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Tax-Exempt Single-Family Mortgage Bonds

By Peggy Brockschmidt

The sale of tax-exempt bonds to finance housing programs has risen rapidly in recent years. Sales of these bonds, most of which were used to finance single-family housing, rose from less than $1 billion in 1974 to $12 billion in 1979. As a result, these bonds accounted for more than a fourth of all tax-exempt issues in 1979. The rapid increase in the issuance of single-family mortgage bonds has generated concern about their effects on local and national mortgage markets, on tax-exempt securities markets, and on monetary and fiscal policy. Reflecting this concern, recent efforts have been made in the U.S. Congress to curb the issuance of these securities, and the future of the securities remains uncertain.

This article discusses the development and the effects of single-family mortgage bonds. The first section of the article reviews the activities of state and local housing finance agencies. The second section examines single-family mortgage revenue bonds issued by local governments. Next, the local and national effects of single-family tax-exempt bonds are discussed; and then the future of tax-exempt bonds for housing is considered.

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HOUSING FINANCE AGENCIES

A housing finance agency (HFA) is an instrumentality of a state or local government with the power to finance housing primarily for low- and moderate-income families through the sale of notes and bonds in the municipal securities market, which is composed of securities issued by state and local governments and their agencies. Since interest on securities issued in the municipal market are fully exempt from Federal income taxes, the market is also referred to as the tax-exempt market.

Background

Most HFA's were formed in the late 1960s or early 1970s, except for the New York State Housing Finance Agency which was founded in 1960. The major impetus for their formation was the Revenue Adjustment Act of 1968. The act delineated "quasi-public" purposes for which tax-exempt funds could be raised, even though they would benefit private companies or individuals, including "residential real property for family units." A further spur to the development of HFA's was the temporary moratorium on direct Federal subsidies for housing imposed in 1973 by the Nixon Administration. Currently 40 states, the District of Columbia,

and Puerto Rico have one or more HFA's.

Housing finance agencies are set up by state law and have limits on their total bond issuance and on the kinds of housing activities they are permitted. The proceeds of a bond issue are used to finance mortgages and to set up reserves for debt service. If mortgage payments are insufficient to meet debt service payments, money is drawn from the reserves. Since housing finance agencies have no taxing power, payments on the bonds are made primarily through the repayment of the mortgage loans securing the bonds and by interest income on available funds in the various reserves.

Single- vs. Multi-Family Housing

In the early years of the HFA's, nearly all the funds raised in the tax-exempt market were used to provide multi-family housing, which was an extension of programs existing since the 1930s in which state and local governments borrowed funds to construct public housing. In recent years, however, a greater portion of the funds have been channeled into single-family housing.

Multi-family housing programs are often, though not always, related to a specific Federal subsidy program targeted toward low- and middle-income families.[1] Prior to 1973, the Section 236 program of the Department of Housing and Urban Development (HUD) supported the activities of HFA's. In recent years, HUD's Section 8 program has been used by HFA's in the multi-family housing programs. Over the 1970-79 period, about 5 per cent of the dollar value of all multi-family mortgages made was financed by state housing finance agencies. In addition, as shown in Table 1, at the end of 1979 they held 12.1 per cent of all outstanding construction loans and 6.8 per cent of all permanent mortgages for multi-family properties.

Single-family housing programs have grown rapidly of late. From 1970 to 1979, the proportion of single-family loan originations and purchases by HFA's to the total originations and purchases by HFA's rose from less than one-third to over 80 per cent. In part, this growth reflects the developments of HFA's in the South and West, where multi-family housing is less common than in the Northeast, and the establishment of programs to provide single-family housing for veterans. Primarily, however, this growth reflects the popularity of programs meant to reduce the costs of home ownership for low- and moderate-income families. Other programs for single-family mortgages have been set up by HFA's to stimulate lending when mortgage money is less available and to revitalize depressed urban areas.

Programs

HFA's have taken various approaches in providing mortgage money to their areas. The programs fall into four major categories: developer loans, loans-to-lenders programs, mortgage purchase plans, and direct mortgage loans.[2]

Developer Loans. The major vehicle for financing multi-family housing for low- and moderate-income families has been the direct loan to a developer for construction of multi-family housing. These loans are below market rates because funds have been obtained in the tax-exempt market at rates about 25 per cent

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[1] See Peggy Brockschmidt, "Multi-Family Housing in the 1970s," *Economic Review,* Federal Reserve Bank of Kansas City, July-August 1978, for a description of Federal multi-family housing programs.

[2] This discussion is taken in part from George E. Peterson, *Tax-Exempt Financing of Housing Investment* (The Urban Institute: Washington, D.C., 1979), pp. 13-18.

lower than in taxable markets. The lower cost of capital to the developer results in lower housing costs when the reduced costs are passed along to the renter in the form of lower rents. Loans can be either short term to finance construction of a project (the more common approach) or long term to provide permanent financing. Developer loans can also be made to finance single-family housing. However, use of programs that subsidize the homeowner directly are more common.

Loans-to-Lenders Programs. A common arrangement for supplying subsidies for single-family mortgages is a program to lend funds to financial institutions, which in turn relend the funds to qualified homebuyers. The HFA will usually specify the interest rate charged on the loans, and it is the reduced interest rate (and hence the lower monthly payments) that provides the subsidy to the homeowner. Within the income guidelines and the geographical and other limits imposed by the HFA, lenders follow their usual lending criteria.

Mortgage Purchase Program. In some programs, the HFA operates as a secondary market purchaser of single-family mortgages. The agency may either purchase existing mortgages or make a commitment to purchase in the future mortgages originated by financial institutions. Buyers of particular types of housing or sizes of mortgages or those meeting

Table 1
MORTGAGE ACTIVITY OF STATE HOUSING FINANCE AGENCIES

	1970		1979	
	Millions of Dollars	Per Cent of Total Market	Millions of Dollars	Per Cent of Total Market
Single Family				
Originations	139	0.4	1,877	1.0
Purchases	14	0.1	1,740	2.5
Outstandings	1,884	0.7	10,704	1.4
Construction Outstandings	–	–	18	–
Multi Family				
Originations	316	3.6	607	4.0
Purchases	4	0.4	159	3.1
Outstandings	1,917	4.2	7,254	6.8
Construction Outstandings	243	3.9	1,480	12.1

	Single Family as a Per Cent of Total	
	1970	1979
Originations and Purchases	32.3	82.5
Outstandings	49.6	59.6

SOURCE: Department of Housing and Urban Development. Includes data from New York City housing finance agencies.

established criteria thus have available more funds than would otherwise be the case. This plan is similar in many respects to the purchase program operated at the Federal level by the Federal National Mortgage Corporation (FNMA) and the Federal Home Loan Mortgage Corporation (FHLMC).

Direct Loan Program. In a few cases, HFA's have chosen to make loans directly to homebuyers rather than through financial institutions. While administratively more complex, this approach allows the agency tighter control over the distribution of the benefits of the subsidy.

LOCAL GOVERNMENT SINGLE-FAMILY MORTGAGE BONDS

The increased activities of state and local housing finance agencies in supplying single-family housing credit were a precursor to the issuance of mortgage bonds directly by local governments. Tax-exempt bonds are used by the municipality to make single-family mortgage loans. These bonds were rare prior to 1978.[3] The first program to receive public attention was introduced by the city of Chicago, which in June 1978 issued $100 million of single-family mortgage revenue bonds. The total amount issued by local governments rose from $550 million in 1978 to approximately $6 billion in 1979.

These city and county programs of mortgage-backed bonds for single-family housing are similar in many respects to the HFA programs. Typically, they follow the loans-to-lenders or mortgage purchase approach and work through financial institutions in the community. The issues will usually restrict the location of the home to the geographical boundaries of the local government and will, in addition, often have limits on the income of prospective home-buyers or on the value of the house to be purchased with tax-exempt funds.

The income and mortgage limits placed on local government single-family mortgage revenue bonds have typically been less restrictive than those imposed by state HFA's. The program limits have often been much above median incomes in the community and thus include the majority of families in the area. In the 50 programs listed in a Congressional Budget Office study of tax-exempt bonds used to finance single-family housing,[4] nine had no income restrictions. The median income limit of the remaining 41 programs was $30,000, with a range of $18,000 to $60,000. In half of these plans, the maximum income level was more than twice the median income of the community. Twenty-eight of the 50 bond issues had no mortgage limits. In the remainder, the median mortgage limit was $60,000, with a range of $44,500 to $100,000. While restrictions on the total assets of borrowers are frequently found in state HFA programs, none of the local government plans had asset limits.

Another difference between local single-family bonds and HFA issues is the degree of risk to the bondholders. HFA issues are commonly backed by the obligation of the agency, that is, the HFA will draw upon its own revenue sources to meet the debt repayment obligations of its bonds. The bonds are also often backed by the "moral obligation" of the municipality or state sponsoring the agency.

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[3] In 1974, Minneapolis issued $10 million of general obligation bonds to finance a city housing rehabilitation loan and grant program. Since then, the city has raised tax-exempt funds for both rehabilitation and new construction through a variety of sources.

[4] *Tax-Exempt Bonds for Single-Family Housing,* a study prepared by the Congressional Budget Office for the Subcommittee on the City of the Committee on Banking, Finance, and Urban Affairs, House of Representatives, 96th Cong., 1st sess., April 1979, pp. 11-14.

Local issues, on the other hand, are normally revenue bonds, that is, only the revenues from the mortgage pool can be used to repay bondholders. It is for this reason that many issues carry private mortgage insurance covering a portion of the entire pool or mortgages and providing an extra layer of protection for bondholders. This insurance is in addition to the private mortgage insurance which is generally used for mortgages in which the loan-to-value ratio exceeds 80 per cent.

EFFECTS OF SINGLE-FAMILY MORTGAGE BONDS

The increase in the supply of mortgage money and the associated increase in tax-exempt debt implied by the issuance of single-family mortgage bonds has both positive and negative impacts. Short-run impacts include the displacement of regular mortgage lenders. Long-run effects include the impacts on borrowing costs of state and local governments and on Federal revenues, which will depend heavily on the future growth of single-family mortgage bonds. This section discusses some of the effects on both the local and national level of the financial innovation of funding single-family mortgages through the tax-exempt market.

Local Effects

The rapid growth of the use of tax-exempt bonds to finance single-family housing has led to discussion of the effect of the bonds on the welfare of individuals, neighborhoods, and cities. In addition, the impact of the bonds on the local mortgage market is a topic of particular concern to long-time mortgage lenders such as savings and loan associations and mortgage companies.

Individuals. The major beneficiary of single-family mortgage bonds is the individual homebuyer who obtains a mortgage at a rate that is, on the average, 20 per cent less than conventional mortgage rates.[5] The lower rate will enable the homebuyer to make lower mortgage payments than would otherwise have been the case or, alternatively, the homebuyer can buy a more expensive house for the same payment level. An additional beneficiary may be the seller of the house, assuming the buyer's access to cheaper money induces the buyer to pay a higher price for the house.

Neighborhoods. Some single-family mortgage bond issues have limited the location of the homes eligible for purchase under the program to central city areas. Others have set aside a portion of the funds for rehabilitation loans to substantially improve older homes. In these cases, the cities felt that state HFA's were not meeting urban redevelopment needs and used the tax-exempt market as a new source of funds for aiding older urban areas. However, the social goals of improving the quality of the neighborhood and bringing middle-class homeowners back to central city areas are thought by some to have undesirable side effects. The major source of concern is that "gentrification"—as the introduction of middle-class homeowners into a neighborhood is called—will result in displacement of lower-income renters, who are often members of ethnic minorities.

Another implication of mortgage bonds is the upward pressure placed on housing prices in a neighborhood because of the increased demand resulting from greater availability of mortgage funds. In cases where the funds supplied amount to one-third to one-half the average volume of mortgage loans made in an area, this impact can be particularly severe. The effect may possibly be mitigated by provisions that

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5 Peterson, *Tax-Exempt Financing of Housing Investment*, pp. 37-38.

loans be used to finance new or rehabilitated homes rather than existing homes, assuming that resources are available to meet the increase in housing demand.

Cities. Local communities can experience several benefits because of their issuance of single-family tax-exempt bonds. First, the total supply of both new and rehabilitated houses in the city can be increased. Next, employment in construction and related industries may increase, resulting in a higher tax base and a higher level of employment, leading in turn to increased property, income, and sales tax revenues for the local government.

The benefits accruing to local communities can be offset if nearby communities issue tax-exempt mortgage bonds. For example, after the Chicago single-family mortgage bond was issued, several Chicago suburbs also floated bond issues to increase the supply of mortgage money to their communities, which diluted the impact of increasing the supply of housing money to attract new families into the central city.

Local Mortgage Markets. The money raised by single-family mortgage bonds can temporarily increase the supply of funds in local mortgage markets. In cases where state usury ceilings have restricted lending by normal mortgage originators, tax-exempt bonds may be a significant source of funds to the local mortgage market.[6] The lending institutions in the community then function as mortgage bankers and use the capital raised in the tax-exempt market to originate new mortgages. They can profit through the retention of servicing and originating fees without having to supply capital.

The extent to which other loan demand at mortgage lending institutions is affected by the issuance of single-family tax-exempt issues will depend primarily on the degree to which subsidized homeowners resemble unsubsidized homeowners. If the two groups are very similar, i.e., if income and mortgage ceilings are nonexistent or ineffective, local mortgage lenders may find that their mortgage demand has declined. No increase in housing supply or in the proportion of the population owning homes will occur; subsidized families will simply replace unsubsidized ones. Regular lenders may then adjust to the reduction in local mortgage demand by reducing their mortgage rates to stimulate demand, or by reducing their secondary market sales of mortgages, buying mortgages in the secondary market, or supplying other types of credit.

National Effects

Besides the effects on individual localities, single-family mortgage bonds can affect tax-exempt securities markets, Federal revenue, and monetary policy.

Tax-exempt Securities Market. The volume of bonds issued in the tax-exempt market has doubled since 1974. Table 2 shows, however, that during the 1974-79 period the issuance of general obligation bonds, i.e., bonds backed by the full faith, credit, and taxing power of the state or local government, has remained relatively unchanged. The increase has occurred in revenue bonds, that is, bonds whose repayment is expected to be made from the stream of revenue generated by the projects financed by the bond proceeds. Such projects include hospitals, pollution control projects, industrial parks, and sports arenas, as well as single- and multi-family housing. But housing has been the major area of growth in 1978 and 1979. As Table 2 indicates, the level of housing revenue bonds issued grew fivefold from 1977

[6] Federal legislation preempted state mortgage usury ceilings beginning January 1, 1980. The preemption would be removed if the state adopts a new usury ceiling.

Table 2
GROSS NEW TAX-EXEMPT BOND ISSUANCE
(Billions of Dollars)

	Total	General Obligation	Revenue		
			Total	Housing	Other
1974	22.8	13.0	9.8	0.7	9.1
1975	29.3	15.0	14.3	0.6	13.7
1976	33.8	16.9	16.9	1.5	15.4
1977	45.1	17.9	27.2	2.4	24.8
1978	46.2	17.9	28.3	5.6	22.7
1979	41.9	12.6	29.3	11.9	17.4

SOURCE: Salomon Brothers **Bond Market Roundup,** February 1, 1980.

to 1979, while other revenue bonds declined.

The growth in housing-related bonds has raised concern about the effects that the increased supply of bonds will have on tax-exempt interest rates. The spread between taxable and tax-exempt rates depends on the income tax bracket of the marginal purchasers of tax-exempt issues, since as the amount of tax-exempt issues increases, other things equal, buyers with lower tax rates will have to be drawn into the market. To equate the taxable and tax-exempt rates for the marginal investor, the tax-exempt rate will rise. This may cause an increase in tax-exempt rates in general and reduce the spread between tax-exempt and taxable rates. The increase in all tax-exempt rates relative to taxable rates may pass on a portion of the costs of housing bond programs to all taxpayers, not just to those located in areas financing housing through tax-exempt bond sales. Also, higher tax-exempt bond rates may lead to postponement or cancellation of bond sales to finance traditional public programs.

The greater issuance of housing bonds may also increase the spread between rates on housing bonds and other tax-exempt revenue and general obligation bonds. Furthermore, at some point, because of single-family housing bond issuance, borrowing costs for multi-family housing projects as well as other revenue projects may be pushed so high that they will become difficult to offer.

Quantifying the impact of the increased supply on tax-exempt rates is no simple matter. Estimates of the impact depend heavily on assumptions about the characteristics of investors in tax-exempt securities and the range of securities and other alternative investments available. Two major studies analyzing the effect of single-family mortgage bonds on tax-exempt rates have been done. The first, by George Peterson for the Department of Housing and Urban Development, concluded that rates would be increased 4 to 7 basis points per $1 billion of tax-exempt mortgage bonds, while the second, by Roger Kormendi and Thomas Nagle for the Public Securities Association, concluded that the impact would be much smaller.[7]

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[7] See Peterson, pp. 103-18, and Roger C. Kormendi and Thomas T. Nagle, "The Interest Rate and Tax Revenue Effects of Mortgage Revenue Bonds," Working Paper, University of Chicago, January 1980.

Peterson analyzed the tax-exempt market by using a model in which demand for these securities by institutional investors is dependent on net cash flow and any securities not taken by those sectors of the economy are purchased

Federal Revenues. A second issue closely related to the effect on tax-exempt bond markets is the effect on Federal revenue of an increased volume of tax-exempt issues and the accompanying increase in tax-exempt interest income. To the extent that investors shift from taxable investments such as stocks, corporate bonds, and other investments, Federal income tax revenues will be reduced. This revenue loss will have to be offset by increased payments by taxpayers in general or by an increase in the deficit, which will increase inflationary pressures in the economy. Projections of expected Federal revenue loss depend primarily on assumptions about the marginal tax rate of those buying the additional tax-exempt securities and the tax rates on alternative investments.

These revenue losses will be partly offset by a reduction in mortgage interest deductions on Federal tax returns since the interest payment on the tax-exempt mortgages is less than on conventionally financed mortgages.

Estimates of net Federal revenue losses were $31.5 million for every year the bonds are outstanding for each $1 billion in tax-exempt housing bonds in the Peterson study and only $10-11 million in the Kormendi-Nagle study.[8] Neither study incorporated the effect of the increased income of investment bankers, mortgage pool insurers, and mortgage servicers on increasing Federal revenues.

Monetary Policy. Typically, the housing sector has felt the greatest impact of monetary restraint, since it is closely dependent on the availability of credit and the level of interest rates.[9] The desirability of reducing the sensitivity of housing to monetary policy is a debated subject. Some would view the response of housing to a restrictive monetary policy as harmful to the economy. They contend that housing should be no more severly affected than other sectors, and that the strong cyclical movements in housing production drive homebuilders out of the industry and ultimately make home ownership more expensive. Opponents of this view contend that housing is the only sector of the economy sufficiently responsive to interest rate changes and therefore is a natural area for stabilization.

Some observers have argued that policy decisions of the Federal government have reduced the effectiveness of high interest rates in reducing mortgage demand. They also contend that more recent actions, such as the

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by individuals. The rate on tax-exempt securities depends on the change in individuals' holdings relative to the change in their holdings of all assets. It adjusts relative to the taxable interest rate to attract enough buyers into the tax-exempt market to absorb the total supply. It should be noted that the supply of other types of securities and the rates on these securities do not affect the demand for tax-exempt securities in this model. The study concluded that each $1 billion in tax-exempt mortgage bonds would push up tax-exempt rates by 4 to 7 basis points.

Kormendi and Nagle attempted to incorporate additional factors into this basic analysis. Including other types of investment in the model and enlarging the sample period led them to conclude that Peterson had over-estimated the impact of an increase in issuance of tax-exempt bonds on the rate of such securities. Their analysis indicated that the initial rate impact would be only 0.9 basis points per $1 billion and the long-run effect only 0.33 basis points.

[8] In all cases, the revenue loss exceeds the subsidy to housing, since the taxes avoided by high-bracket holders of mortgage bonds exceed the difference between the interest payments on tax-exempt and taxable financing. The larger yield required by taxpayers in the marginal tax bracket to equate tax-exempt and taxable yields is paid to all bond-holders, even though those taxpayers in tax brackets higher than the marginal bracket would have been willing to accept lower rates. The greater income received on these securities by higher bracket investors makes the Federal revenue loss exceed the gain to state and local governments of the tax-exempt privilege.

[9] William E. Gibson, "Protecting Homebuilding from Restrictive Credit Conditions," *Brooking Papers on Economic Activity,* 1973:3, pp. 647-91.

introduction of money market certificates and the relaxation of usury ceilings, may have served to further reduce the effects of monetary policy. Any similar measure which allows the effects of high interest rates to be diluted, then, would further reduce the linkages between the level of interest rates, monetary policy, and the growth of economic activity. To the extent that these observers are correct, and if single-family mortgage bonds are issued in a countercyclical fashion, and thus increase in volume when interest rates are rising, monetary policy will be less effective.

THE FUTURE OF SINGLE-FAMILY MORTGAGE BONDS

The single-family housing bonds issued by HFA's and by local communities increase the access of single-family housing to capital markets. However, a range of credit instruments and financing devices is available to single-family housing through the Federal government. These arrangements have led some observers to conclude that single-family housing has sufficient access to capital markets and that the single-family mortgage bond is unnecessary. Also, they contend that the revenue loss to the Federal government from single-family mortgage bonds is unduly high.

The Federal government has encouraged single-family home ownership by both indirect support of housing markets and direct subsidy. Total "tax expenditures" by the Federal government to subsidize single-family housing have been estimated by the Congressional Budget Office (CBO) to be more than $16 billion in fiscal 1980.[10] The Federal government also supports housing through various subsidized loan programs and through special agencies which support the secondary market for home mortgages.[11]

Because of the existing support of single-family housing through Federal housing policy and the large revenue losses implied by the continued issuance of single-family tax-exempt bonds, several bills have been introduced in Congress to make the interest on single-family tax-exempt mortgage bonds subject to Federal income taxes. The bills were intended to prohibit the further use of tax-exempt state and local bonds to provide funds for owner-occupied housing, but to allow continued issuance of tax-exempt bonds to finance rental housing projects for low- and moderate-income families and to finance veterans housing.

In March 1980, the House approved the Mortgage Subsidy Bond Tax Act, which would limit single-family mortgage bonds to 5 per cent of the mortgage market in each state. The bill required that the subsidy be limited to low- and moderate-income individuals who have not been homeowners in the previous three years. It also specifies low down payments and limits the purchase price of the home to 80 per cent of the average purchase price in the area. More liberal provisions were established for areas with high unemployment. After two years, all single-family mortgage bonds would be banned.

Thus far, no legislation has been passed by the Senate to deal with such issues. It seems likely, however, that when the housing, construction, and mortgage markets recover from their current weakness, the issuance of tax-exempt mortgage bonds for single-family housing could be limited in some way.

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10 *Tax-Exempt Bonds for Single-Family Housing*, pp. 67-77.

11 Peggy Brockschmidt, "The Secondary Market for Home Mortgages," *Monthly Review*, Federal Reserve Bank of Kansas City, September-October 1977.

SUMMARY

The use of tax-exempt funds to supply mortgage money for single-family housing has raised a number of important social issues. Many of the effects of such bonds are beneficial to local communities by providing new sources of mortgage funds at times when other sources may be reduced. However, the positive effects at the local level may be insufficient to outweigh the negative impacts of single-family tax-exempt bonds on tax-exempt interest rates, Federal revenues, and other Federal taxes. In addition, the effectiveness of monetary policy is weakened by the greater access of homeowners to capital markets and by the higher level of interest rates required to dampen economic activity. For these reasons, many have proposed curbs on such instruments. Until Federal legislation is passed, discussions on the utility of tax-exempt single-family mortgage bonds is likely to continue.

The Effects of Removing Regulation Q—A Theoretical Analysis

By Scott Winningham

For many years, the maximum interest rates that financial institutions could pay on deposits have been limited by ceilings set by various regulatory agencies. These ceilings—known collectively as Regulation Q regardless of the type of financial institution or applicable regulatory agency—will be phased out over the next six years under the terms of the Depository Institutions Deregulation and Monetary Control Act of 1980. This article investigates theoretically the implications for monetary policy and the economy of removing Regulation Q and related deposit rate ceilings. The first section provides a framework within which the analysis is conducted, and the following two sections present the theoretical analysis.[1]

A FRAMEWORK OF ANALYSIS

The important macroeconomic implications for monetary policy and the economy of removing Regulation Q can be analyzed by reference to a simple model that describes the relationship between interest rates, Gross National Product (GNP), and various monetary assets. This section develops such a model.

The Demand for Monetary Assets

Traditional theories postulate that the public's demand for monetary assets depends on GNP and interest rates.[2] As GNP rises, the demand for demand deposits and other monetary assets generally increases because the public requires more money to finance the additional expenditures. Rising market interest rates, on the other hand, generally result in a decline in the demand for monetary assets, as the public shifts into alternative financial assets in order to increase interest income. However, increases in the interest rates on time and savings deposits are associated with increases in the demand for these deposits and with declines in the demand for demand deposits and other monetary assets.

The Demand for Reserves

Like the public, banks and other depository institutions also demand various financial assets. Of particular interest is their demand for reserves, defined here as deposits of

[1] For a review of the history and purposes of deposit interest rate ceilings, see Scott Winningham and Donald G. Hagan, "Regulation Q: An Historical Perspective," *Economic Review*, Federal Reserve Bank of Kansas City, April 1980, pp. 3-17.

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[2] See, for example, Stephen M. Goldfeld, "The Demand for Money Revisited," *Brookings Papers on Economic Activity* (No. 3, 1973), pp. 577-638. Changes in prices may also affect the public's demand for money. For simplicity, however, the effects of these changes are not considered except insofar as they affect GNP and interest rates.

depository institutions at Federal Reserve Banks plus currency held as vault cash. The demand for reserves is mainly a derived demand, as it depends on the public's holdings of deposits and on reserve requirements imposed by the Federal Reserve. Thus, for example, an increase in market interest rates leads to a decrease in the demand for reserves because it leads the public to hold fewer deposits and, therefore, reduces the required reserves of depository institutions. Similarly, an increase in interest rates on time and savings deposits may reduce the demand for reserves because it induces the public to shift out of demand deposits, which have relatively high reserve requirements, and into time and savings deposits, which have lower requirements.[3]

However, it is conceivable that an increase in interest rates on time and savings deposits could increase the demand for reserves. This would occur if a decline in reserves behind demand deposits were more than offset by an increase in reserves behind time and savings deposits. Such a positive effect on the demand for reserves would have been more likely under the structure of reserve requirements that has existed prior to the phase in of new requirements under the Depository Institutions Deregulation and Monetary Control Act of 1980. After the phase in, reserve requirements on most time and savings deposits will be eliminated. Still, a positive effect after phase in could result because some savings deposits—in particular, NOW accounts, credit union share drafts, and savings deposits subject to automatic transfer—will have the same reserve requirements as demand deposits. If the public shifts enough funds into these interest-bearing transactions balances from other assets with lower or no reserve requirements, the reserves behind these savings deposits could increase enough to offset the decline in required reserves that will occur as the public shifts funds from demand deposits to time and other savings deposits.

Although this positive effect is possible, an increase in time and savings deposit interest rates is assumed to decrease the demand for reserves in the analysis that follows. This assumption is quite important for the results that follow. While the analysis is unaltered, assuming a positive effect on the demand for reserves would reverse the direction of many of the impacts described.

The Supply of Reserves

The supply of reserves depends mainly on actions of the Federal Reserve System. There are two alternative ways of viewing the role of the Federal Reserve. The System may be viewed as allowing the supply of reserves to vary in order to achieve predetermined levels of market interest rates, or it may be viewed as supplying a given amount of reserves and allowing interest rates and other variables to adjust.

The Federal Reserve has periodically followed each type of procedure. For many years, the System followed the interest rate approach. On October 6, 1979, the Federal Reserve decided to focus on controlling various reserve aggregates such as nonborrowed reserves, total reserves, and the monetary base.[4] Under this procedure, interest rates are

[3] Under the new law, after the eight-year phase-in period the reserve requirement on most demand deposits at the largest commercial banks will be 12 per cent, while most time and savings deposits will not be subject to any reserve requirements. If a customer of a large bank were to shift $1,000 out of his demand deposit and into, say, a personal time deposit at that bank, the bank's required reserves would decrease by (.12 x $1,000 =) $120.

[4] Nonborrowed reserves are total reserves less borrowings by banks from the Federal Reserve. The monetary base is total reserves plus currency. The following analysis assumes the Federal Reserve supplies a given amount of total reserves.

—within wide limits—allowed to adjust to changes in the demand for reserves. This second way of viewing the role of the Federal Reserve is adopted in the following analysis.

The Aggregate Demand for Goods and Services

There are two hypotheses concerning the public's aggregate demand for goods and services—the traditional Keynesian hypothesis and the availability hypothesis. Both are described and examined in the analysis that follows.

The traditional Keynesian hypothesis postulates that the aggregate demand for goods and services depends on market interest rates and other factors. For example, as market rates increase, aggregate demand generally declines. This is because higher interest rates increase the cost of financing additional consumption and investment expenditures. Other variables affecting aggregate demand include government spending and taxation policies.

The availability hypothesis consists of two parts, the first of which states that, although aggregate demand may change as market interest rates change, the size of the response is very small. According to this hypothesis, decisions to consume and invest are made primarily on the basis of factors other than interest rates. Thus, relatively large changes in market interest rates have relatively small, perhaps insignificant, effects on GNP, at least within a reasonable amount of time.

The second part of the availability hypothesis states that an important factor affecting the aggregate demand for goods and services is the availability of credit from banks and other depository institutions. The argument is as follows. First, as market interest rates rise, banks and other financial intermediaries ration the credit they make available to their customers rather than increase the interest rates they charge. Second, some consumers and investors do not have direct access to money and capital markets, and therefore must depend primarily on financial intermediaries for funds. The implication of this second part of the availability hypothesis is that the aggregate demand for goods and services—and hence GNP—depends much less on interest rates than on the amount of credit made available by banks and other financial intermediaries to households and businesses.

Uses of the Model

The framework described above can be used to examine the relationship among economic and financial variables. For example, suppose the Federal Reserve supplies $40 billion in reserves. Suppose further that, given other variables, market interest rates of 15 per cent are consistent with $2,000 billion in GNP and with desired holdings by the public of $300 billion in demand deposits and $1,000 billion in time and savings deposits. Also, suppose that reserve requirements and other factors are such that banks desire to hold $40 billion in reserves when market interest rates are 15 per cent, demand deposits are $300 billion, and time and savings deposits are $1,000 billion. Then, the Federal Reserve's $40-billion supply of reserves is consistent with the $2,000-billion level of GNP. Also, given the $40-billion supply of reserves, an equilibrium exists in the market for reserves, and interest rates, monetary assets, and GNP are determined.

The results would not differ in substance if, instead, the Federal Reserve is assumed to control either nonborrowed reserves or the monetary base. For a description of the new operating procedures, see J. A. Cacy and Glenn H. Miller, Jr., "Review and Outlook: A New Approach to Solving Old Problems," *Economic Review*, Federal Reserve Bank of Kansas City, December 1979, pp. 7-13.

Two Effects of Regulation Q Removal

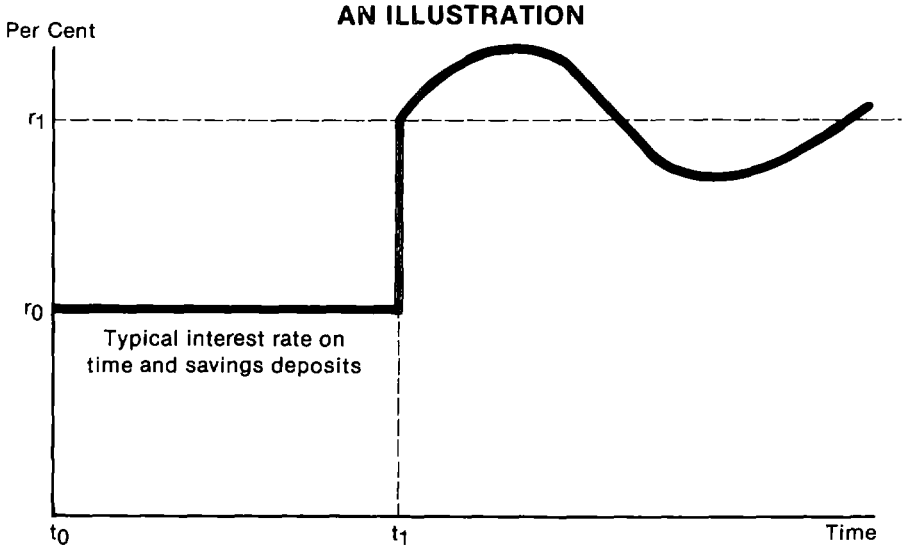
This framework is used in the remainder of the article to examine the effects on monetary policy and the economy of removing Regulation Q. Removal will have two effects. First, there will be a once-and-for-all effect on economic and financial variables. Assuming the ceiling rates are below market-clearing levels, deposit rates will rise once-and-for-all to equilibrium levels when the ceilings are removed. This in turn has a once-and-for-all effect on other variables. Of course, when Regulation Q is removed, the public and banks will no doubt require time to adjust their spending and portfolio behavior to take account of the changed economic environment. Therefore, this once-and-for-all effect may take time to occur fully. Once it has, however, no further change will occur.

The second effect, which continues long after the ceilings are removed, is that removing Regulation Q will affect the volatility of economic and financial variables. The interest rates on time and savings deposits will fluctuate more because they will be allowed to adjust to changing economic conditions. This in turn affects the volatility of other financial and economic variables.

Chart 1 illustrates these two effects of Regulation Q removal on the interest rates on time and savings deposits. The chart assumes that, from time t_0 to t_1, a typical interest rate paid on time and savings deposits is fixed at r_0 by a Regulation Q interest rate ceiling. At time t_1 the ceiling is removed. Ignoring adjustment lags, the time and savings deposit interest rate rises to its market-clearing level, assumed to be r_1. The chart also illustrates the second continuing effect of Regulation Q removal, namely that after time t_1 the interest rate on time and savings deposits is more volatile than before, fluctuating around the equilibrium value in response to changing economic conditions.

Chart 1

THE ONCE-AND-FOR-ALL AND CONTINUING EFFECTS OF REGULATION Q REMOVAL ON TIME AND SAVINGS DEPOSIT INTEREST RATES: AN ILLUSTRATION



THE ONCE-AND-FOR-ALL EFFECTS OF REMOVING REGULATION Q

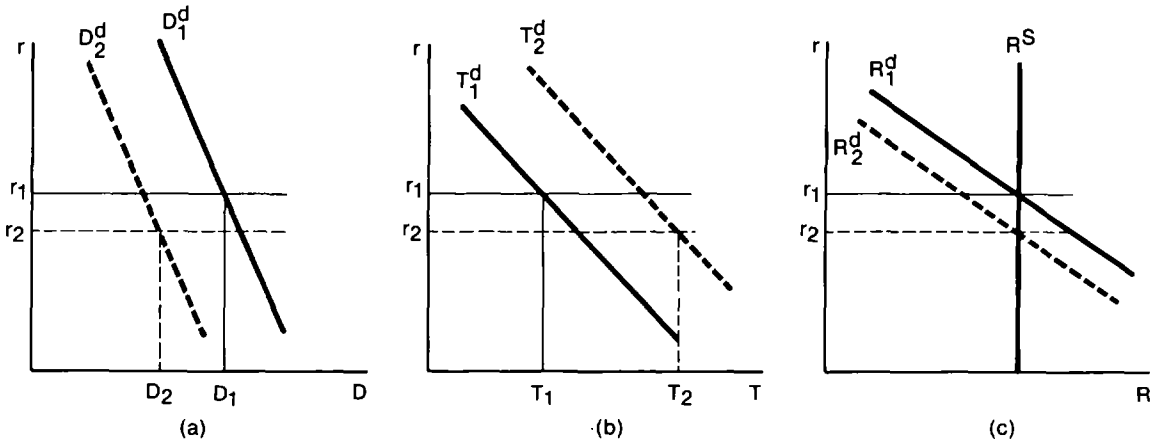
As indicated, the removal of Regulation Q will lead to a once-and-for-all increase in the interest rates on time and savings deposits. This increase in turn leads to once-and-for-all changes in market interest rates, monetary aggregates, and GNP.

Market Interest Rates

The once-and-for-all rise in the interest rates on time and savings deposits increases the demand for these deposits and decreases the demand for demand deposits and other monetary assets. Because reserve requirements on demand deposits exceed those on time and savings deposits, these changes in the demand for deposits tend to reduce the derived demand for reserves. *The decline in the demand for reserves leads to a decrease in market interest rates, assuming the supply of reserves is given by Federal Reserve actions.* In summary, removing Regulation Q will increase the demand for and level of time and savings deposits, reduce the demand for and level of demand deposits, and reduce market interest rates.

These effects are illustrated in Chart 2. The chart shows downward-sloping demand curves for demand deposits, D, time and savings deposits, T, and reserves, R, indicating that the quantities demanded of deposits and reserves increase as market interest rates, r, decline. The chart assumes that with Regulation Q in existence the demand curve for demand deposits is D_1^d, the demand curve for time and savings deposits is T_1^d, and the derived demand curve for reserves is R_1^d. Given the supply of reserves, R^S, the market interest rate is r_1, implying levels of demand deposits and time and savings deposits of D_1 and T_1, respectively. The chart then assumes that removing Regulation Q shifts the demand curve for demand deposits back to D_2^d, shifts the demand curve for time and savings deposits out

Chart 2
THE ONCE-AND-FOR-ALL EFFECTS OF REGULATION Q REMOVAL ON MARKET INTEREST RATES AND DEPOSITS: AN ILLUSTRATION



NOTE: A subscript 1 denotes a regime with Regulation Q, and a subscript 2 denotes a regime without Regulation Q.

to T_2^d, and shifts the demand curve for reserves back to R_2^d.[5] Market interest rates therefore fall to r_2, demand deposits fall to D_2, and time and savings deposits increase to T_2.

The Monetary Aggregates

Since Regulation Q removal will affect the levels of demand deposits and time and savings deposits, removal will also affect the levels of the monetary aggregates which include these deposits. For example, since removal will decrease demand deposits, it will also decrease M1-A—which consists of demand deposits plus currency[6]—and probably M1-B as well—which is equal to M1-A plus checkable deposits at all depository institutions.[7] However, removal will increase M2, which is equal to M1-B plus savings and small-denomination time deposits at all depository institutions, money market mutual fund shares, and overnight repurchase agreements and Eurodollars. M2 will increase because the increase in time and savings deposits in M2 will more than offset the decrease in other components of this aggregate.

GNP

The removal of Regulation Q will also affect GNP. Assuming the traditional Keynesian hypothesis, the decrease in market interest rates tends to encourage spending and therefore leads to an increase in GNP. Assuming the availability hypothesis, the increase in M2 that is associated with an increase in credit availability—as well as the decline in market interest rates—tends to increase GNP.[8]

Table 1
THE ONCE-AND-FOR-ALL EFFECTS OF REGULATION Q REMOVAL

Variable	Expected Change
Market Interest Rates	Decrease
M1-A	Decrease
M1-B	Decrease
M2	Increase
GNP:	
Traditional Keynesian Hypothesis	Increase
Availability Hypothesis	Increase

Summary

Table 1 summarizes the once-and-for-all effects of Regulation Q removal on market interest rates, the monetary aggregates, and GNP. Of course, these effects may not occur immediately. There are lags inherent in the adjustment by the public and banks to the changed environment. Also, when Regulation Q is phased out over several years—as under

[5] Regulation Q removal also changes the slopes of the curves shown in Chart 2, but these effects are not illustrated. They are examined in the next section.

[6] Regulation Q removal will likely affect currency in the same qualitative manner as demand deposits. This effect, however, is probably relatively small.

[7] M1-B includes some savings deposits. In particular, it includes NOW accounts, credit union share drafts, and savings deposits subject to automatic transfer. The interest rate ceilings on these savings deposits in M1-B will be phased out under current law. However, these deposits are a small percentage of M1-B, about 4 per cent in January 1980. Therefore, unless these deposits increase substantially relative to other M1-B assets, Regulation Q removal will probably affect M1-B as it will M1-A, rather than as it will M2.

[8] Assuming the availability hypothesis, it is conceivable that the increase in GNP could increase the public's demand for currency and demand deposits more than enough to offset the negative effect on the demands for these monetary assets of higher time and savings deposit interest rates. If so, currency, demand deposits, M1-A, and M1-B would all increase rather than decrease. Although this possibility is conceivable, it is not assumed to occur. The remainder of this article abstracts from the feedback effect of GNP on the public's demands for monetary assets whenever the availability hypothesis is considered.

current law—the once-and-for-all effects may occur over a considerable period of time. The table assumes that monetary policy and all other factors determining market interest rates, monetary assets, and GNP are unchanged. Thus, the table shows only the effects of removing Regulation Q.

In light of the once-and-for-all effects of Regulation Q removal, the Federal Reserve might alter monetary policy. For example, the System might offset the probable negative effect of Regulation Q removal on the level of M1-A. Chart 2 could illustrate this change in policy by showing a rightward shift in the supply of reserves. Such a shift would tend to lower market interest rates and increase demand deposits and therefore M1-A. Alternatively, monetary policy might offset Regulation Q removal's positive effect on M2. In the chart, a leftward shift in the supply of reserves would tend to increase market interest rates and reduce deposits and therefore M2.

THE CONTINUING EFFECTS OF REMOVING REGULATION Q

In addition to the once-and-for-all effects on economic variables, Regulation Q removal will have continuing effects on the volatility of these variables. Also, the responsiveness of economic variables to changes in monetary policy may be altered on a continuing basis.

The Volatility of Market Interest Rates, the Monetary Aggregates, and GNP

Volatility refers to fluctuations in variables around their equilibrium or expected values. Volatility arises because the economy is continually subject to unexpected changes or shocks —i.e., unexpected occurrences that alter the demands for and supplies of goods, services, and assets. These demand and supply changes lead to fluctuations in economic variables. That is, they cause the variables to be volatile.

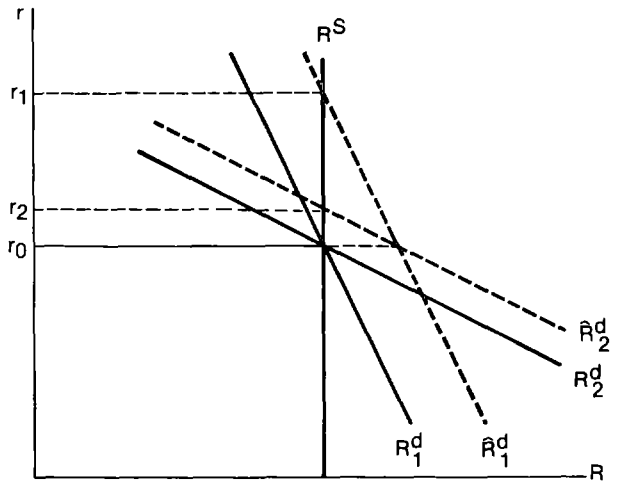
As discussed earlier, removing Regulation Q will increase the volatility of interest rates paid on time and savings deposits by allowing these interest rates to change in response to changes in demand and supply conditions. This greater volatility, in turn, affects the volatility of market interest rates, the monetary aggregates, and GNP. Whether the volatility of these variables increases or decreases depends on

Table 2
THE CONTINUING EFFECTS OF REGULATION Q REMOVAL ON VOLATILITIES

	Expected Change Assuming a Shock to the Demand For:			
Variable	Reserves	Demand Deposits	Time and Savings Deposits	Goods and Services
Market Interest Rates	Decrease	Decrease	Decrease	Decrease
M1-A	Increase	Decrease	Increase	Uncertain
M1-B	Increase	Decrease	Increase	Uncertain
M2	Decrease	Decrease	Increase	Uncertain
GNP:				
Traditional Keynesian Hypothesis	Decrease	Decrease	Decrease	Increase
Availability Hypothesis	Decrease	Decrease	Increase	Uncertain

NOTE: This table assumes no Regulation Q-induced financial innovation. Given such innovation, the volatility of each variable may decrease when Regulation Q is removed.

Chart 3
THE EFFECTS OF AN INCREASE IN BANKS' DEMAND FOR RESERVES WITH AND WITHOUT REGULATION Q



NOTES: A subscript 1 denotes a regime with Regulation Q, and a subscript 2 denotes a regime without Regulation Q.

A cap (~) denotes a regime with a shock, and no cap denotes a regime without a shock.

which demand and supply conditions change in response to shocks. In the context of the framework of analysis used in this article, shocks may alter the demand for reserves, for deposits, and for goods and services. With regard to these shocks, this section analyzes and Table 2 summarizes the effects of Regulation Q removal on market interest rates, the monetary aggregates, and GNP.

Market Interest Rates. For shocks that alter the demand for reserves, removing Regulation Q will tend to decrease the volatility of market interest rates. That is, market interest rates will change less in response to shifts in the demand for reserves in the absence of Regulation Q. This effect is illustrated by Chart 3. The chart assumes that the demand curve for reserves is R^d_1 while Regulation Q is effective, and R^d_2 after Regulation Q is removed. The demand curve R^d_2 is shown to be less steeply sloped than R^d_1. This reflects the fact that after Regulation Q is removed, the demand for reserves will respond more to changes in market interest rates—meaning that a given change in interest rates will lead to a larger change in the amount of reserves demanded.[9]

The chart assumes that a shock occurring while Regulation Q is effective shifts the demand curve for reserves from R^d_1 to $\hat{R}^d_1$. After Regulation Q is removed, the same shock shifts the demand for reserves from R^d_2 to $\hat{R}^d_2$. In response to the shifts in demand, market interest rates increase from r_0 to r_2 after Regulation Q is removed, which is less than the rise from r_0 to r_1 while Regulation Q is effective.

The demand for reserves will respond more to changes in market interest rates after

[9] Besides altering the slope of the demand curve for reserves, Regulation Q removal also shifts this curve and the demand curves for deposits, as the previous section indicated. For simplicity, Chart 3 does not illustrate these shifts examined earlier.

Regulation Q is removed because the demand for demand deposits will respond more—even though the demand for time and savings deposits will respond less.[10] The demand for demand deposits will respond more because the impact on this demand of a change in interest rates on time and savings deposits—allowed by removal—will reinforce the impact of a change in market interest rates.[11] The demand for time and savings deposits will respond less because the impact on the demand for these deposits of a change in the interest rates on them will offset—rather than reinforce—the impact of a change in market rates.[12]

The foregoing analysis has shown that, for shocks that alter the demand for reserves, removing Regulation Q will tend to decrease the volatility of interest rates. A similar analysis would show that removal will also tend to reduce interest rate volatility with respect to shocks that alter the demand for deposits or the demand for goods and services.

The Monetary Aggregates. After Regulation Q is removed, the volatility of demand deposits will increase and the volatility of time and savings deposits will decrease with respect to a shock that alters the demand for reserves. This is because demand deposits will respond more, and time and savings deposits will respond less, to changes in market interest rates after removal.

Since M1-A includes demand deposits but not time and savings deposits, Regulation Q removal will increase the volatility of this aggregate. M1-B's volatility will also probably increase.[13] However, the reduced volatility of time and savings deposits in M2 makes this broader monetary aggregate less volatile with respect to shocks affecting the demand for reserves.

Moreover, for shocks that alter the demand for demand deposits, Regulation Q removal will decrease the volatility of each monetary aggregate. However, for shocks that alter the demand for time and savings deposits, removal will increase the volatility of each aggregate. For shocks that alter the demand for goods and services, Regulation Q removal will have an uncertain effect on the volatility of each monetary aggregate.

GNP. Regulation Q removal will decrease the volatility of GNP with regard to shocks that alter the demand for reserves. Assuming the traditional Keynesian hypothesis, GNP changes as market interest rates change. Thus, because market rates will be less volatile after Regulation Q is removed, GNP will be less volatile. Assuming the availability hypothesis, GNP changes as interest rates and M2 change. GNP will be less volatile in this case because removing Regulation Q will decrease the volatility of both interest rates and M2 with respect to shocks affecting the demand for reserves.

Regulation Q removal will also decrease the volatility of GNP in response to shocks that alter the demand for demand deposits.

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10 The impact on the demand for reserves of the change in demand deposits will dominate the impact of the change in time and savings deposits, due to the higher reserve requirements on demand than on time and savings deposits.

11 For example, when market interest rates increase, the demand for demand deposits would decrease more if interest rates on time and savings deposits increase also, as they would in the absence of Regulation Q.

12 For example, when market rates increase, the demand for time and savings deposits would decrease less if the interest rates on them increase also, as they would after Regulation Q is removed. It is conceivable that the demand for time and savings deposits will actually increase with market interest rates after Regulation Q is removed. However, the following analysis assumes that the demand for time and savings deposits will still depend negatively on market rates after Regulation Q is removed.

13 Removal could decrease M1-B's volatility, though, if it increases the savings deposits in this aggregate substantially relative to other M1-B assets.

Assuming the traditional Keynesian hypothesis, removal decreases GNP's volatility in response to shocks altering the demand for time and savings deposits, but increases GNP's volatility in response to shocks altering the demand for goods and services. Assuming the availability hypothesis, removal increases GNP's volatility given shocks that alter the demand for time and savings deposits, but it has an uncertain effect on GNP's volatility in response to shocks affecting the demand for goods and services.

A Caveat: Regulation Q-Induced Financial Innovation. Throughout this analysis of the effects of Regulation Q removal on volatility, the shocks examined have been assumed independent of whether or not Regulation Q is removed. However, it is possible—and perhaps even probable—that Regulation Q's existence is itself responsible for some shocks to the economy. This is the case, for example, if Regulation Q's existence induces financial innovation.

Indeed, the spread of money market mutual funds, bank repurchase agreements, and numerous other financial contracts may have been due in part to the continued existence of effective Regulation Q interest rate ceilings. Such innovation may have introduced shocks to the economy that might not occur when Regulation Q is removed. Thus, removing Regulation Q may tend to reduce the volatility of all economic variables.

The Responsiveness of the Economy to Changes in Monetary Policy

In addition to affecting, on a continuing basis, the volatility of economic variables, removing Regulation Q will have continuing effects on the way variables respond to changes in monetary policy.

The magnitude of the response of market interest rates to changes in monetary policy will be reduced by removing Regulation Q. Suppose, for example, the Federal Reserve increases the supply of reserves, which tends to decrease market interest rates. Market rates will fall less after Regulation Q is removed because, as shown earlier, removal will increase the responsiveness of the demand for reserves to changes in market rates. Similarly, because demand deposits will respond more to changes in market interest rates after Regulation Q is removed, M1-A, and probably M1-B, will respond more to monetary policy-induced changes in reserves and interest rates. However, since time and savings deposits will respond less to changes in interest rates, M2 will respond less to monetary policy changes. The size of response of GNP to changes in monetary policy will also be reduced by removing Regulation Q. Assuming the traditional Keynesian hypothesis, the smaller change in market interest rates after Regulation Q is removed in turn induces a smaller change in GNP. Assuming the availability hypothesis, the smaller change in M2 after Regulation Q is removed in turn induces a smaller change in GNP.[14]

Table 3 summarizes the continuing effects of Regulation Q removal on the size of responses in market interest rates, the monetary aggregates, and GNP to changes in monetary policy. These effects may have implications for

[14] The volatility of the response in the economy to changes in monetary policy may depend on the status of Regulation Q. This is because Regulation Q's existence may induce financial innovation which alters the structure of the economy. For example, suppose Regulation Q's existence encourages banks and others to create new substitutes for time and savings deposits which are not subject to interest rate ceilings. In this case, the relationship between monetary policy and the economy may change. The more Regulation Q-induced financial innovation there is, the more volatile the effects of monetary policy may be. Removing Regulation Q might tend to reduce the uncertainty about the relationship between monetary policy and the economy and, therefore, improve the effectiveness of monetary policy.

Table 3
THE CONTINUING EFFECTS OF REGULATION Q REMOVAL ON THE SIZE OF RESPONSE TO CHANGES IN MONETARY POLICY

Variable	Expected Change
Market Interest Rates	Decrease
M1-A	Increase
M1-B	Increase
M2	Decrease
GNP:	
Traditional Keynesian Hypothesis	Decrease
Availability Hypothesis	Decrease

the Federal Reserve's conduct of monetary policy. For example, because M1-A is more responsive to policy changes, when the growth rate of this aggregate deviates from desired paths, the Federal Reserve may need to adjust the supply of reserves by less when Regulation Q is removed. Alternatively, because removal decreases the responsiveness of M2 to changes in the supply of reserves, when M2 growth deviates from path a larger change in the supply of reserves may be needed after removal.[15]

SUMMARY

This article has investigated theoretically the implications for monetary policy and the economy of removing Regulation Q deposit interest rate ceilings. It was shown that removing Regulation Q will have once-and-for-all effects on the levels of market interest rates, the monetary aggregates, and GNP, as well as continuing effects on the volatility of these variables and on their responsiveness to changes in monetary policy.

Regulation Q removal will have the once-and-for-all effect of reducing market interest rates and increasing GNP, assuming no offsetting monetary policy actions. Removing the ceilings will also decrease M1-A and probably M1-B but will increase M2. The Federal Reserve may alter its conduct of monetary policy to offset these once-and-for-all effects on levels.

The volatility of market interest rates, the monetary aggregates, and GNP is in general different in a world without Regulation Q than in a world with Regulation Q. Removing the ceilings will decrease the volatility of market interest rates and probably also of GNP. The volatility of the monetary aggregates may increase, depending on the type of shock that occurs. However, Regulation Q removal will more likely reduce the volatility of these variables as well. This is because Regulation Q's existence may itself be responsible for shocks to the economy due to induced financial innovation.

Finally, Regulation Q removal will have a continuing effect on the response of the economy to changes in monetary policy. Removal will decrease the size of response of market interest rates, GNP, and M2—and increase the response of M1-A and probably of M1-B—to changes in monetary policy. Also, the volatility of all responses may decrease after Regulation Q is removed. These effects may imply a need to alter the conduct of monetary policy. Smaller or fewer changes in policy may be needed to return M1-A and M1-B to their desired paths, but larger or more policy changes may be necessary to control M2, interest rates, and GNP.

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15 In the extreme, after Regulation Q is removed even large changes in the supply of reserves might not be sufficient to return M2 to path. In this extreme case, it could be difficult for monetary policy to significantly affect market interest rates and GNP, as well. Such an extreme case is unlikely, however.

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