The Changing U.S. Financial System: Some Implications for the Monetary Transmission Mechanism

By Gordon H. Sellon, Jr.

An important part of monetary policy is the monetary transmission mechanism, the process by which monetary policy actions influence the economy. While the transmission mechanism involves a number of channels, including exchange rates, bank credit, and asset prices, most economists consider interest rates to be the principal avenue by which monetary policy affects economic activity. In a simple, stylized view of the interest rate channel, monetary policy first influences bank lending rates and short-term market interest rates. Changes in short-term rates are then transmitted to long-term rates. Finally, economic activity responds as businesses and consumers react to these changes in interest rates.

The influence of monetary policy on interest rates depends importantly on the structure of the financial system. In recent decades, significant changes in the structure of financial markets and institutions in the United States may have altered the interest rate channel. Key developments include the deregulation of the financial system, the growth of capital markets as an alternative to bank intermediation, increased competition among intermediaries both domestically and internationally, and greater transparency by the Federal Reserve about monetary policy operations.

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These changes in the financial system may have altered both the timing and magnitude of the response of interest rates to monetary policy. Indeed, the failure of long-term interest rates to respond to monetary policy easing during the past year has been cited in the financial press as an indication that monetary policy may now have less influence on interest rates than in the past.

This article examines how the changing financial system has affected the interest rate channel of monetary policy. The article finds that the response of interest rates to monetary policy, rather than diminishing, has actually increased considerably over time. Indeed, bank lending rates on consumer and business loans and mortgage rates now appear to exhibit a much stronger and faster response to monetary policy actions than in the past. Moreover, institutional changes, such as the increased use of variable-rate loans and the availability of low-cost mortgage refinancing, may have altered the transmission mechanism, potentially broadening the influence of monetary policy on the economy.

The first two sections of the article describe the traditional view of the monetary transmission mechanism and identify important changes in the financial structure that may have altered the interest rate channel. The third section shows how the response of bank lending rates on business and consumer loans to monetary policy actions has changed and explores possible reasons for these changes. The fourth section examines major developments in mortgage markets and their implications for the monetary transmission mechanism. The fifth section discusses the overall effect of the changing financial system for monetary policy. The final section provides a summary and conclusions.

I. THE INTEREST RATE CHANNEL OF MONETARY POLICY

In the traditional view of the monetary transmission mechanism, the banking system and interest rates play key roles in determining how the economy responds to monetary policy.[1] Changes in monetary policy typically start in the banking system when a central bank alters the supply of bank reserves to influence a short-term interest rate. In the United States, for example, the Federal Reserve determines a desired level of the overnight interbank federal funds rate and maintains this

rate by altering the supply of bank reserves. Changes in monetary policy are implemented by raising or lowering the intended federal funds rate. These monetary policy actions are transmitted to the economy to the extent that changes in the intended federal funds rate pass through to other interest rates and to the extent that these interest rate changes alter consumer and business spending.

The process by which monetary policy actions influence interest rates varies somewhat for different types of loans and securities. In the case of bank loans to businesses and consumers, for example, the effects of monetary policy are relatively straightforward. Changes in monetary policy affect the supply of bank reserves and the cost of bank funds, and banks tend to pass on these cost changes to loan rates.

For market interest rates, such as those on corporate and government securities, the transmission mechanism is more complex. One way changes in the federal funds rate influence market interest rates is through a process of portfolio substitution in which investors and borrowers adjust their demand for and supply of securities in response to the higher or lower federal funds rate. For example, a higher federal funds rate raises the relative yield on short-term assets, causing investors to shift their demand from long-term assets toward short-term assets and borrowers to increase their supply of long-term assets. These changes tend to lower the prices of long-term assets and raise their yields. As a result, an increase in the federal funds rate is translated into increases in long-term market interest rates.

Another way monetary policy can influence market interest rates is by influencing market expectations of future interest rates. Because long-term interest rates depend on both current and expected future short-term interest rates, a change in the federal funds rate will have a larger effect on long-term rates if financial markets believe that the change will persist for an extended period of time. Indeed, this expectation effect can be so powerful that market interest rates move in advance of a change in the federal funds rate if financial markets anticipate that a policy action is likely to occur in the future (Roley and Sellon).

The institutional structure of the banking system and financial markets is likely to determine both the speed and the magnitude of the response of interest rates to monetary policy actions. For example, if banks are slow to adjust loan rates or if long-term interest rates adjust

slowly to short-term rates, monetary policy will take longer to affect the economy. Alternatively, if the magnitude of the response of bank lending rates and market interest rates to monetary policy actions is relatively small, larger policy actions will be required to have a desired effect on the economy.

II. IMPLICATIONS OF A CHANGING FINANCIAL SYSTEM

Because the monetary transmission mechanism depends heavily on banks and financial markets to channel monetary policy actions through interest rates, changes in the structure of the financial system could alter the transmission mechanism. The past several decades have seen major changes in the U.S. financial system that could potentially alter the interest rate channel of the transmission mechanism. These changes can be grouped under four broad headings: financial deregulation, the growth of capital markets, the creation of new types of financial instruments, and greater transparency of monetary policy operations.

Financial deregulation

Since the 1970s, substantial deregulation of the U.S. financial system has occurred as much of the regulatory structure put in place during the Great Depression has been progressively dismantled. While financial deregulation has taken many forms, two developments have been especially important for the transmission mechanism. The first is the removal of deposit interest-rate ceilings that began with the passage of the Monetary Control Act of 1980. For many years, depository institution faced legal ceilings on the amount of interest that could be paid on deposits.[2] A consequence of these ceilings was that when monetary policy was tightened, depository institutions experienced an outflow of funds as depositors shifted funds out of these institutions in search of higher yielding assets. Faced with an outflow of funds, depository institutions were forced to restrict credit availability. These effects fell most heavily on thrift institutions, and so the housing market was especially sensitive to changes in monetary policy (Duca, Kahn).

During the time that interest rate ceilings were in effect, the impact of monetary policy on the housing market tended to occur more through credit availability effects than through an interest rate channel. That is, housing was affected more by reduced credit availability than by higher interest rates. The principal consequence of the removal of deposit rate ceilings is that interest rates are likely to play a greater role in allocating credit so that the interest rate channel, especially in housing, is likely to be a more important part of the transmission mechanism.[3]

Another key aspect of financial deregulation has been the removal of geographic and product-line barriers that limit competition among financial institutions. In the United States these changes have included the elimination of restrictions on interstate banking and removal of competitive barriers between banks and other financial institutions. At the international level, many countries have taken actions to open their financial markets to international capital flows and to foreign financial institutions. With the removal of these restrictions, the degree of competition among financial institutions has intensified. There has also been a trend toward consolidation within industries and across financial service industries (Group of Ten).

These changes are likely to influence the monetary transmission mechanism to the extent that competition and industry structure affect the pricing of loans and other financial services. It is generally believed that less competitive industries have more pricing power or discretion in adjusting prices to changes in costs. If so, changes in industry structure and the degree of competition in financial services could influence how lending rates respond to changes in monetary policy.

Growth in capital markets

A second key development in financial markets in recent years is the enormous growth in capital markets. This growth is reflected both in the increased role of institutional investors, such as pension and mutual funds, and in the greater volume of financial transactions in these markets. One important consequence of the growing importance of capital markets is that financial intermediation has increasingly shifted outside of the banking system as many borrowers and investors have switched from banks to direct finance in capital markets. For

example, many large corporations now meet their major funding needs through capital markets rather than bank loans, and many investors now hold mutual funds instead of bank deposits.

In response to these changes, many banks have altered their business strategies. For example, banks have shifted the composition of their lending from large corporations to smaller businesses and to consumer and mortgage loans. In addition, banks have relied more on other sources of income, such as fee income for payments services and risk management products and services for investors.

These changes have important implications for the role of banks in the transmission mechanism. Competition from capital markets, like increased competition from other financial institutions, may influence how banks price loans and how bank loan rates respond to monetary policy. In addition, if the composition of bank lending changes, the incidence of monetary policy is likely to change as well. Now, as compared to a few years ago, changes in bank loan rates are less likely to affect large corporations and more likely to influence smaller businesses and consumers.

New financial instruments

Along with the growth of capital markets has come financial innovation in the form of new products designed to better meet investors' and borrowers' needs. Particularly noteworthy because of it implications for the transmission mechanism is "securitization," a process by which individual loans are packaged together and used to back securities that are sold to investors. The most important example of securitization is the development of the secondary mortgage market in which individual mortgage loans are pooled together and used to create mortgage-backed securities. These securities are then sold to capital market investors.[4] Securitization has also occurred for other types of consumer loans, such as credit card, automobile, and home equity loans.

Securitization has important implications for the transmission mechanism. The ability to securitize loans gives banks and other depository institutions access to an additional funding source so that they are less likely to be constrained by the cost and availability of funds when monetary policy is tightened. For example, when monetary policy is

tightened, depository institutions can obtain additional funds by selling loans into the secondary market and then using the funds obtained to make additional loans.

In addition, interest rates on loans eligible for securitization are likely to be more closely tied to market interest rates than interest rates on loans that cannot be securitized. For example, because mortgage-backed securities must be priced competitively with other similar securities in capital markets, the rates on the underlying mortgage loans must also be responsive to changes in the market interest rates on these securities. As a result, with securitization, the influence of monetary policy on mortgage rates may depend as much on its ability to affect market interest rates generally as on its direct influence on the cost and availability of funds to mortgage lenders.

A second innovation in financial markets is the growing use of variable-rate loans. While some short-term business lending has been variable rate for many years, variable-rate loans have become more prominent in mortgage lending and certain types of consumer lending, such as credit card loans and home equity lines of credit. Interest rates on fixed-rate loans are set at the origination of the loan and remain constant for the life of the loan. In contrast, for variable-rate loans, interest rates are generally tied to an index rate so that the loan rate changes whenever the index rate changes. For example, rates on consumer loans that use the prime rate as an index rate will change whenever the prime rate changes.

Variable-rate loans can influence the transmission mechanism in two ways. First, increased use of variable-rate loans may change the response of loan rates to monetary policy by making loan rates adjust automatically when index rates respond to changes in monetary policy. Second, variable-rate loans effectively create an additional channel for interest rates to influence consumer and business spending. With a fixed-rate loan, a borrower's payments do not change when market interest rates change. Thus, changes in interest rates primarily affect new purchases that are financed by credit. For example, when rates on fixed-rate mortgages rise, the demand for housing slows as prospective homebuyers face higher monthly mortgage payments. In contrast, with

a variable-rate loan, changes in interest rates alter the size of payments on *existing* loans and affect the borrower's discretionary income or cash flow, which may influence other types of spending.

Monetary policy transparency

A fourth development that may have influenced the transmission mechanism is a trend by central banks toward greater transparency or openness about monetary policy. Historically, central banks have tended to be somewhat cautious in providing information about monetary policy to financial markets, in part, because of a belief that such information could destabilize markets.[5] In recent years, however, there has been a marked change in views spurred partly by academic research suggesting that providing more information about monetary policy to financial markets may actually help central banks achieve their long-run objectives (Broaddus, Greenspan).

As a result of this change in views, the Federal Reserve now provides information about its short-run objective for the federal funds rate and announces policy actions immediately. In the past, this information was provided on a less timely basis and financial markets spent considerable time and effort in attempting to identify policy changes. In addition, the Federal Reserve now provides a statement about the balance of risks to the economy going forward that may help markets in assessing the likelihood of future policy actions.

These developments could affect the transmission mechanism by speeding up the response of interest rates to monetary policy and reducing the length of monetary policy lags. This could happen in two ways. First, if there are costs to adjusting loan rates and banks are uncertain about when monetary policy actions occur, banks may be slow to change loan rates. In this situation, more timely information about policy could speed up the adjustment of loan rates. Second, to the extent that long-term market interest rates depend on expectations of future policy actions, greater clarity about the longer-term objectives of monetary policy could speed up the response of market interest rates as well.

III. BANK LENDING RATES AND MONETARY POLICY

There is a considerable amount of research on the monetary transmission mechanism suggesting that financial structure plays a key role in the response of bank lending rates to monetary policy. While lending rates have typically exhibited a sluggish response to monetary policy in the past, changes in the financial system in recent years appear responsible for a sizable increase in the response of business and consumer lending rates to monetary policy actions.

Previous research on the responsiveness of bank lending rates

Numerous studies on the response of loan rates to monetary policy have established two stylized facts. First, loan rates are sluggish or sticky in responding to monetary policy actions. Second, financial structure appears important in explaining this phenomenon both within and across countries.

The stickiness of bank loan rates has several dimensions. Loan rates appear to be slow to adjust to policy actions, with lags ranging from several weeks to several months. In addition, policy changes do not get fully passed through to loan rates; that is, the response is generally less than one-to-one. Finally, there is considerable evidence of asymmetry in the response of loan rates. Loan rates generally react faster and more completely when policy is tightened than when policy is eased.

Most research on the United States has focused on the behavior of the prime rate and credit card rates. For the prime rate, there is considerable evidence of long lags and asymmetry. For example, during the 1970s and early 1980s, on average the prime rate responded to monetary policy changes with a lag of one to two months in periods of increasing rates and considerably longer lags for periods of decreasing rates (Arak, Englander, and Tang). More recent research provides additional support for slow and asymmetric adjustment of the prime rate (Mester and Saunders, Dueker).

The stickiness of credit card interest rates is even more extreme. Indeed, for many years credit card rates were essentially unchanged in the face of large changes in market interest rates and other loan rates

(Ausubel). For example, from 1972 to 1979, when the prime rate ranged from a low of 4.75 percent to a high of 12 percent, the average credit card rate only varied from 16.86 percent to 17.25 percent.

Similar results have been obtained in research on bank lending rates in countries other than the United States. In many industrialized and developing countries, bank loan rates appear to be sticky and respond asymmetrically to monetary policy (Cottarelli and Kourelis, Borio and Fritz, Mojon).

Economists have generally attempted to explain these results by properties of the financial structure, including the degree of competition in loan markets, adjustment costs faced by banks and customers, and uncertainty about monetary policy.[6] For example, in less competitive loan markets where banks have market power, banks may have considerable discretion in adjusting loan rates to changes in monetary policy. Similarly, if borrowers face large costs in shifting between lenders or if changes in loan rates are costly for banks, loan rates may be sticky. Banks may also be reluctant to alter loan rates until they know that monetary policy has been changed and that the change is likely to persist.

Has the response of lending rates changed?

If the existing financial structure is an important determinant of the behavior of loan rates, as suggested in previous research, changes in the financial structure could alter this behavior. To determine whether the response of bank lending rates has changed over time, this article compares the behavior of rates over two separate time periods, the 1970s and from 1994 to the present. The 1970s predate many of the important regulatory and structural changes in financial markets that occurred in the 1980s.[7] In addition, in late 1979, the Federal Reserve made a major change in its operating procedures that resulted in significant changes in the behavior of interest rates over the next several years.[8] In contrast, by the 1990s, many of the structural changes to financial markets were largely complete, and the Federal Reserve had returned to a policy of targeting the federal funds rate. Moreover, in 1994, the Federal Reserve made the first of a number of changes in its disclosure policies that increased the transparency of monetary policy.[9]

The analysis focuses on four major bank lending rates: the prime rate and rates on credit cards, automobile loans, and personal loans. The prime rate is a key lending rate on business loans and also serves as a benchmark for many types of consumer lending.[10] The three types of consumer loans comprise the major forms of nonmortgage consumer finance.[11]

To determine whether bank lending rates have become more or less responsive to monetary policy, the analysis focuses on two dimensions: the speed of adjustment of lending rates and the degree of pass-through. For the prime rate, the response of the prime rate to a measure of the Federal Reserve's intended federal funds rate target is examined.[12] For consumer lending rates, their response to changes in the prime rate is analyzed.[13]

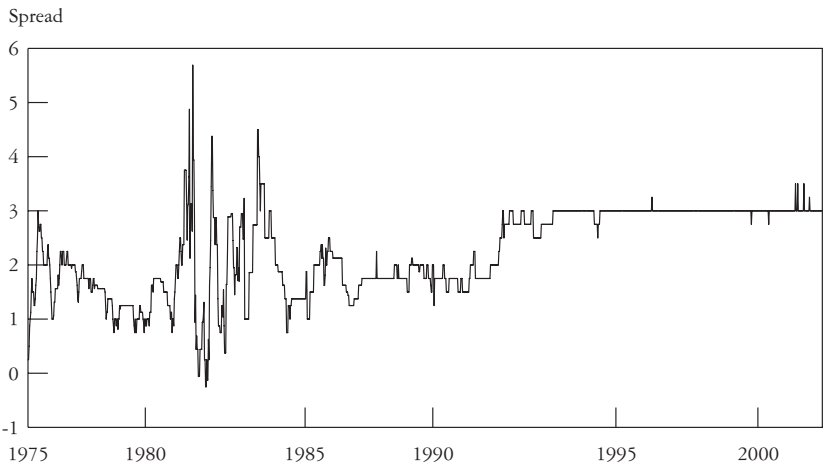
Evidence on the speed of adjustment. One way of measuring the speed of adjustment is to look at the behavior of the spread or the difference between two interest rates. For example, if the prime rate adjusts only slowly to changes in the federal funds rate target, changes in the spread between the two rates will tend to last for an extended period of time. That is, an increase in the funds rate target will initially narrow the spread, and the slow response of the prime rate will cause the spread to remain below normal for a period of time. In contrast, if the response of the prime rate is rapid, changes in the spread will be eliminated quickly.

The spread between the prime rate and the funds rate target—both measured weekly—is shown in Chart 1. The contrast between the 1970s and the 1990s is striking. In the 1970s, the spread was highly cyclical, suggesting a very slow response of the prime rate to monetary policy actions. The response appears to have speeded up considerably beginning in the mid-1980s causing the spread to adjust more quickly. By the mid-1990s, the spread was essentially constant, suggesting that the response of the prime rate to the funds rate target was almost immediate.[14]

There was a similar increase in the speed of adjustment of consumer lending rates to the prime rate over the two periods (Chart 2). In the 1970s, changes in the spread between consumer lending rates and the prime rate lasted for a considerable period of time, suggesting a very sluggish response of consumer rates. In contrast, by the 1990s, changes in the spread did not last as long, indicating a much faster response of consumer rates to the prime rate.[15] It is interesting to note that the behavior of consumer lending rates appears to have changed at different

Chart 1

SPREAD BETWEEN PRIME RATE AND FEDERAL FUNDS RATE TARGET



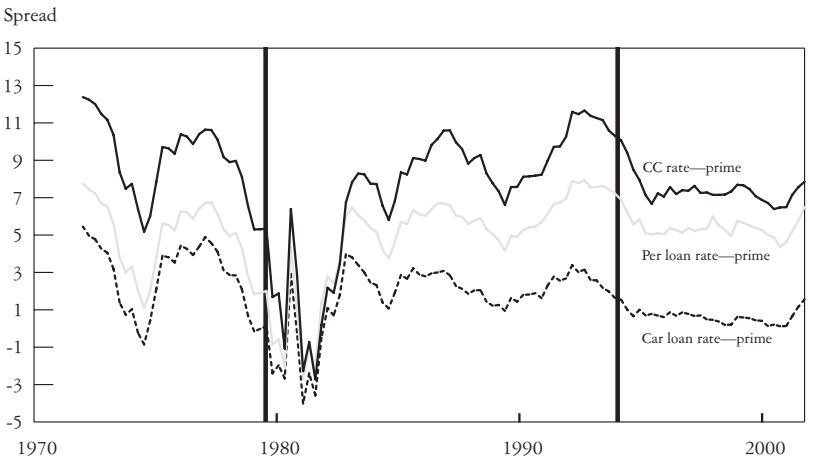
Sources: Board of Governors, author's calculations

times. Auto and personal loan rates seem to have become more responsive to the prime rate in the mid-1980s, while the increased responsiveness of credit card rates occurred much more recently (Chart 2).

Evidence on the size of pass-through. A second dimension of the interest rate transmission mechanism is the degree of pass-through from monetary policy actions to lending rates. That is, when the federal funds rate target changes, how large is the associated movement in lending rates? One way of measuring pass-through is to look at the response of lending rates to changes in the funds rate target over a period of time. Chart 3 compares a measure of the degree of pass-through during periods of monetary policy tightening in the 1970s and the 1990s.[16] Pass-through is measured as the ratio of the total change in the prime rate to the total change in the funds rate target, or the total change in consumer lending rates to the total change in the prime rate from the trough to the peak in rates. The magnitude of pass-through is likely to depend on two factors: the size of the margin between the rates and the relative maturities of the assets. Generally speaking, if banks maintain a fixed margin between the prime rate and the federal funds rate, or between consumer

Chart 2

SPREAD BETWEEN CONSUMER LOAN RATES AND PRIME RATE



Source: Board of Governors

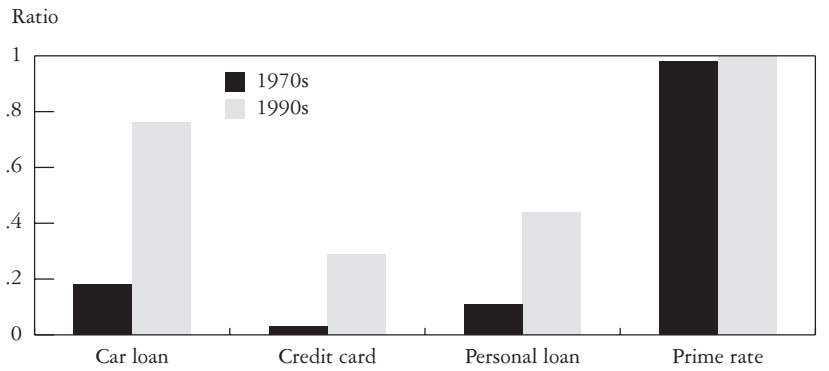
rates and the prime, pass-through should be close to one. In addition, other things equal, pass-through should be greater for loans of similar maturities. Thus, the pass-through of changes in the federal funds rate target should be smaller for loans of longer maturity.

As shown in Chart 3, changes in the federal funds rate target appear to be fully passed through to the prime rate in both of the time periods examined. That is, even though the speed of adjustment of the prime rate was slower in the 1970s, the prime eventually adjusted to maintain a roughly constant margin with the funds rate target. In contrast, for all three types of consumer loans, the size of pass-through was less than one. The smaller pass-through may reflect variability in the margins of these rates over the prime or the fact that these loans had somewhat longer maturities than the prime.[17]

Although the pass-through of prime rate changes to consumer rates is less than one-for-one, Chart 3 shows that the size of pass-through has increased dramatically over time. For example, credit card rates essentially exhibited no response to the prime rate in the 1970s period but

Chart 3

RESPONSE OF CONSUMER LOAN RATES AND PRIME RATE TO MONETARY TIGHTENING



Sources: Board of Governors, author's calculations

exhibited a much greater response to the prime rate in the 1990s. Similarly, the pass-through on auto loan rates rose from about 20 percent to 75 percent over the two periods.

Explanations for the increased response of bank lending rates

Structural changes in the financial system and in the implementation of monetary policy appear largely responsible for the significant increase in the response of bank lending rates to monetary policy. In the case of the prime rate, one likely factor is the increased competition for business loans among banks and between banks and nonbank financial intermediaries discussed earlier.

Another factor is the greater transparency of monetary policy. In the 1970s, Federal Reserve policy actions were rarely announced.[18] While financial markets could often discern policy changes within a few days or a week, official confirmation of a policy action generally did not occur until the next FOMC meeting several weeks later. In contrast, beginning in 1994, the Federal Reserve began announcing policy

changes on the day of the decision. Thus, greater certainty about when policy actions occur may have increased the speed of response of the prime rate.

A second way that policy transparency may have led to a faster response of the prime is by altering the relationship between monetary policy and the cost of bank funds. Previous research on the prime rate has identified changes in the cost of funds as an important determinant of a bank's decision on when to change the prime rate (Forbes and Mayne, Goldberg). One measure of the cost of funds is the rate that banks pay on large denomination certificates of deposits. In the 1970s, changes in CD rates typically occurred at the same time as a monetary policy action or shortly thereafter. In contrast, in recent years CD rates, like many other market interest rates, appear to have moved in advance of policy actions. Consequently, banks may now experience significant cost pressures before rather than after policy actions. If so, banks may be under increased pressure to speed up the response of the prime rate, and an announced policy action may now serve as the trigger for prime rate changes.

The increased responsiveness of bank automobile loan rates is likely due to two structural changes. One is the greater degree of competition from automobile finance companies, such as General Motors Acceptance Corporation and Ford Motor Credit. These companies generally finance their lending by selling short-term commercial paper so that the rate they charge on auto loans varies with market interest rates. To compete with these lenders, banks may be forced to adjust rates on new auto loans in line with finance company and market rates. An additional development is the securitization of automobile loans, which began in the mid-1980s. As noted earlier, securitization of loans tends to force interest rates on the loans to move in line with market interest rates, so the growth in securitization of auto loans may have increased their responsiveness to the prime rate as well.

Two factors appear to be behind the increased responsiveness of personal loans and credit card loans. One development is a shift from fixed-rate to variable-rate loans. Many variable-rate loans are tied to an index rate such as the prime rate so that the loan rate changes whenever the index rate changes. Thus, a faster response of the prime rate to monetary policy would translate into a faster response of interest rates on

variable-rate loans. In addition, to the extent that the margin between the loan rate and the index rate is fixed, changes in the index rate would tend to be fully passed through to the loan rate. Consequently, if variable-rate loans make up an increasing share of total loans, the amount of pass-through may increase.

Variable-rate loans appear to have become prominent in the market for personal loans during the 1980s (Stango). The use of variable-rate loans for credit cards is much more recent and appears to be associated with increased competition among credit card issuers over the past few years (Stango, Board of Governors 1999). For example, in 1990, only about 5 percent of credit card loans were variable rate. By 1994, the percentage of variable-rate loans had increased to 57 percent and, by 2000, to 75 percent (Stango, Nilson Report).

Another factor behind the increased responsiveness of credit card rates is the trend toward securitization, which began in the mid-1980s. Credit card issuers can issue securities backed by credit card loans and sell these securities in capital markets to obtain new funds to make additional credit card loans. As in the case of auto loans, securitization tends to force interest rates on the underlying loans to move in line with market rates so that the card-backed securities can remain competitive with other securities. Thus, the growth of credit card securitization may also have contributed to increased flexibility of interest rates on credit card loans.

IV. MORTGAGE MARKETS AND MONETARY POLICY

While changes in the financial system have had significant effects on bank lending rates, the implications for mortgage markets have been even more profound. Deregulation and securitization have fundamentally altered the structure of housing finance. As a result, mortgage rates, like bank lending rates, have become more responsive to monetary policy, and the monetary transmission mechanism has been altered as well.

Traditional structure of housing finance

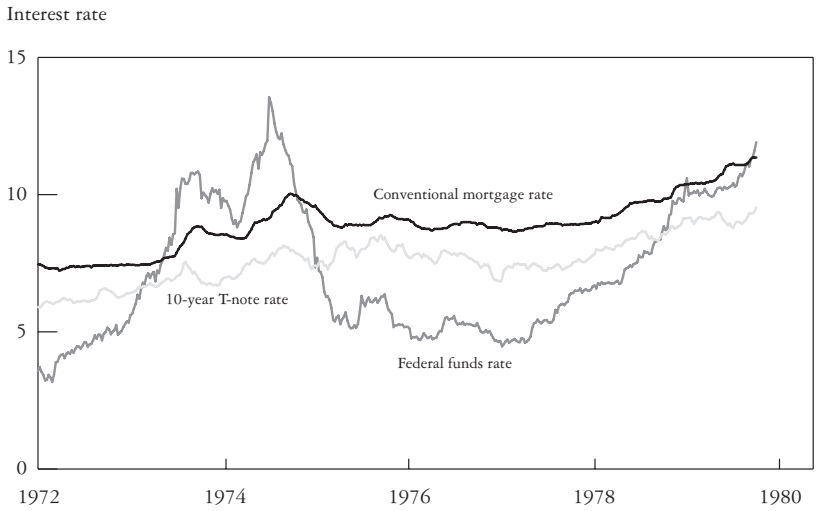
Historically, housing finance in the United States relied heavily on specialized mortgage lenders, such as saving and loan associations and mutual savings banks, rather than on commercial banks to finance home mortgages. Consequently, mortgage rates were determined in a very different institutional framework than lending rates on consumer and business loans. Mortgage markets tended to be local in nature with local deposits used to fund local mortgages. These features had both positive and negative implications for housing finance. On the one hand, local mortgage markets tended to be somewhat insulated from national credit conditions. On the other hand, there was not a good mechanism for directing deposit flows to areas of high mortgage demand.

Regulation, in the form of interest rate ceilings on deposits, also played a key role in housing finance. Commercial banks had been subject to deposit rate ceilings since the 1930s and similar regulations were extended to thrift institutions in the 1960s. During periods of tight monetary policy, deposit rate ceilings caused a sharp outflow of funds from mortgage lenders, which limited their ability to make new mortgage loans. Deposit rate ceilings helped make local mortgage markets more responsive to national credit conditions and monetary policy. In addition, when these ceilings became binding during periods of tight monetary policy, thrift institutions tended to ration credit by restricting its availability rather than by raising mortgage rates.

As a result of these structural features of housing finance, mortgage rates, like bank lending rates, tended to respond very sluggishly to changes in monetary policy. For example, during the mid-1970s mortgage rates lagged significantly behind the federal funds rate and the market rate on 10-year Treasury notes (Chart 4). The lagged response of mortgage rates is apparent both for periods when policy was tightened and for periods when policy was eased. Indeed, the behavior of short-term and long-term interest rates shown in this chart is very consistent with the traditional view of the interest rate channel of monetary policy described earlier in this article in which monetary policy actions precede movements in market interest rates.

Chart 4

RELATIONSHIP OF INTEREST RATES DURING THE 1970S



Source: Board of Governors

Changes in the structure of housing finance

The traditional structure of housing finance was undermined by the inflationary environment of the late 1970s. As inflation and nominal interest rates rose, thrift institutions were caught in a severe profit squeeze. The cost of funds rose dramatically and deposits flowed out of thrift institutions. At the same time, income from mortgage loans did not increase because thrift institutions were restricted to making long-term, fixed-rate mortgages.

These problems led to a significant deregulation of mortgage markets in the late 1970s and early 1980s. One important change was the elimination of deposit-rate ceilings, which were phased out over a period of time. A second change was the legalization of variable or adjustable-rate mortgages. While both of these changes were primarily designed to aid thrift institutions, they had much broader implications for the monetary transmission mechanism as discussed in the next section.

An even more radical change in housing finance occurred with the securitization of mortgage loans. The securitization of mortgage loans first began in the early 1970s, and the secondary mortgage market expanded rapidly in the early 1980s. Securitization affected housing finance in two important ways. First, the securitization of mortgage loans caused mortgage markets to be directly linked to capital markets. As a result, funding of mortgage loans became national in scope rather than local, and local mortgage rates became more responsive to capital market rates, as was the case for credit card, auto, and other securitized loans. Second, securitization resulted in a transformation of the mortgage lending process that greatly increased competition in the origination of mortgage loans.[19] The increased competition, coupled with cost reductions brought about by automation, caused a significant drop in the cost of obtaining a mortgage and made mortgage refinancing a new and important element in housing finance.

Implications for mortgage rates and the transmission mechanism

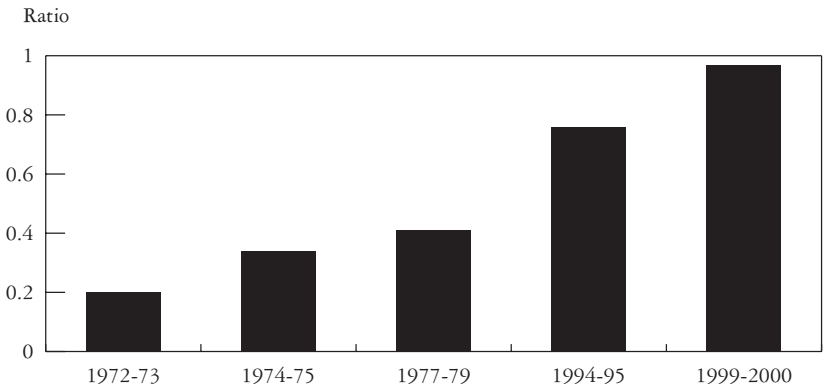
The expected effect of these structural changes in housing finance is an increase in the responsiveness of mortgage rates to monetary policy. In particular, the removal of deposit rate ceilings places less of the burden of rationing available housing credit on quantitative restrictions and more on mortgage rates. Thus, mortgage rates would be expected to move more in response to a tightening or easing of monetary policy than in the era of deposit rate ceilings. Similarly, the securitization of mortgage loans should tie mortgage rates more closely to market interest rates.

Indeed, there has been a remarkable change in the behavior of mortgage rates in recent years. As was the case for bank lending rates, the pass-through of monetary policy actions to mortgage rates appears to have increased. For example, the pass-through of a change in the federal funds target to mortgage rates was much larger in the 1994-95 and 1999-2000 episodes of monetary tightening than in periods of tightening during the 1970s (Chart 5).[20]

In addition, mortgage rates now appear much more responsive to market rates. Movements in rates on fixed-rate mortgages are now closely synchronized with capital market rates, such as the rate on 10-year Treasury securities (Chart 6). Perhaps most interesting is the timing

Chart 5

PASS-THROUGH OF MONETARY POLICY TIGHTENING TO MORTGAGE RATES



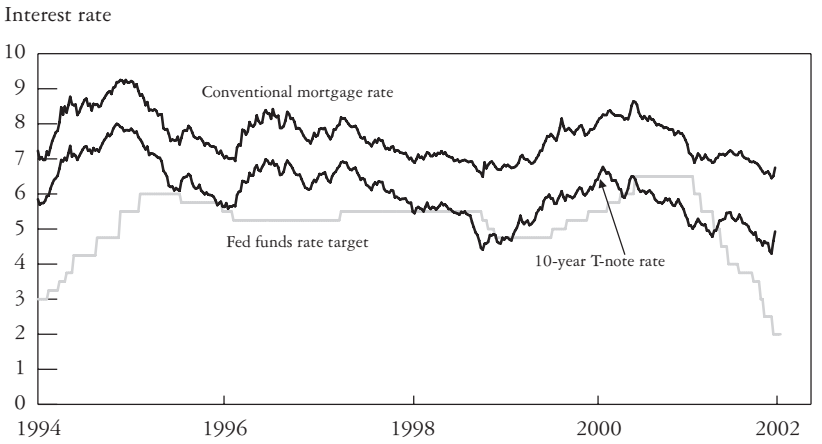
Sources: Board of Governors; author's calculations

of the response of mortgage rates to monetary policy actions. As shown in Chart 4, mortgage rates used to follow monetary policy actions with a considerable lag. More recently, however, both mortgage rates and market interest rates appear to anticipate monetary policy actions (Chart 6).[21] In both the 1994-95 and 1999-2000 episodes of monetary tightening, mortgage rates rose somewhat in advance of increases in the federal funds rate target and fell substantially before decreases in the funds rate target.

The transmission mechanism has also been affected by the introduction of variable-rate mortgage loans and by the lower cost of mortgage refinancing. Variable-rate loans have two effects on the transmission mechanism. First, they tend to cushion the effects of tighter monetary policy. Most variable-rate loans use a short-term interest rate as the index for the loan. The mortgage rate is set at a fixed margin above the index rate and changes, generally on an annual basis, when the index rate changes. Because short-term interest rates are typically below long-term rates, homebuyers can get a lower interest rate by choosing a variable-rate loan rather than a fixed-rate loan when interest rates are rising. As shown in Chart 7, at the onset of monetary tightening in 1988, 1994, and 1999, as marked by the vertical lines, an

Chart 6

RELATIONSHIP OF INTEREST RATES DURING THE 1990S



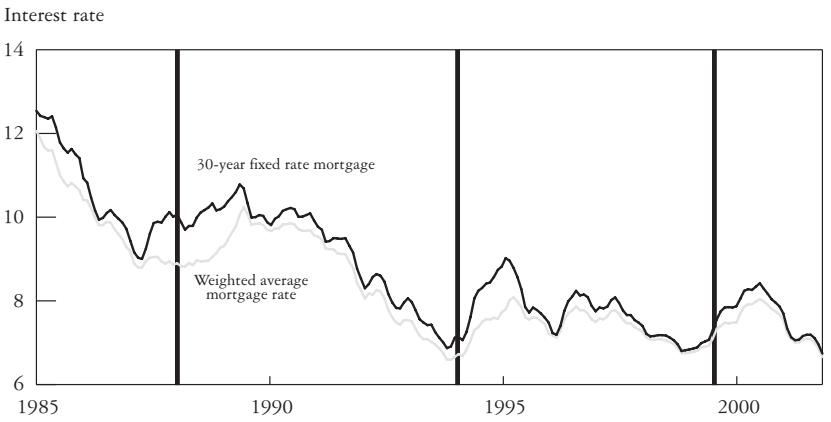
Source: Board of Governors

average of rates on fixed and variable-rate mortgages, weighted by the proportions of fixed and variable-rate loans, increased by less than the increase in the rate on fixed-rate loans. Consequently, the existence of variable-rate loans tends to temper the effect of higher mortgage rates on the housing market.

A second implication of variable-rate mortgages is potentially more significant. Monthly payments on a variable-rate loan change whenever the index rate resets. Because of the size of mortgage loans, even a relatively small change in the rate can cause a large change in the monthly payment.[22] As a result, when a change in monetary policy causes the index rate to change, the increase or decrease in monthly payments alters discretionary income and may lead to changes in consumer spending. Thus, with variable-rate mortgage loans, there is an additional channel through which monetary policy can influence consumer spending beyond the traditional effect on housing demand through changes in rates on new loans.[23]

Chart 7

VARIABLE-RATE MORTGAGES CUSHION EFFECTS OF TIGHTER POLICY



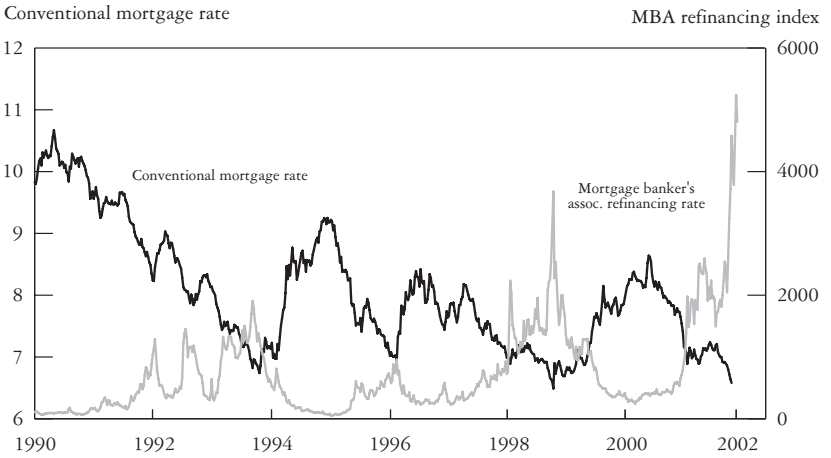
Sources: Board of Governors, author's calculations

The existence of low-cost mortgage refinancing also has implications for the transmission mechanism. When mortgage rates fall as monetary policy is eased, homeowners with fixed-rate loans may refinance these loans either to lower monthly payments or to take cash out based on the home's equity.[24] Refinancing rises sharply in periods in which mortgage rates are falling and drops off quickly when rates begin to increase (Chart 8). Since the mid-1980s, refinancing has become an important part of housing finance with refinancing accounting for as much as three-quarters of new loans in periods of lower interest rates.

Because of refinancing, an easing of monetary policy may increase household discretionary income in a manner similar to that of a variable-rate loan. Consequently, when monetary policy is eased, the traditional effect of lower mortgage rates on the demand for new homes may be supplemented by additional discretionary income for existing homeowners who refinance or for those homeowners who have variable-rate loans.

Chart 8

EFFECT OF MORTGAGE RATES ON REFINANCING



Source: Board of Governors

V. THE CHANGING FINANCIAL STRUCTURE AND MONETARY POLICY

Changes in the U.S. financial system over the past two decades have had important effects on the monetary transmission mechanism. While, on balance, these changes appear to have strengthened the interest rate channel of monetary policy, they also raise some fundamental new questions about the nature of the monetary transmission mechanism.

Implications for the interest rate channel

Changes in the financial structure appear to have influenced the interest rate channel in three ways. First, there has been a striking increase in the size of the response of interest rates to monetary policy for bank lending rates on business and consumer loans and for mortgage rates. This change suggests that a given change in the federal funds rate target will have a larger effect on these rates or, equivalently, that a smaller change in the federal funds rate target may be required to achieve a given change in rates.

Second, there is also evidence of much faster response of interest rates to monetary policy actions. This change is perhaps most apparent in the case of mortgage rates, which now appear to anticipate policy actions by weeks or even months instead of lagging behind policy actions. In addition, the prime rate has reacted almost immediately to policy changes in recent years instead of lagging several weeks behind. These changes suggest that the length of monetary policy lags may have been shortened considerably.

Third, the increased use of variable-rate loans and lower costs of mortgage refinancing have potentially broadened the scope of the interest rate channel. When monetary policy is tightened or eased, changes in rates on variable rate loans alter loan payments and discretionary income. Thus, in addition to the traditional effect of interest rates on the demand for new loans, monetary policy may influence other types of spending by altering payments on variable-rate loans. The availability of low-cost mortgage refinancing has a similar effect. As a decline in mortgage rates leads to an increase in refinancing, homeowners may use the money saved via lower payments or equity extraction to finance other purchases.

At the same time, however, it is important to recognize that variable-rate loans and refinancing introduce some asymmetries into the transmission mechanism. The potential spending stimulus from refinancing only occurs on a large scale when mortgage rates are falling and when rates fall by enough to make refinancing profitable. Furthermore, the existence of variable-rate loans gives new homebuyers an alternative to higher-cost, fixed-rate loans when interest rates are rising. Consequently, to the extent that homebuyers can substitute between the two types of loans, the availability of variable-rate loans may serve to cushion the effects of tighter monetary policy.

Although some of these effects are difficult to quantify, on balance, they appear to have strengthened the interest rate channel either by increasing the influence of monetary policy on interest rates or by broadening the effect of interest rate changes on the economy.[25]

How does monetary policy influence interest rates?

These changes in the structure of the U.S. financial system also have some broader implications for the monetary transmission mechanism. In the traditional view of the transmission mechanism described earlier, there is an implicit tendency to view interest rates as reacting to monetary policy actions. This view appears to adequately characterize the relationship between policy actions and bank lending rates both in the period before changes in the U.S. financial structure and more recently.

As the role of capital markets has grown, however, the traditional view seems increasingly at odds with the relationship between market interest rates and policy actions. Indeed, evidence that market interest rates and mortgage rates frequently anticipate monetary policy actions suggests the need for a conceptual change in thinking about the interest rate channel. Market interest rates increasingly appear to react to news on the economy based on an assumption as to how the Federal Reserve is likely to respond to this news in future policy actions. In this environment, rather than viewing monetary policy actions as initiating or causing changes in market interest rates, it may be better to view monetary policy actions as affecting market interest rates by confirming or refuting market expectations about future policy actions.[26]

One implication of this different perspective is that it may be very misleading to attempt to date changes in monetary policy by looking only at announced changes in policy targets, since some of the change in policy may be incorporated in market rates well before the date of the policy action. Thus, in this view, the failure of long-term rates to respond to monetary policy actions during the past year should not be too surprising because much of the decline in rates occurred considerably before the Federal Reserve began to lower the federal funds rate target.

A second implication of this perspective is that that the effectiveness of monetary policy in altering market interest rates may vary over the course of a tightening or easing cycle. For example, early in a cycle, financial markets may build a series of expected policy actions into interest rates so that an announced policy action may be associated with a rather large change in longer-term market interest rates. In contrast, later in the cycle, markets may believe that current policy actions are

likely to be reversed relatively soon. If so, longer-term market rates may appear unresponsive to monetary policy actions or even move in the opposite direction from what might normally be expected.

A third and final implication of the growing importance of capital markets is that it is very important for financial markets and central banks to be on the same wavelength.[27] If they are not, markets interest rates may experience unnecessary volatility. For example, if financial markets believe that a policy change is forthcoming, interest rates will tend to move before the expected policy action. If markets are wrong and a policy action does not materialize as expected, financial markets will tend to unwind some of the expected policy actions, and interest rates will reverse some or all of their prior movement. The result is unnecessary volatility of interest rates that could be reduced or avoided if financial markets have a better understanding of the monetary policy process.

VI. SUMMARY AND CONCLUSIONS

Interest rates play a key role in the way that monetary policy influences the economy. Over the past three decades, major changes in the U.S. financial system—including deregulation, the growth of capital markets, the development of new financial instruments, and greater transparency of monetary policy—appear to have altered the interest rate channel of monetary policy. As a result, in recent years monetary policy actions have been associated with a faster and larger response of bank lending rates on consumer and business loans and mortgage rates. Moreover, institutional changes, such as the increased importance of variable-rate loans and mortgage refinancing, suggest that interest rate changes may now have broader effects on economic activity.

While an overall assessment of the importance of these developments is difficult to make, on balance, changes in the financial structure appear to have strengthened the interest rate channel of monetary policy. At the same time, these changes in the U.S. financial system suggest a need to modernize the traditional view of the monetary transmission to reflect the fact that monetary policy now works through capital markets as well as through the banking system.

ENDNOTES

[1] For a more comprehensive discussion of the transmission mechanism including channels other than interest rates, see the articles in the "Symposia on the Monetary Transmission Mechanism" in the *Journal of Economic Perspectives*, Fall 1995, vol. 9, no. 4, pp. 3-96.

[2] Commercial banks were subject to deposit rate ceilings under the Federal Reserve's Regulation Q beginning in the 1930s. Deposit rate ceilings were extended to thrift institutions in the mid-1960s.

[3] It is important to note that the overall impact of monetary policy on housing could be smaller after deregulation if the reduction in credit rationing was quantitatively larger than the increased role of interest rates.

[4] For a discussion of the securitization of housing finance, see Sellon and VanNahmen.

[5] For a detailed discussion of central bank secrecy and policy transparency, see Goodfriend.

[6] For summaries of explanations that have been offered for the stickiness of bank-lending rates, see Cottarelli and Kourelis and Nabor, Park, and Saunders.

[7] Major regulatory changes occurred with the Monetary Control Act of 1980 and the Garn-St. Germain Act of 1982. In addition, developments such as securitization and the use of variable rate lending became more prominent in the 1980s.

[8] The Federal Reserve switched from the use of a federal funds rate-operating target to a nonborrowed reserve target, a change that was associated with sharply increased interest rate volatility.

[9] The Federal Reserve began immediate announcement of changes in the intended federal funds rate in February 1994 and provided its assessment of risks to the outlook beginning in May 1999.

[10] The role of the prime rate has evolved significantly over the years. Once viewed as the rate charged to a bank's best corporate customers, the prime now serves primarily as a base rate for smaller business loans and for many consumer loans. Recently, for example, the prime was used as the base rate for about 22 percent of new business lending by commercial banks and was the most common base rate for loans under $1 million (Board of Governors 2001). Many variable rate consumer loans, such as credit card and home equity lines of credit, are frequently tied to the prime.

[11] These rates are obtained from a quarterly survey by the Board of Governors. The rates reported are the most common rate charged during the first calendar week of the middle month of each quarter.

[12] For the 1970s, the target series used is an unofficial measure constructed by Rudebusch and by Sellon. For the 1990s, the intended federal funds rate is available from the Board of Governors.

[13] This article does not look directly at the response of consumer rates to the federal funds rate target because of data limitations. The consumer lending rates are measured quarterly and are only available since 1972. The federal funds rate target series is only available from late 1974. In contrast, the prime rate is available throughout the period.

[14] These findings are confirmed by results from estimating an error correction model for the prime and the funds rate target for the two periods: January 1975 to October 1979, and January 1994 to September 2001. In the early period, the speed of adjustment is about 13 percent per week, suggesting that the prime took about eight weeks to fully respond to a target change. In the more recent period, the initial response is 70 percent, indicating that the entire adjustment takes place by the following week. Moreover, these results may understate the speed of response in the more recent period because the rates are measured on a week-ended Wednesday basis. Since target changes are generally made at FOMC meetings that occur on Tuesday or Wednesday, even a one or two-day lag in the adjustment of the prime will be measured as occurring in the following week.

[15] Econometric estimates also suggest a much faster speed of response for all three types of consumer loan rates to the prime rate. For example, the response of auto loan rates to the prime appears to have increased from about 14 percent per quarter to 64 percent per quarter. However, because of the limited number of observations available in the two samples, less confidence can be attached to these estimates than to the relationship between the prime and the funds rate target.

[16] The response for the 1970s is the average of two tightening cycles in 1972-74 and 1977-October 1979. The response for the 1990s is the average of two tightening cycles in 1994-95 and 1999-2000.

[17] The maturity for the loan data used in this article is 24 months for personal loans and 48 months for auto loans.

[18] Generally, the Federal Reserve did not immediately announce policy actions except in situations in which the discount rate was changed.

[19] Prior to securitization, mortgage lenders would originate loans to be held in their investment portfolio until maturity. Securitization led to the unbundling of the mortgage process into its component parts: origination, portfolio investment, and servicing, with each activity potentially done by a different institution. Because of low scale-economies, loan-origination has become extremely competitive and origination fees have fallen dramatically. Todd provides evidence of the impact of securitization on mortgage origination costs.

[20] Pass-through is measured as the ratio of the change in mortgage rates from trough to peak to the corresponding change in the federal funds rate target.

[21] Lange, Sack, and Whitesell provide evidence that the ability of market rates to anticipate policy actions has increased in recent years.

[22] For example, on a loan of $ 150,000, a decline in the loan rate from 8 percent to 7 percent reduces the monthly payment by $ 102.55, resulting in an increase in discretionary income of about $ 1,200 for the year. For comparison, this amount is twice the size of the 2001 income tax rebate for families.

[23] This effect is attenuated by two factors. Many variable-rate loans have limits on the amount by which the mortgage rate can adjust at one time and over the life of the loan. In addition, if the rate resets annually, only a fraction of variable-rate loans will have their rates reset at any one time. Clearly, the effect will be larger the longer the change in the index rate persists as more loans become subject to a new rate.

[24] The relationship between mortgage rates and the level of refinancing activity is difficult to predict. For a homeowner, whether refinancing is profitable depends on how much the current mortgage rate is below the rate on the existing loan, the cost of the refinancing, and the likely tenure in the home.

[25] It is also important to recognize that while these developments appear to have been strengthened the interest rate channel, there may have been offsetting changes elsewhere that have reduced the impact of monetary policy on the economy. For example, there may have been changes in other channels of monetary policy. Alternatively, the interest sensitivity of some sectors of the economy may have been reduced. These considerations are beyond the scope of this article.

[26] A more extreme view is that in this new environment central banks can move market interest rates purely by policy statements, without any associated policy actions (Guthrie and Wright).

[27] For a more detailed discussion of this point, see Poole.

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