Economic Review

FEDERAL RESERVE BANK OF KANSAS CITY

February 1984

Industrial Change and Public Policy

The Changing Role of Real and Nominal Interest Rates

The *Economic Review* (ISSN 0161-2387) is published ten times a year by the Federal Reserve Bank of Kansas City. Subscriptions and additional copies are available without charge. Send requests to the Research Division, Federal Reserve Bank of Kansas City, 925 Grand Avenue, Kansas City, Missouri 64198. If any material is reproduced from this publication, please credit the source. Second-class postage paid at Kansas City, Missouri. Postmaster: send address changes to the address above.

Economic Review
FEDERAL RESERVE BANK OF KANSAS CITY

February 1984

Industrial Change and Public Policy 3

By Marvin Duncan and Marla Borowski

The economic problems the United States has faced in recent years did not stem from any basic change in the country's industrial structure, according to participants in a recent conference on "Industrial Change and Public Policy." The group agreed that sharp cyclical fluctuations, which could eventually have structural implications, have been the cause of most recent economic difficulties.

The Changing Role of Real and Nominal Interest Rates 12

By Raymond E. Lombra

Because of the deregulation of financial markets and changes in monetary control procedures, the role of interest rates in determining economic activity has changed in recent years. Nominal interest rates have become increasingly less important, while real interest rates have become more significant.

Industrial Change and Public Policy

by Marvin Duncan and Marla Borowski

The severity and duration of recent recessions have prompted a reevaluation of traditional U.S. economic policy and a search for alternatives to improve the nation's economic performance. One of the alternatives is an "industrial policy" that would identify important industries and assist them by providing subsidized credit, protection from foreign competition, and export subsidies.

The call for a targeted industrial policy is based on the assumption that structural change in the economy has substantially dislocated resources and created a loss of competitiveness in both domestic and international markets. It is also based on the assumption that government can correctly identify industries of future importance and devise policies to speed their growth, thus easing structural adjustment and strengthening market competitiveness.

To examine recent changes affecting the U.S. economy and the likely success of a government-managed industrial policy, the Federal Reserve Bank of Kansas City sponsored its sixth annual economic symposium at Jackson Hole, Wyoming, on August 24-26, 1983, to discuss the topic of "Industrial Change and Public Policy." This article summarizes the presentations and discussions of the distinguished group of participants at that symposium.[1]

Poor performance of the U.S. economy

Lawrence Klein stressed that an understanding of change is essential to a proper appreciation of what is happening to the economy. Although the performance of the U.S. economy has been disappointing for two decades, he pointed out that structural change may not be the cause.

Marvin Duncan is a vice president and economist and Marla Borowski is a research associate, both with the Economic Research Department at the Federal Reserve Bank of Kansas City

[1] Participants at the symposium included Lawrence R. Klein, Benjamin Franklin professor of economics at the University of Pennsylvania and 1980 Nobel laureate in economics; Robert Lawrence, senior fellow at the Brookings Institution, Robert Hall, professor and Hoover Fellow with the Hoover Institution, Stanford University; James Tobin, professor of economics at Yale University and 1981 Nobel laureate in economics; Paul Krugman, associate professor of management and economics at the Massachusetts Institute of Technology, Michael Wachter, professor of economics at the University of Pennsylvania; William Wascher, research economist at the Board of Governors of the Federal Reserve

A combination of exogenous shocks and cyclical adjustments has been the driving force of recent economic history, he said. Inflation was boosted by deficit financing of the Vietnam War and increases in the prices of energy and food. With increasing oil prices, capital investment in industrial countries was concentrated on improving energy efficiency, and performance in the industrial countries slowed. Growing foreign exchange reserves of OPEC countries flowed through the world's commercial banking system to developing countries. When interest rates rose, the developing countries could not service their increased debt. In the industrial countries, restrictive policies aimed at combating inflation brought on recession and unemployment. Unemployment was also exacerbated by rapid growth of the labor force.

In the United States, Klein said, tax laws have been changed substantially. Both capital gains and regular rates have been lowered. While the lower capital gains rate has stimulated some venture capital expansion, the lower regular tax rate has caused lost revenue and large federal budget deficits. More liberal depreciation rules could increase businesses' accumulation of funds for capital expansion, but no expansion is underway yet. Finally, the deregulation of financial markets has substantially affected aggregate economic performance.

System; Barry Bosworth, senior fellow at the Brookings Institution; Edwin Mansfield, professor of economics at the University of Pennsylvania; J. David Richardson, professor of economics at the University of Wisconsin; C. Fred Bergsten, director of the Institute for International Economics, William Diebold, Jr., senior research fellow at the Council on Foreign Relations; George Lodge, professor of business administration at the Harvard Business School; and Jerry Jasinowski, senior vice president and chief economist of the National Association of Manufacturers.

According to Klein, cyclical factors will continue to be the main determinant of economic performance. The Wharton Econometric forecast for industrial democracies in the 1980s is for about 1 percent slower growth, 3 percent higher unemployment, and 3 percent more inflation than in 1950-60 and 1960-70.

Robert Lawrence shared Klein's conviction that recent U.S. economic performance can be ascribed primarily to cyclical and exogenous factors. He went on to say that America is not deindustrializing. According to Lawrence, employment, capital formation, research and development expenditures, labor productivity, and growth in output of manufacturing in the United States over the last decade have been at least as good as in other industrial countries. Because manufacturing output is quite sensitive to GNP growth, the recent slowing in the sector should be attributed to sluggish economic growth, not to underlying structural change.

Lawrence said that shifts in consumer preferences have reduced the share of manufactured goods in consumer spending. Similarly, productivity growth has reduced manufacturing's share of total employment. The sector's share of fixed business capital investment has increased. Furthermore, growth of the capital-labor ratio in manufacturing has also increased. The nation's performance also benefits from more flexibility in real wage growth and greater labor mobility than in many other industrialized countries.

Internationally, he said, the pattern of comparative advantage has shifted somewhat because of foreign economic growth and policies. The United States is increasingly more competitive in high technology production than in traditional capital-intensive and labor-intensive production. In fact, the United States generally maintains an overall advantage in

manufacturing. Favorable exchange rates boosted U.S. production and employment in 1973-80. But recent appreciation of the dollar in foreign exchange markets has reduced manufacturing's benefits from trade, a condition likely to continue through 1984.

Neither Klein nor Lawrence accepted the assumption that the structure of the U.S. economy has changed. Rather, they both asserted that recent performance results from sharp cyclical swings in the economy. Both conceded that such marked cyclical swings could result eventually in lasting changes in U.S. industry. They implicitly argued, therefore, that policies to deal with cyclical fluctuations are more likely than industrial policies to improve the economy's performance, both in the short run and over time. That prescription was a recurring theme as other participants examined policy options and implications.

Macroeconomic policy prescriptions

Structural changes should be kept in mind in developing U.S. macroeconomic policy, Robert Hall said. Although the differences between structural and other changes are not sharply defined, he pointed out that prudent policy should be based on consideration of all changes that significantly affect performance. Further, policy goals should probably not be discussed in terms of highly specific targets for output, unemployment, inflation, or interest rates because they are too strongly affected by underlying change. Very specific goals can be unrealistic or contradictory.

Targeting the growth of nominal GNP is Hall's choice for the most satisfactory monetary policy rule. Congress, according to Hall, could adopt a target path for nominal GNP, thus setting a strict, quantitative rule for the Federal Reserve to follow. When nominal GNP was above (below) the target path, monetary policy would contract (expand) the rate of growth of the money supply as needed to return to the path. While this rule would not guarantee perfectly stable prices, it would prevent a serious inflationary spiral. And while it would not prevent recessions, it would lessen their intensity.

As an alternative to the currently flawed U.S. fiscal policy, Hall proposed a 19 percent flat-rate consumption tax. He saw its advantages as providing the revenues for running the government, eliminating the tax preferences that now distort capital investment decisions, and encouraging investment over consumption. Such a tax would meet these objectives over time, he said, despite economic change.

Hall also proposed reform for Social Security. He suggested that the system be divided into two parts, one an actuarially fair disability and retirement system financed by mandatory contributions, the other an income redistribution system financed by the flat-rate consumption tax. But Hall, in his proposal, specifically rejects reductions in Social Security benefits.

Responding to Hall's presentation, James Tobin noted that diagnoses of the economy typically fall into two classes, the macro and the micro. He characterized the macro diagnosis as viewing the central problem as a reconciliation of full employment of labor and capital with price stability. This problem can best be solved through appropriate macroeconomic policies. He saw the micro diagnosis, on the other hand, as viewing structural change as the main problem and industrial policy as the solution.

According to Tobin, industrial policy advocates believe that the United States is losing its competitiveness in world markets and that

the risk of new technologies and investments is too great for the private sector to bear. He felt these beliefs are incorrect. He said the worldwide recession and the high-valued dollar have hampered U.S. performance in international markets. Furthermore, he thought that concern over private sector risk-bearing was misplaced. Large U.S. financial markets, he maintained, offer adequate support for funding socially viable projects.

Tobin's solution for the nation's economic problems was a change in macroeconomic policy. He believed that over a five-year period, Congress, the President, and the Federal Reserve should agree on real and nominal economic targets and aim openly at announced growth paths. The paths should be reconsidered annually. A nominal GNP target, although fixed for a year, would be consistent with the five-year goal. He also proposed an incomes policy — wage and price guideposts with tax-based inducements for compliance — as an adjunct to the targeting of macroeconomic variables.

Alternative policy prescriptions

In addition to agreeing on the need for macroeconomic policy changes, participants identified several sector-specific policy prescriptions for improving U.S. economic performance. These included targeted industrial policy, as well as labor, capital investment, technology, and trade policies.

Targeted industrial policy

Despite the likely effectiveness of better macroeconomic policies in improving the nation's economic performance, some observers today are intrigued with the prospect of a targeted industrial policy that would shape and support industrial development. The case for a targeted industrial policy, according to Paul Krugman, stands or falls on the issue of criteria for selecting industries to be targeted. Suggestions for selection criteria come from two sources — popular discussion and economic theory.

The criteria most often advocated in popular discussions include the amount of value added per worker, the magnitude of linkages to the rest of the economy, the prospects for future international competitiveness, and targeting undertaken by foreign governments. Krugman found that applying the first criterion would likely result in slower growth and higher unemployment. The last would direct investment into industries with excess capacity and depressed rates of return. While the other criteria are less obviously counterproductive, he said, they are not unequivocally beneficial.

Economic theory suggests that industrial policies could succeed. Economies of scale, imperfect competition, external economies, and government programs are market imperfections that industrial policy could address. But Krugman noted that economic theory provides no unambiguous criteria for formulating targeted industrial policy.

Krugman pointed out that after-the-fact evaluation of the effectiveness of industrial policy is difficult. He suggested that the Japanese targeting of steel may have actually lowered Japan's national income and that this targeting was not crucial to current American-Japanese competition. Finally, he said, industrial policy could be simply ineffective.

Capital investment and technology

Discussion of tax incentives to encourage private savings and thus increase capital

investment is misguided, Barry Bosworth said. Demand for investment is down, according to him, not because businesses lack funds to invest, but because financial and monetary policies have led to high interest rates and an appreciated dollar. Enough idle resources exist to support increased investment in the short term. Over the longer term, the government should reduce the federal budget deficit and increase public pension programs to expand the pool of available capital.

Bosworth asserted that the capital tax structure should receive more attention in policymaking. Discussion has centered erroneously, he said, on average and marginal tax rates. The pattern of tax preferences for one type of capital goods over another has resulted in distortion, waste, and misallocation of investment funds. Either a consumption-wage tax or a comprehensive income tax could address the issue of preference.

The high rates of return on spending for research and development justify more government involvement. He proposed, however, that increased public support for basic research should take the form of direct government expenditures, instead of tax incentives for private investment.

Market economies often underinvest in civilian technology because firms do not benefit enough from their own research efforts, Edwin Mansfield explained in his comments on Bosworth's views. But because of the high average and marginal social rates of return from industrial R&D (often 30 percent or more), governments encourage it. American firms have recently received tax credits for increased spending on research and development. But evidence from the United States, Canada, and Sweden indicates that tax incentives have little effect on R&D spending. In the American case, the increase in spending is considerably less than the revenue lost to the Treasury.

Government spending is most effective, Mansfield says, when it goes for long-term basic R&D, which has a disproportionately large effect on productivity. An industry's rate of productivity increase and a firm's rate of innovation are positively related to spending on long-term and basic R&D. Mansfield shared Bosworth's conviction that direct government support for long-term basic R&D should be preferred over tax incentives for research.

Labor policies

The basic problem facing today's displaced workers, Michael Wachter and William Wascher contended, is not a lack of jobs, but the difference between their opportunity wages and the wages they were paid on the last job. Because some workers were able to limit, or even avoid, the decline in average real wages over the 1970s, there were wide differences in interindustry wage changes. High-wage/low-wage or union/nonunion industry wage differences increased persistently. These wage differentials affected workers two ways, they said. The greater their wage premium over their opportunity wage, the greater the income loss to displaced workers. And the greater the union wage premium, the greater the likelihood that workers will be displaced.

The environment for labor improves as the economy expands again. Manufacturing employment is increasing, even in industries with long-run declines. And wage differentials, which peak during a recession, are declining. Also, the outlook is more optimistic over the long term. The economy's ability to employ available workers during a recession will improve as technology changes. More-

over, growth of the labor force is moderating. And the problem of mismatches between unskilled workers and high-skill jobs may be reduced in the future.

Government policies that minimize losses to displaced workers have been generally procylical, Wachter and Wascher contended. They found the solution to the displaced worker problem in the private sector. The surest way to prevent the problem is to avoid the loss of jobs in the first place, and the private sector is responsible for most jobs. Thus, they expected that new collective bargaining initiatives, particularly tradeoffs for job security, will probably receive increased attention from both employers and employees.

In commenting on the paper by Wachter and Wascher, Ray Marshall argued that the structural unemployment problem is larger and more serious than merely the problem of displaced workers. The problem of disadvantaged workers is at least as serious, and it is growing. Government can ease labor difficulties through adjustment policies that go beyond mere income maintenance programs for displaced workers. Community-based programs addressing specific problems and administered by labor, management, and community representatives can be successful, he said, citing the Downriver Program in Wayne County, Michigan.

He thought other selective labor policies — relocation and retraining programs, for example — need to be directed at disadvantaged workers, such as the young, minorities, and the uneducated. Unemployment problems are likely to get worse for these groups over the coming decade. Though macroeconomic policy is ultimately responsible for moderating cyclical instability, and hence unemployment, complementary labor policies can increase the effectiveness of macroeconomic policy.

Trade policies

J. David Richardson assessed the potential of trade policies for improving economic performance. The international economic and political environment, he said, has changed significantly over the past several years. As a result of economic growth overseas, the disparity between the U.S. economy and the economies of its industrial trading partners has been greatly narrowed since the end of World War II. International trade has increased dramatically, with changes in both the types of goods traded and the patterns of trade. Growth in net exports of manufactured goods has slowed in the United States in recent years. Conversely, foreign countries have become more vigorous competitors in our domestic markets. On balance, global trade has become more disorderly as governments more frequently help domestic industries improve their competitive positions.

In this disorderly environment, Richardson envisioned a place for a more active U.S. trade policy, arguing that strategic trade policy could help counter the distortions of an imperfectly competitive world system. If the United States could limit foreign government market intervention by using an active policy that is predictable, nondiscretionary, and contingent on certain behavior, he said, the world market might become more competitive. That, in turn, would be more likely to provide U.S. gains from trade. Where oligopoly distorts the market, an active U.S. trade policy might capture a larger national share of profits.

Other sources of imperfection, such as scale economies and lack of information might be corrected through strategic policies, such as a return to "rules" in trade and bilateral agreements. Such policies, Richardson said, could

provide a safety net for some sectors of the population and could help ease adjustment to new economic conditions. Trade policy can also cushion the effect of economic and political shocks on domestic industries, whether the shocks are from domestic or international sources.

As a response to change, however, an active trade policy has several shortcomings, Richardson said. It is difficult to manage, it gives the appearance of aggressiveness, and its costs can be high. Richardson suggested that other approaches might be better. Among these he included better macroeconomic policymaking, stabilization of exchange rates, programs to ease shifts in labor and capital use, and greater reliance on market forces.

Fred Bergsten emphasized the high value of the dollar in responding to Richardson's paper. The dollar, he thought, is greatly overvalued compared with the underlying competitive relationship between the United States and its trading partners.

He cited the misalignment of the dollar for the stunning loss of American competitiveness in international trade. The effect, he said, is pervasive across U.S. industries and appears to be growing more serious. Ironically, the problem is largely one of our own making and not one imposed by unfair trade practices or a major competitor.

Returning to a recurring theme of the conference, Bergsten pointed to the huge federal budget deficit as the major source of the problem. Without prompt budget action, he said, sterilized intervention in exchange markets will be needed, along with greater policy coordination with trading partners. Over the longer run, the international monetary system could be made less prone to misalignments, perhaps by imposing "crawling target zones" for the currencies of major countries.

An overview

Adding perspective to the symposium, three prominent observers of the U.S. economy contributed their views to the debate on policies dealing with industrial change. American economic policy, George Lodge argued, needs to recognize that three cherished myths about economic behavior do not correspond with reality. The first myth, that the static notion of comparative advantage determines the goods a country produces and that free trade follows, thereby allowing all countries to grow and prosper, has been disproved — first by the Japanese and then by other trading partners. Government policies can create and alter comparative advantage. When this happens, competitiveness and the premise of free trade can be fundamentally disrupted.

In such an environment, the United States has two choices. It can devise a coherent national strategy itself, or it can continue its haphazard reaction to the policies of others.

Either solution destroys the second myth. The American belief that government should be limited, decentralized, and not include coherent planning is ill-suited to current world conditions. Government policies around the world have a great effect on economic performance. On the positive side, however, greater understanding of the effects of government programs — which are sometimes contradictory and generally unplanned — is forcing the U.S. government to take on a more coherent and active role.

The third myth, that the relationship between manager and managed is typically adversarial, is being eroded by increasingly wider public ownership of firms. Both groups now realize that their shared interests far exceed their conflicts. As a result of the changing relationships among shareholders,

debtholders, managers, managed, and government, new concepts of corporate governance are required to assure future American competitiveness.

William Diebold noted his agreement with views often expressed at the symposium — that the case for structural change may not be compelling and that it would be difficult to implement planned industrial policy in the United States. Planned industrial policy aside, however, he said that some areas deserve further analysis. Better understanding of particular industries and specific sectors, the operation of markets, the effect of externalities, and the impact of government is vital for effective, equitable policymaking.

Diebold stressed again the importance of the international ingredient in American economic activity. American competitiveness, foreign government intervention in markets, and international cooperation all have implications for the U.S. domestic economy that need to be better understood.

Contending that U.S. industry may have deteriorated, Jerry Jasinowski thought there could have been four causes. Cyclical instability, he said, has resulted primarily from faulty demand management policies and the OPEC oil price increases. Lack of competitiveness in international markets and long-term structural difficulties each have contributed to poor U.S. economic performance. And finally, factors at the industry and sector level have had an effect.

Public policy can address the first three causes, but microeconomic factors remain the responsibility of the private sector. Eliminating the structural federal budget deficit and adopting multiple targets by the Federal Reserve would help stabilize the economy. Other national strategies for reversing industrial decline include promoting exports to improve competitiveness, speeding capital recovery, removing energy price controls, and providing tax incentives to spur private sector research and development.

Conclusions

Despite much popular rhetoric, the predominant view of symposium participants was that America is not deindustrializing. Neither are its economic problems due primarily to sweeping structural change in the economy. Rather, most of its problems are the result of sharp cyclical fluctuations that could have structural implications over time.

More appropriate and better coordinated monetary and fiscal policies, it was felt, offer a solution to the inadequate U.S. economic performance. Additionally, a range of improved policy options were suggested at the sector and firm level. These included actions to improve labor competitiveness and mobility, changes in tax policies affecting capital investment, increased government funding of basic and long-term R&D, more rational U.S. trade policy, and greater international coordination on exchange rate and trade policy issues.

Symposium participants generally shared a common viewpoint — that the recent inadequate U.S. economic performance has not been caused by structural or industrial change. Rather, it has been a combination of inappropriate macroeconomic policies, a prolonged cyclical downturn, and exogenous shocks. Therefore, changing policies at both the macro and sub-macro levels to mitigate their undesirable effects was believed to be a more promising alternative than identifying and implementing an entirely new "industrial policy."

Industrial Change and Public Policy

Industrial policy proposals have recently been put forward as a means to help deal with the disappointing performance of the U.S. economy over the past decade. To examine the rationale and value of these proposals, the Federal Reserve Bank of Kansas City brought together a number of leading economists for a symposium on industrial change and public policy at Jackson Hole, Wyoming, on August 24-26, 1983. Contents of the 378-page proceedings are listed below.

Moderator: *George L. Perry*

Identifying the Effects of Structural Change, *Lawrence R. Klein*
Commentary, *Jeffrey Sachs*

Changes in U.S. Industrial Structure: The Role of Global Forces, Secular Trends, and Transitory Cycles, *Robert Z. Lawrence*
Commentary, *Lawrence Summers*

Macroeconomic Policy Under Structural Change, *Robert E. Hall*
Commentary, *James Tobin*

Targeted Industrial Policies: Theory and Evidence, *Paul R. Krugman*
Commentary, *George C. Eads*
Commentary, *Robert Kuttner*

Moderator: *Robert C. Holland*

Labor Market Policies in Response to Structural Changes in Labor Demand, *Michael L. Wachter, William L. Wascher*
Commentary, *Ray Marshall*

Capital Formation, Technology, and Economic Policy, *Barry P. Bosworth*
Commentary, *Edwin Mansfield*

International Trade Policies in a World of Industrial Change, *J. David Richardson*
Commentary, *C. Fred Bergsten*

Overview Panel, *William Diebold, George C. Lodge,* and *Jerry Jasinowski*

For a free copy of the proceedings of this symposium, or any of the previous symposiums listed below, write the Public Affairs Department, Federal Reserve Bank of Kansas City, 925 Grand Avenue, Kansas City, Missouri 64198.

Monetary Policy Issues in the 1980s (1982)

Modeling Agriculture for Policy Analysis in the 1980s (1981)

Future Sources of Loanable Funds for Agricultural Banks (1980)

Western Water Resources. Coming Problems and the Policy Alternatives (1979)

World Agricultural Trade: The Potential for Growth (1978)

The Changing Role of Real and Nominal Interest Rates

By Raymond E. Lombra

Many forecasters contended in the last half of 1982 that interest rates — nominal and real — were too high for an economic recovery. In early 1983, when a recovery was clearly underway, some of the same experts argued that high interest rates would hold the expansion well below the average for previous economic recoveries. Not surprisingly, most of the shortfall, which led many to question the sustainability of the recovery, was expected to be in the interest-sensitive components of aggregate demand, particularly housing and consumer durables.

The recovery so far has been close to the average for previous recoveries, and after rebounding sharply in late 1982 and the first half of 1983, spending on housing and consumer durables has remained relatively strong. Such a performance tends to support the view increasingly held by economists that ongoing changes in the structure of the financial system have caused a fundamental change in the relationship between interest rates and economic activity.

Nominal interest rates were widely viewed in the 1950s and 1960s as a key variable that helped determine the pace of economic activity. High rates were thought to retard economic activity, while low rates were thought to stimulate activity. Thus, nominal rates were viewed as a useful indicator of monetary policy. High rates were thought to reflect a restrictive monetary policy, while low rates were thought to reflect a stimulative policy.

As inflation increased in the 1970s, many financial observers, relearning the lessons taught by Irving Fisher at the beginning of the century, gradually concluded that nominal interest rates were a misleading indicator of monetary policy. With nominal rates passing through previous historical peaks and economic activity maintaining considerable momentum, there was a growing awareness that spending and saving decisions were importantly affected by real interest rates — nominal interest rates minus the expected rate of inflation.[1]

From a lender's viewpoint, the interest rate

Raymond E. Lombra is a professor of economics at The Pennsylvania State University and a visiting scholar at the Federal Reserve Bank of Kansas City. Jeff Schlerf and Rick Troll provided research assistance, and Laurence Kantor, William Keeton, Donald Hester, John Riew, George Benston, and Bryon Higgins provided helpful discussions. The views expressed here are those of the author and do not necessarily reflect the opinions of the Federal Reserve Bank of Kansas City or the Federal Reserve System.

is the reward for saving now and spending later. Of primary concern to lenders deciding how much to save and what financial assets to acquire is the purchasing power of the funds lent today compared with the purchasing power of the funds returned when the financial assets are sold or mature. The prices of goods and services determine the purchasing power of a dollar; as prices rise or fall, the purchasing power of a dollar rises or falls. To ascertain the gain in future purchasing power resulting from saving today — the real return or real interest rate — a lender must compare the nominal interest rate and the expected change in prices — the expected inflation rate.[2] Such comparisons determine the reward for lending and, thus, influence the volume of lending, as well as the cost of borrowing and, thus, the volume of borrowing.

This article argues that the focus on real interest rates, as opposed to nominal rates, has become increasingly relevant. It would be incorrect, however, to infer that over the past 20 years only real rates (measured conventionally as discussed below) have mattered in the sense that only they affected economic activity. Given the regulations governing the maximum interest rates paid on deposits and charged on loans and the monetary policy procedures used by the Federal Reserve, movements in nominal interest rates (relative to such maximums or ceilings) and related adjustments in the nonrate terms on loans have mattered for short-run macroeconomic analysis in the 1960s and 1970s. But nominal rates have mattered less as time has passed, deregulation has progressed, and procedures have changed.

In addition to changing the role of nominal rates, deregulation and procedural changes have changed the role of conventionally measured real rates. Real rates measured in the conventional fashion now bear more of any adjustment in market conditions made necessary by changes in the supply of or demand for funds. Among the implications of this changing role of real interest rates are an incomparability of real rates across time, an unstable empirical relationship between interest rates and economic activity, and an indication that historically high real rates are due in part to deregulation, innovation, and changes in monetary policy procedures.

The first section of this article examines the role of interest rates in a world with interest rate regulations and a Federal Reserve policy strategy that tended to limit the fluctuations of short-term interest rates in the short run. The second section examines the role of interest rates in a world experiencing financial innovation, deregulation, and a change in the Federal Reserve's policy procedures. The third section presents empirical evidence supporting the analysis presented in the previous sections. The fourth section develops the implications of the findings for financial analysis and monetary policy.

---

[1] To be even more precise, theory would suggest that real after-tax interest rates (nominal rates minus an adjustment for the tax deductibility of interest payments and minus the expected rate of inflation) are key determinants of spending and saving decisions.

[2] To illustrate, with inflation expected to run 7 percent a year, the real return on $100 lent today for one year at 10 percent is about 3 percent. The lender will receive $110 one year from now, but the expected rise in prices (assuming it occurs) means the lender will not receive a $10 ($10/$100 = 10 percent) gain in purchasing power. A 7 percent price rise will raise the price index from, say, 1.00 to 1.07, meaning that it will take $1.07 at the end of the year to buy the same basket of goods costing $1.00 at the beginning of the year. Deflating the $110 received by the price index yields approximately $103 ($110/$1.07 = $102.80). Thus, the expected gain in purchasing power is about $3 (or $3/$100 = 3 percent).

The role of interest rates before deregulation and the change in policy procedures

Large-scale macroeconomic models estimated over the past 20 to 30 years emphasized the cost of capital and the availability of credit as important channels through which monetary policy was thought to affect economic activity. A restrictive monetary policy, for instance, was expected to raise short and long-term nominal interest rates. With inflation and inflationary expectations assumed fixed in the short run, the policy-induced rise in nominal interest rates was viewed as the equivalent of a rise in real interest rates. Increases in the cost of capital, in turn, were expected to reduce investment, consumption, and perhaps state and local government spending.

Such models also assigned importance to the relationship between nominal market interest rates and the interest rate ceilings governing the rates some financial intermediaries could pay on deposits (Regulation Q ceilings) and the relationship between nominal market rates and the rates intermediaries could charge on certain types of loans (usury ceilings).

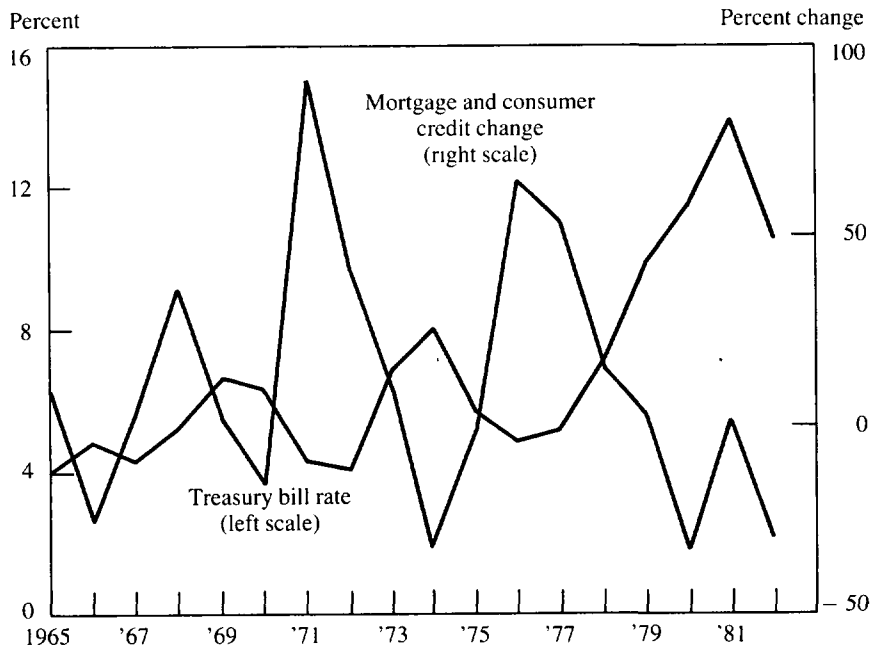
When nominal market interest rates rose above regulated ceilings, deposits flowed out of certain financial institutions, particularly thrift institutions, and lending opportunities in uncontrolled markets, such as the bond markets, dominated those in the mortgage and consumer loan markets. As a result of disintermediation (Regulation Q effects) and the shift in lending opportunities (usury ceiling effects), the availability of funds to some borrowers was severely restricted. With regulations preventing adjustments in nominal interest rates, credit was allocated through the tightening of loan terms, such as downpayment ratios, terms to maturity, lending fees, and collateral requirements. Adjustment of these so-called nonprice terms — actually implicit elements of price that are often in effect prepaid by the borrower — reflected the adaptation of financial intermediaries operating on the supply (lending) side of the market.[3] The adjustments, in turn, were widely believed, and therefore modeled, to have powerful effects on expenditures for housing and consumer durables, especially automobiles. Thus, the normal cost-of-capital channel involving increases in the explicit price of credit was reinforced by the credit-availability channel involving increases in the implicit price of credit.

The effect of changes in the price of credit on mortgage and consumer credit flows can be seen in Chart 1. The substantial deceleration in credit flows (and economic activity) in 1966-67, 1969-70, 1974-75, and 1979-80 was accompanied or preceded by increases in the explicit price of credit, as proxied by the movement in the 3-month Treasury bill rate. Since nominal market interest rates during these periods rose above at least some of the rate ceilings in effect at the time, it is reason-

---

[3] To avoid confusion, it should be emphasized that the existence of credit rationing does not depend on the existence of interest rate ceilings. Uncertainty about the source and duration of disturbances and the costs of adjusting deposit rates will slow the adjustment of deposit rates to disturbances. Similar considerations, as well as incomplete information about the riskiness of particular customers, can lead to sluggish adjustment of loan rates and the use of nonrate terms to allocate credit. The sluggish adjustment of loan and deposit rates is consistent with what has come to be called "equilibrium credit rationing." See, for example, Ernst Baltensperger, "Credit Rationing: Issues and Questions," *Journal of Money, Credit, and Banking*, May 1978, pp. 170-183; Joseph Stiglitz and Andrew Weiss, "Credit Rationing in Markets with Imperfect Information," *American Economic Review*, June 1981, pp. 393-410; and William Keeton, *Equilibrium Credit Rationing*, Garland Publishing, New York 1979.

CHART 1
Treasury bill rate vs. credit flows



able to assume that the rises in the explicit price of credit (market rates) were accompanied by increases in the implicit price of credit (a tightening of the nonrate terms on loans).

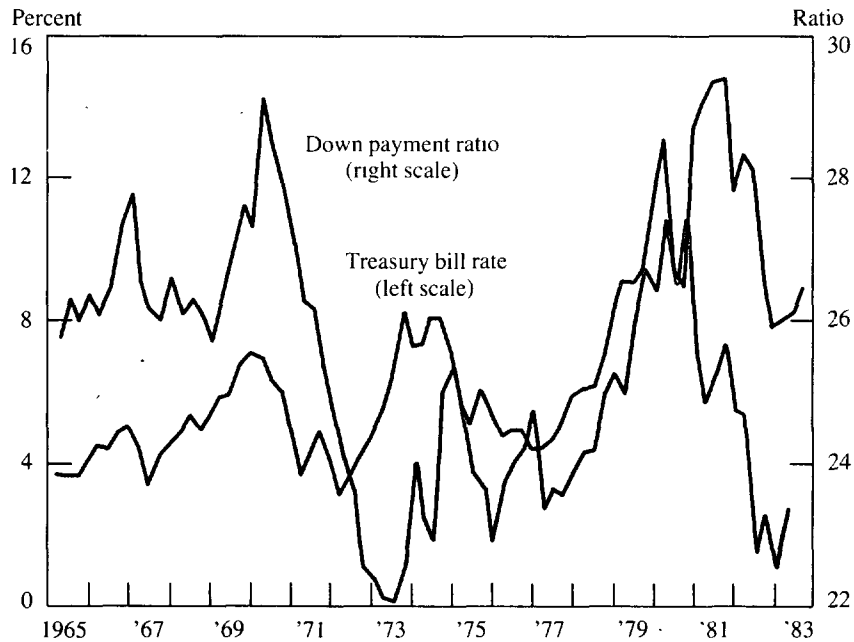
Evidence supporting this conjecture is provided in Chart 2, which shows the relationship between the bill rate and the downpayment ratio on new homes (the downpayment divided by the price of houses), an important nonrate term on mortgage loans. The downpayment ratio generally rose during the same periods that market rates increased. Thus, the resulting weakening of credit flows and spending was the product of rises in rates (the explicit price of credit) and a tightening of nonrate terms (the implicit price of credit).

Aggregate or sectorial effects?

The proposition that disintermediation and credit rationing have economywide effects, instead of only sectorial effects on housing and durables, is somewhat controversial. Substitution among various types of financial claims in borrower and lender portfolios and low costs of information and adjustment in the real and financial sectors of the economy work to redistribute and rechannel funds across sectors, reducing aggregative effects. Given such conditions,

> ...if accelerated flows into open market paper [i.e., disintermediation], defined broadly to include large CD's and money

CHART 2
Treasury bill rate vs. down payment ratio



market funds, are detrimental to outlays financed by regular deposits [e.g., housing], then these flows ought to be favorable to the outlays financed by open market paper [e.g., business fixed investment]; rationing ought to have an allocative, zero-sum impact rather than a cumulative negative impact.[4]

The extent to which such a leak-proof, frictionless caricature approximates reality is, of course, an empirical question. Evidence presented below suggests that rationing probably did have some aggregative effects over the past 20 years, at least in the short run. An important and little-appreciated factor probably contributing to a net negative effect of rationing on economic activity was the monetary policy strategy the Federal Reserve used over most of the 1960s and 1970s.

How does the Federal Reserve's policy strategy matter?

Although the Federal Reserve's approach to policy passed through several stages of development leading to the change in operating procedures in October 1979, an element common

[4] Patric Hendershott, "Estimates of Investment Functions and Some Implications for Productivity Growth," in *The Supply-Side Effects of Economic Policy*, Laurence Meyer, ed., Federal Reserve Bank of St. Louis, 1980, p. 153.

to every stage was the tendency to set (peg) short-term interest rates in the short run.[5] Once a particular level of short-term rates was selected as consistent with achieving intermediate monetary aggregates and ultimate economic objectives, the Federal Reserve acted, usually through open market operations, to augment or absorb the supply of reserves and reduce the fluctuation of short-term interest rates around the selected level.

How this characteristic of policy before October 1979 influenced the effect of interest rate ceilings and associated disintermediation and credit rationing can be shown in a simple example. The intuition underlying the more formal analysis of this question in the Appendix can be grasped by viewing the financial system as composed of two markets — one open, with no controls over interest rates, and one controlled, with such interest rate regulations as Regulation Q and usury ceilings directly influencing borrowing and lending decisions. Assume that the Federal Reserve responds to new information by raising short-term nominal rates in the open market to a level it believes more consistent with the achievement of its monetary and economic objectives and gears its open market operations to bring about this new higher rate level. Suppose also that the new rate level in the open market is higher than the interest rate ceilings in the controlled market.

Looking only at the lending side for simplicity, it is reasonable to expect that those previously planning to lend in the controlled market will shift their lending to the open market, where interest rates are now higher than in the controlled market. For this substitution between markets to have a zero-sum effect on economic activity, rather than a cumulative negative effect, the reduction in the availability of funds in the controlled market (and associated reduction in borrowing and spending) would need to be offset by an increase in the availability of funds (and associated borrowing and spending) in the open market.[6] How the Federal Reserve short-circuited the flow of funds between markets and contributed to a net negative effect of interest rate ceilings, disintermediation, and credit rationing on economic activity is easily demonstrated. When lenders shifted funds from the controlled market to the uncontrolled market, the substitution put downward pressure on rates in the open market. With open market rates threatening to fall below the level sought by the Federal Reserve, the monetary authority drained funds (through open market sales of securities) to prevent such a decline. The net result was that the decline in funds available in the controlled market was not fully offset by an expansion in funds available in the open market.

The role of interest rates after deregulation and the change in policy procedures

Given innovation over time, the passage of both the Depository Institutions Deregulation and Monetary Control Act of 1980 and the Garn-St Germain Depository Institutions Act

[5] See Gordon Sellon and Ronald Teigen, "The Choice of Short-Run Targets for Monetary Policy, Part II: An Historical Analysis," *Economic Review*, Federal Reserve Bank of Kansas City, May 1981, pp. 3-12, for an insightful discussion of the evolution of the Federal Reserve's policy strategy.

[6] In a more complex setting, spenders could finance purchases by drawing down liquid assets or borrowing abroad. Thus, there may not be a tight one-for-one relationship between borrowing in the two domestic markets and spending.

of 1982, and the October 1979 changes in the Federal Reserve's policy procedures, it is appropriate to consider what implications these changes hold for the channels of monetary policy in general and the function of interest rates in particular. With the phasing out of Regulation Q, the relaxing of usury ceilings, and the Federal Reserve allowing more short-run fluctuation in short-term rates, money and credit are allocated increasingly by the level and movement in interest rates (explicit prices) rather than by restraints on availability (quantities) and the associated movement in implicit elements of price (the nonprice terms). As a result, the impact of particular monetary policy actions has come to depend increasingly on changes in real (inflation and tax-adjusted) interest rates on demand.[7]

A problem for monetary analysis is that real rates conventionally measured as nominal rates adjusted only for inflation and taxes do not adequately capture the effects of policy in the environment prevailing before significant innovation and deregulation. The upward adjustment of the implicit elements of price that accompanied rising nominal interest rates means that real rates, which should include such elements, were actually higher during such periods than conventional measures indicate.

To illustrate, the simplest model (without interest rate ceilings) can be written:

(1) $r = i - it - \pi$

where r = the real rate (the nominal rate net of taxes and inflation),

i = the nominal rate,

t = the tax rate, and

π = the inflation rate.

In a model with interest rate ceilings, the expression is incomplete. As nominal rates rise above the ceilings, implicit elements of price (the nonprice terms) are adjusted upward. As a result, the true real rate is

(2) $r = i - it - \pi + \delta$

where δ = the implicit elements of price.[8]

Determinants of movements in the variable δ can be represented by the simple relationship:

(3) $\delta = \alpha_0 + \alpha_1 (i - i_c)$

where $\alpha_0 \geq 0$, $\alpha_1 > 0$, and

i_c = the interest rate ceilings (both Regulation Q and usury ceilings).[9]

Rearranging equation 2 yields:

(4) $r - \delta = i - it - \pi$.

This last expression shows that the conventional measure of real rates understates the

[7] However, it is no doubt true that Tobin's liquidity-constrained consumers and firms are still affected by changes in nominal rates (James Tobin, "Monetary Policy and the Economy: The Transmission Mechanism," *Southern Economic Journal*, January 1978, pp. 421-431) and that credit rationing still exists. Moreover, changes in nominal interest rates generate capital gains or losses for holders of outstanding bonds. Such "wealth effects" may well affect real economic activity.

[8] The terms i and δ can be thought of as two elements of the price vector comprising a loan agreement.

[9] Support for this representation is readily available. The most systematic examination relevant to the present application is contained in a series of papers by Duane Harris ("A Model of Bank Loan Term Adjustment," *Western Economic Journal*, December 1973, pp. 451-462; "Some Evidence on Differential Lending Practices at Commercial Banks," *Journal of Finance*, December 1973, pp. 1303-1311, and "Interest Rates, Nonprice Terms and the Allocation of Bank Credit," *Southern Economic Journal*, January 1974, pp. 428-433). Harris first shows that adjusting the loan rate (the explicit price term) and "nonprice" (the implicit price) terms in the face of changes in financial conditions (for example, changes in the cost or availability of funds) is consistent with profit maximization on the part of intermediaries. Then, using data from the Federal Reserve's Survey of Bank Lending Practices, he finds considerable evidence to support the hypothesis that banks lower (raise) implicit price terms when nominal market interest rates fall (rise).

true real rate by the factor δ. Taken together, equations 3 and 4 indicate that nominal rates mattered, because interest rate ceilings were set in nominal terms. They also indicate that since the implicit elements of price were not fixed over time, real rates measured in the conventional manner cannot be compared directly across time.[10] Thus, studies of movements in real rates across time, and their relationship to economic activity, must be viewed with caution.[11] Among other things, the fact that the real rates estimated and examined in such studies turn out to be negative (or historically low) over sustained periods from the mid-1960s through the late 1970s may be due partly to the failure to take into account the implicit price effects of credit rationing (δ).

Conversely, with credit rationing effects diminishing significantly in the 1980s as a result of innovation and deregulation, conventionally measured real rates may appear high relative to rate levels prevailing in the earlier environment. The reduced importance of implicit elements of price means that interest rates must now bear more of the burden of adjustment to changes in the supply of or demand for funds.[12] Such a perspective may help explain, at least in part, the ratcheting up of real and nominal interest rates around recent business cycle peaks and the considerable cyclical volatility of rates over the past five years. A more powerful way to make the point may be to argue that the question "Why are real rates so high today?" can be answered only by first answering "Why were they so low before?"

Empirical relationship between real interest rates and real GNP

Economic theory suggests that real GNP growth should be negatively related to changes in real interest rates. The discussion above

[10] It is possible to argue that the analysis in the text summarized in equations 1 through 4 depends heavily on the particular nominal rate used to compute the real rate. To illustrate the point, assume mortgages and corporate bonds are good substitutes for each other in borrower and lender portfolios. If this is true, then the ratio of the corporate bond rate (i_{cb}) to the full price of a mortgage (the explicit price or mortgage rate, i_m, plus the implicit price δ) would be relatively constant across time. When nominal market interest rates rise above interest rate ceilings, nonrate terms on mortgage loans (the implicit elements of price) rise. Thus, δ is greater than 0. If the ratio of the corporate bond rate to the full rate on mortgages $[i_{cb}/(i_m + \delta)]$ is constant, then i_{cb} can be used as the relevant base and proxy for the movement in the real rate on all instruments. However, since mortgages and corporate bonds are not generally perfect substitutes, it is unlikely that the relevant ratio is constant across time. As a result, a market rate, such as the corporate bond rate or the commercial paper rate, used to compute the real after-tax interest rate is in all likelihood not immune to the argument presented in the text. Empirical work presented in the next section supports this contention.

[11] See, for example, Frederic Mishkin, "The Real Interest Rate: An Empirical Investigation," in *The Costs and Consequences of Inflation*, K. Brunner and A. Meltzer, eds., Carnegie-Rochester Series on Public Policy, 1981, pp. 151-200, and the references cited therein.

[12] To illustrate the underlying alteration in behavior, a simple, straightforward version of equation 3 was estimated: the change in the downpayment ratio on new homes, a proxy for δ (the nonrate terms on loans) was regressed on the change in the spread between the 3-month Treasury bill rate and the Regulation Q interest rate ceiling on passbook savings deposits. The estimate of α_1 obtained when the equation was fitted over the sample period 1966:II-1978:II was statistically significant at the 1 percent level and equal to 0.41, indicating that a 100 basis point increase in the spread between the bill rate and savings deposit ceiling rate led depository institutions to raise the required downpayment ratio on new homes by 41 basis points. When the sample period was extended through 1982:IV, the years encompassing significant financial innovation and deregulation, the estimate of α_1 obtained was not statistically significant at even the 10 percent level and was equal to 0.06. The result is consistent with the notion that at given levels of nominal interest rates, depository institutions have relied less on nonrate terms in recent years.

suggests that pinning down such a relationship statistically may be complicated by the difficulties of comparing real rates and their effects across time. More specifically, financial innovation, deregulation, and changes in policy procedures have worked to reduce the aggregative importance of credit rationing and movements in nonrate terms on loans while at the same time increasing the role of interest rates. Taken together, these considerations suggest that empirical models of the relationship might be unstable.

To examine these issues, the following equation was estimated:[13]

$$(5)\quad \dot{y}_t = \alpha_0 + \sum_{i=0}^{11} \beta_i \, \Delta r_{t-i} + \sum_{j=0}^{3} \Upsilon_j \, \Delta nr_{t-j}$$

where

$\dot{y}$ = the growth rate of real GNP (quarterly data measured at a seasonally adjusted annual rate),

Δr = the change in the real interest rate, and

Δnr = the change in nonrate terms on loans.

The β_i and Υ_j are the distributed lag weights on Δr and Δnr, respectively. Real rates were defined as the 90-day commercial paper rate minus a four-quarter weighted average of current and past inflation rates, as measured by the GNP deflator.[14] Data on the full range of nonrate terms are not readily available. One proxy, available since early 1964, is the loan-to-price ratio on new homes. Since the downpayment ratio is equal to one minus the loan-to-price ratio, a tightening of the nonrate terms on loans — that is, a reduction in the loan-to-price ratio and, thus, an increase in the downpayment ratio — would be expected to reduce real GNP. Thus, the growth in real GNP and changes in the loan-to-price ratio, a proxy for Δnr, should be positively related.

The results of fitting the basic equation, with and without Δnr, over several sample periods appear in Table 1. The first three equations exclude Δnr. Equation 1, fitted over the whole 1952-82 period, suggests that a 1 percentage point increase in the real interest rate reduces the cumulative quarterly growth rates of GNP by 7.74 percentage points over three years. The results for equation 2 suggest the relationship changes little when 13 years (1952:I-1964:I) are dropped from the sample. The results for equation 3, however, fitted over a sample period ending with the introduction of money market certificates in June 1978, imply a dramatic breakdown in the relationship uncovered in equations 1 and 2. The sum of the coefficients on the real rate is no longer statistically significant.

Equation 4 introduces Δnr into equation 2. The positive, statistically significant coefficient indicates that a 1 percentage point rise in the loan-to-price ratio (a decline in the downpayment ratio) raised the cumulative quarterly growth rates of real GNP by 3.28 percentage points over four quarters. These results suggest that changes in nonrate terms had aggregative effects, instead of only sectorial effects in the short run.[15]

Equation 5 introduces the same Δnr variable

---

[13] The form of this equation was taken from John Paulus and Stephen Roach, "Real Interest Rates and the Economic Recovery," *Economic Perspectives*, Morgan Stanley Economics Department, New York, May 11, 1983. The inferences drawn in the text were not sensitive to a variety of reasonable alternative specifications.

[14] The weights employed, following Paulus and Roach, were 0.4 for the current quarter, 0.3 for one quarter earlier, 0.2 for two quarters earlier, and 0.1 for three quarters earlier. Again, the overall results did not appear sensitive to the weighting scheme chosen (or estimated), to the particular nominal rate used as the base for computation, or to the measure of inflation employed.

TABLE 1
Regression results

Equation Number	Sample Period	Coefficients α_0	Coefficients $\Sigma\beta_i$	Coefficients $\Sigma\gamma_j$	Standard Error	Durbin-Watson Statistic	— R^2
1	1952:I- 1982:IV	−3.47 (6.7)	−7.74 (3.2)		3.8	1.99	.08
2	1964:II- 1982:IV	3.32 (5.9)	−7.25 (2.6)		3.8	2.05	.13
3	1964:II- 1978:II	3.66 (4.9)	−4.27 (.9)		3.9	1.96	.00
4	1964:II- 1982:IV	3.13 (5.9)	−6.49 (2.5)	3.28 (2.4)	3.7	2.03	.18
5	1964:II- 1978:II	3.64 (6.7)	3.12 (.7)	5.75 (3.5)	3.6	1.90	.18

Note: A third-degree polynomial distributed lag encompassing 12 periods, with no endpoint constraints, was used to estimate the β_i. The γ_j, encompassing four periods, were estimated unconstrained. The t-statistics are shown in parentheses below each coefficient.

into equation 3. This shorter sample period encompasses the era when interest ceilings are thought to have been most binding. The sum of the coefficients on Δnr is even larger (5.75 compared with 3.28), and the sum of the coefficients on the real rate now has the wrong sign and is not statistically significant. The smaller sum on Δnr when the sample period is extended through the era when innovation, deregulation, and changes in policy procedures were most prominent suggests that nonrate terms have become somewhat less important over time. Moreover, the instability shown by the sum of the coefficients on the real rate indicates that the relationship between conventionally measured real rates and economic activity is sensitive to the changing aggregative role of nonrate terms.

Some implications

Many have noted the disruptive and disorienting effects of ongoing financial innovation and deregulation. Lyle Gramley, a governor of the Federal Reserve System, has succinctly summarized the full range of issues raised:

> Financial innovation [and deregulation] in the United States has had important and far-reaching ramifications. It has raised questions about the appropriate definition of money, the precision of the Federal Reserve's control over the money stock, the meaning of changes in money bal-

[15] As in all "reduced-form" models, the fact that the explanatory variables may not be strictly exogenous and that the time series properties of the real rate appear to have changed over time requires considerable caution in interpreting the results.

ances, and the mechanism by which monetary policy affects economic activity.[16]

Such questions have led many analysts to the conclusion that the Federal Reserve should abandon or else significantly revise the monetary aggregates strategy comprising the formulation and implementation of monetary policy. Anticipating such arguments, Phillip Cagan put the problem facing policymakers and policy analysts into perspective:

> The long standing criticism that monetary aggregates are unsatisfactory guides for conducting policy, though generally exaggerated, acquires an added relevance with the new developments in the payments system. But the conclusion sometimes drawn from this criticism — that monetary policy should reduce or abandon its concern with monetary aggregates and focus primarily or even exclusively on other economic variables [such as interest rates] — was never valid and will not produce a solution for the future. The new developments that will reduce the usefulness of monetary aggregates as indicators of monetary policy will have largely the same consequences for other economic variables. The variables most often considered as alternatives to the monetary aggregates — short-term interest rates — will also become less reliable guides to the effect of monetary policy on aggregate expenditures.[17]

With innovation, deregulation, and changes in policy procedures reducing the importance of the credit rationing channel of monetary policy, movements in nonrate terms on loans (the implicit elements of price) have become less important in allocating credit and movements in interest rates (the explicit elements of price) have become more important. Conventionally measured real rates of interest now bear more of any adjustment made necessary by changes in the supply of or demand for funds.

From a policy perspective, the volume of spending choked off (encouraged) by any policy-induced change in the supply of funds and associated rise (fall) in nominal interest rates is a function of the responsiveness of credit demands, and thus spending, to associated changes in correctly measured real rates. Even if the problems of measuring after-tax real rates could be solved,[18] nailing down the responsiveness of credit demands and spend-

---

[16] Lyle Gramley, "Financial Innovation and Monetary Policy," *Federal Reserve Bulletin*, July 1982, p. 395.

[17] Phillip Cagan, "Financial Developments and the Erosion of Monetary Controls," in *Contemporary Economic Problems*, 1979, Washington, D.C.: American Enterprise Institute, pp. 117-151.

[18] Such problems include which particular nominal rate to use as the base for calculations, what tax rate to use, and how to measure inflationary expectations. See Carl Walsh, "Should the Federal Reserve Establish a Real Interest Rate Target?" *Economic Review*, Federal Reserve Bank of Kansas City, June 1983, pp. 22-33.

[19] Some of these points have also been made by Lyle Gramley, "Financial Innovation and Monetary Policy," *Federal Reserve Bulletin*, July 1982, p. 399; Donald Hester, "Innovations and Monetary Control," *Brookings Papers on Economic Activity*, 1981:1, p. 175; Robert Holland, "Speculation on Future Innovation: Implications for Monetary Control," in *Financial Innovation*, William Silber, ed., Lexington, Mass., Lexington Press, 1975, p. 170; John Judd and John Scadding, "Financial Change and Monetary Targeting in the United States," in *Interest Rate Deregulation and Monetary Policy*, Federal Reserve Bank of San Francisco, 1982, p. 101, n. 1; James Ostas and Frank Zahn, "Interest and Non-Interest Credit Rationing in the Mortgage Market," *Journal of Monetary Economics*, 1975:1, p. 198; Anthony Solomon, "Financial Innovation and Monetary Policy," *Annual Report-1981*, Federal Reserve Bank of New York, p. 17; and Albert Wojnilower, "The Central Role of Credit Crunches in Recent Financial History," *Brookings Papers on Economic Activity*, 1980:2, pp. 277-326.

ing to changes in the real rate would be complicated considerably by the lack of comparability of real rates across time. To illustrate, models fitted over the 1960s and 1970s will probably overestimate the restraining effects of given increases in nominal and conventionally measured real interest rates in the 1980s. This is just another way of saying that conventionally measured real rates will, for example, have to increase more to induce a given slowing of economic activity.[19] More generally, fixed-coefficient models estimated over sample periods characterized by important changes in the financial structure and policy procedures are not likely to be reliable guides to the short-run effects of monetary policy.

Appendix

How the Federal Reserve's Pre-October 1979 Policy Strategy Contributed to the Effect of Disintermediation and Credit Rationing on the Economy

If the Federal Reserve implements monetary policy by setting (pegging) short-term nominal interest rates in the short run in an effort to achieve its intermediate monetary aggregates and ultimate economic objectives, any increase in credit rationing accompanying an upward movement in nominal market interest rates is likely to have aggregative effects rather than only sectoral effects. Consider Figure 1. In panel A, the function $D_F$represents the demand for funds (loans) by borrowers at financial intermediaries, such as banks and thrift institutions, that are subject to regulations governing the maximum rates they can charge on loans (usury ceilings) and the maximum rates they can pay on deposits (Regulation Q ceilings). It is drawn downward sloping under the reasonable presumption that the quantity of funds demanded is negatively related to the interest rate, the cost of borrowing.[1] The function S_F(where the subscript F everywhere refers to functions, quantities, or rates relevant to the borrowing and lending in the controlled market involving the regulated financial intermediaries) represents the supply of funds (loans) by the intermediaries. It is drawn upward sloping in the belief that the quantity of funds supplied is positively related to the interest rate, the reward for lending. Note that the volume of funds intermediaries are willing and able to lend at any particular rate is a function of the volume of funds they are able to attract from depositors at any given rate. The initial equilibrium is at point A, with Q_F funds lent at a rate i_F, which is assumed for expositional convenience to be equal to the prevailing rate ceilings on loans and deposits.[2]

In panel B, the supply of funds by lenders, S_0, and the demand for funds, D_0, by borrowers in the open, uncontrolled market, such as the bond market, are depicted (where the subscript 0 everywhere refers to functions, quantities, or rates relevant to the borrowing and lending in the open market). The initial equilibrium is at point A′, with Q_0 funds lent at a rate i_0. The figure is drawn so the equilibrium rate in the controlled market i_F is equal to the equilibrium rate in the open market i_0.

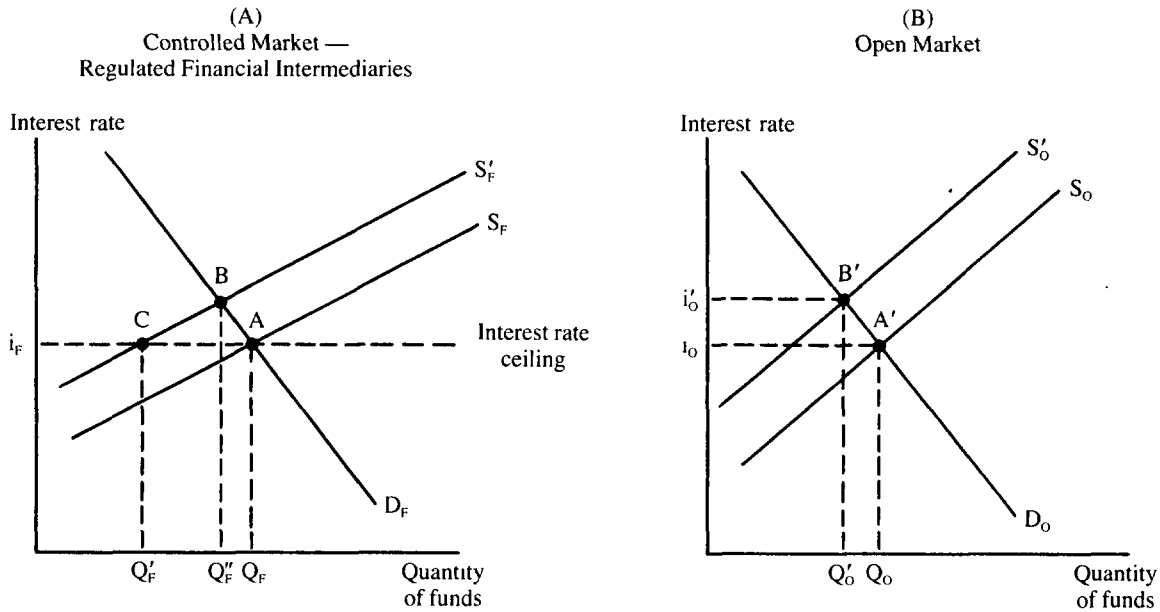
Suppose that in light of its monetary and economic objectives, the Federal Reserve decides to raise the rate in the open market. This is accomplished by reducing the supply

---

[1] Inflationary expectations are assumed to be zero. As a result, there is no need to distinguish between real and nominal interest rates. They are equal

[2] For expositional clarity and to keep the figure as simple as possible, the ceilings on loans and deposits are assumed to be identical.

FIGURE 1
Effect of monetary policy on interest rate and credit availability



of funds available; S_0 shifts leftward to S_0' and i_0 rises to i_0'. If borrowers, the demanders of funds, cannot move freely between markets because of institutional rigidities but lenders can, the rise in the open market rate relative to the controlled market rate will induce intermediaries to lend less in the regulated market, shifting S_F to S_F', and more in the open market, tending to shift S_0' back toward S_0. However, such a flow of funds from the intermediaries to the open market exerts downward pressure on the open market rate and tends to lower the market rate below the level desired by the Federal Reserve. In response, the monetary authority will absorb the funds flowing into the open market (by selling securities) to keep the rate at its desired level.[3] By moderating or eliminating the downward movement in the open market rate, such a response helps produce a net negative effect of rationing on economic activity.[4]

[3] In a more complicated model, where the open market had a short and long-term sector, it would be necessary to analyze how the shift of funds from the controlled market affected the term structure of open market rates and how Federal Reserve actions in the short-term sector of the open market affected long-term rates.

[4] In contrast, if the Federal Reserve is using a reserves approach to monetary control, then the shift of funds from the controlled market to the open market accompanying a rise in the open market rate would not elicit an offsetting reserve-draining operation by the monetary authority. Thus, the economywide effects of the reduction in credit availability in the controlled market would be at least partly offset by the shift of funds into the open market.

The movement in rates from i_0 to i_0' and funds lent from Q_0 to Q_0' in the open market, reflecting the movement from equilibrium point A′ to B′, can be thought of as the cost of capital effect of policy discussed earlier. In addition, the upward movement in the open market rate reduces the volume of funds regulated intermediaries are willing to supply in the controlled market from Q_F to Q_F'' (equilibrium point A compared with point B). This can also be thought of as an element of the cost-of-capital effect. However, since the interest rate in the controlled market is prevented from rising above i_F by the ceiling, lenders will in fact only be willing to supply Q_F'. Thus, intermediaries must raise (tighten) the nonrate terms on loans to reduce the demand for funds (shift D_F to the left to intersect S_F' at point C). The reduction in funds available from Q_F'' to Q_F' can be thought of as the credit rationing effect of policy — an effect that depends on the level of nominal rates relative to the interest rate ceilings and the policy procedure used by the Federal Reserve.

Economic Review
Federal Reserve Bank of Kansas City
Kansas City, Missouri 64198
February 1984, Vol. 69, No. 2