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Program Report

Monetary Economics

N. Gregory Mankiw

The NBER Program in Monetary Economics, established in 1991, encourages practical research in macroeconomics with an emphasis on issues relating to monetary policy. Its goal is to promote a greater understanding of the relationship between central-bank actions and the economy in order to help the world's central bankers better meet the formidable challenges they face. Toward these ends, program members pursue a range of individual and collaborative research studies. Program members and their guests meet twice a year to present and discuss this research. In addition, members meet for one week during the NBER's Summer Institute to present recent research and collaborate on research in progress. Central bankers regularly are invited to attend these meetings and discuss their recent decisions and concerns. Over the past several years, program members have heard from Federal Reserve Governors Lawrence B. Lindsey and Janet L. Yellen; then President of the Federal Reserve Bank of Boston Richard Syron; then Governor of the Bank of Canada John Crow; former President of the Bundesbank Helmut Schlesinger; and the Bank of England's Chief Economist Mervyn A. King, among others.

In addition to regular program meetings and the Summer Institute, the monetary economics program sponsors occasional conferences to focus research on specific topics. I ran the last such conference, which produced a recently published University of Chicago Press volume entitled *Monetary Policy*. Christina D. Romer and David M. Romer currently are organizing the next conference, which will focus on policymaking in low-inflation countries.

Research by program members is diverse. It includes empirical and theoretical work on the effects of monetary policy and the study of alternative policies and institutional arrangements. What follows is a brief description of some avenues of research that program members have been pursuing over the past several years.

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The Effects of Monetary Policy

When the central bank changes the quantity of money, what is the effect on the economy? Although this question is at the heart of monetary economics, the answer is neither easy to obtain nor widely agreed upon. From a scientific point of view, the fundamental problem is that central banks do not conduct controlled experiments. If central banks randomized their actions, we could just observe what happened to the economy after these actions in order to see their effects. But, in fact, central banks most often act in response to actual, perceived, or anticipated events. Thus, researchers studying monetary policy confront the difficult task of sorting out the effects of central-bank actions from the causes of those actions.

Monetary economists have tried to solve this problem in two ways. One is to take a narrative approach to monetary history. This approach dates back at least to Milton Friedman and Anna J. Schwartz's classic treatise, *A Monetary History of the United States*. This NBER-sponsored study examined in detail the causes and effects of major monetary changes over the previous century, with an emphasis on historical and institutional detail. More recently, Romer and Romer have extended this narrative approach. They used the minutes of Federal Open Market Committee meetings to pinpoint dates at which the Fed changed policy toward a tougher stance on inflation. The Romer and Romer dates, as they have come to be called, provide one concrete albeit controversial method for studying the effects of changes in monetary policy.¹

A second way of trying to disentangle the causes and effects of

monetary policy is to take a more econometric approach. That is, rather than relying on a careful reading of history, one can study the effects of monetary policy by applying time-series analysis to macroeconomic data. To make this approach work, some identifying assumption is necessary to sort out cause and effect. One might assume, for instance, that changes in short-term interest rates not explicable by other macroeconomic variables reflect changes in the preferences of the central bank toward inflation. Arguably, this change represents an essentially random change in policy. Once such an identifying assumption is made, one can use macroeconomic data to trace out the effects of monetary shocks over time. One drawback of this econometric approach is that it relies on identifying assumptions that are usually open to dispute. On the other hand, compared to the narrative approach, the econometric approach asks for less subjective judgment on the part of the researcher, which increases the verifiability of the results and reduces the possibility of inadvertent bias.²

Banks and the Monetary Transmission Mechanism

In recent years, much effort has been devoted to reexamining the monetary transmission mechanism—the way in which central-bank actions affect the aggregate demand for goods and services. According to conventional theory, monetary policy affects aggregate demand primarily through interest rates. When the central bank reduces the quantity of money through open-market operations, for instance, interest rates rise to

equilibrate the demand for money with the reduced supply. Higher interest rates, in turn, reduce investment, as the higher cost of borrowing discourages some potential investors. In addition, higher interest rates depress asset values, such as the prices of equities, which reduces household wealth and consumer spending. Thus, when the central bank reduces the money supply and raises interest rates, it reduces consumption and investment and, thereby, the aggregate demand for goods and services. In the long run this reduced demand leads to lower inflation, but in the short run it also depresses the levels of production and employment.

Or so goes the conventional wisdom. Recently, a group of economists has suggested that this story of the monetary transmission mechanism is incomplete at best, for it ignores the key role of bank lending. According to this new view, called the lending view, when the central bank conducts open-market operations to reduce the supply of money, it drains reserves from the banking system, which in turn forces banks to reduce lending. This reduced capacity of the banking system to make loans provides another reason, in addition to higher interest rates, that investment falls after a monetary contraction. According to this lending view, a monetary contraction has an especially strong impact on those investors who are bank-dependent. Small firms, for instance, have limited ability to finance investment through other means, such as the issuance of stocks or bonds, and have limited cash flow to finance investment through retained earnings. When the central bank reduces bank reserves and causes a contraction in bank lending, these bank-dependent firms have little choice but to reduce investment spending.

There remains considerable controversy about how much this new lending view adds to our understanding of the monetary transmission mechanism. Various questions remain open to dispute. When bank lending falls after a monetary contraction, as indeed it does, how much of the fall is attributable to reduced supply because of the fall in reserves and how much is attributable to reduced demand because of the overall economic contraction? When the banking system finds itself short of reserves, to what extent can it make loans in other ways, such as by selling government securities or issuing non-reservable certificates of deposit? When firms find themselves unable to obtain bank loans, to what extent are they able to borrow in other ways, such as through finance companies or trade credit? These and many related questions have provided a fertile area of research for members of the monetary economics program.³

Short-Run Price Adjustment

According to conventional monetary theory, changes in the quantity of money have important effects on production and employment over a period of several years, but these effects dissipate over time. This distinction between the short-run and long-run effects of monetary policy rests on the assumption that wages and prices respond differently over different time horizons. Over short periods of time, wages and prices are relatively sticky; this inability to respond fully to changes in the quantity of money induces changes in real economic activity. Over long periods of time, wages and prices can respond to changing circumstances, so changes in the quantity

of money have little effect on production and employment.

Thus, understanding the dynamic effects of monetary policy requires an understanding of how wages and prices adjust over time. Much research in the monetary economics program is aimed at this topic. Some of this work tries to build theories that explain how firms choose to adjust prices. Other work examines data on prices, sometimes at the economywide level and sometimes at the level of individual firms, in order to evaluate these theories and to shed light on actual price adjustment.⁴

Policy Design, Rules, Institutions, and History

Economists who study monetary economics are motivated by more than the intrinsic intellectual interest of the field. To a large extent, their goal is to provide a greater understanding of the economy in order to improve the conduct of monetary policy. Thus, much work in the NBER monetary economics program is aimed at evaluating alternative approaches to policymaking at the world's central banks.

Some of this work considers the effects of various policy rules. A monetary policy rule is a type of contingency plan for the central bank: it specifies how the central bank will respond to changing economic circumstances. Policy rules are of interest for two reasons. First, some economists have advocated reduced reliance on discretion and greater reliance on rules in order to reduce the political pressure and inflationary bias often considered inherent in discretionary policy. Second, even if a central bank maintains its discretionary powers, it can use policy

rules as guidelines when choosing how to exercise those powers.

There are a large number of possible policy rules from which a central bank might choose. A policy rule long advocated by some economists is a target path for a monetary aggregate, such as M2 or the monetary base. Another possibility is an adjustable target path for a monetary aggregate, where the adjustments occur according to some formula as the central bank collects new information about the velocity of money. Another possible rule is a target path for nominal income, perhaps implemented using the consensus of private-sector forecasts of nominal income. Research can shed light on the pros and cons of these and other rules, for instance by simulating how history might have been different if one of these rules had been in effect.⁵

Closely related to the study of policy rules is the study of institutional design. It is now widely accepted that central banks with greater independence from the government tend to produce less inflation than central banks with close governmental ties. This fact raises many questions. Are independent central banks less inflationary because they care less about short-run fluctuations in production and employment? Are their policy choices less affected by upcoming elections and other political considerations? Are they more likely to follow policy rules? Do the lower rates of inflation of independent central banks affect long-run growth rates? Which of the many institutional features of independent central banks are most important? These and the many related questions have been the subject of much recent research.⁶

The most direct way in which research sheds light on monetary

policy is by studying the policies of the past. Thus, monetary economics is tied inextricably to monetary history. As noted earlier, the NBER has a strong tradition in the narrative approach, including the classic work of Friedman and Schwartz and the more recent work of Romer and Romer. The monetary economics program also includes many other researchers examining historical monetary policies, from the most recent recession to the policies and institutions of centuries past.⁷

Overall Philosophy

The NBER monetary economics program is eclectic in the best sense of the word. It embraces high-quality research on monetary policy and related issues, both theoretical and applied, from a variety of perspectives. Members of the program often disagree with one another. Indeed, it is the disagreements that lead to debate, research, and, ultimately, progress in economic science.

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⁴For some recent work on price adjustment, see A. S. Blinder, "On Sticky Prices: Academic Theories Meet the Real World," in *Monetary Policy*, op. cit.; L. M. Ball and N. G. Mankiw, "Relative Price Changes as Aggregate Supply Shocks," NBER Reprint No. 1961, March 1995; M. F. Bryan and S. G. Cecchetti, "Measuring Core Inflation," NBER Working Paper No. 4303, March 1993, and in *Monetary Policy*, op. cit.; L. M. Ball, "What Determines the Sacrifice Ratio?" NBER Working Paper No. 4306, March 1993, and in *Monetary Policy*, op. cit.; L. M. Ball and N. G. Mankiw, "A Sticky-Price Manifesto," NBER Working Paper No. 4677, March 1994, and *Carnegie-Rochester Conference Series on Public Policy*, forthcoming; B. T. McCallum, "A Semiclassical Model of Price Level Adjustment," NBER Working Paper No. 4706, April 1994; S. Basu, "Intermediate Goods and Business Cycles: Implications for Productivity and Welfare," NBER Working Paper No. 4817, August 1994; A. K. Kashyap, "Sticky Prices: New Evidence from Retail Catalogs," NBER Working Paper No. 4855, September 1994, and *Quarterly Journal of Economics* 110, 1 (1995); J. J. Rotemberg, "Prices, Output, and Hours: An Empirical Analysis Based on a Sticky Price Model," NBER Working Paper No. 4948, December 1994; and M. S. Kimball, "The Quantitative Analytics of the Basic Neomonetarist Model," NBER Working Paper No. 5046, February 1995.

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Research Summaries

The Role of Banks in the Transmission of Monetary Policy

Anil K Kashyap and
Jeremy C. Stein

Over the last five years, we have been working on the question of how the effects of monetary policy—that is, open market operations—are transmitted to the economy. The principal theme of our work has been that, in order to fully understand the monetary mechanism, one must move beyond traditional macro explanations that emphasize households' relative preferences for "money" and other less liquid assets. In our view, the role of the commercial banking sector is central to the transmission of monetary policy. More specifically, two key factors shape the way in which monetary policy works: the extent to which banks rely on reservable deposit financing, and hence adjust their loan supply schedules in the wake of open market operations; and the extent to which certain borrowers in the economy are "bank-dependent," and therefore cannot offset these Fed-induced shifts in bank loan supply easily. These two factors in turn depend on the details of the financing arrangements available to both banks

and nonfinancial firms, so that our research naturally brings together central issues in corporate finance and macroeconomics.

Our key empirical findings can be summarized briefly by the following picture of monetary policy transmission: when the Fed tightens policy, aggregate lending by banks gradually slows down, and there is a surge in nonbank financing (for example, the use of commercial paper). When this substitution of financing is taking place, aggregate investment is cut back (by more than would be predicted solely on the basis of rising interest rates). Small firms that do not have significant buffer stocks of cash are most likely to trim investment (particularly investment in inventory) around the periods of tight money. Similarly, smaller banks seem more prone than large banks to reduce their lending. Overall, the results suggest that monetary policy may have important real consequences, but not because of standard interest rate effects.

Aggregate Patterns

In our first paper, which was co-authored with David Wilcox, we looked at aggregate data. Perhaps the simplest aggregate empirical implication of the bank-centric view of monetary transmission is that banks' loans should be correlated closely with measures of economic activity. In fact, there is a strong correlation between bank loans and unemployment, GNP, and other key macroeconomic indicators, as demonstrated by Bernanke and Blinder.¹ But, in terms of establishing support for a "bank lending channel," such correlations are inconclusive because they could arise even if the lending channel were not operative. For example, it may be that the correlations are driven by changes in the demand for bank loans rather than the supply of bank loans. That is, bank loans and inventories might move together because banks always stand willing to lend, and firms finance desired changes in level of inventories with bank loans.

The main point of the first paper was a way to overcome this fundamental difficulty in separating the