

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

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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 analy-

sis 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).

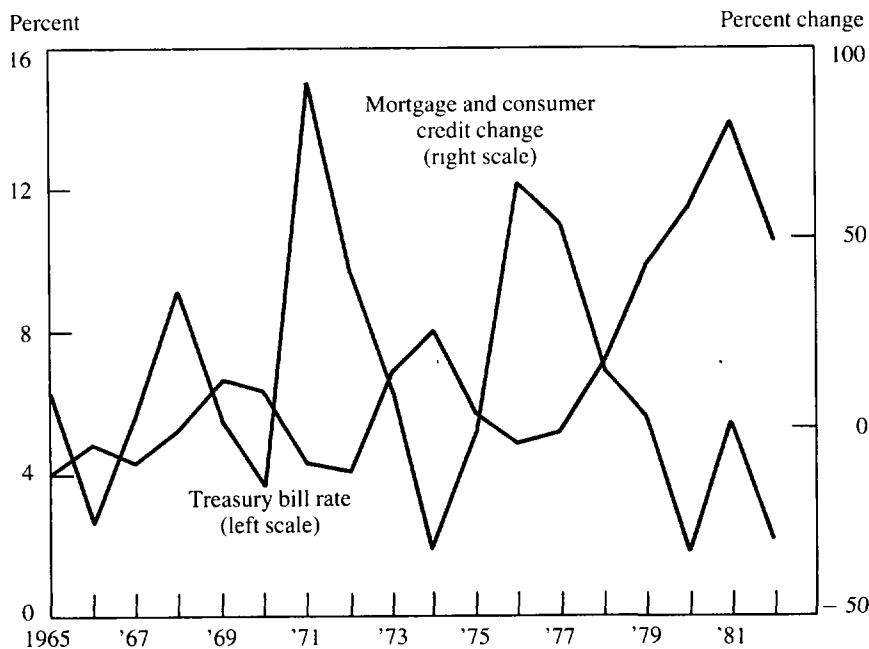
When nominal market interest rates rose above regulated ceilings, deposits flowed out of certain financial institutions, particularly thrift institutions, and lending opportunities in uncontrolled markets, such as the bond markets, dominated those in the mortgage and consumer loan markets. As a result 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).

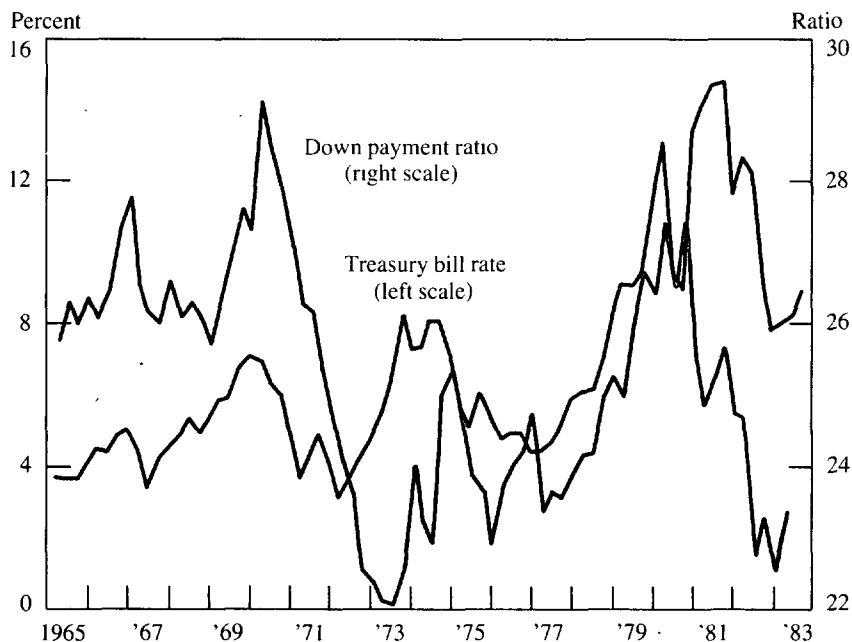
Evidence supporting this conjecture is provided in Chart 2, which shows the relationship between the bill rate and the downpayment ratio on new homes (the downpayment divided by the price of houses), an important nonrate term on mortgage loans. The downpayment ratio generally rose during the same periods 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 pre-

sented 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:

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.

$$(1) \quad r = i - t - \pi$$

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

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

where δ = the implicit elements of price.⁸

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

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

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:

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

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

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 Conse-*

quences 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

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

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 γ_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			Standard Error	Durbin-Watson Statistic	R ²
		α_0	$\Sigma\beta_1$	$\Sigma\gamma_j$			
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_1 . 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 non-rate 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

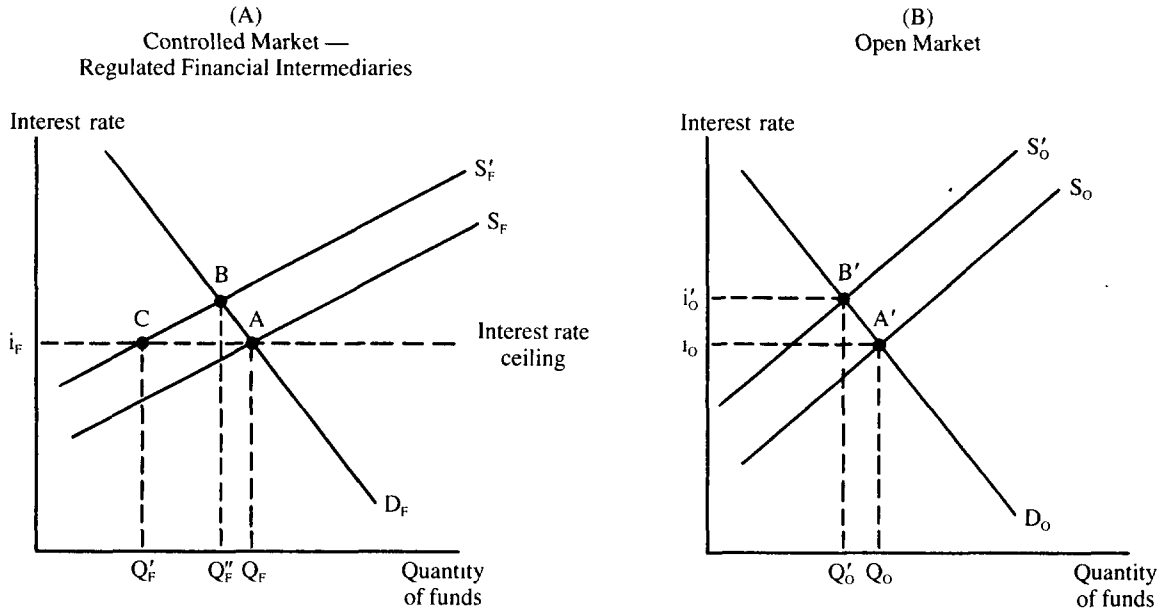
In panel B, the supply of funds by lenders, S_0 , and the demand for funds, D_0 , by borrowers in the open, uncontrolled market, such as the bond market, are depicted (where the subscript 0 everywhere refers to functions, quantities, or rates relevant to the borrowing and lending in the open market). 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 mod-

erating 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.