such as undue inventory accumulation, too hasty capital expansion in some areas, too rapid a rise in debt burden, and consumer resistance to price increases undermined the prevailing high activity and led to the recession of 1957-58. (*Minutes*, September 22, 1959, p. 8.)

Fiscal policymakers expressed a similar view. The 1956 *Economic Report* stated:

> As a Nation, we are committed to the principle that our economy of free and competitive enterprise must continue to grow. But we do not wish to realize this objective at the price of inflation, which not only creates inequities, but is likely, sooner or later, to be followed by depression. (*EROP*, 1956, p. 28.)

The 1958 *Economic Report* stated: "we must be continuously on guard against resort to measures that might provide a spurt in activity at the cost of impairing the long-run health of the economy." (*EROP*, 1958, p. 3.) The 1959 *Economic Report* provided a discussion of the mechanisms by which inflation hurt economic growth. It stated:

> A persistent upward movement of prices would ... narrow markets at home for important groups of goods, lower our capability to compete in the world's markets, and by requiring restrictive fiscal and monetary policies, lessen our chances of fully realizing our potential for economic growth. (*EROP*, 1959, p. 48.)

In addition to this firm belief that overexpansion would have detrimental effects, monetary policymakers in the 1950s also had a relatively modern view of the process of disinflation. There was much discussion of inflationary expectations and the persistence of inflation, especially late in the decade. For example, in February 1959, one member of the FOMC spoke of the "rampant inflationary psychology." (*Minutes*, February 10, 1959, p. 22.) Also, there was a sense that tight policy and slack were necessary to reduce inflation. In 1958, Chairman Martin noted that "[h]e did not know how to deal with the specifics of the problem [of inflationary psychology] except by moving in the right direction within the System." (*Minutes*, August 19, 1958, p. 59.) In 1959, Martin was much more direct about the costs of disinflation. He said that "[h]e hoped that inflation would not get out of hand to such an extent that a very serious price would have to be paid for its correction." (*Minutes*, January 6, 1959, p. 37.)

The 1960s *C*

There was a marked shift in policymakers' view of the economy in the 1960s. Policymakers in the 1960s adopted a highly optimistic view of the levels of output and employment that could be reached without triggering inflation. Also, in stark contrast to policymakers in the 1950s, policymakers in the 1960s came to believe in a long-run trade-off between unemployment and inflation.

The shift was clearest and sharpest among fiscal policymakers. The 1962 *Economic Report*, the first under the Kennedy Administration, identified 4 percent as a "reasonable and prudent" unemployment rate that aggregate demand policy should aim for given the structure of the economy. (*EROP*, 1962, pp. 46, 48.) This assessment did not change noticeably throughout the 1960s.[5] The 1962 *Economic Report* estimated that potential output was growing at an annual rate of 3.5 percent. (*EROP*, 1962, p. 113.) This figure was gradually raised, and by 1967 the estimate was 4 percent. (*EROP*, 1967, p. 44.)

Fiscal policymakers in the 1960s were sufficiently confident of their estimates of the sustainable rate of unemployment that they consistently attributed inflation that arose before unemployment reached this level to sources other than excess demand. In discussing the inflation of 1955 to 1957—a period when unemployment averaged 4.3 percent—the 1962 *Economic Report* argued that "[a] simple explanation running in terms of over-all excess demand is not satisfactory. If aggregate excess demand prevailed at all, it existed only briefly toward the end of 1955." (*EROP*, 1962, p. 171.) The *Report* went on to blame the inflation on the concentration of the boom in durables and on union and corporate power. (*EROP*, 1962, pp. 171-172, 175.) The inflation of 1965 (when unemployment was 4.5 percent) was attributed to idiosyncratic changes in food and commodity prices and was not expected to continue. (*EROP*, 1966, pp. 65-67, 87-88.) The inflation of 1966 (when unemployment was 3.8 percent) was ascribed to the economy approaching potential too fast, not to an excessive level of economic activity, and to idiosyncratic factors, and was again not expected to continue. (*EROP*, 1967, pp. 72-73, 97-98.) And in discussing the further rise in inflation in the second

half of 1967 (when unemployment was 3.9 percent), the *Economic Report* stated:

> Demand was not yet pressing on productive capacity—over-all or in most major sectors. The period of slow expansion [from mid-1966 to mid-1967] had created enough slack so that production could respond to increasing demand without significant strain on productive resources. (*EROP*, 1968, p. 105.)

Fiscal policymakers in the 1960s also came to believe that there was a long-run tradeoff between inflation and unemployment. In the early part of the decade, they felt that there was a large margin of slack in the economy, and so discussed the long run relatively little. Nevertheless, there were certainly hints that they perceived a long-run tradeoff. (For example, *EROP*, 1962, pp. 46-47; 1963, p. 84; 1964, p. 117.) Later in the decade, when they believed the economy was close to potential, policymakers expressed this view clearly. The 1967 *Economic Report* stated that "the economy is now in the range of trade-off between falling unemployment and rising prices," and that one must therefore ask: "how should we rank the advantages of fuller employment against the disadvantages of rising prices?" (*EROP*, 1967, p. 99.) The 1969 *Report* began its discussion of inflation by presenting a scatter plot of inflation and unemployment over the years 1954 to 1968 and noting that "[i]t reveals a fairly close association of more rapid price increases with lower rates of unemployment." (*EROP*, 1969, p. 94.) It also said that "the choice of the ideal level of utilization is a social judgment that requires a balancing of national goals of high employment and reasonable price stability." (*EROP*, 1969, p. 62.)[6]

The views of monetary policymakers in the 1960s are somewhat harder to discern. It is clear that monetary policymakers, like the Administration, were very optimistic about the sustainable levels of output and employment. As described above, in the late 1950s normal, sustainable rates of unemployment were thought to be 5 percent or even higher. But in the early 1960s, with unemployment between 5 and 6 percent, there was general consensus that there was a wide margin of unutilized resources and that inflation was not a concern. In

January 1963, for example, the Committee perceived a "continuing underutilization of resources." (*RPA*, January 29, 1963, p. 63.) In May 1964, the Committee described the nominal GNP growth of 7.5 percent over the previous four quarters as "a moderate, sustainable pace." (*RPA*, May 5, 1964, p. 84.) And in 1968, when industrial production had been growing at an average annual rate of 7 percent over the past seven years, the Committee saw "relative slack" in capacity utilization, though not in the labor market. (*Minutes*, February 6, 1968, p. 36.)

The narrative record does not provide explicit statements of a belief in a long-run tradeoff on the part of monetary policymakers in the 1960s. Indeed, in 1966 Chairman Martin continued to take the opposite position. (*Minutes*, January 11, 1966, p. 82.) And monetary policymakers were quicker than their fiscal counterparts to attribute inflation to high levels of economic activity: beginning in late 1966, they often took the view that the economy was at or near capacity, and that this was leading to inflation. In December 1967, for example, they felt that "[i]t now appeared highly probable ... that upward pressures on prices would persist as the effects of higher costs were reinforced by those of rapidly expanding demands." (*RPA*, December 12, 1967, p. 199.)

Crucially, however, monetary policymakers did not view the high levels of activity as unsustainable. The policy discussions and directives for the first half of 1968 provide considerable insight regarding their thinking. At the beginning of the year, unemployment was 3.7 percent, and real GNP growth was expected to increase from its estimated pace of 4.4 percent per year in the fourth quarter of 1967. (*RPA*, February 6, 1968, p. 117.) Yet, policymakers' central concern was merely that inflation might continue, not that it would rise. A typical statement was that "prospects are for further rapid growth and persisting inflationary pressures" (for example, *RPA*, January 9, 1968, p. 115), or that "unit labor costs would remain under upward pressure." (*RPA*, March 5, 1968, p. 123.) Indeed, although monetary policymakers were less optimistic about inflation than the Council of Economic Advisers, they nonetheless expected inflation to fall. (*Minutes*, February 6, 1968, p. 45.) In June, Congress enacted a tax surcharge, which the FOMC expected to slow real growth but not to

lead to any significant decline in capacity utilization or rise in unemployment. Yet, the Committee believed the surcharge would lead "to a gradual lessening of inflationary pressures." (*RPA*, May 28, 1968, p. 154.) It expected inflation to fall (*RPA*, June 18, 1968, p. 162; July 16, 1968, p. 167), and it replaced the reference to "persisting inflationary pressures" in the policy directive with milder language about price increases. (*RPA*, July 16, 1968, p. 173.) In short, although monetary policymakers did not spell out their worldview explicitly, it appears to have been consistent with that of fiscal policymakers.

The 1970s D

The narrative record suggests that there was another sea change in economic beliefs early in the 1970s. Both fiscal and monetary policymakers adopted the Friedman-Phelps natural-rate framework remarkably rapidly. Throughout the decade, policymakers believed that the change in inflation depended on the deviation of the unemployment rate from its normal level. However, the 1970s saw considerable swings in both the estimates of the natural rate and in views about the downward sensitivity of inflation to economic slack.

Early 1970s. The first evidence that policymakers adopted the natural-rate framework came in their view of what it would take to reduce inflation. The 1970 *Economic Report* (the first under the Nixon Administration) stated that "inflations have seldom ended without a temporary rise in unemployment" (*EROP*, 1970, p. 21), and that a policy of aggregate demand restraint

> should ultimately produce high employment with much less inflation than we have recently experienced. During the transition, we may find both unemployment and inflation to be higher than would have been desirable if the inflation had not been allowed to persist so long. This is the price we must pay for having long pursued inflationary policies. Once inflation has been set in motion, there is no way of correcting it without some costs. (*EROP*, 1970, p. 22.)

The *Report* went on to say that "a GNP gap places a downward pressure

on the rate of inflation" (*EROP*, 1970, p. 58), and that policymakers expected that at the end of the year,

> output will be below its potential and the rate of inflation, while declining, will probably still be too high. The transition to an economy growing along the path of potential output at full employment with reasonable price stability will not have been completed. (*EROP*, 1970, p. 65.)

This view that the change in inflation depends on the deviation of unemployment from the natural rate is the centerpiece of standard formulations of the natural-rate hypothesis. The obvious corollary to the view that inflation falls when unemployment is above its normal level is that inflation rises when unemployment is below its normal level. This view presents a striking contrast to that of just one *Economic Report* before. The 1969 *Report* had stated that the *level* of inflation depended on the unemployment rate and that a society could choose from the feasible combinations of inflation and unemployment. The 1970 *Economic Report* suggested instead that there was a long-run vertical Phillips curve and that society could have any inflation rate it wanted at the natural rate of unemployment.

The acceptance of the natural rate framework at the Federal Reserve appeared principally in the form of a new emphasis on expectations. Expected inflation plays a crucial role in the natural-rate framework: inflation differs from its expected value when employment is different from the natural rate. And, expected inflation, which had been virtually absent from policymakers' discussions during most of the 1960s, suddenly began to play a key role in policymaking at the end of 1968. In December, the FOMC felt that "[e]xpectations of continued inflationary pressures appeared to be widespread," and the Committee referred to "the persistence of inflationary pressures and expectations" and "the prevailing inflationary psychology." (*RPA*, December 17, 1968, pp. 219, 224; see also *Minutes*, December 17, 1968, passim.) This suggests that monetary policymakers no longer believed that inflation simply depended on the unemployment rate, but also on past behavior and other determinants of expectations.

While policymakers quickly adopted the natural-rate framework, their views about the level of the natural rate and the sensitivity of the change in inflation to deviations from the natural rate were initially very optimistic. The 1970 *Economic Report* estimated the natural rate of unemployment at 3.8 percent and the growth rate of potential output at 4.3 percent per year. (*EROP*, 1970, pp. 79, 81.) And, it projected that an average shortfall of output from potential of about 2 percent over a three-year period would bring inflation down by about 3 percentage points. (*EROP*, 1970, pp. 66, 84-85.) Monetary policymakers were similarly optimistic. For example, in early 1970, with the unemployment rate around 4 percent and only a very mild recession expected, policymakers expected inflation to begin falling by the end of the year. (*RPA*, February 10, 1970, p. 99; March 10, 1970, p. 106.) In March 1971, the FOMC was interested in what type of stimulus would be needed to bring unemployment down to 4 percent by the end of 1972, and the staff reported that this could be done with a considerable fall in inflation. (*Minutes*, March 9, 1971, pp. 33-35.)

When inflation failed to fall as quickly as policymakers had hoped, however, they responded by becoming dramatically more pessimistic about the downward responsiveness of inflation to slack. The 1972 *Report* raised the possibility of

> [a] tendency to an unsatisfactorily high rate of inflation which persists over a long period of time and is impervious to variations in the rate of unemployment, so that the tendency cannot be eradicated by any feasible acceptance of unemployment. (*EROP*, 1972, p. 113.)

At the Federal Reserve, Chairman Arthur Burns was sympathetic to this new, pessimistic view of inflation from the beginning of his term in February 1970. The *Minutes* of the June 8, 1971, meeting report that in Burns's judgment,

> the old rules were no longer working. ... Years ago, when business activity turned down, prices would respond—with some lag—not by rising more slowly but by declining; and wages would follow. That kind of response had become progressively

> weaker after World War I, and of late one found that at a time when unemployment was increasing prices continued to advance at an undiminished pace and wages rose at an increasing pace. ... Time and again economists had hoped that the old business cycle would reassert itself in the sphere of prices and wages .... However, he had now come to the conclusion that the response had changed. (*Minutes*, June 8, 1971, p. 50.)

Burns went on to suggest that the rise of public sector unions, the impact of that rise on the labor movement in general, welfare, and other factors might be responsible for the change. (*Minutes*, June 8, 1971, p. 51.) He concluded that:

> monetary policy could do very little to arrest an inflation that rested so heavily on wage-cost pressures. In his judgment a much higher rate of unemployment produced by monetary policy would not moderate such pressures appreciably. (*Minutes*, June 8, 1971, p. 51.)

Such views were common at the Federal Reserve in this period. (For example, *Minutes*, January 12, 1971, p. 25; May 11, 1971, pp. 28-29; June 29, 1971, pp. 34-35.)

Mid-1970s. In the middle part of the 1970s, policymakers gradually reverted to more conventional views of the dynamics of inflation. The 1974 *Economic Report*, for example, although warning that the course of reducing inflation would be "long and difficult," painted a standard picture of the impact of aggregate demand restraint on inflation. (*EROP*, 1974, pp. 21-23, 27-28.) Similarly, the 1975 *Economic Report* said that "a shift to policies of restraint first exerts an adverse influence on output and the desired price deceleration effect materializes only with a lag." (*EROP*, 1975, pp. 128-129.) The 1977 *Economic Report* stated: "Nor can one deny that a slack economy with low utilization of capital and labor resources is usually a moderating influence on prices and wages." (*EROP*, 1977, p. 57.) The *Report* did caution that "because of an economy-wide persistence in price and wage inflation, these excess demand and excess supply effects sometimes seem to work very slowly, with their influence spread over a long

period." (*EROP*, 1977, p. 57.) But these persistence effects were thought to be symmetric. On the monetary side, policymakers concluded at the same time that the appropriate antidote to inflation was conventional monetary tightening.[7] And in March 1977, one member of the FOMC "noted that the substantial margin of unused capacity and the high rate of unemployment at this time should tend to limit the rate of increase in wage rates and in the broad measures of prices." (*RPA*, March 15, 1977, pp. 198-199.)

Similarly, policymakers' views concerning sustainable output and unemployment became steadily less optimistic over the early and mid-1970s. In 1971, fiscal policymakers suggested that the natural rate of unemployment might be 4 percent or somewhat higher. (*EROP*, 1971, pp. 76-78.) In 1972, they calculated that demographic changes might have added ½ percentage point to the natural rate relative to the 1950s. (*EROP*, 1972, pp. 113-116.) And in 1974, they argued that the economy might have been at potential in 1973, when unemployment averaged 4.9 percent, and that the growth rate of potential output might be below 4 percent per year. (*EROP*, 1974, pp. 58-65.) The views of monetary policymakers underwent a similar evolution. For example, the *Minutes* for June 1972 report:

> As to the method of measuring potential output, [Chairman Burns] noted that the calculations the staff had presented ... were based on the assumption of a 3.8 per cent rate of unemployment. It was desirable for the Committee to have such calculations, since they were widely employed elsewhere. At the same time, it would be useful also to have supplementary calculations based on a more realistic unemployment rate—perhaps 4.5 per cent. (*Minutes*, June 19-20, 1972, pp. 80-81.)

This trend toward a higher estimate of the natural rate reached a peak in early 1977. The CEA devoted a substantial portion of the final Ford Administration *Economic Report* to discussing the natural-rate framework and providing new lower estimates of potential output and higher estimates of "full-employment" unemployment. The definition of the full-employment rate of unemployment given in the 1977 *Report* is textbook-perfect—"the lowest rate of unemployment attain-

able, under the existing institutional structure, that will not result in accelerated inflation." (*EROP*, 1977, p. 48.) The *Report* went on to say that the CEA of the 1960s selected 4 percent for this measure, but that the 1977 CEA thought it was substantially higher. The CEA estimated that accounting for straightforward demographic changes raised this number to 4.9 percent. And, if other changes more difficult to quantify were taken into account, "it is likely that they have raised the full-employment unemployment rate even higher than the current estimate, perhaps closer to 5½ percent." (*EROP*, 1977, p. 51.)

The records of the Federal Reserve make it clear that their estimate of the natural rate had also risen substantially by 1977. In July:

> concern was expressed that the lag in growth of productive facilities so far in this business expansion might result in the development of pressure against available capacity while the unemployment rate was still relatively high. (*RPA*, July 19, 1977, p. 249.)

In September, it was suggested that the estimated unemployment rate of 7.1 percent "was still significantly above the level that might be regarded as 'full employment,' even if that level were judged for structural reasons to be considerably higher than in the past." (*RPA*, September 20, 1977, p. 276.) And then in December, when the most recent unemployment rate was estimated to be 6.9 percent:

> one member questioned whether the over-all rate might not be about as low as could be expected, given the rapid growth in the labor force. He suggested that the high rate of unemployment was a structural problem that could not be solved with monetary policy instruments. (*RPA*, December 19-20, 1977, p. 319.)

In the mid-1970s, supply shocks were also incorporated into policymakers' model of the economy. The 1975 *Economic Report*, for example, had a cogent discussion of how an oil price rise could both depress output and lead to inflation. (*EROP*, 1975, pp. 73-75, 190-192.) Similarly, from the very start of the 1973 oil embargo, the FOMC believed that "[a] further weakening in activity and an appreciable rise

in prices are in prospect because of the curtailment in oil supplies." (*RPA*, December 17-18, 1973, p. 220.) However, throughout the mid-1970s, supply shocks were not given a central role. For example, the 1975 *Economic Report* argued that supply shocks were not the key source of inflation in the early and mid-1970s. It stated:

> Supply reductions also contributed to imbalances between aggregate supply and demand, particularly in the past few years: crop failures and reduced oil supplies are the most notable examples. Without neglecting specific features, the U.S. inflation since the mid-1960's can nevertheless be analyzed in terms of a general conception of the inflationary process that emphasizes the role of monetary and fiscal policies. (*EROP*, 1975, p. 128.)

Likewise, while the FOMC mentioned food and energy prices periodically, such shocks were typically mentioned as an aside rather than as a key determinant of macroeconomic conditions. (See, for example, *RPA*, August 20, 1974, pp. 193-194; January 17-18, 1977, p. 167.)

Late 1970s. In the late 1970s, the trends toward a more realistic model were reversed somewhat. First, estimates of the natural rate were reduced, at least among some policymakers. This change was most noticeable in President Carter's signed section of the 1978 *Economic Report*. It stated that: "Over the next several years I believe we can increase our real output by 4½ to 5 percent per year, and reduce unemployment by about one-half of a percentage point each year." (*EROP*, 1978, p. 5.) Given that the unemployment rate at the time was 7.1 percent, the belief that such sustained reductions in unemployment were possible suggests either that the President's estimate of the natural rate was quite low, or that he did not accept the natural rate framework at all.

The CEA's analysis in the 1978 and 1979 *Economic Report*s shows much less of a change. The Council's section of the 1978 *Economic Report* certainly endorsed the Friedman-Phelps framework and devoted an entire chapter to discussing the natural rate and its implications for policy. Of the 1977 revision of potential GNP and high-employment

unemployment, the 1978 *Report* stated: "The present Council has reviewed the new estimates and concluded that they are a major improvement." (*EROP*, 1978, p. 83.) It is true that while the 1977 *Report* emphasized that the new estimates were still surely too optimistic, the 1978 *Report* treated 4.8 percent as a plausible estimate of the natural rate. (*EROP*, 1978, p. 84.) But the 1978 CEA did discuss the possibility that "the overall unemployment rate at which inflation is likely to accelerate has risen by 1½ percentage points rather than 1 percentage point over the past 20 years." (*EROP*, 1978, p. 171.) And, the 1979 *Report* concluded that "under current labor market conditions the danger of accelerating wages begins to mount as the rate of unemployment falls significantly below 6 percent." (*EROP*, 1979, p. 65.)

The prevailing estimate of the natural rate appears to have fallen at the Federal Reserve during 1978 and 1979. G. William Miller was appointed Federal Reserve chairman in March 1978. Over the next year and a half, there were numerous debates within the FOMC about the level of the natural rate. For example in April 1978, with the unemployment rate slightly above 6 percent, two members suggested that:

> the unemployment rate was approaching the level where unused labor resources of many kinds might be limited. A third member expressed disagreement with that view of the unemployment situation [and] ... suggested that it was not widely held. (*RPA*, April 18, 1978, p. 162.)

This optimistic view of the natural rate was reiterated by another member, who felt that "slack still existed in the utilization of industrial capacity and of the labor force." (*RPA*, April 18, 1978, p. 162.) There was a similar discussion in March 1979. With unemployment slightly below 6 percent, some members expected a "significant easing from the rapid rise [of prices] of recent months" because "recent increases in prices represented temporary [supply] factors." (*RPA*, March 20, 1979, p. 139.) That this more optimistic view of the natural rate carried the day is evidenced by the fact that at this meeting four members dissented because they felt that there were "strong inflationary forces reinforced by pressure on capacity in some industries." (*RPA*, March 20, 1979, p. 142.)

Policymakers in the late 1970s also put more emphasis on supply shocks than they had in the middle years of the decade. For example, in May 1978, several members of the FOMC "expressed the view that the rise [in inflation] was likely to be more rapid than projected by the staff" because "the supply-related increase in prices of foods over the remainder of 1978 would exceed the staff projection." (*RPA*, May 16, 1978, pp. 175-176.) Similarly, in early 1979, the rise in oil prices and the resulting general inflation led many members of the FOMC to feel that the probability of a recession had increased. (*RPA*, March 20, 1978, p.138.) At the CEA, supply shocks were given a substantial role in explaining recent macroeconomic developments. The 1978 *Economic Report*, for example, said that fluctuations in consumer prices in the period 1975 to 1977 "were principally due to erratic variations in food and energy prices." (*EROP*, 1978, p. 142.) Perhaps more importantly, whereas the 1975 *Economic Report* emphasized the role of excess demand in causing the inflation of the early and mid-1970s, both the 1978 and 1979 *Economic Report*s took the position that "the dominant influence was the rise in fuel and food prices." (*EROP*, 1978, p. 141; see also, *EROP*, 1979, pp. 38, 55.)

An even more important change in beliefs in the late 1970s was the resurgence of Arthur Burns's view that slack had little impact on inflation. The President's section of the 1978 *Economic Report* stated:

> Recent experience has demonstrated that the inflation we have inherited from the past cannot be cured by policies that slow growth and keep unemployment high. ... The human tragedy and waste of resources associated with policies of slow growth are intolerable, and the impact of such policies on the current inflation is very small. ... Economic stagnation is not the answer to inflation. (*EROP*, 1978, p. 17.)

In reviewing the inflation experience of the previous ten years, the *Report* said:

> The inflation would not have persisted during the 1970 recession if wages and prices were very sensitive to economic slack. On the basis of the experience of that period, and the

> similar one more recently, estimates of the size and duration of the demand restraint and output loss that it takes to slow inflation have been revised sharply upward. (*EROP*, 1978, p. 140.)

There was an extended discussion that "some longer-term decrease in downward flexibility, especially of wages, seems evident." (*EROP*, 1978, p. 145.) The Council concluded that "an attempt to purge inflation from the system by sharp restrictions on demand would require a long period of very high unemployment and low utilization of capacity." (*EROP*, 1978, p. 150.) Similarly, the 1979 *Report* stated: "The stubborn resistance of inflation to the traditional remedies reflects the fact that the rate of wage and price increase is relatively inflexible in the face of slack demand," and that "[r]eductions in output and major increases in unemployment are no longer as effective in slowing the rate of wage and price increase." (*EROP*, 1979, p. 78.)

The FOMC, under Chairman Miller, also showed some of the increased pessimism about the ability of tight policy to reduce inflation evident in the early Carter Administration *Economic Report*s. For example, in August 1978:

> One negative element in this pattern, which seriously concerned all members of the Committee, was the unexpectedly high recent rate of inflation in prices and wages and the related possibility that an appreciable slowing of inflation would prove more difficult to achieve than previously had been anticipated. (*RPA*, August 15, 1978, p. 210.)

As late as May 1979 it was noted that:

> There was evidence that over time the rate of inflation had been less variable in the United States than in other industrial countries, suggesting that it would be more difficult to reduce the rate here. According to a number of economic projections, moreover, deceleration of inflation would be a slow and lengthy process. (RPA, May 22, 1979, pp. 161-162.)

The 1980s and 1990s E

The Modern Consensus. The end of the 1970s and the beginning of the 1980s saw the emergence of an important new consensus among policymakers about the functioning of the economy and the effects of policy. The natural-rate hypothesis, with its rejection of a long-run tradeoff between unemployment and inflation, provided the guiding framework of the consensus. The first *Economic Report* of the Reagan Administration stated: "The average rate of unemployment and the average rate of inflation are best regarded as unrelated in the long term." (*EROP*, 1982, p. 52.) Or, as the 1983 *Economic Report* put it:

> In the 1960s, many economists believed that the Federal Government could keep unemployment down permanently by accepting a higher rate of inflation. ... During the 1970s these views proved to be incorrect. (*EROP*, 1983, p. 18.)

The *Report* went on to say:

> Historical experience suggests that the change in the rate of inflation depends both on the rate at which economic activity is expanding and on the level of economic slack. If the slack in the economy declines too rapidly, or capacity utilization is held at too high a level, inflation will tend to increase. The lower limit on unemployment below which inflation will tend to increase is referred to as the *inflation threshold* unemployment rate. (*EROP*, 1983, p. 37, emphasis in the original.)

The new consensus of beliefs had four critical elements beyond the central place of the natural-rate hypothesis. First, policymakers in the early 1980s had substantially higher estimates of sustainable unemployment than many of their predecessors over the previous two decades. The 1982 *Economic Report* argued that capacity constraints had caused inflation to rise in 1978 to 1979, a period when unemployment averaged 6.0 percent. (*EROP*, 1982, p. 51.) The next year's *Report* stated:

> While it is not easy to pinpoint the inflation threshold unemployment rate precisely, it probably lies between 6 and 7 percent.

> Econometric studies of historical data suggest that when unemployment is close to 6 percent, the rate of inflation tends to accelerate. (*EROP*, 1983, p. 37.)

Second, policymakers returned to the view that aggregate demand policies did provide a means of reducing inflation. The early *Economic Report*s of the Reagan Administration contained standard discussions of how in the short run, restrictive aggregate demand policies would push output below its sustainable level and unemployment above its natural rate, and bring about reductions in inflation. The 1982 *Report* stated, "policies designed to reduce inflation significantly will temporarily increase unemployment and reduce output growth." (*EROP*, 1982, p. 58; see also pp. 24-25, 47.) Similarly, the 1983 *Report* stated,

> the historical experience of the United States and other countries suggests that disinflation is generally associated with lost output and increased unemployment. During periods of disinflation and recession, the measures available to reduce the pain of the transition from accelerating inflation to price stability are limited. Greater fiscal or monetary stimulus might increase employment, but only at the risk of igniting inflation. (*EROP*, 1983, p. 37.)

Monetary policymakers shared these views that economic slack would tend to bring about reductions in inflation, but that unemployment above the range of 6 to 7 percent was needed to do so. For example, in March 1980, when the unemployment rate was in the vicinity of 6 percent, FOMC members felt that "the underlying inflation rate would not be reduced very much in the short run by the rather moderate contraction in activity generally being projected." (*RPA*, March 18, 1980, p. 108.) In July 1981, when unemployment was slightly over 7 percent,

> [w]hile expecting the rate of inflation to remain high by historical standards, nearly all members anticipated some improvement. A number ... felt that significant and sustained progress in reducing the underlying rate of inflation would take time and might not be consistent with an early and strong rebound in economic activity. (*RPA*, July 6-7, 1981, p. 116.)

And in October 1982, with unemployment in the vicinity of 10 percent, the Committee felt that:

> further moderation in labor cost and price pressures and also in inflationary expectations was a reasonable anticipation, given an environment of moderate expansion in output and employment, relatively low levels of resource utilization, and prospects for improvements in productivity. (*RPA*, October 5, 1982, p. 124.)

Indeed, at virtually every meeting in this period, the staff and members expected gradual declines in underlying inflation as the result of economic slack.

The third important element of the new consensus was agreement that means other aggregate demand policies were not viable cures for inflation. Much of the evidence of this shift comes from what is not in the policy record: After the presentation of a proposal for tax-based incomes policies in the final *Economic Report* of the Carter Administration (*EROP*, 1981, pp. 14, 57-68), discussion of wage and price controls, guideposts, incomes policies, and voluntary wage and price cooperation virtually disappeared from the narrative record of stabilization policy. But there is also some direct evidence of this shift in beliefs. For example, the 1982 *Economic Report* stated, "Neither guideposts nor price controls ... have succeeded in stopping inflation." (*EROP*, 1982, p. 49.)

The final element of the consensus was agreement that the costs of inflation were substantial. The 1982 *Economic Report* referred to "the acute costs of rising inflation," (*EROP*, 1982, p. 47.) and the 1983 *Report* stated:

> Of all the economic problems that this Administration inherited when it came to office in 1981, the most urgent was the problem of rising prices. Double-digit inflation had created serious economic distortions. (*EROP*, 1983, p. 19.)

Monetary policymakers appear to have had similar views. For example,

in February 1980, "Committee members continued to express great concern about the inflationary environment and its role in generating distortions and instability." (RPA, February 4-5, 1980, p. 101.)

Another fundamental change that occurred in the 1980s concerned the beliefs relevant to fiscal policy. In the first three decades of the post-war era, the aggregate demand implications of budget policy were seen as crucial. Starting with the beginning of the Reagan Administration, however, the impact of budget deficits on aggregate demand became of secondary importance. Instead, the key beliefs motivating fiscal policy concerned two long-run issues: the appropriate size of government, and the importance of the incentive effects of taxes relative to the government's direct impact on national saving. Since the beliefs underlying fiscal policy in the 1980s and 1990s no longer concerned the issues of aggregate demand management that are the focus of this paper, we do not review the evolution of those beliefs here.

Continuity and change in the 1990s. The central features of policymakers' beliefs have undergone remarkably little change over the past twenty years. Monetary policymakers have remained passionate in their views of the harms of inflation. In 1997, for example, Federal Reserve Chairman Alan Greenspan stated:

> the evidence is compelling that low inflation is necessary to the most favorable performance of the economy. Inflation, as is generally recognized throughout the world, destroys jobs and undermines productivity gains .... Low inflation is being increasingly viewed as a necessary condition for sustained growth. (Greenspan, 1997, p. 1.)

A natural-rate framework has continued to be a core element of policymakers' beliefs in the 1990s. The first *Economic Report* of the George H. W. Bush Administration referred to:

> the widely accepted view that, when inflationary expectations are stable, the economy has a minimal rate of unemployment consistent with nonaccelerating inflation. The nonaccelerating inflation rate of unemployment, often referred to as the

> NAIRU or natural rate of unemployment, is an important guide for policymakers. (*EROP*, 1990, p. 177.)

Similarly, the NAIRU featured prominently throughout the *Economic Report*s of the Clinton Administration. (See, for example, *EROP*, 1994, pp. 109-112; 2001, pp. 73-74.) At the FOMC, policy discussions focused on the relation between actual output and the economy's normal capacity, and there was broad agreement that a situation where output persistently exceeded capacity was unsustainable because of its inflationary consequences. In February 2000, for example, the FOMC felt that:

> The economy's potential to produce goods and services had been accelerating over time, but the demand for output had been growing even more strongly. If this imbalance continued, inflationary pressures were likely to build that would interfere with the economy's performance. (*RPA*, February 1-2, 2000, p. 204.)

During the decade, policymakers gradually raised their assessment of the path of potential output. There was considerable uncertainty and some divergence of views both about the magnitude of the change and about its implications for the natural rate of unemployment. Fiscal policymakers were the most cautious. They argued that it was difficult to know how long-lasting the increase in productivity growth would be, and that a reasonable estimate was that some of it was transitory. (*EROP*, 2001, pp. 28-29, 77.) They also believed that:

> The new, higher trend growth of productivity since 1995 has temporarily lowered the NAIRU (the nonaccelerating-inflation rate of unemployment ...), because it can take many years for firms and workers to recognize this favorable development and incorporate it into their wage setting. (*EROP*, 2001, p. 73.)

Because of this belief that the increased productivity growth was temporarily reducing the natural rate, fiscal policymakers concluded that an unemployment rate in the vicinity of 4 percent was clearly below its sustainable long-run level. (*EROP*, 2001, p. 74.)

At least some monetary policymakers, on the other hand, felt that the changes in the 1990s were more significant. For example, in June 1999 the Federal Reserve argued that "a further pickup in productivity growth is a distinct possibility." (*Monetary Policy Report to the Congress*, July 20, 2000; in *Annual Report*, 2000, p. 63.) With regard to the labor market, there were clearly two distinct positions within the FOMC. Some members shared the CEA's view that the increase in productivity growth had merely lowered the natural rate temporarily. In June 2000, for example, with unemployment at 4.0 percent, some members felt that "labor markets were already operating at levels of utilization that were likely eventually to produce rising labor costs ... even if productivity growth remained high or rose somewhat further." (*RPA*, June 27-28, 2000, p. 232.) Similarly, in August 2000, "a number of members" felt that "a flattening out of the rate of increase in productivity, even at a high level, could well pose at some point a risk to continued favorable inflation performance." (*RPA*, August 22, 2000, p. 240.)[8] But other members do not appear to have seen the changes in the labor market as temporary. At the meeting in June 2000, when some members thought prevailing labor market conditions were not sustainable, "[o]ther members were more optimistic .... To date, unit labor costs had been quite subdued, leaving open the question of what was a sustainable level of labor resource use." (*RPA*, June 27-28, 2000, p. 232.) And, in December 2000, there was considerable sentiment that recently prevailing patterns of the relation between labor utilization and inflation provided a good guide for the future. (*RPA*, December 19, 2000, p. 264.)

A final change in beliefs in the 1980s and 1990s concerned the importance of acting to prevent inflation by moving preemptively. In the years immediately after its shift in operating procedures in October 1979, the Federal Reserve put considerable emphasis simply on bringing about a gradual reduction in money growth in order to ensure a gradual decline in inflation. But in the 1990s, monetary policymakers viewed their job as more subtle:

> Too often in the past, policymakers responded late to unfolding economic developments and found they were far behind the curve .... Those who wish for us ... to await clearly visible signs of emerging inflation before acting are recommending

> we return to a failed regime of monetary policy that cost jobs and living standards.
>
> I wish it were otherwise, but there is no alternative to basing policy on what are, unavoidably, uncertain forecasts. (Greenspan, 1997, p. 2.)

Despite these changes at the end of the century, the analysis of the narrative record for the postwar era fundamentally leaves one with the sense that policymakers' beliefs have almost come full circle. Both in the 1950s and in the 1980s and 1990s, the key features of policymakers' model of the economy were a realistic view of sustainable unemployment and a conviction that inflation was very costly. In between these two points, however, there was an extended detour in policymakers' beliefs toward very optimistic estimates of sustainable unemployment and deep pessimism about the ability of economic slack to reduce inflation.

Evidence of changes in beliefs from Federal Reserve forecasts III

One way to see if the evolution of economic beliefs apparent in the narrative record is genuine and meaningful is to look at the Federal Reserve's internal forecasts. These forecasts provide a window into the model of the economy held by the staff of the Board of Governors. To the degree that the staff's model reflects or influences the framework held by members of the FOMC, the forecasts can provide a window into the economic beliefs of the actual monetary policymakers. Unfortunately, a similarly regular and confidential forecast from the Council of Economic Advisers does not exist to provide insight regarding the thinking of fiscal policymakers.

The Greenbook forecasts A

The Federal Reserve's staff forecast is contained in the "Greenbook" prepared before each meeting of the FOMC. These forecasts begin in November 1965 and are available to the public through December 1996. Because the forecasts begin in the mid-1960s, we can only use them to investigate changes in beliefs between the 1960s and today; we cannot use them to verify the large changes in beliefs between the

1950s and the 1960s apparent in the narrative record. The horizon of the forecasts has lengthened over time. In the late 1960s and early 1970s, the forecasts typically went out only one or two quarters; in the Volcker and Greenspan eras, they have typically gone out six to eight quarters. Therefore, for consistency we can only look at changes in medium-term forecasts over time. While the staff forecasts a plethora of variables, we consider only the forecasts for the change in the GNP/GDP deflator and the unemployment rate.

There is no question that the staff forecasts play a crucial role in monetary policymaking. A reading of the *Minutes* and the *Record of Policy Actions* of the FOMC for different eras shows that the staff forecasts are typically the starting point for discussions of policy. While individual members of the FOMC may express disagreement with the forecast, it is rare that the majority of the Committee challenges it or disregards it. Much more often, the FOMC chooses policy on the basis of how it wants inflation and real output growth to move relative to the forecast. Therefore, it is plausible that the model implicit in the forecasts reflects, or is at least not wildly at odds with, the model held by the majority of the FOMC.

Forecast errors for inflation *B*

We first analyze the forecast errors for inflation. Economic beliefs are likely to be reflected in the overall accuracy of the forecasts. A more realistic model, all else equal, is likely to produce smaller forecast errors. More importantly, beliefs are likely to affect the bias of the forecasts. For example, if the forecasts in a period were based on an overly optimistic view of the natural rate or of the ease of reducing inflation, they would tend to systematically underpredict inflation. The same would be true if the forecasts were based on a belief in a long-run tradeoff and unemployment was below the natural rate.

Method. To calculate forecast errors for inflation, one obviously needs a series for comparison. We use a nearly real-time, unrevised version of the NIPA data on the GNP/GDP deflator. In particular, we use the "final" revision for each quarter, which is typically available at the end of the subsequent quarter.[9] This series represents the most

accurate measure of actual GNP/GDP inflation available near the time

$$\bar{u}_t = {}^1/_3 \sum_{i=0}^{2} u_{t+i} + {}^8/_3 \left(\pi_{t+2} - \pi_{t-1}\right). \qquad (2)$$

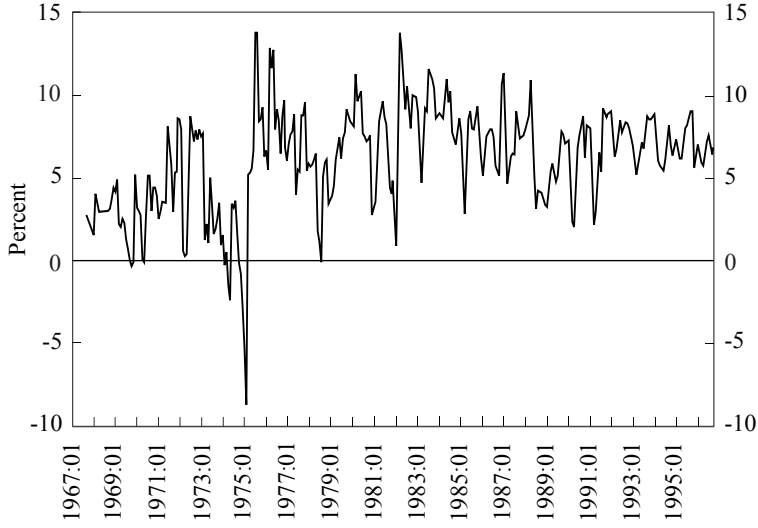
This implied natural rate is calculated for each Greenbook forecast. We then convert the results to a monthly series by assigning the implied natural rate to the month in which the forecast occurred. For the few months when two forecasts were conducted, we calculate the monthly value by averaging the two observations.

Results. Chart 2 graphs the implied natural rates for 1967:10 to 1996:12.[13] The series is clearly quite variable, even in recent years. This presumably reflects the fact that the Federal Reserve staff has other information about likely influences on inflation, such as supply shocks. Because our simple calculation assumes that the only determinant of changes in inflation is the departure of unemployment from the natural rate, the inclusion of these other influences in the forecasts of inflation reveals itself as gyrations in our implicit natural rate series.

The much more important finding apparent in chart 2 is that the implicit estimates of the natural rate were much lower in the late 1960s and early 1970s than in the Volcker and Greenspan eras. Table 2 gives the summary statistics for the implied estimates of the natural rate for different eras. The average implied estimate for 1967:10 to 1975:6 is just 2.9 percent, while for the Volcker and Greenspan years (1979:8 to 1996:12) it is 7.3 percent. That is, fitting the forecasts for the 1960s and early 1970s into a natural-rate framework requires using an extremely low estimate of the natural rate. This finding is consistent with the narrative evidence, which shows that policymakers in this era either believed in a permanent tradeoff between inflation and unemployment, or were highly optimistic in their estimates of achievable long-term unemployment. The forecasts for the Volcker and Greenspan periods, in contrast, are quite consistent with a natural-rate framework with a reasonable (though slightly high) estimate of the natural rate. Again, this is precisely what the narrative evidence suggests should be the case.

As with the forecast errors, the implicit estimates of the natural rate in the mid- and late 1970s show interesting variation. The implicit

Chart 2
Natural Rate of Unemployment Implicit in Greenbook Forecasts



estimates were remarkably high in the late Burns era (1975:7 to 1978:2).[14] They then took an equally remarkable dip back toward to 1960s levels during the Miller years (1978:3 to 1979:7). This latter finding is consistent with the narrative evidence that at least some members of the FOMC during the Miller years were unrealistic in their estimates of the natural rate.

Narrative evidence on the relationship between policymakers' beliefs and postwar stabilization policy IV

The previous two sections have shown that the framework policymakers used to understand the economy evolved over time. What remains to be done is to show that this evolution of beliefs was reflected in the policy choices that were made in different eras. One way to do this is to again consider narrative evidence. Do the records of the Federal Reserve and the Council of Economic Advisers suggest that key policy decisions were motivated by policymakers' model of the economy?

Table 2
Summary Statistics for the Natural Rate of Unemployment Implicit in Greenbook Forecasts

	Martin	Burns		Miller	Volcker	Greenspan	Pre-Volcker	Post-Volcker
	(67:10-70:1)	(70:2-75:6)	(75:7-78:2)	(78:3-79:7)	(79:8-87:7)	(87:8-96:12)	(67:10-79:7)	(79:8-96:12)
Mean	2.5%	3.1%	8.2%	4.6%	8.0%	6.7%	4.5%	7.3%
Standard deviation	1.6	3.5	2.5	2.2	2.4	1.8	3.6	2.2
N	20	61	32	15	66	76	128	142

Note: The implicit estimates of the natural rate are computed from the forecasts of unemployment and the change in inflation in the quarter of the forecast and the two subsequent quarters. See text for details.

Measures of policy *A*

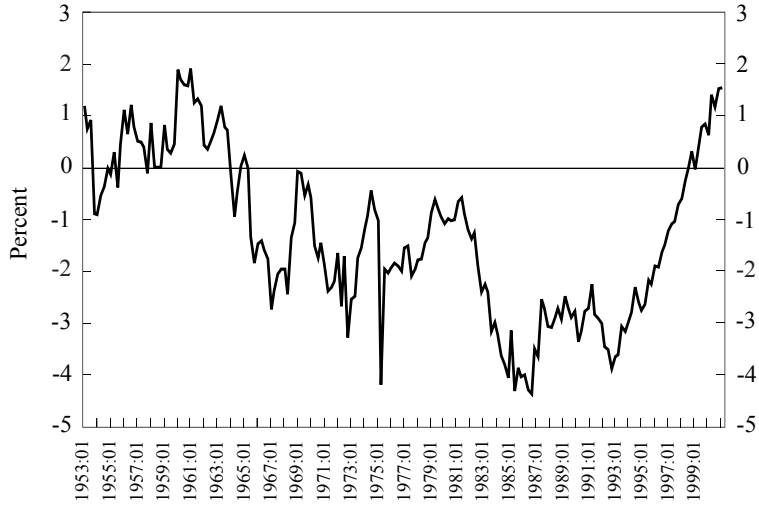
Before one can see if policy changes were motivated by beliefs, one needs to know what policy actions were taken in various eras. To this end, we consider two standard measures of aggregate demand policy. The stance of fiscal policy is well summarized by the ratio of the high-employment surplus to potential GDP. The high-employment surplus shows what the federal budget stance would be if GDP were at potential. Normalizing by potential GDP removes the trend caused by growth in the economy over time. We use quarterly data on the high-employment surplus and potential GDP from 1950 to the present from the Congressional Budget Office.[15] The high-employment surplus to GDP ratio is graphed in chart 3.

An appropriate summary statistic for monetary policy is more controversial. We use an estimate of the real federal funds rate as our measure. At various points in its history the Federal Reserve has targeted different indicators—free reserves in the 1950s, non-borrowed reserves and monetary aggregates in the late 1970s and early 1980s, the federal funds rate in the mid-1970s and the late 1980s and the 1990s. But in all eras, some short-term interest rate was at least a supplementary target. More fundamentally, a short-term interest rate is a consistently good indicator of money market conditions in virtually all eras. Since the funds rate is the most commonly targeted short-term rate, we choose that as our indicator.[16]

Because inflation has varied so substantially over time, we construct an estimate of the ex ante real federal funds rate. To do this, we calculate the ex post real rate using the GDP deflator to measure inflation. We then use a Mishkin (1981) procedure to estimate the ex ante real rate. In particular, we regress the ex post real rate on a constant, a trend, and four lags of each of the nominal funds rate, the deviation of log output from trend, and inflation.[17] The fitted values of this regression are our estimates of the ex ante real funds rate. This series is graphed in chart 4.

The next step in the analysis is to examine whether key movements in these policy indicators were motivated by policymakers' beliefs

Chart 3
Ratio of High-Employment Surplus to Potential GDP

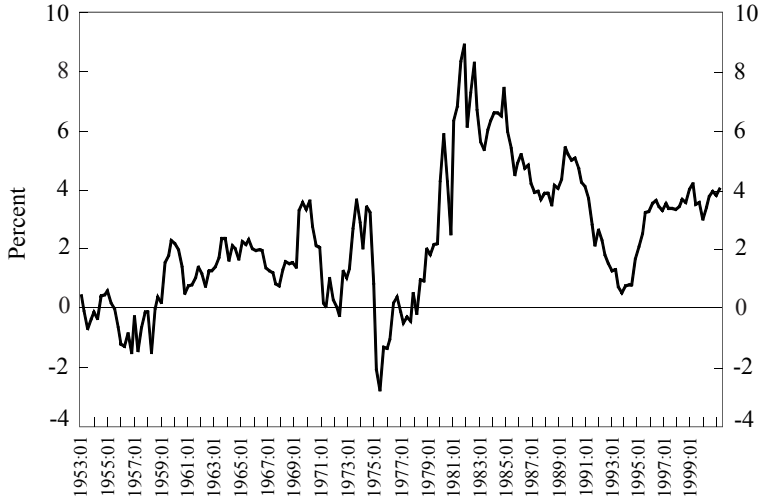


about how the economy worked. In this analysis we consider the same sources as before—the *Economic Report of the President* and the *Minutes*, *Transcripts*, and *Record of Policy Actions* of the Federal Open Market Committee.

The 1950s *B*

An early commitment to aggregate demand management. The first thing to notice about the policy indicators in the 1950s is that they moved around substantially in response to macroeconomic conditions. For example, when inflation began to rise in late 1954 and 1955, both the high-employment surplus and the real federal funds rate rose. Similarly, in the 1957-1958 recession, both indicators declined substantially, indicating a switch to expansionary policy. This is important because there is a tendency to think that aggregate demand policy only started to be used in the 1960s and that policymakers in the 1950s did not feel a responsibility for managing the economy. But the narrative

Chart 4
Ex Ante Real Federal Funds Rate



and empirical records show that the commitment to activist aggregate demand management was already in place in the early 1950s. Thus, the fundamental shift in attitudes about the role of government in managing the economy occurred at or before the start of the postwar era.

The narrative evidence that both fiscal and monetary policymakers felt a commitment to real output stabilization in the 1950s is substantial. The 1956 *Economic Report*, for example, stated: "we have also come to believe that progress need not proceed as irregularly as in the past, and that the Federal Government has the capacity to moderate economic fluctuations." (*EROP*, 1956, p. iii.) It also referred to "a responsibility on the Government to pursue policies that will help to keep the private economy strong and growing" by "acting promptly and resolutely when either recessionary or inflationary influences in the general economy become evident." (*EROP*, 1956, p. 8.) The Federal Reserve clearly felt a similar, if somewhat less strong, responsibility toward real stability. For example, at the start of the 1953-1954

recession, the Federal Reserve adopted a program of "active ease" in September 1953 (*Minutes*, September 8, 1953, p. 12), and had as the primary goal of monetary policy "avoiding deflationary tendencies." (*Minutes*, September 24, 1953, p. 29.)

As the reference above to avoiding both "recessionary or inflationary influences" makes clear, policymakers in the 1950s also felt a responsibility to maintain price stability. The 1958 *Economic Report* stated: "A clear responsibility rests on Government to pursue policies that will help prevent inflation." (*EROP*, 1958, p. 4.) Earlier, the 1956 *Economic Report* recounted that:

> the unfolding of prosperity generated a degree of exuberance which, if left to itself, could have led to widespread increases in prices, speculative buying, new price increases, and eventual economic recession. The Federal Government, keenly aware of its responsibilities under the Employment Act, moved resolutely to prevent such developments. (*EROP*, 1956, p. 28.)

The 1959 *Economic Report* discussed the Eisenhower Administration's proposal "to amend the Employment Act of 1946 to make reasonable price stability an explicit goal of Federal economic policy." (*EROP*, 1959, p. vi.)

Such a feeling of responsibility toward inflation control was, if anything, more evident at the Federal Reserve. For example, when industrial prices started to rise in the summer of 1955, Chairman Martin said, "Inflation is a thief in the night and if we don't act promptly and decisively we will always be behind." (*Minutes*, August 2, 1955, p. 13.) Again in 1958, when the FOMC feared inflation was about to rise again, one governor said that "the country was going to have inflation and that there must be serious shock treatment." (*Minutes*, September 9, 1958, p. 27.) Perhaps the most telling statement of what the Federal Reserve took to be its responsibilities in this era was made in 1959. One member of the FOMC expressed the view that: "The System, of course, wanted growth as well as [price] stability, but if temporarily there had to be a choice between growth and arresting inflationary psychology he would favor the latter course." (*Minutes*, February 10, 1959, p. 22.)

This sense of responsibility toward managing the economy is particularly evident if one looks at the *Record of Policy Actions* of the FOMC during the 1950s. Far from being unconcerned or unresponsive to economic conditions, the FOMC frequently changed what it said it was trying to accomplish in response to economic conditions. Consider, for example, the fairly typical year of 1956. The FOMC met nineteen times during the year. The policy directive given to the open market manager was changed at five of those meetings. For example, in January, "there had been a slight—perhaps almost imperceptible—change in the state of the economy" toward cooling off. (*RPA*, January 24, 1956, p. 20.) In response, the FOMC changed the directive, which had been aimed at "restraining inflationary developments," to also include taking "into account any deflationary tendencies." (*RPA*, January 24, 1956, p. 19.) In March, when "economic activity ... had moved on a plateau during the first quarter of 1956," but "key prices were firm to rising," the directive was modified to take out the concern about deflationary tendencies. (*RPA*, March 27, 1956, pp. 25-26.) This tweaking of the directive and policy in response to current and prospective economic conditions was repeated in May, August, and November. There can be no doubt that the Federal Reserve felt a responsibility toward managing the economy in the 1950s and consciously moved aggregate demand to stabilize output and prices.

This evidence of a feeling of responsibility toward real stabilization and inflation control among policymakers in the 1950s is relevant to the hypothesis of this paper. We argue that changes in economic beliefs were a key source of changes in aggregate demand policy. Showing that policymakers were already committed to managing the economy in the 1950s eliminates the possibility that a changing attitude toward the role of government was a key source of policy changes.

It is also important to point out that as early as the 1950s, policymakers not only felt a responsibility toward managing aggregate demand, but were able to do so. On the fiscal side, the fact that the high-employment surplus declined substantially in the recessions of 1953-1954 and 1957-1958 is evidence that policymakers were able to negotiate tax and spending changes in response to macroeconomic conditions. On the monetary side, the implementation of policy was also

perfectly adequate from the early 1950s on. The Federal Reserve of the 1950s and 1960s has sometimes been criticized for using the imperfect target of free reserves. However, in a previous paper (Romer and Romer, 2002), we show that monetary policymakers in the 1950s not only complemented their free reserves targets with concern about interest rates, but frequently changed their free reserves target to achieve their interest rate objectives. We also find, contrary to the common assertion, that monetary policymakers in the 1950s understood the distinction between real and nominal interest rates. Our finding that fiscal and monetary policymakers in the United States were able to manipulate aggregate demand effectively starting in the 1950s suggests that improvements in operating procedures could not have been the source of the gross changes in aggregate demand policy that we observe.

Motivation for policy actions. The particular aggregate demand policies that monetary and fiscal policymakers took in the 1950s reflected their beliefs about the economy, though with some margin of error. The policy indicators shown in charts 3 and 4 were quite volatile in the 1950s, suggesting that policymakers may have overreacted to economic developments. And, there were certainly times in the 1950s when policy was expansionary to the point of inflation. This happened, not surprisingly, during the Korean War. Both monetary and fiscal policy were quite loose through late 1952.[18] It also happened following the 1953-1954 recession. Both monetary and fiscal policy reacted forcefully to the downturn in the fourth quarter of 1953 and policy remained loose for a number of quarters. As a result, the unemployment rate fell as low as 4 percent in 1955 and inflation began to rise.

But, the key feature of the model of the economy held by 1950s policymakers was a belief that there were no long-run benefits to overexpansion and very high costs to the inflation that would inevitably result. As a result, periods of overexpansion like those in the early and mid-1950s were quickly corrected. And, because inflation was never allowed to get seriously out of hand, the recessions needed to bring inflation down in the 1950s were relatively mild.

There are several examples of aggregate demand policy being used

to keep inflation low in the 1950s. The 1956 *Economic Report* described how fiscal policy was used to fight inflation in 1953:

> In the spring of 1953, when inflation was still a real danger, a Message to the Congress recommended that the excess profits tax, which was then in effect, be extended six months beyond its expiration date of June 30, 1953. The decision to extend this burdensome and unpopular tax was taken because it would have been imprudent to increase the deficit and the public debt under the conditions prevailing at the time. (*EROP*, 1956, p. 73.)

Likewise, in the mid-1950s, when inflation reached 4 percent, the Federal Reserve took contractionary actions. In 1955, one member of the FOMC said, "I feel that there are inflationary pressures present which should be checked *now* by a firmer monetary policy—one firm enough to curtail spending and thus dampen price pressures." (*Minutes*, November 16, 1955, p. 20, emphasis in the original.) Though our estimate of the ex ante real federal funds rate rises only for a short period in this episode, monetary contraction in the mid-1950s is widely thought to have been a key cause of the 1957-1958 recession.

Perhaps the policy response most reflective of the economic framework of the 1950s was the tightening in the third quarter of 1958. Chairman Martin and several other members of the FOMC felt that the Federal Reserve had not been quick enough to tighten after the recovery from the 1953-54 recession and that, as a result, inflation had reemerged in the mid-1950s. One member stated that he "hoped that the System might stay ahead of the situation better than it did following the 1953-54 recession, with a view to forestalling the results that came to pass later." (*Minutes*, September 1, 1959, p. 20.) Determined not to repeat that mistake, the FOMC tightened aggressively soon after the trough of the 1957-1958 recession was reached. The strength of this action can be seen clearly in the rise in the real federal funds rate in late 1958 and 1959 shown in chart 4. This action, taken in the face of virtually constant actual inflation and anemic real growth, was the result of the Committee's belief that inflation had high costs and no benefits. As one member said: "The Committee was sitting on the edge of what might be almost a volcano. ... Therefore, he felt that it

would be a mistake to wait ... before moving to a more restrictive position." (*Minutes*, September 1, 1959, p. 20.)

This monetary policy response was clearly supported and augmented by the Eisenhower Administration. The 1959 *Economic Report* talked approvingly of the "[s]hifts in monetary and credit policy during 1958, and the changes in the underlying economic conditions that called for them." (*EROP*, 1959, p 106.) The 1959 *Report* also called for fiscal tightening to help restrain inflation. It stated that:

> Acceptance by the Congress of the expenditure level of the 1960 budget would be the most important single step in discharging Government's responsibility to help preserve the stability of prices and costs through prudent management of its own financial affairs. (*EROP*, 1959, p. 51.)

As chart 3 shows, fiscal policy did turn noticeably contractionary in early 1960. Like the monetary contraction, the fiscal contraction was motivated by policymakers' model of the economy. The Eisenhower Administration certainly believed that inflation "would do great harm to our economy," and supported lowering aggregate demand as a means of ensuring price stability. (*EROP*, 1959, p. 48.)

The 1960s *C*

The macroeconomic beliefs of the 1960s affected both what policymakers chose to do and what they chose not to do. The effects on what they chose to do were strongest on the fiscal side. Policymakers' belief that the economy could operate at a high level without generating inflation led to the adoption of a wide range of expansionary fiscal measures in 1961 and 1962, the enactment of a major multi-year tax cut in early 1964, and further modest stimulus in 1965. All of these actions were explicitly motivated by the desire to expand economic activity. (*EROP*, 1962, pp. 82-83; 1963, pp. 18-19; 1965, pp. 65-66; 1966, pp. 52-53.) In making the case for the 1964 tax cut, which was by far the largest of these measures, the 1964 *Economic Report* argued that fiscal expansion was necessary because the current unemployment rate was above its normal, sustainable level. It stated:

> – But now, when demand and incentives are not strong enough to make full use of our manpower and machines, the tax brake is set far too tight.
> – We need to release that brake quickly to put billions of dollars of new consuming and investing funds into the hands of the private economy. (*EROP*, 1964, p. 7.)

The *Report* went on to say:

> early enactment of the tax bill and enactment of the President's budget for fiscal 1965 will bring a sharp and needed reduction in the full-employment surplus. The tax and expenditure program will ... provide a strong, fresh impetus to the expansion. (*EROP*, 1964, p. 46.)

The combined effect of these actions, together with the initial spending increases resulting from the Vietnam War, reduced the ratio of the high-employment surplus to GDP from 1.6 percent at the end of 1960 to –1.8 percent at the end of 1965.[19]

On the monetary side, concern about the balance of payments prevented the FOMC from undertaking any substantial easing in the early 1960s. Thus, changes in economic beliefs do not appear to have had a large impact on monetary policy in this period. But in response to this difficulty, policymakers undertook a variety of programs to directly reduce the balance of payments deficit, including the adoption of an "interest equalization tax" in 1963. (*EROP*, 1962, pp. 13-15; 1964, pp. 127-130; 1966, pp. 165-167.) In part because of these programs and expansionary fiscal policy, the constraints on monetary policy stemming from the balance of payments eased considerably by the middle of the 1960s. Once this occurred, the FOMC loosened moderately in 1966 and 1967. The real federal funds rate fell by 1.5 percentage points from 1965:3 to 1967:4. This is certainly consistent with the Federal Reserve's belief that unemployment could be reduced substantially without triggering inflation.

The more important impact of the new beliefs on monetary policy in the second half of the 1960s, however, is in what they caused the

FOMC not to do: despite high output, low unemployment, and rising inflation, the Federal Reserve kept real interest rates low throughout this period. In retrospect, the meetings in the mid- and late 1960s are remarkable in the degree to which members of the FOMC debated nuances of wording in the directive and small changes in policy, yet failed to address the substantial rise in inflation. The beliefs prevalent at the time of a very optimistic level of normal unemployment and a permanent tradeoff appear to have been the source of this inaction. For example, in early 1968, when inflation was over 4 percent and rising, there was still little support for aggressive monetary restraint. One member of the FOMC expressed the common view that:

> he did not think the Committee should change its position. There was considerable evidence that the main thrust of existing inflationary pressures might be of a short-run nature, and that those pressures might end by the middle of 1968. (*Minutes*, January 9, 1968, pp. 68-69.)

The model at the time convinced many members of the FOMC that inflation would disappear on its own if output growth merely returned to normal.

The 1970s *D*

As described in section II, the 1970s were a period of rapidly fluctuating beliefs about the macroeconomy. The result was rapidly fluctuating macroeconomic policies.

The triumph of the natural-rate model at the end of the 1960s led to tightening of both monetary and fiscal policy. Policymakers chose to contract aggregate demand because they believed that slack was necessary to reduce inflationary expectations. The real federal funds rate rose from 1.5 percent in 1968:4 to 3.3 percent a year later. Throughout 1969, the FOMC was willing to accept a level of output below potential to bring inflation down. In October, for example, despite projections of little growth through the middle of 1970, the Committee "decided that a relaxation of monetary restraint would not be appropriate at this time in light of the persistence of inflationary pressures and expectations."

(*RPA*, October 7, 1969, pp. 185-186.) Similarly, the ratio of the high-employment surplus to GDP rose from -1.7 percent in 1968 to -0.3 percent in 1969, as a result of a variety of deliberately contractionary fiscal measures aimed at controlling inflation. (*EROP*, 1970, pp. 31-33.)

The rapid spread of pessimism about the power of aggregate demand policy to reduce inflation soon led to more radical policy changes, however. Policymakers concluded that the economy was operating well below potential, but that inflation was not falling because it was structural or self-fulfilling. This led them to pursue a two-pronged strategy. One prong was "highly expansionary fiscal policy" (*EROP*, 1972, p. 108) that resulted in a sharp swing in the high-employment surplus toward deficit in 1971. Since policymakers had come to believe that slack would do little to reduce inflation, they saw no reason to tolerate unemployment above the natural rate. The other prong was wage and price controls

> to give the country a period of enforced stability in which expectations, contracts, and behavior will become adapted to the fact that rapid inflation is no longer the prospective condition of American life. (*EROP*, 1972, p. 108.)

The loss of faith in aggregate demand policies led policymakers to adopt unconventional policies aimed at forcibly reducing inflation.

The move to expansionary policy in this period was certainly supported by the Federal Reserve. Our estimate of the real interest rate fell substantially in early 1971 and remained very low through early 1973. The motivation for the Federal Reserve's actions during this period is a matter of substantial debate, and many have suggested that political considerations were paramount. Part of the debate surely stems from the fact that the narrative record is less informative than usual in this period. Nevertheless, we find some evidence that beliefs about how the economy operated were important. For example, in December 1971,

> a number of members expressed the view that more aggressive actions to stimulate monetary growth were needed at this time

> in the interest of fostering the desired expansion of economic activity and employment. In their judgment the risk of rekindling inflationary pressures and expectations by such actions was considerably less now than it had been earlier in the year. (*RPA*, December 14, 1971, p. 199.)

This statement suggests that members of the FOMC favored expansion because they believed that they could lower unemployment without generating inflation. This is certainly consistent with the very optimistic estimates of the natural rate that prevailed among monetary policymakers in the early 1970s.

Policymakers in the middle of the 1970s increased their estimates of the natural rate and began to believe once more that aggregate demand contraction could lower inflation. This change in beliefs was clearly reflected in the switch to contractionary policy that occurred in the middle years of the decade. The real interest rate increased, remaining high well into the 1973-1975 recession. Similarly, the high-employment surplus rose until the third quarter of 1974. Policymakers seemed to almost welcome substantial unemployment because they believed unemployment above the natural rate would eventually reduce inflation. This view was expressed by Chairman Burns, who stated in September 1974 that he "would not wish to see a prompt recovery in economic activity. If recovery began promptly, economic activity would turn up at a time when inflation was continuing at a two-digit rate." (*Minutes*, September 10, 1974, p. 65.)[20]

The Carter-era belief that supply shocks were an important source of inflation had little bearing on policy choices in the late 1970s. Once inflation existed, what policymakers chose to do depended on their beliefs about the natural rate and the effectiveness of slack in reducing inflation. And, their belief in this era that the natural rate was relatively low and that inflation was unresponsive to slack was clearly reflected in the policy choices of this period. As charts 3 and 4 show, both fiscal and monetary policy were noticeably expansionary in 1977 and 1978. The high-employment surplus to GDP ratio fell about ½ of a percentage point during this period. The real federal funds rate also fell about ½ of a percentage point between

late 1976 and mid-1977, and remained very low during much of the Miller era.

The fiscal expansion was a deliberate attempt to lower unemployment. The 1978 *Economic Report* stated:

> Soon after the new Administration came into office, it proposed a series of measures intended to raise the rate of growth in real output in 1977 and 1978 to a pace that would lead to significant reductions in the unemployment rate. (*EROP*, 1978, p. 50.)

The 1978 *Report* also discussed the motivation for the personal income tax reduction that was proposed in 1978 and took effect in January 1979. It said, "without additional fiscal measures, economic growth would slow below the rate necessary to maintain satisfactory progress toward our goal of returning to high employment." (*EROP*, 1978, p. 73.) These policies were clearly motivated by the belief that the current unemployment rate was substantially above the natural rate. There was virtually no discussion in the 1978 *Economic Report* that such expansion could have adverse inflation consequences. Indeed, the *Report* stated: "forces at work in the economy are not likely to produce an acceleration of inflation in the next year or two." (*EROP*, 1978, p. 152.)

The low real interest rates in the late 1970s were largely the result of Federal Reserve inaction, similar to that of the late 1960s. Monetary policymakers in 1978 and 1979 were certainly worried about inflation. For example, in May 1978, "Committee members were deeply concerned about the recent acceleration of inflation and about prospects for prices." (*RPA*, May 16, 1978, p. 175.) But throughout this period they were also concerned about real growth and exceedingly cautious in raising interest rates. In early 1978, for example, there was discussion of the desirability of "helping to resist inflationary pressures while simultaneously encouraging continued economic expansion." (*RPA*, March 21, 1978, p. 150.) A typical discussion from this period ended with a decision like the following: "the Committee concluded that it would be appropriate to await some further evidence on the economic outlook" before deciding "whether further firming at this point would be desirable." (*RPA*, April 18, 1978, p. 169.) This extremely

cautious behavior in the context of inflation rates near double digits and rising is certainly consistent with the low and conflicting estimates of the natural rate among members of the FOMC in this period.

The extreme pessimism about the usefulness of slack in dealing with inflation that dominated the Carter-era model showed up in a rejection of aggregate demand contraction to deal with high and accelerating inflation. The *Economic Report* for 1979 declared:

> We will *not* try to wring inflation out of our economic system by pursuing policies designed to bring about a recession. That course of action ... would be ineffective. Twice in the past decade inflation has accelerated and a recession has followed, but each recession brought only limited relief from inflation. (*EROP*, 1979, p. 7, emphasis in the original.)

Instead, as in the early 1970s, the Administration sought to control inflation through a wide range of non-aggregate-demand-based policies. Among the proposals were voluntary wage and price standards, regulatory reform, sales-tax changes, and "real-wage insurance." (*EROP*, 1978, pp. 18-20, 150-152; 1979, pp. 80-91.) A similar view may explain the inaction of monetary policymakers as well. Rather than tighten enough to reduce inflation, some members of the FOMC felt that "prospects for unemployment and prices indicated that active public discussion of some form of an incomes policy would be appropriate." (*RPA*, September 20, 1977, p. 276.) Similarly, in early 1978, "[i]t was noted that an effective program to reduce the rate of inflation had to extend beyond monetary policy." (*RPA*, March 21, 1978, p. 150.)[21]

The 1980s and 1990s *E*

The Volcker disinflation provides one of the most striking examples of the impact of economic beliefs on the conduct of aggregate demand policy. The FOMC undertook a massive and long-lasting shift to tighter monetary policy in October 1979. By our measure, the real federal funds rate rose 6.8 percentage points from 1979:3 to its peak in 1981:3, and it remained high through the mid-1980s.

This policy was unquestionably motivated by the prevailing belief among policymakers that inflation was very costly and that unemployment above the natural rate was the only way to reduce it. At the first meeting of the FOMC after Paul Volcker became Chairman of the Federal Reserve, the Committee discussed "the problems posed by emerging recession and its potential for substantial increases in unemployment," but agreed that "modest measures should be taken to direct policy toward slowing growth of the monetary aggregates" in light of "the fundamental objective of reducing inflation." (*RPA*, August 14, 1979, p. 183.) Over the next several years, the Committee repeatedly expressed its willingness to accept high unemployment to bring inflation down. (For example, *RPA*, July 6-7, 1981, p. 116; February 1-2, 1982, p. 89.)

The extreme size of the monetary contraction was clearly influenced by the belief at the time that the natural rate was substantial. In February 1980, when unemployment was already 6.3 percent, "[m]ost members thought that a moderate contraction in real GNP was likely in 1980, bringing a substantial increase in unemployment." (*RPA*, February 4-5, 1980, p. 100.) Yet, they "agreed that monetary growth should slow further in 1980 ... in line with the continuing objective of curbing inflation." (*RPA*, February 4-5, 1980, p. 102.) Members of the FOMC felt that unemployment had to reach substantial levels to bring about the desired reduction in inflation.

The Federal Reserve had the full support of the Reagan Administration in pursuing this policy of disinflation. (*EROP*, 1982, pp. 8, 63-64; 1983, pp. 3, 23.)[22] Fiscal policymakers agreed that inflation was very costly and that a reduction in aggregate demand was the appropriate policy for reducing it. This is consistent with our finding that fiscal policymakers and monetary policymakers both adopted the modern framework at the start of the 1980s.

The Federal Reserve's continuing concern about inflation, and its continuing belief that substantial unemployment was needed to reduce inflation, led it to react aggressively in the late 1980s to combat a mild resurgence of inflation. Unemployment was in the vicinity of 5.5 percent in 1988. Yet, as documented by Romer and Romer (1994), the

Federal Reserve tightened policy in 1988 and 1989 in an active effort to bring inflation down, and believed that higher unemployment and a chance of a recession were the necessary costs of doing so. The real funds rate rose from 3.5 percent in 1988:1 to 5.5 percent in 1989:1.

The Federal Reserve's belief that it was important to be forward-looking in conducting policy certainly influenced its behavior in the 1990s. For example, it tightened moderately in 1994 and 1997 in response to risks of inflation that had not yet materialized (see, for example, *RPA*, February 3-4, 1994, pp. 131, 134, 137; March 25, 1997, pp. 118-121), and loosened in 1998 in response to the potentially contractionary effects of turbulence in foreign financial markets. (*RPA*, September 29, 1998, pp. 178-181; November 17, 1998, pp. 189-193.) These actions were consistent with the Federal Reserve's belief that it was better to counteract developments before they occurred than after.

The evolution of beliefs continued to affect the conduct of monetary policy in the late 1990s. As is well known, the FOMC's conclusion that changes in the economy had raised the growth rate of potential output and at least temporarily lowered the natural rate of unemployment led it to raise the federal funds rate only moderately in the face of rapid output growth and low unemployment. Furthermore, the Committee's perception of substantial changes in the economy made it more uncertain about the level of potential output, causing it to become less aggressive in moving preemptively. In February 2000, for example, the Committee moved to tighten "in an effort to avert rising inflationary pressures." However, "[f]or a number of reasons, including uncertainties about the outlook for the expansion of aggregate demand in relation to that of potential supply, ... a majority of the members expressed a preference for a limited policy move at this time." (*RPA*, February 1-2, 2000, p. 208.)[23]

Policymakers' beliefs and departures from a modern monetary policy rule V

It is possible to supplement the narrative analysis of policy choices with a more systematic examination of the conduct of monetary policy. In particular, we can examine how the response of monetary policy to a

given set of economic conditions has changed over time, and ask whether the changes appear to be related to changes in economic beliefs.

Method A

To implement this idea, we begin by estimating a monetary policy rule over the period since October 1979. As described in section II, the central features of monetary policymakers' views of the economy have been quite stable over this period. As a result, estimates from this period should provide a reasonable description of how modern monetary policymakers respond to economic conditions. We then compare the implications of this rule with the actual conduct of policy not just over the period since 1979, but over the entire period since the early 1950s. We ask whether there are systematic differences between the actual conduct of policy and the rule's predictions in periods when policymakers' views of the economy differed substantially from modern views.[24]

A standard modern prescription for monetary policy, following Taylor (1993), relates the central bank's choice of the real interest rate relative to its equilibrium level to the departure of inflation from the central bank's target level and the deviation of output from its normal or trend level. A linear version of this prescription is:

$$r_t = r_t^{EQ} + a\left(\pi_t - \pi^*\right) + b\left(Y_t - \overline{Y}_t\right). \qquad (3)$$

Here, r is the ex ante real interest rate, r^{EQ} is the equilibrium real rate, π is inflation, π^* is target inflation, Y is the log of output, and $\overline{Y}$ is the log of normal or trend output. a and b are positive parameters.

There are several issues that must be addressed before equation 3 can be estimated. The first issue is the measurement of the equilibrium real interest rate. Chart 4 shows that the ex ante real rate has been trending up over the postwar period; this trend presumably mainly reflects movements of the equilibrium real rate. To deal with this, we estimate the equilibrium real rate by interpolating linearly between two periods when output was close to trend and the real interest rate was fairly stable: 1962 (when the deviation of output from trend aver-

aged -0.1 percent and the real interest rate averaged 1.1 percent), and 1997 to 1998 (when the deviation of output from trend averaged 0.1 percent and the real interest rate averaged 3.6 percent). We then work with the deviation of the ex ante real interest rate from this trend.

The second issue is the measurement of inflation, actual output, and trend output. Following Taylor, in our baseline specification we measure inflation as the change in the log GDP deflator over the previous four quarters and actual output as log real GDP in the current quarter. We compute trend output using a Hodrick-Prescott filter applied to log real GDP over the period 1952:1 to 2000:4.

The third issue is that the Federal Reserve typically adjusts the real interest rate gradually. We therefore include the lagged dependent variable in the equation. Without this modification there would be severe serial correlation in the errors.

With these changes, equation 3 becomes

$$r_t^{DT} = \alpha + \beta\pi_t + \gamma\left(Y_t - \overline{Y}_t\right) + \rho r_{t-1}^{DT}, \tag{4}$$

where r^{DT} is the detrended ex ante real interest rate and α reflects the target rate of inflation.

Results *B*

We estimate this equation over the post-Volcker sample period of 1979:4 to 2000:3 using ordinary least squares.[25] The estimated equation is:

$$\underset{}{r_t^{DT}} = \underset{(0.17)}{-0.39} + \underset{(0.05)}{0.17}\pi_t + \underset{(0.06)}{0.14}\left(Y_t - \overline{Y}_t\right) + \underset{(0.05)}{0.83} r_{t-1}^{DT}, \tag{5}$$

where the numbers in parentheses are standard errors. The R^2 of the regression is 0.88 and the standard error of the estimate is 0.76.

Equation 5 implies that over the post-1979 period, the real interest rate has responded positively and significantly to inflation and output.

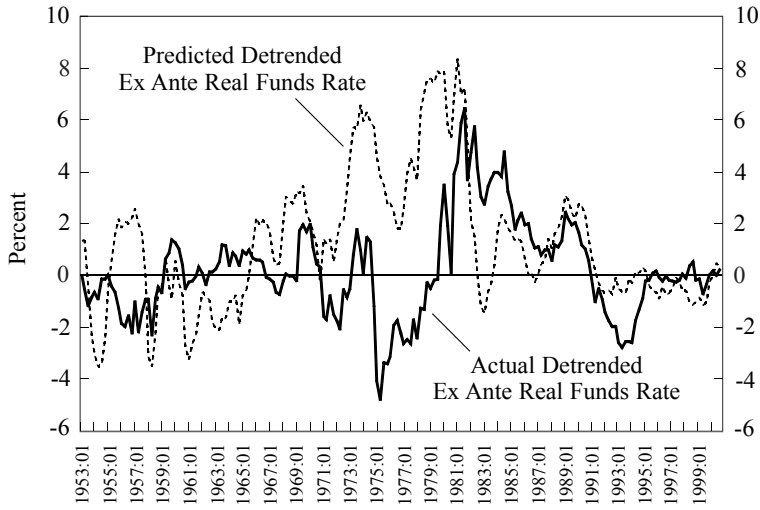
With a lagged dependent variable in the equation, the implied long-run responses of the real interest rate to inflation and output are given by $\beta/(1-\rho)$ and $\gamma/(1-\rho)$, respectively. Thus, because of the high estimate of ρ, the long-run responses of the real interest rate implied by equation 5 are substantial: a rise in inflation of 1 percentage point leads to a rise in the detrended real rate of 0.97 percentage points, and a rise in the deviation of output from trend of 1 percentage point leads to a rise in the detrended real rate of 0.81 percentage points.

Chart 5 compares the predictions of the estimated rule with the actual (detrended) real interest rate over the entire postwar period. The predictions of the rule shown in the figure are the implied long-run responses. That is, the value shown for quarter t is $\left[\alpha + \beta\pi_t + \gamma\left(Y_t - \overline{Y}_t\right)\right] / (1-\rho)$.

As many authors have noted, the actual funds rate tracks the rule fairly closely during the post-1979 period. The largest in-sample departures are early in the Volcker era. Even after the regime shift in October 1979, the real interest rate remained well below the value implied by the rule for a considerable period. The gap narrowed substantially from the extremely high levels of the years immediately preceding the regime shift. But the estimates in equation 5 imply that had policymakers responded to the very high inflation rates of late 1979 and 1980 in a manner typical of their behavior during the entire post-1979 period, they would have pursued even more contractionary policies. It was not until 1981:2 that the actual rate was within 2 percentage points of the value prescribed by the rule. There were large departures from the rule in the opposite direction in 1982 and 1983. During this period, the actual funds rate was more than 4 percentage points above the value implied by the rule for six quarters in a row.

These early departures from the estimated rule may have been the result of policymakers' emphasis on monetary aggregates in this period. Another possibility is that they stemmed from policymakers' uncertainty about the strength of the measures needed to accomplish their anti-inflationary objectives. The departures in 1979 and 1980 could also have arisen in part from a belief among monetary policymakers that there were political constraints on how quickly and strongly they could act, particularly just before a Presidential election.

Chart 5
Actual Real Federal Funds Rate and
Predicted Rate from a Post-1979 Monetary Rule



A final modern period when actual behavior departed significantly from the predictions of the rule was 1992 to 1993, when the actual rate was quite low relative to the predicted values. This presumably reflects the Federal Reserve's concern about the "credit crunch" of the early 1990s.

The more important message of chart 5, however, concerns the period before the emergence of the modern beliefs about stabilization policy. Between the fourth quarter of 1965 and the third quarter of 1979, the actual real rate was below the rate implied by the rule in every quarter except one. The average gap during the period 1965:4 to 1979:3 was 4.0 percentage points. Thus, monetary policy was substantially more expansionary than a modern rule would predict for nearly fifteen years.

While the gap is substantial in virtually all of the years, it is largest in the 1970s. To a large extent, this reflects the fact that inflation was higher in the 1970s. Policymakers in the 1960s were faced with high

output and low or moderate inflation. They chose to keep the real interest rate near its equilibrium level, and so departed moderately from the prescriptions of the rule. Policymakers in the 1970s were faced with high inflation and output fluctuating around its sustainable level. They chose to keep the real interest rate low, and so departed dramatically from the rule's prescription that the appropriate response to high inflation is a very high real rate.

That the deviations from what a post-1979 rule predicts are so large and so persistent in the 1960s and 1970s casts doubt on the plausibility of some alternative explanations for policymakers' behavior. For example, individual personalities, idiosyncratic political forces, and imperfect monetary targets are all factors that could influence policy for perhaps a few quarters or even a few years at a time, but not decades. Similarly, an unnoticed productivity slowdown or supply shocks might be able to explain inflationary aggregate demand policy for a few years in the 1970s, but cannot explain the large and persistent shifts that occurred. Fundamentally, running very expansionary policy for nearly fifteen years almost surely had to be a conscious decision, not an accident or miscalculation.

The decision to run expansionary policy in the 1960s and 1970s was completely consistent with the beliefs held by policymakers at the time. As shown in section II, for most of this time policymakers had very optimistic views about sustainable output growth and the ease of reducing inflation (and, at times, about the prospects for achieving permanently low unemployment). As a result, when faced with a given level of output and inflation, they followed dramatically more expansionary monetary policy than their modern counterparts would have. Also, in the early and late 1970s, policymakers came to believe that tightening would do little to reduce inflation. As a result, when faced with inflation they chose not to raise rates, as a modern rule would call for.

Finally, chart 5 shows that the real rate did not depart systematically from the predictions of the rule in the 1950s and early 1960s. Policy was noticeably tighter than the rule's prescriptions in 1954, noticeably looser in 1956 and 1957, and noticeably tighter again in 1963 and 1964. On average, the actual real interest rate in the period 1953:1 to

1965:4 was higher than that predicted by the modern rule, but only by 0.4 percentage points. Similarly, over the shorter period 1953:1 to 1960:4, the actual real rate was on average lower than the rule's prediction, but again only by 0.4 percentage points.

This fundamental similarity between monetary policy actions in the 1950s and those in the 1980s and 1990s is exactly what one would expect, given the fundamental similarity in policymakers' beliefs in the two periods. Like their modern counterparts, monetary policymakers in the 1950s had a realistic estimate of sustainable unemployment and a firm belief that overexpanding to the point of inflation would have adverse consequences. As a result, they pursued policies designed to keep inflation in check, while counteracting short-run deviations of output from trend, just as modern policymakers have.

That there were more substantial departures from the prescriptions of a modern rule in the 1950s and early 1960s than in the post-1979 period could just reflect changes in economic relationships between the 1950s and the last two decades of the twentieth century. One would expect out-of-sample prediction errors to be larger than in-sample errors. But, the larger departures in the early period are also consistent with the fact that the model used by policymakers in the 1950s was cruder and less carefully calibrated than the model used today. The cruder model, together with the early Federal Reserve's use of imperfect policy indicators, could easily have caused substantial transitory deviations from the prescriptions of a modern rule. But, the fundamental similarity in the early and late frameworks made the departures average roughly zero over the decade. That policymakers in the 1950s chose aggregate demand policies that look like modern choices but with a large random error is exactly what one would expect given the evolution of beliefs that has occurred.

VI Conclusion

There have been large changes in the conduct of stabilization policy in the United States during the past half century. In the 1950s, policymakers cautiously balanced concerns over inflation and real activity; in the 1960s, they focused vigorously on increasing real activity; in the

1970s, they pursued policies ranging from rapid expansion to full-fledged contraction to grudging tolerance of inflation; in the early 1980s, they followed a policy of aggressive disinflation; and since that time, they have again cautiously balanced the pursuit of real growth with concern about the possibility of inflation.

It is tempting to attribute these large variations in policy to variations in politics, ideology, or policymakers' underlying objectives. The evidence in this paper suggests, however, that an alternative hypothesis explains the main changes in macroeconomic policy. Our evidence shows that changes in economic understanding have been central to the evolution of stabilization policy. Throughout the postwar period, policymakers' fundamental goals have been the same: high growth, low inflation, and stability. But as policymakers' understanding of the economy evolved, the policies they adopted in pursuit of those fundamental objectives evolved.

In the 1950s, policymakers believed that the economy's capacity was clearly limited, that efforts to push the economy beyond that capacity would quickly produce inflation, and that inflation had substantial and rapid costs. As a result, while seeking to avoid downturns, they were extremely concerned about inflation and acted aggressively to try to prevent it. In the 1960s, policymakers thought that the economy's capacity was large, that expansion would have at most only moderate inflationary effects, and that modest inflation would not prevent the economy from operating at high levels. As a result, they moved aggressively to attempt to stimulate the economy to high levels of activity. In both the early and late 1970s (though less so in the middle of the decade), policymakers believed that inflation was almost impervious to slack in real activity. They therefore refrained from using significant aggregate demand restraint to attempt to control inflation and pursued a variety of nontraditional policies. Finally, in the 1980s policymakers concluded that nontraditional policies would not work, that traditional policies would, and that inflation was very harmful. They therefore moved aggressively to reduce inflation, and then tried to promote real activity while acting quickly to prevent or reverse even moderate resurgences of inflation.

Our analysis has focused on the role of policymakers' beliefs in explaining the evolution of aggregate demand policy in the United States. It is certainly the case, however, that similar gross changes in stabilization policy occurred in most industrialized countries. Throughout much of the industrialized world, policy developed an expansionary bias in the 1960s that continued into the 1970s, but ended by the 1980s. That these changes were so universal is strong evidence that idiosyncratic factors, such as politics and institutions, were not key. At the same time, beliefs about how the economy works tend to be correlated across countries, and so could provide an explanation for the worldwide changes that occurred. The obvious test of this conjecture would be to examine narrative evidence from other countries to determine whether the evolution of economic understanding that we observe in the United States was indeed an international phenomenon.

Our findings about the key role of economic understanding in the evolution of policy suggest both a note of optimism and a note of caution about the future of stabilization policy. The optimistic note is that because changes in economic understanding have been important to changes in the conduct of policy, policy should on average improve over time. If changes in policy were the result of changes in objectives and ideologies, we would expect to observe continual fluctuations in the conduct of policy as the political process produced leaders and policymakers with different goals and values. But accumulated experience, additional data, and new insights should lead to improvements in economic understanding over time, and thus to improvements in policy. For example, it seems very unlikely that modern policymakers faced with economic circumstances like those of the 1960s and 1970s would advocate the expansionary policies that were pursued then.

The note of caution is that while knowledge on average improves over time, its progress is not uniform. The history of policymakers' beliefs in the postwar era shows that there have been some twists and turns in economic understanding that have led to undesirable policies and outcomes. Policymakers in the 1950s appear to have had a more accurate assessment of the economy's capacity than their successors in the 1960s and 1970s, and a view of the effects of inflation that led them to more appropriate policies. Thus, we cannot be confident that

economic beliefs and the policies derived from them will continue to improve, or even that they will not worsen at times. Future policymakers therefore face the difficult task of distinguishing between genuine advances in economic understanding and appealing, but ultimately flawed, new ideas.

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Endnotes

[1] In his discussion of DeLong's paper, Taylor (1997) makes an argument similar to Mayer's.

[2] In a most confusing development, these brief summaries were renamed the *Minutes of Federal Open Market Committee Meetings* in 1993. To avoid confusing these brief summaries with the detailed *Minutes* for the pre-1976 period, we continue to cite the shorter summaries as the *Record of Policy Actions*. The *Record of Policy Actions* for a year is reproduced in that year's *Annual Report* of the Board of Governors of the Federal Reserve System. In the citations to the *Record of Policy Actions* that follow, the page numbers refer to the *Annual Report*. Because neither the detailed *Minutes* nor the *Transcripts* are currently available for the period 1976 to 1980 or 1997 to the present, we use only the *Record of Policy Actions* for these years.

[3] The discussion of monetary policymakers' beliefs in the 1950s in this section and in section IV draws heavily on Romer and Romer (2002).

[4] In describing the situations that policymakers found themselves in, for simplicity we cite modern data in cases (such as this one) where they are similar to the estimates that policymakers had at the time. Whenever the difference between the contemporaneous and modern figures is non-negligible, however, we use the contemporaneous figure and make clear that it was the estimate available at the time.

[5] The 1966 *Economic Report* argued that changes in the labor market had lowered the feasible unemployment rate to well below 4 percent. (*EROP*, 1966, pp. 42, 75-76.) Later *Economic Reports* reverted to the 4 percent figure, however.

[6] Policymakers in the 1960s did acknowledge that current inflation depended not just on unemployment, but on the inherited inflation rate as well. For example, policymakers at the beginning of 1967, with unemployment at 3.9 percent, stated: "A healthy advance of demand in pace with the growth of potential output would permit gradual restoration of price stability." (*EROP*, 1967, p. 38.) Similarly, for 1968 they expected "the unemployment rate to remain below 4 percent" with "a gradual slowing down of price increases." (*EROP*, 1968, p. 11.)

[7] See especially the discussion of discount rate policy in the 1974 *Annual Report* of the Board of Governors of the Federal Reserve System, pp. 107-110.

[8] Governor Meyer (2000) provided a particularly clear statement of this view.

[9] We obtain this series from the *Survey of Current Business* (typically from the March, June, September, and December issues). We calculate the inflation rate using data on both the quarter in question and the previous quarter from the same issue of the *Survey*. We switch from GNP data to GDP data in November 1991, when the Federal Reserve switched what it forecasts.

[10] Missing values are dealt with in the chart by interpolating between available observations. These values are not used in calculating the summary statistics in table 1.

[11] The pessimism about the sensitivity of inflation to slack in the early and late 1970s could have caused the Federal Reserve to overpredict inflation if it had been coupled with a realistic estimate of the natural rate and contractionary policy. But, because estimates of the natural rate were very optimistic and serious contractionary policies were not attempted in these periods, one would not expect to in fact observe overprediction.

[12] See, for example, Dornbusch, Fischer, and Startz (2001, p. 109). Reasonable variations in the assumed sensitivity of inflation have little impact on the results.

[13] Missing values are again dealt with in the chart by interpolating between available observations. The interpolated values are not used in computing summary statistics.

[14] The high implicit estimates of the natural rate in the mid-1970s could be due to forecasts of supply shocks. As described in section II, policymakers in this period began to believe that supply shocks were important. Since our calculation of the implicit estimate of the natural rate is done under the simplifying assumption that all forecasted movements in inflation are due to deviations of unemployment from the natural rate, forecasts of unfavorable supply shocks could make our deduced estimates of the natural rate larger than the actual beliefs of the forecasters. One piece of evidence that such forecasts of supply shocks could have been present in some forecasts in this period comes from the *Record of Policy Actions* for September 16, 1975. At this

meeting, "Staff projections continued to suggest ... a somewhat faster rise in average prices than in the first half, mainly reflecting increases in prices of food and energy products." (*RPA*, September 16, 1975, pp. 224-225.)

15 The unpublished quarterly values are derived by interpolating the CBO's annual figures.

16 The funds rate data that we use are quarterly averages from Citibase (August 2001). These data are available from 1954:1 to the present. We extend this series back to 1950:1 using data from Martens (1958). The data in Martens are given only in a figure. We deduced the estimates from the graph and then calibrated and checked our estimates using a period of overlap between the Martens data and the Citibase series.

17 The data on real GDP and the GDP implicit price deflator are also from Citibase (August 2001). The funds rate data that we use are quarterly averages. Therefore, one wants inflation over the same quarter. To construct this, we average the GDP deflator from a given quarter (t) and the quarter before. The rate of inflation between t and t+1 derived from this averaged series approximately reflects inflation from the start to the end of a given quarter. We calculate trend output for 1952:1 to 2000:4 by applying a Hodrick-Prescott filter to log real GDP.

18 We cannot calculate the ex ante real rate for the very early 1950s because we use lags of the federal funds rate in the estimation and our data on the funds rate do not start until 1950. However, the ex post real rate was extremely low (substantially negative) in 1950 and 1951, when nominal rates were low and inflation was high.

19 The slight additional fall in this ratio over the next few years was largely the result of the war, however, and not of deliberate fiscal stimulus.

20 See also the many similar statements by participants in the September 10, 1974, FOMC meeting quoted by Mayer (1998, p. 131).

21 Orphanides (2000) argues on the basis of statistical evidence that the major shifts in monetary policy in the period 1965 to 1993 were due largely to changes in policymakers' estimates of the path of actual output relative to the economy's potential. Our narrative evidence confirms Orphanides's conclusion that changing views about the output gap were important to the conduct of policy. But it shows that other aspects of policymakers' beliefs—the belief in a long-run tradeoff in the 1960s and, especially, the pessimism about the responsiveness of inflation to slack at various times in the 1970s—were also important to the conduct of policy. In addition, it seems unlikely that policymakers' estimates of the economy's potential were independent of other aspects of their beliefs. For example, during most of the 1960s and 1970s, estimates of the natural rate of unemployment were 4 percent or below. Since actual unemployment only rarely reached those levels, policymakers with a modern natural-rate framework and the information available at the time almost surely would have had higher estimates.

[22] The final *Economic Report* of the Carter Administration was more circumspect: although it stated the Administration's support for the Federal Reserve's policies, it focused mainly on the dangers of rigid adherence to money targets. (EROP, 1981, pp. 13-14, 50-57.)

[23] As described in section II, the evolution of the high-employment surplus over the last twenty years largely reflected policymakers' views about the proper size of government and the supply-side effects of tax cuts, not their beliefs about aggregate demand policy.

[24] Taylor (1999) performs a similar exercise. Rather than using an estimated rule for comparison with actual policy, however, he imposes coefficient values a priori. In addition, he does not account for the upward trend in the equilibrium real interest rate, and he does not consider the 1950s. He reaches broadly similar conclusions to ours about monetary policy since 1960.

[25] The results are robust to two natural variations. The first, following Clarida, Galí and Gertler (2000), is to estimate a forward-looking variant of equation 4. Specifically, we replace the measures of inflation and the output gap in equation 4 with inflation from quarter t to quarter t+1and the deviation of output from trend in quarter t+1. We then estimate the equation by instrumental variables, instrumenting with variables known at time t; we use the current value and two lags of inflation and of the deviation of output from trend (plus the lagged dependent variable and the constant) as the instruments. The results are quite similar to those in equation 5. The second variation, following Rudebusch (2001), is to replace the lagged dependent variable in the equation with an assumption that the error term follows an AR-1 process. The idea behind this specification is that the serial correlation of the departures of the funds rate from the predictions of a rule based on output and inflation may reflect not gradual adjustment by the Federal Reserve, but the presence of additional factors influencing the Federal Reserve's choice of the real rate that are serially correlated. This approach implies somewhat smaller responses of the real rate to inflation and output, but yields very similar conclusions about the relationship between the actual and prescribed real rate over the postwar era.

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Commentary: The Evolution of Economic Understanding and Postwar Stabilization Policy

Thomas J. Sargent

"You can get your information about the economy from admittedly fallible statistical relationships, or you can ask our uncle. I, for one, have never hesitated over this choice. But I fear there may be altogether too much uncle-asking in government circles in general, and in central banking circles in particular."—*Central Banking in Theory and Practice*, Alan Blinder, p. 9.

A new rendition of the "Berkeley story" 1

The topic of this session is "Changing Views about Stabilization Policy: A Historical Perspective." The Romers contribute to this topic by narrowing it. Mostly they use a narrative approach to buttress, refine, and extend the "Berkeley story" about post-World War II U.S. monetary policy.[1] The Berkeley story is that the monetary policy authorities knew an approximately correct model of the macroeconomy in the 1950s, forgot it in the late 1960s and early 1970s, made bad policy as a result, then relearned the correct model in the 1980s and thereupon improved policy. The Romers say that by 1970 the Fed accepted the natural rate hypothesis[2] and had appropriately modified its preferences by aiming to sustain unemployment at its best estimate of the natural rate of unemployment.[3] But the natural rate is, at best, a slowly moving hidden variable obscured in noise. Adopting a theme of Athanasios Orphanides (2003, 2002), the Romers attribute the Fed's

policy mistakes of the 1970s to its inaccurate estimates of the natural unemployment rate (or potential GDP). The Romers say that better estimates in the 1980s and 1990s facilitated better policy.

The Romers put changing ideas about the exploitability of the Phillips curve front and center. They assign Samuelson and Solow's 1960 paper an important role in creating the intellectual foundations for the policy mistakes that led to America's biggest peacetime inflation:

> In the early 1960s, policymakers adopted the Samuelson-Solow (1960) view that held that very low unemployment was an attainable long-run goal and suggested that there was a permanent tradeoff between inflation and unemployment (page 2).

The Romers' story is all about how policymakers temporarily went astray by forsaking a good model of the Phillips curve for a worse one, but eventually returned to the correct view:

> … perhaps the most interesting characteristic of this evolution of beliefs is that core beliefs ended the century at much the same point that they began the postwar era (page 3).

Omitted ideas 2

Interesting as the Romers' account is, it is particularly striking for how it neglects some of what I think were the most important and useful ideas that macroeconomists contributed to policy debates since WWII, including but not limited to these salient ones:[4] (1) rational expectations, (2) commitment and time consistency problems, (3) reputation as a substitute for commitment, (4) the disturbing multiplicity of reputational equilibria, (5) the development of systematic evidence that shock distributions widened then narrowed over the postwar period, (6) the subtle difficulties in empirically distinguishing time-invariant models from models with coefficient drift, especially with respect to low-frequency movements, and (7) uncertainty about model specification. The absence of these ideas from the Romers' account contrasts with the analysis of the art of central banking by former Vice Chairman Alan Blinder (1997). Blinder's book draws the reader into

considered arguments about aspects of almost all of these issues and how they inform or constrain monetary policy decisions.

I will briefly take up these ideas that are missing from the Romers' narration, and then make some comments about the advantages and disadvantages of a narrative approach to evaluating policy.

Rational expectations 2.1

Friedman's and Phelps's natural rate theory is incomplete without a theory about expectations. Friedman and Phelps both assumed adaptive expectations, an assumption that left open the possibility that there is considerable scope to exploit a Phillips curve. The natural rate hypothesis acquired its full power in limiting the scope of feasible counter policy only when Robert E. Lucas coupled it with the assumption of rational expectations.[5]

Time inconsistency and commitment 2.2

The assumption of rational expectations led to Kydland and Prescott's analysis of a time consistency problem that occurs when the natural rate hypothesis is true. They showed that when the public has rational expectations, a benevolent and fully informed monetary policy authority will choose a suboptimal policy if it cannot tie the hands of its successors. Choosing sequentially (i.e., holding Fed meetings recurrently and deciding meeting by meeting) worsens outcomes relative to what can be achieved if the Fed could precommit once and for all to a plan. The problem is not that the Fed has the wrong model or the wrong objectives but that it has to choose sequentially.

Reputation 2.3

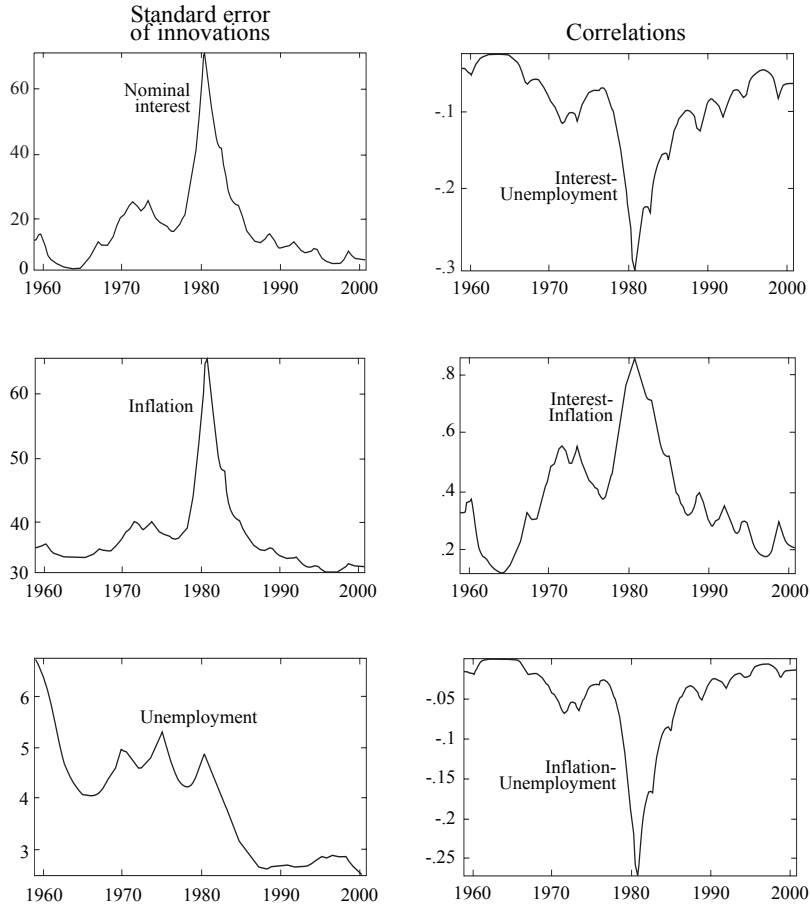
The time-consistent equilibrium of Kydland and Prescott restricts the strategy of the monetary authority not to depend on histories of actions and outcomes. This rules out reputational effects that can operate when strategies depend on histories. In response to the time-consistency problem, macroeconomists adapted ideas from game theory and showed that it is possible for the Fed's time-consistency problem

to be overcome if the public comes to have a system of expectations about the Fed's actions—a Fed reputation that the Fed wants to confirm because failure to do so would cause the Fed to acquire a reputation associated with worse outcomes.[6] The theory carries some good news and some bad news. The good news is that self-sustaining reputations exist that give rise to optimal outcomes and, thus, solve the time-consistency problem. The bad news is that the theory contains self-sustaining bad reputations, some of which actually give worse than time-consistent outcomes. In these bad self-sustaining equilibria, the Fed has incentives to confirm expectations that it will choose bad policy. In these bad equilibria, the Fed is caught in what Chari, Christiano, and Eichenbaum (1998) call an "expectations trap." These authors have strung together compelling quotations from Arthur Burns that convince them that Chairman Burns understood the natural rate hypothesis but thought of himself as caught in an expectations trap.

Coefficient drift and changing distributions of shocks 2.4

Lucas' 1976 critique of econometric policy evaluation procedures adduced drift in macroeconometric specifications as evidence of misspecification, especially ways of modelling the public's expectations formation. After Lucas, an important split has developed about whether macroeconometric relations have actually drifted and continued to drift. Some important researchers[7] offer evidence for the hypothesis that although the variances of shocks have evolved over time, the coefficients in VARs and monetary policy decision rules seem to have been stable over the post-WWII period.[8] Their evidence buttresses the view that it wasn't Fed behavior that changed between the late 1960s-1970s period and the Volcker-Greenspan era, but rather the distribution of shocks. The evidence says that shock variances for inflation increased markedly during the Burns period then came back down.[9] (Chart 1 contains estimates of the drifting-shock innovation variances and correlations for a three-variable VAR for the unemployment rate, a short-term nominal interest rate, and CPI inflation. The source is Cogley and Sargent (2002)). However, other researchers who fit alternative models have provided evidence that the coefficients of VARs and monetary policy decision rules have also drifted over the post-WWII period.[10] I would summarize the current state of the

Chart 1
Drifting Innovation Variances and Correlations



debate between the no-drift in VARs versus the drift in VARs school as follows: While there is convincing evidence about the post-WWII drift in shock variances, the evidence for or against coefficient drift is more tenuous and controversial because of the low statistical power that most tests of time invariance have against the kinds of drift that seems to be in post-WWII VARs. To me, this empirical literature

seems very relevant to the questions about the Fed's learning, forgetting, and changing behavior that are taken up by the Romers.

Drifting persistence of inflation and inference about the natural unemployment rate hypothesis *2.5*

Advocates of the drift-in-coefficients view have sought and found evidence that the *persistence* of inflation has drifted during the post-WWII period, with inflation not having much persistence during the Bretton-Woods subperiod, acquiring considerable persistence during the 1970s and early 1980s, then becoming less persistent recently. This drift in persistence is important in light of some formulations of the natural unemployment rate hypothesis.[11] See John Taylor (1998) for a discussion of the role of how evolving persistence in inflation can interact with an imperfect specification of the natural rate hypothesis to yield inferences about the natural rate hypothesis that unnecessarily depend on the persistence of inflation.

Difficulties in detecting trend breaks in productivity growth *2.6*

Breaks and drifts in the trend rate of productivity growth are statistically difficult to detect and to disentangle from higher-frequency movements. For example, application of two-state Markov switching models that have aimed to detect and estimate breaks in trend productivity growth have instead detected higher frequency shifts between booms and recessions. This literature has much to say about evaluating estimates of the natural rate of unemployment and potential GDP using real time data together with one-sided filters.

Model uncertainty *2.7*

Academic authorities from Milton Friedman to Alan Blinder have wrestled with how to respond to the fact that there is not a single macroeconomic model that they or other experts trust. Uncertainty about models, which is typically symptomized by wanting to bring *multiple* plausible models to bear in decision-making, naturally creates a desire for decisions that are cautious or robust to model specification.[12] When there are multiple models in play, it is a subtle question

about how to *learn* as new data become available. Economists' and statisticians' usual prescription for learning, which is to apply Bayes Law, presumes that a unique, but possibly very uncertain, model has been formulated.[13] One possible sense of Friedman's theme "long and variable lags" refers to model uncertainty in the sense of multiple models, because lags typically do vary across models.

The Romers' narrative 3

The Romers' narrative is fascinating, and I am very sympathetic to their story. But I think that a more nuanced and qualified view of the evidence would take into account some of the neglected ideas that I listed above. I have already mentioned Chari, Christiano, and Eichenbaum's (1998) work on expectations traps. In addition to the passages from Arthur Burns that these authors cite, distinguished monetary authorities like Blinder have written about the struggle about whether to confirm or disappoint what the market expects them to do. A credible government plan *is* an expectations trap, e.g., a system of expectations about the Fed's decision that the Fed has every incentive to confirm. By way of discussing credibility, chapter 3 of Blinder (1997) contains a compelling discussion of whether the monetary authority should always confirm the market's expectations. Blinder is talking about expectations traps and about how to cope with them.[14]

A second reason for being cautious about the Romers' narrative interpretation that it is literary and not tight enough to subject to statistical verification. The Romers write about the process of the Fed's forgetting and learning, but they don't specify a model of learning. When Chung (1990) and Sargent (1999) did write down and implement particular models of the Fed's learning process, they found that the Berkeley story has trouble fitting the facts because, by applying statistical procedures much like Samuelson and Solow's, the Fed would have learned to stop trying to exploit the Phillips curve at least by the early 1970s. That feature of the learning process diminishes the statistical fit of the story. One might come out of such statistical exercises with less confidence about the Berkeley story than the Romers' narrative conveys.

Hindsight and the unavoidable subjectivity of a narrative approach 4

Morris Zapp's dictum that "every decoding is another encoding" warns us that a narrative approach is treacherous.[15] The narrator must filter the historical record, and any sensible filter is based on a model, so that the narrative has to reflect the narrator's own model. To illustrate some of the inherent difficulties of the narrative approach, I offer my own commentary on a string of quotations from a pair of prominent macroeconomists and policy advisers who wrote during the early 1960s. Before asking you to guess who they are, I will refer to these authorities as Professors X and Y. My commentary unfolds.

Ahead of their time: warnings about instability of the Phillips curve *4.1*

Professors X and Y convey a keen awareness that macroeconomics had not settled upon a commonly accepted model for interpreting output-inflation dynamics:

> Rather than pronounce on the terribly difficult question as to exactly which is the best model to use in explaining the recent past and predicting the likely future, we shall try to emphasize the types of evidence which can help decide between the conflicting theories. (p. 177.)

As was typical at that time, Professors X and Y started from a benchmark model that asserted that monetary expansions would have no effect on real variables if they were engineered in a way to make them purely equivalent to changes in units of account. However, Professors X and Y emphasize that empirically most changes in money don't satisfy those neutrality conditions:

> But as Hume had early recognized, the periods of rising prices seemed to give rise to at least transient stimulus to the economy as active profit seekers gained an advantage at the expense of the more inert fixed-income, creditor, and wage sectors. (p. 178.)

They, thus, caution that:

> …This illustrates the danger of going from the innocent hypothesis, that a balanced change in all prices in the long run be consistent with no substantive changes in real relations, to an overly simple interpretation of a complicated change that is actually taking place in historical reality. (p. 179.)

Professors X and Y are cautious about using data to make inferences about competing views of inflation:

> What appear at first to be subtle and reliable ways of distinguishing cost-induced from demand-induced inflation turn out to be far from airtight. In fact we are driven to the belief that aggregate data, recording the ex post details of completed transactions, may in most circumstances be quite insufficient. It may be necessary to disaggregate. (p. 182.)

Professors X and Y understand that expectations about the future shape current decisions, which means that inflation, output cross-correlations have a dynamic structure that must be interpreted carefully:

> …in a closely interdependent economy, effects can precede causes. Prices may begin to ease up because wage rates are expected to. (p. 183.)

> …a period of high demand and rising prices molds attitudes, expectations, even institutions in such a way to bias the future in favor of future inflation. (p. 185.)

Professors X and Y were ahead of their time in being skeptical about the permanence of an observed tradeoff between inflation and unemployment:

> …there is a suggestion that in this country it might take 8 to 10 percent unemployment to stabilize money wages. But would it take 8 to 10 percent unemployment forever to stabilize the money wage? Is not this kind of relationship one

> which depends heavily on remembered experience? We suspect that this is another way in which a past characterized by rising prices, high employment, and mild, short recessions is likely to breed an inflationary bias…(p. 187.)

Furthermore, Professors X and Y point out that long enough time series of U.S. data don't reveal much of a tradeoff anyway:

> A first look at the scatter [of U.S. unemployment versus the increase in the money wage] is discouraging; there are points all over the place. (p. 188.)

They go on to note that it is only by focusing on short enough subsamples that they can spot a tradeoff between inflation and unemployment, and they emphasize the past instability of those short-period tradeoffs:

> What is most interesting is the strong suggestion that the relation [between unemployment and money wage increases], such as it is, has shifted upward slightly but noticeably in the forties and fifties. (p. 189.)

Professors X and Y go on to emphasize the *prospective* instability of such a tradeoff should policymakers attempt to exploit it:

> All of our discussion has been phrased in short-run terms, dealing with what might happen in the next few years. It would be wrong, though, to think that our figure 2 menu that relates obtainable price and unemployment behavior will maintain its shape in the longer run. What we do in a policy way during the next few years might cause it to shift in a definite way. ...it might be that the low pressure demand would so act upon wages and other expectations as to shift the curve downward in the longer run—so that over a decade, the economy might enjoy higher employment than our present day estimate would indicate.[16] (p. 193.)

Although this passage was written a number of years before Edmund

Phelps and Milton Friedman formulated the natural unemployment rate hypothesis, it clearly conveys the sense that there is a family of Phillips curves indexed by the public's expected rate of inflation. There is also a firm suggestion of the Lucas critique, in particular that the location of the Phillips curve depends on monetary policy choices, through their effects on peoples' expectations of inflation.

This ends my commentary, which is sincere. I reveal the authors next.

Professors X and Y revealed *4.2*

Professors X and Y are Paul Samuelson and Robert Solow, and the quotations are all from their much-maligned May 1960 *American Economic Review* article "Analytical Aspects of Anti-Inflation Policy." Romer and Romer join a host of previous writers who put black hats on Samuelson and Solow in the passage cited on page 1 of this note.

tive history that you wrote is that the words "real interest rate" do not appear until very late in the 1970s. A big part of the problem in the 1960s and the 1970s was that Martin and other people, including people in the academic profession, believed that nominal interest rates of 6 or 7 percent were really very high rates. And even though they had learned to think about expectations, they had not learned to think about real interest rates and they don't use the words "real interest rates" until very, very late in the period. So, that was a big thing. That was the same problem they had in the 1920s. They just didn't believe that interest rates of 6 or 8 percent were politically acceptable.

Second, I think it is very difficult to explain the 1950s and 1960s without recognizing that Chairman Martin was there during both periods. If there is anything that I know from having met with him and his consultants at various meetings and reading what he had to say in the minutes, it is that he certainly did not have a macroeconomic model. He would have been the first to deny that he had anything like a macroeconomic model. He didn't like macroeconomic models. I am not even sure whether he liked economists. So, you need to explain how this same person—Martin—could have had a low-inflation strategy, and very decidedly so, in the 1950s and then given it up in the 1960s. How did he happen to help finance the Vietnam War?

I would say that for most of the 1950s, the dominant personality in terms of thinking about how the Fed reacted was Winfield Riefler. He did not have an economic model. He had not had an economic model in the 1920s, except for a very short-term relationship between member bank borrowing, or free reserves, and what the Fed was doing. What Winfield Riefler had in his head, which he says many times in those minutes is, "You have to look at the relationship between money growth and the rate of growth of output." And that got lost. Martin didn't really believe much in monetarism. In fact, he didn't believe in it at all. But Winfield Riefler did and, to a considerable extent, so did Thomas, who took his place after Riefler retired in the late 1950s. That is an important part, and you need to explain something about how Martin changed.

The third thing I would add, which I think is missing in your account, is the role of politics. You have Eisenhower at one end and

Reagan at the other. That makes a considerable difference to what is going to happen both to fiscal policy and to the kinds of pressures that the Fed is going to be under. Then, you have people in between, like Johnson and Nixon. Nixon never tired of telling Arthur Burns, "Arthur, you warned me about the 1960s but cost it me the election. You are not going to do that again, are you Arthur?" Or, you have Lyndon Johnson who tells Walter Heller, "Call up Robertson and say, 'If you are going to be reappointed, will you follow your president or will you work against your president?'" And Robertson, according to Heller, says, "Of course, I'll follow my president." So, Johnson says to Heller, "Okay, tell him we are going to reappoint him." Politics makes a big difference. And politics doesn't play a role in your story but it certainly played a role in the pressures that were on the Fed in the 1960s and the 1970s—from Lyndon Johnson, Richard Nixon, and probably the Carter Administration. And finally, of course, what got lost in the late 1960s and the 1970s was the belief that money growth had something to do with inflation.

Mr. Fischer: Thanks very much, Allan. Just to clarify, Allan is also writing a history of the Fed, so he has taken a close look at the record. We will turn now to the Romers for a quick response. We then have four more questions. I would ask the next questioners to be brief.

Ms. Romer: I will be brief too. I want to make one thing clear: We are very much not about where policymakers' beliefs came from. One of the ways that we limited our paper is to only look at what policymakers believed not why they believed it. The role of academics and the role of learning are at some level outside our story. It is not that we don't think these issues are important, it is just that they are beyond the scope of this study.

Likewise, on the role of politics, the way we envisioned our question is—how far can we get in explaining the changes in stabilization policy with only the change in policymakers' beliefs. Again, I agree that an element of politics is certainly important. What I think surprised us is how far we could get in explaining the evolution of policy with only views.

On Chairman Martin, one thing to say is he may have not said that

he had a macro model, but he had a framework. He was making decisions, he had views about how the economy worked, and what inflation did to the economy. You can't make policy without some view about how the economy works. On this idea about how quickly the framework changes, and how Martin changes, it is not necessarily that a particular person's view changes. Rather, what may change is the belief carrying weight within the FOMC. Our view of Martin is that at some point—and again this is speculating and something we are working on—loses faith in his own framework, the framework that had inflation being very costly.

In response to Allen Sinai's comment on the Greenbooks, again we're looking for data. We were trying to get some indicator of policymakers' beliefs other than narrative evidence. When the Fed staff members make their forecast, does that reflect the Board? Does it influence the Board? I guess my naive view is that if the staff were coming in with a wacky model that wasn't being supported by the members of the FOMC, they wouldn't be there for long. So, I would still stand by this notion that there is some relationship between the model inherent in the staff forecast and the beliefs of actual policymakers. And, whether the modern Federal Reserve rejected the natural rate hypothesis in the 1990s, I think the much more plausible view of what happened is that they kept the framework and they greatly lowered the estimate of the natural rate. So, I don't think you have to say they threw away the whole model.

Mr. Romer: Two very brief things. Alan cited the standard error for estimates of the natural rate. That was a paper published in roughly 1997. It was a stunning result. Reading especially the *Economic Reports* of the 1960s, you expect from their tone to see the second and third decimal places on their estimates of the natural rate. They really think they understand what is going on, and they are willing to discount evidence that goes against it. They are willing to work very hard to move the economy to what they think is the natural rate.

Regarding politics, Tom Mayer had a line that I found very persuasive. He said, "If the political story were really central, what you would see in reading the records of the Fed, is that the Fed is straining

at the leash all the time." You occasionally see a Fed that is in conflict with the White House. You don't see a Fed that for two decades is trying to do something that it wants to do but feels grossly constrained by outside pressures.

Mr. Fischer: Thanks.

Mr. Cotis: I think this paper is fascinating, but it's empirical part may be less convincing than it could be. I think one big omission is supply-side shocks and more specifically oil shocks. This omission has an impact on some of your empirical findings, and it might lead you to overstate a little bit your case increased knowledge of the economy leading to better performance of policy makers over time.

Let's look at two or three illustrations—accuracy of the Fed forecast, for instance. If we look at chart 1 in your paper, we see that errors are massively concentrated during the oil shock period. Like everyone else, Fed forecasters were taken by surprise and their forecasts were too inert. After that, we moved to a much steadier inflation regime, and the accuracy of the forecast got much better—basically because the task was much easier too.

The second illustration deals with the natural rates of unemployment implicit in the Fed forecasts. Had you controlled for variations in the terms of trade in your calculations, you would have ended up with a much smoother series and a lot less hiccups to explain away through political considerations.

The third illustration is distance to the Taylor rule in terms of interest rate setting. The period where the mismatch is the biggest by far is the oil-shock period. I'm not sure that a very simple version of the Taylor rule provides us with the best gauge to assess the accuracy of monetary policy. In these very special circumstances, we need to disentangle between underlying and actual inflation. So, maybe you are overstating a little bit your case by really not taking into account the changing in the nature of shocks hitting the economy over the period.

Mr. Fischer: Thanks very much. The final three questions or com-

ments will be from Bill Poole, Philippa Malmgren, and Larry Summers.

Mr. Poole: I think the paper should give more emphasis to the debates on monetarism. I would comment on two aspects of it. Certainly, the debate over the role of money was continuous during this period. It had an important bearing on Fed policy and on market behavior. As the 1970s went on, you saw more and more market responses—interest rate responses—to the weekly announcements of money growth clearly was important in the policy turn in 1979. So, it had a real bearing on what happened in monetary policy.

Secondly, there was a big debate over the relative roles of monetary and fiscal policy. In the 1960s particularly, monetary policy within the Federal Reserve was thought to be almost a sideshow, and the critical issue the Fed saw at that time was the need for fiscal response to the Vietnam War. That was part of the reason why the Fed's response was so delayed. Here again, this was an important academic debate—the relative role of money and monetary and fiscal policy. The Fed was on the wrong side of that—certainly in the mid- to late 1960s.

Ms. Malmgren: I thought the central idea of your paper—that the objectives of policy have not changed over the years: high growth, low inflation, stability—are all there. But the relative mix of them has changed at times. There were three pieces that could be added that would help explain the change in the mix.

One is (and I'll pose it in the form of a question): Has the quality of the data that the policymakers are working with changed sufficiently over time to help explain why certain decisions were made? In other words, the absence of certain information, or low quality of it, perhaps is an important factor.

That feeds into a second point, which is the speed at which policy influenced the economy. Has that changed over time? Is that an important feature of that relative mix?

And third, something you hinted at but did didn't go into, is whether

the personal and recent experiences of policymakers influence that relative mix as well. In other words, it is that old idea that somehow central bankers can sometimes be dominated by looking in the rearview mirror at the last accident that occurred. I am wondering whether there might be a role for that to play in the analysis that you undertake.

Mr. Summers: I thought the paper was terrific. The first comment I was going to make was on Allan Meltzer's comment about nominal and real interest rates, which feels like a major issue to me. Part of what was terrific about the paper was that it stayed away from the explanation of specific events in terms of political factors. An important argument for that approach is that if you looked at the broad history of England and, I suspect, much of Europe through much of this period—low inflation, expansion, of getting it back under control in the 1980s—it would be parallel and that speaks to the importance of what the paper is trying to analyze, which is the broad Zeitgeist in which policy was operating.

That said, I thought Tom Sargent had it more right than the authors did on the 1970s. It seemed to me that what the authors attribute to misleading estimates of the natural rate and to belief that disinflation works painfully could also very well be understood, as everybody had a built-in expectation that inflation was just going to continue, and it was so tough to fight that it wasn't worth the bother. Then, there was a growing understanding in which the academic literature probably played a small part of the importance of credibility—doing things to gain credibility. The heavy focus on the notion of independent central banking that became a part of discussions of this kind in the 1980s, but was not nearly as much a part of discussion in the 1950s, supports that interpretation. So, I would tell the story somewhat differently for the latter period of policy error.

Mr. Fischer: Thanks, Larry. Christina and David. Do you have any final comments?

Ms. Romer: I want to address this issue about the real interest rate. While I certainly agree with Allan Meltzer that it is not mentioned, I think that is too simplistic. In particular, when you read the Federal

Reserve records for the 1950s, policymakers were not stupid. And, although they don't say the term, "the real interest rate," there is a lot of discussion that the nominal rate is high because expectations of inflation are high. They certainly understand that there is something else out there that matters. There is a view that somehow the 1960s and 1970s were all just an accident: monetary policymakers were looking at the wrong indicator, they were looking at free reserves, or the nominal rate, and they just missed what was going on. But what we are talking about are gross changes. These are not subtle little changes over the last fifty years. The 1960s and the 1970s had a very different policy—there was an extreme expansionary bias to policy. This gross change is coming precisely from policymakers' model of the economy.

Regarding the point about the changing objectives, what we want to say is that objectives didn't change somehow for intrinsic reasons. Policymakers didn't wake up one day and say they care more about inflation than before. I believe that their objectives changed because their model changed. If you have a model where inflation is unbelievably costly, you care more about it. It is not somehow distinct from the model.

Mr. Fischer: David, any last word?

Mr. Romer: I don't have a lot to add to that. On this question of whether these things come from tactical errors or supply shocks: Looking at what they thought was going to happen to the economy will get you a long way from these issues about tactics and so on. If you look either explicitly at the forecasts or you look at what they were saying, they were thinking most of the time they were going to operate the economy at what, in retrospect, looks like a pretty high level. Depending on the era, either they thought inflation was going to nicely go away by itself or, in some periods, that inflation would persist. They were just willing to live with that. I can't pronounce complicated German words, but I think Larry is right to say it is the Zeitgeist of the era that is the driving force and not the narrower things.

Mr. Fischer: One last comment that Bill Poole has left. Before the session, Bill was saying, "We also need to remember that we had a pegged exchange rate in the 1950s and into the 1960s." That had an influence, probably, on creating more coherence in William McChesney Martin's thinking than various comments have implied.

Is There a Role for Discretionary Fiscal Policy?

Alan J. Auerbach

Introduction

On March 9, 2002, President Bush signed the Job Creation and Worker Assistance Act. The act included a temporary increase in depreciation allowances for business spending on equipment and software, in the form of 30 percent partial expensing and a temporary extension of unemployment benefits. At the time, the motivation of the act was that it would provide fiscal stimulus that could help the economy recover from the first recession in a decade. Yet, whether the economy was still officially in recession at the time was not known, because the National Bureau of Economic Research (NBER) dating of the recession trough had not yet occurred. Indeed, there was a clear possibility that the recession might be over. On February 28, the Bureau of Economic Analysis had released "preliminary" estimates showing that real GDP had grown at an annual rate of 1.4 percent in the fourth quarter of 2001, following a real decline of 1.3 percent in the third quarter—a decline substantially associated with the economic disruptions caused by the September 11 attacks. This preliminary estimate updated the "advance" estimate of 0.2 percent fourth quarter growth released January 30.[1]

The difficulty of practicing countercyclical fiscal policy has been a staple of macroeconomics textbooks for decades. With the typical postwar recession lasting less than a year and discretionary fiscal changes subject to information, political, and economic lags,

knowledgeable policymakers have understood the daunting task they faced. But the strong support for this most recent "stimulus package" reminds us that policymakers may go where economists fear to tread. No politician wishes to be cast in the title role of "It's the Economy, Stupid."

Even as the practice of countercyclical fiscal policy has survived, the period since the golden days of "fine-tuning" has provided further caveats about its use, dating from Lucas' celebrated critique in the 1970s, emphasizing that activist policy must take account of its effects on the expectations of firms and households, to the more recent argument that tax cuts may fail to be expansionary in circumstances of budgetary duress. With the recent recession and legislative action, it is a good time to review the state of discretionary fiscal policy, considering the extent of its use, its successes and failures, and the extent to which alternative policies have been or might be available. Rather than attempting a comprehensive survey, I consider several of the issues that have arisen recently in consideration of the efficacy of fiscal policy.

How active has U.S. fiscal policy been in recent decades?

In embarking on a study of U.S. discretionary fiscal policy, it makes sense to ask how active policy has been and whether the degree of activism has changed over the years. While these are simple and straightforward questions, their answers are not. One cannot simply look at quarterly or annual changes in federal taxes and spending.

Cyclical adjustment

The most obvious problem with looking at fluctuations in tax revenues, spending, or their difference—the budget surplus—is that each of these aggregates—especially tax revenues—is sensitive to the economic cycle. Changes occur without any active policy decisions. Indeed, as discussed further below, these changes may serve as automatic stabilizers, but they need to be left aside in attempting to measure active policy changes.

The Congressional Budget Office (CBO) computes a cyclically adjusted quarterly measure of the federal budget surplus, based on the

National Income and Product Account (NIPA) seasonally adjusted quarterly surplus measure.[2] This "full-employment" surplus series, available from the first quarter of 1956, provides a measure of how policy has changed at the quarterly frequency; it is helpful to examine fiscal behavior at this frequency in studying countercyclical policy, given that the period of the typical recession is less than one year.[3]

Table 1 presents regressions relating the change in the full-employment budget surplus to the lagged measure of the full-employment GDP gap, with both measures divided by the level of full-employment GDP. The first column presents the simple regression relating these two variables over the full sample period. The negative coefficient indicates that the full-employment surplus has fallen in response to a rise in the GDP gap, consistent with the use of discretionary countercyclical fiscal policy. The relationship, however, is weak and not statistically significant. But there are, of course, other determinants of fiscal policy. As many authors have emphasized,[4] U.S. fiscal policy over the years has had the property that increased levels of national debt lead to higher subsequent budget surpluses. In first differences, this implies that a higher deficit in the past should cause a tightening of policy—an increase in the current surplus. Adding the lagged budget surplus to the regression, in the second column of table 1, confirms this prediction. The higher is the lagged budget surplus, the larger is the fall in the current full-employment surplus. This relationship is statistically significant; so too, now, is the effect of the lagged output gap.

Has the responsiveness of policy to the cycle and to the degree of fiscal balance changed over time? The final three columns of table 1 address this question by repeating the estimation of column 2 for three subsamples. Column 5 covers the period since the second quarter of 1993, roughly corresponding to the beginning of the Clinton Administration. Column 4 covers a period of equal length immediately preceding this, and column 3 covers the balance of the sample period, through the second quarter of 1984. For this initial period, the relationship is comparable to that of the full period shown in column 2. For the subperiod extending from 1984 to 1993, though, the estimates indicate that policy was more responsive both to the cycle and to the prior budget surplus. The sensitivity to the surplus, in particular, shows a

Table 1
Determinants of the Full-Employment Surplus
Dependent Variable: Quarterly Change in Full-Employment Surplus, Relative to Full-Employment GDP
(standard errors in parentheses)

	(1)	(2)	(3)	(4)	(5)
Independent Variable	1956:2—2001:4	1956:2—2001:4	1956:2—1984:2	1984:3—1993:1	1993:2—2001:4
Constant	0.003 (0.040)	-0.087* (0.051)	-0.121* (0.066)	-0.771** (0.361)	-0.154 (0.110)
GDP gap (-1)	-0.024 (0.016)	-.057*** (.019)	-0.060** (0.024)	-0.136** (0.065)	-0.358*** (0.126)
Budget surplus (-1)	—	-0.070*** (0.025)	-0.096** (0.042)	-0.250** (0.109)	-0.285*** (0.092)
$\bar{R}^2$	.008	.044	.044	.106	.184
Number of observations	183	183	113	35	35

* significant at the .10 level
** significant at the .05 level
*** significant at the .01 level

Source: Congressional Budget Office.

marked increase during this period that followed the large Reagan tax cuts phased in beginning in 1981 that, along with the contemporaneous defense buildup and other factors, led to a sharp expansion in national debt and deficits relative to GDP. During the final period, covering the Clinton years and the beginning of the current Bush Administration, the influence of the budget surplus and, especially, the output gap, increases again. The coefficient on the output gap predicts that the full-employment surplus falls by over a third of the previous quarter's output gap.

To put this last coefficient estimate in context, consider the implied effect of an increase of 1 percentage point in the unemployment rate. Based on the recent Okun's law relationship, this implies a roughly 2 percent drop in output relative to its full-employment level. The coefficient of -.358 on the output gap implies a corresponding rise in the full-employment deficit of -.72 percent in the next quarter—about $75 billion on an annual basis at the current level of GDP.

In summary, based on the estimates in table 1, U.S. fiscal policy, as measured by changes in the full-employment deficit, appears to have been responsive to both cyclical and budgetary conditions, with the sensitivity to each factor increasing over time.

Timing and measurement of response

Even purged of automatic cyclical changes in revenues and spending, there are a number of reasons why the current full-employment deficit may not offer an ideal measure of the state of fiscal policy. First, there may be changes occurring over time that have nothing to do with policy actions. For example, increasing dispersion of the income distribution, as occurred during the 1980s and 1990s, led to increased tax revenues through the progressivity of the individual income tax. To the extent that such changes occur smoothly over time, they will be picked up by the constant in table 1's regression model, but their patterns may be more complex than this.[5]

Second, a change in the full-employment surplus, even if resulting from a policy change, is not necessarily due to a *contemporaneous*

policy change. Several major pieces of tax legislation in recent decades have included phase-in provisions that confound interpretation of changes in the full-employment deficit. Consider the sequence of events in the early 1980s. After the massive tax cut embodied in the Economic Recovery Tax Act of 1981, there were smaller but still significant tax increases passed in the years immediately following. The net impact, though, was still a phased reduction in taxes. As the 1981 legislation included tax-cut provisions that took effect as late as 1985 (when bracket indexation became effective), the net changes during the early 1980s might have appeared expansionary, even as restrictive legislation was being passed. A similar situation exists now as a result of the 2001 passage of the Economic Growth and Tax Relief Reconciliation Act (EGTRRA). That legislation's provisions are scheduled to be phased in over a ten-year period. Should these future changes occur during periods of recession, they might appear to reflect the use of countercyclical discretionary policy, even though they were enacted long before such conditions existed or were even contemplated.

Finally, as has long been noted, changes in particular components of the surplus—most obviously, changes in spending as opposed to changes in revenues—should have different effects on aggregate demand. Thus, the change in the deficit, even cyclically adjusted, is inadequate to convey the magnitude of stimulus to aggregate demand. For all three of these reasons—non-cyclical autonomous changes, timing, and composition, an alternative measure of fiscal policy, based on explicit policy changes, may be preferred. For this purpose, one may construct a series using the periodic fiscal updates published by the CBO.

For many years, CBO has provided frequent updates of its baseline revenue and expenditure forecasts for the federal budget, covering the current fiscal year and several future fiscal years. With each update, it allocates changes in forecast revenues and expenditures to legislative or policy actions, on the one hand, and economic factors on the other (which it breaks down further into "economic"—macroeconomic—and "technical" sources, such as those associated with shifts in the income distribution). CBO typically publishes two major revisions incorporating updated economic forecasts during each year, the

Economic and Budget Outlook in late January or early February, and the *Economic and Budget Outlook Update* during the summer. By accumulating changes between each of these forecasts (including intermediate revisions, such as those typically made in response to the release of the President's budget), one may derive a roughly semiannual series of forecast changes in revenues and expenditures. In the past, I have used the resulting series to evaluate CBO's forecasting record, focusing primarily on the revisions *not* related to policy (Auerbach 1994, 1999), but also focusing, as here, on the determinants of policy, albeit at an annual frequency (Auerbach 2000).

Data from CBO forecast revisions are available since summer 1984 as the pattern of semiannual forecasts begins with the winter 1984 *Budget Outlook*. For each observation, I measure the policy change with respect revenues, expenditures,[6] or their difference—the surplus—as the discounted sum of policy changes adopted during the interval for the current and subsequent five fiscal years (relative to each year's corresponding measure of potential GDP), with the six weights normalized to sum to 1.[7] Based on a simple goodness-of-fit measure (the regression's $\overline{R}^2$) in a search over different values, I choose a discount factor of .5, meaning that each succeeding fiscal year's policy change is accorded half the weight of the previous one.[8] To facilitate comparison with the results in table 1, I relate these fiscal policy changes to lagged values of the full-employment GDP gap from the prior quarter, and the previous fiscal year surplus.[9] Table 2 presents the results of these regressions, for the three dependent variables, for the full sample period and the first and second halves of the sample period, which approximately correspond to the last two subperiods examined in table 1.

The results in table 2 are generally consistent with those in table 1. Over the full sample period, both the GDP gap and the budget surplus exert a significant, negative impact on surplus-enhancing policy actions, with both revenues and outlays responding in a consistent manner. The strength and precision of the effects are smaller for the overall surplus during the first half of the sample period than in the second, as was the case for these two periods in table 1. As can be seen from the breakdown between revenues and outlays, though, this strengthened responsiveness since 1993 is due to behavior on the

Table 2
Determinants of Policy Changes
Dependent Variable: Semiannual Legislated Change in Surplus, Revenue, and Outlays Relative to Full-Employment GDP (standard errors in parentheses)

	Dependent Variable								
	Surplus (exc. debt service)			Revenues			Outlays (exc. debt service)		
Independent Variable	1984:2—2002:1	1984:2—1993:1	1993:2—2002:1	1984:2—2002:1	1984:2—1993:1	1993:2 2002:1	1984:2—2002:1	1984:2—1993:1	1993:2—2002:1
Constant	-0.211***	-0.400	-0.254***	-0.077*	-0.119	-0.122*	0.134**	0.281	0.132***
	(0.074)	(0.463)	(0.062)	(0.040)	(0.180)	(0.060)	(0.054)	(0.355)	(0.040)
GDP gap (-1)	-0.078*	-0.100	-0.158**	-0.024	-0.026	-0.095	0.055*	0.074	0.063
	(0.043)	(0.077)	(0.067)	(0.023)	(0.030)	(0.065)	(0.031)	(0.059)	(0.044)
Budget surplus (-1)	-0.110***	-0.152	-0.182***	-0.043**	-0.049	-0.102**	0.067***	0.103	0.080**
	(0.029)	(0.121)	(0.047)	(0.016)	(0.047)	(0.046)	(0.021)	(0.092)	(0.031)
$\overline{R}^2$	.317	-.006	.618	.208	-.054	.280	.213	-.022	.442
Number of observations	36	36	36	18	18	18	18	18	18

* significant at the .10 level
** significant at the .05 level
*** significant at the .01 level

Source: Congressional Budget Office.

revenue side, as outlay responses are relatively similar (and not statistically different) during the two halves of the sample period.

The responsiveness of revenues to the budget surplus since 1993 is quite consistent with the pattern of major tax legislation, with the tax increase of 1993 occurring at a time of large budget deficits being followed by a small tax cut in 1997, when the deficit was much smaller, and a large tax cut in 2001, when the budget was in surplus. What is, perhaps, more surprising is that this same increased sensitivity does not also show up on the outlay side. After a period of effective downward pressure on discretionary spending, associated with the multiyear spending caps initiated by the Budget Enforcement Act in 1990 and extended by legislation in 1993 and 1997, the decade closed with a surge in "emergency" spending in 1999 and 2000, meant to override the spending caps, with the caps simply being ignored thereafter, even before the post-September 11 surge in national security spending.

Part of the explanation for this lack of the expected empirical finding may be the behavior of entitlement spending, which has been growing in importance over the years, or the conventions used to determine when spending policy has "changed." This is typically a more difficult task than is faced on the revenue side, where policy changes primarily just track actual legislative changes. To address each of these concerns, I consider, in table 3, the behavior of discretionary spending over the years. These data are available since fiscal year 1962, so the first observed change in fiscal year spending is for 1963. The table relates actual year-to-year changes in discretionary spending to the prior year's GDP gap[10] and budget surplus, all relative to full-employment GDP. This exercise has two advantages over the examination of outlays in table 2: It focuses only on discretionary spending, and considers actual spending changes, rather than changes in forecast spending. It also has the disadvantages of being at an annual frequency, making an evaluation of countercyclical responses problematic and including changes in spending that might be the automatic result of cyclical factors. This second problem should not be a major concern, though, given that the focus is on *discretionary* spending.

For the full sample, in table 3's first column, the coefficients of the

Table 3
Determinants of Discretionary Spending
Dependent Variable: Annual Fiscal-Year Change in Discretionary Spending, Relative to Full-Employment GDP
(standard errors in parentheses)

	(1)	(2)	(3)	(4)	(5)
Independent Variable	1963—2001	1963—2001	1963—1983	1984—1992	1993—2001
Constant	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.002)	-0.005 (0.004)	-0.001** (0.0005)
GDP gap (-1)	0.005 (0.038)	—	—	—	—
Budget surplus (-1)	0.026 (0.052)	0.022 (0.038)	0.042 (0.105)	-0.078 (0.088)	0.061** (0.018)
$\overline{R}^2$	-0.046	-0.018	-0.044	-0.027	0.570
Number of observations	39	39	21	9	9

** significant at the .05 level

Source: Congressional Budget Office.

GDP gap and the budget surplus both have the predicted sign, but both are small and neither is estimated precisely. In all specifications and time periods, the GDP gap was quite insignificant, suggesting a weak relationship at the annual frequency. Thus, the remaining columns present estimates excluding this variable, for the full sample period and three subperiods, the last two, 1984-1992 and 1993-2001, corresponding to the two recent sample periods examined in tables 1 and 2. The results in these columns do suggest a recent increase in the responsiveness of discretionary spending to the budget surplus, with this relationship being statistically significant since 1993. But, with only nine observations for this period, one should not make too much of these results. There may, indeed, have been a recent breakdown in fiscal discipline, but it is difficult to quantify the importance of this phenomenon using standard statistical techniques.

Summary: How active has policy been?

The results presented thus far are subject to a collection of empirical limitations, which have been discussed in the context of their presentation. But, taken together, they suggest that fiscal policy has been responsive both to cyclical factors and conditions of fiscal balance during recent decades. The cyclical responsiveness may be something of a surprise, given a general perception that attempts at countercyclical fiscal policy have been poorly timed. Indeed, one can cite instances in which timing has been poor, but there are other cases, for example the advance tax reduction checks sent during the late summer of 2001, when fiscal changes occurred at the right time, even if, as seems likely for the 2001 tax cut, the countercyclical thrust occurred by coincidence at least as much as by design.

Still, the magnitude and timing of discretionary responses is only part of the story concerning the efficacy of fiscal policy as a tool for macroeconomic stabilization. An important additional step involves the link from fiscal changes to behavioral responses, an issue about which there has been much recent debate and to which I return below. Also, the automatic responses of the budget to the economic cycle, purged from consideration above in order to measure the strength of discretionary policy actions, are, nonetheless, a component of stabilization policy

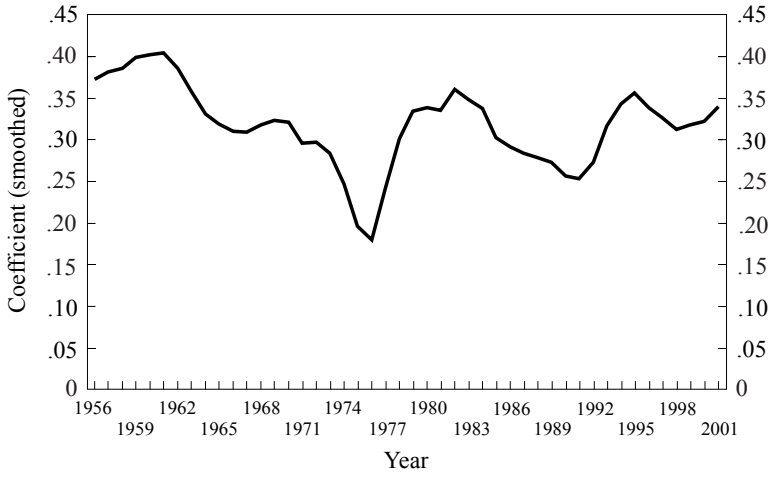
and worthy of consideration, particularly if skepticism remains about the viability of discretionary policy. I turn to this issue next.

Automatic stabilizers

As economic activity fluctuates, so does federal spending and, especially, federal tax revenues. Traditionally, these fiscal changes have been seen as automatic stabilizers, stimulating aggregate demand as income falls and reigning in demand and income rises. But changes in the composition of revenues and spending over the postwar period have been substantial. What impact have these changes had on the strength of automatic stabilizers in the United States?

One method of measuring the strength of automatic stabilizers is to relate the gap between the full-employment surplus and the unadjusted surplus to the contemporaneous gap between GDP and full-employment GDP. The coefficient of this relationship indicates the magnitude of the response of the surplus to GDP that is embodied in the CBO's calculation of the full-employment surplus. For the full sample of quarterly data used above in table 1, this coefficient (in a regression not shown) is .350, indicating that fluctuations in the federal budget surplus are equal in magnitude (and of opposite sign) to around one-third of contemporaneous output fluctuations. One can also look at the coefficient for individual years to see how this relationship has changed over time. As these annual estimates are somewhat unstable, one can get some idea of the evolution of the coefficient by looking at a five-year weighted moving average of individual year estimates. This series of smoothed coefficients is shown in chart 1.[11] The chart shows fluctuations in the relationship over time, but no obvious trend, other than perhaps a drop from the high values of the 1950s. But this approach, based on aggregate measures of the output and surplus gaps, does not allow one to determine whether these fluctuations relate to actual changes in the tax structure or automatic spending rules or to the position in the cycle or other factors for which one might wish to control. To learn more, it is helpful to use a more micro-level approach, estimating how, based on tax and spending rules, the liabilities of taxpayers and the level of government spending would have changed in each year in response to a change in output.

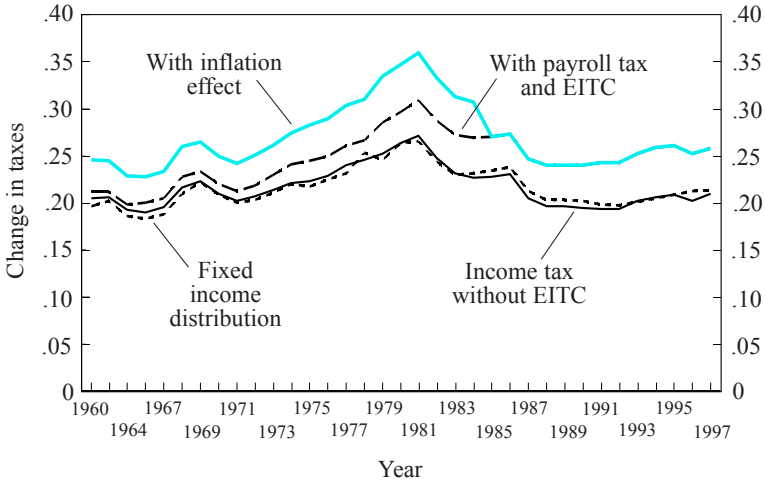
Chart 1
Automatic Stabilizers Implied by the Full-Employment Deficit



Source: Congressional Budget Office.

Auerbach and Feenberg (2000) used this latter approach to estimate the impact of output fluctuations on individual tax payments. Chart 2 updates the main results of that study, using the same methodology with minor adjustments and extended to include later years. The chart includes calculations for even years between 1960 and 1966, and every year thereafter through 1997.[12] For each year, the calculation is based on that year's NBER TAXSIM model based on a file of individual income tax returns, using a "tax calculator" to estimate the impact on tax liability of changes in tax-return components of income and deductions. To calculate the value for a particular year, one carries out a hypothetical experiment in which all income and income-related deduction items on each tax return in that year are increased by 1 percent, meant to simulate a 1 percent change in aggregate income spread neutrally across the population. Then, all the individual tax changes are added together and divided by the sum of assumed income changes for that year. The result is the ratio of the aggregate change in taxes to the aggregate change in income.

Chart 2
Automatic Stabilizers of Individual Income and Payroll Taxes



Source: NBER TAXSIM model.

The first series of chart 2 presents estimates of this ratio for the income tax, excluding the Earned Income Tax Credit (EITC). We might expect this ratio to have fallen during the 1960s and 1970s, with the general decline (at least until the 1990s) of top marginal tax rates associated with major legislation in 1964, 1981, and 1986. However, the two years in which the ratio is highest are 1980 and 1981. The explanation lies in the high inflation of the 1970s and early 1980s, with bracket creep (not eliminated from the tax system until 1985) pushing taxpayers into higher brackets. The trend reverses beginning with the 1981 tax cut, as the ratio declines gradually into the early 1990s.

The second series in chart 2 repeats the exercise of the first series, but holds the distribution of income constant at that of the 1980 tax year, to determine whether changes in the responsiveness of the tax system over time are associated with the well-documented shifts in the income distribution. One implements this hypothetical experiment by applying the tax law for each respective year to the 1980 sample, with

incomes and income-related deductions adjusted to reflect the ratio of that year's aggregate adjusted gross income to the adjusted gross income for 1980. We might expect this series to exhibit less sensitivity to the cycle in recent years by giving less weight to income in higher marginal tax brackets, but the impact of this adjustment is trivial.

The third series in the chart is a reprise of the first, with varying income distribution, but now the EITC and payroll tax are added. Adding the EITC alone (not shown) has no effect until its 1975 enactment, and a very small effect for the remainder of the period, never adding more than 1 percentage point to the overall response for the aggregate taxpaying population considered in this chart. The payroll tax adjustment accounts for only the employee portion, consistent with the assumption that the fluctuation in before-tax income does not affect the relative incidence of the payroll tax on employer and employee.[13] The effect of the payroll tax over time incorporates two factors, both of which increase its magnitude. First, the payroll tax has risen over time. Second, the rapidly rising payroll tax ceiling has made more taxpayers subject to the payroll tax on marginal income changes. Overall, the payroll tax increases the tax response substantially, particularly in later years, when it accounts for roughly one-sixth of the overall tax response.

The final series shown in chart 2 takes into account the indirect effects of inflation on tax payments. The existence of a short-run Phillips curve implies that a decline in the rate of economic activity, as represented by a rise in the unemployment rate, will be associated with a fall in the inflation rate. As discussed above, inflation raised the *real* value of taxes paid before 1985, so a reduction in the rate of inflation would have decreased this effect, adding to the stabilizing impact of the tax system. This effect is incorporated in the calculation by assuming that the same uniform 1 percent shock to real income induces a 0.5 percent shock to the price level, for a total increase in each individual's nominal income of 1.5 percent. The impact of this additional effect is, as expected, to raise the tax response in the years prior to 1985.

Regardless of which of the series in chart 2 that one considers, 1981 stands as the year in which the individual tax system absorbed the highest share of marginal income changes. The payroll tax imparts an

upward trend from the early 1980s on, while the lack of indexing raises values for the period prior to 1985. The overall picture is one of very little net change over the full period, as the effects of particular changes have tended to cancel each other out. The tax response in 1997 is roughly what it was in 1960.

These results offer a somewhat different pattern than those in chart 1, although that chart also shows a relative peak around 1981, a rise in the early 1990s, and relatively little trend in responsiveness over time. One important source of the difference between the charts is coverage: The personal income and payroll taxes covered in chart 2 represent the most important automatic stabilizers in the United States, but there are other components that are omitted. Chart 1 covers the business and excise taxes excluded from calculations for chart 2, as well as expenditure-side responses, notably unemployment compensation. Also, the data used to produce chart 1 take into account changes in the size of the taxpaying population, while those used for chart 2 do not. These differences explain why the fiscal responses in chart 2 are smaller than those in chart 1,[14] and may also explain differences in year-to-year movements. Still, both charts suggest that the potential role of the fiscal system as an automatic stabilizer is not markedly different than it was decades ago.

The magnitude of these automatic fiscal adjustments, though, indicates only a potential for stabilization. The actual impact on aggregate demand of these fiscal changes, like the impact of the discretionary changes discussed above, depends on behavioral responses, in this case of household consumption expenditures. There has been considerable discussion in the literature about the responsiveness of households to temporary tax changes, starting with the recognition that consumption responses to temporary changes should be smaller than those to permanent changes—perhaps extremely small—among households with long-term planning horizons.

Indeed, Shapiro, and Slemrod (2001) found in a survey that a small minority of households (22 percent) planned to spend the advance tax refunds sent in 2001. On the other hand, econometric studies of responses to predictable changes in Social Security taxes and tax

refunds (Parker 1999 and Souleles 1999, respectively) find a larger consumption response, and a still larger consumption response—as high as 90 percent—has been estimated for the phased-in Reagan tax cuts of the early 1980s (Souleles 2002). The data used for these studies typically are inadequate to determine whether the consumption response would be different for the high-income individuals who pay such a large share of income taxes and, hence, would bear a large share of tax fluctuations. One might expect a much lower response among this group than among the general population if liquidity constraints were causing the large consumption response. But the literature has not provided a strong link between excess consumption sensitivity and liquidity constraints, nor has it provided clear evidence of a smaller consumption response at higher incomes. Thus, although theory suggests that the overall impact on consumption could be substantially less than the automatic tax adjustments shown in chart 2, some recent estimates indicate large consumption responses. But the reasons for such large estimated responses are not well understood, and, hence, it is unclear whether they would also apply to changes in tax payments induced by cyclical fluctuations.[15]

However, there is another potential way in which the tax system can act as an automatic stabilizer that has generally been overlooked. Automatic stabilizers have typically been conceived in relation to aggregate demand. But, to the extent that employment levels are also determined by labor supply conditions, a tax system with rates rising with respect to income might also serve to stabilize output. Falling output, in reducing marginal tax rates, could encourage greater labor supply, with rising output and marginal tax rates having the opposite effect. Moreover, the temporary nature of the change in income, which works against the effectiveness of demand-side stabilization, reinforces the supply-side impact. If leisure is a normal good, permanent increases in the after-tax wage have an income effect that discourages labor supply and works against the substitution effect of the wage change. But this offsetting income effect is largely absent from temporary changes.

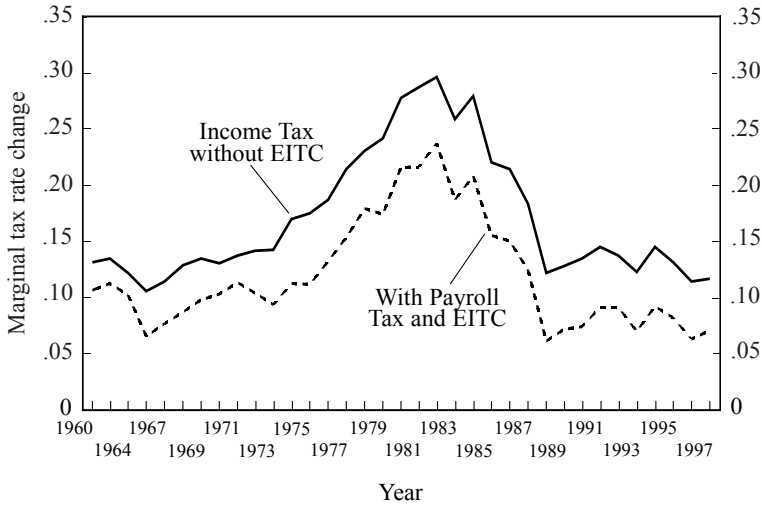
How large an effect might such marginal tax rate changes have? If we focus only on first-round effects (i.e., ignoring subsequent effects of the induced increase in labor supply on the before-tax wage and

marginal tax rate), the net stabilization effect will equal the product of two terms: the impact of the initial change in output on the after-tax wage rate though the changing marginal tax rate, and the change in labor income from the induced labor supply response. As shown in Auerbach and Feenberg (2000), this product is roughly equal to the product of the change in the marginal tax rate with respect to a unit proportional change in income, $dt/d \ln Y$, and a relevant labor supply elasticity, say η, that may be relatively large, reflecting not only the absence of an income effect but also the possibility of intertemporal labor substitution.

Chart 3 presents estimates of the impact of income changes on marginal tax rates, averaged over the population in proportion to labor income. Like the series in chart 2, these are extensions of results presented in Auerbach and Feenberg (2000). The series in the chart correspond to two of those in chart 2, for the income tax alone without the EITC, and for the income tax with the EITC plus the payroll tax. As one would expect, the patterns in this chart are similar to those in chart 2, with the sensitivity of marginal tax rates peaking around 1981, when marginal rates peaked, falling thereafter and again after 1986, as a result of the legislated flattening of the marginal rate distributions in those years. The EITC effect (not shown separately from that of the payroll tax) is small, slightly reducing the marginal tax rate sensitivity (due to individuals passing out of the phase-out range with rising income). The impact of the payroll tax is more significant and counter to its impact on the demand side. Here, it reduces the tax system's impact; around the payroll tax ceiling, the marginal tax rate falls sharply as income rises.[16, 17]

Overall, the potential stabilizing impact through marginal tax rate changes has fallen considerably since the early 1980s. Even now, though, the implied effect is about .07 times the labor supply elasticity, potentially close in magnitude to the consumption response just estimated. Thus, to the extent that cyclical fluctuations in employment are an equilibrium phenomenon—generated not simply by changes in labor demand, but by interactions of supply and demand—one should not ignore the role of marginal tax rates in stabilizing output.

Chart 3
Response of Marginal Tax Rate to Before-Tax Income



Source: NBER TAXSIM model.

In summary, automatic stabilizers have long been suggested to be an effective tool for overcoming the lags of discretionary policy. According to the traditional approach to estimating the tax system's capacity for automatic stabilization, the U.S. tax system is roughly as effective as in the 1960s, though less effective than it was two decades ago. But there is an additional issue that must be confronted regarding automatic stabilizers, that their ability to stimulate aggregate demand depends on the transmission of temporary after-tax income shocks to consumption. Despite recent contributions to the literature, the strength of this consumption effect is still not clear. On the other hand, there may be an impact on the supply side that has typically been ignored, that provides a stronger impact on output, particularly in the case of temporary tax shocks. The relative importance of automatic stabilizers on the demand and supply sides remains to be determined.

How effective has fiscal policy been?

Above, I presented evidence on the cyclical responsiveness of discretionary fiscal policy, as measured by changes in spending and tax revenues effected through explicit policy changes. This evidence suggests that these fiscal changes have been countercyclical, making them potentially helpful to the cause of macroeconomic stabilization. Indeed, the cyclical responsiveness appears to have increased during the past decade.

As the discussion of the previous section on automatic stabilizers reminds us, though, one must look beyond simple changes in revenues and spending to the impacts on output. This is especially important on the revenue side, for revenue changes, in themselves, have no impact on GDP—they work *only* through the behavioral responses they elicit. In terms of household consumption, the main response considered thus far—the primary issue is how large the response will be. But, for the other component of private domestic spending—investment—the issues are more complicated.

Stabilization and investment

Although spending on durable investment goods may depend to a certain extent on current after-tax cash flow, it also depends on expectations of future profitability and, importantly, future tax policy. The issue of intertemporal substitution, raised above in the discussion of the potential labor supply response, is even more relevant here in considering the purchase of long-lived durable investment goods. Changes—or expected changes—in the effective price of durable goods potentially can exert a powerful impact on investment spending, in a manner that is not well captured by concurrent changes in business tax collections.

A good illustration of this distinction is afforded by the 2002 stimulus bill's change in investment incentives. The primary change was the introduction of expensing (instead of regular depreciation) for 30 percent of purchases of investment goods with tax lifetimes of twenty years or less, for a period of three years. As a form of accelerated

depreciation, this policy, mechanically, would have a larger revenue effect in the short run than in the long run, even if it were enacted permanently. The additional deductions for future investment would be offset by the smaller deductions on prior investment that had already been partially expensed. Thus, the annual revenue losses would not provide an accurate picture of the tax incentives for capital investment, which would remain constant after enactment. As enacted, though, the provision is more complicated to analyze, for it makes capital less attractive to have after three years but also encourages a shift in the timing of investment to occur within the three-year window. The plausibility of the provision's three-year life span is also at issue in determining whether firms treat this "temporary" incentive as permanent. Actual behavior will reflect expectations about the future, not statutory language, and the past practice of countercyclical investment incentives will influence the formation of these expectations.

The role of current tax provisions and expectations can be described using the standard Hall-Jorgenson user of cost of capital, which provides a measure of the required gross, before-tax return to capital and, hence, a measure of the incentive to use capital in production. For a constant tax system, the user cost is:

$$c = \frac{q}{p}\left(\rho + \delta - \frac{\Delta q}{q}\right)\frac{1 - k - \tau z}{1 - \tau} \qquad (1)$$

where p is the price of output, q is the price of new capital goods, ρ is the nominal discount rate, δ is the exponential rate at which capital actually depreciates, k is the investment tax credit, τ is the corporate tax rate, and z is the present value of depreciation allowances per dollar of capital purchased. According to this theory, taxation affects the incentive to invest in a straightforward manner, with increases in the corporate tax rate raising the cost of capital (assuming that $z < 1$) and increases in the investment tax credit or the present value of depreciation allowances lowering the cost of capital. If one modifies the assumptions to incorporate changes in tax policy, the user cost of capital becomes (Auerbach 1983):

$$c = \frac{q}{p}\left(\rho + \delta - \frac{\Delta\left[q(1-\Gamma)\right]}{q(1-\Gamma)}\right)\frac{1-\Gamma}{1-\tau} = \frac{q}{p}\left(\rho + \delta - \frac{\Delta q}{q}\right)\frac{1-\Gamma}{1-\tau} + \frac{q}{p}\frac{\Delta\Gamma}{1-\tau} \quad (2)$$

where Γ equals the sum of the investment tax credit and the present value of tax savings from depreciation deductions.[18]

According to expression (2), the price of capital goods is effectively the underlying price, q, multiplied by a factor that accounts for the tax benefits associated with the purchase of capital, Γ. The presence of the additional term on the right-hand side of (2) means that there are now two ways in which tax policy may affect investment. First, as already discussed, it can affect the overall level of desired capital, given a constant tax regime. Second, if the regime is expected to change, it may encourage firms to alter the timing of their capital purchases. Indeed, a change such as the expected elimination of an investment tax credit has a powerful effect on the user cost, as computed from expression (2), for it induces a huge capital gain at the time of the credit's elimination.

To study these timing effects, though, a model that assumes instantaneous capital stock adjustment is inadequate. Theoretical models that incorporate adjustment costs commonly assume that the cost of adjustment rises at an increasing rate with the level of capital expenditures, implying that it is desirable for the firm to spread the expenditures over time. Moreover, expectations of future changes in the incentive to use capital in production lead to immediate changes in investment in order to minimize the adjustment costs incurred in closing the gap between the current and future desired capital stocks.

As shown in Auerbach (1989) and Auerbach and Hassett (1992), optimal investment behavior in the presence of convex adjustment costs, which gives rise to Tobin's q theory of investment (e.g., Hayashi 1982), may also be characterized by a partial adjustment investment process in which the desired capital stock at date t varies inversely with the weighted average of the current and expected future user costs of capital based on expression (2):

$$c_t^* = E_t \sum_{s \geq t} w_{s-t} c_s \qquad (3)$$

where the weights, w_i, sum to unity and decline exponentially, at a rate that is inversely related to the size of adjustment costs; the more sluggish the investment response, the more the future matters.

Expression (3) for the weighted sum of user costs has some straightforward implications. If the user cost suddenly changed today—for example, because of a change in tax law designed to deliver the economy from recession—and this change were expected to last indefinitely, then the weighted average is simply the new current value (because the weights add to unity). However, if today's change in the user cost is not expected to persist—for example, because the change in tax law is expected to be temporary—then the user cost relevant for current investment must reflect this anticipation. Generally, this will encourage even more current investment than if the incentive were expected to be permanent.

The possible effects of temporary incentives can be illustrated with the new U.S. law. Table 4 summarizes the immediate fiscal stimulus for a representative asset for a variety of assumptions about the weight placed on future capital costs and the permanence of the tax change. The weights on future capital costs reflect a plausible range, based on the estimates in Auerbach and Hassett (1992). As the table suggests, there is a wide range of possible effects, depending on the technology of investment adjustment and the nature of expectations; and it is reasonable to assume that expectations would account for more than the statutory language, given the degree of policy activism in the past.

In a regression based on annual data for the period 1953-1985, Auerbach and Hines (1988) found that the key variable in the user cost expression (2), $\frac{\Gamma}{1-\tau}$, was significantly affected by the unemployment rate, the rate of GNP growth, and the real interest rate. Some of the signs were consistent with countercyclical policy timing, but others were not, making the net stabilizing impact unclear. Further, one must also take into account the impact that such frequent policy changes had on investment in periods when stimulus was not being applied—

Table 4
Percentage Change in User Cost from 2002 Partial Expensing Provision
(7-Year Equipment)

Weight*	New Law	1-year	Permanent	Uncertain**
.3	-3.56	-11.64	-2.80	-3.18
.5	-4.19	-8.30	-2.80	-3.49
.7	-3.84	-4.96	-2.80	-3.32

* Weight = discount factor applied successively to each future period's cost of capital.
** Assumes that investors believe there is a 50 percent chance of the new law becoming permanent and a 50 percent chance of it remaining as enacted.

Source: Auerbach and Hassett (2002), adapted from Cohen, Hanson, and Hassett (2002).

when the expectation of an investment incentive might have depressed investment. Based on their empirical estimates of investment behavior, Auerbach and Hassett (1992) concluded that, during the period 1953-1988, actual tax policy had destabilized business fixed investment. The period since then, until this year, has been one of quietude with respect to investment-oriented changes in the law, but not with respect to *proposed* changes, including a similar provision to that enacted this year proposed by the first President Bush in 1992, and the possibility of an incremental investment tax credit floated during the first year of the Clinton Administration. Presumably, some of the investment fluctuations of the past decade represented reactions to tax changes that never occurred.

While discretionary fiscal policy has proved problematic for stimulating investment, there are also problems associated with automatic stabilizers. As portrayed by the neoclassical investment theory, forward-looking investment behavior need not respond strongly to current cash-flow conditions. This prediction remains controversial, as the literature—motivated by theories of capital market imperfections and asymmetric information—continues to debate the importance of current cash-flow conditions for investment. To whatever extent cash flow does matter, income tax fluctuations, especially fluctuations in

the corporate income tax, can cushion investment fluctuations, for they rise and fall with current profitability. But there are important limits to this cushion on the down side imposed by tax law asymmetries, notably the limits on the deductibility of losses and the corporate Alternative Minimum Tax (AMT).

The inability of corporations to get refunds for losses can loom very large in recessions. During the deep recession in the early 1980s, for example, Altshuler and Auerbach (1990) found that roughly one-fifth (weighted by assets) of the non-financial corporate sector was constrained in this manner, with an even larger number of firms not fully able to utilize investment tax credits for which some investment qualified at the time. Such restrictions have a mixed effect on the forward-looking incentive to invest, as the inability to deduct depreciation and other up-front incentives today is offset by the possibility that profits will be shielded by future losses. But, for cash-constrained firms, the negative effect is clear. Thus, the 2002 stimulus package also included a temporary two-year provision that extended the number of prior years to which current losses could be "carried back" to offset past profits and get an immediate deduction for losses.

The corporate AMT has an effect similar to the limit on losses. It is more likely to bind (i.e., exceed a firm's regular tax liability) in periods of low profitability, as a firm's AMT liability is less sensitive to profit fluctuations than its regular tax liability. Like the limit on losses, the AMT represents a deviation from symmetric taxation that reduces cash flows during periods of low profitability. There are other asymmetries present in the tax code, working in the same direction, such as the limit on the use of foreign tax credits.

These various tax law asymmetries—which may have little economic justification and, in any event, have generally been enacted without consideration of economic effects—have, as the 2002 legislation illustrates, transferred a potential automatic stabilizer into the realm of discretionary policy. As the limits of discretionary policy are recognized, it certainly makes sense to give some serious thought to reforming these provisions permanently.

Measuring fiscal policy's quantitative effects

Taking account of all the channels through which discretionary fiscal policy has operated, is it possible to measure how effective it has been? In a recent investigation using time series methods, Blanchard and Perotti (1999) find that discretionary fiscal policy "works" in the sense that positive innovations to government spending increase subsequent output, as do negative innovations to tax revenues. In particular, tax reductions increase consumption. This means that discretionary policy *could* work, in that it has some effect on output and its components.

Also using time series methods, Romer and Romer (1994) conclude that actual discretionary fiscal policy worked in the right direction, which is consistent with the regressions above showing that discretionary policy has responded to the GDP gap. But they also estimate that discretionary fiscal policy's overall impact was minimal, compared with that of monetary policy. They infer from the size and timing of automatic fiscal stabilizers that these have had a more important impact than discretionary policy. But it is difficult to estimate the impact of automatic stabilizers directly—precisely because they are directly tied to output fluctuations. That is, while there may have been "natural experiments" for discretionary policy that can be used to estimate such policy's economic impacts, automatic stabilizers are, by their nature, driven by output fluctuations. So, we will see little independent variation in them.

As discussed above, the current level of tax revenues is an inadequate summary measure of the expansionary thrust of fiscal policy. Even adjusting for the cycle, revenues can rise or fall as a consequence of extraneous factors (such as changes in the income distribution), and their composition and future path should also affect current consumption and investment decisions. Thus, estimates that cyclically adjusted tax revenues have tended to fall with increases in the output gap are not inconsistent with the conclusion that discretionary tax policy has destabilized investment, and estimates that discretionary policy has had a weak overall effect on output may reflect a combination of negative and positive impacts. Taken together, the evidence suggests that discretionary fiscal policy has effects but leaves us with little evidence

that these effects have provided a significant contribution to economic stabilization, if, in fact, they have worked in the right direction at all.

Discretionary fiscal policy and the long-run budget constraint

The review above has emphasized that the efficacy of fiscal policy as a stabilization tool depends both on the government's ability to time policy changes and on the impact of these changes on aggregate activity. For consumption and investment, the impact of policy on current activity depends on expectations about the future as well. Tax cuts perceived to be temporary may undercut consumption responses; temporary investment incentives may work in the opposite direction, strengthening the immediate response (but also, potentially, weakening prior investment). As yet, I have not discussed how the fiscal environment may influence these expectations about the future. Recent contributions to the theoretical literature, and, indeed, recent policy arguments, have emphasized the importance of long-run considerations, suggesting that the scope for expansionary fiscal policy may be limited when long-run fiscal constraints are significant.

The government's long-run budget constraint is derived from the annual identity relating the budget surplus to the gap between revenues and spending plus the restriction that government debt cannot forever grow faster than the interest rate. This constraint may be written:

$$B_t = \sum_{s=t+1}^{\infty} \left(\frac{1+r}{1+g}\right)^{-(s-t)} S_s^p \tag{4}$$

where B_t is the ratio of end-of-year national debt to GDP in the current year t, S_s^p is the primary surplus in year s as a share of that year's GDP, and r and g are the interest rate and the rate of economic growth, assumed for simplicity here to be constant. Under normal circumstances, $r > g$, meaning that it is not possible to "grow our way out of debt" passively by waiting for growth to provide the revenues needed for debt service; a higher level of national debt requires a compensating higher present value of future primary surpluses. This constraint

always applies to government policy, whether or not it holds for *current law*. If expression (4) indicates an imbalance under current policy, this simply means that current policy is not sustainable.

The current state of fiscal policy, relative to one of fiscal balance, can influence the efficacy of discretionary policy in two ways. First, it can influence current policy, discouraging further expansion in the face of a pre-existing fiscal imbalance or encouraging it when the government's fiscal position appears more responsible. The estimates in tables 1-3 suggest that policy follows this pattern, at least if the previous budget surplus as a share of GDP provides some indication of the government's fiscal position. (I return to this question of measurement below.) Second, the government's fiscal position provides information about the set of feasible future policies. A situation of extreme imbalance, for example, suggests that a substantial reduction in spending, a substantial increase in tax revenues, or both will be needed in the future.[19] Thus, a large current tax cut may have a less powerful impact on current consumption, if households view it as unsustainable and likely to be followed very quickly by a tax increase.

Indeed, many contributions to literature, surveyed recently by Giavazzi and others (2000), have suggested reasons why a loosening of fiscal policy, adopted under such conditions of fiscal duress, may actually have contractionary economic effects. Normally, we would expect tax cuts to have positive wealth effects, increasing current consumption demand. Even recognizing the government's long-run budget constraint, which requires these tax cuts to be paid for by offsetting future policies, current consumers with finite horizons would expect some of the burden to be placed on future generations, leaving a net positive wealth effect for those alive today. As already discussed, the size of this wealth effect might be small if the tax cut is assumed to be temporary.

But the wealth effect might even be negative if the government must rely on very distortionary future taxes to recoup today's revenue loss, or if reaching some critical debt level or degree of fiscal imbalance triggers a crisis or a precipitous increase in tax burdens. In both instances, the full induced cost of future tax increases more than offsets the benefits of immediate tax cuts, even for current generations

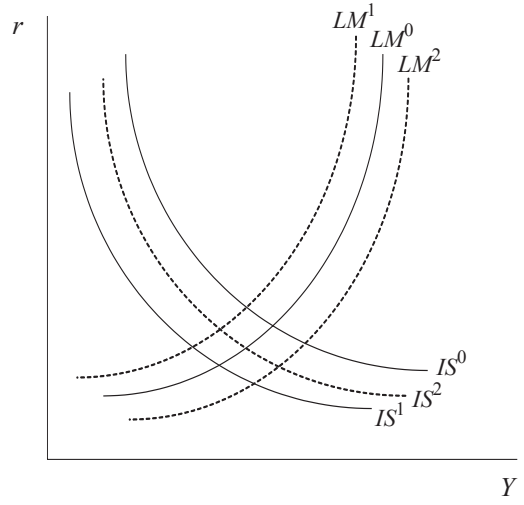
who are then induced to curtail consumption and save more in preparation for the hard times to come. A similar logic applies to the effects of government expenditures, and there is some international evidence from the output responses to fiscal policy that mechanisms like these may be at work (Perotti 1999).

The possibility of fiscal policy having expansionary effects certainly has come up in debates about U.S. fiscal policy in the 1980s and 1990s. The strong performance of the U.S. economy in the 1990s was often attributed by the Clinton Administration to responsible fiscal adjustments, including the tax increase of 1993 and the extension of discretionary spending caps in 1993 and 1997. A common view appears to have evolved in policy discussions of 1990s fiscal policy that the positive effects worked through interest rate adjustments, the reduced crowding out and greater confidence in government inducing lower interest rates, which then spurred interest-sensitive private demand.

There is a long-running debate over the extent to which fiscal contractions actually do reduce interest rates significantly. But, whatever one's perspective on this debate, it is unclear how the theoretical literature explaining why fiscal contractions might expand output can be translated into the popular view of recent events that sees this expansion of output as occurring through a decline in interest rates. In particular, a fall in interest rates is not typically an element of the theory of expansionary fiscal contractions, and it is not evident how fiscal contractions might lead simultaneously to lower real interest rates and higher aggregate demand and output.

As a start, the conflict may be illustrated using a standard IS-LM diagram, as in figure 1, with the real interest rate on the vertical axis and output on the horizontal axis. The standard analysis of a fiscal contraction, either through a tax increase or a spending reduction, starts with a downward shift in the IS curve from its initial position at IS^0, inducing a decline in aggregate demand and a decline in interest rates, with the decline in interest rates serving to cushion the decline in aggregate demand via a movement along the new, lower IS curve, labeled IS^1 in the figure. If the fiscal contraction conveys positive news about the future, this may stimulate current private-sector demand, causing the

Figure 1
Contractionary Fiscal Policy and Economic Expansion



downward shift in the IS curve to lessen, as represented by the intermediate curve labeled IS^2. There is no theoretical barrier to the IS curve actually shifting upward beyond the original curve, IS^0, if the positive impact on private demand is sufficiently strong. If this happens, then aggregate demand will indeed rise, but so will the interest rate, *r*. Adding inflation expectations to this basic framework merely deepens the problem. If the fiscal policy reduces the expected inflation rate, it reduces the nominal interest rate corresponding to any given real interest rate, thereby increasing money demand and causing a leftward shift in the LM curve, from LM^0 to LM^1. This will require an even larger increase in the real interest rate for aggregate demand to increase.

The IS-LM model embodies a variety of restrictive assumptions, of course, but the difficulty of generating this combination of interest rate and output movements really just has to do with equilibrium in the capital market. If the demand for funds does not decline, then a fall in the real interest rate must be initiated by an increase in the supply of funds. What mechanism can generate this increased supply of funds

and an increase in output at the same time? It is hard to see this combination as the result of a process beginning on the demand side, which would start with a reduction in the supply of funds via an increase in private or government consumption.

On the supply side, there could be an increase in labor supply (perhaps due to the income effect associated with expected higher tax payments in the future), which would increase output and, possibly, saving. But the increase in employment would tend to increase the productivity of capital and, hence, the demand for capital too. The same would be true of a positive productivity shock (perhaps in some way associated with the salutary effects of the fiscal policy on economic stability)—it might increase output and the supply of funds, but it would also increase the demand for funds by firms seeking to take advantage of the higher productivity level. A temporary productivity shock would "work" in that it would increase output and saving as households sought to spread the benefits of the temporary shock over the future, but this seems rather far afield from what has been envisioned in policy discussions.

The analysis here is certainly not definitive, for there are many more scenarios and assumptions that a creative mind could employ. For example, if the fiscal contraction reduced the riskiness of future inflation (rather than just the level of expected inflation), this change might make long-term bonds relatively less risky than cash, reducing the demand for money and shifting the LM curve out in figure 1, as to the position LM^2. The result could be an increase in output and a decline in real interest rates, indicated by the intersection of this curve and the curve labeled IS^2.[20] Or, perhaps, the "common wisdom" is based on confusion between nominal and real interest rates, for it is easier to understand how nominal rates might decline even as output increased as a consequence of a fiscal contraction. Finally, it is possible that a policy of fiscal contraction induces expectations of further fiscal contractions in the future, thereby lowering long-term interest rates enough to expand current output and short-term interest rates.[21] Thus, long-term rates would fall as current output rose, but short-term rates would rise.

As this discussion is meant to demonstrate, it is entirely possible that

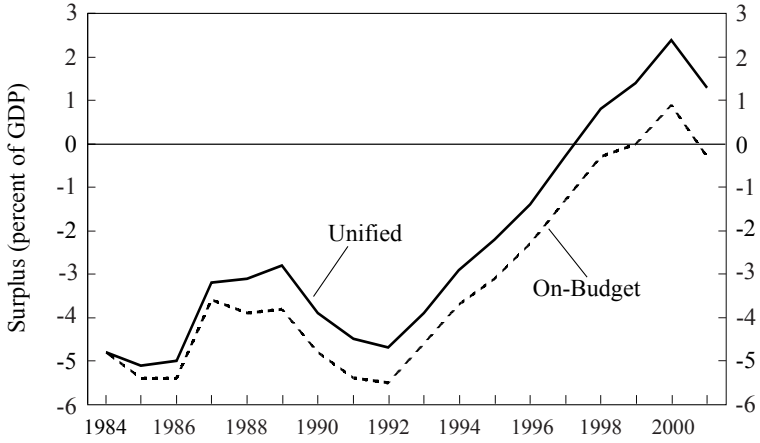
fiscal contractions might benefit the economy, and it is also possible that the United States in the 1990s offers us a positive demonstration. But the mechanism by which this is commonly supposed to have happened is not easily matched to a clear, compelling economic explanation. As we contemplate fiscal contractions in the future to respond to the major fiscal imbalance that exists, it is important to understand not only whether the 1990s fiscal contraction had expansionary effects, but also, if so, how this occurred.

Accounting conventions and fiscal policy

Ultimately, government fiscal decisions must conform to the long-run budget constraint, but any particular year's policies need not, unless a long-run imbalance has precipitated a crisis requiring immediate action. The United States faces a long-term fiscal imbalance, giving the trajectory based on its current fiscal polices. The estimated size of this imbalance has fluctuated in the past decade, falling during the late 1990s and rising recently. But the main source of the imbalance—large, unfunded transfer programs, an aging population, and a continuing rise in health care spending per capita—has not changed. Based on the most recent CBO projections, Auerbach and others (2002) estimate that the current imbalance, expressed as a permanent share of GDP by which the primary surplus would need to increase to satisfy expression (4) above, is between 4 and 8 percent. This is an enormous magnitude, larger as a share of GDP than any conventionally measured primary deficit during the postwar period.

It appears that government policy does respond to measures like the budget surplus, but the surplus itself is an extremely arbitrary measure. The most familiar illustration of this is the distinction between the unified federal budget and the budget that excludes "off-budget" items, most significantly the Social Security (OASDI) trust funds. In all but two recent fiscal years (1999 and 2000), the unified budget excluding off-budget items has been in deficit and the OASDI trust fund substantially in surplus. Moreover, as chart 4 illustrates, the trends of the two surpluses are different. The Social Security trust fund has been growing as a share of GDP since it was roughly zero in 1984.

Chart 4
Unified and On-Budget Surplus, Relative to GDP



Source: Congressional Budget Office.

Recognition that the Social Security trust fund is being accumulated to help pay for future benefits is now widespread among policymakers. Recent years' legislative machinations have given us new and arcane budget concepts like the "lock-box," in which the Social Security trust fund was to have been kept from the clutches of the fiscally irresponsible. But there is probably still not complete understanding how small the Social Security trust fund is relative to the unfunded commitments that appear nowhere on the conventional federal balance sheet, or that the annual accumulations in the trust fund are swamped by the annual accumulations in this implicit but very firm liability.

There have been attempts to broaden the federal budget presentation to make implicit liabilities more explicit. For example, the official U.S. budget documents released by the Office of Management and Budget (OMB) for fiscal years 1993-1995 provided estimates of generational accounts, a recently developed and now widely used method of evaluating fiscal conditions.[22] These presentations showed a substantial fiscal imbalance, represented by large looming burdens on future generations. Both CBO and, to a lesser extent, OMB have begun providing longer-term budget projections that, like those of the

Social Security trustees reports, show quite clearly the unsustainable policy trends.

Generational accounts and estimates of long-term budget gaps have become more familiar over time, but these projections still serve more as background information than as direct inputs to the policy process, which continues to rely on current and short-term deficit measures and, indeed, has come to rely more mechanically on these measures since the Gramm-Rudman-Hollings legislation of the 1980s setting deficit targets.[23] Given how much attention recent political debates about taxes and federal spending have given to the budget surplus, making changes to the "official" budget surplus, as through inclusion of some measure of accumulating liabilities, could have a major impact on policy.

As an illustration of what such a change might mean, the first column of table 5 presents rough estimates of the size of the implicit liability of the OASDI system at the beginning of each year from 1997 to 2002, based on annual Social Security trustees reports, other data, and a variety of assumptions that are described more fully in the appendix to this paper. This implicit debt is considerably larger than the reported national debt.[24] The change from one year to the next in the implicit debt is a measure of the corresponding implicit deficit. This deficit, shown for each year in the table's second column, may be broken down into two components, one attributable to changes in the base year of the calculation and the other due to changes in population projections and economic projections from one year to the next. For example, the change in the implicit liability between 2000 and 2001 is estimated to be $769 billion, of which $798 billion—slightly more than the total implicit deficit—is attributable to the advance of a year in the date at which the calculation is being made. A small reduction of $29 billion in the implicit deficit is attributable to an improvement in the forecast from the 2000 Trustees Report to the 2001 Trustees Report. For 2001, the total implicit deficit is estimated to be negative (i.e., there is an implicit surplus), because the impact of the base-year shift is more than offset by a substantial improvement in the forecast.

The deficit components attributable to changing forecasts are quite

Table 5
Implicit Debt and Deficits of the OASDI System
(billions of dollars)

Year	Debt	Deficit	*Portion of Deficit Due to Change in* Base Year	Projections
1997	9,433	317	620	-303
1998	9,750	-70	666	-736
1999	9,680	1,567	668	899
2000	11,247	769	798	-29
2001	12,016	-409	845	-1,254
2002	11,607			

Source: Author's calculations based on Social Security data.

volatile, but the components due to base-year changes are not. These large, positive components reflect the fact that a large cohort in the population—the baby boom generation—is moving closer and closer to retirement and the receipt of benefits. The closer in time these benefits are, the higher the present value of the liability to pay them. These annual accumulations in the OASDI debt swamp the annual accumulations in the OASDI trust fund, reminding us that, absent a continuing trend of improving projections like those of the last two years, a full accrual accounting of the OASDI system would show enormous annual deficits. Adding in the implicit liabilities of the Medicare system would substantially amplify this result.

Just as in the private sector, accounting conventions can have important real effects if the underlying information is not fully transparent. Even though it would directly cause no changes in the government's underlying liabilities, formally incorporating the accruing obligation to pay Social Security and Medicare benefits would convey much more clearly to policymakers and, perhaps more importantly, to those to whom policymakers are accountable, that the fiscal imbalance is not merely a "future" problem. It is hard to imagine that inclusion of deficit numbers like those in table 5 in the annual presentation of the federal budget would not have an important impact on fiscal policy decisions.

Conclusions

Recent experience and research suggest a number of conclusions regarding the use and efficacy of discretionary fiscal policy:

(1) In recent years, U.S. discretionary fiscal policy appears to have become more active in response to both cyclical conditions and a simple measure of budget balance.

(2) Considerable uncertainty remains about how large an impact discretionary fiscal policy has on output.

(3) There is little evidence that discretionary fiscal policy has played an important stabilization role during recent decades, both because of the potential weakness of its effects and because some of its effects (with respect to investment) have been poorly timed.

(4) Budgetary pressure may not only affect the fiscal response, but may also weaken the efficacy of expansionary fiscal policy if it is adopted. Conversely, contractionary fiscal policy may not restrict activity and might even have a salutary effect on output. This possibility may be relevant for understanding the impact of fiscal policy in the 1990s, although the mechanism is unclear.

(5) Automatic stabilizers offer an alternative to discretionary fiscal policy. The automatic stabilizers embedded in the fiscal system have experienced little net change since the 1960s and have contributed to cushioning cyclical fluctuations. But the tax system has many attributes that weaken its potential role as an automatic stabilizer, particularly with respect to investment.

(6) The government's reported fiscal position, to which fiscal policy appears responsive, represents a very poor measure of underlying fiscal balance.

These findings suggest the need for continued caution in the use of discretionary policy, greater focus on making automatic stabilizers more effective, and the integration of better measures of fiscal balance

into the discretionary policy process. And, of course, more research on the relevant issues.

Appendix

This appendix provides a brief description of the data and methodology used to derive the implicit OASDI liability estimates reported in table 5.

For each year from 1997 through 2001, the following procedure is used. Projected annual flows in and out of the OASDI system over a roughly seventy-five-year period are taken from that year's OASDI trustees report. Projections of the male and female population at each age in each of these future years is taken from contemporaneous population projections, provided by Social Security from unpublished data.[25] The projected taxes and benefits in each future year are allocated among cohorts using the tax and benefit profiles by age and sex from Gokhale and others (1999).[26] Then, to obtain an estimate of the OASDI system's "closed-group" liability—the liability to those already participating—only the taxes and benefits in each future year that have been allocated by this procedure to individuals who are at least eighteen years old in the base year are counted. Finally, all of these included tax and benefit flows are discounted back to the base year using a nominal discount rate of 6 percent, a long-term discount rate consistent with recent trustees' assumptions. For 2002, the same procedure is used, except that 2001 population projections are used because the unpublished population projections for 2002 are not available.

The deficit for each year equals the next year's estimated liability minus that of the current year. The part of this deficit that is attributable to the change in base year is obtained by re-estimating the following year's debt using the current year's projections of flows and population.

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Endnotes

[1] The fourth-quarter 2001 growth rate was again revised upward, to 1.7 percent, when its "final" estimate was released on March 28. A month later, an advance first-quarter 2002 growth estimate of 5.8 percent was issued. As of this writing, both of these numbers have already been revised again.

[2] In addition, there is an adjustment that removes the NIPA effect of the allied contributions for Operation Desert Storm. I am grateful to Frank Russek of CBO for making these unpublished data available and explaining their construction.

[3] The NIPA measure of the budget deficit differs from that actually used in the federal budget, but there is no quarterly measure of the latter available.

[4] See, for example, Bohn (1998).

[5] Allowing for nonlinear changes over time, through the addition of a time trend, generally increases the coefficients in table 1, but does not change the picture of sharply increasing sensitivity over time.

[6] I exclude from changes in expenditures induced changes in debt service, as these are attributable to both revenue and expenditure policy changes and a breakdown is not available.

[7] Because policy revisions between the winter and summer take effect starting midway through the current fiscal year, I reduce the weight on the current fiscal year by one-half and increase weights on subsequent years correspondingly. That is, if δ is the discount factor, the weights applied to revisions between summer and winter are $x, x\delta, x\delta^2, ..., x\delta^5$, while the weights applied to revisions between winter and summer are $.5y$, $.5(y+y\delta)$, $.5(y\delta+y\delta^2)$,..., $.5(y\delta^4+y\delta^5)$, where x and y are determined so that the weights for the six fiscal years sum to 1.

[8] The results for alternative discount factors, ranging from .1 to .67, are qualitatively similar to those presented in table 2.

[9] I use the annual surplus measure, rather than the quarterly NIPA surplus used in table 1, to maintain consistency with the surplus, revenue, and expenditure policy measures here, which are based on the actual federal budget.

[10] The results were similar using the GDP gap for the last quarter prior to the fiscal year, rather than for the previous fiscal year.

[11] The moving average weights are (1/9, 2/9, 1/3, 2/9, 1/9); the figure also excludes

1991, because of the anomalies associated with Operation Desert Storm.

[12] I am extremely grateful to Dan Feenberg for providing these estimates and those presented in chart 3.

[13] In principle, the change in the employer portion should also act as a cushion, but the impact would be more indirect, akin to that of other business tax payments.

[14] Chart 1 presents tax offsets as a share of GDP, while those in chart 2 are relative to the tax-return concept of Adjusted Gross Income (AGI), which is about 60 percent of GDP. Thus, an offset in chart 2 represents an absolute response that is about 60 percent the size of an equal percentage offset in chart 1.

[15] Kniesner and Ziliak (2002) come closer to answering this question by estimating a large consumption response directly to variations in individual disposable income. However, they do not estimate the response to tax payments separately, and the variations in disposable income they consider are conditional on aggregate consumption and, hence, purged of cyclical movements.

[16] The measured effect may be somewhat overstated because it does not take into account the present value of benefits generated by marginal payroll taxes. But this offset would be far from complete for households near the payroll tax ceiling, given the progressivity and other features of the benefit formula.

[17] As discussed in Auerbach and Feenberg (2000), incorporating the added change in nominal income due to inflation magnifies the measured effect before 1985.

[18] This sum equals $k+\tau z$ if τ is constant over time. If τ is expected to change over time, then the present value of tax savings from depreciation deductions is not the simple product of the current value of τ and the present value of depreciation deductions, z.

[19] Included among the range of possible tax revenues are the implicit taxes on the holders of government assets associated with inflation—through seignorage and erosion of nominal debt—and outright default.

[20] One might test this hypothesis by looking at movements in yields on indexed government bonds, which would not benefit from a reduction in inflation risk. Unfortunately, the United States began issuing indexed bonds only in 1997, after the Clinton Administration's fiscal policy had largely been implemented.

[21] This possibility of this combination of effects is demonstrated analytically in Blanchard (1981).

[22] See, e.g., Auerbach and others (1999).

[23] The primacy of the simple surplus measure is consistent with the fact that more forward-looking measures of the budget gap in alternative specifications of the policy equations in table 2 were less successful in explaining policy changes.

[24] The magnitude of these estimates is roughly consistent with similar calculations for the period through 1997 presented in Goss (1999).

[25] I am grateful to Seung An at the Social Security Administration for providing these data.

[26] If a_i is the relative benefit (or tax) profile element for each cohort i (where i ranges over age and sex) and p_{it} is cohort i's population in year t, then the fraction of year t's benefits (or taxes) allocated to a particular cohort j is $a_j p_{jt}/(\Sigma_i a_i p_{it})$.

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Commentary: Is There a Role for Discretionary Fiscal Policy?

Martin Feldstein

Alan Auerbach has given us a valuable paper loaded with new empirical research on the macroeconomics of fiscal policy. I agree with his basic conclusion that there is "little evidence that (the effects of discretionary fiscal policy) have provided a significant contribution to economic stabilization, if, in fact, they have worked in the right direction at all." I, therefore, concur with his support for the earlier conclusion of Romer and Romer (1994) about the general superiority of monetary policy as a tool for macroeconomic stabilization.[1]

Although Auerbach's evidence is innovative and impressive, he recognizes that it confirms views that are now well-established and widely held in the profession. Even economists who did not consider themselves to be monetarists came to this conclusion on the basis of their own research. I recall studies in the 1970s by Otto Eckstein and also by the Office of Management and Budget of the Carter Administration that concluded that the timing of previous discretionary fiscal policies had actually been destabilizing. In 1983, as the economy was pulling out of the recession and Congress was pressing for a new fiscal stimulus, I testified as CEA chairman that a congressional call for a fiscal stimulus might be one of the best coincident indicators of an economic upturn.

It is surprising, in light of all of this, that Auerbach finds (in table 2) a substantial and statistically significant use of discretionary fiscal policy in the Clinton years, as reflected in the response of changes in discretionary fiscal policy to the lagged GDP gap during the years of the Clinton Administration, although not in the previous eight years of his sample (i.e., in the presidency of George H.W. Bush and the second term of President Ronald Reagan.)[2]

But despite the general presumption against discretionary "countercyclical" fiscal policy that Auerbach's research supports, I believe that there is one important condition when discretionary fiscal policy can play a positive role: in a sustained downturn when aggregate demand and interest rates are low and when prices are falling or may soon be falling. This situation is of more than theoretical interest since it describes Japan's current condition and some analysts believe may also be relevant to the United States and Germany.

In discussing the case for discretionary fiscal policy in this context, I will also emphasize that an expansionary fiscal policy need not increase the full employment deficit. More specifically, changes in fiscal incentives may be more useful than traditional fiscal policies that increase budget deficits and work through income effects alone.

The case against discretionary fiscal stabilization policy

To explain why discretionary fiscal policy may be appropriate in the special case that I have identified, it is useful to begin by reviewing the widely accepted case against using discretionary fiscal stabilization policy under most circumstances when a change in aggregate demand is desired.

This general consensus against discretionary fiscal policy is a really remarkable reversal from the Keynesian view of appropriate policy that prevailed in the 1960s and even in the 1970s. The basic view at that time was that a shortfall of aggregate demand could be and should be reversed by a cut in taxes or an increase in government spending. The economics profession has now rejected that prescription for three basic reasons.

First, the powerful multiplier effect assumed in the early textbook Keynesian models was dramatically reduced when economists recognized that the marginal propensity to save out of temporary tax cuts is likely to be relatively high and that the increase in money demand that accompanies an economic expansion causes a demand-reducing rise in interest rates.

Second, more recent analyses summarized in Giavazzi and others (2000) have shown that tax reductions or expenditure increases can actually depress economic activity. One important way in which this can occur is by raising long-term interest rates as bond investors react to the fear of future deficits.[3]

Third, the combination of fiscal policy lags (recognition lags, implementation lags, and lags in the effect of spending and taxes on aggregate demand) and the substantial uncertainty about the magnitude of the economic response to fiscal changes increase the risk that well-intentioned fiscal policy will be destabilizing, a point emphasized many years ago by Milton Friedman (1953). With the average recession lasting just eleven months from peak to trough, it takes remarkably good luck to add fiscal stimulus at just the right time.

Reacting to the low fiscal multiplier by a more vigorous fiscal policy, i.e., a larger tax cut or spending increase, is unsatisfactory for two reasons. First, it would leave the economy with a permanently larger national debt. Although early Keynesians dismissed the burden of the debt with the argument that "we only owe it to ourselves," James Meade later taught us that even a domestically held national debt is a burden because of the dead-weight loss associated with the taxes needed to pay the interest on the debt. Second, the larger the fiscal policy change is, the more likely it is to destabilize total aggregate demand by adding (or subtracting) a large stimulus that is imperfectly correlated with the underlying shortfall (or excess) of demand.

Monetary policy is, therefore, generally accepted as the policy of choice when it comes to reducing aggregate demand or stimulating a weak economy.

Monetary policies to counter deflation

But what should be done in an economy in which the existing level of demand may cause low inflation to become deflation, despite low existing interest rates, or in which prices are already falling, despite very low interest rates?[4]

A widely cited Federal Reserve study by Ahearne and others (2002) points to the Japanese experience in the 1990s and suggests that when inflation is very low and demand is weak, monetary policy should be pursued very aggressively—going beyond the interest rate cuts that would normally seem appropriate for that combination of inflation and unemployment.[5] Their reasoning, in brief, is that deflation can imply high real interest rates, even if the nominal interest rate is reduced to a near-zero level. Such high real rates would push the economy deeper into recession and cause an even faster decline of prices. They conclude that to avoid this vicious downward spiral, it is important to cut interest rates sharply while inflation is still positive if there is a danger that it may evolve into deflation.

They argue, in effect, that with low interest rates, low inflation, and weak demand, the risks to the economy are asymmetric. If demand continues to decline, prices might start falling and produce a condition that an expansionary monetary policy cannot correct. In contrast, if the expansionary monetary policy turns out to have been unnecessary, the result will be a higher rate of inflation that can later be brought down by a tighter monetary policy.

I do not favor this approach for two reasons.[6] First, the "hyperexpansive" monetary policy might cause an asset price bubble in securities and real estate markets or an excessive decline of the exchange rate as well as a more rapid increase in the prices of goods and services.[7] The adverse effect when the asset price bubble later collapses or the exchange rate rises might be severely destabilizing. An excessively easy monetary policy is a dangerous tool.

Second, it may also be an unnecessary tool. Discretionary fiscal policy could be used in these circumstances either to prevent the economy

from slipping into deflation or, if deflation occurs, to bring it back to price stability.

Since I began by pointing out the difficulties of using discretionary fiscal policy under normal circumstances, let me comment now on why it might be effective and appropriate in the deflationary situation of the type that Japan is now experiencing. First, the dampening effect of increased short-term interest rates caused by an induced rise in money demand can obviously be offset in this case by a monetary policy that holds short rates constant. Moreover, the problem of lags and uncertainty is not relevant when we are considering a long-term situation of depressed demand, like that in Japan, rather than the traditional business-cycle downturn that lasts less than a year.

Fiscal expansion without budget deficits

The final common objection to using discretionary fiscal policy is the possible contractionary effect on current demand of an increase in the current or expected future deficit. It is important, therefore, to emphasize that an expansionary fiscal policy need not involve a rise in the full-employment deficit if its expansionary impact is achieved by increasing the private *incentive* to spend. A fiscal policy can be expansionary if it has a positive substitution, effect even if there is no income effect. Indeed, a fiscal incentive that succeeds in increasing economic activity can actually reduce current and future budget deficits.

To be specific, I will now give two kinds of examples of discretionary targeted fiscal incentives that I believe could stimulate economic activity in a situation characterized by low demand, low inflation, and low interest rates.

Offsetting the effect of low interest and inflation rates on business investment

Because tax rules do not distinguish between nominal and real interest rates, a fall in inflation with a constant real interest rate causes the real net-of-tax interest rate to rise. Even when inflation is zero or

positive, a decline in inflation rate causes a higher real net-of-tax interest rate. One way to offset this and maintain the same incentive to invest is to modify the depreciation rules or the investment tax credit.

More formally, the real interest rate (r_n) is related to the nominal interest rate (i), the tax rate (τ) and the rate of inflation (π) by $r_n=(1-\tau)i-\pi$. A change in inflation that does not alter the real interest rate ($r = i-\pi$) implies $di/d\pi=1$ and, therefore, $dr_n/d\pi = -\tau$. Consider, for example, the implication if the real interest rate is 4 percent and the relevant tax rate is the corporate rate of 0.35. If the inflation rate is 4 percent, the nominal interest rate is 8 percent, and the real net-of-tax interest rate is 1.2 percent [0.65(0.08) – 0.04 = 0.012]. If the inflation rate drops to zero, the nominal interest rate drops to 4 percent but the real net-of-tax interest rate more than doubles, going from 1.2 percent to 2.6 percent [0.65 (.04) = 0.026].

The incentive effect on business investment of the decline in inflation is, of course, more complicated because the fall in inflation also increases the present value of the nominal depreciation allowances.[8] This offsetting effect is more important for some types of assets than for others, depending on the life of the asset and the depreciation rules. In the extreme, inventory investment (for a firm that uses last-in-first-out inventory accounting) is depressed by lower inflation because there is no offsetting change in the value of depreciation to balance the rise in the real net-of-tax interest rate.

If the net effect of the lower inflation is to reduce the overall incentive for business investment, the depressing effect on aggregate demand can be offset by a suitable investment tax credit. This is true even if the inflation rate is negative.

Stimulating demand by households and businesses in Japan

Japan has now experienced a decade of stagnation with growth rates that are far less than Japan's potential and with several years of declining prices. Although the short-term interest rate is essentially zero, the real rate is positive and could rise if the rate of deflation increases. The large existing budget deficit (a primary deficit of about 5 percent of

GDP) and the excessive national debt (a national debt that exceeds 140 percent of GDP) make additional fiscal deficits potentially counterproductive. In this context, I have previously discussed two targeted fiscal policies that could increase aggregate demand without increasing the size of the budget deficit (Feldstein, 2001).

The first option would raise consumer spending. The government of Japan has said for some time that it wants to reduce its reliance on the income tax and increase its reliance on its value-added tax. The Japanese government could announce that it will raise the current 5 percent value-added tax by 1 percent per quarter and simultaneously reduce the income tax rates to keep revenue unchanged, continuing this for several years until the VAT reaches 20 percent. This revenue-neutral policy would imply consumer prices rising at the rate of 4 percent per year. This tax-induced inflation would give households an incentive to spend sooner, rather than waiting until prices are substantially higher. And yet, it would not change the size of the structural budget deficit.

The second such revenue-neutral-targeted incentive policy could encourage business investment by a Japanese government announcement that it was instituting a large investment tax credit—say, 30 percent—paid for by an increase in the corporate income tax and that the investment tax credit rate would decline by 5 percentage points per year until it was eliminated (with corresponding revenue-neutral reductions in the corporate tax rate.) Companies, like the consumers in the previous example, would have a substantial incentive to spend sooner before the net price of investment goods rises. A similar declining tax credit could be applied to investment in business structures and residential housing.

In summary, an expansionary fiscal policy based on a revenue-neutral structural incentive may be more productive and less risky than an excessively easy monetary policy as a way of dealing with a deflationary situation or one that could become deflationary.

This case for using discretionary fiscal policy in any country assumes, of course, that a political agreement can be achieved for legislative action in a timely enough fashion. If partisan conflict prevents this, the

central bank would have to weigh the consequences of a potentially excessive monetary easing—including the consequences for security and real estate markets and for the exchange rate—against the risks of deflation.

Additional comments on Auerbach's paper

Let me conclude with a few additional specific comments on the Auerbach paper.

Measuring the fiscal stimulus

Auerbach discusses the difficulty of measuring the discretionary fiscal stimulus andmakes a good case for using the Congressional Budget Office measure of policy changes, rather than changes in the full-employment surplus. To the extent that the stimulus is given by a change in the budget deficit, the Auerbach decision is probably a good one. But it is too limited a measure of fiscal stimulus. It is possible to stimulate demand without any change in the budget deficit by changing incentives to spend through a change in relative prices. The investment tax credit is the most obvious example of this. Although an increase in the investment tax credit does cause a decline in tax revenue, the incentive effect is greater than would be achieved with an equal lump sum cut in taxes. It is difficult to know how to interpret the Auerbach regressions of the effect of the GDP gap on discretionary fiscal stimulus policy when it omits the use of these incentive policies.

The surplus reaction function

The surplus-reaction function that Auerbach estimates relates the change in the full-employment budget surplus to the GDP gap and the level of the budget surplus. I have already commented on Auerbach's evidence on the relation of discretionary policy to the GDP gap. His regressions also show that changes in discretionary fiscal policy are inversely related in a substantial and significant way to the past level of the actual budget surplus.

A larger budget surplus causes legislated changes in taxes and

spending that reduce the surplus, while a larger budget deficit has the opposite effect. The recent out-of-sample experience is consistent with this estimated relation. Looking ahead, it implies that the current and projected budget deficits will induce fiscal contractions to shrink future deficits.

The Auerbach estimates also have important implications for the proposals to shift a portion of Social Security payroll taxes out of the budget and into personal retirement accounts. If the relation estimated by Auerbach continues to hold, these personal retirement accounts and the associated rise in the off-budget surplus would cause an increase in national saving.

Automatic stabilizers

Auerbach's analysis of automatic stabilizers implies that each dollar decline in GDP induces an offsetting rise in the fiscal deficit of 35 cents. Although this relation is estimated for the nation as a whole, it probably applies also to individual states and regions. If so, a one-dollar decline in the GDP of New England induces an offsetting decline in the net taxes (i.e., taxes net of transfers) paid from New England to Washington of about 35 cents.

This offsetting fiscal stimulus helps the United States to operate with a single monetary policy, even though there are regional differences in cyclical shocks. There are, of course, no similar transfers from the individual nations of Europe to a central European fiscal authority to cushion the effects of the European single monetary policy.

The long-run fiscal situation

Auerbach is, of course, correct to emphasize the seriousness of the long-run fiscal situation. As a practical matter, he is also correct that the long-run budget deficits will not disappear because of growth alone. But his specific arguments, based on equation 4 in his text, are less convincing. While the real rate of return on capital exceeds the economy's rate of economic growth, the same is not true of the real interest rate on government debt, the relevant interest rate in equation

4. Moreover, the primary surpluses also depend on the rate of economic growth because the elasticity of tax revenue with respect to GDP exceeds one. If the ratio of government spending to GDP remains constant as the economy grows, the budget deficit would eventually disappear because of this more rapid growth of tax revenue with existing tax rules.

In fact, though, we cannot grow our way out of budget deficits because government spending also rises more rapidly than GDP. Even without new spending legislation, this will happen in the future under current law because of the aging of the population, raising pension benefits under Social Security, and increasing health outlays under Medicare. Supplementing existing payroll taxes with small amounts of saving in personal retirement accounts would make it unnecessary to raise the future payroll tax rate. A similar plan could limit the future tax cost of Medicare. We cannot grow our way out of the future Social Security and Medicare deficits, but we can save and invest our way out of the problem.

Endnotes

[1] It might be useful in this context to distinguish between "deliberate" discretionary stabilization policy (i.e., aimed at cyclical stabilization) and the incidental effect of fiscal changes done for other reasons. The tax cuts enacted in 1981 and in 2001 were both planned during the earlier election campaigns to improve long-term incentives but happened to play a positive but unintended stabilization role.

[2] I am not surprised that Auerbach cannot distinguish separate effects of the GDP gap on revenues and expenditures. During the Clinton years, the line between revenue changes and expenditure changes was substantially blurred by an increased use of tax rules to achieve expenditure goals, e.g., the child care credit and the expanded earned income tax credit.

[3] This impact on long-term interest rates is different from the IS-LM model of the effect of money demand on short-term interest rates that Auerbach emphasizes. A very small current budget deficit may have little contemporaneous direct effect on demand, but might cause such a large increase in the expected future deficit, and therefore in the long-term interest rate, that current demand actually falls, lowering the short-term interest rate. This possibility of the changing shape of the yield curve reconciles the

"popular" view that a budget deficit can reduce demand through higher interest rates with the traditional IS-LM analysis. Elmendorf and Reifschneider (2002) show that this effect can be quantitatively important, although in the empirical rational-expectations model that they examine it is not important enough to make a fiscal "stimulus" contractionary. The actual effect depends, of course, on the extent to which market participants extrapolate current deficit increases into the future. Evidence of the positive effect of expected future deficits on long-term interest rates is presented in a recent paper by Canzoneri and others (2002).

In noting the importance of the interest rate effect of fiscal policy, I don't wish to imply that I support the claim that the Clinton Administration raised economic growth by its 1993 tax increase. The rise in growth rates in the second half of the 1990s was dominated by the effect of exogenous improvement in productivity associated primarily with information technology. It was this growth that produced the extra tax revenue and that eventually eliminated the budget deficit. The 1993 tax rate changes were not large enough to produce the observed reduction in budget deficits, even if those lower rates had no adverse effects on taxable incomes.

[4] There is, of course, no problem with low interest rates and low inflation or even deflation if there is also a healthy positive rate of growth. There is no reason, in theory, why such a combination is not possible or even, as Milton Friedman (1969) argued, preferable. Although his argument ignored the revenue consequences of negative inflation in an economy in which the taxation of capital income is not indexed for inflation, a more complete analysis might still imply that the optimal inflation rate is negative. My own analysis of the benefits of price stability (Feldstein, 1998, 1999) assessed the effect of reducing true inflation from 2 percent to zero (i.e., reducing measured inflation from about 4 percent to 2 percent) but did not derive an optimal inflation rate and assumed that the real long-term growth rate is independent of the choice among low inflation rates.

[5] Although their emphasis is on monetary policy, they note the advantage of combining very easy monetary policy with fiscal expansion.

[6] There is also the question of whether monetary policy is really ineffective when the price level is falling. Although there is a lower bound on interest rates, implying a positive real interest rate, a rapid increase in the base money supply achieved by buying long-term assets and foreign exchange might still be able to stimulate the economy. However, lower long-term nominal rates may still leave positive real rates if deflation is rapid and a sharp decline in the exchange rate might create adverse "beggar thy neighbor" effects on other economies that should be avoided.

[7] Ahearne and others (2002) acknowledge that excessively easy money may cause an overshooting of asset prices and exchange rates.

[8] See, for example, the discussion in Feldstein (1999).

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Commentary: Is There a Role for Discretionary Fiscal Policy?

Fumio Hayashi

It's a great honor to be part of this prestigious conference. I am pleased to serve as a discussant for the paper by Alan Auerbach, who is my former colleague and respected friend. I would like to thank the Research Department of the Federal Reserve Bank of Kansas City for the occasion.

Auerbach's paper is a comprehensive review of U.S. fiscal policy of recent decades, covering four major topics: (1) whether the fiscal policy has been countercyclical, (2) transmission channels through which fiscal policy could affect the economy, (3) a quantitative evaluation of the effect of fiscal policy, and (4) the size of implicit liability of the OASDI system. I really liked Auerbach's style of interweaving economic analysis with references to specific legislations.

In my comments on the paper, I will focus on the first three topics, because the fourth topic, despite its obvious importance in policy discourse, seems only tangentially related to the rest of the paper. I will then present some Japanese evidence corroborating the main points of the paper.

Has U.S. fiscal policy been countercyclical? **1**

To address the first topic, Auerbach looks at various fiscal variables, including tax revenue, spending, and their difference (namely, the

budget surplus). For the change in the fiscal variable in question, he identifies two components and sees how they are related to the GDP gap. Those two components are the "discretionary" component and "non-discretionary" component (namely, the so-called automatic stabilizer). He entertains several alternative definitions of those two components, including the cyclical adjustment used to calculate the full-employment surplus. Auerbach's preferred definition, I take, is to define the discretionary component as the change due to legislative action when macroeconomic variables are held constant, and the non-discretionary component as the change due to macroeconomic sources with the spending rule and tax laws held constant. I agree that this definition should be preferred for two reasons. First, unlike the cyclically-adjusted measures, it obviously does not require the notion of the output gap. Second, as I will argue below, it may be useful in econometrically identifying the output effect of fiscal policy.

Here is my own formal illustration of this definition of discretionary and non-discretionary policies. Consider, for example, the tax revenue for period t, R_t. It can be written as a known function, f_t, of aggregate income Y_t, and a vector of parameters describing income distribution Θ_t:

$$R_t = f_t(Y_t, \Theta_t). \tag{1}$$

The tax law that is in place for period t determines the function f_t. (This relationship can be derived by first writing down tax payment as a function of income for each individual and then aggregating over individuals.) The change in revenue from $t-1$ to t, $R_t - R_{t-1}$, can be decomposed into three parts:

$$\begin{aligned} R_t - R_{t-1} &= f_t(Y_t,\Theta_t) - f_{t-1}(Y_{t-1},\Theta_{t-1}) \\ &= [f_t(Y_{t-1},\Theta_{t-1}) - f_{t-1}(Y_{t-1},\Theta_{t-1})] \\ &\quad + [f_t(Y_t,\Theta_t) - f_t(Y_{t-1},\Theta_t)] \\ &\quad + [f_t(Y_{t-1},\Theta_t) - f_t(Y_{t-1},\Theta_{t-1})]. \end{aligned} \tag{2}$$

The first component, $f_t(Y_{t-1},\Theta_{t-1}) - f_{t-1}(Y_{t-1}, \Theta_{t-1})$, is the change due to a tax law change taking place in period t holding (Y, Θ) constant. It is, therefore, the discretionary component. The second component, the change due solely to a change in aggregate income, is the

automatic stabilizer or the non-discretionary component. According to the paper, the Congressional Budget Office (CBO) publishes this breakdown (or something close to it) for federal tax revenue and spending. For individual tax payments, Auerbach provides his own estimate of the second component and also calculates the sensitivity of this component to aggregate income.

The empirical evidence included in tables 1-3 and charts 1 and 2 of the paper is clear: No matter which definition of the discretionary and non-discretionary components one uses, the U.S. fiscal policy has been countercyclical. More specifically, the regression analysis reported in tables 1-3 shows that the discretionary component of the fiscal variable in question (tax revenue, spending, and the surplus) is systematically related to the lagged value of GDP gap in a countercyclical way (so, for example, tax revenue is positively related to the GDP gap of the previous period), while charts 1 and 2 show the sensitivity of the non-discretionary components of the surplus and taxes to aggregate income. I think that Auerbach's decision not to focus on a single measure of fiscal policy (such as the budget surplus) is a wise one, because if there is a single measure summarizing the stance of fiscal policy, it depends on the model. For example, in the Ricardian world, where timing of taxes doesn't matter, the deficit is irrelevant.

The paper's finding that discretionary policy is countercyclical is somewhat surprising, given the general perception that the United States no longer practices Keynesian stabilization fiscal policy. For example, Romer and Romer (1994) conclude that the response of discretionary fiscal policy is small, if any. Alan's finding is largely consistent with this perception because his sample period includes the Clinton years and the beginning of the current Bush Administration, the period when the sensitivity to the output gap increased markedly (see, e.g., column 5 of table 1).

Transmission channels of fiscal policy 2

The second part of Auerbach's paper examines channels through which fiscal policy could affect output, besides its direct effect on aggregate demand through government spending. Those indirect channels

include consumption, investment, and aggregate supply. Auerbach provides a brief survey of the literature on how consumption responds to the timing of taxes and a quite extensive discussion about corporate taxes and investment, the latter drawing on the wealth of research done by Auerbach and his collaborators.

I find it curious that the discussion of consumption occurs at two places in the paper, one under the unlikely heading of automatic stabilizers and the other in the context of the long-run budget constraint. The issues discussed at those two places are essentially the same: whether the timing of taxes matters for consumption. What I take away from the paper's discussion for consumption is that there is little agreement about the effect of a debt-financed tax cut on aggregate consumption.

In passing, it may be worth pointing out that the paper has no discussion of the output effect of government expenditure. Besides its direct impact on aggregate demand, government expenditure can have indirect impacts on output. If private consumption and government consumption are substitutes, as is the case with the school lunch program, an increase in government spending will be at least partially offset by a decline in private consumption. Also, government spending will influence aggregate supply if government capital is an argument in the aggregate production function.

Quantitative evaluation of the effect of fiscal policy 3

Taking into account all those channels of fiscal policy, what is the output effect of fiscal policy? I thought the third part of Auerbach's paper, with the section heading of measuring fiscal policy's quantitative effects, would be the centerpiece of the paper. But the paper's discussion is very brief, not much longer than a page. The only credible evidence Auerbach cites is Blanchard and Perotti (1999), which studies the output effect of government spending and taxes using the structural vector autoregression (SVAR) technique.

It is difficult to estimate the output effect of fiscal policy, and the reason is well known. As the first part of the paper amply demon-

strates, fiscal variables, being systematically related to current output and other macroeconomic variables, are endogenous variables. This systematic response is the *policy rule*. For later reference, it is useful to state this point formally. Let x_t be the value in period t of the fiscal policy variable in question, Ω_t be the information set to which the fiscal authority responds according to the policy rule $g(\Omega_t)$, and ε_t be the non-systematic component of x_t (usually referred to as the *policy shock* or *policy innovation*). Thus, we can write:

$$x_t = g(\Omega_t) + \varepsilon_t. \tag{3}$$

The government's information set Ω_t includes the current and lagged value of output. Because the government responds to output according to the policy rule, the existence of the correlation between output and x_t (or more generally, the significance of the x_t coefficient in the regression of output on the current and lagged value of x and lagged output) cannot be taken as evidence in favor of the output effect of fiscal policy. A very forceful exposition of this point can be found in Cochrane (1994).

Recent literature provides two approaches to resolving this difficulty. The first is the "narrative approach" of Ramey and Shapiro (1997). It examines the response of output to the three large increases in military spending (taking place in 1950, 1965, and 1980) that are arguably exogenous. The second is the SVAR approach. It identifies the policy shock by estimating the policy rule g(.), under a plausible set of assumptions. If output responds to the policy shock ε_t, we can conclude that the policy variable x_t has an output effect because ε_t is part of x_t. The available evidence is that fiscal policy affects GDP. Recall that in any SVAR, a one-unit increase in the innovation for the policy variable in question brings about subsequent changes in all variables of the system, including the policy variables. Blanchard and Perotti (1999) estimate that the tax multiplier (defined as the maximum value of the subsequent GDP changes triggered by a (negative) one-dollar tax shock) is about 0.8 in one specification (see their table 3) and the spending multiplier similarly defined is about 1.3 (see their table 4).

It should be noted that the distinction between discretionary policy and the automatic stabilizer, although of paramount importance to legislatures, is not useful in addressing the output effect of fiscal policy. By definition, the nondiscretionary component (the automatic stabilizer) of the fiscal variable in question is systematically related to output and other macro variables. So, it is part of $g(\Omega_t)$. The discretionary component, on the other hand, includes the policy innovation as well as the systematic component. Put differently, $g(\Omega_t)$ consists of the automatic stabilizer and the systematic component of discretionary policy. What matters for economic analysis is the decomposition of x_t between $g(\Omega_t)$ and ε_t.

It is my conjecture that the particular definition of discretionary policy as the change in the fiscal variable due to a legislative action, as formalized in equation 2, is useful in the identification of the policy shock. Assume, quite realistically, that the legislation takes one period so that discretionary policy cannot respond to current economic conditions. Then the error term in the regression of discretionary policy on *lagged* macroeconomic variables (shown in table 2 of the paper) *is* the policy shock.

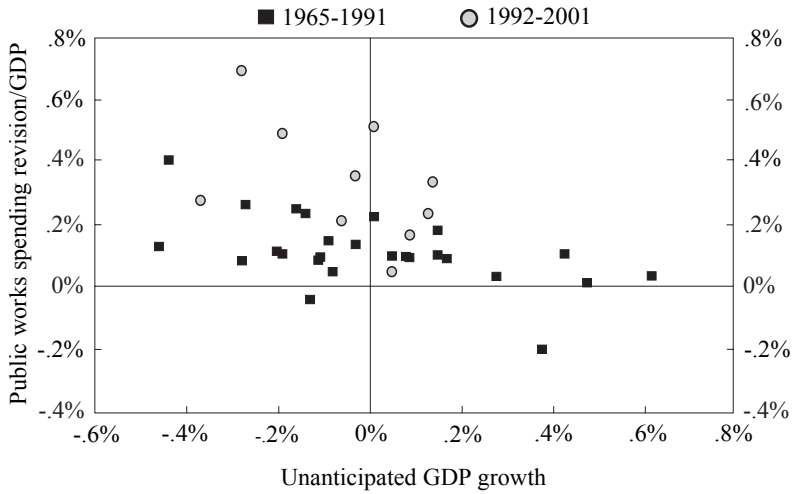
A separate question, which is more closely related to the title of the paper, is whether fiscal policy has been stabilizing. Would GDP have been more volatile if fiscal variables were less sensitive to GDP? This question is about the mapping from the policy rule to the variance of output. Again, the discretionary/nondiscretionary distinction is not useful.

Evidence from Japan 4

Having flown all the way from the other side of the world, I feel compelled to bring some news from the originating country. I now turn to some evidence from Japan that corroborates the main points of Auerbach's paper.

Chart 1 here is meant to address the issue dealt with in table 3 of Auerbach's paper. In that table, Auerbach examines whether discretionary spending (in the sense of non-entitlement spending in the fed-

Chart 1
How Pork Responds to GDP News



eral budget) responds to the output gap. Almost every year since 1965 in Japan, the initial central government budget approved by the Diet at the beginning of the fiscal year (which is April) was revised in the fall, to respond to unforeseen economic conditions. A good measure of those unforeseen developments is the government's GDP forecast error. An official forecast of GDP growth from fiscal year t–1 (April of year t–1 through March of year t) to fiscal year t is published by the government in January of year t. Actual GDP growth from fiscal year t–1 to t is not known until several months after the end of fiscal year t (March of year t+1). Thus, the unexpected growth from fiscal year t–2 to t–1 represents news about GDP that becomes available during fiscal year t. Public works expenditure in the central government budget is the common tool for fiscal stimulus by the Japanese government. (Incidentally, as we all know, much of this is pork-barrel spending.) Almost every year, this budget item was increased in the revised budget in the fall. This is the important component of the "stimulus package" obligatory put together by the Japanese government over the last couple of decades, often under the United States' pressure.

Chart 2
Primary Surplus against Debt Outstanding, Central Government

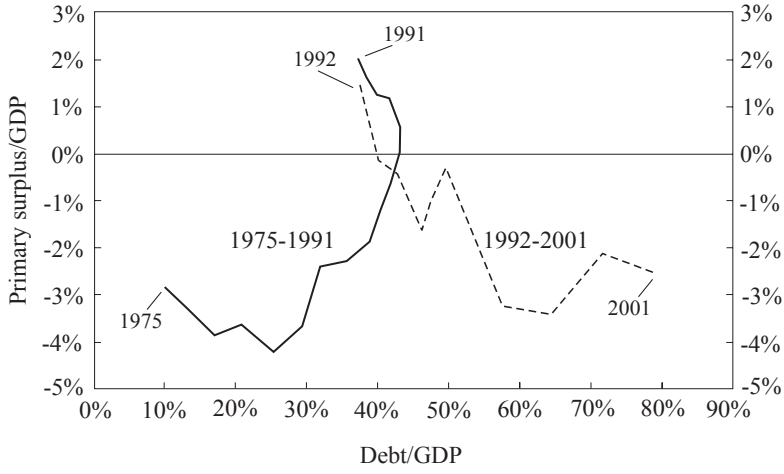


Chart 1 plots the GDP fraction of this revision of public works budget for fiscal year *t* against the unanticipated GDP growth for fiscal year *t*–1. (The idea of relating budget revisions to unanticipated GDP growth can be found in Asako, Ito, and Sakamoto (1991)). Consistent with the evidence of Auerbach's table 3, there is an inverse relation between the two, meaning that discretionary spending in Japan is countercyclical. Contrary to Auerbach's table 3, the inverse relationship is statistically significant. The observations for the 1990s in chart 1 shows that the cyclical sensitivity increased in the 1990s.

Auerbach's table 1 reports results from the regression of the change in full employment federal budget surplus on the lagged GDP gap and the lagged budget surplus. As Auerbach notes, the negative regression coefficient on the lagged budget surplus means that increased national debt leads to higher subsequent budget surpluses. As shown by Bohn (1998), the positive relationship between the (primary) surplus-to-output ratio and the ratio of the stock of national debt to output ensures

the long-run government budget constraint to be satisfied. Chart 2 here checks whether there is such a positive relationship for the Japanese central government budget. The budgetary deterioration in the 1970s was followed by the rapid improvement in the 1980s. The positive relationship established in the 1980s, however, broke down in the 1990s with a sharp deterioration of the budget and the resulting ballooning of the national debt. To my surprise, the yield on the Japanese government bond remained quite low, at nearly 1 percent during this episode of rapid budgetary deterioration. Perhaps the market participants, with the memory of the 1980s still fresh in their minds, believe that a similarly decisive consolidation is just around the corner.

There are several SVAR studies on the effect of monetary policy in Japan, but the only SVAR study of Japanese fiscal policy I am aware of is Kuttner and Posen (2001). They apply the same methodology used in Blanchard and Perotti (1999) to the Japanese economy and find that the SVAR tax multiplier is much larger for Japan than that estimated for the United States by Blanchard and Perotti. The estimated tax multiplier is about 1.7 (with a cumulative effect of about 4.9), while the spending multiplier is about 1.1 (with a cumulative effect of 3.5). Based on this evidence, Kuttner and Posen prescribe a large tax cut as a cure for the prolonged Japanese recession.

Conclusion 5

Auerbach's paper provides a wealth of information useful for thinking about the output effect of fiscal policy. The title of his paper, however, should be changed: The word "discretionary" should be changed to "stabilization." The corroborating Japanese evidence shows that, if anything, Japan is a more eager practitioner of stabilization policy.

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General Discussion: Is There a Role for Discretionary Fiscal Policy?

Chair: Stanley Fischer

Mr. Fischer: We will give Alan Auerbach a couple of minutes to respond. Alan, I'd like to interject one further comment. You say at the end of your paper that fiscal policy should be used with caution. Do you mean that it should not be used at all—which is what aggregate fiscal policy is, and that is what Marty seemed to be saying—or do you mean that it should be used in small doses?

Mr. Auerbach: I think the latter. I'm sympathetic to Marty Feldstein's argument about Japan—not necessarily for the detailed reasons he gave, but just because a prolonged slump is different from a ten-month recession. Implicit in what Marty was saying, is that a lot of the criticisms of the timing of discretionary fiscal policy don't really apply when, year after year, you are experiencing slow economic growth.

I'll respond selectively to the points raised by my discussants. Regarding Marty's recommendations for Japan for phased incentives for spending, either by consumers or investors, it is worth drawing a parallel to recent U.S. policy. Our stimulus package enacted in spring 2002 may turn out to be a coincidental indicator for the end of the recession; Marty and his friends on the business-cycle dating committee will tell us, probably in a couple of years. The stimulus package included a three-year (small by comparison to a big investment credit)

temporary investment incentive. It was temporary both for budget reasons and also as a way of giving an extra kick. I mentioned that policy in my paper. I also mentioned the fact that such temporary policies—this goes back to the first discussion of the dynamic inconsistency and the timing of investment incentives—can cause worries about what happens next time. If we move to a regime in which we say, "Whenever we think investment could be stronger, we'll have investment incentives, one worries that could be very destabilizing for investment on a going-forward basis. I would exercise caution in this instance even in Japan, as I would have exercised more caution in the United States than our government did.

I think Fumio Hayashi's point about the use of structural Vector Auto-Regressions (VARs), is important. I should have emphasized it more in the paper. The literature is very confusing and Fumio made the right distinction between innovations and discretionary fiscal policy in a structural VAR, which puts fiscal policy, monetary policy, output, and possibly other variables into a system of equations. The coefficients of the VAR are going to pick up both discretionary fiscal policy and automatic stabilizers. All they won't pick up—all that will be in the innovations—are things that we can't explain using either a policy rule or what is built into the tax code. That could be unpredictable changes in policy. It could also be things that have nothing to do with policy—a change in the income distribution, which causes tax revenues to go up, for example.

Some suggest interpreting the efficacy of policy by looking at the impact of innovations, as opposed to the impact of predictable policy, but it is hard to know what to think about the impact one sees from innovations because we don't really know what these innovations represent. To estimate the value of discretionary policy, which I presume would mean zeroing out the innovations in fiscal policy and also setting the fiscal coefficients to zero (i.e., saying the fiscal policy doesn't respond) you really have to believe the VAR. You have to believe that is the structural model of the economy and that when you change these coefficients, all of the other coefficients in the system are going to stay the same. I am skeptical about this. If one thinks about the effects of fiscal policy on investment, for example, looking simply at levels of

aggregate revenues does not produce a structural model for determining investment behavior. Therefore, we won't have invariant coefficients in this model if we start changing policy around in a big way.

Finally, let me address the issue of sustainability of policy, even if we have a past policy rule that says government policy tightens when we have larger debt, one can say that we are not on a sustainable path if we don't do that in the future. That's one interpretation of what I was saying in the paper. But I don't think we are necessarily in the same situation as we have been historically in the period for which these equations were estimated—particularly, if you look not at the reported primary surplus and the reported value of the government debt, but measures that take into account the very large implicit liabilities that we have now and are accruing very rapidly. It is not clear to me that our recent policy actions have had the characteristics described in the historical equations. Therefore, I am not sure that we are on a sustainable path, even taking account of the policy actions we are taking.

Mr. Fischer: Thanks very much. If I could just ask the people who comment or ask questions to keep them brief please. We will start with John Makin, Pam Woodall, Rob Dugger—the first three.

Mr. Makin: I just wanted to comment on something that Alan and Marty alluded to: Is there a role for discretionary fiscal policy in an unusual cycle like the one we have seen in Japan and like the one we may be seeing in the United States? In that context, I would like to suggest that the notion that somehow raising taxes and reducing expected future deficits was the key to the expansion of the 1990s is certainly debatable, as Alan suggests, and perhaps a dangerous notion right now. Because among the criteria that Marty listed—and I am going to focus here on the United States—we do have weak demand growth; we do have inflation falling. Another thing that bears on the policy mix here is that we have weak global demand growth, so that aggressive monetary stimulation in the United States that caused the dollar to depreciate sharply might have the effect of exporting U.S. deflation, and it might be better to try to enhance demand growth with lower taxes. And, finally, pushing too hard with monetary policy at this point might miss the mark and create a bubble somewhere else. If

we look at the stylized facts during the last year in the United States—despite the fact that we did have tax increases in the 1990s—in fact, what has come to pass is that they have not led to smaller expected future deficits; deficits have gone up sharply. Simultaneously, consumption responded sharply and positively to the tax cuts that were enacted last fall. We had a surge of consumption in the fourth quarter and the first quarter of this year. And while all this was happening, nominal interest rates were going down by a 100 basis points, with that reduction in interest rates composed partly of lower expected inflation and lower real interest rates. The bottom line here—the lesson—is that there is a role for discretionary fiscal policy at this stage in an unusual cycle in the United States, as well as Japan, and that lower marginal tax rates would be very constructive, both in the short run and the long run.

Finally, Fumio, I would suggest that I too thought interest rates were too low in Japan. But actually, when I went back and looked at real interest rates, as our previous session suggests, real interest rates in Japan today are about where they have been on average during the past thirty years.

Mr. Fischer: Thanks, John. Pam Woodall, please.

Ms. Woodall: On this question of whether fiscal policy works, I wonder whether it is worth differentiating a bit more between the effectiveness in different countries, since we have an international audience here. Most of the work on fiscal policy effectiveness has actually been done in the United States. But there are good reasons for thinking that the effect elsewhere might be smaller. There are two recent studies on discretionary fiscal policy. One study is by Roberto Perotti, where he finds that fiscal multipliers are much larger in the United States than in smaller economies. There is also an IMF working paper that shows that in open economies where imports are more than 20 percent of GDP, fiscal policy has no impact at all on demand. Whereas, in relatively closed economies, which in this case would be America and Japan, it is effective. On the other hand, automatic fiscal stabilizers would actually be expected to have a bigger impact in Europe than in Japan or the United States because taxes and spending are a larger share of GDP. I just think it might be worth considering these differences a bit.

Mr. Fischer: Thanks, Pam. Rob Dugger.

Mr. Dugger: I think everyone is attracted to the interest in Japan because it is so distinct and always offers up the possibility of lots of lessons. I am drawn to the Hayashi-Prescott paper, which hasn't been given much attention. It wasn't mentioned at all or cited in the Ahern paper that the Board staff did. I am particularly drawn to the final conclusion of it where you observe that there seemed to be an allocation of fiscal spending to declining industries. That observation was affirmed by Ed Lincoln in his book. He talked a lot about the politics of the allocation of deficit spending. It seemed to me, Martin, that part of your suggestion about what to do with respect to Japan and a fiscal policy response seemed to have something to do with changing the allocation away from declining industries. So, it has something to do with the churning of an economy, the restructuring process of an economy. My question to the three panelists is: To what extent is "the preservation of a status quo distribution of sector support of declining industries"—a phrase that Ed and Fumio used in the conclusion of their paper—enhancing the churning of an economy? Is that a desirable goal in a fiscal policy response?

Mr. Fischer: Mickey Levy.

Mr. Levy: I have two comments on the way Alan Auerbach calculates whether fiscal policy changes are discretionary. You regress the full-employment budget surplus on lagged measures of the full employment GDP gap and rely on Congressional Budget Office (CBO) estimates of the gap. Historically, the CBO has always abided by a fairly rigid NAIRU model for economic forecasting. Whenever its NAIRU model fails to accurately forecast inflation, on an ex post, ad hoc basis, it changes its natural rate and estimate of the GDP gap to whatever fits the model. So, my question is: When we look back on how we estimate what is discretionary and what isn't, was it discretionary at the time? What was the estimated GDP gap at the time? Consider how we interpret the 1993 tax hikes. We all agree that during the 1990s there was a pretty persistent upward revision in forecast of estimated potential GDP. Were the Clinton tax hikes put in place at a time when the gap was negative, which in hindsight looks positive?

You need to reassess how we distinguish between what was perceived of as discretionary at that time. Associated with that is Marty Feldstein's proposal for Japan that we reduce marginal tax rates and increase the value-added tax. If that is neutral with respect to the budget deficit, it would show up as not a discretionary fiscal policy change, based on the way you assess what is discretionary or not, even though we know it could have a significant impact.

Similarly, in the United States, the Tax Reform Act of 1986, the CBO budget scorekeeped as revenue-neutral, even though it significantly changed marginal tax rates and incentive. According to your measure, the tax legislation would not be considered as discretionary, even though it stands out as very discretionary.

Mr. Fischer: Thanks, Mickey. Larry Meyer is next please.

Mr. Meyer: Alan, you started off with a very interesting observation. You said that some of us might find surprising your result that discretionary fiscal policy has become increasingly activist over time. I was surprised.

That does raise a question about how a researcher should respond when the data seem to disconfirm his or her priors. Of course, you had an interesting phrase, "But that is what the data show." So, the question is what to do?

You have a perfectly reasonable approach. When the data disconfirm your views, you change your views. Some of my former colleagues will attest that I'm a little bit more stubborn in my priors. So, my first inclination would be to reassess the methodology and question the data. Another reason for doing this is actually the Romer-Romer paper this morning. They told us, convincingly I think, that ideas matter for policy. But, in my view, you seem to contradict this result. It seems to me that during the latter period, ideas changed and became increasingly skeptical about the effectiveness of discretionary activist fiscal policy. At the beginning of the Reagan Administration there was a clear disavowal of short-term stabilization policy, and that has continued. More focus was on long-run supply-side, tax policy, worrying about deficits,

etc. So, the question is, why do your data show differently? It seems to me that the problem is that you fail to really look at the intent of the changes. This follows up on some of the points that Mickey was raising.

You note this a little bit in your paper as one of the limitations. But I think it is a very important one. So, how do you look at the Reagan tax cut of 1981-1982? Is that activist stabilization policy? I always refer to President Reagan as an accidental Keynesian. That was a policy that was proposed and implemented for other reasons. It was timed fortuitously. When you take that into account, you might have a different view about activist fiscal policy. Maybe it helps to understand your other result—that activism doesn't translate into success. If the motivation for these changes was not active stabilization policy, then it is very reasonable that about half the time they should be well-timed and half the time they should not be from the perspective of stabilization policy.

Mr. Fischer: Thanks, Larry. The last comment is from Glenn Hubbard, and I am very sorry, but time is up after that.

Mr. Hubbard: My first comment echoes something that Larry just said. The paper left me with a sense of unease. Some of the uneasiness comes with the technical thing, which I won't go into, of how the CBO incorporates spending in its forecasts.

More substantively, the distinction Larry made is not second order but first order. There is a big difference between discretion generally and stabilization policy. Think of three major tax changes in the past couple of decades—the Reagan tax cuts, the Clinton tax increase, and President Bush's tax cut. None of those was adopted with stabilization policy in mind. Two of those shared a common view about decreasing marginal tax rates and effects on economic growth. Another held that increasing marginal tax rates would increase economic growth. But none of those was about stabilization policy. That is important because you then can't really evaluate those policies in this framework. They weren't intended for stabilization, and I would think the more standard public finance analysis of what the effects are of these policies on investment or labor supply or growth would be the better way to go.

The third point I'd like to make is that I agree with you, Alan, wholeheartedly on the notion of the need for more clarity in this idea that raising taxes or increasing primary surpluses in a country like the United States increases economic growth. I think that is a relatively thin reed. I would encourage you to think hard about the second point about micro-estimates of growth from cutting tax rates. The burden is also on the other side to get at micro-estimates of raising them.

Mr. Fischer: Thanks, Glenn. We will now ask the people on the podium to respond briefly.

Mr. Feldstein: I will just comment about two things that have been raised. One is this question of how one measures or even thinks about fiscal policy. The traditional way, of course, has been in terms of some kind of change in the size of the full employment deficit. It is very important always to think about the incentive effects of the fiscal policy. That is certainly not new. The investment tax credit is a good example of something in which the expected impact is very different from the revenue loss associated with it. Another example is changes in marginal tax rates. In thinking about discretionary fiscal policies, it is important to think about policies that are aimed at changing incentives, as well as policies that simply change the amount of cash in people's pockets.

One of the puzzles in Alan's paper is that he found the discretionary policies during the Clinton years. Here, the data do seem to speak pretty loudly that there is this relationship between changes in discretionary budget changes and the lagged GDP gap. It may be coincidental, as Larry Meyer, I suppose, would argue, but the data certainly do seem to say that. Then, he doesn't find a clear breakdown when he tries to look at that same question separately in terms of taxes and expenditures. That is a kind of puzzle. But I don't think it is a very deep puzzle, because one thing we saw during that decade was a movement away from literal expenditures as a way of achieving expenditure goals. So, we saw an increase in welfare in the form of an expanded earned income tax credit and a number of other special provisions during that decade which were done through the tax system so that they resulted in lower taxes rather than increases in spending.

Mr. Fischer: Thanks. Fumio, any last comments?

Mr. Hayashi: What we did in Hayashi-Prescott is that we can explain the Japanese drop in the 1990s by the supply side, which is the productivity slowdown in the 1990s and the 10 percent decrease in hours worked that took place around 1990. Those two factors do a very good job of explaining that great recession in the 1990s. Now in that model, which is a standard real business-cycle model, there is government expenditure. It does something, but very minor compared with the supply-side considerations. In particular, our model cannot explain this 1997 drop in GDP when the government tightened its fiscal policy, but still our model can explain the trend of the whole 1990s. Suppose that Kuttner and Posen are right and the fiscal multiplier is huge. Should we engage in fiscal easing now in Japan? I am not sure. All those public works expenditures will go to subsidizing inefficient industries, and that is going to aggravate the supply-side program. So, I am not sure that I would recommend what Marty has been recommending on the fiscal side.

Mr. Fischer: Thanks, Fumio. Alan?

Mr. Auerbach: Just a few comments. First, on the issue of the relative efficacy of fiscal policy in smaller countries like EU countries, we would expect the effects to be smaller, just like we would expect the fiscal policy in Arkansas to have a smaller effect on GDP in Arkansas. It is a fairly obvious point. But it is an interesting observation, given that with the move to the euro there has been a move in the focus from monetary policy to fiscal policy to counter shocks in individual countries. Yet, as countries become more open, we also expect the multipliers to spill over into other countries and, therefore, for fiscal policy to be less effective too. The answer we have in the United States is that we have a central government. That is something that needs to be thought about in the European context as well.

As to the issue of declining industries and fiscal policy, thankfully, we in the United States have not really had is fiscal policy targeted toward industries—leaving aside things like steel tariffs, which have been getting a lot of publicity but aren't that significant. Obviously,

one's attitude about discretionary fiscal policy would be even more negative if the policies tended to take the form of being targeted toward industries that are declining.

As to how one should interpret regressions, it depends on how much of a Bayesian you are and how strong your prior is. Even if the *t*-statistics are significant, for equations estimated over a short period, a few anomalous events can give you significant coefficients and poor out-of-sample predictions. There is no quarrel with that. But, during a long enough sample period, if people say they are doing one thing and the data tell us they are doing something else, we should believe what the data are telling us. An example is 2001. The tax cut was not put forward explicitly for cyclical reasons, but I do recall discussions about it being an insurance policy in case we needed some stimulus. There could be several factors at work and cyclical factors might play a role in policy choices, even when not being emphasized.

Finally, as to using CBO data or other similar data to measure stimulus—this relates to the first point I made in my presentation—it is very hard to measure discretionary fiscal policy. There can be changes in baselines that, because of changes in the perceived policy, actually don't represent legislated changes. Or, there can be legislated changes that are going to occur during a period of five years, which nobody thinks are actually going to be sustained and, therefore, don't really represent a policy change. In either case, it is difficult to analyze the effects of discretionary fiscal policy.

Mr. Fischer: Thanks, Alan, and to the discussants.

Monetary Policy in a Changing Economic Environment

Otmar Issing

My remarks focus on the challenges facing monetary policy in a rapidly changing world. I start by examining the nature of economic change confronting monetary policy in its daily execution. In the absence of an unambiguous mandate to maintain price stability and of a clear strategy to sustain it, the ongoing task of identifying the latest economic shocks may easily distract the central bank from the need to maintain a firm sense of direction in the longer run. Next, I advance an interpretation of why the transition to European monetary union—involving, by all standards, a state of acute uncertainty—could be accomplished in the smooth manner in which it proceeded. In this context, I highlight the role of two complementary policy perspectives. These two principles of good policy are conducive to flexible and timely responses to unfolding events and, at the same time, ensure policy against myopia and short-termism and keep it solidly anchored to its medium-term objective.

Cyclical and structural change

Economic change—and the uncertainty that it brings about—has three dimensions. At the ground level we have *cyclical*, that is transitory and/or nonstructural economic shocks coming along continuously. The theory of economic policy normally assumes that such shocks are "additive" in nature, in that they do not pose a controllability problem for policy. Nevertheless, they have to be properly identified in real

time. Econometric theory has spent decades devising sophisticated identifying restrictions to isolate different types of shocks from the tangle that appears in the data. The purpose of these exercises is to trace the propagation profile of exogenous impulses through the economic system. But nothing close to a consensus view has emerged. In fact, inference is often nonrobust across various identification schemes.[1]

As a consequence, central bankers are given little guidance as to the nature of the stochastic disturbances that drive the business cycle on average. Of course, model selection itself is at stake here, as competing modelling paradigms can only be put to a test—and discriminated—by matching their quantitative implications with the dynamic shock responses seen in the data. If the latter can only be generated on the basis of controversial identification restrictions, the empirical benchmark becomes elusive. For all these reasons, central bankers must exercise judgment when they encounter perturbations, and they cannot rely on any single approach to reasoning through the implications of such shocks.

At a higher level, and a lower frequency, we have *structural* change. This induces parameter—i.e., multiplicative—uncertainty, as innovations tend not only to persist, but become embedded in the coefficients through which key variables respond to exogenous forces. Monetary policymakers, again, find themselves at a crossroads. For one thing, it is extremely difficult for them to decompose in real time what is due to structural change and what stems from normal cyclical sources of fluctuation, as these events tend to come together. But, more fundamentally, central bankers perceive the uncertainty surrounding structural variation as of a higher order of magnitude—and of a different nature—compared with the way parametric risk is treated in much of the literature. I believe this type of our measure of uncertainty is closer, in this case, to a Knightian concept, wherein probability distributions for model coefficients cannot be articulated.[2]

A further source of uncertainty, of a *strategic* sort, stems from the endogenous—at times unpredictable—process whereby agents form their expectations. This process has a strategic, game-theoretic flavor, as the central bank and its way to respond to the events is very much

part of the picture, and in some way it is driving the formation of views about the future.

Incidentally, the identification of the disturbances stemming from cyclical, structural or expectational disturbances is further complicated by the ex post statistical revisions, which may at times overturn the empirical platform on which central bankers have to make their decisions in real time[3]. And it should be superfluous to remind the reader of the paramount measurement problems that cloud state variables, such as the output gap, the NAIRU, the steady-state real interest rate, which are of key importance in mainstream macroeconomic discussions.

Institutional change

Complexity reaches its climax in the presence of large-scale *institutional* change, however. This source of change is sufficiently rare in history to escape econometric testing and sufficiently severe to impart a profound discontinuity in the data-generating process. Times of institutional change are times in which the signal extraction problem for central banks is most acute. Structural change may be associated with a widely dispersed range of expectations. These, in turn, may behave erratically and fail to coordinate on a focal point.

The European Central Bank (ECB) has some examples to tell in this regard. When the ECB started conducting policy in 1999, area-wide back data were only scantly available, many statistical indicators were still under construction. More importantly, the presumption was that the creation of the euro area would itself imply a major regime shift. Therefore, the statistical patterns emerging from past data—if and when made available by aggregation of national figures—might not be informative of the structure of the new economic entity or might even be misleading. Under such circumstances, it could not be taken for granted that private agents could immediately form expectations consistent with the new regime, and, thus, instability in behavior could not be ruled out. In some sense, we were studying the evolution of a moving object, which was changing for the very reason that it was being observed, as in the famous Heisenberg paradox. Real time misperception, false inference, Knightian uncertainty, all the usual professional

hazards of central banking, plus something else seemed to be compounded—let's be conservative—by a factor of three.

Indeed, the ECB did preside over a monumental transition. The money market, for one, underwent a historical transformation on the eve of the launch of the euro in January 1999. Eleven national markets, so diverse in terms of participants, operating conventions, settlement structures, credit facilities, had to merge into a unified trading area almost overnight. New payments systems for large-value transactions were implemented. Capital markets traditionally protected by currency fragmentation and national regulations were opened up to arbitrage and straight competition.

Yet, the transition was smooth and the abrupt switch in structural relations, which many observers had seen in the offing, did not materialize after all. Markets immediately recognized the new rules of the game. They adjusted swiftly to the new monetary policy environment. Since 1999, overnight rates have limited their fluctuations on the dates of monetary policy announcements to less than 5 basis points on average, a sign that policy was reasonably predictable.[4] The ten-year break-even inflation rate obtained from French index-linked bonds—a crude measure of inflation expectations—has consistently signaled the degree of credibility of the ECB's monetary policy to maintain inflation in line with its announced definition of price stability. This indicates that markets have perceived our pattern of response to the events as transparent and consistent over time.

All this has to be measured against the magnitude of the disturbances that intervened in the course of the first three and a half years of our existence. Since 1999 the euro area has weathered a number of major economic or financial turbulences worldwide, preserving a degree of monetary and economic stability that would have hardly been conceivable before the advent of Monetary Union. The euro area has gone through a sequence of energy price shocks with only limited and short-lived impact on inflation expectations. And a long trend of foreign exchange depreciation—recently reversed—as well as a marked correction in stock prices since early 2000 have done little to shake the confidence in the euro as a solid store of value.

Anchoring expectations in a changing environment

How was all this possible? How could uncertainty of the highest degree fail to leave a mark in the records? In my view, the ECB's success in anchoring expectations right from the start has not fallen from the sky nor has it been entirely "inherited" from the past. Instead, I would argue that our success can be attributed in good measure to the ECB's monetary policy strategy and the more general principles that underlie our policymaking. Not least, it has been a reflection of our philosophy that markets are powerful, sometimes overwhelmingly so, but, nevertheless, in need to be guided by a central bank, not meddled with.

First, the way we committed ourselves to the overriding mandate to be the guardians of price stability in the euro area—which we received from an international treaty—anchored expectations in a time of accelerated change. The ECB's announcement of a quantitative definition of price stability—which is symmetric in the sense that it is incompatible with inflation as well as with deflation—was immediately acknowledged by our counterparts. It is important to add that price stability, according to our definition, is to be maintained over the medium term. The medium-term orientation of our monetary policy strategy and our aversion to fine-tuning of short-term developments in prices and real variables has helped to provide a firm compass while the economy was sailing through the uncharted turbulent waters of 1999 and subsequent years. It deflected the risk that amidst exceptional uncertainties, the central bank may itself become an additional source of noise. Ultimately, it provided a degree of leverage over expectations on the eve of the transition to the new currency that could pin them down solidly to the intended objectives of policy.[5] The mandate and the independence that it ensures endowed the new institution with a stock of credibility that facilitated its operations and its interactions with the markets from the first day of monetary union.

Secondly, our strategy has helped to sort through a wealth of incoming statistics and has provided a reliable road map and a sense of direction.[6] We have built into our strategy two complementary perspectives over the workings of the economy, one in which money and credit

are attributed a key role in the formation of prices. And one in which real variables receive pre-eminent attention as the determinants of price pressures in the short term, and where monetary factors are treated only implicitly. Under what we call the first pillar, we thoroughly monitor monetary and credit indicators on the basis of those analytical frameworks that can sensibly incorporate developments in money. Under this pillar, we announce a reference value for M3 growth, which, if realized on average over the medium term, should in normal circumstances indicate that policy is consistent with the achievement of price stability.[7] I shall return to this principle shortly, as it will constitute the focal point of my remaining observations. Under the second pillar, we review a broad set of nonmonetary indicators and assess their implications for price setting over a short- to medium-term horizon.

These two mutually reinforcing perspectives provide robust indications for a policy aimed at price stability, which survive the cross-checking of competing models and the rise-and-fall cycles of fashions in economic thinking.

Keeping a firm sense of direction

But how can a monetary policy framework induce prompt action in the face of ever-changing circumstances and, at the same time, maintain a firm sense of direction? Here, there is clearly potential for destabilizing mechanisms setting in. Constantly bombarded by economic news, a central bank risks becoming hypnotized by the latest indicator, by the markets' likely reaction to the latest indicator, by the markets' anticipation of the central bank's response to the latest indicator, and so on into infinity. This mechanism can lead monetary policy gradually astray from its foremost role of providing a firm medium-term anchor for the economy.

So, at the risk of oversimplifying, let me now turn to consider two general principles of prudent monetary governance that may help central banks to reconcile the need for prompt action and a firm medium-term orientation.

(1) First, a central bank always needs to tailor action upon the origin,

the magnitude, and the nature of the shocks that hit the economy from time to time. As I tried to argue above, this is a highly demanding exercise because shocks do not come about with labels. They have to be identified first, in real time. But there are no shortcuts or excuses—no simple rules linking policy to one or two privileged indicators can substitute for an accurate examination of shocks and a careful analysis of their potential for transmission into prices over a sufficiently extended span of time ahead. A corollary to this principle is that the horizon for policy action cannot be set in advance, as I shall argue more extensively below.

(2) Second, a central bank can benefit from keeping an eye fixed on the single long-term compatibility condition that monetary economics has to offer to practitioners, free of model-specificities and restrictive assumptions. Namely, that over a sufficiently extended period of time, money should grow at a rate that is consistent with trend growth in real output and the central bank's definition of price stability. In more general terms, this principle embodies the ancient wisdom of the quantity theoretic law—that it is the growth of money that ultimately anchors the development of prices.

Each one of these two principles—if taken individually—entails some guidance for the monetary policymaker, which, however, is partial. A monetary policy strategy—such as the one adopted by the ECB—can be seen to provide a robust framework for monetary policy decision-making, which heeds these two general principles in a way in which they reinforce and complement each other.

The lesson suggested by the first principle is that disturbances have to be evaluated as they come about, according to their potential for propagation, for infecting expectations, for degenerating into price spirals. And preventive action should not be delayed, as it becomes clear that shocks—whatever their origin—may take hold in the economy and evolve into inflationary or deflationary pressures over the medium term. The time dimension of these possible developments varies with the type of shock, the initial macroeconomic conditions, the prevailing financial sentiment, the international environment, and many other variables. Therefore, the horizon for monetary policy

cannot be set in advance. Sometimes it pays to look far ahead, beyond the average lag of monetary transmission. Sometimes the economy can be expected to return to price stability within a much shorter horizon. In all events, a central bank has to ensure that expectations be quickly reverting to its declared objective of policy.

The policy recommendation implicit in the second principle is simple: Do not ignore the information that monetary developments contain for medium-term price developments, even if the relationship between money and prices may not come through strongly at shorter horizons. This principle also provides an antidote against the pitfalls of exceedingly forward-looking rules. Looking into the future with a vigilant eye, as the first principle suggests, is a fundamental element of good policy. But, by constantly looking ahead, one should not lose sight of the intended trajectory of policy and the need to act consistently over time. One should always be constantly aware of possible inadvertent slippages from the intended long-term direction. In the end, monetary policy needs to ensure a path of money supply that is consistent with maintaining price stability over the medium term. Trends in money velocity can be incorporated in such a longer-term benchmark to account for the evolving structure of the monetary exchange. But, in the end, there can be no sustained inflation without systematic accommodation in monetary aggregates.

The key point that I want to bring out here is that neither of these two principles can stand alone. Both are in need for mutual cross-checking. The first principle suggests that the central bank move its interest rate policy instrument in reaction to the disturbances that are considered to have implications for price stability in the medium term. But these actions—taken at successive points in time—may not prove to be consistent over time and could, thus, cumulatively result in systematic divergence from the desired objective. Thus, the course of policy followed in the attempt to counter perturbations via shock-specific responses needs to be ascertained against the straight line provided by the quantity theoretic reference of the second principle. If that line turns out to have been departed from for an extended period of time, then policy, sooner or later, has to be brought back onto the right course.

Incidentally, it is worth noting that historical episodes of asset price "bubbles" have tended to be accompanied by strong and persistent deviations from that reference line. Thus, a monetary policy strategy that monitors closely monetary developments and measures them against a medium-term reference growth rate may—as an important side effect—also contribute to limiting the emergence of unsustainable developments in asset valuations. I shall come back to this below. Asset prices, by themselves, are not a suitable goal for monetary policy. In the long run, the relative price of assets is mainly driven by underlying real factors—e.g., technological developments and preferences—which cannot be controlled by monetary policy. But monetary aggregates and credit developments in situations of financial instability can signal to what extent consumption, investment, labor, and price-setting decisions are being affected by conditions of financial disorder, excessive euphoria, or disillusion.

Conversely, the second principle too, if followed in isolation, is subject to potential difficulties. As first pointed out by William Poole more than thirty years ago, there are many short-term shocks to the amount of money demanded for each unit of nominal income, which monetary authorities would do better ignoring and accommodating. These unexplained innovations may be simply related to seasonal noise in the money creation system or transitory forces driving around transactions habits. They may reflect reversible movements in the preference for liquidity, in- or out-flows of foreign exchange transiting through checkable accounts or else. In the case of Europe, it cannot be ruled out that the process of financial integration may have affected the income velocity of monetary aggregates. In these circumstances, having to hit a constant rate-of-growth target for, say, base money on a near-term horizon would result in ample fluctuations in short-term interest rates. And this instability would likely be transmitted to prices and output, causing unnecessary fluctuations in these variables. In this context, the first principle of good policy, prescribing a careful filtering of disturbances, provides important safeguards against such policy-induced instabilities. In fact, it underlies the ECB's decision to adopt a *reference value* for monetary growth, which is *not* a monetary target. And it also supports the need to look at monetary developments from a medium-term perspective. Nevertheless, as

long as money demand relationships are reasonably stable—as has been the case in Europe in contrast to the United States—information from monetary developments should provide robust indications of medium-term price pressures.

Paraphrasing an expression of Paul Samuelson, we were given two eyes: one to watch money and credit aggregates and one to watch everything else. Ultimately, these two policy perspectives are to be combined in a single strategy that subsumes them both in a unified—albeit complex—and robust framework for action. This strategy lends policymakers an accurate perspective over the economy to respond expeditiously to the events and, at the same time, ensures them against systematic slippage.

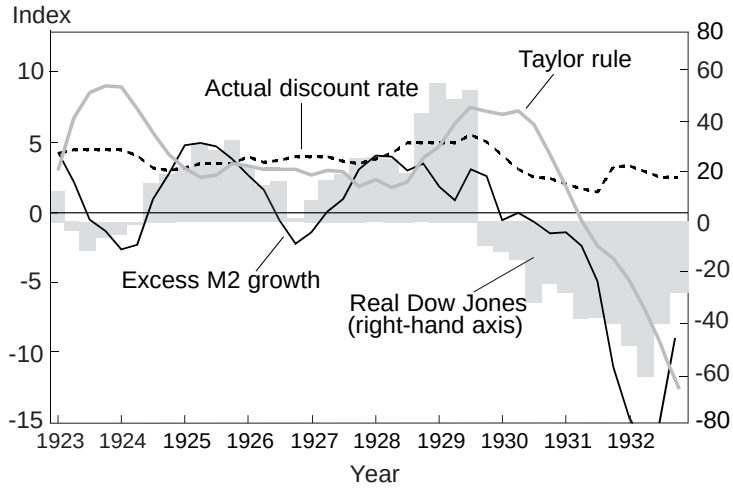
The controversy over the reference value for money growth

Our policy approach has encountered some criticism, however. This criticism builds on two premises. First, we sometimes hear that there exist ready-made statistical gauges that summarize and condense all the information that a central bank needs to know about the state of the conjuncture. One of these privileged indicators that has gained prominence is an inflation forecast. Another one is some measure of slack, i.e., the distance between actual and potential activity.

Second, we are told that as long as the central bank moves its interest rate instrument with sufficient vigor in response to, say, an inflation forecast, it does all it is required to pin down prices and keep the economy on track. A rule of the type advanced by John Taylor is a good example of this line of thinking.

The ECB has expressed its reservations on the use of such simple interest rate rules ignoring money elsewhere, and I shall not repeat those arguments here.[9] What I would like to do, instead, is go through a simple, purely suggestive exercise in historical interpretation. Three past episodes are selected, which, in hindsight, are regarded as having involved various degrees of unintentional monetary policy mistakes. I have asked myself the question whether a simple interest rate rule, à la Taylor, had it been available at the time, could have been of help

Chart 1
The United States in the 1920s: Excess Money Growth, Real Asset Price Growth, and Monetary Policy*
(Year-on-Year Changes)



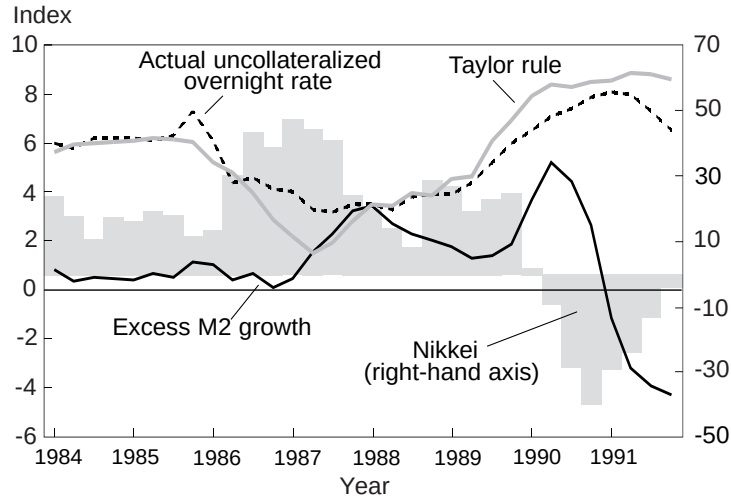
*Note: Excess money growth is defined as $\Delta_4 m - [\Delta_4 p^* + \Delta_4 y^*] + \Delta_4 v^*$, where Δ_4 denotes the four-quarter difference operator and m, p^*, y^* and v^* stand for (logs of) the actual stock of M2, the price objective, real potential GDP, and long-term velocity of circulation, respectively. The price objective is normalized to 1, potential output is obtained applying an HP-filter to actual real GDP, trend velocity for 1923-1930 is constructed by interpolating a linear trend to realized velocity over 1921-1929, and by imposing a structural break afterward to reflect the sharp contraction in nominal GDP, primarily led by a fall in producer prices. The Taylor rule has been calibrated to an equilibrium real interest rate equal to the average real discount rate observed in the first two quarters of 1923, and imposing an inflation coefficient 1.5 and an output gap coefficient of 0.5.

Sources: ECB staff calculations on Friedman and Schwartz (1963-1993) and NBER data.

in preventing those mistakes. And finally, I have tried to figure out whether a policy taking the quantity theoretic equation seriously, and using money stock indicators in addition, could have been instrumental in yielding a better macroeconomic outcome.

These episodes comprise the Federal Reserve System's management of the "Roaring '20s" and of the deep crisis that followed; Japan's monetary policy in the second half of the 1980s in the face of a

Chart 2
Japan in the 1980s: Excess Money Growth, Real Asset Price Growth, and Monetary Policy*
(Year-on-Year Changes)

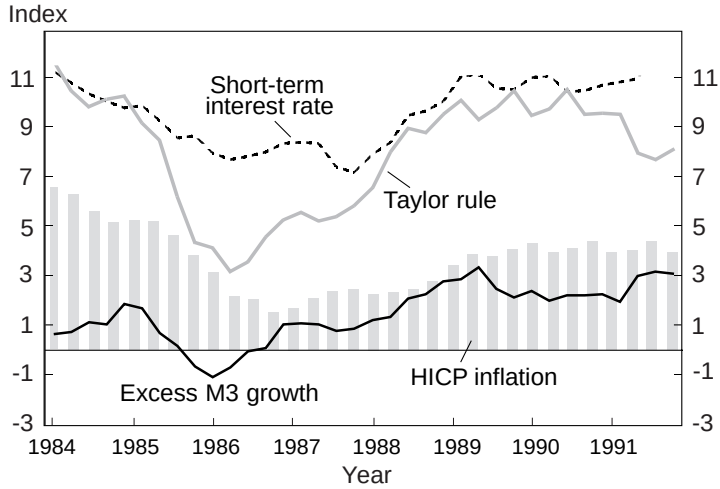


*Note: Excess money growth is defined as $\Delta_4 m - [\Delta_4 p^* + \Delta_4 y^*] + \Delta_4 v^*$, where Δ_4 denotes the four-quarter difference operator and m, p^*, y^* and v^* stand for (logs of) the actual stock of M2+CDs, the price objective, real potential GDP, and long-term velocity of circulation, respectively. The Bank of Japan implicit inflation objective has been set equal to a yearly rate of 1.7 percent (the average of the Japanese CPI inflation between 1984 and 1991), potential output is obtained applying an HP-filter to actual real GDP, trend velocity is constructed by interpolating a linear trend to realized velocity over a twenty-year period, starting in 1980. The Taylor rule has been calibrated to an equilibrium real interest rate equal to the average real uncollateralized overnight rate observed in the first two quarters of 1984, and imposing an inflation coefficient 1.5 and an output gap coefficient of 0.5.

Sources: Bank of Japan and ECB staff calculations.

tremendous asset price buildup; and, finally, monetary policy over the same period in what would later become the euro area. The three episodes are depicted in charts 1, 2, and 3. In all examples, a measure of excess money growth is used. This is defined as the difference between the actual growth rate of nominal broad money and the rate that would be implicit in the quantity relation with real income growing at its potential rate, inflation at the central bank's objective, and velocity at its long-term trend.

Chart 3
The Euro Area in the 1980s: Excess Money Growth, Inflation, and Monetary Policy*
(Year-on-Year Changes)



*Note: Excess money growth is defined as $\Delta_4 m - [\Delta_4 p^* + \Delta_4 y^*] + \Delta_4 v^*$, where Δ_4 denotes the four-quarter difference operator and m, p^*, y^* and v^* stand for (logs of) the actual stock of M3, the price objective, real potential GDP, and long-term velocity of circulation, respectively. The euro-area implicit inflation objective was obtained by an error-correction formula, whereby the level of past realized inflation was corrected by subtracting 7.5 percent of the discrepancy between that level and the "price norm" of 2 percent adopted by the Bundesbank. Potential output is obtained applying an HP-filter to actual real GDP, trend velocity change is set to –1.0 percent per year during the entire period under consideration. The Taylor rule has been calibrated to an equilibrium real interest rate equal to the average three-month real interest rate observed in the first two quarters of 1984, and imposing an inflation coefficient of 2.08 and an output gap coefficient of 0.08. The inflation and output gap coefficients are estimated using a GMM technique during the period 1980-2001.

Sources: ECB staff calculations.

Needless to say, the list of caveats is even longer than usual. First, there is obviously some selection bias to be discounted: These episodes have *not* been chosen at random. Secondly, in none of these three periods was anything close to a Taylor rule debated in the profession as a viable option for guiding central bank action. The very notions of "potential output," "target inflation," "real equilibrium interest rate," "money velocity trend," although put forward by a

number of academics, were either unknown or intentionally ignored in the 1920s at the Federal Reserve Board. And the same concepts, while available and, in fact, widely used by central bank economists in the 1980s, were and are open to all sorts of measurement controversies. To mention only one, regarding the euro area in the 1980s, the "inflation objective" of a group of twelve central banks conducting more or less independent policies is a sufficiently elusive construct to warrant a great deal of caution.

Having said all this, I believe this exercise is, nonetheless, instructive.[10] At a minimum, it illustrates how different statistical gauges can yield conflicting policy signals and how badly central banks can sometimes do if they choose to neglect the fundamental arithmetic embodied in the quantity relation. Chart 1, for instance, suggests that had the Fed looked at a measure of excess money growth, had it not rejected the then novel normative framework offered by the quantity theory of the business cycle, it would have probably realized that monetary policy was *too lax*, not *too tight*—as suggested by the Taylor rule standard for much of the 1920s.[11] Intriguingly, the measure of excess money growth appears to move in sympathy with the profile of the histograms that represent the growth rates of real stock prices in New York. It becomes positive—and significantly so—in those years in which the market is most buoyant. And it turns negative when the market pauses or falls. Perhaps one can conclude that money was growing too fast in the years immediately preceding the crash, compared with the long-term necessities of an inflation-free economy operating at potential.[12] Perhaps that excess of monetary injection was spilling over into the purchase of financial assets.

However, looking at the discount rate only, to the exclusion of the monetary indicator, and measuring the historical path of the discount rate against the benchmark provided by the Taylor rule, one would draw the opposite indication.[13] While significant by a Taylor rule standard, the degree of tightening was perhaps not commensurate with the surging risk appetite that was driving up market rates and yet luring more and more investors into the financial gamble. The extent of the abrupt policy reversal in the first half of 1929, which many contemporary observers quote as a primary cause of the disorderly fall in the

market, is also more apparent from the quantitative than the interest rate indicator.

A similar picture emerges from the Japanese data. While a Taylor rule would have signaled an appropriate-to-tight stance of policy until well into 1989, excess money was building up in the second half of the 1980s, finally at an accelerating pace.[14] Apparently, the Bank of Japan had expressed early concerns that rapid money growth might predispose the "dry wood" needed to set the asset market on fire.[15] Deputy Governor Yutaka Yamaguchi (1999) echoed those concerns in a recent insightful intervention in Jackson Hole. But probably no tightening—in excess to that already apparent in the data—could have been justified to the public on the back of persistently subdued inflation and growing measures of productivity. Again, it seems that a monetary policy gauge focused on inflation and a measure of slack only—to the neglect of money—would have failed to sound the alarm.[16]

The euro area in the 1980s provides an alternative picture: the connection between excess money growth and goods, as opposed to asset price, inflation. The disinflationary process that had occurred in the first half of the decade, aided by the sharp decline in the international energy prices, was followed by a gradual reversal. Monetary authorities, although not off track by a Taylor rule standard, were slow to spotlight those developments and somehow fell behind the curve. Once more, money rising in excess of its long-term reference value could have warned of impending risks to price stability.

Of course, simple graphical co-movements cannot be emphasized too much, let alone taken to prove any casual relationship. And the obvious objection to my story is that there are other episodes in the history of industrialized countries in which money growing temporarily out of line with fundamentals has failed, ex post, to ignite an asset bubble or to tolerate an inflationary process under way. Furthermore, alternative indicators, such as private credit, may at times outperform broad money in signaling that observed swings in asset prices are abnormal and may prelude to financial distress.[17]

But the absence of a fire does not mean that we should not pay for

fire insurance. Rather, the question is whether, ex ante, the probability of a policy mistake is sufficiently large to warrant concerns and, at some point, intervention. These concerns and this threat of intervention on the part of the central bank may be sufficient to deter that risk in the first place.[18]

Of course, there are shocks to money growth that, in retrospect, appear to have been due to pure velocity noise. If we had an all-encompassing model of how real and financial forces interact, if we were entirely confident that our model suffered from no omission of key underlying relationships, incorporated no functional mis-specification, was exactly estimated, then these velocity shocks would be readily recognizable. They would show up as the residuals of the complex money demand equation in the model. But no model and no central bank in the world is at that stage yet. Incidentally, it is a well-known feature of the general equilibrium models in wide use today that the money demand condition that they incorporate displays a rather poor fit to the data. A central bank cannot place too much trust on the coefficients and the residuals that this equation generates. There definitely seems to be more to the link between money, income, and prices in the data than captured by such simple interpolations. This fact, in my view, should urge us to accelerate our efforts to develop a more sophisticated understanding of how money interacts with price setting and how financial and real variables can influence each other.

So, central banks have to face dilemmas of the following nature. Does a shock to observed money quantities reflect pure noise that will unwind in due course, or does it bear information over the forces driving the setting of prices? Is an observed shift to more liquid portfolios a sign that agents are building up transaction balances in order to finance higher spending and/or in anticipation of higher prices in the near future? Or is it a mere signal of a heightened precautionary motive, a by-product of financial anxiety, of market jitters, which will reverse themselves sooner or later without economic implications? In particular, to what extent is an unexpected surge in money a counterpart to easy credit—which can feed asset market speculation or excess demand, with unsettling consequences stemming from both? The experience accumulated in the 1920s and the 1980s suggests that con-

ditions of easy credit and rapid monetary expansion, while escaping simple checks based on inflation and output gap indicators, can inflict lasting damage on the economy. Suggestively, many stories were told in Japan in the 1980s about the relation between money supply and prices having become unstable and unreliable.

A central bank cannot systematically dismiss shocks of this nature as nuisances. Ultimately, the obvious question to ask is what has changed in the relation linking money holdings and consumption-saving decisions, a connection which, as I argued above, is not well-described in available models. But in a situation of doubt, one should always be reminded that the—provided money is properly measured—quantity theoretic regularity will, at the end, reassert itself. So, if price stability is to be preserved consistently over the medium term, a persistent violation of that regularity should have an impact on policy decisions.

Concluding remarks

I conclude with a number of observations that have been recurrent in my remarks above.

First: There is no simple escape for a central bank from a serious analysis of economic change, which comes in the form of shocks and noise. These changes are often opaque and present themselves in disguise, but they may contain information that cannot be discarded on a priori grounds. There is no escape to a serious analysis of economic perturbations. Certainly, following deceptively simple policy rules of one sort or another is no viable cure to complexity.

Second: The change in money demand is one of the most difficult to decipher. Looking ahead, these shocks may even augment in number and magnitude—as has been the case in the United States and elsewhere in the past—which would make filtering and reading the signals coming from money a difficult undertaking. But the central bank should not deny itself the opportunity to take advantage of all the information that it carries with itself. The conviction that money matters and contains invaluable information for policy is shared across central bankers wedded to different monetary policy strategies.

Third: While looking into conjunctural signals, a central bank should never fall prey to myopia and short-termism. Monetary theory has provided a compass for measuring how the course of policy has deviated in the past and will likely deviate in the future from the straight line consistent with price stability and a sustainable growth path. This quantity theoretic reference should be consulted regularly and taken seriously. Monetary policy cannot react mechanistically to monetary variables, and the weights that a central bank attaches in its considerations to the various headline measures of money supply are state dependent: They cannot be set in advance. Thus, there may be extended periods of time in which observers do not detect reactions to monetary indicators. In our strategy, for example, the weights are conditional on the analysis of monetary shocks, which is conducted under the first pillar. This analysis is aimed at purging the developments in monetary aggregates of the noise with which they are usually observed. This analysis yields more reliable measures that can be used for policy orientation.

But if deviations in these measures of money from the long-run trajectory consistent with price stability are ample and persistent, a central bank should intervene if the anchoring properties of money are to be reinstated and made operative.

Author's note: The author would like to thank Massimo Rostagno for his valuable contribution.

Endnotes

1 Various alternative methods to identify *monetary* policy shocks generally produce comparable qualitative results, in the sense that inference is reasonably robust across a large subset of identification schemes. However, this does not appear to be the case for exercises aimed at identifying shocks to *technology*. Furthermore, there is some disagreement as to the extent to which different shocks have been responsible for output variation in the past. See, among others, L. Christiano and others (1999) and J. Galí (1999).

2 To make an example of this type of unstructured uncertainty: What is the admissible range of parameter change induced by increased globalization, new technologies, or continuous financial innovation? Are both sources of structural change only going to show up in a faster transmission of shocks cross-border. Or is the emergence of genuinely global financial operators going to fundamentally alter the transmission of monetary policy at a local level? Likewise, the developments of new financial products are a potent force behind enhanced flexibility and macroeconomic resilience. But the very technologies that appear capable of better allocating risk and, thus, containing economic imbalances may also be imparting new forms of vulnerabilities that can intensify the business cycle. Because of their increasing degree of complexity, the new instruments can potentially expose the overall system to heightened risk if miscalculations are large. Again, assigning probabilities to these equally plausible courses of events appears hazardous on a priori grounds.

3 On the policy consequences of real time misperceptions induced by ex-post statistical revisions, see A. Orphanides (2000).

4 See V. Gaspar and others (2001), and P. Hartmann and others (2001).

5 On the connection between a central bank's predominant focus on price stability, its aversion on real fine-tuning, and its credibility assets, see V. Gaspar and F. Smets (2002).

6 For a more precise description of the ECB monetary policy strategy, see ECB (1999, 2000) and O. Issing (2001).

7 Interested readers can find a precise account of the methodology that we follow to construct the reference value in C. Brand and others (2002).

8 A discussion of the problem of excessive forward-lookingness in monetary policy is provided in M. Woodford (2000).

9 Interested readers are referred to ECB (2001).

[10] The results presented in the charts prove reasonably robust across a number of admissible assumptions and specifications. However, in the case of charts 1 and 2, the analysis becomes less and less reliable as the horizon is stretched to cover periods following the crash of the stock markets in late 1929 and 1990, respectively. This is due to fundamental uncertainties clouding the way key parameters, such as the perceived equilibrium real interest rate and the expected trend in money velocity, react to the deepening of the economic crisis that ensued in both cases.

[11] In a recent review of this period, T. Humphrey (2000) has argued that the Fed's refusal to endorse the policy prescriptions implicit in the works of I. Fisher in those years contributed to the fatal policy mistakes that have been described in the classical book by M. Friedman and A. Schwartz (1963-1993). The monetary theory of the Great Depression, as expounded in that book, still constitutes the leading interpretation of that piece of monetary history. The contention that an easy policy was fueling the stock market bubble was always a fixation of various Austrian economists at the time.

[12] That monetary policy should aim at price stability, even under the price-taking rules of the international gold standard, was one of the main principles advocated by I. Fisher in his classic 1911 book on the purchasing power of money. Other prominent monetarists of the time espoused the principle and elaborated monetary benchmarks which, if observed by the Federal Reserve, would have yielded an outcome of price stability: See, for example, the 1924 article written by C. Snyder, an economist at the Federal Reserve Bank of New York. In fact, these theories of "managed money" were consistent with the workings of the international gold standard, as the gold-reserve-to-note-and-deposit-liabilities ratio of the Federal Reserve System—at an average of 65 percent over the 1920s—was considered in excess of what was imposed by the System's international gold-standard commitments. In the words of Friedman and Schwartz (1963-1993): "[The Federal Reserve System's] own gold position plus prevailing international monetary conditions enforced recognition of the difference between its problems and those of earlier central banks. It had to face explicitly the need to develop criteria and standards of monetary policy to replace the automatic operation of the gold standard." (page 240.)

[13] Throughout the 1920s, annualized inflation never exceeded 2 percent (with the exception of the first quarter of 1921, when it strongly rebounded from the profound deflation of 1920), and from the end of 1924 it remained persistently negative for the rest of the decade. Consumer price deflation became perceptible in 1928, when it averaged -1.2 percent. Deflation started accelerating in the course of 1930 to reach a peak of almost – 8 percent between the end of 1932 and the beginning of 1933.

[14] B. McCallum (2000) confirms the good fit of a Taylor rule to the actual policy orientation of the Bank of Japan in the 1980s. He also finds that a rule involving a target for base money growth would have provided important insights to the policymakers in those difficult circumstances.

[15] The expression is quoted in K. Okina, M. Shirakawa, and S. Shiratsuka (2001) who provide a comprehensive overview of the period, stressing the role of money as an indicator of market excesses. According to their account, the Bank of Japan had raised the issue of money growing too fast already in 1986.

[16] It is also notable how excess money starts contracting sharply already in the first half of 1991, immediately following the cyclical peak in the Japanese economy. The Taylor rule, instead, persistently points to a need for tightening. It should be noted that Japanese inflation averaged 1.7 percent during the period covered in chart 2. However, the average increase in consumer prices from the start of 1986—when the early signs of the asset price buildup became visible—to the end of 1989 was a mere 0.9 percent.

[17] The close correlation between domestic credit growth and the change in (a composite indicator of various) real asset prices is stressed in a recent contribution by C. Borio and P. Lowe (2002).

[18] This interpretation of rule cross-checking in terms of insurance against perverse outcomes is consistent with that advanced by a recent paper by L. Christiano and M. Rostagno (2001).

[19] See, for example, M. King (2002), and L. Meyer (2001).

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Monetary Policy in a Changing Economic Environment: The Latin American Experience

Guillermo Ortíz

Introduction 1

Although there is a substantial body of literature on macroeconomic policies in Latin America, the role of fiscal and monetary policies as tools to stabilize the business cycle has not received much attention. This is understandable in light of the fact that during the last thirty years, both fiscal and monetary policies were responsible, to a large degree, for the region's history of macroeconomic and financial instability. Rather than being tools for the stabilization of the business cycle, they were typically managed in a way that amplified the effects of shocks on output and interest rates.

Therefore, the literature on macroeconomic policy has concentrated on the role played by the monetary and fiscal authorities in the region's history of balance of payments and financial crises and their quest to re-establish macroeconomic order and stability. Macroeconomic policies were mostly procyclical, as they fueled an overheated economy in the run-up to the crises and were strongly tightened when the external constraints became binding.[1]

During the 1980s, the financial fragility associated with the debt crisis implied that, in Latin America, monetary and fiscal policies could not be oriented toward smoothing the business cycle. Balance sheet problems implied that countries were in a particularly vulnerable situation, so negative shocks translated into considerable instability, loss

of credibility and, therefore, the need to implement procyclical policies when faced with negative shocks. Thus, macroeconomic policies were geared toward solving persistent solvency, balance of payments, and inflationary problems.[2]

During this period, it became clear that increasing the role of the private sector while the size of the public sector was reduced was a necessary condition for sustainable growth.[3] As a consequence, a comprehensive reform effort was implemented in many countries. An important objective of this reform process was the restoration of macroeconomic stability. Therefore, monetary policy experienced substantial changes during this period. The main factors that influenced the transformation of monetary policy in Latin America were:

First, mounting evidence from the region's experience with high rates of inflation, and hyperinflation in some cases, that showed the large costs of inflation in terms of output growth, income distribution, and financial sector deepening. The increased awareness regarding the high costs of the monetary authority not focusing on price stability gradually closed the door to the pressures for expansionary monetary policy aimed at "fueling economic growth."

Second, after years of fiscal mismanagement, stabilization efforts were anchored on a significant strengthening of public finances and a trend toward improving fiscal institutions, eliminating pressures for monetizing public sector deficits. However, it should be noted that results on the fiscal front have differed significantly among countries in the region. In particular, after positive developments in the initial stages of the reform process, many countries have not been able to carry out further fiscal consolidation, leading to an increase in the public debt-to-GDP ratio even in times of positive economic performance.[4]

Third, the independence gained by the regional central banks gave incentives for a further consolidation of public finances, since the monetary authorities were forbidden to finance public sector deficits. Central bank independence was a signal that Latin America was committed to institutionalize the initial move toward responsible fiscal and monetary policies. However, in many cases, of which Mexico is an

example, the independence was granted during a period when predetermined exchange rate regimes were in place. This last element severely curtailed monetary autonomy, as the establishment of a predetermined exchange rate and the opening of the capital account precluded the independent implementation of monetary policy.

Thus, the fourth element that shaped the recent evolution of monetary policy in the region was the balance of payments *cum* financial crises of the 1990s, which highlighted the difficulties of fixing the exchange rates in a world of highly mobile capital. The collapse of the European Monetary System (EMS) in 1992, the Mexican crisis of 1994 to 1995, and the subsequent crises in emerging markets motivated several countries in the region to abandon their predetermined exchange rate systems and adopt a free-floating regime. The adoption of floating regimes proved to be the other big turning point for monetary policy in the region. Central bank autonomy and fiscal discipline eliminated fiscal influence on monetary policies, and a free-floating exchange rate opened the door for the monetary authorities to implement monetary policy with price stability as its primary objective.

While these elements were put in place, Chile, Mexico, Brazil, Peru, and Colombia began to move toward an inflation-targeting framework. As the first three countries are the ones whose experiences are better documented, in the rest of paper I will focus on them. Chile started in 1990 a gradual transition where an inflation-targeting framework coincided with a crawling exchange rate band. In 1999, once the effects of the 1998 international financial crisis receded, Chilean authorities decided to abandon the exchange rate target zone and let their currency float. Mexico also underwent a gradual transition toward inflation targeting since the adoption of the floating exchange rate in December 1994. On the other hand, Brazil embraced a full-fledged inflation-targeting framework immediately after the devaluation of the real in 1999 as a way to generate sufficient confidence in the new regime to avoid the inflationary effects of the currency movement.

In an environment of greater fiscal discipline, the adoption of a floating exchange rate regime, together with inflation targeting, works

toward re-establishing the role of monetary policy as an additional policy instrument given that:

(1) It frees monetary policy from the constraint of defending the exchange rate and allows it to be carried out, taking into account both domestic and foreign variables to achieve price stability.

(2) It provides an additional adjustment variable that can respond to shocks.

(3) It eliminates the implicit exchange rate insurance and, thus, provides less incentives for the generation of currency mismatches among assets and liabilities.

However, to fulfill these tasks, to minimize the costs associated with a flexible exchange rate regime, and to have an inflation-targeting regime where the targets work properly by anchoring expectations, there are several prerequisites that need to be met:

(1) The history of high inflation implies that the most important challenge facing the monetary authority is to establish its credibility. The public needs to be confident that the central bank will react in order to attain its targets, countering inflationary pressures that would lead to deviations. Building credibility is a process that takes several years. The inflation-targeting framework stresses the importance of increasing transparency and improving communication with the public to strengthen trust.[5] The continuous fulfillment of the targets is an important factor to accelerate the recovery of credibility.

(2) Given that, in the past, monetary policy was constrained by the exchange rate regime, the technical tools to conduct monetary policy were underdeveloped. Therefore, increasing the understanding of the transmission mechanism of monetary policy is crucial to assess the effect of monetary policy in the economy, the speed of the response, make inflation forecasts, and carry out a proactive monetary policy.

(3) To minimize exchange rate mismatches and, therefore, to be in a situation in which exchange rate volatility does not lead to financial

vulnerability, there is the need to develop markets to ensure these risks. There are two markets that need to be developed. The first is a derivatives market that allows firms to hedge exchange rate risk. The second is a long-term domestic debt market, so firms are able to obtain long-term funding in domestic currency. Both are clearly complementary in order to allow firms to reduce currency and maturity mismatches at minimum cost.

As a result of the changes mentioned in the macroeconomic framework of these countries, inflation has fallen sharply in most of them and the attainment of price stability is in sight.

The remainder of the paper discusses the main hurdles (mentioned before) that had to be overcome to accomplish this task and stresses how in 2000-2002 we have already seen the first examples of a countercyclical monetary policy in some of these countries. Finally, I will conclude with some challenges that monetary authorities face in Latin America.

Re-establishing monetary policy as an additional policy instrument 2

As was mentioned in the introduction, there are several hurdles that monetary authorities had to overcome to re-establish monetary policy as a useful stabilization tool. In this section I will go into more detail on how we are dealing with these issues.

Restoring credibility *2.1*

The monetary authority's credibility regarding its inflation targets and its resolve to meet them are crucial elements to:

(1) Increase the effectiveness of monetary policy to achieve its goals.

(2) Reduce the costs of the disinflation effort.

(3) Allow monetary policy to function as a countercyclical tool.

The first two points hinge on the fact that monetary policy actions affect price-setting behavior through the "transmission mechanism." One of the main components of the mechanism, as we all know, are expectations, given that current monetary policy actions only affect short-term interest rates, but aggregate demand is influenced also by the evolution of long-term interest rates, other asset prices, the real exchange rate, etc. These prices depend, to a large extent, on expectations of future policy actions. In addition, wage and price-setting behavior is influenced by the public's perception about future price behavior and monetary policy actions. Therefore, the more credible and predictable monetary policy is, the more effective it becomes and, thus, the social cost of the disinflationary process falls.

Regarding the third point, it is useful to split the discussion of countercyclical monetary policy actions on how the authority should react to demand and supply shocks. In the first case, there is no conflict between the actions needed to achieve the inflation target and those needed to smooth the business cycle, given that inflationary pressures arise as output is above its long-run potential. Thus, the policy prescription of tightening monetary conditions helps to reduce inflation and return output to its long-run equilibrium level. However, when confronted with a negative supply shock, the monetary authority faces the typical tradeoff between achieving the inflation target or partially counteracting the negative effect of the shock on output. In this situation, when the targets are credible, the increase in inflation will tend to be perceived as transitory, and the authority will be able to pursue its smoothing role without concerns that the temporary deviation of inflation from the target would feed into medium-term inflation expectations.

For these reasons, it was crucial that monetary authorities, at the time of adoption of inflation targets, gained the public's trust. At the same time, the inflation-targeting framework was adopted with this aim, making significant efforts in the areas of transparency and communication. Also, hitting the inflation targets and running the risk of undershooting the targets was essential to accelerate the recovery of credibility. When there is less than full credibility, the policy reaction function should be asymmetric, given that the cost of overshooting the target goes beyond the typical quadratic loss that we put in our models

due to the additional cost associated with a loss of trust.[6] Some technical papers have found that the credibility of the targets has improved significantly in Chile, Mexico, and Brazil, and that inflation expectations have become less dependent of transitory inflationary shocks.[7] However, due to the asymmetric policy response I mentioned earlier, ex post, the targets were achieved by a comfortable margin in Mexico since 1999.

In addition to the econometric exercises done by other authors, it is useful to provide a graphical proof of how expected inflation has been converging to the future inflation targets as these have been met. To this effect, chart 1 shows the evolution of inflation and the targets and chart 2 shows inflation expectations for the next twelve months and the twelve months ahead inflation target for Mexico and Chile. It is clear how, in both cases, as the targets have been met, inflation expectations have become more similar to the targets.

Another consequence of the increase in credibility is the weakening of the pass-through from exchange rate movements to inflation that has taken place in these economies (more on this in section 3.1).

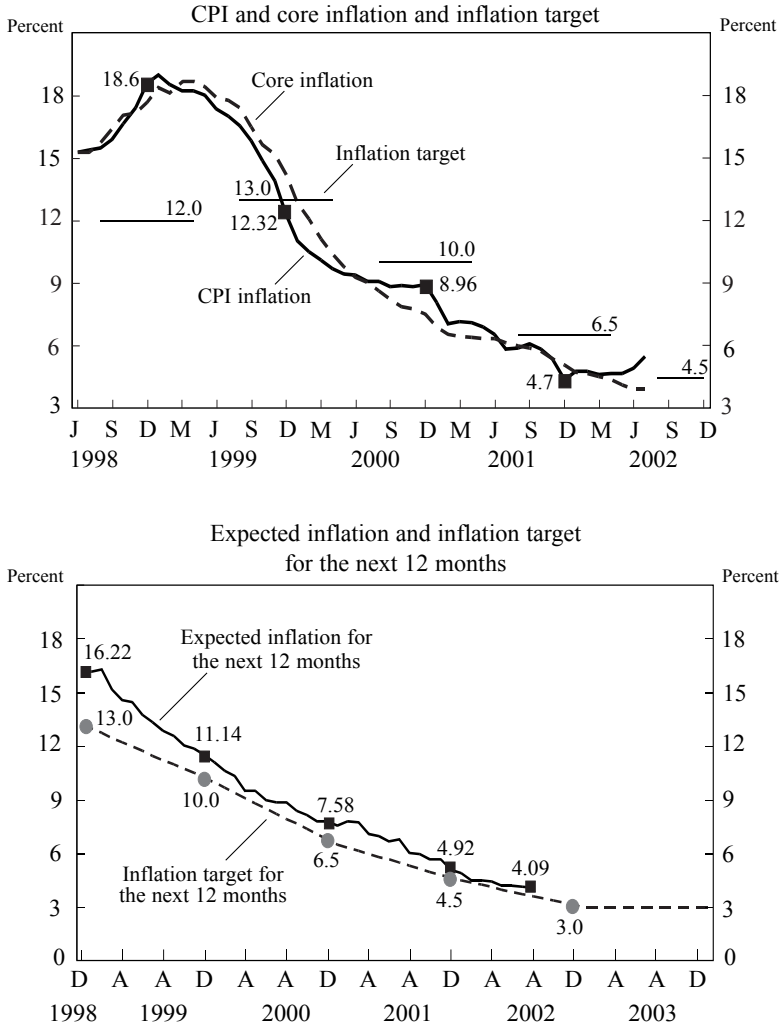
The transmission channels and the disinflation strategy *2.2*

To carry out an independent monetary policy in the context of a flexible exchange rate and an inflation-targeting regime, it is useful to develop macroeconomic models to understand the inflation process, evaluate the effect of monetary policy on the economy, and make inflation forecasts.

In consequence, the central banks of Brazil, Chile, and Mexico have been developing models and undertaking research to assess the transmission channels of monetary policy.[8] This is a challenging endeavor for several reasons.

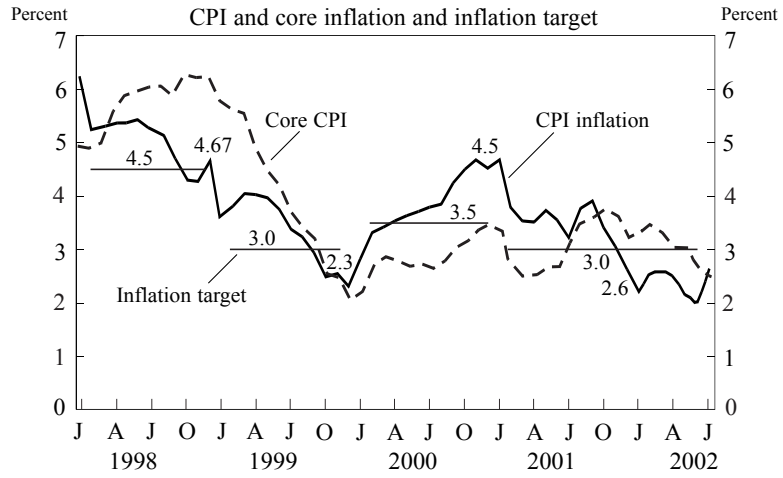
First, changes in regime may affect the relationship between instruments, transmission channels, GDP, and prices due to Lucas Critique-type of arguments. For instance, the causes and effects of a change in interest rates are likely to be different under a floating exchange rate

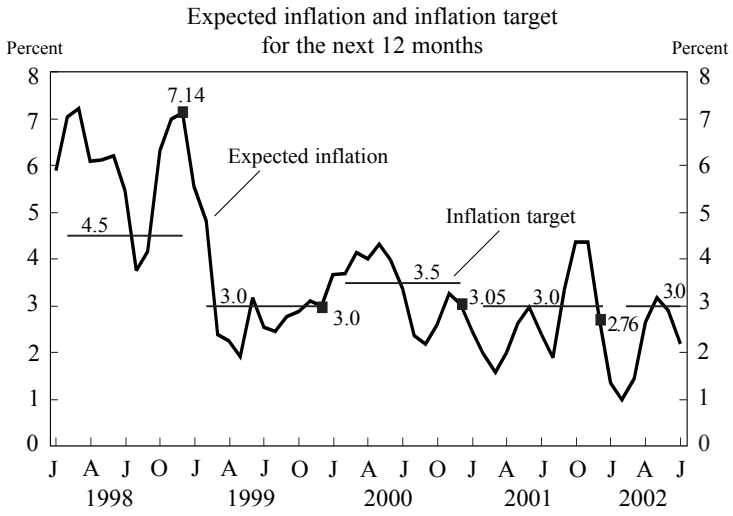
Chart 1
Inflation, Expected Inflation, and Inflation Target in Mexico
Annual Percentage Change



Source: Inflation and targets are from the Bank of Mexico. Expected inflation is obtained from the Monthly Survey of Private Sector Analysts conducted by the Bank of Mexico.

Chart 2
Inflation, Expected Inflation, and Inflation Target in Chile
Annual Percentage Change





Source: Inflation and targets are from the Central Bank of Chile. Expected inflation is obtained from the difference between nominal interest rates and the Unidad de Fomento indexed (real) interest rates of equivalent maturity.

regime than under a fixed one. So, historical estimations of the effect of monetary policy can be misleading. Second, the economy has been changing rapidly because of both internal and external factors, independently of the changes in monetary policy regime. For example, past structural reforms are consolidating, old bargaining structures are changing because of political and social changes, international integration of goods and financial markets continues, and there is technological innovation in the financial sector.[9] Third, in several instances, data that is relevant to evaluate conditions in the economy are of poor quality or even nonexistent.

Finally, the structural changes in these economies imply that equilibrium values of key variables may be evolving over time, such as the growth rate of potential output, the noninflationary rate of unemployment, and the equilibrium levels of the real interest rate and the real exchange rate. In this context, it is not easy to judge whether a variable is converging or deviating from its long-run equilibrium value.

These uncertainties are particularly important for both Brazil and Mexico, given the more recent structural changes and episodes of balance of payments or banking crises and high inflation. In Chile, many of the most significant structural reforms were made two decades ago, and it has not been subject to a major crisis, leading to an acceleration of inflation since the period 1982-1983. This has allowed the Central Bank of Chile to have a clearer view about what the fundamental relationships are between different variables and a more precise estimation of the effects of monetary policy. In contrast, the changes in the Brazilian and Mexican economies imply that model developers often have to use more calibration and guesswork in their models, given the present instability in econometric estimates.

The empirical work that has been done in the three Latin American countries shows that the transmission channels are qualitatively the same as in industrial countries, though their quantitative importance varies, conditioned by the degree of financial penetration, credibility, and trade openness in the economy.[10] The three main channels are: (1) an interest rate and credit channel that affect aggregate demand and through it wages and the prices of nontradable goods; (2) a capital

Table 1
Banking Sector Credit and Trade as Proportions of GDP: Average 1997-2001
Percentage

	Brazil	Chile	Mexico	United States	Canada	Germany*	France*
Banking sector credit/GDP	33.8	60.4	16.3	67.6	67.2	58.0	41.9
Trade/GDP	22.6	60.5	62.0	24.3	82.5	23.3	16.5

* Trade outside the European Union.

Source: Trade to GDP was obtained from the OECD for industrial countries and from national statistical offices of the three Latin American countries. Banking-sector credit was obtained from the IFS.

flow channel that affects the level of the exchange rate, in turn influencing directly the prices of tradable goods and indirectly those of nontradables because of the effect of a more appreciated real exchange rate on aggregate demand; and (3) an expectations channel that affects the determination of wages and prices directly, as well as asset prices.

In the case of Brazil and Mexico, the effect of interest rates on economic activity through the interest rate and credit channel affecting aggregate demand is likely to be lower compared with industrial countries or in Chile, given the more limited development of the financial sector (table 1). Thus, larger interest rate adjustments would be needed to see equivalent changes in economic activity and prices of nontradable goods, as those observed in industrialized countries or in Chile.[11]

On the other hand, Mexico and Chile are fairly open economies, with trade representing 62 percent and 61 percent of GDP respectively in the period 1997-2001 (table 1). In addition, their levels of development imply that tradable goods account for a larger proportion of the CPI, so the influence of interest rates on the exchange rate

may translate into significant effects on prices of tradable goods and the CPI. Nevertheless, the relationship between movements in the exchange rate and prices has historically been larger in the three countries than would be justified by their degree of openness and development. That is because in economies with high inflation, the nominal exchange rate is also a leading indicator of inflationary pressures, and changes in this variable were often taken as a lack of commitment by the central bank with price stability.

In contrast, in more stable economies the pass-through tends to be lower, irrespective of the degree of openness, because of several factors. First, expectations and contracts are anchored at low levels of inflation and are not affected by exchange rate movements. Second, a significant part of the changes in costs of imported goods is absorbed by the profit margins of distributors. Finally, the type of shocks leading to movements in exchange rates are more predominantly real shocks, not nominal ones. For example, if there is a terms-of-trade shock that leads to a fall in output and aggregate demand, a depreciation of the exchange rate should have a small effect on prices. In contrast, a depreciation that corresponds to a looser stance of monetary policy or a decline in the demand for the country's assets—when the economy is growing at its potential—should have a larger effect on prices.

Summarizing, Chile's transmission channels are likely to be similar to those of a country like Canada, with significant financial penetration, a very open economy but an already low pass-through given the consolidation of low inflation. The case of Brazil is one in which both the interest rate and credit channel and the exchange rate channel are relatively weak. The Mexican case is between these two extremes, with a relatively weak effect on aggregate demand from the interest rate and credit channel, and a stronger exchange rate channel, though its importance seems to have diminished.

The adoption of an inflation-targeting framework in the three countries should lead to a reduction in the relationship between exchange rates and prices, and increase the role of expectations. Past stabilization programs in Latin America were typically based on maintaining

the exchange rate as a nominal anchor, so this variable played both a direct role affecting prices of tradable goods and an indirect role, as expectations were anchored around its level so movements in this variable affected all the prices in the economy. With inflation targeting, the short- and medium-run targets are the new nominal anchors. This implies that even though the inflation-targeting scheme was initially applied in industrial countries, it is of particular relevance for emerging markets countries that are following a disinflationary process. In addition to the substitution of the exchange rate as a nominal anchor, the establishment of a long-term target and an increase in transparency are of particular importance in order to avoid shocks driven by expectations and confidence crises, as those observed historically in many emerging markets.[12]

There is another particular element that conditioned the disinflationary strategy followed in the three countries. As in industrial countries, there are important labor market rigidities, related with contracts and costs of adjusting the amount of employment in a firm, that imply that monetary conditions in the economy translate into wage adjustments with a significant lag. However, high past levels of inflation implied that the necessary adjustment in nominal wage increases was much larger than any seen recently in industrial countries. In addition, high inflation also led to significant wage and contract indexation, especially in Brazil and Chile, introducing an additional element of inflation inertia. Finally, past inflation might have made workers accustomed to receiving large nominal wage increases, creating "money illusion." In the case of Mexico, important real wage increases have been observed during the last four years, whereas the years of high inflation with higher nominal increases implied significant real losses for workers. Yet occasionally, under the new low-inflation environment, nominal wage increases that imply real increases are rejected for being "too low." However, this is another area where the establishment of inflation targets and the importance of credibility can have a substantial contribution, as both firms and workers internalize the targets when negotiating nominal wage increases. Otherwise, firms know that a lax stance when negotiating wages in a low-inflation environment can imply a sharp erosion of profit margins.

The existence of price and wage rigidities and the need to build credibility imply that emerging-market central banks need to follow a very proactive communication strategy that includes publishing quarterly reports, giving constant public speeches, and scheduling meetings with both managers or owners of firms, trade unions, and political leaders. The objective is to generate a sharper coordination of expectations around the targets, reducing the costs of attaining the disinflation.

How does the need to build credibility and the characteristics of the transmission channels condition the strategy for disinflation? It turns out that there are several elements that would call for different speeds and degrees of aggressiveness for reducing inflation. There are three main elements that justify a more gradual process.

First, there is a tradeoff between the benefits of lower inflation and the costs associated with its reduction. To minimize the latter due to the presence of rigid wages and a lack of credibility, it is convenient to follow a gradual process of adjustment.

Second, it is relatively easy to reduce inflation quickly based on anchoring the exchange rate and, thus, engineering a reduction in the prices of tradable goods. However, past stabilization processes in Latin America and elsewhere have shown that disinflationary efforts based mainly on the exchange rate frequently translate to an increase in external vulnerabilities that ultimately leads to a crisis and a loss of past stabilization achievements. Thus, a successful stabilization of inflation needs to be based on a balanced approach, allowing for an adjustment of expectations and the prices of both tradable and nontradable goods. The adjustment in expectations and nontradable goods takes longer to engineer.

Finally, as mentioned, there are important uncertainties about the relative strengths of the different transmission channels of monetary policy due to the important structural changes that have been observed in the economy and the monetary policy regime. This implies that there needs to be a continuous re-evaluation of the strength of the different channels and of the effects of the monetary instruments. It would be rash in such a context to follow very extreme policies.

This last argument was formalized by Brainard (1967). He found that a prudent monetary policy should be followed when facing uncertainty about policy multipliers.[13] In the case of emerging markets, the argument is compounded with respect to that noted by Brainard, as there is parameter, information, and structural uncertainty. Therefore, taking these uncertainties into account, the recommendation would be that policymakers should compute the magnitude and direction of the change in the monetary instrument and then do less.[14]

However, when credibility is at stake, it is difficult to follow an extremely gradual approach and a very cautious strategy. The need to build credibility implies that the disinflationary process needs to work as a signal of the commitment of the central bank with price stability. Therefore, the response of monetary policy to shocks should be forceful to guarantee the attainment of the targets, and the disinflation implicit in the targets needs to be substantial.

As a result of the previous considerations, authorities needed to strike a balance between both concerns. Thus, a gradual disinflation process was established in terms of progressively smaller targets for inflation. But once these were established, credibility was pursued by complying strictly with them by reacting aggressively to potential inflationary pressures that would generate permanent deviations from the targets.

The gradual strategy was followed in the three countries, while the need to avoid any upward deviation from the targets has been particularly emphasized in Chile and Mexico. In Brazil, inflation was reduced fairly quickly from a level of 5,000 percent in 1994 to 2.5 percent in 1998, in the context of the exchange-rate-based "Plan Real." It then increased to 8.4 percent in 1999 as a result of the devaluation of the real, falling gradually to close to 5 percent in 2000. However, it has been pushed up again by a series of negative price shocks. In the case of Chile and Mexico, inflation has fallen gradually but steadily. Chilean inflation was reduced from 30 percent to 3 percent in ten years, while in Mexico it fell from 52 percent to 5 percent in six years. In both countries, core inflation has been below the target for the last three years, and it is likely that this will again be seen in 2002. These

results also show that an exchange rate anchor is not necessary to attain price stability in emerging markets.

Developing financial markets *2.3*

There can be instances when financial developments reduce the effectiveness of monetary policy and impose restrictions on the actions of the central bank. There are four of these issues that are of particular relevance in Latin America: (1) a low level of domestic financial development or a process of disintermediation that reduces the effectiveness of monetary policy through the aggregate demand and credit channels, though a response to changes in opportunity costs is always present; (2) liability dollarization that leads to an excessive monetary reaction to exchange rate movements; (3) weakness in financial intermediaries that may imply problems in the banking sector when the stance of policy is changed;[15] and (4) the possibility of perverse debt dynamics arising from a tightening of policy when, for example, a large proportion of public debt is at variable interest rates,[16] so a confidence crisis may ensue.[17] Therefore, an additional objective of the authorities should be further consolidation of the credit channel, increasing the amount of intermediation in the domestic financial sector, and giving proper incentives to limit currency and maturity mismatches.

In the Mexican case, the balance of payments crisis of 1994-1995 translated into a deep banking-sector crisis, as conditions in the economy were such that the number of non-performing loans increased substantially and bank capital was eroded. Decisive actions were carried out to support the banks, being fully successful in that no bank runs were observed during this period and there was no need to impose capital controls. However, there has not been a sustained recovery in bank lending to the private sector.

There are several causes that have limited the recovery of the banking sector. On the supply side, banks needed to replenish their level of risk-adjusted capital and, thus, invested mostly in government bonds that, during a large part of the period, were high-return, low-risk instruments. In addition, the crisis episode made it clear that institu-

tional characteristics of the credit market made it very difficult to recover loan guarantees and that bankruptcy problems took a long time to solve. It might also have been the case that the relatively high real interest rates that were maintained during the period limited the demand for loans.

These three issues were recently addressed. Banks have progressed in their recapitalization, with the ratio of capital to risk-adjusted assets standing at 15.05 percent as of March 2002. Two legal reforms oriented toward easing collateral recoveries and making bankruptcy procedures more expedient were made in 2000. Finally, real interest rates on government bonds have remained at levels below 4 percent since mid-2001, their lowest levels since these were initially issued at the beginning of the 1980s. This implies that the structural conditions that would allow for a credit recovery seem to be in place, at least since mid-2001. However, the recent deceleration in economic activity has led to a reduction in the demand for credit. It will be necessary to wait for stronger evidence of economic recovery to be sure that past reforms were sufficient to guarantee a recovery in bank loans.

There has been progress on other components of the Mexican financial system. In particular, the reform to the pension system toward individual accounts implies that the amount of resources invested in capital markets will steadily increase. The amount of resources intermediated through individual retirement accounts has increased to almost 5 percent of GDP as of July 2002 and is expected to increase at a rate of approximately 1 percent of GDP per year. In addition, a long-term domestic bond market has been developed, initially trading only with government bonds but increasingly being used by nonfinancial firms to obtain long-term resources in domestic currency for investment and by financial companies to provide long-term loans, such as mortgages. So far, the outstanding value of private-sector bonds has reached more than $6 billion.

In terms of liability dollarization, it is likely that the three countries, and particularly Brazil and Mexico, are currently in a transition process toward lower levels of foreign indebtedness.[18] Previously, high levels of debt denominated in foreign currency responded in an

important way to the implicit insurance associated with the fixed exchange rates that were in place. The disappearance of these makes foreign financing less attractive, as firms have to recognize the currency risk associated with such operations. Consequently, in Mexico the ratio of foreign debt to assets fell by 4.5 percentage points from 1994 to 2000 for nonexporting firms listed in the stock market, while it remained virtually constant for exporting firms. The ratio of exports to debt in dollars has increased substantially, from 2 percent in 1994 to 7 percent in 2000, suggesting that firms are maintaining a less-exposed position to currency risk.[19]

Therefore, the change to a flexible exchange rate regime is generating an automatic recomposition of liabilities. However, the incentives provided by the regime should be complemented by other actions. A derivatives market needs to be developed to allow firms to hedge the risk derived from the financing obtained from diversified sources.[20] In addition, the lack of long-term domestic debt markets implied that firms either had a currency or a maturity mismatch with respect to the assets bought with the financing. The development of a long-term debt market should contribute to solve this problem.[21]

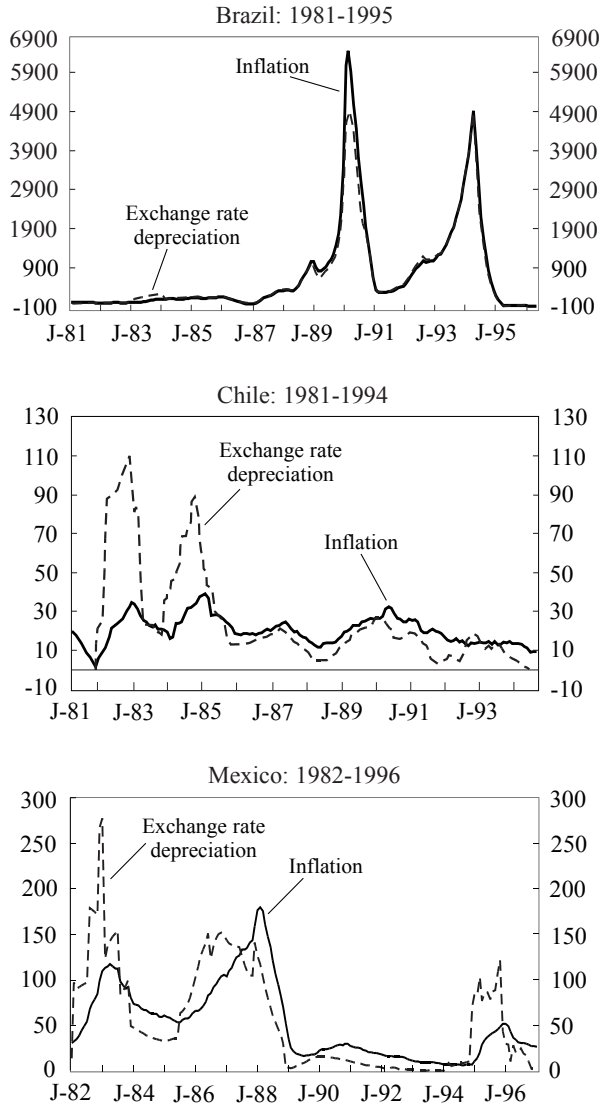
The evolution of the pass-through and the monetary policy response in practice 3

In this section, I comment briefly on the fact that the exchange rate pass-through, an important constraint to the implementation of an independent monetary policy, has weakened in the last couple of years. I also look at the effect that this phenomenon, together with the improvements in credibility and the success in the stabilization process, has had on the policy reaction function.

The exchange rate pass-through and exchange rate shocks 3.1

Historical estimations of the exchange rate pass-through indicate that this had been high and quick in the case of the three countries. Chart 3 shows the evolution of annual inflation and depreciation rates for the three countries, and it is evident that there was a very strong link. As mentioned, this was due both to the direct effect of exchange

Chart 3
Historical Series of Annual Inflation and Depreciation Rates in Brazil, Chile, and Mexico
Percentage Points*



* The data are from each country's central bank.

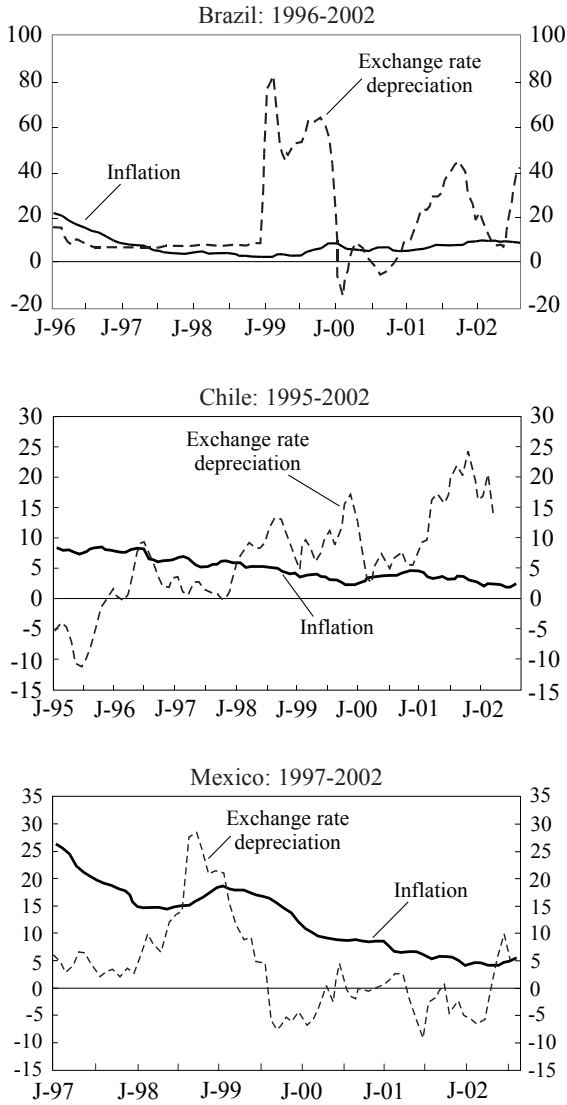
rate movements on prices of tradable goods and on the role of nominal anchor that the exchange rate had played historically.

Such high pass-through imposes several restrictions on monetary policy, particularly on the ability to let the exchange rate respond to shocks and, thus, having a well-functioning floating exchange rate regime. If movements in the exchange rate have such a strong effect on prices, the central bank will need to respond strongly in order to limit their inflationary impact, even if there is no explicit exchange rate target. If the private sector expects this reaction, then it will behave as if the exchange rate fluctuations that the central bank is willing to allow are limited, and, thus, the incentives for proper liability management are dented. In addition, the exchange rate won't be allowed to respond fully to counter shocks.

Fortunately, there are several good theoretical reasons to expect the pass-through to have fallen in the three countries during the recent period. First, the transition from an exchange-rate-based monetary policy to an inflation-targeting framework implies that the signaling role on the stance of monetary policy played by the nominal exchange rate in the past is substituted by the targets and explicit actions of monetary policy. Second, the fact that the exchange rate is allowed to fluctuate, and it both appreciates and depreciates, implies that prices setters are more likely to wait to adjust their prices until they have better information about whether a given change is permanent or transitory. Third, increasing competitiveness in the economy implies that price setters are less able to pass to consumers increases in costs of imported inputs.[22]

Empirically, there is strong evidence to support this hypothesis. Chart 4 shows the evolution of annual inflation and depreciation rates during the most recent period. The exchange rates in Brazil and Chile have depreciated very significantly with little or no effect on prices. The evidence is not as strong in the Mexican case, as there have been no wide fluctuations in the exchange rate during the last four years, when the average value of the exchange rate has been $9.44 pesos/dollar and has fluctuated between -3 percent and 7 percent of this value. However, on those occasions when the exchange rate has moved, the speed of disinflation has not been affected.

Chart 4
Recent Evolution of Annual Inflation and Depreciation Rates in Brazil, Chile, and Mexico
Percentage Points*



* The data are from each country's central bank.

Table 2
Results from a Regression of the Annual Inflation Rate on the Annual Depreciation Rate[23]

Country and Sample Period	Coefficient on Exchange Rate Depreciation	Country and Sample Period	Coefficient on Exchange Rate Depreciation
1) Brazil		4) Australia	
1982-2002	1.187***	1980-2002	.009
1982-1995	1.193***	1980-1990	.021
1996-2002	-.035	1991-2002	.004
2) Chile		5) Canada	
1982-2002	.216***	1980-2002	-.114
1982-1994	.151***	1980-1990	.202*
1995-2002	-.192***	1991-2002	-.152***
3) Mexico		6) New Zealand	
1980-2002	.583***	1980-2002	.029
1980-1996	.542***	1980-1990	.006
1997-2002	.316***	1991-2002	-.020

* Significant at 10 percent.
*** Significant at 1 percent.

The graphical evidence can be supported by a simple econometric exercise. The effect of the annual depreciation rate on annual inflation rates was estimated for the three Latin American countries, as well as Australia, Canada, and New Zealand, using a sample that begins in the early 1980s and also for two subsamples. The first of these covers most of the 1980s and early 1990s, and the second subsample starts in the 1990s and ends in 2002. The results are quite striking. The pass-through coefficient falls in a very important way for all Latin American countries from the earlier subperiod to the latter one. Something very similar happens in Canada, which has very similar coefficients to Chile,[24] while Australia and New Zealand have much smaller coefficients for the whole period and both subsamples. Thus, the countries in the Western Hemisphere have been converging with the two in Oceania.

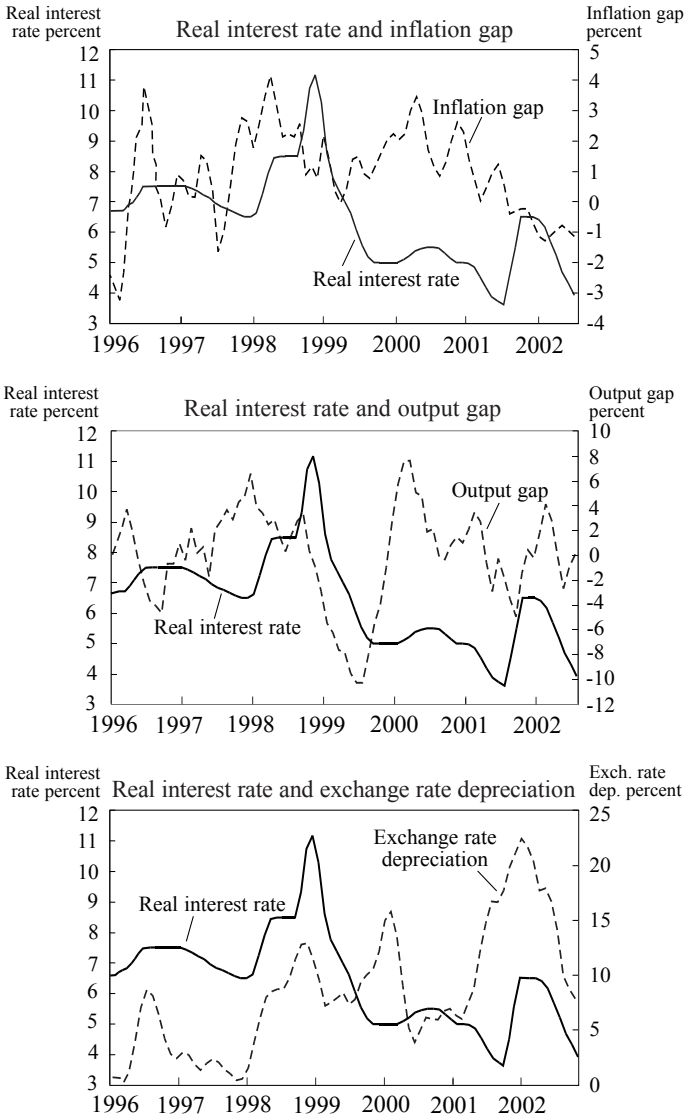
The monetary policy response 3.2

During the period 1998-2002, there were several episodes that required important decisions in terms of the implementation of monetary policy. It is interesting to highlight the different policy reactions to the 1998-1999 and the 2001 shocks, both in Mexico and Chile, and the acceleration of aggregate demand observed in Mexico during 2000. In 1998, the strong financial contagion and concerns with a strong pass-through led to a significant tightening of monetary conditions in both countries, a procylical response. However, in 2000, policy was tightened in Mexico in response to a potential overheating of the economy. Finally, in 2001-2002 the absence of financial contagion allowed the monetary authorities in Chile and Mexico to reduce interest rates and follow more countercyclical policies, even in periods of exchange rate depreciation.[25]

Charts 5 and 6 show the level of short-term real interest rates, the inflation gap, the output gap, and exchange rate movements in Chile and Mexico, respectively. The shocks in 1998-1999 were associated with the contagion arising from the Russian and Brazilian crisis, which led to an important depreciation of the currency and an increase in the inflation gap in Mexico, and a depreciation of the Chilean peso. In both economies, there was a sharp interest rate response to limit the effects from the depreciation on prices, as well as to counter what were considered as speculative pressures not responding to fundamentals. To some extent during this period, the consideration of financial contagion and the assumption of a high pass-through translated into an important policy tightening that produced a procyclical response, as the original shock had a negative effect on output.

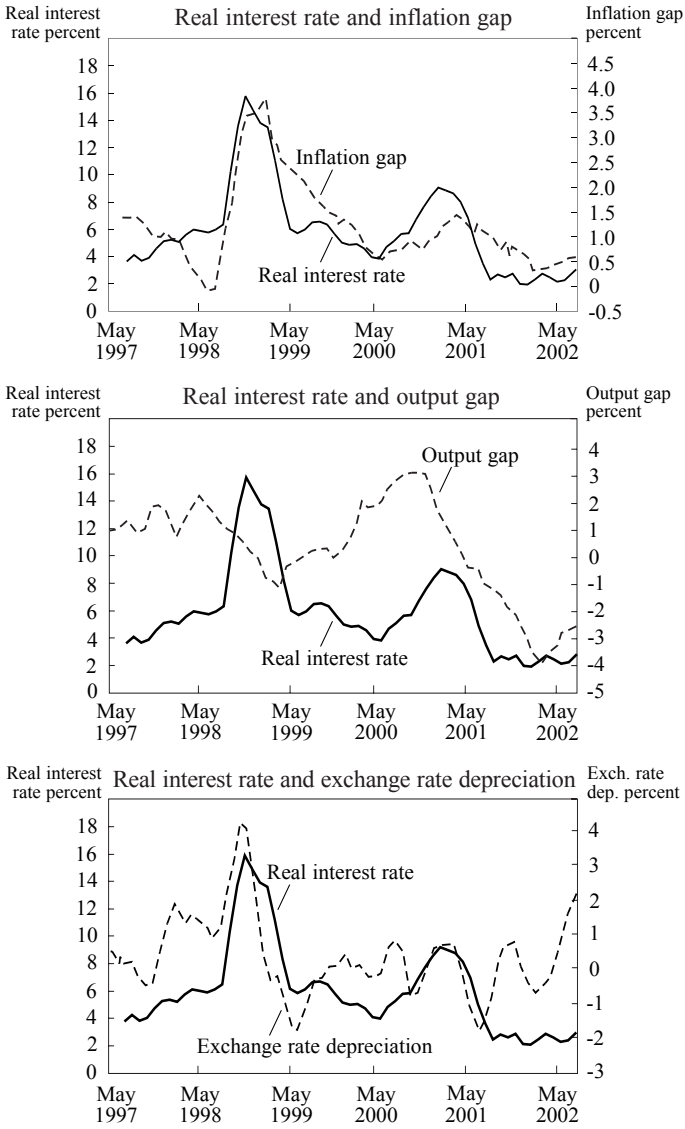
A first example of countercyclical monetary policy is the one seen in Mexico in 2000. During this year, the economy grew by almost 6.6 percent, but, more importantly, aggregate demand was growing at a substantially higher rate (10.5 percent). This had the potential of translating into future inflationary pressures, so monetary policy reacted, leading to a substantial increase in interest rates, even though inflation at the moment was in a declining trend and the objective for the year was attained.

Chart 5
Chile: Real Interest Rate, Inflation Gap, Output Gap, and Exchange Rate Depreciation
In Percent: Three Months Moving Average*



* The data are from each country's central bank.

Chart 6
Mexico: Real Interest Rate, Inflation Gap, Output Gap, and Exchange Rate Depreciation
In Percent: Three Months Moving Average*



* The data are from each country's central bank.

In the period 2001-2002 there was an increase in the ability of the monetary authorities in Mexico and Chile to carry out a countercyclical monetary policy when the economy was subject to negative shocks. The worldwide deceleration of economic activity observed during 2001 impacted the Mexican and Chilean economies in a negative and significant way. However, for the first time in the last thirty years in Mexico, an external shock of this magnitude did not translate into extreme volatility of financial variables, a balance of payments crisis, and a deep recession. After a period of three decades, Mexico experienced a normal business cycle, such as those observed in industrial economies. This is a reflection of the increased credibility attained by the monetary and fiscal authorities as well as the new economic conditions of the Mexican economy.

The Bank of Mexico was able to ease monetary conditions in response to the shock, with real rates falling from 10 percent at the beginning of the year to 1.3 percent at the end. This was due to the recognition that the negative effect of the external shock on domestic conditions would lead to a reduction in inflationary pressures. In the past, with lower credibility, the move could have been interpreted as the central bank responding to objectives other than inflation, due to particular interests in the bank or to outside pressures. However, the stable evolution of the exchange rate and interest rates implies that it was interpreted correctly as a response to a change in the determinants of inflation. The Chilean experience shows a very similar and more extreme countercyclical response. As can be seen in chart 5, in 2001 and 2002 there was a very large depreciation and a significant reduction in interest rates. The movements of these two variables obviously help to partially compensate the negative output effects of the worldwide slowdown.

Thus, after a very long period, the Bank of Mexico and the Central Bank of Chile were able to respond successfully to shocks in particular by easing policy in response to a negative external shock instead of having to tighten it in order to counter confidence problems. However, it should be noted that credibility is still fragile, particularly in Mexico. This is due to the fact that the credibility of the monetary policy is also conditioned by the institutional environment in the country. Specifically, structurally fragile public finances and the lack of political

agreements to strengthen them impose severe constraints on the ability of the central bank to maintain price stability. At a minor level, the government may need to increase public prices by decree. At a larger level, high public debt to GDP may curtail the ability of the central bank to modify monetary conditions because of the perverse debt dynamics that were mentioned earlier, specially if the debt is indexed to the exchange rate or has variable interest rates. In an extreme case, this could lead to a balance of payments crisis. The Central Bank of Brazil is currently facing such an environment.

Conclusions 4

The adoption of a floating exchange rate regime and an inflation-targeting strategy posed several challenges to central banks in Latin America. In particular, after a history of high inflation and predetermined exchange rate regimes, monetary authorities needed to re-establish their credibility and substitute the traditional exchange rate anchors for credible inflationary goals. To accomplish this, countries followed a strategy that emphasizes the understanding of the transmission mechanism to sustain monetary policy decisions and the strengthening of transparency and communication with the public to build credibility. The available evidence suggests that this strategy has been successful so far as inflation has converged, or is close to doing so, to price stability in many of these economies.

In the following years, our understanding of how our economies work under price stability, a phenomenon that has not been seen in many decades, will provide important information to keep updating our monetary policy framework, further improving the effectiveness of monetary policy.

In particular for the case of Mexico, agents and policymakers should learn to live in a low-inflation environment. On the part of the monetary policy authority, the policy response should become more symmetric and gradual. In addition, the regional experience with low inflation will provide useful evidence to assess what is the appropriate definition of price stability for developing countries.

On the part of the public, it is important to consolidate the notion that irrespective of short-term inflation deviations due to exchange rate movements, the authority will deliver an inflation rate that, on average, is equal to the target. Therefore, long-run inflation expectations should be anchored around that level, and prices and wages should be based on this expectation.

Finally, the institutional framework in which a central bank operates is of the utmost importance. Fragility in public finances, compounded by a lack of political agreements to strengthen them, implies that the costs and difficulties from attaining and consolidating economic stability are much larger. More work is needed in Latin America in this respect.

Author's note: The author thanks Miguel Messmacher and Alejandro Werner of the Bank of Mexico for their valuable comments and suggestions.

Endnotes

[1]Although there are some studies that clearly document the procyclical role of fiscal policy in Latin America, (for example Gavin and Perotti (1997), and Vegh and Talvi (1996)), there is no study that focuses on the pro or countercyclical nature of monetary policy in the region.

[2] Stiglitz (2002) has criticized both the IMF and emerging-market governments for backing procyclical policies in response to negative shocks. However, this criticism does not take into account that many of these episodes were characterized by severe confidence crises, in response to which authorities needed to follow tight monetary and fiscal policies.

[3] The so-called "Washington consensus."

[4] The lack of consolidation is explained in most cases by the inability to create the political consensus necessary to carry out additional reforms. These have been especially elusive in those countries where a large proportion of spending is determined at the state level, as each state governor has incentives to see the government's budget as a public good and knows that a purely individual attempt at adjustment has scant chance of success while it carries important political costs.

[5] Credibility is also a prerequisite in order to be able to carry out countercyclical fiscal policy. Agents must be willing to believe that an increase in the budget deficit is temporary and only seeks to smooth the business cycle, not a more permanent deterioration in public finances that can lead to an unsustainable debt trajectory.

[6] As Almeida and Goodhart (1998), and Bernanke and others (1999) have found, the adoption of inflation targets has led to a reduction of inflation expectations but only gradually. This suggests that the process of confidence building is a difficult and lengthy one and might even be asymmetrical. If it is easier to lose credibility than to win it, authorities have to be particularly careful at the time when this is being built.

[7] Specifically, the following results have been found for the three countries: (1) the inflation target has become a more important determinant of inflation expectations; (2) it has become easier to predict inflation, and this last variable has converged toward the targets; (3) the sensitivity of core inflation and inflation expectations to general consumer price inflation shocks has become smaller. Some of the papers reporting these results include: Mishkin and Schmidt-Hebbel (2001); Corbo and Schmidt-Hebbel (2001); Corbo, Landerrechte, and Schmidt-Hebbel (2001); and Schmidt-Hebbel and Werner (2002).

[8] For examples of the types of models that have been developed, see García and

others (2002) for Chile; Springer and Kfoury (2001) for Brazil; and Martinez, Messmacher, and Werner (2002) for Mexico.

9 For reviews of the reform process in Mexico, see Lustig (1998); in a general Latin American framework see Edwards (1995); and in Mexico's financial sector see Ortiz (1994).

10 See, for example, Bogdanski, Tombini, and Werlang (2000) for Brazil; Cabrera y Lagos (2000) for Chile; and Martinez, Sanchez and Werner (2000) in the Mexican case.

11 However, the disparities observed in terms of banking credit to GDP exaggerate the differences in terms of the effects on consumption and investment of higher interest rates, as an opportunity cost always arises from higher rates. Thus, the amount of retained earnings allocated to fixed investment, trade credit from firms, and the supply of loans by retailers to customers are likely to fall.

12 The vulnerability of these countries to confidence crises is implicit evidence of the importance of the expectations channel in these economies.

13 These considerations are also important in industrial countries, as noted by Blinder (1998).

14 In the case of changes in variables, when there is uncertainty about whether they respond to a shock that has changed its equilibrium value, such as the real exchange rate, the authority needs first to evaluate the different effects that a convergence to or a deviation from the equilibrium would have and observe the available information carefully to make a diagnosis about the adjustment. For example, a depreciation in the equilibrium real exchange rate should lead to an adjustment in the relative prices of tradable and nontradable goods, but not to inflationary pressures in the nontradable sector.

15 Financial fragility of banks after the balance of payments and banking crises of 1995-1996 in Mexico imposed a severe restriction in terms of the scope of reaction of monetary policy. Sharp increases in interest rates would have worsened the situation of banks, increasing the default rate on loans and, thus, leading to a larger fall in bank capital and a higher fiscal cost of supporting the sector. In turn, this could have translated into a larger confidence crisis, even counteracting the desired effect from the tightening of monetary policy.

16 In the case of Brazil today, a large proportion of domestic public debt is either at variable interest rates or indexed to the currency.

17 In the case of debt indexed to foreign currency, an attempt to ease policies that

generates a depreciation of the currency can also lead to the perception that the country may have problems servicing its debt.

18 Nevertheless, the extent of liability dollarization and the use of the dollar for current transactions is surprisingly low in Mexico, in spite of the past balance of payments crises, episodes of high inflation, and extremely close links with the United States.

19 See Martinez and Werner (2002) for an extensive analysis of how the structure of liabilities has changed for Mexican-listed firms.

20 For a more in-depth discussion about the importance of the development of a derivatives market and what has occurred in Mexico, see Ortiz (2000).

21 Proponents of dollarization or hard pegs in Latin America, such as Hausmann and others (2001), and Calvo (2000), argued that there was an intrinsic "original sin" in the countries of the region, i.e., it was not possible or too expensive to obtain long-term financing in domestic currency, so a currency or maturity mismatch always appears. The Chilean and Mexican examples indicate that the "original sin" is not immutable.

22 For recent empirical analysis of the determinants of the pass-through, see Goldfajn and Werlang (2000), Arias and Messmacher (2002), and Schmidt-Hebbel and Werner (2002).

23 The regression is of the form: $\Pi_t = \alpha_0 + \alpha_1 \Delta e_t + \varepsilon_t$, where Π_t is the annual inflation rate and Δe_t is the annual depreciation rate. In the case of the three Latin American countries, the data has monthly frequency and was obtained from each central bank. In the case of the three industrial countries, the data have quarterly frequency and are from the IFS.

24 The negative coefficient in the Chilean and Canadian cases suggests that in the latter period the exchange responded to real shocks that were affecting the economy. For example, a reduction in the price of commodities and in the demand for exports translated into a deceleration of the economy and a depreciation of the exchange rate. The effect of the economic deceleration dominated any inflationary pressures arising from the exchange rate adjustment.

25 For an empirical assessment of the policy reaction functions, see Schmidt-Hebbel and Werner (2002).

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Monetary Policy in a Changing Economic Environment

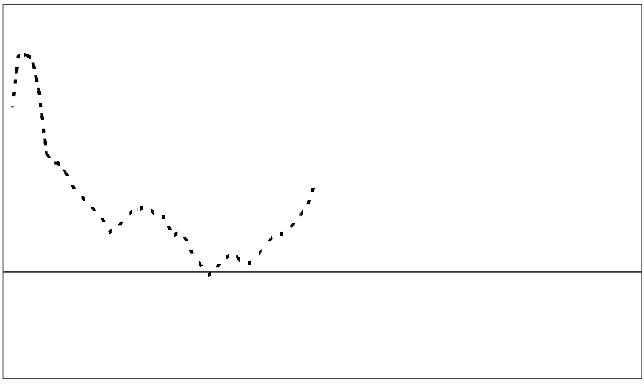
Yutaka Yamaguchi

Three years ago at this same conference, I was given an opportunity to talk about Japan's monetary policy in the years when asset price bubbles expanded.[1] Today, I would like mainly to review monetary policy in the following phase when the bubbles burst, for an asset price swing is the "changing economic environment" most relevant to us. Incidentally, we are now in the third phase when the economy is in a "liquidity trap," which I will leave for a future topic of discussion.

I have to start with a bit of an old story. The Tokyo stock market peaked in late 1989. The bubble in the property market—and in Japan real estate had far greater market capitalization relative to stocks—persisted about a year longer. A growth slowdown followed. The trend growth rate in the 1990s is just 1 percent per year on average, a marked shift downward from 4 percent in the 1980s (chart 1).

There is little doubt that the bursting of asset price bubbles contributed significantly to the decline in the trend growth rate. But it was not the sole reason. Against the backdrop of a changing environment, such as a rapidly aging society and limited export-led growth, a prospective shift to more moderate growth was already broadly envisioned in the early 1980s. The economic system, which had been built on the premise of high growth, needed to be modified and, in fact, was already in the middle of significant structural adjustment in the mid-1980s.

Chart 1
Economic Growth and Inflation



The asset price bubbles not merely interrupted this process but turned the clock backward. The excessive optimism, the main feature of a major asset bubble, induced businesses to build up capital stocks, payrolls, and debts that would have made sense only under a sustained acceleration of growth. When the bubbles burst, the ensuing adjustment and workout had to be all the more painful and prolonged.

This aspect of Japan's asset market bubble, with its consequences for the structural adjustment in the 1990s, is important because it illustrates the specific environment in which the Bank of Japan (BOJ) had to conduct monetary policy. In other words, monetary policy conducted in a different context should be assessed in the light of each unique historical setting, and its effects should be different where, for instance, a need is less evident for a structural shift to lower growth.

In July 1991, the BOJ started to cut the Official Discount Rate (ODR), then at 6 percent. Those were the days when production and the CPI showed signs of acceleration and substantial uncertainty existed as to whether the business cycle had peaked. Re-emergence of a land price bubble was a more convincing scenario than a sustained asset deflation. Therefore, the ODR cut in mid-1991 received harsh criticism in and outside the country as a premature relaxation.

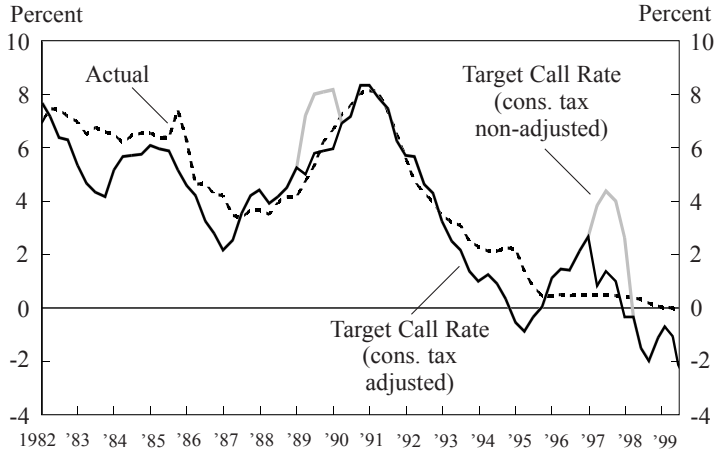
In retrospect, it turned out to be the first of a series of reductions, and by September 1995 the ODR was as low as 0.5 percent—the level some economists regard as a possible threshold to a liquidity trap. In about a four-year span, the sizable room for interest rate reduction had essentially been used up.

The BOJ has often been criticized for an alleged delay in monetary easing. Significant research has been conducted, including studies by the BOJ staff as well as by the Federal Reserve Board staff, to assess the easing path by applying a standard backward-looking Taylor rule as criteria.[2] One such study concluded that monetary easing after the bubble burst, particularly in the crucial early stage of relaxation, could be considered generally appropriate as a standard stabilization policy based on real-time financial and economic indicators as well as market forecasts (chart 2). And yet, even with a policy response that could be considered appropriate in normal times, there emerged a substantial decline in the trend growth rate as well as a rapid and continuous fall in asset prices that weakened the financial system and destabilized the economy.

Against the background of the post-bubble economic performance of Japan, the views have been expressed that the bank should have gone beyond standard stabilization policy and tried more aggressive easing before monetary policy became constrained by the zero nominal bound.

Let me briefly examine two aspects of such views. The first is the practical feasibility, which partly depends on the predictability on a real-time basis of a post-bubble economic trend. The second is the effectiveness of an aggressive monetary policy to mitigate the adverse effects stemming from the bursting of asset price bubbles.

Chart 2
Taylor Rule



Notes: 1. Taylor rule is defined as follows:
Basic equation: $R_t = r^*_t+\pi^*+\alpha(\pi_t-\pi^*)+\beta(Y_t-Y^*)$
r^*_t: Equilibrium real short-term interest rate at period t
π^*: Targeted rate of inflation
R_t: Uncollateralized overnight call rate at period t
π_t: Rate of CPI inflation at period t
Y_t-Y^*: Output gap at period t
where α and β are equal to 1.5 and 0.5, respectively.
2. Target rate based on Taylor rule, shown in bold line, is adjusted for the introduction of the consumption tax (3 percent) in April 1989, and an increase in its rate (to 5 percent) in April 1997. For reference, the consumption tax non-adjusted series is also plotted as the shaded line.

Sources: Kunio Okiina and Shigenori Shiratsuka, "Asset Price Bubbles, Price Stability, and Monetary Policy: Japan's Experience," IMES Discussion Paper 2001-E-16, Institute for Monetary and Economic Studies, Bank of Japan, 2001, chart 7.

Suppose a central bank decides to ease dramatically beyond "standard" or rule-based guidelines at an early stage. The intention would be to pre-emptively accelerate inflation to avoid the future risk of deflation when, as in the case of Japan, some but not all asset prices are falling sharply, economic growth is still fairly robust, and inflation is mild. The accelerated inflation rate required to offset the negative shock generated by the bursting asset bubbles should well-exceed the target if the country in question is pursuing an inflation-targeting policy.

The central bank pursuing such a strategy would have to be acutely concerned, substantiated by quantitative analyses, about the risk of deflation a few years into the future. Without such a superb insight, it would be hardly possible for a central bank to abandon a price target, explicit or implicit, at a stage when deflation is yet a remote risk.

Economic predictions are inevitably clouded by uncertainties. What makes economic reading in the post-bubble period uniquely difficult is the great uncertainties associated with asset market developments.

First, we cannot be sure how the asset markets will develop and when an equilibrium with the real economy will be restored. In addition, different asset segments can show divergent price patterns, as in Japan's stock and real estate markets in 1990. Such divergence can emerge at an early stage when inertia of wishful thinking lingers with the confusing effects on expectations. Thus, the capital loss and the harm to the financial health of businesses and households are extremely difficult to estimate.

Second, uncertainty also exists in the transmission mechanism between asset prices and real activity and inflation. In an economy like Japan's, where banks dominate financial intermediation, capital losses tend to accumulate gradually in the banking system (table 1). Indeed, there was a presumption that shocks would be contained within the financial sector and would not spread to the real side of the economy. Therefore, there was a widespread belief that the situation would turn around if business could be sustained until land prices started to rise again. When bank capital was eroded to a critical threshold, however, an acute credit crunch erupted. It is against such an uncertain setting that economic forecasting must incorporate the timing and magnitude of the "headwind" generated by the deteriorating balance-sheet conditions of businesses, households, and particularly banks.

Let me turn to the second aspect—namely, the effectiveness of a hypothetical early easing. Some simulation results indicate that such a policy would have elevated the inflation rate to a level that would have worked as a comfortable cushion against future deflation (chart 3).

Table 1
Financial Structures

[1] Financial liabilities held by nonfinancial corporations (ratio to total financial liabilities)

	Japan	U.S.	Germany
	(percent)	(percent)	(percent)
Borrowing	38.8	12.1	33.3
Bonds	9.3	8.2	1.3
Shares and equities	33.8	66.6	54.3
Others	18.1	13.0	11.0

[2] Financial assets held by households (ratio to total financial assets)

	Japan	U.S.	Germany
	(percent)	(percent)	(percent)
Currency and deposits	54.0	9.6	35.2
Bonds	5.3	9.5	10.1
Investment trusts	2.3	10.9	10.5
Shares and equities	8.1	37.3	16.8
Insurance and pension	26.4	30.5	26.4
Others	3.9	2.2	1.1

Notes: [1] Figures are those for the end of 1999. [2] Regarding financial debt for enterprises, stocks are evaluated at market value, and, thus, do not necessarily correspond to the accumulated funding by enterprises. It should be noted that equities are likely to be higher for the U.S., compared to those for other countries, because net worth of sole proprietorships are included as households' equities.

Source: Bank of Japan, Research and Statistics Department, "Japan's Financial Structure: In View of the Flow of Funds Accounts," *Quarterly Bulletin*, 9(1), Public Relations Department, Bank of Japan, 2001, pp.105-142.

An important point here is what lies at the root of the predicament of Japan's economy and financial system. Admittedly, under the non-negativity constraint of nominal interest rates, real rates will be pushed up by the extent of deflation, even though deflation itself is rather limited at less than 1 percent per year in Japan now. However, as suggested by chart 4, asset price deflation, which has been continuous for

ten years at an annual rate of close to 10 percent, has likely exerted far greater pressure on activity than slightly positive real interest rates.

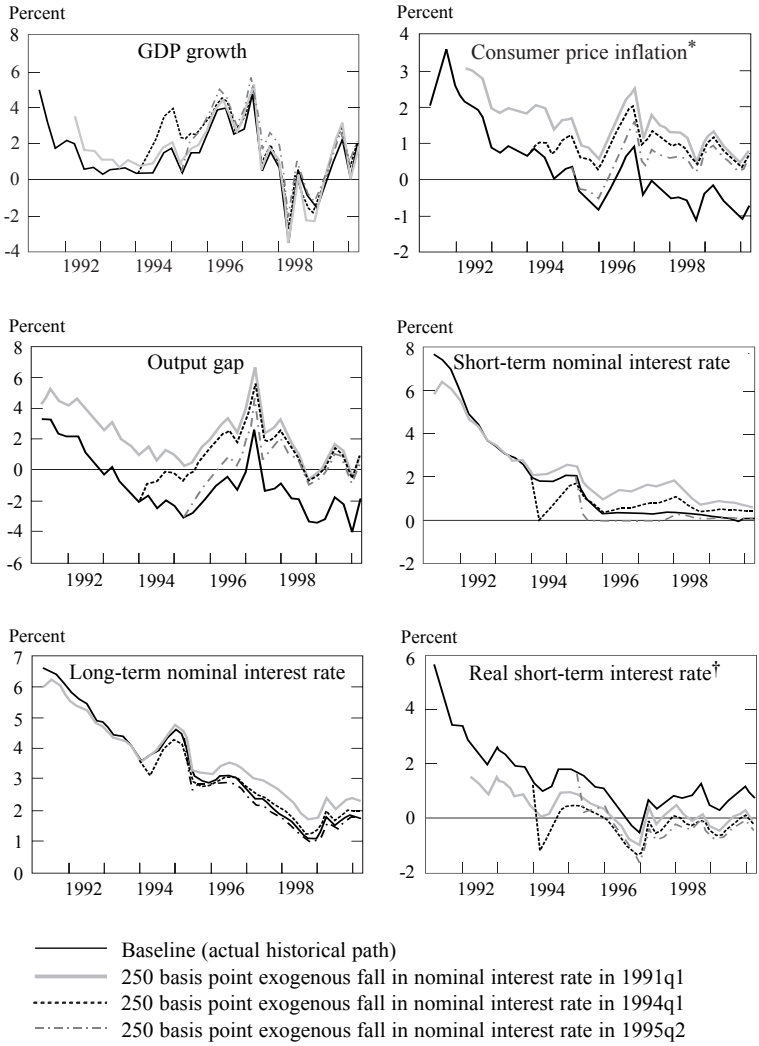
The question from my perspective is: Could aggressive easing have significantly moderated the fall of real estate prices and, therefore, the balance-sheet problem? Generally speaking, significantly lower interest rates should be conducive to a tighter output gap, higher inflation, and, when the asset market is falling, a moderate asset price decline. Would such results be achieved by aggressive easing in the aftermath of an asset bubble? I am skeptical.

We have witnessed time and again that after asset inflation has developed into a major bubble, it is impossible to "soft land" the market. That being the case, and if the asset market in question has traditionally served as a sort of anchor for financial stability, as with real estate in Japan, the capacity of monetary policy to stimulate demand and inflation is bound to be severely impaired. Even if such a strategy had proved to be successful, it would only have delayed the inevitable adjustment between asset prices and economic fundamentals.

If a central bank's predicting ability of post-bubble developments has to remain less than perfect, would it be better once again to consider aggressive tightening when a bubble is perceived to be growing? This is the question I talked about three years ago here. I remain skeptical. However, given the fact that it is always the preceding massive flows of credit that become worthless once the tide is reversed, severely damaging the balance sheets of the parties concerned, it might be worth considering possible ways to focus on restraining "excessive" credit flows during asset market upswings (chart 5).

Let me conclude by adding a few observations in somewhat broader context. It is ironic that, as the track record shows (chart 1, chart 2), the Bank of Japan followed a path in the 1980s and early 1990s that could be regarded as fully consistent with some policy rule, such as the Taylor rule, and yet suffered from the wildest swings of asset markets. Suggestions have been made that the bank should have deviated from such an implicit rule-based path, both in times of upswing as well as downswing. From my perspective, for discussions on policy rules to

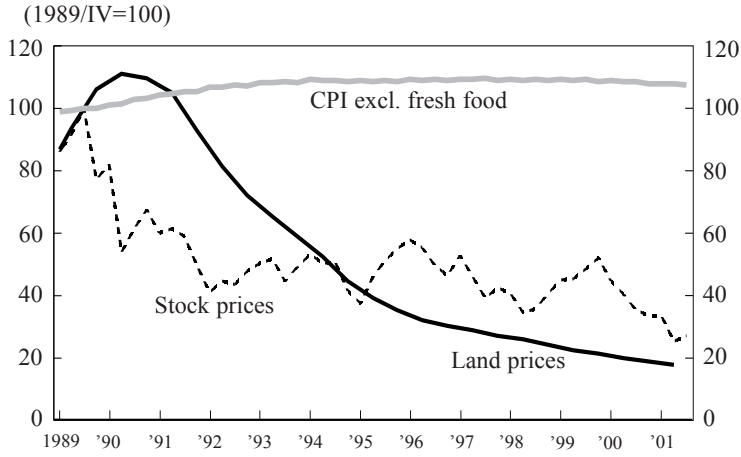
Chart 3
Simulation of Hypothetical Early Monetary Easing



* Adjusted for estimated effect of consumption tax increase in 1997q2.
† Short-term nominal rate minus consumer price inflation over the previous four quarters.

Source: Alan Aherne, and others. "Preventing Deflation: Lessons from Japan's Experience in the 1990s," International Discussion Paper no. 729, Board of Governors of the Federal Reserve System, 2002, exhibit IV.2.

Chart 4
Asset Price Deflation



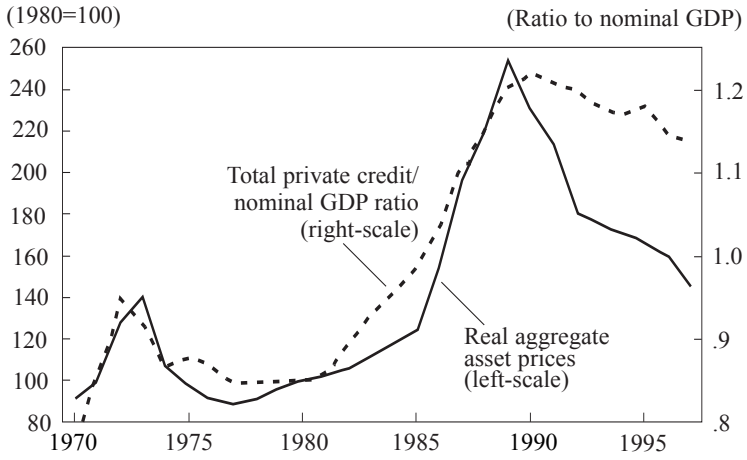
Sources: Bank of Japan, *Financial and Economic Statistics Monthly*, Ministry of Public Management, Home Affairs, Posts and Telecommunications, Consumer Price Index; Japan Real Estate Institute, Urban Land Price Index.

be more relevant and robust, they should at least take into account major swings of asset prices. Our experience shows that price stability, by making low interest rates possible, can pave the way to a major asset price bubble when it is coupled with excessive optimism for the future.

Finally, what matters most in the post-bubble development is the magnitude of the lost capital and its distribution (that is, who in the system has to absorb the loss). In Japan, that magnitude has been overwhelming and has been concentrated in the banking sector.

When an economy is faced with the size of lost capital, as in Japan, a well-functioning financial infrastructure is crucially important for its prompt resolution. Infrastructure in this context includes proper accounting, disclosure, disciplined governance, an incentive mechanism, and supervision. Japan was slow in developing and putting into place such a framework.

Chart 5
Credits and Asset Prices in Japan



Note: Real aggregate asset price indices are a weighted average of equity and residential and commercial estate price indices deflated by consumer prices. The weights are based on the composition of private sector wealth.

Source: Bank of International Settlements, *Quarterly Review*, International Banking and Financial Market Developments, August 1999.

I emphasize this aspect because if expeditious and forceful progress had been made to deal with the capital loss in general and that of the banking system in particular, monetary policy in Japan might have found a different environment in which to operate. Amid a major shock, such as the collapse of key asset prices, a need to address the nexus of monetary and prudential policies cannot be overemphasized.

Author's note: The author benefited from discussions with his colleagues of the Bank of Japan, especially Kunio Okina and Masaaki Shirakawa. The views expressed, however, are those of the author.

Endnotes

[1] Yutaka Yamaguchi, "Asset Prices and Monetary Policy: Japan's Experience," in *Proceedings of a Conference on New Challenges for Monetary Policy* (Federal Reserve Bank of Kansas City, August 26-28, 1999).

[2] See, for example, Naruki Mori, Shigenori Shiratsuka, and Hiroo Taguchi, "Policy Responses to the Post-Bubble Adjustments in Japan: A Tentative Review" (Monetary and Economic Studies, 19 (S-1), Institute for Monetary and Economic Studies, Bank of Japan, 2001); and Kunio Okina and Shigenori Shiratsuka, "Asset Price Bubbles, Price Stability, and Monetary Policy: Japan's Experience" (IMES Discussion Paper 2001-E-16, Institute for Monetary and Economic Studies, Bank of Japan, 2001) as researched by the BOJ staff; and Alan Aherne, and others. "Preventing Deflation: Lessons from Japan's Experience in the 1990s," (International Discussion Paper no. 729, Board of Governors of the Federal Reserve System, 2002) Bank for International Settlement, 72nd Annual Report (Bank for International Settlement, 2002), as researched by staffs of overseas central banks and international organizations.

General Discussion: Monetary Policy in a Changing Economic Environment

Chair: Stanley Fischer

Mr. Fischer: Thanks very much indeed, Mr. Yamaguchi and the other panelists. Comments from Morris Goldstein?

Mr. Goldstein: I have a question for Guillermo Ortíz, I wondered how you have read experience during the past five years in both Asian emerging economies and in Latin America about how to conduct monetary policy under three simultaneous conditions. First, you have a large share of the debt, either the private external debt or the government debt, that is denominated in foreign currency. Second, the exchange rate is under downward pressure. Third, the economy is slowing. So, clearly, you have a dilemma. If you don't raise interest rates to protect the currency and the currency goes into a big fall, you get all these negative balance sheet effects that are contractionary and can induce a crises. If you do raise interest rates to protect the currency, then you are raising interest rates when the economy is slowing down. Similarly, for debt management, if you give people foreign currency-denominated debt because they are nervous about the exchange rate, then you pay less of an interest rate spread but you are building up big contingent liabilities if the exchange rate falls further. What to do?

Mr. Fischer: Thanks. Don Kohn, please.

Mr. Kohn: I have a comment or question for Otmar Issing and also for Yutaka Yamaguchi. Otmar, it seems to me that your price target is

completely redundant with the monetary target. If you are just looking at money for long-term trends, you could just look at prices for long-term trends and that will save a lot of confusion that is engendered by the second pillar.

And for Yutaka, I guess I'm a little concerned about the arguments against aggressive easing. I certainly think this ought to happen very, very rarely—hopefully never that extra aggressive easing came into consideration because of concern about the zero bound, but I would hope that if it were necessary, it would be undertaken. I am concerned about the issue of fighting the last war of holding back because of being worried about raising an asset bubble again. This is something that Marty raised in his comments. I'm also concerned about a perceived inflation-targeting constraint. Any system we have, if it involved inflation targeting, ought to be flexible enough so that when the risks and rewards weren't linear, were skewed in one direction, the system ought to allow for higher inflation targets temporarily. Finally, I am also concerned about this notion that lower interest rates won't help the particular assets that are falling in price. Easing could help a lot of other things and work through a lot of other channels.

Mr. Fischer: Thanks, Don. Wayne Angell, please.

Mr. Angell: I would like to have Mr. Yamaguchi respond to the question that Marty Feldstein raised in which I happen to hold an opposite view and that is that it is the sales tax or the value-added tax that lowers the natural rate of interest in Wicksellian sense below zero. It is the natural interest rate below zero that impoverishes monetary policy. Is there any consideration to going the opposite direction that Marty suggested and getting rid of that sales tax, which for a society that has such a high savings preference you don't need any more boost in the savings preference with the sales tax?

Mr. Fischer: Thanks, Wayne. Sebastian Edwards, please.

Mr. Edwards: This is a comment and a question for Guillermo Ortíz. A very important point that Guillermo made today has to be emphasized further: the decline in the practice of wage indexation in Latin

America and the effect it has had on the virtual disappearance, or very sharp reduction I should say, in the pass-through from exchange rate depreciation into prices. If you look at the regression results that Guillermo produces in his table 2, all the breakpoints coincide with either the end of implicit or explicit indexation. In the case of Mexico, it's the end of the Pacto. In the case of Brazil, it coincides with the summer of 1996 unsuccessful Petrobras strike where the government, in particular the president, was extremely clear in the sense that backward-looking indexation would not take place. And, in the case of Chile, 1982 is the end of 100 percent backward-looking indexation. I think that is a very important point.

The question is the following: Given this change and this reduction in the pass-through, how does that affect, in your view, or should affect the whole discussion on incorporating exchange rate developments in the conduct of monetary policy in emerging markets? In particular, should these countries intervene in the foreign exchange market, as Brazil is doing now and as Mexico and Chile have done periodically. And second, should the exchange rate become an explicit element in a Taylor rule-type of formulation for monetary policy?

Mr. Fischer: Thanks. Over there please.

Mr. Dudley: Mr. Yamaguchi raised some interesting questions. To me, the fundamental and critical question is: If you eased monetary policy superaggressively, would it have worked? If you answer "yes," then you don't have to worry about bubbles being created because you can clean the damage up afterward. If you answer "no," then you really do have to do more to prevent bubbles from growing in the first place.

I have two questions. One: If the central bank follows a superaccommodative monetary policy that is more accommodative than anyone thinks is appropriate, how does the bond market react to that? I would actually argue that the bond market would probably react quite badly to that, so you might not be able to make financial conditions more accommodative.

Two: If the central bank acted in that manner, what would that do to

expectations about risk? The central bank would essentially be saying that it is very worried about a deflation outcome and you should be too. I would imagine that would also have pretty negative implications for financial asset prices, and so the superaccommodative monetary policy might not lead to an easier state of financial conditions.

Mr. Fischer: Thanks. Kermit Schoenholtz is next. I am sorry the lists are closed. We have just two more.

Mr. Schoenholtz: It is a question for Deputy Governor Yamaguchi. It was related to something Otmar Issing had said, which was, essentially, that the ECB's success in anchoring expectations had been related to its monetary policy strategy and to its principles of policymaking. The Bank of Japan has publicly stated a desire to end deflation and has moved to a quantitative strategy of achieving that. The question is: Are there other mechanisms—bold or unconventional mechanisms—that ought to be entertained by central bankers in trying to change expectations when they seem so deeply embedded? Thank you.

Mr. Fischer: Thanks.

Mr. Berner: Deputy Governor Yamaguchi, one question related to all the others: You seem to put at the end of your talk a lot of emphasis on microeconomic, as opposed to macroeconomic solutions, to help the biggest problem that you foresee, which is getting capital to exit from the system, reflecting the capital losses that were there but which are still on the books of banks and maybe other institutions. So, am I correct in reading you to say that maybe monetary policy's biggest role in the post-bubble environment is to help that process and that is really the principal role through which monetary policy can end the deflation in that period?

Mr. Fischer: Thanks very much. We'll now turn to the panelists for the final comments. We have an agenda for tomorrow on the table already, which is asset prices and inflation targeting, which is discussed in the paper by Lars Svensson. Many of you remember three years ago Deputy Governor Yamaguchi standing up here plaintively saying, "We had zero inflation, what was our excuse going to be for raising interest

rates when we saw this bubble going on?" I guess that is related to the questions that are going to be discussed tomorrow and also to some of the issues raised by Alan Greenspan at the beginning today.

Let's turn to the speakers in the order in which they spoke. Otmar, please.

Mr. Issing: I can be very brief—only one question. Don Kohn raised concerns about confusion about our strategy. Yes, Don, you are certainly not confused. You talk about potential confusion of somebody I don't know.

In deriving a reference value or a target, of course, implicitly you need—this is true—a target for the inflation rate. So, you might say it is redundant to have it separately. But the present situation very clearly shows that it is not redundant. Our explanation for the strong growth of M3 last year and now is that we have had substantial portfolio shifts. To that extent, we don't expect inflation risk from that. So, having only the reference value or only the definition would not lead to more clarity, but I would claim create confusion.

Mr. Fischer: Guillermo Ortíz, please.

Mr. Ortíz: The hypothetical example posed by Morris is not an easy one. I think two things need to be established. The first is how credible is the monetary authority? Second, what is the degree of pass-through between the exchange rate and prices? If the authority has less than full credibility and there is high pass-through, then you have no option but to raise interest rates, tightening strongly. Otherwise, a situation of loss of confidence can develop, as those we have seen in the past. This is an essential point. But even if you have more credibility, the authority faces an asymmetric loss function — if you want to put it that way — because losing credibility takes a long time to rebuild. If there is any danger of loss in credibility, it is preferable to perhaps tighten too much and, unfortunately, it might be desirable to risk a further contraction of the economy rather than the loss of which I am talking about.

With regards to Sebastian Edward's question, we have learned that

intervening works poorly, and can only be justified when you have some very particular or special development, due to contagion or some exogenous shock, so the exchange rate is clearly out of line with fundamentals. The last time we intervened in the foreign-exchange market was in a case like this, at the height of the Russian crisis in September 1998. Since then, we have never intervened in the foreign exchange market, and our policy is just not to do so. In the case of Brazil, for example, there is a clearly identified source of uncertainty, which is political uncertainty, not economic fundamentals, so the central bank is trying to hold the fort. To the extent that the outcome of the election and the dynamics of it look reasonable, there is an argument for intervention. Intervention on a regular basis or to counter forces that have something to do with fundamentals is totally futile and useless.

Mr. Fischer: Thanks. Mr. Yamaguchi, please.

Mr. Yamaguchi: I have more questions than I would like to have, but will start very briefly with Don Kohn's question. I agree that any rule has to be flexible. If the rule is flexible enough, we might not have any problem in introducing such. But, I think that, based on experiences on asset price bubbles, the development in the asset market might be presenting a new challenge to the formulation of a policy rule. I trust that we will have more discussion on this tomorrow.

Your argument that lower interest rates should help push up the asset market prices, I fully agree. In fact, I skipped reading this particular sentence in my text, "Generally speaking, significantly lower interest rates should be conducive to tighter output gap, higher inflation, and moderation of asset price decline." I had to skip this sentence when Stan showed me that I only had one minute left to speak. Don't think there isn't any material difference between you and me. I want to emphasize that the argument that I presented today was mainly about the phase immediately following the turning point of a big asset price bubble.

The question on exploiting the VAT to reduce national saving in a country where increased saving is not that desirable: I think that what can account for the high level of saving is rather complex, and, as far

as I know, no good explanation for that has been offered. Having said that, providing our people with an enhanced sense of security about their future life would be more helpful than reducing the consumption tax. The consumption tax—reduction of that—would probably be interpreted by our people as another reckless endeavor to enlarge the government deficit into the future.

On Mr. Dudley's question on the effects of so-called superaccommodative monetary policy: If such policy options succeed at all in generating inflationary expectations, sure it will generate a sharp response in the bond market, and the bond market will probably go up substantially. The question for us is: With what instruments can we possibly do that?

This question brings me to another question presented by Mr. Schoenholtz: Are there any good policies to help change the deflationary expectation that, in his opinion, is already deeply embedded in the system? My answer is that there isn't any orthodox policy to generate a new expectation on inflation or deflation. We have practically used up all options in the orthodox monetary policy area. Inflation targeting probably wouldn't help because we do not have in our orthodox policy options an effective instrument to deliver that message. The reason why we have not resorted to inflation targeting is simply that we believe we cannot deliver that kind of promise to our people. So, the whole discussion brings us back once again to the desirability of trying the so-called unorthodox policy options, such as purchasing corporate stocks, purchasing real estate properties, and so forth.

Finally, macro monetary policy, as opposed to micro, attempts to reform this and that part of the financial system. Any reform to help enhance the health of the financial system—particularly the banking system—would help. I should say that even while we try to present our various options for financial reforms in the so-called structural reform agenda, we will continue to think very seriously on what can be done further in the area of macro monetary policy.

Mr. Fischer: Thanks very much, and thanks again to all the participants this morning.

Monetary Policy and Real Stabilization

Lars E.O. Svensson

Introduction 1

During the past two decades, maintenance of low inflation, "price stability," has become the principal focus of central banks around the world. At the same time, the view has emerged that monetary policy is better suited than fiscal policy for short-run stabilization purposes. This paper examines to what extent monetary policy can be directed at both "monetary stabilization," stabilizing inflation at a low level and "real stabilization," stabilizing output or, rather, the output gap and whether there are significant limitations on the use of monetary policy for real stabilization purposes. Section 2 discusses what a realistic view of monetary policy is, what monetary policy realistically can and cannot achieve, what the long-run and short-run tradeoffs are between inflation and output, what the appropriate objectives for monetary policy are, and what the role of credibility is for the tradeoff between inflation and output stabilization. Section 3 discusses how central banks can make the objectives of low and stable inflation and a stable output gap precise and the benefits thereof, how central banks can achieve the best outcome relative to these objectives by a procedure called "forecast targeting," and how this procedure is best implemented. Section 4 discusses how the objectives of financial stability and a well-functioning payment system can be taken into account and reconciled with the objectives of low and stable inflation and stable output gap, and to what extent central banks should respond to asset prices and bubbles. Section 5 discusses how the risks of hitting the

zero (lower) interest rate bound and falling into a deflationary liquidity trap can be handled, how central banks can avoid falling into liquidity trap, and how central banks can escape from a liquidity trap if they have fallen in. Section 6 summarizes the conclusions of the paper.

A realistic view of monetary policy 2

A discussion of whether stabilization of the real economy is consistent with a policy directed at low and stable inflation and how a central bank can achieve a desirable combination of real and monetary stability should start from a realistic view of what monetary policy can and cannot do. Such a view of monetary policy is also important in a discussion of the appropriate goals for monetary policy and in understanding why an increasing number of countries have selected low and stable inflation, "price stability," as the primary goal for monetary policy.[1]

Let me start from the presumption that the ultimate objective of economic policy is to guarantee and enhance the citizens' welfare. This ultimate objective is often expressed as a number of separate goals that contribute to the citizens' welfare—for instance, efficient resource utilization, full and stable employment, high economic growth, price stability, equitable distribution of wealth and income, regional balance, and environmental protection.

Monetary policy is part of economic policy. At first, one might think that monetary policy should have the same goals as overall economic policy. However, because monetary policy only has sustained or persistent effects on a limited number of variables affecting economic welfare, it is more appropriate that monetary policy is assigned a limited number of goals. Specifying goals for monetary policy that it cannot achieve would be unproductive and could even be counterproductive. Instead, monetary policy should be assigned goals that it can achieve and that are consistent with the ultimate objective for economic policy. In order to determine which goals are most suitable for monetary policy, one must, therefore, understand the effects of monetary policy and what monetary policy can and cannot achieve.

How monetary policy affects the economy 2.1

Monetary policy affects real and nominal variables through a number of channels—together referred to as the *transmission mechanism* of monetary policy.[2] Central banks normally conduct monetary policy by setting a short nominal interest rate, the central bank's *instrument rate* (for instance, the federal funds rate in the United States). Suppose that the central bank lowers the instrument rate. How is the economy affected? In the short term, domestic prices and domestic inflation in industrialized countries are relatively slow to change (or sticky). This means that private-sector inflation expectations for the short term are relatively sticky. This further implies that central banks, by controlling the short nominal interest rate, can also affect the short real interest rate: the difference between the short nominal rate and short-term inflation expectations. Via market expectations of future real rates, longer real rates also are affected. Thus, the lowering of the instrument rate normally lowers short and longer real interest rates, which will affect economic activity.

Furthermore, a reduction in the short interest rate normally depreciates the domestic currency and, hence, increases the nominal exchange rate (when the nominal exchange rate is expressed as units of domestic currency per unit of foreign currency). Because domestic prices, in practice, are sticky (at least for industrialized countries), the domestic currency also depreciates in real terms. That is, the real exchange rate (the price of foreign goods and services in terms of domestic goods and services, or the price of tradable goods and services in terms of nontradable goods and services) also rises. The rise in the real exchange rate implies that the domestic price of imported and exported final goods increases (when the foreign-currency prices of imported and exported final goods are sticky). Because these goods enter the Consumer Price Index (CPI), this means that CPI inflation increases, the extent of which depends on these goods' share in the CPI. This is the so-called *direct exchange rate channel to CPI inflation*. The direct effect on CPI inflation usually occurs within about a year or even quicker.

The fall in short and longer real interest rates mentioned above will stimulate consumption and investment and, thereby, increase aggregate demand and output in the economy. In practice, output is demand-determined in the short to medium term, at least in industrialized countries. This is the so-called *real-interest rate channel to aggregate demand*. The rise in the real exchange rate makes domestically produced goods less expensive relative to foreign goods. This increases demand for export and for import-competing goods, which also adds to aggregate demand. This is the *exchange rate channel to aggregate demand*. The effects through these two channels usually occur in about a year or so.

The monetary policy literature has also discussed a so-called *credit channel to aggregate demand*. It works in the same direction as the pure real-interest rate effect on aggregate demand. For simplicity, we can therefore include the credit channel in the above real-interest-rate channel to aggregate demand. The real-interest rate channel also includes the effect on aggregate demand of *wealth* changes of interest rate changes, for instance, effects via changes in the stock-market value.

The impact of monetary policy on inflation *2.1.1*

Having traced the transmission channels to aggregate demand, let me discuss the effects on domestic inflation: the rate of change in the prices of the domestically produced goods and services. (Inflation in domestically produced tradable and nontradable final goods and services is the main component of CPI inflation; another substantial component is inflation in imported final goods.) We normally think of current output as determined mainly by aggregate demand in the short and medium term. *Potential output* is the hypothetical output level that would result in the absence of price and wage stickiness. It is largely determined by factors other than monetary policy.[3] The *output gap* is the difference between current output and potential output. It can be seen as a measure of general excess demand in the economy. The above transmission channels to aggregate demand are, hence, also channels to the output gap. The increase in aggregate demand and the output gap will then lead to an increase in domestic inflation because increased production increases the costs of production, and increased

demand allows firms to increase prices. The increase in domestic inflation usually occurs within another year or so. This is the *aggregate-demand channel to domestic inflation*.

For a given output-gap level, domestic inflation is also independently affected by production costs—for instance, wage costs and costs of imported intermediate inputs such as oil and raw materials. The fall in the exchange rate increases the cost of imported intermediate inputs as well as imported final goods, and the reduced purchasing power of wages may trigger increased wage demands. This can be called the *production-cost channel to domestic inflation*. Finally, price and wage setting are strongly affected by expectations of future inflation, since movements in the expected future price level are the obvious starting point for individual price and wage setting. This is the *expectations channel to domestic inflation*. Any increased inflation expectations that may be generated by the lowering of the instrument rate and the resulting increase in activity will then independently add to the effect on domestic inflation.

Thus, a reduction in the central bank's instrument rate affects the economy through a number of channels with different lags. The exchange rate and short and longer interest rates are usually immediately affected. Within about a year or less, there is an effect on CPI inflation through the direct exchange rate channel. As this first effect is working through, in about a year or so, there is an increase in output and the output gap. Through that linkage, within another year or so, there is a second effect on CPI inflation. Both effects are in the same direction—namely to increase inflation. However, the lags mentioned are only very rough rules of thumb. In practice, the lags and the strength of the effects through the different channels vary across channels and over time, and the effects are spread out over several quarters. For instance, the lag and the strength of the direct exchange rate effect on CPI inflation depends on the so-called pass-through of exchange rate changes: the degree to which importers pass on exchange rate changes to buyers rather than absorbing them in their profit margins. The pass-through varies considerably, depending on the circumstances—for instance, with the perceived persistence of the exchange rate change, the size of the initial profit margins, and the price sensi-

tivity of demand for imports. Furthermore, the economy is subject to a never-ending sequence of shocks and disturbances, directly and indirectly, to inflation and output, including price changes of raw materials, shifts in international capital flows, productivity changes, changes in indirect taxes, etc. Many of these shocks are quite difficult to identify, and many occur during the lag between instrument adjustment and effects on output and inflation. Thus, it is worth emphasizing that the central bank's control over inflation, output, and other macro variables is quite imperfect.

The long-term effects of monetary policy 2.1.2

We have seen above how the central bank, by lowering its instrument rate, thereby reducing the short real interest rate and depreciating the currency, can increase aggregate demand and output for a couple of years, say. Can the central bank indefinitely maintain a low instrument rate and depreciated currency and, in this way, stimulate the economy indefinitely? The answer is definitely no. In the longer term, the central bank must set its instrument rate so that, on average, the short real interest rate is equal to the average *neutral real interest rate*. The neutral real rate is the real interest rate that is consistent with output equal to potential output. Thus, the neutral real rate is the hypothetical real interest rate that would result in the absence of price stickiness and other frictions. It is largely determined by factors other than monetary policy.[4] If the central bank tries to maintain a short real rate below the neutral real rate for too long, aggregate demand outstrips potential output, the economy becomes overheated, and inflation increases to high single-digit, then double-digit inflation, and eventually hyper-inflation.[5] As history has demonstrated several times, a hyper-inflationary situation eventually results in a breakdown of the market system and a severe economic and financial crisis. Thus, sustained stimulation of the real economy through monetary policy is not a feasible option.

In the long term, monetary policy can only control nominal variables such as inflation and the exchange rate. In the long term, monetary policy cannot increase the average level or the growth rate of real variables such as GDP and employment, or affect the average level of the

real exchange rate. There is evidence that monetary policy that leads to high and/or variable inflation is harmful to the real economy and to economic growth, by making the market mechanism work less well and by creating unnecessary uncertainty. However, once monetary policy brings inflation down to relatively low and stable levels, monetary policy has no long-term effects on the *average* level and *average* growth rate of real variables. Nevertheless, monetary policy can affect the *variability* of real variables, as further discussed below.

Suitable goals for monetary policy 2.2

In the long run, output fluctuates around potential output, which is determined by factors other than monetary policy (except that, as already noted, bad and volatile monetary policy may well create a volatile and uncertain economic environment that deters investment and, hence, growth in potential output). Thus, there is a conspicuous difference between output targets and inflation targets for monetary policy. Whereas a long-run inflation target for monetary policy makes eminent sense and can be achieved, a long-run level or growth target for output different from potential output does *not* make sense for monetary policy because it cannot be achieved. Thus, the long-run output target is given by potential output, which is largely independent of monetary policy.[6] In the long term, monetary policy can, at best, provide a stable environment for the real economy. However, the fact that monetary policy has effects on the level of real variables in the short and medium term creates considerable tensions and temptations that need to be faced and handled.

A crucial ingredient in a stable environment for the real economy is a nominal anchor: an anchor for the nominal variables and private-sector expectations of future nominal variables. An increasing number of countries have found that low and stable inflation provides the best nominal anchor. The reason is that the alternative, higher inflation, has serious negative consequences. In practice, higher inflation always comes with higher variability in inflation. High and variable inflation impairs the capacity of the market mechanisms to achieve efficient resource allocation, and the ensuing uncertainty makes it more difficult for firms, consumers, and savers to make the right decisions. It

leads to arbitrary and inequitable redistributions of incomes and assets, for instance, a shift away from small savers to professional investors, and from tenants to owners of houses and property. Inflation is effectively theft from small savers and low-income groups. High inflation has no lasting positive effects, and the adverse effects eventually become unbearable. Numerous historical experiences have demonstrated that bringing inflation down from a high level is costly; as a rule, a deep recession with high unemployment is required. Accordingly, it is important to avoid letting inflation take off in the first place. For these reasons, an increasing number of countries have specified "price stability" as the primary goal for monetary policy.[7]

However, completely disregarding the real consequences of monetary policy in the short and medium term and focusing exclusively on controlling inflation at the shortest possible horizon would have bad consequences. This policy is called "strict inflation targeting" in the literature. In practice, in an open economy, it would mean relying almost exclusively on the direct exchange rate channel to CPI inflation described above, since it has the shortest lag. For instance, any disturbance to domestic inflation that could arise from a number of different sources would be countered by attempts to move the exchange rate so as to let the domestic price of imported and exported final goods adjust to stabilize CPI inflation. This would require aggressive and volatile policy and lead to considerable volatility in interest rates and the nominal and real exchange rate, which would contribute to increased volatility of output and would surely be detrimental to welfare.

A more moderate policy, called "flexible inflation targeting" in the literature, maintains that the primary goal of monetary policy is to achieve price stability in the form of an inflation target. But it is recognized that some weight should be given to stabilizing the business cycle and, consequently, stabilizing output movements around potential output. In practice and in most situations, this means taking a somewhat more gradual and more moderate approach to monetary policy, aiming to achieve the inflation target at a somewhat longer horizon (say, two to three years) than would be technically feasible (perhaps three to four quarters). It also means accepting that inflation will, in the short term, deviate, sometimes quite a bit, from the infla-

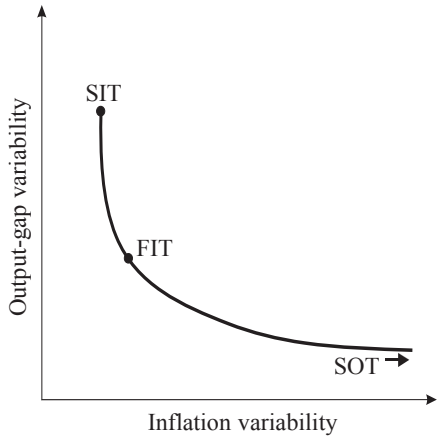
tion target. This approach also relies more on the aggregate demand channel than the direct exchange rate channel to inflation.

It is sometimes said that monetary policy, with essentially only one instrument, the instrument rate, can only have one goal, preferably low and stabile inflation. This is an oversimplification. With only one instrument, monetary policy can still have several goals, as long as these goals are weighted together into a single objective function, as discussed in greater detail in section 3.1.

The tradeoff between inflation variability and output variability 2.2.1

The tradeoff between inflation variability and output-gap variability and the choice between strict and flexible inflation targeting have been discussed extensively in the monetary policy literature, for instance, in several papers presented at the Jackson Hole symposia in 1996 and 1999 (Federal Reserve Bank of Kansas City [21] and [22]). The tradeoff is often illustrated as in figure 1, with inflation variability around a given inflation target measured along the horizontal axis and output-gap variability measured along the vertical axis. The intersection of the axes corresponds to zero variability of inflation and the output gap—that is, inflation always equal to the inflation target and the output gap always equal to zero. Because of the complex transmission mechanism of monetary policy, unpredictable shocks, imprecise control and inevitable uncertainty, zero variability is a completely infeasible outcome. Instead, the curve, which can be called the Taylor curve, in honor of Taylor [53], where it first appeared, shows the most efficient and feasible combinations of inflation and output-gap variability that monetary policy can achieve.[8] Points above and to the right of the curve correspond to inefficient monetary policy, where either inflation variability or output-gap variability, or both, could be reduced by better monetary policy. Points below and to the left of the curve correspond to outcomes that are infeasible. The point SIT corresponds to strict inflation targeting, when the central bank concentrates on stabilizing inflation without considering the consequences for output-gap variability. It results in the lowest feasible variability of inflation but high variability of the output gap. The point FIT corresponds to flexible

Figure 1
The Tradeoff between Inflation Variability and Output-Gap Variability



inflation targeting, where the central bank puts some weight on stabilizing output-gap variability. It leads to somewhat increased inflation variability but reduced output-gap variability. The point SOT, to the right outside the figure, corresponds to "strict output-gap targeting," when the central bank puts all weight on stabilizing the output gap. It would lead to very high inflation variability or worse, since the economy is then effectively lacking a monetary anchor.

Discussions among policymakers, experts, and researchers in the monetary policy area (as reported, for instance, in [21] and [22]) have by now resulted in considerable agreement that flexible inflation targeting is the best compromise for monetary policy (see also Debelle [17]). There is also general agreement that inflation-targeting central banks in industrialized countries, in practice, conduct policy in this way. That is, they aim to stabilize inflation around the inflation target but also, to some extent, stabilize output around potential output—acknowledging that, because of the tradeoff, unpredictable shocks, uncertainty, and unavoidably imperfect control, there will always remain some variability in both inflation and the output gap. The Federal

Reserve System, although not being as transparent and systematic as the inflation-targeting central banks and probably having shifting goals over time, appears, nevertheless, to display elements of flexible inflation targeting with a relatively large weight on output-gap stabilization.

Credibility and the tradeoff between inflation and the output gap 2.2.2

One important mechanism for improving the tradeoff is by achieving credibility, in the sense of anchoring inflation expectations on the inflation target. With an explicit inflation target, credibility of the inflation-targeting regime can be measured as the degree of proximity between private-sector inflation expectations and the inflation target. Shocks to inflation expectations are historically an important source of variability in inflation and output, since shifts in inflation expectations have independent effects on future inflation (the direct expectations channel to domestic inflation mentioned above).[9] Shifts in inflation expectations also cause additional indirect disturbances to output and inflation by affecting real interest rates and exchange rates. As a result, volatility in inflation expectations shifts the curve in figure 1 up and to the right and worsens the variability tradeoff. Conversely, more stable inflation expectations anchored on the inflation target improve the tradeoff, shift the curve down and to the left, and allow inflation variability or output-gap variability (or both) to fall. This is also because inflation expectations anchored on the inflation target create a strong tendency for actual inflation to revert to the inflation target and, everything else equal, mean that monetary policy needs to be less active. Interest rates and output need to move less to counter unfavorable movements in inflation expectations. The economy is, to some extent, put on autopilot. This situation is every inflation-targeting central banker's dream. Although central bankers often may seem obsessed with credibility, this obsession is for good reason.

Practical experience shows that credibility has to be earned over time. In most new inflation-targeting regimes, especially when initial inflation is high and a period of disinflation is required, inflation expectations are high and credibility is low. An idea that makes a lot of sense is that in a new inflation-targeting regime, the central bank

should initially put more weight on reducing and stabilizing inflation and be a less flexible inflation targeter in order to more quickly achieve credibility. The cost would be more output-gap variability in the beginning of the regime. The benefit would be an improved tradeoff and lower variability of both inflation and the output gap later on, when credibility has improved and the central bank can afford to be a more flexible inflation targeter.

This can be illustrated in terms of figure 1 in the following way: Suppose, because of low initial credibility, that the economy initially is at a point northeast of point FIT, with higher variability of both inflation and the output gap. This initial point would be on an initial tradeoff curve located to the northeast of the curve through points FIT and SIT. Suppose the central bank implements strict inflation targeting. This would correspond to a move northwest along the initial tradeoff curve. If credibility improves, the tradeoff curve would shift to the southwest, to the curve through points FIT and SIT. The economy would then be at point SIT. If the central bank then implements flexible inflation targeting, the economy would move to point FIT. Compared to the initial situation, the economy would benefit from lower variability of both inflation and the output gap.

Independent stabilization of interest rates and the exchange rate 2.2.3

A separate issue is the desirability and feasibility of independent stabilization of interest rates and the exchange rate. It is certainly possible for the central bank to stabilize either the interest rate or the exchange rate somewhat, at the cost of increased variability of inflation and/or the output gap. Is it desirable for the central bank to do so? Except in situations of financial fragility with concerns about the stability of the financial and payment system (to be discussed in section 4), I find it difficult to see good reasons for such stabilization at the cost of increased inflation and output-gap variability (see further discussion in section 3.1). In practice, flexible inflation targeting, with a longer horizon to meet the inflation target and concern for output-gap variability, will normally mean a more gradual approach and a less activist policy and, hence, reduced interest rate variability. Because

interest rate changes lead to exchange rate changes, everything else equal, this also reduces exchange rate variability. Increased credibility and increasingly stable inflation expectations will reduce a major source of shocks to both interest rates and exchange rates. Thus, successful and credible flexible inflation targeting is likely to contribute to less variability of interest rates and exchange rates. However, exchange rates are, by nature, volatile asset prices and are affected by a number of shocks beyond inflation expectations and interest rate changes. Such shocks will continue to cause unavoidable exchange rate variability.

Summary *2.3*

In the long term, monetary policy can only control nominal variables such as inflation and the nominal exchange rate. It cannot increase the average level or the growth rate of real variables such as GDP and employment, or affect the average level of the real exchange rate. At best, it can reduce the variability of real variables somewhat. In the short and medium term, monetary policy has effects on both nominal and real variables. However, the complex transmission mechanism of monetary policy, varying lags and strength of the effects through different channels, unpredictable shocks, and inherent uncertainty combine to prevent any fine-tuning. There is general international support for a regime of flexible inflation targeting, where inflation is stabilized around a low inflation target in the medium term (rather than at the shortest possible horizon) and a gradual and measured policy response avoids creating unnecessary variability in the real economy. This still leaves some ambiguity about the precise relative weight on output-gap stabilization relative to inflation stabilization. I will argue in the next section that this remaining ambiguity can be eliminated and that it is a good thing to do so.

How to achieve the optimal compromise between inflation stability and output-gap stability 3

How can a central bank achieve the optimal compromise between inflation stabilization and output-gap stabilization, while maintaining long-run price stability in the sense of an average inflation equal to the

inflation target? I believe this can be done by refined flexible inflation targeting in the following way:

1. The central bank first formulates, announces, and motivates an explicit loss function for inflation deviations from the inflation target and output deviations from potential output. This loss function is effective for several years. (Although this idea of an explicit loss function may appear quite shocking to some central bankers, as we shall see, we are only talking about one more number than the inflation target.)

2. Before each major monetary-policy decision (say, about every quarter), conditional on the central bank's view of the transmission mechanism, its estimate of the current state of the economy, and its judgment about relevant circumstances and shocks, the central bank constructs a set of conditional (mean) forecasts, *projections*, of the target variables for alternative instrument-rate paths, thereby tracing out the feasible set of alternative inflation and output-gap projections.

3. The central bank then selects the projections of inflation and the output gap in the feasible set that minimizes the loss function and, thereby, best fulfills the objectives. These projections will return inflation to the inflation target and output to potential output at the appropriate pace, thereby achieving the long-run inflation target as well as the best compromise between any short-run deviations of inflation from the inflation target and output deviations from potential output.

4. The central bank announces the optimal projection of the target variables and the corresponding projection of the instrument-rate path (normally time-varying), and publishes and explains the analysis that results in these projections. These projections then become the central bank's best *unconditional* forecast of future inflation, output gap, and instrument rate ("unconditional" forecast in the standard sense of incorporating all relevant information, including the central bank's best prediction of its future interest rate setting).

5. The central bank then sets the current instrument rate in line with the optimal instrument projection and continues to do so until the next major monetary-policy decision.

6. At the time of the next monetary-policy decision, the central bank repeats steps 2-5, taking into account the new information that has arrived, its new estimate of the current state of the economy, and its new judgment about relevant circumstances and shocks.

It is worth emphasizing that the above is not a mechanical procedure and that it does not rely on models only. Instead, it allows for considerable judgment and discretion in constructing the projections. It is an example of the "constrained discretion" that, according to Bernanke and Mishkin [13], characterizes inflation targeting. It has much in common with current best international practice of inflation targeting in New Zealand, the United Kingdom, and Sweden.[10] It is "refined" flexible inflation targeting, in that it goes beyond current best practice in making precise and explicit (rather than implicit) the real stabilization objective, and in formulating an explicit loss function, and in using this loss function to select the optimal projections of inflation and the output gap. It is similar to the practice in New Zealand of publishing a time-varying projection for the interest rate, but it goes beyond the practice in Sweden and the United Kingdom of relying on and publishing projections of inflation and output conditional on an unchanged interest rate.

Specifying an explicit loss function *3.1*

An essential element in achieving the best compromise between inflation and output-gap stabilization is, obviously, to specify what is meant by the best compromise. There are several advantages to being explicit and transparent, and avoiding ambiguity and obfuscation about the loss function: Explicit objectives improve the focus inside the central bank on achieving the goals, provide for more consistent policy, and allow more precise internal evaluation of past policy. Transparent communication of those objectives allows more precise and relevant external monitoring and evaluation of central-bank policy, thereby improving the incentives for the central bank to achieve the stated objectives. Furthermore, it allows scrutiny of and debate about the objectives themselves, an essential aspect of a democracy.[11]

Inflation-targeting central banks, although being strong advocates of

transparency in monetary policy, have, so far, avoided completely specifying their loss function. However, without such specification, the precise monetary-policy objectives under inflation targeting are still open to interpretation and continue to suffer from a lack of transparency. Especially, how much weight is put on stabilizing the real economy relative to stabilizing inflation around the inflation target? Indeed, the objectives can be misunderstood. For instance, Meyer [35], although arguing strongly in favor of a numerical inflation target, interprets the inflation-targeting regimes in New Zealand, Canada, and the United Kingdom as having a "hierarchical" mandate for price stability and contrasts this with a "dual" mandate (which he favors) in Australia and the United States. Although, as explained below, I believe this distinction between a hierarchical and dual mandate is a misunderstanding of the nature of flexible inflation targeting (and I argue in Svensson [45] that New Zealand is currently a prime example of flexible inflation targeting), as long as inflation targeting central banks do not announce a precise loss function for monetary policy, misunderstandings of the precise objectives are invited.

The objectives corresponding to flexible inflation targeting can be described precisely by a quadratic period loss function

$$L_t = \left(\pi_t - \pi^*\right)^2 + \lambda\left(y_t - \bar{y}_t\right)^2, \tag{3.1}$$

where π_t and y_t denote inflation and output in period t, respectively, π^* is the inflation target, $\bar{y}_t$ is potential output, $y_t - \bar{y}_t$ is consequently the output gap, and $\lambda > 0$ is the relative weight on output-gap stabilization. Thus, inflation and output are the "target variables," that is, the variables that enter the loss function. The corresponding "target levels" are π^* and $\bar{y}_t$, respectively. (Equivalently, we can say that inflation and the output *gap* are the target variables, with the target levels π^* and 0, respectively.)

Because of the lags in the effect of monetary policy actions on inflation and output, the central bank has to be forward-looking and consider the effects of current monetary-policy actions on future inflation and output gap. Furthermore, because of the unavoidable uncertainty and imperfect control, the objectives have to be expressed in terms of

expected future losses. Also, potential output, $\bar{y}_t$, is an unobservable variable that has to be estimated. This is achieved by considering an intertemporal loss function in each period t in the form of expected discounted future losses,

$$\mathcal{L}_t = (1-\delta)E_t \sum_{\tau=0}^{\infty} \delta^{\tau} L_{t+\tau}, \tag{3.2}$$

where δ $(0<\delta<1)$ is a discount factor and E_t denotes expectations (estimations) conditional on information available in period t.[12]

The target level for the output gap is, thus, equal to potential output. There is general agreement that inflation-targeting central banks normally do not have overambitious output targets—that is, exceeding potential output. Thus, discretionary optimization does not result in average inflation bias, counter to the case in the standard Kydland-Prescott-Barro-Gordon setup. Since the inflation target is *subject to choice* but the output target is *given* by (estimated) potential output (as discussed above in section 2.2, having an output target for monetary policy different from potential output makes no sense), there is an asymmetry between the inflation target and the output target, consistent with the inflation target being the "primary objective" and a "hierarchical" mandate. On the other hand, once the inflation target has been determined, the objective is to minimize an expected weighted sum of squared inflation deviations from the inflation target *and* squared output deviations from potential output. In this sense, flexible inflation targeting can be interpreted as a "dual" mandate. Thus, the hierarchical mandate applies to the *average level* objectives, whereas the dual mandate applies to the *variability* objectives. Thus, flexible inflation targeting can be interpreted as having *both* a hierarchical and a dual mandate, and no conflict need arise between them.

The intertemporal loss function has only *three* parameters: π^*, λ, and δ. For an inflation-targeting central bank, there is a specified inflation target (a point target or the midpoint of a range), π^*, and a specified index measuring inflation. The inflation target can be determined by the government, as in the United Kingdom; specified in an agreement between the government and the central bank, as in New

Zealand; or determined by the central bank as an interpretation of legislation specifying "price stability" as the target for monetary policy, as in Sweden. Regarding the remaining two parameters, the discount factor and the relative weight, δ and λ, the discount factor is, for all practical purposes, likely to be very close to one, especially when the period is a quarter. Interestingly, when the discount factor is close to unity (and the intertemporal loss function is scaled by $1-\delta$ as in (3.2)), the intertemporal loss function is approximately equal to the weighted sum of the unconditional variances of inflation and the output gap,

$$\mathcal{L}_t \qquad (3.3)$$

(when the unconditional means of inflation and the output gap equal the inflation target and zero, respectively: $E[\pi_t] = \pi^*$ and $E[\quad] = 0$).[13] As mentioned, flexible inflation targeting corresponds to a positive weight on output gap stabilization, λ

crises occur, does financial stability impose constraints on monetary policy and force the central bank to modify its decisions. Typically, monetary policy is modified in a direction toward more expansionary policy in order to improve the situation for a fledging financial sector, perhaps winning some time for a financial sector cleanup and reform. A transparent central bank would then explicitly announce when financial stability concerns restrict its policy and motivate the corresponding deviation from normal policy (for instance, a deliberate overshooting of the inflation target). The nature of the constraint would seem to be quite complex and difficult to specify in advance—for instance, having to do with probability assessments of various bankruptcies in the financial sector. The complexity of the constraint, of course, makes it attractive to regard it as a constraint that does not bind and can be disregarded in normal times.[28]

How does the central bank know whether the constraint binds or not? It knows by continually monitoring the state of the financial sector. In some countries, for instance, Sweden, the United Kingdom, and Norway, the central bank publishes a regular *Financial Stability Report* (typically semiannually). This report includes analysis of indicators of the state of the financial sector—in particular, early-warning indicators of potential future problems. (Producing and publishing such a regular report is one of the proposals for the Reserve Bank of New Zealand in my review [45].) These reports serve to assure the general public and economic agents that everything is well in the financial sector when this is the case. They also served as early warnings for the agents concerns and for the financial-regulation authorities when problems show up at the horizon. Early action can then prevent any financial instability to materialize, keeping the probability of future financial stability very low.

Asset prices and bubbles *4.2*

To what extent should the central bank take account of asset prices and, in particular, potential asset-price bubbles? In the forecast targeting described above, asset prices will affect policy to the extent they are deemed to affect the projections of the central bank's target variables, inflation, and the output gap.

Suppose asset-price increases or an asset-price bubble is deemed to eventually increase spending on consumption and investment so that aggregate demand exceeds potential output. The central bank would then project a higher future output gap and higher future inflation, and, everything else equal, the central bank would respond with a tighter instrument-rate plan. Suppose that a large asset-price increase is deemed to be fragile and a possible bubble with a significant risk for a future collapse. Suppose further that a future collapse is deemed to have undesirable consequences for inflation and the output gap. Then, the bank faces a delicate situation. It is possible that an instrument-rate plan with a higher instrument rate in the near future will be deemed to dampen asset-price increases in the near future and also reduce the risk or size of a collapse in the more distant future, this way providing a more stable development of inflation and the output gap. These are examples of situations when the central bank may choose to respond to asset-price developments. However, the reason for those responses is that the central bank is concerned about the repercussions for inflation and the output gap, not with the asset prices as such. That is, asset prices are not target variables; they do not enter the loss function. It goes without saying that in most realistic situations, it will be very difficult to judge whether a particular asset-price movement is grounded in expectations about reasonable fundamentals or a bubble, and whether there are repercussions on inflation and the output gap that motivate adjustment of the instrument-rate plan. This is obviously an area where good judgment is crucial. It is not a place for any mechanical adjustment to asset prices or bubbles. (Svensson [50] discusses the unavoidable role of judgment in monetary policy in greater detail.) The central bank's reaction will not be stable but will shift with its judgment and counter to substantial parts of the literature. I do not believe that it is productive to discuss these issues directly in terms of the central bank's reaction function, for instance, as modifications of a Taylor rule.[29]

Asset-price movements and asset-price bubbles may directly threaten financial stability and cause the financial-stability constraints on monetary policy to bind. Thus, the central bank may want to respond to asset-price developments that bring increased risk of future financial instability. Again, in many realistic situations, the difficulty

in making such judgments will be very large, and there will, in many cases, be insufficient information for taking such pre-emptive action.

Pre-emptive action to avoid future financial instability and corresponding future constraints on monetary policy is an example of pre-emptive avoidance of future restrictions on policy. It is from a principle point of view, similar to pre-emptive action in order to avoid a future binding zero bound on the instrument rate, that is discussed in section 5. Furthermore, because a restriction that binds in some situations and not in others is inherently nonlinear, policy that attempts to avoid future restrictions will also tend to be nonlinear. Indeed, with nonlinear restrictions for objectives or in the transmission mechanism, optimal policy is nonlinear rather than linear.

The zero bound, a liquidity trap, and deflation 5

Low inflation and low nominal interest rates imply some risk for hitting the zero (lower) bound for nominal interest rates. Flexible inflation targeting aimed at low and stable inflation and a stable output gap needs to take the zero bound, a liquidity trap, and the risks of a deflationary spiral into account. The risk of the economy falling into a liquidity trap needs to be kept small. Ways of escaping from a liquidity trap, if the economy would ever fall in, also need to be considered.[30]

Suppose that the economy is hit by bad shocks that cause both a recession (a negative output gap) and deflation. The central bank would like to stimulate the economy (there is, in this case, no conflict between getting out of the recession and getting inflation back to normal) and lower the interest rate. The central bank can only lower the nominal instrument rate to zero. With deflation and expectations of deflation, the real interest rate (the nominal interest rate plus expectations of deflation) may still be higher than the level required to stimulate the economy out of recession and deflation. If the nominal interest rate is zero, the economy is satiated with liquidity. Open-market operations by the central bank to expand the monetary base by buying Treasury bills have no effect on prices and quantities (other than quantity of money and outstanding quantity of Treasury bills). The private sector is effectively indifferent between holding zero-interest-rate

Treasury bills and money (once money holdings exceed the satiation point, the transactions and precautionary demand for money at a zero interest rate) and simply holds less Treasury bills and more money. This is a liquidity trap: Expanding liquidity (the monetary base) beyond the satiation point has no effect. Because the real interest rate is too high, the economy may sink further into a spiral of deflation and depression. This is the nightmare of central bankers. Fortunately, it is a nightmare whose realization can be made very unlikely.

There are two parts of the solution to the problems associated with the zero bound and a liquidity trap. The first part concerns how to avoid hitting the zero bound and falling into a liquidity trap; the second part concerns how to escape from a liquidity trap after falling in.

As discussed more extensively in my contribution [43] to the Jackson Hole symposium 1999, a credible positive symmetric inflation target larger or equal to 1 percent (per year) should be an effective way to avoid falling into a liquidity trap. An inflation target of 2 percent, say, should provide an ample margin to the liquidity trap. Suppose that transparent inflation targeting succeeds in making this target credible, so that private inflation expectations are anchored at the target. If the normal real interest rate is about 2 percent, the average nominal interest will then be about 4 percent. If the inflation target remains credible, so that inflation expectations remain about 2 percent, reducing the nominal interest rate to zero gives a real interest rate of minus 2 percent, 4 percentage points below the normal real interest rate. This should, in most cases, provide ample stimulus to the economy.

Indeed, forecast targeting, as discussed above, automatically means watching for changes in future inflation and reacting in time—well before actual inflation has turned into deflation. The MPC selecting the feasible projection of inflation and the output gap that minimizes the loss function, as discussed in section 3, will automatically avoid projections and policy that get stuck in a liquidity trap. Obviously, it is important that the loss function is symmetric around the inflation target (and is *perceived* to be so by the private sector), and that the central bank acts as decisively to inflation projections falling below the target as to those falling above.[31]

The above should go a long way to prevent sustained deflation and a liquidity trap from ever materializing. Still, given the potential harm a liquidity trap and a deflationary spiral may cause, and given the small but still positive risk that a series of unfortunate shocks may push even an exemplary inflation-targeting regime close to a liquidity trap, as discussed in more detail in [43], I believe it is prudent for central banks and fiscal authorities to prepare for the worst. Thus, I believe that central banks and fiscal authorities should make advance *contingency plans* for a series of expansionary emergency measures to be undertaken at prescribed indications of an imminent liquidity trap, but only under such prescribed indications.

The foolproof way *5.1*

If the economy has fallen into a liquidity trap, with a zero nominal interest rate, deflation, and recession or even depression, there is, as mentioned above, no conflict between stabilizing the real economy and achieving the (positive) inflation target. From the point of view of both objectives, strongly expansionary policy is called for. As several authors have pointed out, an open economy has access to a very effective stimulative measure, namely a currency depreciation. From that insight, I have constructed a specific proposal, the foolproof way to escape from a liquidity trap, published as an academic article with all technical details, [48], in a conference volume from a conference organized by the Bank of Japan (BOJ) and as a newspaper article, [44], in *Financial Times*. Although this proposal is directed directly to the BOJ and the Ministry of Finance (MOF) of Japan (the latter because the MOF is formally in charge of exchange rate policy in Japan), the foolproof way applies to any sufficiently open economy that has fallen into a liquidity trap.[32, 33]

Getting Japan out of recession/depression and deflation arguably remains the world's most urgent monetary-policy task. Japan has already lost a decade to economic stagnation and deflation. Its monetary policy arguably represents the world's worst monetary-policy mistake since the Great Depression. With continued bad policy, Japan may very well lose another decade. The zero-interest rate policy implemented from February 1999 to August 2000, and again from

March 2001, via the "quantitative easing" (expanding the monetary base), is not sufficiently expansionary to induce a recovery. With expectations of deflation, the real interest rate remains positive. But the zero interest rate need not be the limit for monetary expansion. Indeed, there is a foolproof way to jump-start the Japanese economy. The BOJ (in charge of monetary policy) and the MOF (in charge of exchange rate policy) can cooperate to replace stagnation and deflation by growth and low inflation.

The foolproof way is to announce (1) an upward-sloping price-level target path to be achieved, (2) a depreciation and a temporary peg of the yen, and (3) the future abandonment of the peg in favor of inflation targeting when the price-level target path has been reached. Then, the BOJ and the MOF just have to behave accordingly.

The price-level target path provides the best nominal anchor and also an exit strategy for the temporary peg. It should start above the current price level, by the "price gap" to be undone. Several years of zero or negative deflation have resulted in a price level below previous expectations, increased the real value of debt, and contributed to deteriorating balance sheets for firms and banks. The price gap may be 10 to 20 percent or more. The upward slope should correspond to a small positive inflation target appropriate to for Japan, 1 or 2 percent, say.

How is the price-level target achieved? This is the role of the depreciation and the temporary peg. First, a depreciation and temporary peg of the yen is technically feasible. If the peg would fail, the yen would appreciate back to where it was, making it a good investment. Thus, initially, before the peg's credibility has been established, there will be excess demand for yen. This is easily fulfilled, though, since the BOJ can print unlimited amounts of yen and sell those for foreign exchange. Indeed, there is a big difference between defending a fixed exchange rate for a strong currency under appreciation pressure (when foreign-exchange reserves rise) and for a weak currency under depreciation pressure (when foreign exchange reserves fall). Thus, the peg can be maintained, and after a day or a few, the peg's credibility will have been established.

Second, the initial depreciation of the yen should be so large that it results in a real depreciation relative to any conceivable long-run equilibrium real exchange rate. This may require a peg at 140 or 150 yen to the dollar, or even more. Then, the future must eventually bring a real appreciation. Thus, the market and the general public must expect a future real appreciation. But with an exchange rate peg, the real appreciation can only occur with a rise in the domestic price level. Hence, by pure logic, once the credibility of the exchange rate peg has been established, the market and the general public must expect future inflation in Japan. Thus, gloomy deflation expectations will be replaced by optimistic inflation expectations.

Third, the expected future real appreciation of the yen will induce a desirable fall in the long real interest rate in Japan. Indeed, equilibrium on the international capital market requires that the expected real return on investment in Japan and the rest of the world (including expected real exchange rate movements) move approximately in parallel. This fall in the long real rate in Japan can also be seen as the result of the increased inflation expectations noted above.

All this will jump-start the Japanese economy and increase output and the price level. First, the real depreciation will stimulate Japanese export and import-competing sectors. Second, the lower long real interest rate will stimulate Japanese consumption and investment. Aggregate demand and output will rise. Third, the real depreciation, the increased aggregate demand, and the increased inflation expectations will all contribute to inflation and an increasing price level.

The price level will approach the price-level target path from below. When the price-level target has been reached, the peg should be abandoned, the yen floated, and the BOJ should adopt explicit inflation targeting.

The foolproof way can be followed unilaterally by Japan, without cooperation from countries in the region or from the United States. The objections to a real depreciation of the yen that have been voiced by other countries in the region and some U.S. officials are mistaken. Expansion in Japan requires a lower real interest rate, and *a real*

depreciation is the unavoidable mirror image of a lower real interest rate. A real depreciation means that Japanese exporters get a short-term competitive edge, but growth in Japan and increased aggregate demand will increase Japan's import from the rest of the world. A real depreciation has both a substitution and an income effect on the trade balance. These effects are of opposite signs. Thus, the real depreciation will tend to increase Japan's trade surplus. But the income effect, due to increased output, employment, and income in Japan, will tend to reduce the trade surplus because of Japan's increased import. Therefore, the net effect on the trade balance is probably quite small. The foolproof way is, therefore, not a beggar-thy-neighbor policy, except possibly in the very short run. In the medium and long run, the region, the United States, and the world will gain substantially from an expansion in Japan. In particular, if the rest of the world is sluggish, Japan is needed even more as an engine of growth and trade.

Other proposals for Japan have focused on introducing inflation targeting (for instance, Bernanke [10], Krugman [30], and Posen [39]) and/or depreciating the yen (for instance, Bernanke [10], McCallum [31], and Meltzer [34]). The foolproof way is consistent with these proposals, but it provides better benchmarks in the form of a peg for the yen, a price-level target path, and an exit strategy for the peg. The peg also provides an arena where the BOJ and the MOF can quickly demonstrate their resolve to end stagnation and deflation and, thereby, gain credibility.

Finally, the foolproof way does not at all reduce the urgent need for structural reform and a cleanup of the financial sector in Japan. Importantly, it is a complement rather than substitute to these other policy actions.

Some commentators (*The Economist* [19] and *Financial Times* [18], as well as a number of newsletters from various investment banks) seem to assume that the only effects of a depreciation of the yen are a rise in the Japanese CPI due to increased import prices and a stimulation of exports. They have, consequently, concluded that the effect of an exchange rate depreciation is more modest. As shown above, and fortunately for Japan, the effects of a depreciation and a peg of the yen

depend on the whole policy package of the foolproof way and will, therefore, be more widespread. Thus, the main effect of a depreciation of the yen and a peg is not the direct effect on CPI inflation through domestic prices of imports (the direct exchange rate channel to CPI inflation mentioned in section 2). This direct exchange rate effect is an additional effect to the ones mentioned above for the foolproof way. Thus, the foolproof way will lead to increased inflation of *domestically produced* goods and services—that is, increased inflation in the Japanese *GDP deflator,* increased expectations of inflation in the GDP deflator, and increased demand for domestically produce goods and services from a lower real Japanese GDP-deflator interest rate, the nominal interest rate less inflation of the GDP deflator. Indeed, the "price level" referred to in the foolproof way is really the GPD deflator, not the CPI. (This is made clear in the technical article [48] but not in the popular article [44]. The foolproof way can also be expressed in terms of the CPI price level, but the analysis is then slightly more complex.)

The foolproof way takes the rest of the world as given and, in particular, assumes that the rest of the world is not in a liquidity trap and a deflationary spiral but has positive inflation and a positive nominal interest rate (which has, fortunately, always been the case since the Great Depression). If the rest of the world would also be in a deflationary spiral (a highly unlikely outcome if the rest of the world has sufficiently positive inflation targets), it and Japan can obviously not apply the foolproof way at the same time.

Some commentators have been concerned about the fall in Japanese bond prices and corresponding negative balance-sheet effects that the foolproof way would cause. The foolproof way implies, once the temporary peg has become credible, that the Japanese short nominal interest rate has to rise above zero (to the level of the U.S. rate, if the peg is against the dollar). This implies that there will be a capital loss for holders of Japanese government bonds. However, these losses are gains of the same size for the Japanese government. If the losses are considered a problem, the government could compensate the losers by a subsidy, for instance, in the form of an increased coupon on the outstanding government bonds. Of course, any recovery and return to growth and expansion in Japan must imply an eventual increase in the

short nominal interest rate above zero and, therefore, a capital loss on bonds. Avoiding that capital loss will mean avoiding a recovery. Furthermore, the total balance-sheet effects of the foolproof way, with lower real interest rates, increased demand, output, employment, and profits, would seem to be overwhelmingly positive, with rises of stock prices and property values that would swamp any capital losses on government bonds.

Interestingly, since the current U.S. short nominal interest rate is low, the rise in the Japanese nominal rate from the foolproof way would be small. From this point of view, this may be a good time to initiate the foolproof way. For Japan, it would have been better the earlier it had been initiated, though.

The foolproof way could jump-start Japan out of recession/depression and deflation. Not applying the foolproof way could mean another lost decade for Japan. The foolproof way can help any sufficiently open economy to escape from a liquidity trap. It belongs among the contingency plans that prudent central banks should prepare for the worst-case scenario of falling into a liquidity trap and risking a spiral of deflation and depression.

Summary and conclusions 6

The conclusions of this paper can be summarized in the following points:

– In the long term, monetary policy can only control nominal variables such as inflation and the nominal exchange rate. It cannot increase the average level or the growth rate of real variables such as GDP and employment, or affect the average level of the real exchange rate. At best, it can reduce the variability of real variables somewhat. In the short and medium term, monetary policy has effects on both nominal and real variables. However, the complex transmission mechanism of monetary policy, varying lags and strength of the effects through different channels, unpredictable shocks, and inherent uncertainty combine to prevent any fine-tuning. There is general international support for a regime of flexible inflation targeting, where infla-

tion is stabilized around a low inflation target in the medium term (rather than at the shortest possible horizon), and a gradual and measured policy response avoids creating unnecessary variability in the real economy. Monetary policy can achieve average inflation equal to a given inflation target and, at best, a good compromise between inflation variability and output-gap variability. Monetary policy cannot completely stabilize either inflation or the output gap. Increased credibility in the form of inflation expectations anchored on the inflation target will reduce the variability of inflation and the output gap.

– I believe that the time has come for central banks to improve transparency and accountability by specifying and announcing an explicit loss function for monetary policy. This actually boils down to just specifying one more number than the inflation target, namely a parameter with a simple interpretation, the dislike of output-gap variability relative to inflation variability. The Monetary Policy Committee can simply vote on the relative weight as it votes on a number of other things. Specifying and announcing an explicit loss function will better focus the work inside the bank on achieving the optimal compromise between inflation stability around the inflation target and output stability around potential output, allow more precise external monitoring and evaluation of monetary policy, and allow more precise scrutiny and debate about the monetary-policy objectives.

– Central banks can best achieve both the long-run inflation target and the best compromise between inflation and output-gap stability by engaging in "forecast targeting," where at each major monetary-policy decision, the bank selects the feasible combination of inflation and output-gap projections that minimize the loss function and the corresponding instrument-rate plan and sets the instrument-rate accordingly. These projections are then the central bank's best unconditional forecasts of inflation, the output gap, and the instrument rate. Announcing and motivating these forecasts maximize the impact on private-sector expectations and the economy and make the implementation of policy most effective. This allows the most effective external monitoring and evaluation of the policy, and, thereby, creates the strongest incentives for the bank to conduct good policy. It also allows precise debate about the monetary-policy objectives.

– Because of the variety and complexity of the information the central bank responds to and the unavoidable big role of judgment in its response, forecast targeting cannot be expressed in terms of a simple instrument rule, such as a Taylor rule.

– Financial stability, including a well-functioning payment system, is an important additional objective for the central bank. This objective can conveniently be considered as a restriction on monetary policy that does not bind in normal times but does bind in times of financial crises. Transparency then requires central banks to explain when this restriction does bind and how it induces deviations from normal policy. By producing and publishing *Financial Stability Reports* with indicators of financial stability, the central bank can monitor the degree of financial stability and issue warnings to concerned agents and authorities in due time and, this way, avoid deteriorating financial stability.

– Forecast targeting implies that asset-price developments and potential asset-price bubbles are taken into account and responded to the extent that they affect the projections of the target variables, inflation, and the output gap. Situations can arise when asset-price developments are deemed unsustainable and, hence, bubbles and when a future collapse is deemed likely. If the probability of such a future collapse is deemed to impact on inflation or output gap projections, the central bank may want to adjust policy to moderate the asset price developments and reduce the probability of future collapses, thereby achieving more preferable inflation and output-gap projections. In most cases, it will be difficult to make such precise judgments, though, especially to identify bubbles with reasonable certainty.

– The zero bound, liquidity traps, and risks of deflation are serious concerns for a monetary policy aimed at low inflation. A symmetric positive inflation target is likely to provide sufficient margin to those risks. Forecast targeting with such an inflation target will avoid the zero bound, liquidity traps, and deflation. Prudent central banks and ministries of finance may want to prepare in advance contingency plans for situations when a series of bad shocks substantially increases the risk of falling into a liquidity trap, as well as contingency plans for

how to escape from a liquidity trap if the economy has fallen in. An open economy can use the foolproof way to escape, with a price level target, a currency depreciation and a temporary exchange rate peg, and an exit strategy with a shift to inflation target when the price-level target has been reached. This applies, in particular, to Japan, where not following the foolproof way could mean another lost decade.

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Endnotes

[1] This section builds on Svensson [45].

[2] See Svensson [48] for a more formal discussion.

[3] Thus, potential output is distinct from a pure trend of actual output, and it will vary with real shocks to the economy. Potential output is defined *inclusive of real imperfections* like imperfect competition. Thus, potential output is lower than the *efficient* output level resulting under perfect competition and no frictions.

[4] Thus, similarly to potential output, the neutral real rate (also called the Wicksellian natural interest rate) is distinct from a pure trend of the actual real interest, and it will vary with real shocks to the economy.

[5] The mirror image of this is a rapidly increasing rate of growth of the monetary base. In order to maintain the short real interest rate below the neutral rate, the central bank has to inject money into the economy at a rapidly increasing rate. At higher inflation rates, this money-growth channel to inflation becomes dominant.

[6] Increasing potential output toward the efficient output level is an important objective for economic policy, but other policies than monetary policy should be used—for instance, structural policies that improve the degree of competition on markets for goods and services and the workings of the labor market.

[7] "Price stability" in the literature usually, somewhat inappropriately, refers to a situation with low and stable *inflation*, and not only to a situation with a stable *price level*. Throughout this paper, I only discuss *inflation targeting*, not *price-level targeting*. As discussed in Svensson [43], these are not identical. Inflation targeting makes inflation stationary, but not the price level. Imperfect control of inflation introduces shocks to the price level that are not undone. The price level becomes a random walk with drift. Even with a zero inflation target, the price level becomes a random walk. Thus, the variance of the future price level increases linearly with the forecast horizon. Price-level targeting, also with a steady increasing price-level target, would make the price level trend-stationary and the variance of the future price level would be constant. Price-level targeting has, to my knowledge, only been explicitly attempted in Sweden in the 1930s, see Berg and Jonung [9].

[8] Taylor [53] measured inflation and output-gap variability in terms of standard deviations. Given the discussion of a quadratic loss function in section 3, it is more convenient to express variability in terms of variances.

[9] Goodfriend [25] discusses "inflation scares." Debelle [17] discusses credibility and the tradeoff between variability of inflation and the output gap.

[10] Some readers may ask why I do not include Canada as a country with best international practice of inflation targeting. After all, Canada was the second country after New Zealand to introduce an explicit inflation target, and the Bank of Canada has considerable accumulated experience and has been quite influential in advising other central banks introducing inflation targeting. The reason is that the Bank of Canada does not yet live up to best international practice when it comes to transparency because it does not publish a detailed internal inflation forecasts. When that occurs, I will be very pleased to list the Bank of Canada as one of the best-international-practice inflation targeters. However, the competition at the top may be stiffening: The Bank of Norway, for instance, is a competent and enthusiastic newcomer to the inflation-targeting camp, see Svensson, Houg, Solheim, and Steigum [51].

[11] Goodhart [26, p. 173] expresses some skepticism about feasibility of both establishing and minimizing an explicit loss function for monetary policy. I argue in some detail against that skepticism in Svensson [49], on which paper this section builds.

[12] The scaling by $1-\delta$ of the expected sum of discounted future losses is practical, since it implies that the sum of the scaled discount factors is unity, $\sum_{\tau=0}^{\infty}(1-\delta)\delta^{\tau}=1$. This implies that the sum is of the same order of magnitude and in the same units as period losses.

[13] However, a fine point to remember is that, since (3.3) does not allow derivatives with respect to inflation and output gap in a particular (future) period, when such derivatives are needed, they must be computed before the limit is calculated. Along the same line of reasoning, objectives in the form of expected discounted future losses like (3.2) with (3.1) are more operational than in the form (3.3), since the former form can be used to evaluate single projections of inflation and the output gap (see further discussion below).

[14] Let median(v) denote the median of the elements of the vector v. For an MPC with J members, let λ_j denote the individually preferred relative weight of member j, $j = 1, \ldots, J$. Then the MPC's aggregate relative weight, $\bar{\lambda}$, will simply be given by $\bar{\lambda}=\text{median}(\lambda_1, \lambda_2, \ldots, \lambda_J)$.

[15] Although some might argue (and even favor) that MPCs, especially the Federal Open Market Committee of the Federal Reserve System, work by members having different individual loss functions and voting according to those individual loss functions, I find that situation of different unknown loss functions inconsistent with a reasonable degree of transparency.

[16] Gaspar and Smets [24] discuss several cases when the central bank achieves better results, from the point of view of society, if it has a relative weight on output-gap stabilization, λ, that is less than society's, what is called "weight-conservativeness" in Svensson [42]. The classic argument for weight-conservativeness is in Rogoff. [40], where it reduces average inflation bias under discretion. This, of course, presupposes

that the central bank has an output target that exceeds potential output (an output-gap target that is positive), so there is an average inflation bias in the first place. Average inflation bias seems to have, more or less, vanished from practical monetary policy. I believe the best explanation for this is rather that central banks have become "output-conservative," in the sense of having an output-gap target equal to zero, as discussed above for inflation-targeting central banks. This explanation is also consistent with the data, since countries with lower inflation do not have higher output variability (higher output variability is a prediction of weight-conservativeness). Gaspar and Smets discuss more recent arguments for weight-conservativeness—for instance, that it may reduce the "stabilization bias" that results under discretion in more complex models than the original Kydland-Prescott-Barro-Gordon model. However, stabilization bias is quite model-dependent, and it need not always go in the same direction. Furthermore, a commitment to an optimal targeting rule, as in Svensson and Woodford [52], is a better way to avoid stabilization bias, and the optimal targeting rule remains quite simple in the models considered by Gaspar and Smets. Ehrmann and Smets [20] show that, in the (very realistic) situation where there is uncertainty about potential output, a weight-conservative central bank under discretion would only marginally improve social welfare. Even then, a commitment to the relatively simple optimal targeting rule would be best. Orphanides and Williams [37] consider a situation with simple learning and expectation formation by the private sector, in the form of the running of simple regressions of current inflation on lagged inflation, and show that weight-conservativeness has the good effect of stabilizing inflation expectations. However, this is a very primitive form of learning, and transparent inflation-targeting central banks affect inflation expectations much more directly via published inflation forecasts and by explaining how monetary policy works. On balance, I am not convinced by the various arguments presented in favor of weight-conservativeness, and I believe that the MPC should *not* try to be weight-conservative relative to society, except possibly when a new inflation-targeting regime needs to establish credibility, as discussed in section 2.

[17] Nobay and Peel [36], al-Nowaihi and Stracca [2], and Ruge-Mercia [41] examine alternative asymmetric monetary-policy loss functions. Asymmetric loss functions are frequently motivated from a descriptive rather than prescriptive point of view—for instance, corresponding to observed deviations from rational behavior. I believe an informed and competent MPC deciding on the appropriate loss function should approach the issue from a prescriptive point of view and select the most appropriate and rational loss function.

[18] Meltzer [33], writing in 1986, emphasized the magnitude of forecast errors and expressed severe doubts about discretionary policy based on forecasts and judgment. Evidence from the last decade undoubtedly puts policy, that is based on forecasts and judgment but, in addition, is constrained by a more explicit objective and explained in a transparent way, in a much better light.

[19] In cases when the assumptions of a linear model and quadratic loss function are not fulfilled, as discussed in Svensson [46] and [50], one can still apply "distribution

forecast targeting," where the forecasts are explicit probability distributions and the intertemporal loss function is the explicit or implicit integral over those distributions.

[20] The Bank of England and the Riksbank do not publish graphs of *mean* (that is, probability-weighted average) forecasts in their *Inflation Reports* but rather of *mode* (that is, maximum probability) forecasts, with "fan charts" and confidence intervals illustrating the probability distribution. Since the mode forecast has no special policy relevance (unless the loss function is of the rather bizarre all-or-nothing kind, see Wallis [55] and Vickers [54]), it would make more sense to plot graphs of mean forecasts. The mean and the mode are usually not that different, though, since they (for a uni-modal probability distribution) differ only when the probability distribution is asymmetric and the distribution is usually relatively symmetric. When the probability distribution is asymmetric, there is usually some discussion in their *Inflation Reports* of the relative size of "upward" and "downward" risks, which can perhaps be interpreted as a modification of the mode forecast toward the mean. If the mean would be plotted instead, no such modification would be needed, and the fan chart can be interpreted as just displaying the uncertainty of the forecast around the mean. This would be a more transparent way of communicating, I believe.

[21] For simplicity, I here abstract from a time-consistency problem that arises with models with forward-looking variables. Even in the absence of an average inflation bias, this time-consistency problem results in "stabilization bias" (non-optimal coefficients in the implicit reaction function) and a lack of history-dependence. The magnitude of the problem may be small in realistic models with relatively strong backward-looking elements. The nature of the problem and possible solutions, including "a commitment to continuity and predictability" or a commitment to an optimal targeting rule are discussed in Svensson and Woodford [52] and Svensson [50].

[22] As Goodhart [26, p. 177] puts it: "When I was a member of the MPC I thought that I was trying, at each forecast round, to set the level of interest rates so that, without the need for future rate changes, prospective (forecast) inflation would on average equal the target at the policy horizon. This was, I thought, what the exercises were supposed to be." Nevertheless, the Bank of England (2000, p. 67) states that "[h]owever, there is no mechanical link between the projected level of inflation in two years time based on constant interest rates and the appropriate current setting of monetary policy."

[23] Furthermore, as discussed in Svensson [47], inflation-forecast targeting, either in the general form of minimizing a loss function over forecasts or in the specific form of fulfilling a targeting rule is generally not the same thing as implementing a "forecast-based" instrument rule, as

$$i_t = \gamma(\pi_{t+T,t} - \pi^*),$$

where the instrument rate responds to a T-period-ahead inflation forecast, or the vari-

ants thereof that originated in the Bank of Canada's Quarterly Projection Model and are examined by, for instance, Batini and Haldane [6], McCallum and Nelson [32], and Batini and Nelson [8].

24 Batini and Nelson [8] discuss two very different definitions of the policy horizon in monetary policy, calling them the "optimal policy horizon" and the "optimal feedback horizon." The former refers to the horizon at which inflation reaches the target after a shock away from the target; the latter refers to the optimal horizon T for a forecast in a forecast-based instrument rule. In general, there is no specific relation between the leads of inflation that appear in the optimal specific targeting rule and the leads that correspond to these optimal-horizon definitions. Put differently, there is no specific "optimal horizon."

25 Let each member j, $j = 1, \ldots, J$, of the MPC individually prefer the instrument-rate plan $i^{tj} \equiv \left\{ i^j_{t+\tau,t} \right\}_{\tau=0}^{\infty}$ in period t. Then the MPC's aggregate instrument-rate plan, $\bar{i}^t \equiv \left\{ \bar{i}_{t+\tau,t} \right\}_{\tau=0}^{\infty}$ fulfills $\bar{i}_{t+\tau,t} = \text{median}\left(i^1_{t+\tau,t}, i^2_{t+\tau,t}, \ldots, i^J_{t+\tau,t} \right)$ for all $\tau \geq 0$.

26 The proposal can be seen as a mechanism for aggregating preferences that avoids the so-called Condorcet paradox, that with multiple policy alternatives there may not be a policy that commands a majority vote against all alternatives (see, for instance, Person and Tabellini [38]). The proposal means that the MPC members vote *simultaneously* on the instrument rate for all future periods by each member first writing down his or her preferred instrument rate for each period. The aggregate instrument rate for each period $t+\tau$, the median rate for that period, can then be seen as the result of voting on the instrument rate in that period, *independently* of the outcome of the voting for other periods.

27 There is an equivalence between a constraint and a modified loss function (this is the idea behind using a Lagrangian to solve a constrained optimization problem). In the same way as there is, for an import quota, an equivalent alternative (variable) import tariff, there is, for a given restriction, an equivalent alternative additional term in the loss function with an endogenous and nonlinear shadow price of the constraint. The endogeneity and nonlinearity of the shadow price make the additional term in the loss function more complex than a quadratic term, though.

28 A constraint that binds in some situations and not in others introduces a nonlinearity. Then the conditions for certainty-equivalence, by which the mean projections of the target variables are sufficient, are no longer fulfilled. Strictly, the central bank should then apply the "distribution forecast targeting" referred to in footnote 19. Continuing to use mean projections may still be an acceptable approximation, more so the smaller the probability of the constraint binding.

29 The role of asset prices and bubbles in inflation target has been the subject of relatively intensive debate in, for instance, Batini and Nelson [7], Bernanke and Gertler

[11] and [12], Cecchetti, Genberg, Lipsky, and Wadhwani [14], and Cecchetti, Genberg, and Wadhwani [14]. Most of this debate has been in terms of whether or not an instrument rule should include responses to asset prices and bubbles. This is, in my mind, too mechanical an approach to the question of whether or not inflation-targeting central banks should respond to the information contained in asset prices and bubbles. As discussed in Svensson [50], with judgment playing an essential role, the central bank reaction function becomes overwhelmingly complex, and it is more practical to discuss policy in terms of the much simpler optimal targeting rule, the Euler condition of optimal monetary policy.

30 Two conference volumes, Fuhrer and Sniderman [23] and Bank of Japan [48], discuss these issues at length.

31 As for the restriction corresponding to financial stability discussed above (footnote 28), the zero bound implies a nonlinearity that strictly violates the certainty-equivalence results that implies that mean forecasts are sufficient to guide policy. In most cases, it is still probably an acceptable approximation to continue to use mean forecasts when the probability of the zero bound binding is positive. However, if the central bank deems that the approximation is not sufficiently good, it may need to shift to distribution-forecast targeting.

32 An ambitious Federal Reserve Board paper on preventing deflation and the lessons from Japan's experience strangely leaves out any discussion of a currency depreciation, Ahearne and others [1, footnote 7]: "In this paper, we focus on the constraints to conventional monetary policy posed by the zero-lower-bound on nominal interest rates. We do not dispute the possibility of using other nonconventional means of monetary stimulus once the zero bound is reached—see Krugman (1998), Goodfriend (1997, 2000), Bernanke (2000), Clouse, Henderson, Orphanides, Small, and Tinsley (2000), and Svensson (2001), among others, as well as Ueda (2001) for the BOJ's views toward such options. Nevertheless, we would agree with many analysts that once the zero bound is reached, reactivating the economy becomes more difficult and more uncertain."

33 See www.princeton.edu/~svensson/japan/japan.htm for more details on Japan and the foolproof way.

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Commentary: Monetary Policy and Real Stabilization

Matti Vanhala

Lars Svensson's discussion about the role of monetary policy goes to the heart of the matter. I will comment on the topic generally, but using Lars' paper as a vehicle to some degree. I suspect that he represents a possibly significant body of academic opinion that central banks should broaden their view of their own mandate.

I like Lars Svensson's paper. Let me characterize it: It is elegant and insistent, in that its internal logic is consistent in the extreme. It is imaginative in its assumptions about the environment of monetary policy. It is subversive in its policy prescriptions.

I would like to advise you not to focus on the *specifics* of his argumentation and modelling. Focus instead on the two core elements in his presentation: First, the mandate of monetary policy. Secondly, how a central bank should go about designing, deciding, implementing, and communicating its monetary policy in a way that promotes intellectual discipline, transparency, and accountability. I would especially like to stress the importance of this second element. Central banks must make progress in the area of transparency, and here Lars' paper offers some brave and consistent elements for debate. He deserves credit for sticking his neck out.

The fundamental issue for this session is whether monetary policy should or should not directly contribute more to real growth and employment, instead of focusing predominantly on price stability.

Whenever economies slow down, an increasing interest in this question is to be expected, whatever the monetary policy regime. In countries where central banks have only in the last decade been given independence, along with a legislative mandate centering on price stability, it was equally to be expected that once their economies slow down, the rhetoric would change. It is as if quite a few people would have second thoughts about both mandates and independence now that they see that central banks actually behave independently and pursue price stability as mandated.

All this has been in accordance with the script. Most of the rhetoric is froth, not intended for anything but political consumption. Nevertheless, there is always a danger that central banks themselves are intimidated if there is a constant trickle of hints and doubts from the outside.

Given the limited time available, I will be quite straightforward about my own prejudice in this matter:

(1) For monetary policy, with its one and only instrument, i.e., one interest rate (not the curve nor any spreads), to adopt objectives additional to price stability entails a genuine constraint and compromise on price stability in favor of objectives for which monetary policy is ill-equipped and cannot be expected to perform efficiently. Giving monetary policy a role in which it cannot succeed will weaken its effectiveness and its credibility in the area where it has a reasonable analytical basis and a respectable record.

Of course, there are exceptional circumstances from time to time, forcing other considerations into the forefront. But these situations are not the rule.

In any case, and generally speaking, price stability provides a beneficial environment for the real development of the economy. All this is well-accepted. But there is this seductive distinction between the short-term and the long-term real effects of monetary policy. It always surfaces in these debates. What about it?

We are well aware that monetary policy actions can have impacts on the real economy in the short run. It can also have, and has frequently had, longer-run effects when it contributes to violent swings in the economy that result in the destruction of physical and human capital that would otherwise have contributed to continuing real growth. Worse still, it can contribute to a lack of confidence in the operation of the economic system. During the last decade, a great many developed industrial economies have retreated from monetary policies that managed to make a major negative contribution to the real economy by permitting high and variable inflation.

It seems clear to me that deliberately exploiting any assumed favorable short-term tradeoff between price stability and output stability is an incredibly demanding task for monetary policy. We do not possess the knowledge required. We do not know what precise short-term relationships are likely to prevail in the immediate short-term future. We do not even know the current state of the economy with any confidence—as we have seen everywhere again this year. No one really knows what the output gap is, other than a useful and popular concept with many meanings. For these and other reasons, forecasting is particularly bad at detecting changes in trends and at predicting turning points. Yet, this is precisely what would be needed for meaningful stabilization policies. With a medium- and long-term orientation in a monetary policy aiming for price stability, the situation is quite different.

(2) But even if occasionally we might feel confident about being able to contribute to short-term stabilization of the real economy, should we embark on such a course?

In the case of unfavorable supply shocks, a monetary policy designed to soften the impact will delay a real adjustment that might need to start immediately. This point is quite important in the European context; it is possibly less acute for the United States. In Europe, structural rigidities are generally agreed to be a major cause of the modest assessments of potential growth. Here, an accommodating monetary policy can do little to help; quite the contrary, it may worsen the fundamentals.

Similar concerns may apply to the demand side. An accommodating policy implies discounting a forecast reversal (upturn) in the economy that may turn out to be slow in coming. We have lived through such scenarios also in the past.

(3) Another problem with a politically more "forthcoming" mandate in monetary policy is the likelihood that enlargements of the mandate in the direction of stabilization policy take pressure off other public policies, typically the policies that would be the only efficient ones but which are politically difficult to carry to acceptance and implementation. All structural problems belong in this category. It seems to me that political inconvenience has no legitimacy as an argument. Monetary policy should not be allowed to slip into the role of a bad substitute for efficient measures needed on the part of other policymakers, usually the government.

(4) A similar argument is often valid in the context of so-called "coordination" of monetary and fiscal policies. Coordination sounds attractive and rational, but it ties the central bank into suboptimal constellations and policies in its main area of responsibility.

For all these reasons I believe that it is almost certainly unrealistic and always dangerous to the credibility of monetary policy to get into short-term output stabilization. But, this is not a gloomy view of the role of monetary policy. Acknowledging reality gives a better starting point for pursuing whatever aims you can successfully pursue. This means price stability, or perhaps we should say monetary stability, if we take financial stability seriously, as we should. Whether in some future we might be able to justify ambitions concerning asset markets remains to be seen.

Let me now revert to Lars Svensson's paper and to what I regard as the two core issues in his essay. I have serious doubts about a dual mandate for monetary policy, as I have explained. What I like, however, is his meticulous effort to spell out a consistent framework of transparency. This is an area where work is needed. Lars deserves recognition for sketching out a consistent set of elements, from design to decision to implementation to communication. The problem with

his specific and very precise version is that we might not be able to make it comprehensive to a broad public, in which case it would all be in vain. A useful test is the following question: Can you explain your policy easily to any parliamentarian in five minutes and be sure that he or she, thereby, is qualified to convey it correctly and convincingly to his or her voters in two minutes? If there is any doubt, all transparency and accountability is gone.

General Discussion: Monetary Policy and Real Stabilization

Chair: John B. Taylor

Mr. Taylor: Thank you, Matti. We have some time for comments and questions.

Mr. Freedman: As always, I find Lars' characterizations interesting. When we introduced inflation targeting in Canada in 1991, we talked very explicitly about the fact that if there were a shock to the system and inflation moved away from the target, we would bring it back gradually because of the need to avoid the kind of volatility both in output and the policy instrument that would come from trying to get it back too quickly. It was only in 1996 or 1997, when I read Lars' first published piece on this question, that I realized that we had been minimizing the loss function all along. That was a very nice way of characterizing it.

There are two points about this paper I'd like to make. The first relates to the mean versus mode debate, and I'd like to tie that to the asset price issue. One of the real challenges to central banks is how to deal with small probability cases. If we have a situation where there is, say, a 10 percent probability of an asset price collapse and a 90 percent probability that it is not going to happen, do you then go ahead and focus on what one would call the mode, which is the appropriate path for policy in the 90 percent case and say, "If the 10 percent case happens, we'll try and deal with it later."? Or do we try to deal with

the mean? In that case if the small probability outcome doesn't happen, you are going to have an interest rate path that is not appropriate. But even if it does happen, you will not have moved interest rates enough to deal with the collapse of asset prices in any case. So, it is very much an open question of how to deal with such a situation.

My last point is a technical one. The chancellor's letter in the Bank of England arrangements should not be interpreted as a characterization of what lambda is. Rather, it is a point more related to accountability. Charlie Bean talks about the relation between the Bank of England and the chancellor as an incomplete contract—i.e., the chancellor is not specifying to the Bank of England how quickly to come back to target. Rather, the letter, as I said, is a question of accountability, and it is up to the central bank (and this is true for all central banks) to determine the speed of return, which in your model is the lambda. I tend to think of lambda as relating to how quickly you want to get back to target.

Mr. Taylor: Thank you Martin.

Mr. Barnes: I have a question about the foolproof way to escape from a liquidity trap, which obviously makes sense for a one-economy situation like Japan. But an obvious question would be: What happens when you have two or more major countries in that situation? In the context of the United States, it may be an outlying forecast to make, but the reality is we have a 1 percent inflation rate, a 1¾ percent interest rate, and an economy that is operating below capacity. The possibility of a U.S. liquidity trap should be in the distribution somewhere. How would you escape from that situation?

Mr. Taylor: There are a number of people who would like to speak, so let's go through a few and then Lars can comment. Allan Meltzer is next.

Mr. Meltzer: First, I have a couple of comments. One is to pick up a comment that Governor Vanhala made and amplify it. There are real influences on prices such as oil shocks, excise tax changes, and other one-time effects. To lump those together with the monetary part of

inflation is, I believe, to lead yourself into trouble. You really want to think about those separately because you may want to respond to them separately. You may, in fact, not want to respond to the oil shock increases at all because you think those are one-time changes. That is a continuing problem in the discussion of inflation, and inflation targeting is to really think about separating out one-time changes from the steady-state changes that come from monetary policy. When Milton Friedman used his famous expression, "Inflation is always and everywhere a monetary phenomenon," he didn't mean that oil-price shocks couldn't occur. He just meant that those were not part of what he wanted to call inflation. It is important that that distinction should take a larger part. I know you have written about this before, Lars, but in this paper where you are giving instructions to the central bank, you skip over that.

Second, I would like to comment on the standard model. This is not a comment so much on you because your paper really exposits very well what is pretty much a standard model. But, that model cannot explain the recent past at all well because there is a channel missing. That channel is the channel by which monetary policy directly affects the demand for assets, and asset prices are affected by monetary policy. There is no reason, in either practice or theory, why increasing money cannot directly affect asset prices. If we think about the recent experience, asset prices rose. When asset prices rose, those prices are the value of existing assets. When the value of existing assets rises relative to the cost of producing new assets of that kind—called investment—we get more investment. And, when asset prices collapse, we get less investment. I don't think you can explain what has happened unless you bring in the relative price of assets to output, as in much earlier models by Tobin, by Brunner, and me that emphasize the role of asset prices, as in Tobin's "Q." That is missing from these models, and it is misleading for central banks to think they can explain what is happening. It doesn't change what the nature of their objective is, but it very much changes the way in which they are going to respond to that objective. In my view, that relative price mechanism is not a wealth effect. It is a relative price effect. It tells us the next steps in the recovery are that people are going to borrow at low interest rates and buy existing assets. That will be one way in which the transmission

mechanism—raising asset prices—and thereby stimulating investment, the production of substitutes for those assets.

Finally, there is an interesting issue of political economy, which you don't address but which you weren't asked to address. That is, why do some countries and central banks become more explicit in the way in which they announce their targets? Others practice something very much like the framework that you and others have elaborated but don't explicitly say it. Then, there is a third group, which neither say it nor do it. There is an interesting question there about what kind of political structures generate the kind of framework that you talking about.

Mr. Taylor: Why don't you quickly react to where we are now because there are a lot of other people who would like to comment.

Mr. Svensson: I'll do my best to be brief. In response to Matti Vanhala, he questioned whether one should mention additional objectives for monetary policy at all. I think they are already there. In the U.S. Reserve Bank Act, there are more things mentioned than stable prices. In the PTA in New Zealand, there are more things mentioned, as in the chancellor's letters. So, I propose a way to take it into account rather than pretending that they don't exist.

In explaining the loss function to the general public, you can say that you want to achieve a long-run average inflation target, but you also want to achieve a good compromise between inflation variability and output gap variability, as indicated by the relative weight, lambda.

In response to Chuck Freedman, I agree that the issue of low probability events is a very interesting one. The standard view is that you should use the mean and this way, anticipate the event. But, some people have suggested there are some low probability events for which you may want to wait and see whether this event occurs and only handle it then. I don't think it is completely clear what one should do. Regarding the chancellor's letter: An explicit loss function would be a precise interpretation of the chancellor's intent. It would be appropriate if the Bank of England made such an interpretation explicit.

About the foolproof way: Certainly, if both the United States and Japan are in a liquidity trap and a deflationary spiral, it wouldn't work. The foolproof way assumes that the rest of the world is in reasonable shape. Then the one country can pursue this policy. I proposed the foolproof way two years ago at a conference at the Bank of Japan. At that time, the United States was in a boom. It would have been the perfect time for the Japanese to do it. Now is, from the point of view of the U.S., a less good time to do it, but it is still better to do it now than to wait until later.

Allan Meltzer always raises deep and interesting points. He is also so generous that he has told us his questions in advance. But they are still so deep that I need to think a bit more about them before having good answers. Most or all of the wealth effect is actually included in these models because one works with an Euler condition, which takes into account the, intertemporal budget constraint.

The political economy question of Allan's I find fascinating. Why do some countries central banks become so explicit and others not? However, in countries with not-so-explicit central banks—like the Federal Reserve—people like Alan Blinder have argued for transparency and openness for a long time. So, it is not a simple picture.

Mr. Taylor: Matti Vanhala would like to make a quick comment on one of Allan's points.

Mr. Vanhala: On Allan Meltzer's last point: He wondered what these unholy alliances may have been that created these overly specified inflation-targeting regimes. That is a very good question. But there is a clear answer as well. When these regimes were designed in the beginning of the 1990s, when it was realized that we need solid emphasis on price stability and on results, some central banks were given independence and, of course, part of the political bargain—with the strong support of academia—was that the mandate should be very precisely specified. Therefore, we have all these limits, midpoints, ranges, etc. through which the central banks have boxed themselves in. That again, of course, provides the fertile ground now for these same unholy alliances to try to fix a mix of objectives. Here we go again!

Mr. Taylor: Larry Meyer, please.

Mr. Meyer: Lars, you make a very interesting point about the asymmetry in the two targets. That is, the inflation target is a choice variable and it can be set very precisely, whereas the output target is given by the structure, we are uncertain about it, and it changes over time. Having said that, your distinction between "level" and "variability"—one being hierarchal and the other being consistent with a dual mandate—is totally artificial. I look at your equation 3.1. It looks to me like output and inflation come in exactly the same way. One has a star and one has a bar. Does that make them different? They both look like they come in levels. It seems to me that you have written down the dual mandate. I would like you to tell me what the loss function looks like in the hierarchal mandate.

I can't imagine a central bank making explicit its loss function, but it does raise some interesting questions that we could have some broad discussion on. That would be: What should a committee agree to agree on when it sets policy? I would put an explicit numerical inflation target in that list. And what should they agree that they could have differences of opinion on and that should be reflected in their votes? For me, the lambda and the loss function or the nature of the loss function would be something that one would allow the individual committee members to differ on. But that is an issue.

I just have to raise a comment about Matti's remarks. It reminds me of the first Jackson Hole conference I attended. I heard a lot of central bankers giving me advice as a new governor. They were telling me, "If you want to be credible as a central banker, you should never admit you have another target other than inflation, because you lose your credibility."

My response was, "Okay, that's very interesting. I'm new at the game." I need to lie about what my goals are to build my credibility that I am an inflation fighter. That didn't seem to make any sense to me. Now, I agree with Lars that most central banks are flexible inflation targeters in one form or another. The difference is that some admit it and some don't. You can't be transparent by pretending you only

focus on inflation when you focus on both. You can't communicate to the market.

Mr. Taylor: Bill Poole, please.

Mr. Poole: This is a very sound paper and I agree with almost all of it. But I do have a very deep disagreement on the proposal for an interest rate plan. Let me explain why. I want to start with a fact, an observation, which is that in the United States since 1994, the market has been very accurate in its forecasts of Federal Reserve policy actions—extremely accurate. Now, what do you make of that?

What I make of it is that as a first approximation, the United States is in what the journal literature would call "a full rational expectations equilibrium," in which the central bank and the market receive the same information at the same time and draw the same conclusions from that information. It is a first approximation. Bob Rasche and I have written a couple of papers on this subject, and I don't have time to go through all the details obviously. But if you accept that point of view, then a couple of things flow from it.

First of all, longer-term interest rates fluctuate and do a great part of the stabilization work for the central bank. You can see that in the data for the United States if you look at how stable the federal funds rate is compared with the fluctuations in longer-term interest rates. So, the market is doing a great of the stabilization work.

Secondly, the interest rate adjustments are driven primarily by the arrival of new information, not by anything that can be specified at the time that you were to spell out an interest rate plan. If you spell out an interest rate plan, true transparency requires a probability distribution on all these possible outcomes, which would reflect the probability distribution on all the information that is arriving that is going to drive the interest rate adjustments.

It seems to me that what the central bank has to do is to try to provide a sense of the response function, how the central bank is going to respond to the array of events that might occur. That is the main com-

munications problem, not trying to explain what is already built into the plan.

Mr. Taylor: Marty Feldstein, please. We still have quite a few people, so if you could limit your remarks it would help a lot.

Mr. Feldstein: I want to focus on Japan. I agree with Lars that it is one of the major problems facing the world economy, not just because of what continued lack of growth in Japan means for Japan, but also what could happen more generally as a result.

But, I worry about Lars' "foolproof" suggestion. Essentially, what it is is a major currency depreciation, which leads in time to an increase in domestic inflation. But, while you emphasize the inflation aspect of it, it also has an important impact on neighbors and other trading partners—a destabilizing impact. While you are focusing on the advantages of the policy for Japan, it simultaneously could have very serious destabilizing effects on other countries as they try to match the exchange rate adjustment or, even if they don't, the consequences for their trade. I think about Thailand, Korea, even China. Therefore, why not seek something broader than monetary policy as a way of stimulating the domestic economy without these adverse effects on the foreign economy? It will not surprise you that what I have in mind is targeted fiscal incentives of the sort that I talked about yesterday, using the tax system to try to stimulate domestic demand in a revenue-neutral way.

Mr. Taylor: Michael Mussa, please.

Mr. Mussa: I'd like to reinforce what Marty had to say on this last point. What Lars is really prescribing as policy is accurately described as competitive depreciation. It is expressly illegal under international law. It is the one thing that the Articles of Agreement of the International Monetary Fund actually preclude using the exchange rate in this deliberate way to stimulate the domestic economy. You cannot do it as a matter of international law. Now, could you get other trading partners to acquiesce in this clear violation of international law? Perhaps so, if the rest of the world economy was performing rea-

sonably well. But as Marty emphasized, certainly the Koreans and the Chinese and others in Asia—in addition to various sectors in the United States—would not be entirely happy about this development.

Lars says explicitly in his paper that the Japanese could do this without the cooperation of anyone. I think that is just dead wrong. If a country is going to engage in this type of policy, it needs to gain clearance from its principal trading partners. And, as a condition for agreeing to allow a country to pursue this type of policy, it would be relevant to insist that the Japanese undertake other elements of policy adjustment that are in their interest and in the interest of the better functioning of the international economy as a whole—including a much more serious and timely effort to address the long-standing structural problems in the Japanese economy. It is one thing to advise them that they should do this; it is another thing to say, "Look, if we are going to agree to competitive depreciation as your way out of this mess, there are a lot of other things that need to be on the policy agenda as well."

Mr. Taylor: Wayne Angell, please.

Mr. Angell: Lars, I appreciate very much your precise distinction between a macro channel, which we are all very familiar with, an aggregate demand through interest rates, and also a micro channel, which is the direct impact upon the exchange rate. But just as changing the liquidity of dollars alters the exchange rate even more so and more quickly, does it alter the exchange rate between dollars and copper? Copper, like exchange rates, has the advantage of being traded, so we can see immediately the effect. My question, Lars, is: Why not expand this micro channel to a direct channel and recognize that monetary policy has the power of affecting the pricing power of business decisions? You can make the scarcity of dollars different and that alters the scarcity of copper and all other commodities. Why not look at that channel as well as the exchange rate channel?

Mr. Taylor: Stan Fischer, please.

Mr. Fischer: I have just three comments. There has long been an embarrassment in the way economic theorists get to inflation target-

ing. They write down a loss function, which has inflation and output in it, and, in the end, they say to target only inflation. How exactly you made transition isn't clear. Lars has simply grabbed the bull by the horns and said, "You can't do that and you have to evaluate policy according to the original loss function you used." That would make life a great deal more complicated for the central bank, as several people have indicated.

One question it raises is whether the Bank of England's two-year horizon is, as Chuck Freedman suggested, the practical answer to the question of how you make that judgment.

Second point: Over what time period is this loss function being evaluated? It is written down atemporally, but it must be something of a long time period. It is going to be very hard to judge a central bank over what happens this week or this quarter in terms of how well it is doing in meeting its objectives.

Third point: Why do you say, "No fine-tuning?" As far as I can see, the procedure you recommend is one that will have the targets being adjusted every ten minutes or so, as new information comes in. So, on what basis would you rule out fine-tuning?

Mr. Taylor: Roderick Carr, please.

Mr. Carr: Lars is a great student of New Zealand and it is a privilege to have the paper. I sometimes think of myself as a graduate from the school of transparency and increasingly think of myself possibly as a refugee from transparency. But I have three areas of question for Lars to think about for us.

One is the idea that maybe when we enumerate ideas we lose some of their potency. I think about the way in which NAIRU, output gaps, the idea of the medium term, and even the concept of instability are extraordinarily powerful and useful concepts. But increasingly when we enumerate them and they get caught in the political debate, sometimes we then find ourselves unable to use them productively. I feel that with the enumeration and the loss function, we may find ourselves

in the same dilemma. So, the question really is: Does enumeration risk destroying some otherwise extraordinarily useful constructs?

Secondly, in the loss function, there is an assumption, it looks like, that is merely the distance away from the target that may impact on issues such as the speed of return. I also wonder whether it is as symmetrical as that—whether we have become concerned not only at the distance from the target but the direction of the movement. In thinking about a loss function, maybe it is even more complicated than that. And the increasing complexity perhaps poses real risks.

Finally, there is a question about whether the increase in enumeration of either targets or loss functions creates a pseudo science and expectations of precision around the conduct of monetary policy, which will inevitably lead to disappointment from political masters. New Zealand now has this extraordinary debate about whether we should be targeting precisely 2 percent or precisely something like 2½ percent inflation. I just fear that we have created an expectation of precision, which will be disappointed.

Mr. Taylor: Philipp Hildebrand is next, and then Roger Ferguson, and then the list is closed.

Mr. Hildebrand: I have just a short question for Matti. Matti, don't you think that if you are too pure as a central bank, you run the risk that the parliamentarians you mention eventually force you into exactly the kind of framework you are trying to avoid?

Mr. Taylor: Roger is next.

Mr. Ferguson: Let me reinforce the point that Bill Poole made on this concept of interest rate plan. It strikes me as a highly risky concept for a central bank to publish or be very explicit about an interest rate plan based on unknown incoming information. It has two problems. One, as Bill indicated, it creates the possibility of a nominal anchor with respect to interest rates, which might then lead to a second problem—undercutting credibility of a central bank as it finds it has to move from what appeared to be one interest rate plan to another.

I agree with Stan's point: It is possible that with incoming information coming very quickly, the perfect interest rate plan may change quite rapidly.

Mr. Taylor: Thank you, Roger. Lars and then Matti will finish off.

Mr. Svensson: I have only been given three minutes, so I apologize for not responding to all these comments. However, some of the comments remind me about Milton Friedman's statement that Stan Fischer quotes in a one of his papers, "The two most important variables on their loss function are avoiding accountability on the one hand and achieving public prestige on the other."

About these controversial interest rate paths. A nice thing is that they are already used in New Zealand. They work fine. There are no problems with them.

Let me use my brief time on only two things. First, Bank of England's two-year horizon is an approximation and probably not the optimal targeting rule. This is discussed in some detailed in the paper.

Second, let me take up the foolproof way. Would it be a competitive devaluation? It certainly is a sizable depreciation. But it is the right thing to do. The fact is that you must reduce the real interest in Japan, and you cannot do that without also depreciating the yen. They are two sides of the same coin. So, expansion and policy reducing the real interest rate in Japan must result in a depreciation of the yen, and vice versa.

Furthermore, from a depreciation of the yen, there is both substitution and an income effect on the current account. If the depreciate gets Japan going, the income effect will suck in imports, which will be great for the neighbors. When I presented the foolproof way two years ago at a conference at the Bank of Japan, John Taylor was also there, and he reported simulations with his multi-country model, in which a depreciation of a similar kind actually had the substitution and the income effect on the current account roughly canceling themselves. So, the current account effects of the foolproof way would probably be very moderate. It still is the right thing to do, whether legal or not!

This is the most important current monetary policy issue in the world. The Japanese should do it unilaterally if necessary.

Mr. Taylor: Would you please address this hierarchical point that was mentioned by Larry and Stan?

Mr. Svensson: I do discuss this in the paper. First, regarding the average level targets, There is a unilateral mandate. You select the inflation target, but you don't select the output target. This is given my potential output. Second, regarding the variability objectives, there is a dual mandate. You want to minimize a weighted average of both inflation and output-gap variability.

Mr. Taylor: Okay, Matti.

Mr. Vanhala: There was a very relevant comment by somebody here about the illusion. Maybe it was from our New Zealand "graduate of the transparency school." It is true that there are some elements in the debate about inflation targeting which don't exist in real life— excessive precision certainly is one. As Lars also said in his paper, "No inflation targeter seen so far applies inflation targeting in real time." The debate tends to get bogged down in this question of how rapid the reaction should be, etc. In reality, there is a lot of flexibility in these regimes, as they are pursued. Of course, the ECB's way to define its price stability objective is different from most others. That regime also is very far away from the strict, doctrinaire, precise definition method. This is quite important.

Philipp Hildebrand questioned whether the parliamentarians might be very upset if the central bank insists on price stability only. What most central banks would say is that price stability is the primary objective. Whatever we do, the parliamentarians get upset and we get along very well nevertheless.

Mr. Taylor: Thank you very much for the great presentations, answers, and comments.

Should the European Central Bank and the Federal Reserve Be Concerned about Fiscal Policy?

Matthew B. Canzoneri, Robert E. Cumby, and Behzad T. Diba

Introduction I

Can the Federal Reserve or the European Central Bank (ECB) be held responsible for price stability, regardless of how fiscal policy is conducted? Is legal independence sufficient to allow central banks to carry out their mandates? Or, must legal independence be bolstered by constraints on fiscal policy? The Delors Report (1987) provided a blueprint for European Economic and Monetary Union (EMU) and argued that constraints were necessary, and the European Union codified limits on deficits in the Stability and Growth Pact (SGP) of 1997. In the United States, federal balanced budget amendments have been proposed, but the arguments for them have not been as closely tied to central bank independence. The academic literature lends some support to the notion that fiscal discipline is necessary for price stability; Michael Woodford (2001), in his money, credit, and banking lecture, asserts that "a central bank charged with maintaining price stability cannot be indifferent as to how fiscal policy is determined."

In this paper, we describe the fiscal discipline that the recent literature suggests is necessary for central bank independence, and we discuss the price—in terms of foregone fiscal stabilization—at which the required discipline can be obtained. We argue that the United States and the European Union (EU) probably have the discipline that is required, that the Federal Reserve and the ECB probably do not need the protective shield of a SGP or a balanced budget amendment, and that the

constraints embodied in the SGP or a balanced budget amendment are, in any case, much stronger than necessary.[1] We assess recent efforts to refocus the SGP in a way that gives automatic fiscal stabilizers free reign, and we discuss the interaction between automatic stabilizers and monetary policy in the euro area. Fiscal policy also represents a source of potentially destabilizing shocks. We present new evidence on how U.S. fiscal shocks have affected financial markets and output over the last four decades and how the Federal Reserve has reacted to them.

The interaction between monetary and fiscal policy has been characterized in different ways. Monetary policy discussions in the 1960s, 1970s, and early 1980s generally ignored fiscal policy altogether. Those that did not—such as Alan Blinder's 1982 symposium paper—tended to view monetary and fiscal policymakers as having different goals for inflation and output. Independent central banks and their governments were thought to be engaged in strategic games of macroeconomic stabilization, with outcomes that were often bad for the economy. This view of the coordination problem is still popular in the literature.[2]

We take a different approach.[3] We will present evidence suggesting that legislative processes are too slow for the discretionary component of fiscal policy to interact strategically with monetary policy at business cycle frequencies; the delay in passage of a stimulus package until March of this year, after two quarters of positive economic growth, is an example of the political inertia we have in mind. Automatic stabilizers do, of course, provide macroeconomic stabilization. Legislation establishing tax rates, unemployment benefits, and other entitlements make fiscal policy react to macroeconomic shocks in a systematic way. But, this legislation affects market efficiency and income distribution, and it has been determined by microeconomic and political considerations; from a macroeconomic perspective, automatic stabilizers can generally be viewed as a nondiscretionary component of fiscal policy.

A natural way to proceed is to decompose fiscal policy into a component that responds systematically to economic conditions and the structural primary deficit:

$$\text{fiscal deficit} = [\text{automatic stabilizers} + \text{interest payments}] + \text{structural primary deficit} = [\alpha y + \text{interest payments}] + \text{structural primary deficit} \quad (1)$$

The first component part is composed of automatic stabilizers and interest payments on the existing debt. The automatic stabilizers move countercyclically with the GDP gap (denoted by y); the parameter α measures the strength of the stabilizers. Interest payments depend on the size of the debt and the interest rates at which it was contracted. The second component—the structural primary deficit—includes discretionary fiscal policy as well as mandatory spending.

In section II, we discuss the first component of fiscal policy and its implication for monetary policy. In the United States, monetary policy has presumably adjusted to the existing automatic stabilizers. In the EU, matters are more complicated because of the decentralization of fiscal policy, the asymmetric way macroeconomic shocks and monetary policy affect regions within the euro area, and the existence of the SGP; both monetary and fiscal policies are adjusting to the realities of EMU. The SGP tries to strike a delicate balance: On one hand, the SGP imposes the constraints on national fiscal policy that were thought necessary to protect the ECB from outside political pressures. On the other hand, the SGP—unlike a balanced budget amendment—allows some flexibility for the national fiscal policies to iron out the regional imbalances. Ideally, the appropriate automatic stabilizers—which may not be the same for each country—would be given free reign. We will discuss the effectiveness of the SGP in protecting the ECB from outside pressures, and current attempts to refocus the SGP in a way that will cause less collateral damage to the automatic stabilizers.

In section III, we discuss the second component of fiscal policy and the need for fiscal discipline. The recent literature suggests that it would be a mistake to dismiss the discretionary part of fiscal policy as simply a macroeconomic shock. As government debt grew in the United States and in the EU, a more sinister view of fiscal policy—and its implications for monetary policy—began to develop. Political economists talked of political biases leading to excessive deficits,[4] and discussions of "unpleasant monetarist arithmetic" and the "fiscal theory

of the price level" suggested that the government's approach to the question of fiscal solvency can severely limit the options left open to monetary policy. If fiscal policy does not react to the government's debt, monetary policy can, in theory, lose the ability to control the price level or the real interest rate. Fiscal policy has to have a certain kind of discipline if a central bank is to have the functional independence to achieve price stability. As we shall see, either the EU's SGP or the United States' (proposed) balance budget amendment would guarantee the fiscal discipline that is required. Indeed, from the narrow view of monetary policy, this may be the best argument for them. However, we will argue that they are heavy-handed solutions to a problem that may not even exist, at least in the United States or the EU.

In section IV, we discuss other ways in which fiscal policy interacts with monetary policy. We show that there is very little evidence that discretionary fiscal policy in the United States or the EU has been focused on macroeconomic stabilization. Changes in fiscal policy do, however, represent macroeconomic shocks with which monetary policy has to contend. We show that, contrary to the findings of some others, financial markets—long-term interest rates in particular—do react to fiscal deficits.

We then explore these issues further by combining two lines of research. One, following Blanchard and Perotti (2001) and Fatas and Mihov (2000a), examines the effects of fiscal shocks in a vector autoregression (VAR) that abstracts from financial markets and monetary policy. The second, surveyed by Christiano, Eichenbaum, and Evans (1999), examines the effects of monetary policy shocks in a VAR that abstracts from fiscal policy. We find that financial markets do absorb some of the effect of government spending shocks and mitigate their effect on output. This seems to have made life easier for the Federal Reserve.

The three sections that follow can be read independently. Section II focuses on issues that are of current interest in the euro area and, in particular, the Stability and Growth Pact. Section III focuses on issues raised by the new fiscal theory of the price level; fiscal discipline is clearly a requirement for central bank independence, but if our

assessment is correct, it is probably not a matter of immediate concern in either the United States or the euro area. Section IV presents new evidence on the way in which fiscal shocks affect the U.S. economy and the Federal Reserve. Conclusions are presented at the end of each section.

Automatic stabilizers and interest payments on the debt II

Central banks have to adjust to the nondiscretionary components of fiscal policy in a systematic way. The legislation that defines automatic stabilizers and the political challenge of debt finance in high-debt countries are aspects of fiscal policy that do not change every year; they tend to evolve slowly. Curiously, these two aspects of fiscal policy meet in current discussions of the EU's SGP. Their interaction and the implications for monetary policy is our topic here.

Both the United States and the EU saw the need to grant legal independence to their central banks, but the notion that legal independence has to be bolstered by constraints on fiscal policy has only been popular in the EU. The Delors Report (1987) provided the blueprint for EMU and called for constraints on national fiscal policies to protect the ECB from outside political pressures. Reference values for national deficits (3 percent of GDP) and debts (60 percent of GDP) were among the eligibility requirements written into the Maastricht Treaty, and they live on in the SGP. The deficit limit has always played a more prominent role than the debt limit. We suspect that this is because the 3 percent deficit limit could reasonably be applied to all countries, while the 60 percent debt limit was simply not feasible for some high-debt countries.[5] The SGP calls for annual submissions of national "stability and convergence programs," surveillance by the European Commission and the European Council, an "early warning" mechanism, and financial penalties if the warnings are not heeded. The recent experiences of Germany and Portugal—who had to take corrective actions to avoid early warnings—suggest that the pact has some bite; peer pressure appears to be the teeth.[6,7]

First, we ask whether the SGP actually protects the ECB from outside pressures. Then, we ask if the protection it provides comes at too

high a price. The ECB might be expected to create stable macroeconomic conditions for the euro area as a whole, but it cannot be expected to iron out the regional imbalances that we already see emerging. Automatic fiscal stabilizers are the best solution to regional imbalances, if the SGP is flexible enough to let them work.

Pressures for lower interest rates and the effectiveness of fiscal constraints II. A

Governments frequently lobby for lower interest rates. In the United States, some administrations (such as the Reagan Administration) have done so quite openly. The Clinton Administration avoided public comment on Federal Reserve policy, but was widely believed to be concerned that high interest rates would slow economic growth. When the ECB first came to power, several finance ministers called for a competitive exchange rate; this was implicitly a call for looser monetary policy. (The Maastricht Treaty allows the Council of Ministers to adopt "general orientations" for exchange rate policy, provided that it does not interfere with price stability. So, it may not be surprising to see calls for a looser monetary policy expressed in terms of the exchange rate.) None of these pressures were directly related to fiscal policy, and constraints on deficits or debt levels would presumably have had little effect on them.

There may be a worry that high-debt countries will lobby for lower interest rates. A country with a public debt equal to its GDP could lower its interest payments—and its tax collections—by 1 percent of GDP if it could just persuade the central bank to lower interest rates by 1 percent. Italy, Belgium, and Greece had public debts greater than or equal to their GDPs in 2001, but none of these countries ran afoul of the SGP. Instead, it was Germany and Portugal that narrowly escaped early warnings, and these countries had lower debt to GDP ratios than the euro area average. The SGP seems to have penalized the wrong countries. The reason for this is that the SGP focuses on deficit limits instead of debt limits. Germany and Portugal ran deficits that were 2.7 and 2.5 percent of GDP in 2001, close to the 3 percent limit; Italy and Greece ran deficits that were 1.4 and 0.4 percent of GDP, and Belgium had a surplus.[8]

Another worry in some circles is that fiscally irresponsible countries may ask the ECB or other community members for financial bailouts. Here again, it would appear that the SGP's focus on deficits, rather than debt levels, is misplaced. Luxembourg—whose debt is only about 5 percent of GDP—could presumably run high deficits for quite some time before anyone would worry about its ability to service its debt.

In Canzoneri and Diba (1999), we surveyed a number of arguments for fiscal constraints. In each case, debt limits appeared to be the appropriate remedy (if one was needed). One might argue that deficit limits do penalize high-debt countries, since interest payments make it more difficult for a high-debt country to live within the deficit limit. One might also argue that constraints on deficits will keep debt levels from building up over time. But, as the previous examples illustrate, the pact's current focus on the deficit, rather than the debt, can present a rather distorted picture of where the problems actually lie. Some commentators predict that Italy's debt-to-GDP ratio will rise this year, even though its deficit-to-GDP ratio will remain below 3 percent.[9] It will be interesting to see how the European Commission and the European Council react to this situation. Will the focus on deficits continue or will some importance actually be attributed to the debt criterion?

In conclusion, deficit limits appear to be a rather blunt instrument for protecting the central bank from outside political pressures. In the next section, we will see that the new "fiscal theory of the price level" does provide a logically consistent argument for deficit (or debt) limits; however, we will also see that the argument is probably not relevant for the EU (or the United States). Moreover, depending upon how the constraints are actually imposed, they may inhibit the functioning of automatic stabilizers. We turn to this issue in the next section.

The optimal strength of automatic stabilizers and implications for monetary policy *II. B*

How strong should automatic stabilizers be?[10] And how should monetary policy adjust to them? Here, it is useful to think of monetary policy as a rule, analogous to the automatic stabilizers for fiscal policy:

$$R_t = \text{constant} + \beta(\pi_t - \pi^*) + \gamma y_t. \quad (2)$$

As a number of studies have shown, the Federal Reserve tends to increase the interest rate (R) when inflation (π) rises above its target (π^*) or when the GDP gap (y) increases;[11] the gap term may reflect active demand management, or it may simply serve as an additional predictor of future inflation. In any case, the size of the parameter γ measures the strength of the Federal Reserve's usual response to an increase in the GDP gap, while α in the fiscal policy rule measures the strength of automatic stabilizers.

How should the monetary and fiscal policy rules be coordinated? Suppose Congress legislates stronger automatic stabilizers. One might think that the Federal Reserve would respond by decreasing γ:[12] With stronger stabilizers in place, a shock to aggregate demand would have a smaller effect on output and inflation, and the Federal Reserve would not need to respond as aggressively. Conceptually, fiscal policy could also adapt to changes in monetary policy. The Maastricht Treaty specifies price stability as the primary goal of the ECB. If over time we observe that the ECB responds to this mandate by choosing a smaller γ than was in effect before EMU, then it may make sense for national legislatures in the euro area to strengthen their automatic stabilizers.[13]

Taxes and transfers affect market efficiency and the distribution of income, and legislation establishing automatic stabilizers has generally been determined by microeconomic and political considerations. EC (2002a) reports that the average deficit elasticity in the EU (and in the euro area as well) is 0.5. That is, when the GDP gap increases by 1 percent, the deficit goes up by ½ percent of GDP. There is, however, considerable variation across the EU. Nordic countries favor more progressive tax structures, and their deficit elasticities are around 0.7 or 0.8. Ireland, Portugal, and Austria are on the low end, with elasticities around 0.3 or 0.35. EC (2002a) and Cohen and Follette (2000) report deficit elasticities of 0.25 and 0.30 for the United States, which is about half the euro area average.

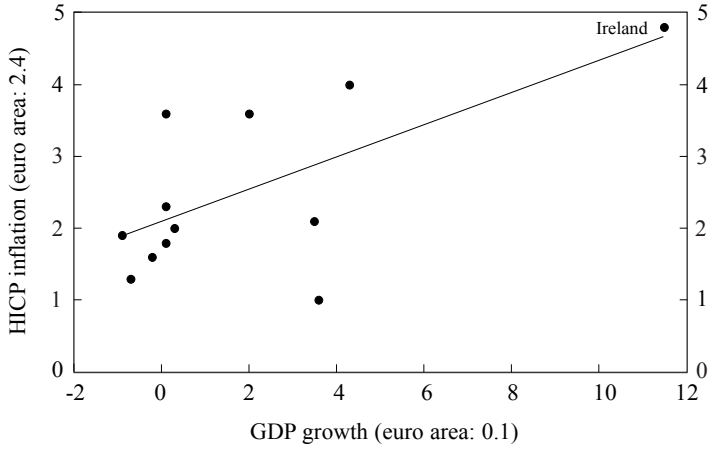
In the United States, there may not be a coordination problem. Legislation establishing the automatic stabilizers may not have taken

macroeconomic stabilization into account, but the Federal Reserve has presumably adapted to the existing legislation. In the euro area, the situation is more complicated for at least two reasons: First, the "federal" budget is small in comparison to the national budgets, and it has no automatic stabilizers to speak of.[14] Twelve national governments have legislated twelve sets of automatic stabilizers with twelve different deficit elasticities. Second, the SGP limits deficits to 3 percent of GDP, and this may not allow the legislated stabilizers to function freely.

We begin with the diversity of deficit elasticities. From a macroeconomic point of view, one might think that there is an argument for uniformity: How can the ECB adapt to twelve different automatic stabilizers? However, fiscal policy plays a more complicated role in the euro area than it does in the United States. As noted earlier, the literature on EMU suggests that national shocks will be larger in the euro area than are regional in the United States, and that monetary policy will have more uneven effects across countries in the euro area than across regions in the United States.[15] Chart 1 illustrates the diversity of current macroeconomic performance. Ireland is currently on the expansionary end (with 4.8 percent inflation and 11.5 percent growth), while Belgium and Finland are on the recessionary end (with about 1.5 percent inflation and negative growth). Now that there is a single monetary policy in the euro area, national fiscal policies are all that are left to iron out these regional imbalances. From this perspective, it is not at all clear that uniform automatic stabilizers are the best policy. Regions that experience larger idiosyncratic shocks and/or show a smaller response to a change in the common monetary policy may well benefit from stronger automatic stabilizers. It would be interesting to know if the observed variation in deficit elasticities lines up with these criteria.[16] However, there has been little research on this coordination problem,[17] and we have heard no discussion of it in the official community.

By contrast, there has been an extensive discussion of the SGP's effect on the existing automatic stabilizers, and there is a concerted effort to change the focus of the SGP so as to give the automatic stabilizers free reign. The SGP limits actual deficits to 3 percent of GDP,

Chart 1
Inflation and Growth across the Euro Area



Notes: From OECD key short-term indicators, June 2002. Percentage change from previous year. Dates vary slightly across countries.

but it also commits EU governments to bring "medium-term budgets" to "close to balance." Medium-term budgets are generally being interpreted as structural or cyclically adjusted budgets, and the effort under way is to change the emphasis from a constraint on actual deficits to a constraint on structural deficits.[18] In the latest updates of the stability and convergence programs, EU countries confirm their commitment to reach structural balance by 2003 or 2004.

The logic of this switch in emphasis can be illustrated by a simple example. Suppose an EU country is producing at full capacity, that its budget is in balance, and that its deficit elasticity is 0.5 (the EU average). Now, suppose that GDP falls by 6 percent, which may be viewed as a major recession for this country. The automatic stabilizers will produce a deficit of just 3 percent (= 0.5×6) of GDP. In other words, if the government brings its budget into structural balance, then it can

be reasonably assured that its automatic stabilizers will not be impeded by the 3 percent limit on actual deficits.

Of course, EU countries vary in their deficit elasticities and in their cyclical volatilities. A country with strong automatic stabilizers and high output volatility will need to achieve a stronger structural balance than a country with weak stabilizers and low volatility. Measurement issues abound.[19] However, EC (2002a) reports a set of "minimal benchmarks" for structural deficits, which—if achieved—will "allow automatic stabilizers to play fully while respecting the 3 percent limit."[20] The euro area average is a structural deficit of 1.4 percent. Some of the smaller countries and the Nordic countries have to tighten their belts even further: Belgium, the Netherlands, Denmark, and Sweden have minimal structural deficits in the range of .03 percent to .08 percent of GDP; Finland and Luxembourg need structural surpluses. We hear that this is causing some discontent. Why should countries be "penalized" for favoring a more progressive tax system and a more egalitarian distribution of income? The SGP is forcing a weighing of the microeconomic and macroeconomic factors that should go into the determination of automatic stabilizers.

Conclusions: The SGP and automatic stabilizers *II. C*

If the purpose of the SGP is to protect the ECB from outside political pressures, then debt targets would seem to be the appropriate remedy. As the recent experiences of Germany and Portugal show, the emphasis on "excessive deficits" may be misleading. Moreover, deficit constraints seem to be having an asymmetric effect in practice. The "stick" is strong when the economy is weak and deficits are nearing the 3 percent limit, but the "carrot" is weak when the economy is strong and deficits are out of the news. Germany, for example, would probably not be experiencing its current difficulties if it had strengthened its structural balance when the opportunity presented itself.

While we are not convinced that any kind of fiscal constraint is necessary for price stability, Canzoneri and Diba (1999) recommended switching the emphasis of the SGP from actual deficits to structural deficits, and we are pleased to see movement in this direction. It is an

effective means of allowing the automatic stabilizers to function freely. For those in the United States who advocate a balanced budget amendment to keep government debt in line, the EU experience provides a valuable lesson.

Many in Europe think that growth in public debt should be limited for a host of reasons that extend well beyond monetary policy. And, indeed, fiscal constraints were written into the Maastricht Treaty and the SGP to address a broad range of problems.[21] However, the Maastricht Treaty and the SGP are closely identified with EMU in the public view, and this is perhaps unfortunate. It may be dangerous to burden the EMU project with concerns that are not directly related to monetary policy.

III Discretionary fiscal policy and the need for fiscal discipline

Recent theoretical contributions suggest that the government's approach to fiscal solvency has strong implications for the options that are left open to the central bank. To us, the main message from the "fiscal theory of the price level"—and from an earlier literature on "unpleasant monetarist arithmetic"—is that fiscal policy has to be disciplined if the central bank is to have the functional independence to carry out a mandate for price stability. We have a very specific notion of discipline in mind: Fiscal policy has to assure fiscal solvency for any price path that the central bank might deliver. In practice, the central bank may choose its inflation target in consultation with the government, but a disciplined fiscal policy will accommodate any conceivable price path.

We begin by describing the new fiscal theory of the price level. Then, we ask whether U.S. and EU governments have the discipline that is required for functional central bank independence.

And finally, we identify constraints on fiscal policy that assure the required discipline if it is lacking. A balanced budget amendment or the constraints specified in the SGP would suffice, though they appear to be much stronger than is necessary.

Much of our discussion will revolve around public-sector budget constraints. Flow budget constraints say that the Treasury has to finance fiscal deficits by selling bonds to the public or to the central bank. These annual budget constraints can be aggregated into a single present-value budget constraint (PVBC); it says that over time the (expected and discounted) stream of government revenue has to pay for the stream of government spending plus the existing public sector debt:[22]

$$E_0 \sum_{t=0}^{\infty} \delta_t \left(T_t + CBT_t \right) = \left(M_{-1} + B_{-1} \right) + E_0 \sum_{t=0}^{\infty} \delta_t G_t. \quad (3)$$

Existing government liabilities consist of base money (M_{-1}) and Treasury bonds (B_{-1}) held by the private sector. Government revenue consists of taxes (T) and central bank transfers (CBT). Central bank transfers are the interest payments on bonds held by the central bank; they are returned to the Treasury. Assuming that money was introduced by open market operations, the central bank's bond holdings are equal to the private sector's base money holdings. So, for future reference, CBT—or what is more commonly known as seigniorage—can be expressed as R times M: M is the base for the seigniorage tax, and R is the tax rate. The discount factors (δ_t) are the price of a dollar to be delivered t years in the future; they vary inversely with interest rates.

For empirical work, it is convenient to scale variables by nominal GDP. Canzoneri, Cumby, and Diba (2001a) show that (3) can be rewritten as:

$$\begin{aligned} \frac{M_{-1} + B_{-1}}{P_0 Y_0} &= E_0 \sum_{t=0}^{\infty} D_t \left[\frac{\text{Primary Surplus}_t}{P_t Y_t} \right] \\ &= E_0 \sum_{t=0}^{\infty} D_t \left[\frac{T_t - G_t}{P_t Y_t} + \frac{CBT_t}{P_t Y_t} \right]. \end{aligned} \quad (4)$$

The liabilities-to-GDP ratio has to equal the expected present value of present and future primary surpluses, inclusive of central bank transfers, and scaled by GDP. Here, the discount factors (D_t) vary directly with real growth in the economy and inversely with real interest rates.

During the last three decades, a large literature has examined the dynamics of the government budget constraint. This literature began with Blinder and Solow's (1973) theoretical analysis of different approaches—money versus debt—to the financing of a deficit. Following Hamilton and Flavin (1986), several contributions to the literature tried to develop empirical tests of government solvency. The critical insight regarding the new fiscal theory of the price level is that the PVBC, (4), is an equilibrium condition.[23] The fundamental question, according to the new theory, is not *whether* the PVBC is satisfied, but *how* the PVBC is satisfied?

The fiscal theory of the price level *III. A*

The fiscal theory of the price level provides a new insight regarding the ways in which the government's approach to fiscal solvency can limit the options that are left open to the central bank.[24] Woodford (1995) characterized the government's approach to solvency by classifying fiscal policies as Ricardian or non-Ricardian. In a "Ricardian" regime, primary surpluses are expected to move over time so as to guarantee that the PVBC holds, no matter what prices or discount factors are fed into it. In a "non-Ricardian" regime, there is no such guarantee.[25] Our notion of discipline is motivated by Woodford's classification scheme: The government is disciplined (in our sense) if its fiscal policy is Ricardian (in Woodford's sense).

Much of what is familiar to us from monetary economics comes from reasoning in which fiscal policy is assumed—sometimes only implicitly—to be Ricardian. A Ricardian fiscal policy takes care of the PVBC; so, prices and discount factors can be determined elsewhere by, say, the forces of money supply and demand or a Phillips curve. A non-Ricardian fiscal policy can have some very unfamiliar implications. For example, suppose real primary surpluses (inclusive of central bank transfers) are determined by a political process that takes no account of fiscal solvency. What makes the PVBC hold? Nominal income, $P_0 Y_0$, and/or the discount factors, D_t, have to move to keep (4) in balance. Fiscal surpluses replace the monetary supply as the nominal anchor; hence, the name—*fiscal* theory of the price level.

Non-Ricardian regimes are what is new and controversial about the fiscal theory of the price level. To get a feel for how prices and real interest rates are determined when fiscal policy is non-Ricardian, we consider the effects of a tax cut in two different economies: One has relatively flexible wages and prices, and the other has a high degree of nominal rigidity.

In an economy with flexible wages and prices, real output and real interest rates (and therefore the discount factors, D_t) are determined by real factors such as productivity; they are fixed at their "natural" rates.[26] A tax cut lowers the right-hand side of (4), and the price level, P_0, rises to bring the left-hand side in line. Why does the price level rise? Surely, price increases are caused by excess demand and not by accountants somewhere in the bowels of the Treasury. Woodford (1995) describes the price adjustment process as a wealth effect: After taxes are cut (and the right-hand side of (4) falls), real household wealth (the left-hand side of (4)) is too high; so, aggregate demand is too strong and prices rise, restoring the balance in (4). In any event, the price level is determined by fiscal policy, and fluctuations in real primary surpluses become the main source of price instability.

Of course, there are fiscal aspects to monetary policy. Even in a non-Ricardian regime, a central bank could, in principle, work through the seigniorage term in (4) to control the price level. For example, when taxes are cut, the central bank would raise the interest rate enough to make the increase in seigniorage offset the decrease in tax revenue, holding the right-hand side of (4) constant. However, Canzoneri and Diba (1998), and Canzoneri, Cumby, and Diba (2001a) show that such a policy would not be feasible in practice. Actual and potential seigniorage revenues are too small in OECD countries to be used in this way. In the United States, for example, base money was only 6 percent of GDP in 1995, and a typical surplus shock would be conservatively estimated at 1 percent of GDP. The Federal Reserve would have to raise the interest rate on government bonds by 1700 basis points to make seigniorage revenues offset a surplus shock of this size![27] interest rate hikes of this magnitude are simply not feasible. The central bank would not be able to stabilize prices in this non-Ricardian regime.

In an economy with significant wage and price rigidities, real interest rates and output will rise after a tax cut. Here, P_0, Y_0, and the discount factors, D_t, move in equilibrium to satisfy (4).

Once again, the central bank could work through seigniorage to offset fluctuations in the government's primary surplus, but seigniorage revenues are just too small for this to be feasible in practice. In a non-Ricardian regime, the central bank loses control of aggregate demand.

The assumption that the government has nominal, rather than real, liabilities is essential for this to be a theory of the price level.[28] Provided the government has some nominal liabilities, the government's present value budget constraint will always be satisfied in equilibrium—either by Ricardian fiscal policy or by price level movements. If, however, all liabilities are real, changes in the price level cannot satisfy the present value budget constraint. Either government spending, taxes, or seigniorage must adjust to assure fiscal solvency. An earlier literature on "unpleasant monetarist arithmetic" discussed these issues.[29]

The bottom line on the fiscal theory of the price level is similar to the message of unpleasant monetarist arithmetic. Legal central-bank independence does not confer functional independence.

If the central bank is to be held accountable for price stability, legal independence must be bolstered by the fiscal discipline of a Ricardian regime. The next questions are: Do governments in the United States and the EU have the discipline of a Ricardian regime? And if not, what constraints on fiscal policy would guarantee the required discipline?

Are governments in the United States and the EU disciplined? *III. B*

This is not an easy question to answer. There is no formal statistical test that will discriminate between Ricardian and non-Ricardian regimes. In any given model of the economy, the same structural equations hold for Ricardian regimes and for non-Ricardian regimes. There is no parameter value or exclusion restriction to be tested. The distinc-

tion between regimes is in how we solve the model: Do we let primary surpluses move to satisfy the PVBC, or do we take them to be exogenous and force other variables to do the adjusting? Put another way (essentially by Cochrane (1998)), for any given view of how the economy works and any given data set, there will be a Ricardian way of explaining historical events and there will also be a non-Ricardian way.

In a series of papers, we have taken a different approach to the question.[30] We have analyzed the theoretical and historical plausibility of the two regimes. One might think that the discipline required of Ricardian regimes is unrealistic and that they are unlikely to be observed in reality. To establish the theoretical plausibility of Ricardian regimes, we have shown that Ricardian policies can actually be quite lax; the discipline required is not as strong as it might at first seem. To establish the historical plausibility of Ricardian regimes, we have argued that a Ricardian interpretation of a variety of historical events and statistical regularities is more plausible than the non-Ricardian interpretation. We will begin with the theoretical plausibility of Ricardian regimes.

Theoretical plausibility of Ricardian regimes *III. B. 1*

Is the discipline required of a Ricardian regime plausible? In the United States, we have seen government debt as a fraction of GDP rise during the Reagan and (first) Bush Administrations, and then stabilize and decline in the Clinton Administration. Now, it seems likely to rise again. In the EU, some worry that debt is out of control in certain countries. Just how disciplined does a government have to be to have a Ricardian policy?

There is, so far as we know, no way of writing an equation that characterizes all Ricardian policies. However, in Canzoneri, Cumby, and Diba (2001b), we were able to characterize a large class of them. To get some intuition as to why our class of policies work, think about what the PVBC actually says and what it has to rule out. Equation 3 says that over time expenditures cannot exceed revenues: The government cannot run a "Ponzi scheme" in which it borrows and then continually rolls the debt over, never paying it off.

Consider a fiscal policy that relates the surplus to GDP ratio to the liabilities to GDP ratio:

$$S_t / P_t Y_t = \phi_t \left(L_t / P_t Y_t \right) + \in_t, \tag{5}$$

where $\phi_t \geq 0$. S_t is the primary surplus inclusive of central bank transfers, and L_t is the sum of base money and government debt. $\in_t$ is a random variable representing automatic stabilizers or political factors unrelated to fiscal solvency. The parameter ϕ_t measures the responsiveness of primary surpluses to changes in the level of government liabilities. ϕ_t may vary from year to year; when ϕ_t is positive, the government is paying off some of its debt. Intuitively, the government will have to do this continually, or at least from time to time, if it is to avoid running a Ponzi scheme. In Canzoneri, Cumby, and Diba (2001b), we prove a proposition saying that (subject to some regularity conditions) if ϕ_t is expected to be positive infinitely often, then the *PVBC* holds for any prices and discount factors; the policy (5) is Ricardian.[31, 32]

Note that, in principle anyway, the policy can be quite lax. ϕ_t could be positive after every election, at the beginning of every decade, or even at the beginning of every century; ϕ_t only has to be positive infinitely often. However, our proposition probably overstates the case. Financial markets have to believe that fiscal retrenchments will eventually occur and on a recurring basis. This credibility requirement may put stronger constraints on Ricardian policies than our proposition indicates. In any case, our proposition establishes the theoretical plausibility of Ricardian regimes.

Historical implausibility of non-Ricardian regimes *III. B. 2*

Next, we consider two historical episodes: (1) the 1999-2001 pegging of exchange rates prior to the introduction of the euro; and (2) the postwar behavior of U.S. surpluses and government debt. Both of these episodes have plausible Ricardian interpretations, and, we think, quite implausible non-Ricardian interpretations. In Canzoneri and Diba (2000), we argue that the fiscal theory's interpretation of the purported shift in monetary and fiscal policy in the United States around 1980 is also implausible.

The 1999-2001 period of fixed exchange rates in Europe. The first historical episode we consider is the successful pegging of exchange rates at the outset of EMU.[33] A grid of exchange rates was announced and the exchange rates were maintained for three years until the national currencies were replaced by the euro at the beginning of this year.

Standard monetary theory gives the Ricardian interpretation of this period: Central banks in the euro area maintained the fixed parities by coordinating monetary policies. We can illustrate the Ricardian interpretation a simple analytical example; the argument generalizes to more realistic settings. Let $\overline{E}$ be the official franc/DM parity, and let R_F and R_G be the French and German interest rates. The interest parity condition,

$$R_F = R_G + \left(E^e - \overline{E}\right) / \overline{E}, \tag{6}$$

says that French and German bonds have to pay the same expected rate of return. The French and German central banks made the peg credible ($E^e = \overline{E}$) by forcing their interest rates to converge. The French and German PVBCs are in the background. But in the Ricardian interpretation, they are being maintained by the fiscal policies of the French and German governments. The price levels in France and Germany are determined by monetary policy.[34] In the simplest example, purchasing power parity, (7) $P_F = \overline{E}P_G$, links the French price level, P_F, to the German price level, P_G.

The non-Ricardian interpretation of this period is quite different: Governments in the euro area maintained the fixed parities by coordinating fiscal policies. We can illustrate the non-Ricardian interpretation using the same equations as above; again, the argument generalizes to more realistic settings. French surpluses determined the French price level, P_F, via the French *PVBC*, while German surpluses determined the German price level, P_G, via the German *PVBC*. The French and German governments coordinated surpluses so that the two price levels were consistent with purchasing power parity, (7), at the announced parity. Monetary policy made the interest rates converge in (6), since the peg was credible.

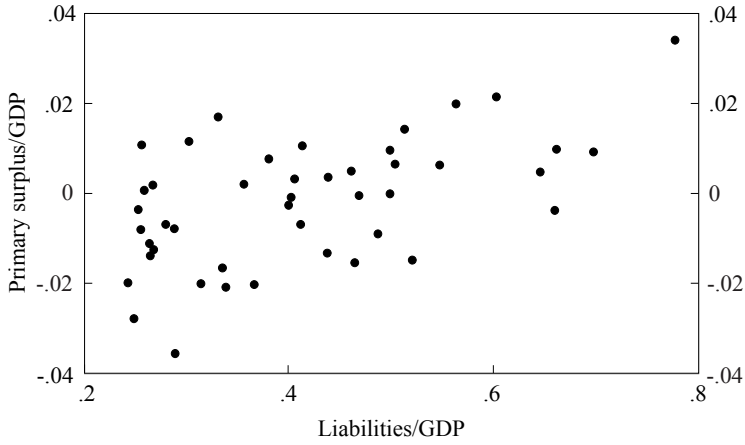
Central banks coordinated policy to maintain fixed parities in the Ricardian interpretation; governments coordinated policy to maintain fixed parities in the non-Ricardian interpretation. This dichotomy should not be surprising. The exchange rate is a nominal variable, and monetary policy provides the nominal anchor in a Ricardian regime, while fiscal policy provides the nominal anchor in a non-Ricardian regime.

The Ricardian interpretation of this period seems quite plausible to us. National central banks had already joined forces in Frankfurt to implement a common monetary policy across the euro area. On the other hand, the non-Ricardian interpretation seems quite implausible. We heard of little or no effort to coordinate surpluses across the euro area. The SGP came nowhere near to calling for that, and the "euro club" of finance ministers hardly seems to have that as an objective.[35]

The same analysis can be applied to other successful exchange rate systems. For example, the Benelux and Austrian currencies were closely tied to the DM well before the advent of EMU. These arrangements are generally thought to have been maintained by central banks with relatively little help from fiscal policy. We conclude that the governments of these countries have probably had the discipline of a Ricardian regime for some time, and that all the governments in the euro zone have had that discipline for at least the last three years.

The postwar behavior of U.S. government surpluses and liabilities. In section III. B. 1, we noted that the fiscal policy (5) would be Ricardian if ϕ_t is expected to be positive infinitely often. That discussion seems to invite a statistical study of the relationship between primary surpluses and government liabilities. This is, however, not as straightforward as it may at first seem. What, for example, would we learn from a regression of surpluses on current or lagged liabilities? Chart 2 plots U.S. surpluses and liabilities from 1951 to 1995, and there seems to be a loose positive relationship. Suppose, however, the regression coefficient was not significant. Would this be evidence against Ricardian regimes? Not necessarily. The proposition referred to in section III.B.1 does not require ϕ_t to be positive each period;

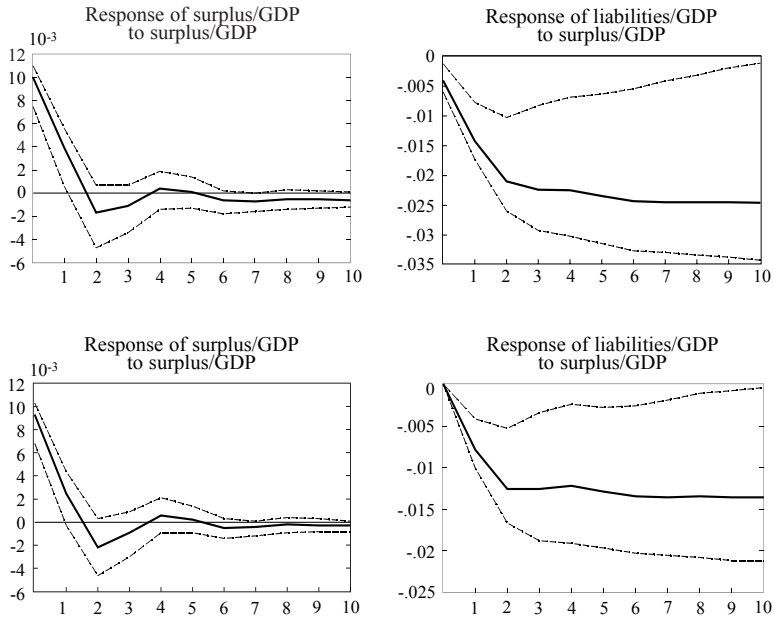
Chart 2
Primary Surpluses and Liabilities, 1951-1995



indeed, ϕ_t does not even have to be positive in a finite data set. Suppose the regression coefficient was positive and significant. Is this evidence in favor of Ricardian regimes and against non-Ricardian regimes? Again, not necessarily. A positive correlation between surpluses and liabilities is certainly consistent with a Ricardian regime; the surplus is responding to the debt. However, it is also consistent with a non-Ricardian regime, with the direction of causation going the other way: Changes in the surplus induce price level changes that, in turn, change the real value of the debt. It is clear from the PVBC that the current value of government liabilities will respond positively to an increase in present or expected future surpluses. As indicated earlier, there is probably no formal statistical test that will distinguish between these two regimes.

The data on surpluses and liabilities do exhibit significant regularities or patterns. These patterns have Ricardian and non-Ricardian interpretations, and we can ask which interpretation is more plausible. In Canzoneri, Cumby, and Diba (2001b), we documented various pat-

Chart 3
VAR in Surplus/GDP and Liabilities/GDP



Notes: VAR is estimated with two lags and a constant over the sample 1951-1995. Standard error bounds estimated with bias-adjusted bootstrap procedure.

terns using VAR in the surplus, liabilities, and other variables. Chart 3 shows impulse response functions from a VAR in just the surplus and liabilities (both normalized on GDP). A surplus innovation produces a significant fall in next year's liabilities and an additional fall in the following year. Moreover, a surplus innovation produces a significant increase in next year's surplus.

The Ricardian interpretation of these patterns is quite straightforward. A primary surplus pays off some of the current debt; so, next year's liabilities are smaller. Since next year's surplus is also higher, even more of the debt is paid off and liabilities fall in the following year as well.

The non-Ricardian interpretation is somewhat more complicated, but it can be discerned from the present value budget constraint. To see the effect of surplus innovation on next year's liabilities, we have to move (4) forward by one period. A positive innovation in this year's surplus would not have any effect on next year's liabilities if it did not affect next year's surplus or the following years' surpluses. From chart 3, we see that an innovation in this year's surplus increases next year's surplus. So, equation 4 (moved forward by one period) would predict a rise in next year's liabilities and not the fall depicted in chart 3. The non-Ricardian interpretation of the patterns in chart 3 has to be that this year's surplus innovation will produce rather large decreases in surpluses that are in the rather distant future. The decreases have to be in the rather distant future because they do not appear in chart 3 or in a decade of autocorrelations of the univariate surplus process. The decreases have to be rather large because they have to offset the earlier surplus increase and they will be heavily discounted.

The non-Ricardian interpretation of the patterns in chart 3 is logically consistent, but how plausible is it? What is the political theory that would predict large surpluses ten or more years after an observed deficit innovation? The answer cannot be something like: Politicians (or voters) wake up every decade and respond to the growing debt, or politicians fight wars (against poverty, terrorists, other countries, or other politicians) and pay off the debt later. These fiscal policies fit the requirements of our proposition; they result in Ricardian regimes. The explanation has to be a political theory that is unrelated to the debt. Politicians would have to remember that they ran primary surpluses a decade or more in the past, and then they would have to have a reason to make up for them by running a deficit. The plausibility of the non-Ricardian interpretation rests on making such an argument.

Constraints that assure fiscal discipline *III. C*

Section III. B suggests that governments in the United States and the EU do have the fiscal discipline of a Ricardian regime. However, not everyone will be convinced by our arguments, and governments may act differently in the future. It may, therefore, be prudent to identify—and perhaps enact—constraints on fiscal policy that will guarantee

that governments have discipline. It is also important to identify constraints that will cause the least collateral damage.

The deficit constraint in the SGP is a sufficient condition, and this may be the best argument for it.[36] The rule says that total deficits (inclusive of interest payments) may not exceed 3 percent of GDP:

$$\left(G_t - T_t - CBT_t\right) + B_t R_t \leq .03 P_t Y_t. \tag{8}$$

Rearranging terms:

$$\frac{T_t + CBT_t - G_t}{P_t Y_t} \geq R_t \left[\frac{M_t + B_t}{P_t Y_t}\right] - \left[0.03 + R_t\left(\frac{M_t}{P_t Y_t}\right)\right]. \tag{9}$$

(9) is a fiscal policy rule of the form (5); the interest rate is the coefficient ϕ_t, and the last term is the random variable $\in_t$. If the constraint is expected to be binding infinitely often, then the proposition discussed in section III.B.1 applies. Woodford (1997) has shown that the 60 percent debt limit is also a sufficient condition.

Much weaker fiscal restrictions would suffice, as the discussion in section III. B. 1 makes clear. For example, the cap on the deficit could be 5 percent of GDP instead of 3. Or, the rule could apply to the sum of the primary surplus and half of the interest payments on the debt. More generally, the rule could be stated in terms of the structural deficit, instead of the actual deficit; this would lessen the collateral damage, as discussed in section II.

Conclusions: Fiscal discipline and functional central bank independence *III. D*

The fiscal theory of the price level—like the earlier "monetarist arithmetic"—makes the point that if the government's present value budget constraint is to hold, the government's approach to the debt and fiscal solvency can limit the options open to a central bank, even if it has been granted legal independence. If the central bank is to have the functional independence to achieve price stability, then the govern-

ment must have the discipline of a Ricardian regime: It has to assure fiscal solvency for any path the price level might take.

We find it theoretically and historically plausible that governments in the United States and the EU have this discipline, but it is difficult—if not impossible—to test the hypothesis formally. The SGP guarantees the required discipline (assuming that it is enforced) in the euro area, and this may be the best argument in its favor.[37] The traditional arguments for the SGP (given in the last section) are really arguments for debt limits and not the deficits limits that have figured prominently in recent applications of the SGP. The fiscal theory of the price level gives a logically consistent argument for deficit limits, but it is probably not relevant for governments in the euro area.

Discretionary fiscal policy and macroeconomic stabilization IV

Taylor (2000) has argued that discretionary fiscal policy in the United States has not been and, indeed, should not be actively engaged in macroeconomic stabilization. EC (2002a) seems to make a very similar case for the EU. In the first subsection, we review the evidence on discretionary fiscal policy and conclude that there is little reason to think that the President and Congress interact strategically with the Federal Reserve over stabilization policy. In the second subsection, we view discretionary fiscal policy as a macroeconomic shock. We present new evidence on how U.S. fiscal shocks affect U.S. financial markets and output. And we show how the Federal Reserve has reacted to this source of instability.

Is discretionary fiscal policy geared toward macroeconomic stabilization? *IV. A*

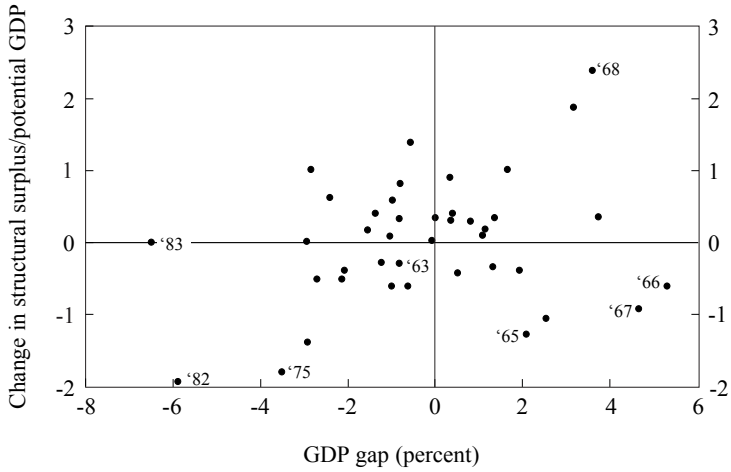
Recent attempts to legislate countercyclical policies have not been very successful, which is not surprising given the fact that postwar recessions have averaged eleven months (peak to trough) and federal budget decisions are taken more or less annually. Taylor (2000) notes that "In 1992, President Bush proposed legislation intended to speed up the recovery from the 1990-1991 recession. Congress rejected this proposal for countercyclical fiscal stimulus. In early 1993, President

Clinton proposed his own stimulus package, but Congress rejected this proposal too." After much congressional debate, in March of this year, President Bush signed into law the Economic Security and Recovery Act. However, this was preceded by two quarters of positive growth, and, as of this writing, the recovery still appears to be under way. Political institutions in the United States are not very conducive to timely countercyclical actions.

Chart 4 gives a historical perspective on the actual stance of fiscal policy. It plots changes in the structural surplus (normalized on potential output) against the GDP gap (measured in percentages).[38] One might think that countercyclical stances are located in the southwest quadrant (expansions when the gap is negative) and the northeast quadrant (contractions when the gap is positive); procyclical stances are located in the northwest and southeast quadrants. Viewed in this way, there were twenty-two countercyclical budgets and nineteen procyclical budgets. The regressions in the top panel of table 1 support the visual impression in chart 4. There seems to be little evidence that actual discretionary policy has been countercyclical.

We should, however, be a little careful in interpreting these data: Chart 4 does not illustrate the intent of the observed policy stance; and the change in structural surpluses has some defects as a measure of the stance of fiscal policy. Examination of some the points in chart 4 is instructive. The 1963 expansion was President Kennedy's tax cut; it was intended to be countercyclical. The 1965, 1966, and 1967 expansions were President Johnson's spending on the Vietnam War and the war on poverty; clearly, they were not intended as countercyclical measures, but they resulted in the 1968 tax increase, which was. The 1975 expansion was President Ford's tax cut, following the oil price increase; his predecessor's famous assertion—"We are all Keynesians now"—suggests its intent. The 1982 expansion was President Reagan's tax cut. This tax cut was proposed before the 1980 election, and it was not intended as a countercyclical measure; however, it appears in chart 4 as the most aggressive example of a countercyclical measure. Meyer (2001) refers to President Reagan as "an accidental Keynesian." The 1983 point in chart 4 illustrates a defect in our measure of the fiscal stance: It shows no change in the structural surplus,

Chart 4
Discretionary Policy and GDP Gaps
(U.S. Data, 1960-2001, Fiscal Year)



but 1983 clearly saw a continuation of the expansionary policy begun in 1982.[39]

In all, there is little evidence in the United States—especially during the last two decades—that discretionary fiscal actions have been effectively focused on macroeconomic stabilization. EC (2002a) presents similar evidence for the EU.

The aggregate effects of fiscal policy and their implications for monetary policy *IV. B*

In this section we consider two questions—how intermediate-term and long-term bond markets have reacted to fiscal shocks and how the Federal Reserve has reacted to fiscal shocks. There is a widespread view in policy discussions and financial market commentary that higher fiscal deficits are associated with higher intermediate-term and long-term interest rates. (Short-term rates are presumably determined by Federal Reserve policy.) This view is also reflected in large-scale

Table 1
Regressions of Structural Surplus/Potential GDP on the GDP Gap

	Dependent Variable: First Difference of Ratio		Dependent Variable: Level of Ratio	
Sample Period	GDP Gap Coefficient	R-Squared	GDP Gap Coefficient	R-Squared
1960-2001	.093	.071	-.015	.001
	(1.730)		(-.197)	
1960-1979	.117	.080	-.203	.271
	(1.255)		(-2.584)	
1980-2001	.111	.111	.316	.264
	(1.544)		(2.676)	

Note: All regressions included a constant. T-ratios are in parentheses.

econometric models and in Federal Reserve Board documents. In contrast, much of the academic literature—for example Plosser (1982, 1987) and Evans (1985, 1987a, 1987b)—has concluded that there is no evidence to support a statistically significant positive relationship between fiscal deficits and interest rates. Recent empirical work on the effects of fiscal policy—for example Blanchard and Perotti (2001) and Fatas and Mihov (2001a, 2001b)—has not examined the link between fiscal shocks and interest rates.

We examine the role played by financial markets in two ways. In section IV. B. 1, using Congressional Budget Office (CBO) budget forecasts, we find that there is a sizable and statistically significant effect of projected surpluses on the spread between intermediate-term (or long-term) Treasury yields and Treasury bill yields. An increase in the projected surplus averaging 1 percentage point of GDP is associated with a decline in the spread of about 55 to 60 basis points. In section IV. B. 2, we expand on Blanchard and Perotti's (2001) approach to identifying fiscal shocks and estimating their effect on output by introducing the reactions of financial markets and monetary policy. We find that positive spending shocks lead to increases in interest rates, and

that this reaction by the financial markets attenuates the effect of spending shocks on real GDP. The results for tax shocks are not as clear as those for spending shocks and some puzzles remain. In section IV. B. 3, we examine the response of monetary policy—and the federal funds rate in particular—to fiscal shocks. We ask whether the response can be described by a simple Taylor rule. A more detailed discussion of econometric identification issues can be found in the appendix.

The reaction of financial markets to fiscal policy *IV. B. 1*

Interest rates and other asset prices may be affected by tax and spending shocks. Discussions of the financial markets' reaction to fiscal shocks generally focus on intermediate-term or long-term interest rates. For example, fiscal policy is cited (along with expectations about the state of the economy and, to a lesser extent, expected inflation) as the cause of long-term interest rate developments in the Federal Reserve's two most recent semiannual monetary policy reports to the Congress.[40]

The effects of fiscal policy on long-term interest rates are also embedded in large-scale macroeconometric models, such as FRB/US (which was developed at the Federal Reserve Board and is used there for policy analysis and forecasting), DRI/WEFA, and Macroeconomic Advisers models. Elmendorf and Reifschneider (2002) simulate the effects of sustained tax cuts and spending increases in the FRB/US model, in which asset prices are set in financial markets by forward-looking agents. They find that the ten-year note rate rises immediately when taxes are cut and then continues to rise for several years. In contrast, the federal funds rate, which is determined by a simple Taylor rule, rises only slowly. Thus, the spread between the ten-year note rate and the federal funds rate rises. Elmendorf and Reifschneider also find that financial market responses to a tax cut significantly attenuate the tax cut's effect on real output. An increase in spending also raises the ten-year bond rate immediately; the federal funds rate rises as well, but more gradually than the ten-year note rate.

Policy discussions of the aggregate effects of fiscal policy often involve the implications for monetary policy. For example, with the

emergence of both actual and projected fiscal surpluses in 1999 and 2000, a number of commentators in the press and in financial markets worried that the declines in long-term interest rates induced by these surpluses would conflict with attempts by the Federal Reserve to dampen aggregate demand.[41] More recently, some discussions of the slow phase-in of the tax cuts enacted in 2001 focused on the resulting increases in long-term interest rates and the potentially contractionary effects that these would have on aggregate demand.[42]

It is perhaps surprising, given the widespread view that fiscal policy affects financial markets, that a significant part of the academic literature finds that budget deficits do not have a statistically significant effect on interest rates. In two closely related papers, Plosser (1982, 1987) looks at the effect of innovations to government debt on excess holding period returns on Treasury bills with two to twelve months to maturity, and on bonds and notes with up to five years to maturity, all relative to the one-month bill rate. He finds no evidence of a significant positive effect—estimates are negative and marginally significant. Plosser does find some evidence that shocks to military spending raise rates, but the results are sensitive to the choice of sample.

Plosser's findings are echoed in a series of papers. Boothe and Reid (1989) apply the methods in Plosser (1982, 1987) to Canadian data and find no evidence of a statistically significant positive effect of deficits (or government spending) on interest rates. Evans (1987b) applies Plosser's approach to data from five countries in addition to the United States; he finds no evidence of a statistically significant positive effect of deficits on interest rates. Evans (1987a) looks at U.S. data from 1908 to1984 (and eleven subsamples), and he finds no evidence of a statistically significant positive effect of deficits on either the interest rate on commercial paper or the AAA bond rate. Evans (1985) looks at three wartime periods in the United States—the Civil War, World War I, and World War II—in which fiscal deficits increased substantially without any discernable effect on nominal or real interest rates. In fact, he presents regressions in which higher deficits are associated with interest rate declines (holding government spending constant).

Many people have remained unconvinced by this literature—

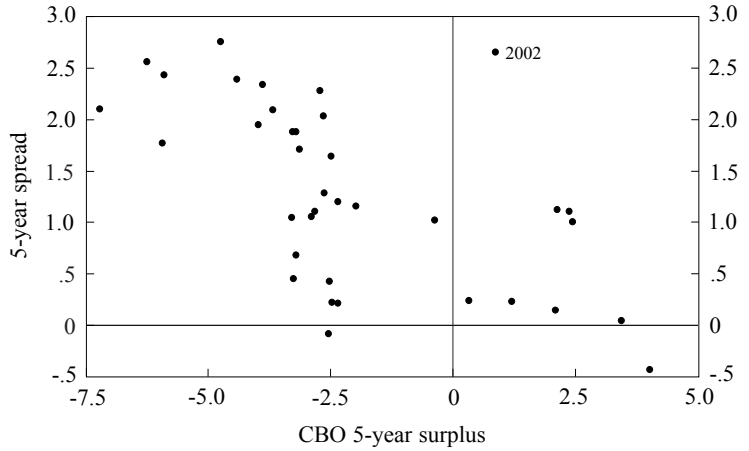
Elmendorf and Mankiw (2000) characterize it as "uninformative" and Bernheim (1989) is even more critical. And the academic literature does not all reach the same conclusion. Wachtel and Young (1987) find that revisions in CBO and OMB forecasts for current fiscal year deficits have a positive and statistically significant effect on daily changes in interest rates all along the yield curve. Kitchen (1996) also finds statistically significant effects of changes in OMB forecasts (in this case both one-year and multiyear forecasts) on overnight changes in interest rates on Treasury securities of various maturities. Elmendorf (1993) uses forecasts of budget deficits from Data Resources, Inc. and finds that forecasts of larger deficits are associated with higher intermediate-term and long-term interest rates. And Elmendorf (1996) examines financial market responses to news about the Gramm-Rudman-Hollings law of 1985; he finds that higher expected spending and larger expected budget deficits are associated with higher real interest rates.

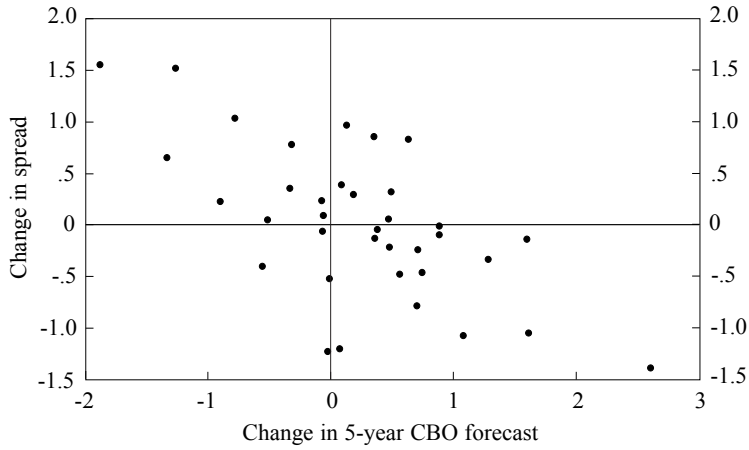
Here, we present new evidence on the link between fiscal surpluses and interest rates. The CBO forecasts budget balances each year in January or February (after the release of the President's budget) and again in midsummer.[43] For the past ten years, the CBO has been forecasting over a ten-year horizon. Prior to that, its horizon was only five years. We look at the effect of CBO surplus forecasts on interest rates over both samples: semi-annual data for five-year forecasts beginning in 1984 and ten-year forecasts beginning in 1992.[44] Our sample ends at the beginning of 2002.

Rather than looking at the level of interest rates, we look at two spreads: the spread between five-year Treasury notes and three-month Treasury bills, and between ten-year notes and three-month bills.[45] We do so for two reasons: First, discussions of fiscal policy's effect on interest rates often focus on intermediate and long-term rates;[46] and second, by looking at the spread, we avoid having to model the level of interest rates.

The top panel of chart 5 plots the spread between the five-year note rate and the three-month bill rate on the vertical axis and the CBO five-year surplus forecast on the horizontal axis, using semi-annual

Chart 5
Interest Rate Spreads and Budget Forecasts





data from 1984 to 2002.[47] The bottom panel plots the first differences in these two series. As is apparent from the two plots, there is a clear inverse relationship between the interest rate spreads and the CBO forecasts. Higher projected budget surpluses are associated with lower interest rate spreads. There is one outlier in the top panel, January 2002. Two factors may account for its outlier status. This forecast revised both the five-year and ten-year surpluses downward rather dramatically, but in the view of many observers, not by enough. The sizable August revisions suggest that those observers were correct. In addition, the Federal Reserve had pushed short-term rates down considerably in the preceding year.

Table 2 contains the results of two sets of regressions that correspond to the two panels of chart 5. The left-hand panel contains the estimated slope coefficients (and the estimated *t*-ratios) for the regression,

$$RL_t - R3_t = a + bS_t + u_t, \tag{10}$$

where RL_t is the yield on either the ten-year note or the five-year note (expressed as percent per year), $R3_t$ is the yield on three-month bills, and S_t is the annual average of the CBO's cumulative five-year or ten-year surplus forecasts (expressed as a percent of GDP). The estimates are corrected for first-order serial correlation. The right-hand panel contains the estimated slope coefficients (and the estimated *t*-ratios) for the regression,

$$\Delta RL_t - \Delta R3_t = a + b\Delta S_t + v_t. \tag{11}$$

All of the estimates confirm a statistically significant link between higher projected budget surpluses and lower spreads of long-term rates over short-term rates. The magnitude of the effect is substantial in both samples and somewhat larger for five-year projections than for ten-year projections, probably reflecting greater uncertainty about the second five years of those forecasts. The estimates computed using the five-year projections suggest that an increase in projected future deficits averaging 1 percent of current GDP is associated with an increase in long-term rates over short-term rates of between 53 and 60 basis points.

Table 2
Regressions of Interest Rate Spreads on CBO Budget Surplus Projections

	Levels		First Differences	
	5-Year Note - 3-Month Bill	10-Year Note - 3-Month Bill	5-Year Note - 3-Month Bill	10-Year Note - 3-Month Bill
5-year projections 1984-2002	-.524 (-4.625)	-.591 (-4.555)	-.538 (-4.950)	-.603 (-4.846)
10-year projections 1992-2002	-.415 (-3.308)	-.451 (-3.348)	-.410 (-3.429)	-.446 (-3.468)
Actual surpluses 1984-2002	-.200 (-1.809)	-.279 (-1.792)	-.487 (-1.921)	-.679 (-2.428)

Note: All regressions included a constant. T-ratios are in parentheses.

Measurement error is almost certainly a serious problem that biases all of these estimates toward zero. The baselines used reflect provisions in existing tax laws, such as sunset provisions and alternative minimum tax problems, that are widely recognized as almost certain to be changed. Thus, the effects of projected surpluses are likely to be larger than the estimates in table 2. A second consideration might also impart a downward bias to the slope coefficients. To the extent that positive supply shocks, such as increases in trend productivity growth, both raise projected surpluses and raise interest rates, the measured effect of projected surpluses on interest rates will be understated.

The last row of table 2 provides estimates of the effects of current, rather than projected, surpluses on interest rate spreads. Instead of regressing interest rate spreads on projected surpluses, we regress spreads on the actual surplus (as a percent of GDP, both lagged one quarter). These results also suggest that higher budget surpluses are associated with lower spreads.

These results present strong evidence that budget deficits exert a

substantial and statistically significant effect on interest rates. The reaction of intermediate-term and long-term rates to projected fiscal surpluses suggests that even if monetary policy is characterized by strict interest rate targeting and does not react to fiscal policy, financial market reaction may attenuate the effect of fiscal policy on aggregate demand.[48] The results do not, however, distinguish between the interest rate effects resulting from the actions of automatic stabilizers and those arising from discretionary policy or between the effects of fiscal shocks and those of anticipated fiscal policies. In addition, the results tell us only about the response of intermediate-term and long-term rates over and above any Federal Reserve reaction. They do not tell us about the full interest rate effect of fiscal policy. In the next section, we attempt to remedy these two shortcomings by considering the effects of fiscal policy shocks over time in a structural VAR.

The reaction of inflation and output to fiscal shocks *IV. B. 2*

Blanchard and Perotti (2001) estimate the dynamic effects of tax and government spending shocks on real output in a three-equation structural VAR. In order to identify these shocks, they assume that legislative action takes sufficiently long that tax and spending decisions are not affected by current quarter changes in output. Therefore, within the quarter, spending shocks do not respond at all to output and net taxes respond to output only through the operation of automatic stabilizers.

Blanchard and Perotti (2001) decompose net taxes into several categories and use detailed estimates of the output elasticity of each of these categories to compute the aggregate output elasticity (which varies over time due to changes in tax laws and to changes in the composition of net taxes across the categories). This allows them to estimate the effect of output on net taxes and identify tax shocks.[49]

Blanchard and Perotti (2001) find that both taxes and spending have a sizable and persistent effect on real output. A positive one-dollar tax shock (a tax increase) reduces output initially by about 70 cents. The effect rises slightly, with the peak effect—a decline in GDP of about 80 cents—occurring about five quarters after the shock. After that, output

returns gradually to trend.[50] A one-dollar spending shock (an increase in spending) raises GDP by about 84 cents within a quarter. The effect of the shock grows and is quite persistent, reaching a peak effect on GDP of about 1.3 dollars about fifteen quarters after the shock.

These results raise several questions, which we address here. What is the impact of fiscal shocks on inflation? Is there evidence of reaction by the Federal Reserve to fiscal policy shocks? Does it differ from the response predicted by a simple Taylor rule? Does financial market (and Federal Reserve) reaction to fiscal shocks attenuate the effect of the shocks on real output?

We provide answers to these questions by bringing together two pieces of the literature. The first, typified by Blanchard and Perotti (2001) and Fatas and Mihov (2000), considers the aggregate impact of fiscal shocks. The second, typified by Bernanke and Blinder (1992), Bernanke and Mihov (1998), and Chistiano, Eichenbaum, and Evans (1999), considers the effect of monetary policy shocks. Interestingly, the analysis of fiscal shocks ignores potential interactions with monetary policy and the analysis of monetary policy ignores potential interactions with fiscal policy.

We begin by estimating Blanchard and Perotti's structural VAR, which describes the dynamics of net taxes, government spending (government consumption and investment), and real output. We then add a core set of variables typically used in VAR analysis of monetary policy: inflation (measured by the GDP deflator), commodity prices (the index of sensitive materials prices from the index of leading economic indicators), bank reserves, and the federal funds rate.[51] In addition, we include the ten-year constant-maturity Treasury rate. Identification of these shocks uses the standard triangularization method with two important exceptions. First, we take account of the effect of interest rate changes on federal government net interest payments, and therefore on net taxes. Second, we take account of the effect of price level changes on tax receipts. Failing to do so would raise the possibility of attributing an increase in government interest costs resulting from a positive interest rate shock to a negative tax shock.[52]

Chart 6
Response of Real U.S. GDP to Fiscal Shocks

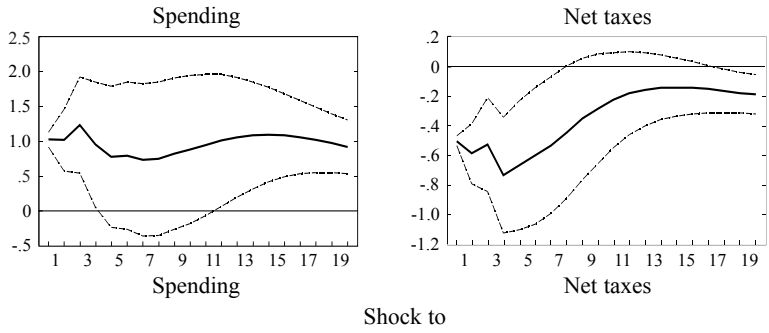
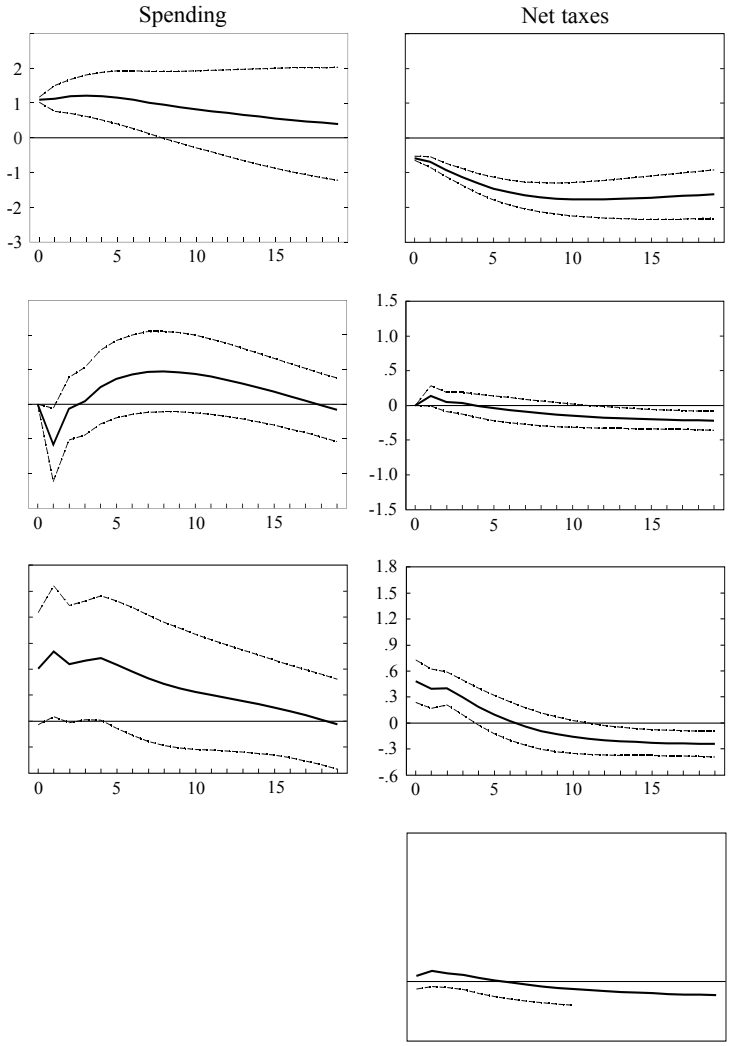


Chart 6 presents the impulse response functions for shocks to net taxes and government spending from our estimates of the original (three variable) Blanchard-Perotti model.[53] Although our sample differs from the one used by Blanchard and Perotti (2001), the impulse responses computed from the structural VARs are quite similar. A one-dollar increase in taxes reduces GDP by about 60 cents on impact. The effect grows, reaching a peak effect on GDP of about -80 cents four quarters after the shock. Output then gradually returns to its trend. The impact of a spending shock is both greater and more persistent than the impact of a tax shock. A one-dollar increase in spending raises GDP by about 85 cents on impact. The effect grows, reaching a peak effect on GDP of about 1.05 dollars around fourteen quarters after the shock. The decline from the peak effect is quite gradual. Chart 6 also displays the standard error bands computed using 500 bootstrap replications.[54] As is the case with the estimates presented in Blanchard and Perotti (2001), the impulse response functions are imprecisely estimated—the standard error bands are fairly wide.

Chart 7 presents the impulse response functions from our estimates of the expanded (eight variable) model. Both tax and spending shocks are normalized to 1 percent of GDP. Chart 7 shows the dynamic responses of real GDP, inflation, the federal funds rate, and the ten-year bond yield.[55, 56] The response of output is measured in percent

Chart 7
Response of Real GDP, Fed Funds, Long Rate, and Prices



and the response of interest rates and inflation are measured in percentage points (expressed at an annual rate).

The left-hand column displays the effects of a spending shock. The impact effect on real GDP is larger than in the system without interest rates (shown in chart 6); the impact multiplier is 1.1 rather than 0.85. The peak effect is also larger (1.2 rather than 1.05), but both of these differences are fairly small given the precision with which we are able to estimate the responses. The most striking difference between the two sets of estimates is the more rapid return of real GDP to trend when we allow for an interest rate response. The peak effect of a spending shock on output is reached after about one year. Although the output effects of a spending shock are still quite persistent, they are much less persistent than when interest rate effects are ignored. The multiplier after five years is just under 0.4, which is less than half of its estimated value without an interest rate response.

Inflation rises temporarily in response to a spending shock. After a brief (and difficult to explain) two-quarter decline, inflation gradually rises, reaching a peak of about 0.5 percentage point two years after the shock. The impact on inflation then declines, with inflation returning to its trend value about five years after the peak. The inflation effects are estimated even less precisely than the output effects—even the peak effect is only slightly more than one standard error above zero.

The ten-year note rate is estimated to rise by about 45 basis points on impact. After reaching a peak of about 65 basis points in the next quarter, the effect of a spending shock on the ten-year note rate declines slowly. Only after about ten quarters does the effect fall below 50 basis points.

The right-hand column of chart 7 contains the response to a tax shock (a tax increase) equivalent to 1 percent of GDP. The impact multiplier, about 0.6, is virtually identical to that obtained without any interest rate response. Surprisingly, the estimated response after that exceeds the response depicted in chart 6. The output effect grows, reaching a peak multiplier of -1.7 after three years. The inflation

response to a tax shock is more muted than is the response to a spending shock. After an initial (and once again puzzling) uptick, the inflation response declines steadily and is about 0.2 percent below trend after five years. The effect of the tax shock on the long-term interest rate is similarly small. After rising slightly, the ten-year note yield falls. Five years after the shock, it is down by only 12 basis points.

The reaction of monetary policy to fiscal shocks *IV. B. 3*

Monetary policy in the United States is frequently characterized with a simple Taylor rule—like equation 2—linking the federal funds rate to the equilibrium real interest rate, the output gap (with a coefficient of 0.5), and the gap between inflation and its target value (with a coefficient of 1.5). Using the output and inflation responses found in chart 7, the rule suggests that a positive spending shock ought to lead to an increase in the federal funds rate (even assuming that the equilibrium real interest rate is unchanged). More precisely, the rule suggests that the federal funds rate ought to rise by about 50 basis points on impact and reach a peak effect of about 120 basis points after about two years. The results from our structural VAR are roughly consistent with the rule's predictions: The estimated impact effect of a spending shock on the federal funds rate is 60 basis points; the federal funds rate then rises for about a year, reaching a peak of about 75 basis points before declining. These effects are, however, measured quite imprecisely.

A positive tax shock would be expected to reduce the federal funds rate in response to the declines in output and inflation resulting from the shock. The simple Taylor rule would predict that the federal funds rate would fall by about 30 basis points for a few quarters and, beginning in the third quarter after the shock, decline further. The peak effect predicted by the Taylor rule is about -110 basis points, about four years after the shock. By contrast, the response of the federal funds rate in our VAR (pictured in the right panel of chart 7) is positive for nearly two years before turning negative. Recall that for tax shocks (in contrast with spending shocks), our VAR found a greater estimated effect on output when interest rate responses were taken into account. Part of the explanation for this anomaly may lie in the behav-

ior of the federal funds rate. The initial rise in the federal funds rate (and the long-term rate) seems to reinforce the effect of the tax increase on aggregate demand. This behavior of the federal funds rate is rather puzzling: Why would the Federal Reserve tighten monetary policy in response to a tax increase? Omitted variables are a potential problem in any small VAR, and we suspect that an omitted variable may lie behind this puzzle.

Conclusions: Fiscal shocks and monetary policy *IV. C*

Discretionary fiscal policy does not appear to have been effectively focused on macroeconomic stabilization, at least not in the last two decades. We find little reason to think that the President and Congress interact strategically with the Federal Reserve over stabilization policy; this view of the policy coordination problem seems to be dated.

Fiscal policy does, however, affect the economic environment in which monetary policy acts. Fiscal policy provides automatic stabilizers, but it is also the source of macroeconomic shocks that may destabilize prices and output. In contrast to much of the academic literature, we find a strong and statistically significant correlation between fiscal deficits and intermediate-term and long-term interest rates. Moreover, our structural VAR implies that positive spending shocks lead to increases in interest rates and that this reaction by the financial markets attenuates the effect of spending shocks on real GDP.[57] These findings reconcile the empirical evidence with structural models that have been developed at the Federal Reserve Board and with what appears to be the conventional Federal Reserve wisdom.

We also estimate the Federal Reserve's reaction to fiscal shocks. The Federal Reserve appears to have reacted to government spending shocks in a way that is consistent with standard calibrations of the Taylor rule. So, these spending shocks do appear to be a concern for the Federal Reserve, but they are of no greater concern than any other shock that affects the GDP gap and inflation.

Appendix: Econometric and Identification Issues

In section IV we examine the effects of shocks to net taxes (taxes net of transfers, including net interest payments) and spending (government consumption and investment) separately, allowing the effects of the two to differ. We use the VAR,

$$X_t = \sum_{j=1}^{q} A_j X_{t-j} + u_t,$$

where q is the data-determined lag length, $X_t = (T_t, G_t, Y_t, \pi_t, C_t, RFF_t, R_t, R10_t)'$, T_t is the log of real per capita net taxes, G_t is the log of real per capita government consumption and investment, Y_t is the log of real per capita GDP, π_t is the change in the log of the GDP deflator, C_t is the log of the index of sensitive commodity prices from the index of leading economic indicators, RFF_t is the federal funds rate, R_t is the log of per capita bank reserves, and $R10_t$ is the ten-year constant maturity Treasury yield. The VAR combines the variables used by Christiano, Eichenbaum, and Evans (1999)—with the exception that we use only one monetary aggregate rather than the three that they use—and those used by Blanchard and Perotti (2001).

The reduced form disturbances in the VAR, u_t, will be correlated and $E(u_t u_t') = \Sigma$. As a result, these disturbances cannot be interpreted as fiscal shocks. In order to identify shocks to U.S. fiscal policy, we need to impose some structure on the covariance matrix of the reduced form disturbances. The standard approach to doing so is to choose a "causal ordering" in which variables earlier in the ordering are assumed to exert a contemporaneous effect on variables later in the ordering, but the reverse is assumed not to be true. This has the effect of decomposing the covariance matrix Σ into GG', where G is triangular and is then used to recover the effects of orthogonal, structural shocks. ($G^{-1}u_t = v_t$, where the structural shocks, v_t, are uncorrelated).

Rather than adopting this standard approach, we follow Blanchard and Perotti (2001) and identify the shocks using institutional features of the U.S. tax and transfer systems and the timing of revenue collections to identify the "automatic" responses of net taxes and spending

to changes in GDP in a structural VAR. In addition, because we include both prices and interest rates in our VAR, we adjust for the effects of price and interest rate changes on net taxes. These automatic responses are then subtracted from the reduced form disturbances to identify structural tax shocks. Spending shocks are then identified by the assumption that the timing of spending decisions is such that there is no response of spending to GDP within a quarter. Prices can, however, affect real spending within the quarter because many spending decisions are set in nominal terms and are not adjusted for within-quarter inflation. The remaining shocks are then identified with the causal ordering used by Chistiano, Eichenbaum, and Evans (1999).

More formally, the reduced form shock in the net taxes equation is assumed to be related to the other shocks by,

$$u_t^T = a_1 u_t^Y + a_2 v_t^G + a_3 u_t^\pi + a_4 u_t^{R10} + a_5 u_t^{RFF} + v_t^T .$$

Blanchard and Perotti (2001) draw on Giorno, Richardson, Roseveare, and van den Noord (1995) to estimate the GDP elasticity of five components of net taxes and compute the share-weighted average of these elasticities to determine a_1 and we follow their procedures to obtain our estimate. We follow Perotti (2002) in estimating a_3. In order to compute the price elasticity of income tax and Social Security tax receipts, we assume that tax rates are not indexed within the quarter, and therefore move with nominal wages. We then use the estimates of the elasticities of individual income taxes and Social Security taxes with respect to real wages in Giorno and others (1995) and subtract one to get the price elasticities. Transfers do not adjust within the quarter to price shocks, so the price elasticity of real transfers is -1.0. Real indirect tax receipts and real corporate income tax receipts are assumed to unaffected by price shocks.

Estimating a_4 and a_5 is a bit more involved. As interest rates change, the change in net taxes is,

$$dT = \sum_{k=1}^{M} D_k dR_k ,$$

where the sum is over debt maturities, D_k is the value of new debt

issues of maturity k, and R_k is the yield on new issues of maturity k. As we are interested in the effects of shocks to the short rate and the ten-year note rate, we approximate,

$$dR_k = \beta_1 dRFF + \beta_2 dR10$$

and estimate the parameters β_1 and β_2 by regressing the constant maturity Treasury yield for each maturity on the federal funds rate and the ten-year note rate. Next, we estimate D_k for each quarter by taking the quantity of debt outstanding by maturity category (taken from the *Treasury Bulletin*) and adjusting by the ratio of new issues to the amount outstanding for each maturity category. (We compute this ratio using auction data from the Bureau of Public Debt Web site for three years.) Finally, we assume that auctions, on average, occur midway through the quarter, so that interest on new issues is paid for only one-half of the quarter.

In order to identify spending shocks, we follow Blanchard and Perotti (2001) and assume that there is no discretionary response of spending to any other shocks within a quarter, and use Perotti's (2002) assumption that the price elasticity of real spending is -0.5. The structural spending shock is equal to the reduced-form spending shock adjusted for the reduced-form price shock, $u_t^G + 0.5u_t^P = v_t^G$.

We identify real GDP shocks by assuming (as do Christiano, Eichenbaum, and Evans (1999)) that shocks to interest rates, prices, and monetary aggregates have no contemporaneous effect on GDP. The reduced form GDP shock is then,

$$u_t^Y = c_1 u_t^T + c_2 u_t^G + v_t^Y.$$

Again, we follow Blanchard and Perotti (2001) and estimate the parameters c_1 and c_2 with an instrumental variables regression v_t^G and v_t^Y as instruments.

We identify the shock to the federal funds rate by assuming that the monetary authority follows an augmented Taylor rule, which allows for a reaction to taxes and spending directly, rather than restricting that

reaction to occur through the impact of taxes and spending on output and inflation. In addition, we allow commodity prices to affect the federal funds rate, although removing this effect would have no noticeable impact on the results we report. The reduced form federal funds rate shock is then,

$$u_t^{RFF} = g_1 u_t^T + g_2 u_t^G + g_3 u_t^Y + g_4 u_t^\pi + g_5 u_t^C + v_t^{RFF}.$$

In order to deal with the simultaneity that arises due to the interest rate effects on net taxes, we estimate the parameters using instrumental variables.

Combining these identifying assumptions with the causal ordering used by Christiano, Eichenbaum, and Evans (1999), and allowing the Federal Reserve to react to tax and spending shocks in setting the federal funds rate yields the system that we estimate.

$$\begin{bmatrix} 1 & 0 & -a_1 & -a_3 & 0 & -a_4 & 0 & -a_5 \\ 0 & 1 & -b_1 & 0 & 0 & 0 & 0 & 0 \\ -c_1 & c_2 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ -g_1 & -g_2 & -g_3 & -g_4 & -g_5 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} u_t^T \\ u_t^G \\ u_t^Y \\ u_t^\pi \\ u_t^C \\ u_t^{RFF} \\ u_t^R \\ u_t^{R10} \end{bmatrix} \begin{bmatrix} 1 & a_2 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & d_1 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & f_1 & f_2 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & h_1 & h_1 & h_1 & h_1 & 1 & 0 \\ 0 & 0 & k_1 & k_2 & k_3 & k_4 & k_5 & 1 \end{bmatrix} \begin{bmatrix} v_t^T \\ v_t^G \\ v_t^Y \\ v_t^\pi \\ v_t^C \\ v_t^{RFF} \\ v_t^R \\ v_t^{R10} \end{bmatrix}$$

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Endnotes

[1] Here, we are only concerned with the fiscal requirements for central bank independence. There has been a tendency in Europe to use the EMU process—both the entrance requirements and the SGP—to address a range of fiscal ills.

[2] Examples include: Alesina and Tabellini (1987), Dobelle and Fischer (1994), Beetsma and Bovenberg (1998), Dixit and Lambertini (2001), Lambertini and Rovelli (2001), Buti, Roeger and in't Veld (2001, 2002), and Hughes-Hallett and Viegi (2002).

[3] Our approach is not really new. It is consistent with the view taken by John Taylor in his 1995 symposium paper, with Laurence Meyer's (2001) observations, with the official views expressed in EC (2002a), and with the discussion in Alesina and others (2001).

[4] Alesina and Perotti (1995) survey these political economy models.

[5] The Maastricht Treaty tried to overcome this obstacle by only requiring that the debt-to-GDP ratio be "sufficiently diminishing and approaching the reference value at a satisfactory pace." But, this language is open to interpretation, and hard-liners seemed to take comfort in phrases like "3 percent is 3 percent."

[6] Canzoneri and Diba (1999) describe the pact's "excessive deficits" procedure. EC (2002a; section 2) describes the pact's surveillance procedure and its "early warnings" mechanism, and their recent application to Germany and Portugal. See also EC (2002b).

[7] Portugal is currently coming under further scrutiny. According to Commissioner Solbe's statement of July 25, "Today, the Portugese authorities have made public the general government figures for 2001: the general government deficit in 2001 amounted to 4.1% of GDP ... The Commission will therefore initiate the Excessive Deficit Procedure for Portugal ..." An annex outlines the specific steps that will be taken. See European Commission Rapid Press Releases.

[8] These figures, and projections for 2002, can be found in tables I.2 and I.3 of EC (2002a).

[9] See the *Financial Times*, September 4, 2002.

[10] Auerbach and Feenberg (2000), Cohen and Follette (2000), Taylor (2000) and Sala-i-Martin and Sachs (1992) discuss the strength of U.S. automatic stabilizers. EC (2001, 2002a) discuss the strength of EU stabilizers.

[11] Rules of this form provide a reasonably good explanation of both Federal

Reserve and (earlier) Bundesbank behavior; see Taylor (1999).

[12] Taylor's (1995) simulations suggest that this would be the right response.

[13] Again, Taylor's (2000) simulations lend support for this.

[14] The biggest EU programs are the Common Agricultural Policy and the Structural Development Funds; neither has a strong cyclical component.

[15] See, for example, Bayoumi and Eichengreen (1993), and Carlino and DeFina (2000). The ECB's staff argues that there has been some convergence; see Angeloni and Dedola (1999).

[16] Fatas and Mihov (2000a) consider a cross section of twenty OECD countries and find that the volatility of real GDP growth is inversely related to government expenditures, revenues, and transfers (each as a fraction of GDP). They then examine the relationship between automatic stabilizers and output volatility and find the evidence is mixed.

[17] Current research is hampered by the fact that most New Neoclassical Synthesis models exhibit Ricardian equivalence, which implies that transfers have no effect.

[18] On page 31, EC (2002a) states that "The core commitment of the SGP is for Member States to achieve and maintain medium term budget positions that are close to balance or in Surplus." The emphasis on structural balance is quite evident throughout this EC document.

[19] The volume edited by Brunila, Buti, and Franco (2001) contains several studies of this and other aspects of the SGP.

[20] Actually, these are a revised—and somewhat weaker—set of numbers. There were technical issues in finding a consensus on these benchmarks. Measurement of the deficit elasticities was not too contentious, but measurement of GDP gaps was. In November 2001, ECOFIN endorsed a method of measuring gaps—essentially, a production function approach replaced HP filtering (see EC (2002a)). There is also a "Lucas critique" problem here: Cyclical volatility under EMU may be different than the pre-EMU volatility.

[21] Evidence of this is not hard to find. The European Commission working paper no. 45 (July 2002) states that "the Maastricht Treaty represents a clear commitment to sound public finances, both in response to the preceding secular upward drift in government spending, deficits and debt, and in view of EMU, in which sound budgets are necessary to support price stability. ..." Moreover, EU members who are not in the

euro area (United Kingdom, Denmark, and Sweden) are required by the SGP to submit annual stability programs, and they are monitored by the European Commission, though they are not subject to the pact's financial penalties.

22 The present-value budget constraint is found by iterating the government's flow budget constraint forward and applying the household transversality condition; (3) may, therefore, be viewed as an equilibrium condition. See Canzoneri, Cumby, and Diba (2001a) for a more detailed derivation. For algebraic simplicity, we have assumed that all government bonds mature after one year. This simplification is not necessary; see Woodford (1998) and Cochrane (2001).

23 Woodford (1995) articulates this argument most clearly: The private sector's PVBC must hold as a consequence of the households' utility maximization. And, in equilibrium, the public sector's PVBC is the mirror image of the private sector's PVBC.

24 Important early contributions to this literature include: Leeper (1991), Woodford (1994, 1995), Sims (1994), and Cochrane (1998). Canzoneri, Cumby, and Diba's (2001b) first footnote and Woodford's (2001) third footnote point to more recent contributions. Interesting precursors include: Sargent (1982), Begg and Haque (1984), Masson (1987), and Auernheimer and Contreras (1990). Notable critics include: McCallum (1998) and Buiter (2001). Our own contributions are: Canzoneri and Diba (2000) and Canzoneri, Cumby, and Diba (2001a,b).

25 Why the "Ricardian" label? Later on, we will see that government bonds have wealth effects in non-Ricardian regimes. Woodford (2001) offers another motivation. In discussions of "Ricardian Equivalence," it is asserted that a tax cut financed by government borrowing must necessarily be accompanied by tax increases at some time in the future that hold the present value of tax liabilities constant *at current prices and discount factors*; this will be true by definition in a Ricardian fiscal regime.

26 We assume that tax distortions are small; the tax cut does not affect these variables.

27 Canzoneri, Cumby, and Diba (2001a) used the standard error from an AR1 regression to estimate the conditional standard deviation of the surplus-to-GDP ratio. For the United States, they found this "typical" surplus shock to be a little over 1 percent of GDP. This estimate is conservative since the surplus process is serially correlated, and a 1 percent shock to the current surplus would raise the right-hand side of (4) by more than 1 percent. To make the increase in seigniorage offset this "typical" shock to the surplus, we need: $0.01 = 0.06 \times \Delta R$, or $\Delta R = 1/6 \approx 0.17$. Notice that this estimate is also conservative, in that we have assumed money demand does not fall as the interest rate rises.

28 This theory also applies to an economy in which some government debt is denominated in a foreign currency or indexed to the price level; see Woodford (1998).

29 See Sargent and Wallace (1981) and Sargent (1987, pp. 176-177).

30 See Canzoneri and Diba (2000); Canzoneri, Cumby, and Diba (2001a,b).

31 More precisely, ϕ_t has to be bounded away from zero infinitely often, but the bound can be arbitrarily small.

32 To gain some intuition for how this rule works, consider an example where $\in_t = 0$, and where the real interest rate and real GDP are constant. (5) reduces to $s_t = \phi_t w_t$, where "s" is the surplus to GDP ratio and "w" is the liabilities to GDP ratio. The flow budget constraint can be written as $w_{t+1} = (1+r)w_t - (1+r)s_t$, where r (> 0) is the real interest rate. Substituting the surplus rule into the flow budget constraint, debt dynamics are governed by $w_{t+1} = (1+r)(1-\phi_t)w_t$. Iterating this equation forward, $w_{t+T} = (1+r)^T[(1-\phi_t)(1-\phi_{t+1})\bullet\bullet\bullet(1-\phi_{t+T-1})]w_t$. Debt dynamics would be stable if ϕ_t were between r and 1 infinitely often, so that $\lim_{T\to\infty} w_{t+T} = 0$. However, the "no Ponzi game" restriction that is equivalent to the PVBC, (4), only requires that the present value of $w_T - (1+r)^{-T}w_T -$ go to zero as $T \to \infty$. If ϕ_t is between 0 and 1 infinitely often, then the *PVBC* holds for any r or P_t that is fed into it, and we have a Ricardian regime.

33 Canzoneri, Cumby, and Diba (2001a) provides a more detailed discussion of this historical episode.

34 The model is closed by money market equations for each country.

35 Indeed, as we shall soon see, adherence to the SGP would assure a Ricardian regime.

36 See Canzoneri and Diba (1998, 1999) or Canzoneri, Cumby, and Diba (2001a).

37 The balanced-budget amendments that have been proposed in the United States would also produce the required discipline.

38 The change in surpluses is forward looking. For example, the change in the surplus between 1963 and 1964 is plotted against the output gap for 1963. The standardized primary surplus as a percent of potential GDP and the output gap are from table F-11 of the Congressional Budget Office's, *The Budget and Economic Outlook: Fiscal Years 2003-2012*.

39 An alternative measure would be the level of the surplus (rather than its change).

Taylor (2000) used the level and reported regressions like those in the bottom panel of table 1. The regressions show a significantly procyclical policy prior to 1980, and a significantly countercyclical policy post-1980. Taylor argues that the post-1980 result is misleading for two reasons: (1) the Reagan tax policy we have already discussed; and (2) the late 1990s change in income distribution (to richer tax payers in high brackets), which gave the impression of a discretionary tax increase. He concludes that "the seemingly well-timed countercyclical fiscal movements of the structural surplus during the 1980s and 1990s is best interpreted as a coincidence."

[40] Federal Reserve Board (2001) pp. 163-164 and (2002), p. 520. The view that fiscal deficits affect long-term rates is also reflected in Chairman Greenspan's speeches and testimony. See Greenspan (2001, 2002).

[41] These discussions tended to be somewhat confused. The only real alternative to running surpluses was to make fiscal policy more expansionary, which would not have assisted the Federal Reserve in dampening aggregate demand.

[42] See, for example, Gale and Potter (2002).

[43] We have regular data on the midsummer update only beginning in 1984.

[44] We follow the literature in working with deficits rather than the level of the debt. Feldstein (1986) argues that interest rates are probably more responsive to expected deficits than to either current deficits or outstanding debt, and presents some evidence that expected future deficits affect current interest rates.

[45] We use the constant maturity Treasury series for the five-year and ten-year notes and express the bill rate as a bond equivalent yield.

[46] John Kitchen suggested this specification to one of the authors. The evidence in Elmendorf and Reifschneider (2002) is consistent with a greater impact of tax change on longer-term rates than on shorter-term rates.

[47] All surplus numbers are cumulative and expressed as the average annual surplus relative to lagged nominal GDP.

[48] Macroeconomic Advisers (2000) reports that about three-fourths of the interest rate sensitivity of aggregate demand in their model is tied to long-term yields.

[49] Identifying the shocks is completed in two alternative ways: by allowing spending to affect net taxes within the quarter (but not vice-versa) and the other way around.

[50] Blanchard and Perotti (1999) look at two specifications of trends—one

deterministic and the other stochastic. The effects described previously are for the deterministic trend specification. The effects of a tax shock are greater with stochastic trends, with a peak effect on GDP of -1.33 occurring after seven quarters.

51 To keep the number of variables as small as possible, we chose to use only one of the three monetary aggregates used by Christiano, Eichenbaum, and Evans (1999).

52 We present the details of how we adjust for interest costs in net taxes in the appendix.

53 Because the VAR is estimated in logs, we need to transform the impulse responses to get the multipliers that we plot. To do so, we multiply the responses by the ratio of the levels of the variables at the end of the sample (more precisely, their average values during 1999).

54 For comparability with the results presented in Blanchard and Perotti (2001), we plot the responses plus and minus one standard error.

55 We also examined the impulse response from a 100 basis point increase in the federal funds rate. But because they are very similar to those reported in, for example, Christiano, Eichenbaum, and Evans (1999), we do not report them.

56 As in chart 6, we plot one-standard-error bands along with the estimated impulse response.

57 The results for tax shocks are not as clear as those for spending shocks. Some puzzles remain for future work.

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Commentary: Should the European Central Bank and the Federal Reserve Be Concerned about Fiscal Policy?

Alan S. Blinder

Canzoneri, Cumby, and Diba (henceforth, CC&D) have written a lovely three-act play, set in the majestic shadows of the Grand Tetons. I enjoyed reading it, and I enjoyed seeing it performed live.

Actually, the opus is a trio of one-act plays united by a common theme, which is how fiscal policy might influence monetary policy. Like many such artistic creations, the three acts hang together only loosely, and the authors explicitly invite us to treat each as a free-standing work—which I will do. After a few remarks on each, I will suggest a new fourth act, which would bring back an important issue that CC&D seem to have banished to the wings: the policy mix. Returning it to center stage offers me an opportunity to stroll down memory lane a bit, for I presented the very first paper at the very first Jackson Hole conference on precisely this topic.[1]

Act 1: Fiscal discipline in the stability and growth pact

So, let me start with Act 1, which is a thoughtful criticism of the EU's "Stability and Growth Pact." Some of us will recall that this agreement was originally called the "Stability Pact." The reference to growth was added at the 11th hour, just when financial penalties for miscreants were being added. In a curious compromise, France won on the wording and Germany won on the penalties for noncompliance. But the pact was always focused on stability; it was designed to ensure

that any lack of *fiscal* discipline in member countries would not interfere with the ECB's quest for *monetary* stability in the euro area.

CC&D offer two criticisms of the pact, both of which I agree with. First, it sets limits on annual budget *deficits*, even though most coherent arguments for fiscal limits apply to cumulative national *debts*. For example, countries with large debt burdens might lobby the central bank for lower interest rates. The consistency, in steady state, of a 3-percent-of-GDP deficit limit and a 60-percent-of-GDP debt limit with 5 percent nominal GDP growth may be a lovely piece of arithmetic. But CC&D correctly point out that substituting the deficit limit for the debt limit may penalize the wrong countries at the wrong times.

CC&D's other criticism is that the pact sets limits on *actual* budget deficits rather than *structural* budget deficits. In so doing, it potentially interferes with the operation of the automatic fiscal stabilizers—which, of course, work far faster than discretionary policy ever can. As the authors note, this problem is particularly worrisome in Europe, where what they call the *deficit elasticity* is quite high—roughly double that of the United States.[2] To put the point bluntly, adherence to the pact during a serious recession might force a country to pursue Hooverite fiscal policies, even if its long-run fiscal house was in good order. This unhappy scenario must look somewhat less than hypothetical in Germany right now.

I agree with CC&D's criticisms wholeheartedly and only wish they had been empowered to draft the Stability and Growth Pact. But I would like to take the point further—to *discretionary* fiscal policy. All the countries in the European Economic and Monetary Union have, by necessity, a common monetary policy. But their cyclical situations are bound to be quite disparate at times—as they are now. If Ireland is in an exuberant boom while Belgium is languishing in a slump, the ECB's choice of monetary policy will presumably be too loose for Ireland and too tight for Belgium. Doesn't it then make sense to *tighten* fiscal policy in Ireland and *loosen* fiscal policy in Belgium? The pact will not stand in the way of the Irish tightening, but it might prevent the Belgian easing, thereby giving the euro area as a whole a deflationary bias.

Now, you might be thinking that this same problem must apply to the fifty states of the United States, all of which live under the Fed's common monetary policy. But the analogy is a poor one, for the fifty states are truly united, while the twelve countries are not. If, for example, New Jersey is booming while Wyoming is depressed, significant (per capita) fiscal transfers will flow automatically from New Jersey to Wyoming via Washington. The analogous transfers through Brussels are puny by comparison. Labor mobility across state lines in the United States is also much greater than labor mobility across national borders in Europe.[3] So, there is much greater need for *nation-specific* discretionary fiscal policy in Europe than there is for *state-specific* discretionary fiscal policy in the United States. When it comes to dealing with country-specific shocks, the monetary union tied one hand behind policymakers' backs, perhaps for good reasons. The Stability and Growth Pact then tied the other. Try riding a horse with both hands tied behind your back.

Act 3: Does discretionary fiscal policy make sense?

I'd now like to jump to Act 3 because it is more closely related to Act 1. CC&D ask two questions. The first is: Has discretionary fiscal policy in the United States actually been used as a macroeconomic stabilizer? Their answer is: not often. I agree. If Congress and the President could not get their act together under the clear-emergency conditions that followed September 11, I think we might as well bury the possibility of intelligent fiscal policy. And may it rest in peace.

CC&D's second question is whether fiscal deficits raise long-term interest rates, as seemingly all policymakers and market participants believe. One of the dirty little secrets of empirical macroeconomics, which the authors here reveal, is that there is almost no empirical evidence supporting this commonsense proposition. Yet, many of us continue to believe it. For example, I think I saw with my own eyes that long-term interest rates fell dramatically in response to the Clinton Administration's deficit reduction plan in 1993.

Fortunately for all of us, CC&D present some new empirical results that buttress the commonsense view. They find that projected (by the

Congressional Budget Office) fiscal deficits "exert a substantial and statistically significant effect on interest rates." (p. 366-367.) I am, of course, cheered by these findings. But Act 1 reminds us of a nagging question. Doesn't the very idea that prices adjust to clear markets suggest that bond prices should react to the outstanding *stock* of government *debt*, rather than to the *flow* of annual *deficit*s?

Actually, CC&D's results may support this hunch. When you add up projected deficits, or changes in projected deficits, over ten-year periods, you may well obtain a variable that correlates better with the expected *debt* ten years from now than with this year's annual *deficit*. I would recommend that the authors try substituting the projected future stock of debt for the variable they use and see what kind of results they get.

Act 2: The fiscal theory of the price level

I come now to Act 2, which is mostly about the so-called fiscal theory of the price level. The theory's name derives from its peculiar conclusion that *fiscal policy*, not monetary policy, determines the price level in the very long run—a curiosum that CC&D do a fine job of explicating. For present purposes, the hallmark of the theory is its emphasis on the need for a certain degree of *fiscal discipline* if monetary policy is to do its job. As the authors put it, "the government's approach to fiscal solvency has strong implications for the options that are left open to the central bank." (p. 344.)

Does it really? Despite coming from Princeton, I am not convinced that the FOMC should pay much attention to the fiscal theory of the price level when it meets next month, or next year, or even next decade.[4] The main reason pertains to the meaning of the phrase "long run" in this context. The point, which CC&D make tacitly but do not emphasize, is that the time span to which the fiscal theory applies is a very long one, indeed. I call it the "infinite run." You can find several hints of this in CC&D's Act 2.

First, they emphasize their novel theoretical finding that the fiscal discipline required to give monetary policy enough independence "can

be quite lax." (p. 350.) Specifically, the deficit must react negatively to the accumulated debt "infinitely often," (p. 350.)—which, in the authors' words might mean "after every election, at the beginning of every decade, or even at the beginning of every century." (p. 350.) Let's see. If "infinitely often" can mean once a century, then even Lyndon Johnson, Ronald Reagan, and George W. Bush can be viewed as paragons of fiscal virtue.[5]

Second, they note in a footnote that the government's present value budget constraint is derived by "iterating the government's flow budget constraint forward, and applying the transversality condition." (p. 380, footnote 22.) Mention of any transversality condition should ring a warning bell in your minds. It refers to an *asymptotic* convergence condition—what I just called "the infinite run." Over *that* long a run, we are not just all dead, we are all fully decomposed!

Third, their description of how the economy responds to a tax cut will sound odd to most students trained in macroeconomics: "A tax cut lowers the right-hand side of [the present value budget constraint], and the price level rises to bring the left-hand side in line." (p. 347.) Wait a minute. Is the key equilibrium condition really the satisfaction of the present value budget constraint? Does the price level really bear the main burden of adjustment? Don't many other variables adjust much faster—such as real output and interest rates, both of which should rise after a tax cut? Any empirical macro model will tell us that what is portrayed here as the effect of a fiscal expansion on the price level must take a very long time, indeed.

Let's think a bit about how the actual macrodynamics play out after a rise in government spending.[6] Start the economy in equilibrium with a balanced budget. Now raise spending, thereby stimulating aggregate demand. If the central bank holds either bank reserves or the money supply constant, interest rates will rise immediately, with the magnitude dependent on expectations of, e.g., how long-lasting the deficit is expected to be and how monetary policy might respond in the future. If the central bank holds the short-term interest rate constant, the yield curve should steepen.

As this process is playing out, new assets—either high-powered money or government bonds—must be created to cover the budget deficits. That's the flow budget constraint:

$$\Delta M + \Delta B = G + iB - T(y,P), \tag{1}$$

in nominal terms, where $T(y,P)$ is tax receipts, G is government expenditure, i is the nominal interest rate, M is the (high-powered) money supply and B is the number of $1 bonds.[7] The asset creation described by equation 1 will also drive aggregate demand upward. As Carl Christ pointed out in a 1968 paper, a new steady-state equilibrium requires that the budget deficit eventually be closed.[8] How does that happen? Here, the mix of future monetary and fiscal policies becomes crucial, which was the point of a once-famous but now forgotten 1973 paper by Bob Solow and me.[9]

Let's review the four possible cases and relate each to the fiscal theory of the price level. An increase in government spending that enlarges current and future budget deficits will require some combination of:

(1) increased issuance of interest-bearing debt,[10]

(2) increased creation of high-powered money,

(3) increases in future taxes,

(4) decreases in future government expenditures.

Case 1. Stability under bond financing: The fiscal expansion sets a horse race in motion. On the one hand, real output (y) and the price level (P) rise, thereby increasing tax receipts and helping to close the deficit. But, on the other hand, interest rates (i) and the national debt (B in nominal terms, $b=B/P$ in real terms) also rise, which widens the deficit. Solow and I (1973) showed that, for some parameter values, the economy's natural dynamics will be stable even when all deficits are financed by issuing bonds. In that case, the economy will converge to a new, higher equilibrium with budget balance restored:

$$t(y,P) = g + ib, \tag{2}$$

where $t(.)=T(.)/P$, $g=G/P$, and $b=B/P$. In the stable case, the fiscal expansion will never "force" the central bank to print more money. So, this case is "non-Ricardian," in the language of the fiscal theory of the price level. More important, it is not threatening to the functional independence of the central bank.

That's good news. But is the economy likely to be stable under bond financing? In the simple case where the tax function is linear homogeneous (so that $tP=0$),[11] the long-run multiplier implied by equation 2 is:

$$dy/dg = (1/t_y)\,[1 + b(di/dg) + i(db/dg)]. \tag{3}$$

Explicit solutions for di/dg and db/dg depend on the details of the underlying model. But scrutiny of equation 3 will do for present purposes. Surely di/dg and db/dg will be positive, making the term in square brackets larger than one. And $1/ty$ is a pretty big number—say, three or four in the United States. So, equation 3 suggests a rather large multiplier, dy/dg, certainly much larger than what the FRB/US model tells the FOMC. That should alert us to the strong possibility that the economy might never converge to the new equilibrium under bond financing.[12]

Case 2. Instability under bond financing: In fact, using a fixed-price model, Solow and I (1973) showed that the economy might well be unstable under bond financing of deficits, but is always stable under money financing. A few years later, Tobin and Buiter (1976) established corresponding results for a full-employment model in which a variable P did all the adjusting while y was fixed.[13] Shortly thereafter, Pyle and Turnovsky (1976) derived similar results for a more complicated model in which both P and y adjusted simultaneously.[14] The message of these and other papers was simple and consistent: Stability under money financing was vastly more likely than stability under bond financing.

What do these results mean in practice? If the government runs a

deficit, and the economy is stable under money financing but unstable under bond financing, the central bank may be forced to finance deficits by printing money. The other option doesn't work. Since the policy of bond financing can be viewed as adherence to monetarism (because the central bank sticks to its money target, regardless of the deficit), this result anticipated Sargent and Wallace's (1981) "unpleasant monetarist arithmetic."[15] From the point of view of the fiscal theory of the price level, it is also the more worrisome "non-Ricardian" case. Here, monetary policy does lose control of the price level to fiscal policy.

Cases 3 and 4. Adjusting future fiscal policy instead: But what about the so-called Ricardian cases, which Solow and I did not consider back in 1973? Imagine that the economy starts bombing off on one of the unstable paths. Something has to give, because actual economic variables do not go to positive or negative infinity. We have just noted that money financing of deficits can stabilize the system, though at a cost of considerable inflation. What about changes in fiscal policy?

In a quite different context, Barro (1974) pointed out that current tax *cuts* can be balanced by future tax *increases* that preserve the present-value budget constraint.[16] If present-value constraints are all that matter—a proposition I would dispute—a tax cut is a non-event in this case. Alternatively, current tax cuts (or expenditure increases) can be balanced by future reductions in government spending of equal present value. In neither of these cases is the ability of the central bank to stabilize the price level compromised in any way.

So, where does this all leave us, and how does it relate to CC&D's nicely written second act? If the government runs a large deficit, thereby boosting the growth of aggregate demand, there are four pure possibilities—and, of course, an infinite number of combinations of the four.

(1) If all deficits are covered by issuing bonds, and the economy is stable under this financing policy, the central bank need not react. It might want to react by tightening monetary policy to prevent inflation. But the central bank, not the fiscal authorities, controls the price level.

(2) If bond financing of deficits leads to dynamic instability (or, under rational expectations, to "unpleasant monetarist arithmetic"), and the fiscal authorities refuse to be disciplined, the central bank may be forced to cover the deficits by printing money. In that case, it does, indeed, lose control over the price level and of monetary policy more generally.

(3) and (4) In the unstable case, the fiscal authorities might decide to prevent instability by exercising some discipline. That could mean either raising taxes or cutting spending. Either reaction would take the pressure off monetary policy. And CC&D tell us that not much discipline is required.

Finally, we should all remember that this discussion is loaded with, what I call, "angels-on-the-head-of-a-pin economics." The "runs" to which these theoretical results apply are very long, indeed. Over time spans that a practical central banker might think of as "the long run," say five to ten years, the present-value budget constraint is not terribly relevant under normal circumstances. And even the flow budget constraint equation 1 is just an accounting identity that summarizes options rather than imposes any serious constraints.[17] It is, instead, the old-fashioned fiscal-monetary policy mix that may really affect the economy. This brings me to the unwritten Act 4, wherein the prince of Denmark enters the play.

Suggested Act 4: The fiscal-monetary policy mix

I begin with the obvious. Both fiscal policy and monetary policy influence aggregate demand, exchange rates, real interest rates, and stock market valuations. Mostly through the latter two, they influence the share of investment in GDP. If we imagine holding aggregate demand constant and changing the policy mix toward more expansionary fiscal policy and tighter monetary policy, that should raise real interest rates and decrease the investment share. (CC&D's Act 3 reassures us on this point.) It should, therefore, damage medium-term growth. A change in the policy mix in the other direction should be pro-investment, and therefore pro-growth.

All that is economic kindergarten. Yet, the policy mix, an issue barely raised by CC&D, was the focus of my 1982 Jackson Hole paper on the coordination of monetary and fiscal policy. Why?

Because in August 1982, the United States was in the early stages of reacting to the Reagan-Volcker policy mix. The abandonment of fiscal discipline by the Reagan Administration, even though it would be corrected in much less than a century, collided violently with the anti-inflation policies of the Federal Reserve under Paul Volcker, sending interest rates skyrocketing. This undesirable mix of tight money and loose fiscal policy had plagued us before—think, for example, of Johnson and Martin in 1966. But the Reagan-Volcker episode was probably the most spectacular example ever. In commenting on my 1982 paper, James Tobin opined that the "fiscal-and-monetary tug-of-war has over the years, spectacularly right now, led to a mix that penalizes capital formation and growth."[18] The perverse policy mix made a great deal of difference to the U.S. economy. It was, I would say, one of the two main macroeconomic stories of the 1980s—the other being the conquest of inflation—even though it did not last long enough to wrest control of the price level from the Fed.

The main macroeconomic story of the 1990s was precisely the opposite. The Clinton-Greenspan policy mix of tighter fiscal policy (leading ultimately to large surpluses) and easier monetary policy served the nation extremely well. It presumably boosted both the investment share and the growth rate for years. And what might happen a century later was presumably unimportant to markets, to citizens, and to policymakers.

Now, in the 2000s, we are faced with the possibility that fiscal and monetary policy might collide again. It is not revealing any trade secrets to state that monetary policy will have to be tightened considerably once the current period of weakness is over. The FOMC has already said that, and I'm sure it did not have the year 2102 in mind. Yet, fiscal discipline has collapsed again. Not only are we in the midst of a ten-year tax-cutting binge, but the shackles on government spending have also come off. It could be that the Bush-Greenspan policy mix will wind up being a smaller-scale replay of Reagan-Volcker.

If you will indulge me one last word about my 1982 Jackson Hole paper, I will conclude by tying Act 4 back to Act 2. Among the topics that worried me then was the lack of coordination between monetary and fiscal policy. I suggested that a policy mix of tight money and loose fiscal policy might be the natural Nash equilibrium of a noncooperative game between a government that placed higher weight on reducing unemployment and a central bank that placed higher weight on reducing inflation.[19] One way to solve this problem, I observed, was suggested by Milton Friedman back in 1948—years before he became the first monetarist.[20] Friedman suggested that fiscal policy set spending and taxes on *microeconomic* criteria, and not vary them cyclically. With what we now call the *structural* deficit fixed at zero, the actual budget would show a surplus or a deficit, depending on the stage of the business cycle. And Friedman suggested that all such deficits or surpluses be financed by money creation or destruction.

Notice three things about this policy. First, recall the theoretical finding that the economy is (virtually) always dynamically stable under money financing of deficits. Second, in terms of the four cases dealt with in Act 2, this non-Ricardian case is precisely the opposite of monetarism: The supply of bonds is non-reactive while money growth varies sharply with the business cycle—and in a stabilizing manner. And third, this Friedman rule would create an extremely powerful automatic stabilizer. A $100 billion deficit, for example, would lead to $100 billion in new *high-powered* money. That's quite a kick. It wouldn't last for a century, but it ought to cure slumps in short order.

I can't help thinking that both fiscal and monetary policymakers might be better off studying the 1948 writings of Milton Friedman than the modern fiscal theory of the price level.

Author's note: The author is grateful to Lars Svensson for helpful discussions.

Endnotes

[1] See Alan S. Blinder. "Issues in the Coordination of Monetary and Fiscal Policy," in *Proceedings of a Conference on Monetary Policy Issues in the 1980s* (Federal Reserve Bank of Kansas City, 1982), pp. 3-34.

[2] The terminology is misleading. The "deficit elasticity" is the derivative (not the elasticity) of the government budget deficit with respect to GDP.

[3] This is true even though even labor mobility in the United States should not be exaggerated. See Olivier Blanchard and Lawrence Katz, "Regional Evolutions," Brookings Papers on Economic Activity, 1:1992, pp. 1-75.

[4] I refer to the fact that two of my esteemed colleagues, Christopher Sims and Michael Woodford, have been major proponents of the theory. See, for example, Sims (1994) or Woodford (1994). [References are in CC&D's bibliography.]

[5] Of course, these once-a-century fiscal adjustments would have to be very large to do the trick. CC&D are playing with the mathematics of infinity here.

[6] I switch from a tax cut to an increase in government spending only for notational simplicity.

[7] To keep the arithmetic simple, I model government bonds as having zero maturity. A more realistic model would let bond prices depend on interest rates and allow for capital gains and losses.

[8] See Carl F. Christ, "A simple macroeconomic model with a government budget restraint," *Journal of Political Economy*, 76:1968, pp. 53-67. In a growth context, the corresponding condition is that the debt/GDP ratio be stabilized.

[9] See Alan S. Blinder and Robert M. Solow. "Does Fiscal Policy Matter?" *Journal of Public Economics*, 2:1973, pp. 319-337.

[10] Of course, if the country's long-run fiscal situation truly raises the specter of insolvency, it may not be able to float debt. This is an important case for the fiscal theory of the price level. But it is not likely to apply to the EU or the United States.

[11] This simplification is in no way crucial to any results; it just reduces the algebra.

[12] Note that, under money financing, db/dg will be zero and di/dg will probably be negative.

[13] In this case, a linear homogeneous tax function will not do. Rising *P* must raise *real* tax receipts. See James Tobin and Willem Buiter. "Long-Run Effects of Fiscal and Monetary Policy on Aggregate Demand," in Jerome Stein, ed., *Monetarism* (North-Holland, 1976).

[14] See David H. Pyle and Stephen J. Turnovsky. "The Dynamics of Government Policy in an Inflationary Environment: An 'Intermediate Run' Analysis," *Journal of Money, Credit, and Banking*, 8:1976, pp. 411-437.

[15] In the stable case, the steady-state multiplier *dy*/*dg* is actually *larger* under bond financing than under money financing. This implies that an open-market purchase of bonds will be disinflationary—which is the essence of Sargent and Wallace's surprising result. [Reference is in CC&D's bibliography.]

[16] See Robert J. Barro. "Are Government Bonds Net Wealth?" *Journal of Political Economy*, 82:1974, pp. 1095-1117.

[17] One major exception is if the nation's finances are in such a mess that it cannot float bonds. In that case, monetary policy becomes subordinated to fiscal policy because a fiscal deficit forces money creation.

[18] See James Tobin. "Discussion," in Federal Reserve Bank of Kansas City, *Monetary Policy Issues in the 1980s*, 1982, p. 44.

[19] Both were assumed to favor a higher investment share of GDP.

[20] See Milton Friedman. "A Monetary and Fiscal Framework for Economic Stability," *American Economic Review*, 38: 1948, pp. 245-264.

Commentary: Should the European Central Bank and the Federal Reserve Be Concerned about Fiscal Policy?

Sebastian Edwards

Canzoneri, Cumby, and Diba have written a very good paper on the relationship between fiscal and monetary policy. It is informative, clear, and persuasive. As the title indicates, the analysis deals exclusively with the cases of the United States and the European Union (EU). In a way, however, these are the countries where the discussion on the connection between fiscal and monetary policy is least interesting. This is because, as the authors themselves persuasively point out, it is very difficult to argue seriously—either theoretically, empirically, or historically—that the United States or the EU have lacked Ricardian fiscal discipline. Clearly, these are not cases of fiscal dominance.

There are, however, a number of other countries where the issue of fiscal constraints on monetary policy actions is very important. Many of these countries are in Latin America, and a premier example is Argentina, where the dominance of fiscal policy—and, in particular, of rampant fiscal imbalance in the provinces—ended up triggering a massive crisis at the end of 2001. A second case, although not nearly as serious as Argentina, is that of Brazil, where recent—that is, during July and August of this year—concerns about the sustainability of fiscal policy have generated very serious financial upheaval and have resulted in a rapid weakening of the currency and a significant jump in the country risk premium.

In these comments, I expand the analysis presented by Canzoneri, Cumby, and Diba to the case of the emerging markets, with especial emphasis on Latin America. I will address three issues. First, I will discuss how the existence of indexed debt changes the channels through which macroeconomic shocks are validated. Second, I will discuss two specific cases: Chile and Brazil. And third, I will deal with a brief discussion on monetary policy and financial sector regulation in the emerging markets.

As is explained in great detail in the their paper, in standard *fiscal theory of the price level* stories, jumps in the price level play an important role in making sure that the intertemporal budget constraints holds. This comes out very clearly in the paper's equation 4. A higher price level reduces the real value of outstanding public-sector debt and restores the intertemporal equilibrium condition when the deficit is too high as to assure sustainability. This, of course, is a very plausible story when the public debt is denominated in the local currency. Things, however, change if the debt is indexed. Consider the extreme case when all of the public-sector debt is fully indexed to the domestic price level. Under these circumstances, jumps in the domestic price level do nothing to restore equilibrium: A jump in the price level results, through the indexation mechanism, in an immediate equiproportional jump in the nominal value of outstanding debt, and the debt-to-GDP ratio is restored to its pre-price level jump level. A similar situation, although not as drastic, will take place when a proportion of the debt is indexed to the price level, or when the debt is indexed to the nominal exchange rate. This was, indeed, the case of Argentina during the 2001 to 2002 crisis.

In the presence of massive indexation, there are two ways out of the problem. One alternative is that the authorities understand that with indexed debt, price level jumps do not help to restore equilibrium; all they do is unleash a public debt-driven hyperinflation process. As a result of this understanding, the government authorities change their behavior and conduct fiscal policy in a super careful, conservative, and austere way. That is, the sheer existence of indexation provides an incentive for the government to fiscally be disciplined, in a Ricardian sense. Some authors have argued that this would, indeed, be the case

and have suggested that emerging markets should deliberately index their debt to the nominal exchange rate as a way of generating a conservative fiscal behavior. History, including the recent Argentine debacle, has shown, however, that this is not a likely outcome of indexing the public-sector debt. Instead, the presence of indexed debt—and, in particular, debt indexed to the exchange rate—will usually result in perverse incentives, where the monetary authorities intervene in the foreign-exchange market in an effort to avoid the weakening of the currency. A second way out of the inconsistencies generated by indexed debt is that instead of the intertemporal constraint being re-established by a jump in the price level (an upward jump in the denominator in equation 4), it gets re-established by a write-off of all or part of the debt itself (this is a downward jump in the numerator in equation 4).[1] This is, indeed, the way in which the situation was resolved in Argentina at the end of 2001, when the government defaulted on $140 billion (U.S. dollars) of debt. As the developments of the last eight months in Argentina have shown, the costs associated with this option—in terms of loss of access to the international capital market, collapse in output, and climb in the rate of unemployment—can be very high, indeed. In fact, I believe that it is fair to say that one of the most important lessons of the Argentina debacle is that, contrary to what a number of observers claimed in the period leading to the crisis, there isn't such a thing as a costless—or even low cost—debt default.

The second part of my comments refers to two country experiences—those of Chile and Brazil—that are particularly relevant for the discussion at hand. Chile provides a particularly interesting case because it has not only been the most successful country in Latin America in the last decade and a half, but since the year 2000 it has operated with two rules: a monetary rule based on an inflation-targeting framework and an explicit, publicly known fiscal rule. As background, Chile has posted an average rate of growth of 5.8 percent during the last fifteen years; it has an extremely open economy—average import tariffs are approximately 4.8 percent; inflation has been stable at around 4 percent; and it has had an independent central bank since the return of democracy in 1990. Chile has been a pioneering inflation-targeting country and has a very low public-sector debt-to-GDP ratio, in the order of 12 percent. In early 2000, the incoming

administration of President Ricardo Lagos adopted a very strict fiscal rule that calls for a yearly *structural surplus of 1 percent of GDP.* This rule has three interesting characteristics: First, it is a deficit-based, as opposed to debt-based, rule of the type that Canzoneri, Cumby, and Diba criticize in their paper. Second, the Chilean rule is significantly stricter than the *Stability and Growth Pact* rule in effect in the EU. And third, by defining the rule in terms of the structural fiscal balance, it has allowed the government to run a counter-cyclical fiscal policy, something that almost no Latin American country has been able to in the last thirty years or so. In fact, it is expected that during 2002—a year of recession and depressed terms of trade—the consolidated nominal public-sector deficit in Chile will be 3.2 percent of GDP.

What is particularly interesting about Chile's rule is that it was not enacted—as some uninformed observer could conclude—as a way of protecting the independent central bank from a non-Ricardian public sector. The main reason why the Lagos Administration implemented this rule is to protect the Treasury from the government's own political supporters, both in Congress and outside of it. This strict rule has, indeed, helped keep the left-of-center coalition member parties at bay in their requests for increasing expenditure in pet projects. Although the fiscal rule main objective was not to isolate the central bank from "fiscal theory of the price level" type of pressures, it has allowed the bank to use greater degrees of freedom. In particular, it has allowed the central bank to pursue a more aggressive low-interest-rates policy during the last few months. In addition, with fiscal policy governed by the above-mentioned rule, the central bank has felt comfortable with a weaker currency and has avoided intervening (very) actively in the foreign-exchange market.

From a political economy point of view, the different political forces have broadly accepted the overall notion of a fiscal rule. Some of the details—including the calculation of potential GDP growth and of the "normal" price of copper—have been challenged, but the principle has been accepted. This is, on itself, important and may very well start a trend among Latin American countries.

I now turn to Brazil, a country that has been profusely in the news

lately—in particular as a result of deteriorating financial conditions and the large IMF package announced a few weeks ago. Although it is clear that in Brazil there is no "fiscal dominance," the fiscal side does introduce some important constraints to the conduct of monetary policy. This is for two basic reasons: First, Brazil's public-sector debt is at its limit, having reached its "ceiling" some time during the first few months of this year. In terms of GDP, the consolidated public-sector debt was 30 percent by the end of 1994—the first year of the *real* plan. It was 50 percent by mid-2001, and it had climbed to 62 percent by the end of July of this year.[2] Second, most of this public-sector debt is indexed, either to the foreign exchange or to short-term interest rates. Recent calculations indicate that, all in all, more than 70 percent of total public-sector debt is indexed, with 40 percent tied to the real/U.S. dollar exchange rate and another 30 percent tied to interest rates. This has left the central bank between a rock and a hard place. In particular, under conditions of instability and uncertainty, the central bank is greatly constrained on its ability to use the interest rate as a policy tool. If it raises interest rates, that part of the debt tied to it will increase, raising the debt-to-GDP ratio generating through this channel, greater instability. If, however, interest rates are not raised, the currency will tend to depreciate—as it has during much of this year—also generating a higher debt ratio, which feeds into greater instability.

Earlier this year, things took a turn for the worse in Brazil. This was the result of two shocks: First, the collapse of the Argentine economy introduced great uncertainty with respect to the future of the regional trading bloc MERCOSUR, generating a drastic decline in FDI in Brazil. And second, there has been a great deal of uncertainty surrounding the October 6 presidential election. In particular, private-sector analysts have been concerned with the very strong showing in the polls of the left-wing candidate Luiz Inacio da Silva, "Lula." The combination of these two shocks and the very high debt-to-GDP ratio, discussed above, have shown to be a fatal combination. Investors have dumped Brazilian bonds, local firms have tried to cover their foreign-exchange exposure, and international banks have been calling in their credit lines. As a result, the risk premium on Brazilian international bonds has climbed past the 2,000 basis points mark, and the exchange rate, which in January stood at 2.3 reais per dollar, has migrated to the

3.2 to 3.4 range. The country has rapidly moved into a "bad equilibrium," where the beliefs that a crisis may occur have generated a series of reactions that have resulted in an increase in the probability that the crisis may indeed occur. Brazil has been trapped in a vicious circle.

The IMF program announced a few weeks ago has been a serious attempt to move Brazil out of this bad equilibrium. It is a solid and largely well-designed program. At $30 billion (U.S. dollars), it is larger than what most people expected; it is back-loaded and provides the right incentives; it includes $6 billion (U.S. dollars) of fresh resources to be disbursed this year; it lowers the international reserves floor to $5 billion (U.S. dollars), increasing the amount of usable reserves significantly; it introduces flexibility into the inflation-targeting rule; it maintains a primary surplus target of 3.75 percent of GDP; and it is lean in terms of ancillary conditions. I believe that this program has a fighting chance of succeeding. All political candidates have broadly supported it, the trade surplus is increasing, and for a few days the market seemed to have reacted positively to the news of renewed multilateral support. Having said this, it is important to emphasize that for the public debt situation to really stabilize, a constellation of factors has to come into line. First, during 2003 to 2004, average rate of growth should move back to the 4 to 4.5 percent mark. Second, the cost of borrowing for Brazil should go down from it current level of approximately 1,900 basis points above Treasuries, to the vicinity of the 700 basis points. Third, maturing bonds, loans, and credit lines have to be rolled over massively. Fourth, the primary surplus should go up to approximately 3.9 percent of GDP and maintained at that level for the foreseeable future. And finally, the currency has to strengthen drastically, moving from the current 3.3 reais per U.S. dollar rate, to around 2.3 to 2.4 reais per dollar. While it is not impossible to fulfill this rather formidable list of requirements, it will not be easy to do it.

The final part of my remarks refers to two issues regarding monetary and financial policy in the emerging countries. Here, I am on more tentative terrain, and instead of making a statement I want to raise some questions that I believe will have important consequences for the future stability of the emerging nations and of the world financial system. The first question is whether the exchange rate should

enter into the monetary policy rule in an inflation-targeting framework. From a technical point of view, this discussion may be framed in terms of the form of the Taylor rule in a small open economy. Taylor himself has posed the problem as follows (2001, p. 263.): "How should the instruments of monetary policy (the interest rate or a monetary aggregate) react to the exchange rate?" In order to address this question more formally, consider the following equation (see Taylor, 2001.):

$$r_t = f\pi_t + gy_t + h_0 e_t + h_1 e_{t-1}. \quad (1)$$

Where r_t is the short-term interest rate used by the central bank as a policy tool, π_t is the deviation of the rate of inflation from its target level—possibly zero—y_t is the deviation of real GDP from potential real GDP, and e_t is the log of the real exchange rate in year t.[3] f and g are the traditional Taylor rule coefficients; h_0 and h_1 are the coefficients of the current and lagged log of the real exchange rates in the expanded Taylor rule and are the main interest of this discussion. Traditional analyses have assumed that the central bank should ignore open economy considerations when undertaking monetary policy—in terms of equation 1, this means that $h_0 = h_1 = 0$. It is conceivable, however, that in a small open economy the optimal monetary policy rule—that is the policy that maximizes the authorities' objective function—is one where both h_0 and h_1 are different from zero. Interestingly, if $h_0 < 0$ and $h_1 = -h_0$, then the rule implies that monetary policy should react to changes in the (real) exchange rate. Notice that the formulation in equation 1 does not imply, even when h_0 and h_1 are different from zero, that the monetary authorities should defend a certain *level* of the exchange rate.

The second question is whether foreign-currency indebtedness should be regulated in emerging countries with a floating exchange rate and inflation targeting. The importance of this question is based on the fact that when there is massive foreign-currency-denominated debt—either public or private—changes in the nominal exchange rate will tend to be translated into large balance-sheet effects. This, in turn, is likely to affect the authorities' willingness to let the exchange rate to truly float. There is some evidence suggesting that price-based and transparent mechanisms that regulate capital *inflows*, such as the flex-

ible tax on short-term capital used by Chile during much of the 1990s, work relatively well as a transitional device. It allows for some capital mobility and discourages short-term speculative monies; at the same time, it avoids arbitrary decisions by bureaucrats. But, as I have argued elsewhere, even Chile-style capital controls have costs, and they did not spare Chile from contagion or macroeconomic instability during the second half of the 1990s. This is a question that, as the previous one, will require additional research.

Endnotes

[1] From a purely algebraic point of view, a third option is that *real GDP*, the second variable in the denominator in equation 4 experiences a jump. From a practical point of view, however, this is not a relevant alternative, as it is extremely unlikely that in a country with doubtful solvency real GDP growth will increase at the rates required to solve the intertemporal imbalance.

[2] Only 20 percent of this debt corresponds to foreign debt.

[3] In this formulation, an increase in *e* denotes a real exchange rate appreciation.

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General Discussion: Should the European Central Bank and the Federal Reserve Be Concerned About Fiscal Policy?

Chair: John B. Taylor

Mr. Taylor: Thank you very much, Sebastian. We have a couple of questions here, Jean-Philippe would you please get us started?

Mr. Cotis: I am not going to say the Stability and Growth Pact is an ideal theoretical object, but it is there. I am not sure it imparts such a deflationary bias to European activity. I guess the recent doctrine in Europe was that we should aim, at least, at structural budget balance. This is not silly in a context of aging populations, staffing pension reforms, and very high unfunded liabilities. Having reached a position of structural budget balance, you have ample room for automatic stabilizers to play and enough to cope with large negative output gaps, from 4 to 6 percentage points of GDP. I don't have to remind you that automatic stabilizers are twice as large in Europe than in the United States. So, what went wrong in Europe over the past few years? I guess fiscal policies went wrong, quite independently from the pros and cons of the stability pact.

A number of European countries ran pro-cyclical fiscal policies during the late 1990s, leading to a marked deterioration of their structural balances. It was neither good for economic stabilization nor for the long-run sustainability of public finances. So, I doubt that deteriorating further the structural balances in Europe will be helpful on either count. A few words about Germany now. Unfortunately, I am not quite

sure that Germany's main problem is primarily a demand one. It is much more of a structural problem. In any case, Europe is now faced with an area-wide slowdown, which has been met with reasonably accommodative monetary conditions. They will benefit Germany. From a theoretical point of view again, I am sure the Stability and Growth Pact is something that is not perfect, but in practice it was not applied. The fact that some countries did not really stick to the philosophy of the pact during the previous upswing—running procyclical fiscal policies—is really at the root of the problem. Not sticking to the spirit of the pact has been the major source of economic destabilization.

Mr. Taylor: Thank you. Let's go through other comments before we have the panel respond. Larry Summers, please.

Mr. Summers: We have talked about the fiscal theory of the price level and Alan's equation 1 with respect to the United States, Europe, and emerging markets. I want to raise the possibility of whether it doesn't have very substantial relevance to the situation in Japan, which is the one place where we have not talked about it.

If you look at Alan's equation 1, we traditionally talk about fiscal policy, which is the right-hand side of the equation, and monetary policy, which is left-hand side of the equation. The problem we encounter, if there is a liquidity trap, is that m and b are perfect substitutes. So, switching m and b back and forth doesn't have any effect. One way around that is the one that Allan Meltzer has suggested a couple of times, which is to say that there is some other asset, and if you switch around $m + b$ for that asset, you will have a substantial effect. That is a way of looking at the problem. Another way of looking at the problem is to think about what used to be called "money-financed fiscal expansion." That is, an increase in g minus t, supported by an increase in m with no change in b. That doesn't change the government's level of indebtedness. That does provide for a significant expansion. It doesn't involve the kind of proximate external implications that a change in the exchange rate, as was earlier suggested, and is available as a mechanism if the whole world were to find itself in this difficulty. So, I'd be interested in somebody commenting on the fiscal theory of the

price level as relevant in Japan and whether we are not a bit hobnobbed or held back by our traditional divisions conceptually between what constitutes fiscal and monetary policy in Japan.

Mr. Taylor: Thank you, Larry. Alan Auerbach is next.

Mr. Auerbach: I have two related points about debt measurement and a short point about the fiscal theory of the price level.

First of all, regarding the Growth and Stability Pact, there was a discussion of problems relating to basing it on deficits rather than debt. Both of these relate to deficits and debt as measured. In the United States and even more so in Europe, we have enormous and very rapidly increasing levels of implicit debt, so that both the deficits and the debt would look very different if one incorporated these accumulating liabilities. Indeed, how to measure them is not clear. Having a pact that attempts to pick a particular measure and impose restrictions on that strikes me as a first-order problem in fiscal control. I don't think this issue has gotten enough attention.

A similar point relates to the interchange between the authors and Alan about finding the effects of the explicit debt level or deficits on interest rates: Any theory that says explicit liabilities should matter because we are in a world of finite horizons also says that implicit liabilities should matter. Those move around a lot, so leaving them out of an equation trying to explain interest rates is a really good explanation for why the included variables don't have any impact or as much of an impact as we believe them to have.

Finally, on the fiscal theory of the price level, I offer a comment that relates a little bit to the point Sebastian Edwards made about indexed debt. If you had a world in which there were no nominal assets at all—if you were in a nonmonetary world—the government's budget constraint would still hold. We could still do the test of whether we are in a Ricardian or non-Ricardian world. And we might reject that we are in a Ricardian world. What would that tell us? It wouldn't tell us that the fiscal theory of the price level applies because this world doesn't have a price level—the price level is indeterminate; it doesn't matter.

We would know in that world there would be some other adjustment. It might be default of the debt. It might be a change in regime, a future tax increase, a cut in government spending. All of those possibilities, as Alan pointed out, exist when you put money back in the model. I find it very unconvincing when one looks at whether short-run policy satisfies or doesn't satisfy the budget constraint that that tells us anything about whether it is going to be monetized or whether there is going to be a jump in the price level. All it tells us is that something is wrong with current policy and there is going to be some adjustment. It doesn't tell us that the fiscal theory of the price level applies.

Mr. Taylor: Guillermo Ortíz.

Mr. Ortíz: I have just a very brief comment on Sebastian's last remarks. Putting capital controls or imposing other types of limits to the indebtedness of private agents is a pretty bad idea. It is much better to provide incentives for firms to hedge foreign-exchange exposure rather than to think in terms of controls. Let me suggest that one way of doing so is simply by developing derivative markets so that firms can hedge their exposure in a cost-effective way. Another very important incentive is associated with the adoption of flexible exchange rates. We conducted a study in Mexico recently and found there has been a structural change in private-sector indebtedness in the sense that the foreign indebtedness of corporates is now heavily concentrated on exporting firms, while before several firms producing nontradable goods had significant exchange rate exposure. So, firms by themselves are hedging their own foreign-exchange risk once they are provided with the right incentives. It is interesting to look at.

Mr. Taylor: Mickey Levy, please.

Mr. Levy: In your paper you try to identify and test the impact of fiscal policy (changes in fiscal surpluses or deficits) on interest rates or the yield spread, and you find an inverse correlation between projected budget surpluses and the yield spread. I find in looking at your equation 11, both the yield spread and the deficit or surplus projections are both jointly and endogenously determined by real, nominal, and cyclical variables. So, your empirical findings do not seem particularly instructive.

Mr. Taylor: Okay, would you like to respond to some of the comments and then we will take a break?

Mr. Cumby: Let me just start with a couple of brief comments and then Behzad Diba and Matt Canzoneri can join in. First, I think we all agree with Alan Blinder's view that neither the Fed nor the ECB ought to be staying up nights worrying about the fiscal theory of the price level. The reason is that all of the evidence that we look at—direct and indirect, and no matter how we slice it—supports the conclusion that fiscal policy has been sufficiently disciplined to be Ricardian.

Second, it is a bit unfortunate that, for reasons of an expositional clarity, we tend to focus on an economy with flexible prices and with real income and real interest rates given. With sticky prices, the important point still remains that if the fiscal authorities don't maintain sufficient discipline, it is the fiscal authority that controls nominal aggregate demand, not the monetary authority. So, the key question is not whether prices are sticky, but whether fiscal policy is sufficiently disciplined. Price stickiness will affect the economy's response to a change in nominal aggregate demand but not whether the nominal anchor is determined by fiscal or monetary policy.

Third, with indexed debt or real debt, the price level cannot adjust to satisfy the government's present value budget constraint. Something else has to give. It is probably worth recalling the literature on unpleasant monetarist arithmetic, which is a predecessor to the literature on the fiscal theory of the price level. In that earlier literature, the price level does not move to satisfy the present-value budget constraint. Instead, that literature considers how changes in seigniorage can satisfy the present value budget constraint if taxes and spending do not.

Finally, I want to express appreciation to Sebastian Edwards for validating our expectations. We thought about having discussion of how this would apply to emerging markets. We figured that you knew a whole lot more about that than we did, and we wanted to leave you something to say.

Mr. Taylor: Okay, is that it? Anything else?

Mr. Diba: Thanks for the comments. Alan Blinder's point about stocks and flows is well-taken; we just follow the literature in using deficits instead of debt. There is actually a footnote in the latest version of the paper acknowledging the point. In terms of Alan's discussion of the stability conditions under money or debt finance, the main point of the fiscal theory of the price level, as articulated by Mike Woodford, is that in an economy with nominal debt, the present-value budget constraint must always hold in equilibrium. Regardless of the government's financing decision, the private sector satisfies its present-value budget constraint, and the government's budget constraint is just the mirror image of the private sector's constraint. This is also related to a point Alan Auerbach made. We are explicitly dealing with an economy that has nominal debt. So, the present-value budget constraint is satisfied. The question is: To what extent is it going to be satisfied through an endogenous adjustment of nominal GDP, either prices or output?

I fully agree with Alan Blinder's assertion that the FOMC need not worry about the fiscal theory. In fact, the reason we articulated the proposition in the paper was that there were some suggestions in the earlier literature that surpluses must react strongly to debt to put the economy in a Ricardian regime. More specifically, the proposition says that the fiscal response does not have to be larger than the interest rate on debt and can be fairly minimal. So, it should be safe to ignore the issue in terms of practical thinking about monetary policy during normal times.

Once we think that this sort of minimal fiscal policy is present, the question is where do we go with our thinking about how fiscal policy affects the central bank? Our approach is to think of fiscal policy as a source of shocks to which monetary policy may respond. I fully agree with Alan that his Act 4 is the one where the more interesting questions are. In the paper, we offer one particular way of addressing such questions by documenting the responses of interest rates, output, and prices to fiscal shocks.

On Sebastian's points, the comments are appreciated. His comment about indexation is certainly right. If some of the outstanding debt is indexed or denominated in foreign currency, nominal GDP will be more volatile in a non-Ricardian regime. And in the extreme case that he was highlighting, when all the debt is indexed, the present-value budget constraint cannot be satisfied through fluctuations of nominal GDP. The applicability of the fiscal theory to Latin American economies is certainly an interesting topic. There is a very nice paper by Eduardo Loyo that argues the Brazilian inflation of the 1980s can be understood as a combination of non-Ricardian fiscal policy and the adoption of a Taylor rule by the central bank. I think there are interesting and open questions along these lines. However, saying that fiscal policy matters does not necessarily mean that the fiscal theory of the price level is true. For example, in Brazil, it may have been the case that fiscal policy was increasing the supply of bonds that had some liquidity services. The fiscal theory doesn't just say that fiscal policy matters; it also says that the effects of fiscal policy work through changes in the nominal net worth of the private sector. So, the theory emphasizes the types of wealth effects that Alan does not seem to find very reasonable.

Finally, Larry Summers' question points to another interesting application. The fiscal theory would say that switching bonds into money should not matter much, regardless of whether or not the economy is in a liquidity trap. I don't know what the theory would say about Japan, because the theory would imply that changes in expectations about primary surpluses are what matters.

Mr. Taylor: Okay, thank you very much.

Overview

David A. Dodge

What I propose to do on this panel today is to talk about stabilization policy and policy cooperation from the viewpoint of an industrial country that has a floating exchange rate and both an explicit inflation target for monetary policy and a clear objective for fiscal policy. While my perspective has been particularly influenced by my time as deputy minister of finance and now as governor of Canada's central bank, the broad outlines of my conclusions are widely shared, not only in those two institutions, but in Canadian academic and public policy circles as well. Moreover, I believe that our experience and the lessons that can be drawn from it are applicable to all open economies with flexible exchange rates.

In the 1990s, the Bank of Canada and the government of Canada reached a series of joint agreements on inflation-control targets. As well, the government established a framework that greatly reduces the probability of running a fiscal deficit and, thus, puts the debt-to-GDP ratio on a clear downward track.

Initially, the credibility of these policies was not high; so, it was essential to demonstrate clearly our resolve to achieve greater fiscal prudence and lower inflation until credibility was gained. Thus, it was sometimes necessary to override the automatic stabilizers of fiscal policy in order to establish credibility. And for monetary policy, it meant that we could not always implement the easing warranted by

our inflation targets. But as the targets were achieved, the public's trust that the authorities were going to do what they said they would do increased. That trust is tremendously important.

Now that the credibility of both monetary and fiscal policies is firmly established, the stabilizers are able to do their job.

I would like to begin by considering stabilization policy, then say a few words on policy cooperation.[1]

Stabilization policy

Monetary policy and stabilization

In aiming to achieve a 2 percent inflation target over an eighteen- to twenty-four-month horizon, Canadian monetary policy plays an important role in stabilizing the economy in response to demand and supply shocks.

When there are shifts in demand, the direction of changes in our policy interest rate is quite clear. Suppose that the economy is operating at its production potential and that inflation is at the 2 percent target. A downward shift in demand would create excess supply in the economy, putting downward pressure on inflation. To bring inflation back to 2 percent over a period of eighteen to twenty-four months, the Bank of Canada would lower its target for the overnight interest rate. Through its effect on market interest rates and the exchange rate, this action would increase the level of output in the economy, moving it back toward production potential. Inflation would, therefore, return to the target shortly after the excess supply disappeared from the economy. An upward shift in demand would, of course, generate symmetric responses.

While the theory is clear about the appropriate response to demand shocks, the magnitude and persistence of shocks—and, hence, the size and timing of interest rate adjustments—are always difficult to judge. This is where the art of monetary policymaking comes into play.

It is even more difficult, of course, to gauge the appropriate monetary policy response to supply shocks, which take the form of higher (or lower) inflation than expected for a given level of demand. The bank's framework for inflation targeting allows temporary supply shocks to be largely ignored, as long as they do not feed into inflation expectations. The credibility that has been established means that they typically no longer do so. Consider price surprises coming from the most volatile components of the consumer price index—components such as fruits and vegetables or fuel oil and natural gas. As our operating guide, we use a measure of core inflation that excludes these components. This gives us, and economic observers, some confidence that we are looking at something close to the underlying trend of inflation. Thus, our interest rate response to price shocks that are perceived to be temporary can be minimal. As a result, there will be little effect on output. In other words, monetary policy does not turn temporary supply shocks into something that is destabilizing for aggregate output.

A more difficult situation occurs when persistent increases or decreases in prices coming from the most volatile components of the consumer price index threaten to keep the total index away from the target for a significant period. Credibility helps here too, but the bank must be particularly cautious that these movements in inflation do not feed into inflation expectations.

Supply shocks that take the form of a change in the level or growth rate of potential output are often hard to recognize. Here, however, the key is for the central bank to return the trend of inflation to the target if it has moved away. Since the trend of inflation relative to the target is the best indicator of where demand is relative to potential output, this will be consistent with moving demand back into line with the new path of potential output over the medium term.

Fiscal policy and automatic stabilization

In Canada, the main automatic fiscal stabilizers are various types of tax revenues, as well as employment insurance payouts. Some of these fiscal stabilizers work almost immediately—for example, personal

income tax deducted by the employer. Others, such as employment insurance payments, work with a fairly short lag.

Comparing and contrasting automatic fiscal and monetary stabilizers

Automatic fiscal stabilizers are very effective in dampening an output cycle. But they offset only part of the change in output. In contrast, monetary policy can fully offset a change in output, but it takes time to work, with the full impact on output normally felt only after twelve to eighteen months.

Discretionary stabilization policy

While the *automatic* or quasi-automatic stabilization provided by monetary and fiscal policies is very desirable, the question remains as to whether there is a role for something further—a *discretionary* stabilization policy.

In the case of monetary policy, the nature of the response is the more or less automatic one described earlier. As I implied then, judgment is key to the process. That is particularly true in times of great uncertainty, such as last autumn. But a clear inflation target means that, in principle, the discretionary choice for monetary policymakers is limited relative to that of the fiscal authorities.[2]

The arguments for and against discretionary fiscal policy as an important element in macroeconomic stabilization in an *open* economy tend to revolve primarily around lags and around the effectiveness of short-run fiscal policy relative to monetary policy.

If the timing were close to perfect, fiscal policy measures that lasted for two or three quarters could, *in principle* and under ideal circumstances, shorten the time it takes to move output back to its desired level. Thus, in principle, discretionary fiscal policy is a useful tool. But, as a practitioner, I can tell you that the great problem here is that temporary measures are both difficult to initiate quickly when the need arises and extraordinarily difficult to stop once the need is past.

Thus, as a practical matter not a philosophical one, there are some severe limitations to the use of discretionary fiscal policy as a stabilizer.[3, 4]

My views about this have been reinforced by the way the business cycle in Canada has developed over the last eighteen months or so. In early 2001, we were expecting that the slowdown in both the U.S. and Canadian economies would be modest. In Canada, an earlier-announced tax cut was fortuitously coming into effect. It was not until the middle of last summer that it became evident that the Canadian economy was undergoing a more pronounced slowdown than we had expected. Between January and August 2001, we had lowered our policy interest rate by 175 basis points. Even the most ardent supporters of discretionary fiscal policy would not have thought about doing anything major until August. With the horrific events of September 11, economic forecasters marked down their forecasts for 2001 and 2002 significantly. We, like other major central banks, accelerated the pace at which we were cutting interest rates—from September through January 2002, we lowered our policy interest rate by a further 200 basis points.

Fortunately, the Canadian government added only a small amount to spending in its budget announcements in late 2001, and that consisted mainly of necessary spending for security and border issues. I say "fortunately" because, based on the national accounts published at the end of May 2002, growth in the Canadian economy actually rebounded in the fourth quarter of 2001 and accelerated to about 6 percent in the first quarter of this year.

Thus, with the benefit of hindsight, it is evident that there was more underlying strength in the economy than we expected. Combined with the large amount of monetary stimulus that was applied, this meant that the economy could recover rapidly. Therefore, added fiscal stimulus was not necessary to get the economy going. And the monetary stimulus provided is proving much easier to turn around. Since mid-April, we have raised our policy rate by 75 basis points. To be sure, other uncertainties have arisen and will continue to arise in the future. Our best judgment about these uncertain factors will continue to be taken into account. But, overall, this episode is clearly showing

that monetary policy actions can be used more flexibly than fiscal policy actions.

I would stress that discretionary fiscal policy can also get governments into trouble if it leads them to neglect their long-run fiscal anchor—particularly since discretionary action is more likely to be associated with an easing in policy than a tightening. This neglect would risk eroding fiscal credibility—the trust that the public has that the fiscal targets will be met.

Policy cooperation and stabilization

Now, let me turn to the issue of policy cooperation and policy coordination.

Our inflation targets are joint targets. They are not just the bank's targets—they are the targets of the government of Canada as well.

Our view is that, essentially, "coordination" came through the joint agreement on inflation targets. With clear agreement on the medium-term policy objectives and with a shared understanding of the policy framework, there is no need for coordination on the setting of interest rates and fiscal policy instruments.

The economic literature on policy coordination tends to be about situations where the fiscal and monetary authorities have one or more of the following: very different views of economic welfare,[5] inconsistent policy objectives, policy that is totally discretionary, or a tendency to get involved in game-like behavior with one another. None of these applies in Canada—and none should apply anywhere.

Given our policy framework, when the government changes fiscal policy, it needs to think of how these changes will affect inflation and, consequently, interest rates. Similarly, the Bank of Canada needs to consider how changes in fiscal policy will affect demand and inflation and, thus, its setting of interest rates. Therefore, it is to the mutual benefit of both parties to *cooperate* in sharing information and analysis as they adjust their policy settings.

Cooperation between the bank and the federal Department of Finance occurs on a number of levels. I have frequent discussions with the minister and deputy minister. And there are meetings at the staff level to share, for example, information from economic forecasts, surveys, and contacts with various groups and organizations. One of the key reasons for our regular discussions has been to ensure that each institution understands the details of the framework within which the other one is pursuing its objectives and how this framework is being implemented with respect to current economic surprises. The bank also keeps in close touch with provincial fiscal authorities.

Thus far, I have not said anything about the appropriate mix of monetary and fiscal policies when talking about coordination and cooperation. Quite simply, with explicit frameworks in place for monetary and fiscal policies, the whole issue of policy mix becomes moot. The fiscal and monetary authorities are both adjusting their policy instruments to attain their respective objectives. There is no other mix of interest rates and fiscal thrust that the authorities will perceive as consistent with meeting the monetary and fiscal objectives.

Concluding thoughts

Clear monetary and fiscal objectives, combined with clear accountability for meeting those objectives, provide the background for policy cooperation and stabilization in Canada. The monetary and fiscal policy frameworks have created an environment where cooperation in the form of sharing information and analysis is most effective. Fiscal and monetary credibility is high. In other words, economic agents trust that the monetary authorities and the fiscal authorities will maintain these frameworks.

With trust in place and with expectations well-anchored, the automatic fiscal stabilizers can be allowed to operate fully, and monetary policy actions can be directed to achieving the inflation targets. In addition, when major shocks occur, with trust in place, there can be a temporary overshoot or undershoot of the fiscal or monetary targets without unhinging confidence in the framework or in expectations that the targets will be met over time.

I believe that Canada's experience and the lessons we have learned about having clear policy objectives and supportive, transparent policy frameworks have broad applicability in open economies with a flexible exchange rate.

Endnotes

[1] The interaction of fiscal and monetary policies is covered more fully in Dodge (2002).

[2] Some commentators have described inflation targeting as "constrained discretion," in the sense that there is a clear objective and a medium-term framework but no precise rule for varying the policy interest rate (Bernanke and others, 1999). That is, there are many possible paths back to equilibrium. At the Bank of Canada, we have decided that the best way to implement inflation targeting is to have an acceptable tradeoff between the variance of inflation around its target and the variance of output around its production potential. Thus, we have chosen an eighteen- to twenty-four-month horizon for achieving the inflation target. We take into account all the relevant information, but we have no simple rule for setting interest rates.

[3] This is also the view of Cecchetti (2002) and Taylor (2000). For an opposing view, see Seidman (2001). Much earlier, Boulding (1969) summarized an academic session on recent experiences in the use of fiscal policy with a poem including the following lines, "… Policy may follow Fillip's Law—Too little and too late, too much too soon. ..."

[4] For the Canadian federal government, the limitation of discretionary fiscal policy as a stabilizer is compounded by the fact that Canadian provincial governments taken together represent a larger share of the economy than the federal government does, and their spending structure (which includes more spending on capital than the federal government) better lends itself to discretionary spending for stabilization purposes.

[5] That is, their "loss functions" are very different.

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Overview

Jacob A. Frenkel

In his opening remarks, Alan Greenspan reminded us that last year when we were meeting in this place, we were just on the eve of 9/11, and we did not know about it. We are now a year after 9/11, we know about it, but each one of us may have a different assessment of that event. Some would argue that this has demonstrated the fundamental resilience of the U.S. economy. Some would argue that we are living in a changing environment.

Alan mentioned in his opening remarks that if we look at the scope of the topics for this conference from fiscal policy to policy mix, one may wonder initially what it has to do with monetary policy—until one realizes that they are all part and parcel of the ingredients for monetary policy. The real debate is: Should monetary policy deal with each and every aspect of the real economy through a complicated monetary rule? Or, should all of these details of the real economy be ingredients into the decision-making process that ultimately focuses on a very narrow and well-defined objective. Those are some of the issues that came up in the discussion this morning.

I think that Otmar Issing mentioned yesterday that we have moved to a Knightian world, a world of uncertainty. I would like to start my remarks with a brief anecdote of a questionnaire that was given in New York a few weeks after the 9/11 Twin Towers catastrophe. At the time, it was known that there would be some military action in Afghanistan, but, of course, nobody yet knew the outcome. Three

questions were asked. Question 1: Suppose that when next summer comes, you find out that the military activity in Afghanistan proved to be successful. Would you plan to take your family on holiday in the United States? The answer was yes. Question 2: Suppose that when next summer comes, you find out that the military activities have failed, whatever way they have been defined. Will you plan to take your family on holiday here in the United States? The answer was yes. Question 3: Suppose that when next summer comes, you do not know if the military activities have been successful or failed. Will you plan to take your family on holiday in the United States? And a much larger proportion of people said no. Now, it looks a paradox: If you win, it is a holiday; if you lose, it is a holiday; and if you don't know, it is a linear combination of the two, you stay home. When you think about it, the answer can be interpreted in terms of the Knightian distinction between risk and uncertainty. We know how to live in a period of risk, we know how to parameterize it, and we know to buy insurance. That's life. We know to take an umbrella when the forecast is for rain. We know how to take risk and price it.

But when you don't know the probability distributions, obviously that is when you go to the bunker. When you are in a bunker, you sit on your hands. You wait with investment plans. CEOs are reluctant to have investment plans. And what happens to forecasts of the real economy when they are made from the bunker without a periscope? Forecasters will look at each other and say, "Sit on your hands." Forecasters competed in downward revision of the real economy of the United States shortly after the Twin Tower disaster took place. The real issue is: When will we return from the world of uncertainty to the much more pleasant risky world in which we know how to operate?

How come some forecasters fundamentally downgraded their forecasts and others did not? The distinction was between those who stuck to the fundamentals when making their forecasts, not withstanding the fact that they were sitting in a bunker, and those who looked at their friends without a periscope and forgot the fundamentals. I'd like to come back to this, but it ties to the issue of policymaking in an uncertain world, in an uncertain environment, in a changing world in which parameters are different than what they used to be.

I still remember the face of Dan Rather when he reported with a sigh of relief that apparently the anthrax attack was not done by al-Qaida but by an American lunatic. So, that was something that was more familiar—that is American lunatics.

In the first session, we spoke about partial information, partial understanding, partial forecasts—and how you make those partial things. Do you look at the minutes from the meetings? Do you look at who was chairman? Do you look at the central figures? Allan Meltzer helped us a little bit in this regard. But the basic question brings us back to Herb Stein's question, which is: What do you do when you don't know what to do? Morris Goldstein left us with a similar question that was not answered. But that is really the question, especially in such situations where the processes are deemed to be nonsustainable. Again, as Herb Stein said, "Things that cannot be continued forever tend not to continue forever." He was very perceptive. But economists from Malthus onward have always been good in stating what cannot go on forever. They were less good in stating *when* things will burst.

This brings me to the opening session yesterday morning, which really set the stage for this debate: Alan Greenspan's discussion of bubbles and the overall perspective. I must say that this was the most comprehensive presentation that I have heard about the subtleties involved, and, not surprisingly, I fully support the perspective that was presented.

There is a fundamental policy issue: to burst or not to burst. But the dilemma for Hamlet was much simpler. Because when we ask "to burst or not to burst," we have to also ask "to burst what?" Is there something to burst? Is there a bubble to burst? When should we burst? How should we burst? What policy instruments should we use to burst? Pronouncements? Interest rates? We know very well that if you burst only through the interest rates—which is the only actual policy instrument that you have as a monetary authority—it would require such a fundamental change in interest rates that it is bound to create significant difficulties to the real economy, either through the aggregate demand side or through the balance sheets and all the corporate imbalances that will arise. You better be sure that you know what you

are doing. If you are not sure, how do you go around it? If it is a bubble, it will burst. And, if it burst, there will be fallout. Should you have prevented it? Could you have prevented it? That is the policy dilemma.

The message that came from yesterday's session is that even if an event has a low probability, if its implications are extremely catastrophic, you had better beware. This adds a footnote to the discussion between Chuck Freedman and Lars Svensson about low-probability events. In order to assess them, you must attach costs. In general, policymaking processes are always comparisons between the cost of type one error and the cost of type two error. There is always this choice to be made. As we heard yesterday, the assessment of that kind of situation is that you had better prepare the economy to deal with a bursting bubble, so that when it does burst you have minimal cost. What does it mean to prepare the economy? Well, have a sound financial system, have a sound banking system, have good mechanisms of that type in place because when the bubble bursts is not the time to put them in place. Have a good competitive system, have a good deregulated system, and have a good productive system, so when something bad does happen you see that time is nonlinear and you are able to bounce back much more rapidly than in the past.

This principle of trying to deal with it without imposing additional costs was discussed throughout the sessions. For example, when Marty Feldstein spoke about expansionary fiscal policy, he said, "Let's do it. However, without the cost that this typically entails—without increased budget deficits, without having the government debt rising. Let's do it through the supply side and incentive effects, etc."

Guillermo Ortíz spoke about the implications for foreign exchange volatility in several countries. He said, "Let's not mess it up by intervening in the foreign exchange market, but create the market mechanisms that will enable that volatility to be absorbed at the minimal cost." Again, he mentioned stronger financial systems, stronger foreign exchange markets, and the like. So, that line of preventive action by creating a better absorbing capacity, rather than adding noise to a system and hoping that negative shocks will offset each other rather than be additive, has been a very important principle here.

I would like only to add one footnote to these elements—which is, if a central bank gets into the habit of bursting bubbles, there is a great danger of taking over the automatic corrective mechanisms of the marketplace that are capable of defusing quite a few bubbles that we don't see. There have been so many bubbles like the dog in Sherlock Holmes that never barked. You don't know how many bubbles have been there that were defused by the market. There is a strong case to be made that if the market anticipates the Fed will take care of the bubbles, then there will be actually more bubbles, because the corrective mechanisms that would have defused them will be less. The issue of moral hazard is there. But in any event, there is no central bank in the world that can defuse exactly the number of bubbles that exist. Again, the dilemma of the central banks will be: Do I prefer a policy that defuses three out of the next five bubbles? Or a policy that defuses five of the next three bubbles? Three out of three is out of the question. So, you can see that we are just elevating the degree of uncertainty to a different level without really addressing the issue itself. But there is good reason to assume that under these circumstances we will have, on average, a higher interest rate in the economy, because it is the height of the interest rate that deals with the bubbles—or a highly volatile interest rate, because it will be the sharp declining interest rate that will need to be implemented in order to deal with the consequences of the bursting bubble—with shorter periods of expansion than we have had. Of course, sophisticated investors will know to take this into account.

We will never know the central bank's model until the ultimate point, and that is the point the Romers brought forward. But, we can infer something about it. Therefore, understanding the model is still key. Before I move on to the inflation targeting, let me tell you a little story about the importance of understanding the model. I have told this to some of you before, so I assume you are forgetful. There was this guy who was driving in the Champs Élysées next to the Arc de Triomphe. He was looking for a parking place, which is very difficult to find there. After several rounds there, he raised his head and said to God, "If you are there, I promise, if you find me a parking place, I'll start observing. I'll do everything my grandfather taught me to do." He didn't finish this remark and suddenly a car right in front of him left

and a beautiful parking place became available, and he pulled in to it and said, "God, no need. I found one!"

Well, this guy did not understand the model. He did not understand the cause and effect. That is the problem in economic life, where time is very nonlinear and suddenly the future comes ahead of the policy because it was anticipated. This can be very confusing.

The problem with crises is that they are like London buses—they come in twos or threes—and when they arrive they never go to the place where you want them to go. The dictum of dealing with the infrastructure of the economy, rather than to do the Mickey Mouse policymaking is the line that I would take.

This brings me to inflation targeting, which I would call more a focus on objectives for monetary policy. There are two types of economies that have adopted inflation targeting. There are those who have had a tradition of relative price stability, and they found it useful to immortalize it through inflation targeting—I put Canada in this group. There are others that have had a tradition of high volatile inflation, occasionally hyper inflation—I put Mexico, Brazil, Israel, and others in that group.

A Martian coming down to Earth and seeing that these countries have adopted inflation targets will get confused, because the history here does matter. The purpose is important. But let me start from the end. I cannot think of a single economy that has adopted the inflation-targeting strategy and has regretted it. The fact of the matter is—and I will speak more on the countries that I am more familiar with, the countries with a legacy of inflation—the focus on the objectives of the central bank and the codification of that focus through legislation or government decision has been absent in most of the places. There is nothing more important to bring about price stability or reduced inflation than to first know what you want to achieve. Then, the next question focuses on: If you want to achieve it, what is the mechanism and the framework that are needed? If you need the legislation, let's do it. If you need the instrument, let's provide it. If you have a government that must join the act by joint determination of the inflation target, so

that the inflation target achievement is not an orphan for the central bank but a major strategy issue for the government at large, then do it. In the case of Israel and many other places, it has been extremely important. In this regard, the points that Guillermo Ortíz has made are very important.

I have some difficulties with the otherwise excellent presentation by Lars Svensson, because of the issues that were raised already. I don't have a problem with having the output gap as part of the objectives. But, there is some logical inconsistency. On the one hand, I agree with Lars on the argument that asset prices and asset market developments can be incorporated into the decision of the central bank to the extent that they affect the ultimate objective—call it "price stability." So, there is a channel. But, I could not, by the same logic, do the same, as Marty indicated. The output gap will be incorporated to the extent that it affects my ability to achieve my objective. It is really through the line of price stability, rather than the two heads of the central bank objectives. Because there is nothing more dangerous than to have accountability for an objective to which you do not have the instruments to achieve. Before long, the central bank will be in charge of the growth of the economy, and the fiscal authorities will go to the beach. I think that is bad. I must say that when Marty indicated that he gets along with the parliamentarians very well, I noted his body language and remembered the telephone call that the secretary-general of the Communist Party got before the fall of the Soviet Union. And he was asked on the telephone, "How do you feel?" The answer was, "Very good." And the other guy told him, "Okay, I'll call later. You must not be alone in the office." So, there is an issue of developing the priorities and the like.

Let me make one final remark that ties back to the fundamentals. Today, there seems to be in the eyes of the observers a fundamental disconnect between the picture of the real economy, at least in the United States, and the so-called mirror image of that real economy, as reflected from financial markets. The question is: Why?

First of all, we know it is nonsustainable. That is what Herb Stein told us. Well, if it is not sustainable, who will adjust to whom? Will the

mirror image, which may be distorted, correct itself to the real economy; or will the real economy get the contagion effect from the mirror image? It is not that there is no mechanism by which the mirror image, which may be distorted—because of the scandals in Wall Street, because of a variety of issues—can actually export some of the viruses to the real economy through consumer confidence and the like, especially if we don't explain to the consumer what is really going on. But if one comes with the right periscope and looks at the fundamentals and recognizes the openness of the economy, the flexibility of the economy, the competitiveness of the economy, the productivity of the economy, the technological revolution that has been part of it, the information revolution, the robust financial speed. In 1997, we all thought the world was going under with the Asian crisis and now it's over. In 1998, we all thought the world was going under with Russia and LTCM and now it's over. There is fundamental resilience that at the end of the day, and it is not sheer optimism, it is the mirror image that will ultimately adjust to the real economy. If that is the case, I end up being optimistic, though unsanguine.

Overview

Frederic S. Mishkin

I.

The basic lesson I have gleaned from this symposium is that Keynes' adage, "In the long run, we are all dead," is bad economics. The key to doing stabilization policy right is to take a long-run view, while Keynes' adage suggests otherwise and encourages a focus on short-run stabilization.

The need for a focus on long-run issues in the design of fiscal policy comes out clearly in the papers by Alan Auerbach and Matthew Canzoneri, Bob Cumby, and Behzad Diba and the discussion that followed. Expectations are central in all of the analyses, and so long-run considerations are critical to understanding what effects fiscal policy will have. It, thus, follows that to make sure that fiscal policy has the intended effects and is beneficial, it needs to be designed with long-run considerations in mind.

The same is true for monetary policy. The discussions of monetary policy in presentations by central bankers Otmar Issing, Guillermo Ortíz, Yutaka Yamaguchi, and David Dodge also puts great stress on a long-run focus in the proper design of monetary policy. Indeed, the paper by Christina and David Romer makes it quite clear that monetary policy was only successful when it focused on long-run considerations. Only when the Federal Reserve recognized that there was no long-run tradeoff between output and inflation and pursued the goal of price stability seriously, as it did in the 1950s and early 1960s and after

1979, did good outcomes result. The 1970s, when monetary policy focused more on short-run considerations, was not a happy decade for monetary policy because inflation spiraled out of control.

II.

A focus on the long run in the conduct of monetary policy is a good principle, but what does it mean in practice?

Clearly, policymakers should care about output fluctuations as well as inflation fluctuations when setting monetary policy, and this is reflected in the standard loss function for the monetary policy authorities that we see in Lars Svensson's paper. Given that output fluctuations enter policymakers' objectives, it seems sensible that central banks should operate along the lines of a Taylor rule in which the policy interest rate responds to the output gap as well as to the inflation gap. I want to argue that this seemingly obvious conclusion is not the right one.

There are three basic problems with a focus on stabilizing the output gap in the conduct of monetary policy. First, as has been emphasized in the papers and discussion at this symposium, there is a great deal of uncertainty about the level of potential output and, so therefore, about the size of the output gap. This uncertainty not only stems from the fact that output data are revised substantially after the fact, but also because our theoretical understanding of the concept of potential output is actually quite limited. It is no surprise then that our estimates of the output gap are often way off, and then a focus on the output gap can get you into real trouble.

Indeed, this is exactly what happened in the 1970s in the United States as is illustrated by the Romer-Romer paper here at the conference and also in several papers by Anathasios Orphanides, who is on the staff at the Board of Governors of the Federal Reserve. The Fed got into trouble during this period because Arthur Burns put too much weight on the output gap in setting monetary policy when the output gap was grossly underestimated. Because Burns erroneously believed that the economy had a lot of slack (i.e., the output gap was negative),

when he saw that inflation was not declining or might even be rising, he came to the conclusion documented by the Romers that monetary policy was ineffective in constraining inflation. Indeed, Burns repeatedly stressed that inflation fluctuations were due to special factors rather than monetary policy. As the Romers point out, the result was that the Fed pursued overly expansionary monetary policy, which led to the great inflation of the 1970s.

A focus on the output gap in the last half of the 1990s would have been equally disastrous for monetary policy. When I entered the Federal Reserve System in 1994, the standard view both at the New York Fed, the Board of Governors, and elsewhere was that the NAIRU was around 6 percent. However, when economic growth looked like it was above sustainable levels and the unemployment began to fall below 6 percent, inflation remained low (and even kept to a slight downward path). In this situation, the Fed did not tighten as would have been suggested by a focus on the estimated output gap because the Fed, instead, kept its eye on the inflation ball. It was willing to entertain the possibility that the output gap might be seriously mismeasured and so ignored the inappropriate signal from its output gap estimates. The result was a highly successful monetary policy that did not choke off the very high growth rates of this period and yet saw the Fed attain a CPI inflation rate around 2 percent, which most central bankers view as being consistent with the holy grail of price stability.

The second problem with a monetary policy focus on reacting to output fluctuations is that it can have undesirable consequences for central bank credibility. A focus on output fluctuations may lead economic agents to believe that the monetary authorities will try to eliminate any decline in output below potential. As a result, it is more likely that workers and firms will raise wages and prices because they know that the monetary authorities are likely to accommodate these rises by pursuing expansionary policy to prevent unemployment from developing. The result is that a self-fulfilling equilibrium can occur in which wages and prices rise, then monetary policy accommodates this rise, and this leads to further rises in wages and prices, and so on, thus leading to a new equilibrium with higher inflation without a reduction in output fluctuations.

The third problem with a focus on the output gap is that it can complicate and hinder the central bank's communication process with the public, markets, and politicians. When the monetary authorities explain their monetary policy actions by indicating that they are trying to shrink the output gap, the public is more likely to focus on short-run considerations (job, jobs, jobs) rather than long-run considerations (controlling inflation). The result is that there might be more political pressure for the central bank to fall into the time-inconsistency trap and pursue overly expansionary monetary that results in inflation but does not actually create jobs.

My concerns about a monetary policy focus on output suggest that the Federal Reserve's "bias" statement that it currently makes at the conclusion of every FOMC meeting might be problematic. In this statement, the Fed assesses the balance of risks, whether they are toward higher inflation or toward a weaker economy. The problem with this statement is that if for a substantial period of time it states that the balance of risks are toward weakness in the economy, it may create the impression that the Fed has a short-run focus on preventing economic downturns. This could then lead in the future to increased political pressure on the Fed to pursue short-term rather than long-term policies. Furthermore, it could lead to a weakening of the Federal Reserve's inflation-fighting credibility. Neither of these problems might be severe currently, but in the future they could lead to a worsening of the tradeoff between output and inflation fluctuations, thereby worsening economic performance. To prevent this outcome, the balance of risks statement might be better couched in terms of risks toward a deflationary economic environment rather than toward a weaker economy.

III.

Given my criticisms of a monetary policy focus on output gaps, should a central bank not be concerned at all about output fluctuations? The answer is no, and Lars Svensson's paper shows how this can be done without falling into the traps outlined above. First, a central bank should pursue a target rule of flexible inflation targeting, rather than an instrument rule of the Taylor type. Second, it should

embed its output stabilization goal in its flexible inflation-targeting regime by adjusting how quickly it tries to approach the long-run inflation target, depending on preferences about the tradeoff between output versus inflation fluctuations.

It is also important that the central bank make clear to the public that it does indeed care about output fluctuations, and this is why it will not try to achieve its inflation target too quickly. Because almost all inflation-targeting central banks have found themselves close to their long-run inflation targets in recent years, they typically explain their target rule by saying that they are attempting to hit the target over an eighteen-month to two-year period. This horizon, I suspect, is quite close to the policy horizon, the time it takes for monetary policy to affect inflation, and it is reasonable to have this horizon when actual inflation is not far from its long-run goal. However, if shocks to inflation drive it substantially away from this long-run target, then a longer horizon should be used to achieve this target, given that a nonzero weight is put on output fluctuations in the objective function. Central banks might, thus, want to make it clearer that if inflation is driven much farther away from its long-run target than has been the case in recent years, then the approach to this long-run target will have to be slower than the current eighteen-month to two-year horizon. In this way, they can demonstrate that they do care about output fluctuations, but are optimizing monetary policy in a long-run rather than a short-run context.

In addition, central banks can demonstrate that they care about output as well as inflation fluctuations by emphasizing that the prevention of undershoots of the inflation target is every bit as critical as preventing undershoots of the targets. As the book I wrote with Ben Bernanke, Tom Laubach, and Adam Posen demonstrates, the Bank of Canada has been particularly effective at communicating that it is serious about avoiding undershoots of the inflation target, and this has increased public support for the Bank of Canada. [I have also argued elsewhere that having a target for inflation (taking out any measurement bias) that is slightly above zero also would help demonstrate the central bank's concern about output fluctuations and would also provide some insurance against deflation, which has costly consequences.]

IV.

A critical element of successfully conducting a flexible inflation targeting regime is central bank transparency and a successful communication strategy. Svensson advocates further increases in transparency over what even the most transparent central banks do currently. But can you take central bank transparency too far?

This issue reminds me of the famous quote from the fashion designer Chanel, "You can never be too rich or too thin." It may be true that you can never be too rich (but maybe your children can be), but you certainly can be too thin. After all, anorexia and starvation can be killers. Indeed, I think that Svensson advocates a degree of transparency that does go too far. And although I usually agree with Lars and think that, on the whole, his paper is excellent, here I have to strongly disagree with him. Matti Vanhalla and other participants at the symposium have also expressed their doubts about pushing transparency too far, and I want to delve into this issue further.

Svensson wants central banks to increase transparency in two ways: First, he suggests that central banks should explicitly describe their objective functions by announcing to the public their numerical weights on output versus inflation fluctuations, as well as potential GDP and the inflation goal. Second, he advocates that central banks announce the expected future policy path for the interest rate instrument. The big problem I have with these proposals is that they violate the KISS (Keep It Simple Stupid) principle.

The big advance in central bank thinking in recent years is simplification of the communication strategy with the markets, the public, and the politicians. This has been achieved by focusing on price stability, which puts the appropriate emphasis on what monetary policy can do (promote price stability) and not on what it cannot do (create jobs in the long-run through expansionary monetary policy). Svensson's suggestions would very much complicate the communication process.

Having a central bank specify the weights in its objective function is far from simple. Although being an economist, I try to be rational and

maximize my welfare, I would find it very hard to specify my objective function. I suspect that most people, and even economists, would be in the same boat. Thus, I don't think that it would be at all simple for the members of the policymaking board at a central bank to do this. Also, if most people have trouble quantifying their objective function, is it unlikely that the public would understand what the central bank was talking about if it quantified its objective function.

Furthermore, who should choose the numerical weights for the objective function? Should it be the central bank, as Svensson seems to suggest? Why shouldn't it be the government who, in a democratic system, is usually thought of as the best entity to set the goals for its agencies?

In addition, specifying the objective function requires the central bank to announce values for potential GDP. However, as already mentioned, potential GDP is extremely hard to measure. Announcing the central bank's projections for potential GDP may lead to these projections being interpreted as targets and may promote too much of a focus on the output gap, which, as I have discussed, leads to all sorts of difficulties.

The bottom line is that having a central bank specify the weights in its objective function opens up a can of worms and it should be avoided. Specifying a policy interest rate path is also a complicated exercise, and I was not convinced by Svensson's "simple proposal" for the policymaking board to do this. When I began my stint in the Federal Reserve System in the fall of 1994, the Board staff's greenbook forecast was constructed conditional on a future path of the federal funds rate. The members of the FOMC found that this complicated discussion of monetary policy at their meetings and, as a result, the forecasting procedure was changed so that the forecasts were conditioned on the current value of the federal funds rate, which was left unchanged for the horizon of the forecast. I, thus, agree with the view expressed by Charles Goodhart, a past member of the Monetary Policy Committee of the Bank of England, that having the policy board agree on a future expected path of the policy rate and then announcing it would not enhance monetary policymaking practice.

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The bottom line from the presentations and discussion at this symposium seems to me to be the following: In the long run, we might all be dead. But if we do not focus on the long run, then we might get pretty sick in the short run. Therefore, a focus on the long run in conducting both monetary and fiscal policy for stabilization purposes is imperative.

General Discussion:
Overview Panel

Chair: John B. Taylor

Mr. Taylor: There is time for some good comments from the audience. Actually, I have one person who already asked and that is John Makin.

Mr. Makin: I wanted to return to the issue raised by Lars Svensson's paper today with respect to the Bank of Japan, because we all agree that the situation in Japan is very important. The topic of this conference is stabilization policy and market bubbles. Japan is facing a market bubble issue and has to make a decision as to whether to burst the bond market bubble. The nominal yield in the ten-year JGB is 1.17 percent and on two-year notes in Japan is less than 10 basis points. So, if Japan does follow the foolproof solution and aggressively pushes up inflation expectations by adopting an aggressive currency depreciation policy, it will be bursting the bond market bubble. This becomes a significant problem because the major absorbers of Japanese government bonds over the past five years have been Japanese banks and insurance companies, and their balance sheets are already quite weak.

I would just point out that one of the things that needs to be addressed in conjunction with any kind of a reflationary solution for Japan would be the issue of a large transfer from holders of bonds probably to holders of equities. In the event of a rapid reflation in

Japan, the equity market would respond positively and rapidly and the bond market would sell off hard. That said, the problem is that the difficulties implied by Japan's deflation rate only get larger, given the steady-state deflation that is present in Japan. That doesn't mean we shouldn't follow a reflationary solution in Japan; I just think some specific addressing of the problem that is implied in bursting the bond market bubble would be appropriate and manageable. But, it needs to be addressed specifically.

Mr. Taylor: Thank you. Ilan Goldfajn, please.

Mr. Goldfajn: I was actually trying to make a comment in the last session. But since this is an overall session, I will just make my comment regarding fiscal dominance. I am from the Central Bank of Brazil. My country was mentioned in vain in the last session, so I want to make a few comments.

The discussion in this session and the previous session regarding fiscal dominance and the relationship with monetary policy, Sebastian Edwards mentioned that he believed the case of Brazil is an intermediate case where there are relatively strict intermediate restrictions to monetary policy. I argue that I don't think this is the case. Let me tell you why that is. If you look at what happened—let me digress a little bit on Brazil just a bit in the last few years—you've seen a lot of things happen. Some reforms have not been done, but a lot of things have happened. Since 1994, inflation, which was in three and four digits, has come down. We now have an expected inflation rate for next year of 4½ percent. It follows the depreciation. We have a banking system that was cleaned in 1995 and is relatively strong. We have a fiscal primary surplus that until 1990 was zero. It was adjusted to 3.75, and this year it will probably close to 3.9. So, in the previous paper, it seems that fiscal policy reacts to the level of the debt.

Of course, we don't have the major themes that people put on crises, for example. We don't have a fixed exchange rate. We don't have fiscal irresponsibility. We don't have banking problems. We don't have short-term external debt. Our public debt is held by domestics. Our external debt is mainly private. I know all the caveats and I know what

people are thinking. I don't have a paper like Lars' that contains all the caveats, but I am available to talk about this later. What about the sustainability, which is what I think Sebastian was mentioning? If you actually do the calculations, instead of just thinking and looking at the market numbers and assessment, you realize that the current primary surplus is enough in the medium term to have a differential, *r* minus *g* times the level of debt of almost 7 percent. So, we can have real interest rates 7 percent above our growth and still make it at the current primary surplus. So, what is the problem? Why is it that we still have mb for Brazil at 1,600?

I have two interpretations. One, we have elections. It is a democracy. Candidates left from this government are less known and have said stupid things in the past. After you say stupid things, it is probably harder to convince people that you are not going to do stupid things in the future. This has made markets more nervous. Since then, things have changed. We have an International Monetary Fund program that has dealt smartly with the incentive structure of the candidates to actually choose the right direction. I think it is even more important than the money is the incentive structure of getting the continuity of policies. What else? If this has been done, why are markets still nervous?

One reason is that this is a learning process. The second is related to Alan Blinder's comment regarding fiscal sustainability. How do we judge it? In the United States, long run or the infinite run as you mention or even the transversality condition, or the Keynesian long run, where everybody will be dead. In emerging markets, especially after several shocks, the long run is very short. People die very fast. Their bodies decompose even faster. The judgment of what is sustainable is not in years, not in months, sometimes it is just what happens with the exchange rate. If this affects your debt, that is the judgment. Sebastian Edwards mentioned that he actually was a little more benign. He actually gives us one year, until 2003. He said that if in 2003 you reach real rates of 9 percent—we are actually at 9 percent—but, if we reach 9 percent, if you grow then it is fine. But that is the maximum I have heard in terms of long run. When you actually do the calculations that is sustainable. When you look at the real variables that matter—real interest rates and real exchange rates—real interest rates have gone

down in the last few years. The real exchange rate is more depreciated than ever. Probably it has overshot. I have worked with real exchange rates. I haven't seen a real depreciation of 40 percent. They don't happen. Eventually, you get an appreciation. That is probably what will happen. Real depreciation means a very steep decline in the debt. I just wanted to make these points, given that you missed me in the previous session.

Mr. Taylor: Thank you very much. We have quite a few people who would like to speak, so let's keep it short. Lars Svensson is next.

Mr. Svensson: Three quick points: First, I am afraid that Rick is deeply inconsistent when he first emphasizes the importance of having explicit objectives and then refuses to specify the loss function. Furthermore, potential output is a crucial concept in monetary policy, but it is a very difficult one. But that is no reason for not being explicit. That it is a crucial concept is precisely why central banks have to explain what concept of potential output they are using, why they are using it, and how they measure it. All these objections about being explicit reminds me of ten years ago, when almost everyone was against having an explicit inflation target. We all know where that debate went.

My second point is on Japan, on the problem of a fall in bond prices if you would do the foolproof way: There is a solution, because that fall is a capital gain for the Japanese government, a reduction in the value of the outstanding debt. The government can use that gain to compensate bond holders—for instance, by increasing the coupon on the outstanding bonds.

My third point concerns the issue that Stan raised. Is there a risk that taking output into account means fine-tuning? I argue that the process of forecast targeting handles that in the right way because essentially all the incoming information is filtered through the forecasts. Only if the information it has an impact on output and projections inflation one or two years ahead do you respond to that information. Most of the information coming in would have no impact on those projections and would hence not induce any monetary policy response. So, you

won't be reacting. Most often it will have a very little impact, so you practically don't react to it. Occasionally something big happens, for instance, 9/11—which has big impact on the projections. Then you respond forcefully.

Mr. Taylor: David Romer.

Mr. Romer: I found a lot of the discussion this morning bizarre. Lars started out by saying that central banks should care somewhat about output stabilization and should say so. Let's stop with that statement and forget about the details. Much of the morning has been spent jumping on that idea. People are saying very strongly that central banks shouldn't try to stabilize output. And then they say, "Well, they certainly shouldn't admit it if they do do it."

There are two arguments here and they both seem obviously wrong. One is that central banks should focus on what they can do and not on what they can't do. That is fine. But, central banks do have some ability to stabilize real output. They are not perfect at it. They are also not perfect at producing price stability. So, that argument seems completely off point. We have no other policy mechanism to provide stabilization policy in a world where, as I think, the general consensus is still that fiscal policy is not of much use. The second argument is that we shouldn't admit it, because if we admit to the stupid politicians and public that we care at all about their jobs, they will make us live through the 1970s again. The 1970s were traumatic; they were terrible. We have lots and lots of knowledge of that experience and no one wants to replay that. We don't have to worry about that. Of course, we should be cautious. Of course, we should worry that we can't measure potential output well.

But those aren't reasons to refuse to try to stabilize output at all. The problem is clearest in Rick's comments. Rick spent awhile objecting to the idea of using potential output, and then his next subject was about flexible inflation targeting, which is exactly doing that. We should be willing to say the obvious, which is that central bankers, in some form or another, should pay some attention to the real economy and not just through what it means for inflation.

ing just at the regression will say, "Gee, these guys have lowered interest rates when they saw the output gap rising." But that is the wrong inference. Output begat pricing enabled lowering interest rates because it did not endanger the inflation front.

Mr. Mishkin: The first thing I would like to talk about in terms of Lars' comment is what lens you are looking through in terms of flexible inflation targeting. I have been looking through a lens in which the key benefit of doing inflation targeting is the communications strategy. Then, the question is: Does it help to be more explicit in the communications strategy? You can be too explicit and actually hurt communications. One example occurs sometimes when I go out to dinner with my wife, and she dresses up and looks great I find it very helpful to say, "Sweetheart, you just look fabulous tonight." It's when I go into details that I get into big trouble.

The issue that Romer raised is a very important one, which is that you don't want to have the disconnect of actually caring about output stabilization but not talking about it. There are two issues here that are important. One is the recognition that we really don't know what the output gap is. If we don't know, we want to look at a lot of information to tell us what it might be. A key piece of information to look at is what is happening on the inflation front. That is exactly what the Fed has done in recent years. When you look at the last five years of Federal Reserve policy, the reason they didn't worry about unemployment falling below NAIRU which was thought to be below 6 percent is because they were reading the tea leaves and saying, "We don't see inflationary pressures." That was happening at the Board; that was happening at the New York Fed where I worked. The second issue is that you do want to be very explicit about saying you care and how you care. There are times when it is absolutely clear that you have big output gaps. So, in Japan, we don't have to sit there and say, "There is a lot of subtlety." In that sense, you can raise these issues in an appropriate way. But we have to be sort of humble in the sense that we don't really know exactly what the output gaps are.

In terms of the issue of bubbles, let me just make very brief comments. One issue troubles me when people discuss Japan: Is it true that

the collapse of the bubble caused a big problem? It is likely that the reaction to it is what caused the bigger problem. In the United States we had bubbles going on too in terms of the real estate sector and problems in the financial sector in the late 1980s and early 1990s. We didn't wait ten years to clean it up. I think that is very, very important. Furthermore, there is this issue about pricking bubbles saying, "Well, we have a lot of uncertainty about the output gap. We have a lot of uncertainty about whether bubbles are rising." I would say two things. One argument I've made is: Because of the uncertainty about the output gap, we have to pay less attention to it. But, for bubbles it is even more complicated to figure out when we are in a bubble or not. A lot of people say, "Wouldn't it have been great if the Fed had tightened in 1996?" At a time people began worrying about stock market values.

That would have cut off a lot of very good high-tech investment. I always get very nervous when government officials think they know what appropriate market prices are—even when they are brilliant central bankers (which I think all central bankers are).

Mr. Taylor: Okay. Well, that concludes things. Let me say the first time I came to one of these conferences was 1982—twenty years ago—and they keep getting better (not uniformly) but this reaches a new peak. I appreciate all the work you and Craig Hakkio and all the staff have done. So, anyway thank you very much, Tom.

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