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Consumer Experiences With Credit Insurance: Some New Evidence

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Credit insurance is a product that has been steeped in controversy for many years. This article examines several issues surrounding the marketing and sale of credit insurance through a recent survey on consumer experiences with the product. Survey findings indicate that credit insurance is purchased frequently, that consumers generally do not feel pressured into buying the product, and that consumers view credit insurance quite favorably. Past abuses in the marketing and sale of credit insurance therefore may have been overstated or have declined in recent years.

The sale of credit insurance in connection with extensions of consumer credit has been a controversial subject for many years. Sold by various types of financial institutions and some retailers, credit insurance is designed to repay a borrower's debt in the event of his death or disability. Credit insurance has been controversial because of its alleged high cost in many states and because of allegations of abusive marketing and sales practices. The credit insurance industry has responded to such criticisms by arguing that rates are reasonable in view of the circumstances under which credit insurance is sold. Also, while acknowledging the existence of some abusive practices in the past, industry representatives argue that most abuses have been eliminated in recent years.

Credit insurance will likely remain a controversial product. A strong rise in consumer debt during the 1980s has caused both consumer advocates and

some governmental authorities to take note once again. Recently, the Federal Reserve's Consumer Advisory Council, an advisory group consisting of 30 financial industry, regulatory, and consumer representatives, expressed interest in credit insurance practices and the attitudes of borrowers toward them. Also of late, mandatory competitive rate bidding (for credit insurance) in Massachusetts has been the object of intense scrutiny by industry observers.[1] Pressures for greater banking deregulation and attempts by some banking organizations to gain permission to conduct specific new insurance activities, such as underwriting and selling home mortgage insurance, also have called attention to insurance practices.[2]

Finally, considerable discussion has arisen concerning an amendment to the Federal Reserve System's Regulation Y. This amendment eliminates a longstanding requirement that bank holding company subsidiaries proposing to engage in the underwriting of credit insurance demonstrate public benefits in the form of a rate reduction (see Box).

In view of the continuing interest in credit insurance, it seems worthwhile to examine the nature of this product and to review some of the issues surrounding it. This paper also reports some new evidence on the frequency of credit insurance pur-

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Credit Insurance and Regulation Y

Regulation Y of the Federal Reserve System governs bank holding company activities permitted under the Bank Holding Company Act of 1956 as amended. In 1970, Regulation Y was revised in several important ways. One of the most important was to allow bank holding companies to engage in certain nonbanking activities.

In deciding which activities were to be permissible, the Federal Reserve Board was to apply a two part test: new activities had to be both "closely related to banking" and "a proper incident thereto." The "closely related" test requires an examination of any proposed activity in light of past usual and reasonable banking practices. The "proper incident thereto" test requires a finding that, after an assessment of all potential benefits and adverse consequences, the activity will result in "net public benefits."

Although not on the original "laundry list" of new permissible nonbanking activities, the underwriting of credit insurance was quickly proposed as a new activity for bank holding companies. In 1972, the Board determined that the underwriting of credit insurance was closely related to banking but that the activity involved potentially serious adverse effects. These effects included the potential for excessive charges to consumers and excessive underwriting profits, incentives for bank holding companies to pressure borrowers into buying unnecessary or inferior credit insurance, and the use of credit insurance effectively to raise the interest charges on loans covered by state usury laws.

To ensure the presence of "net public benefits," the Federal Reserve Board, since 1972, has required bank holding companies to offer credit life insurance at rates slightly below the maximum rates permitted by state laws, based on a sliding scale. In general, the Board has required a 15 percent rate reduction in states with relatively high ceiling rates (for example, $1.00 per hundred dollars of single credit life insurance) and as little as a 2 percent rate reduction in states with relatively low ceiling rates (for example, $0.50 per hundred dollars of insurance). Also, bank holding companies generally have offered a 5 percent premium rate reduction from state-assigned rates on credit accident and health insurance to meet the Board's public benefits test.*

The Board's requirement has always been controversial. Consumer advocates, who desire lower credit insurance rates for borrowers, and insurance industry representatives, who have opposed the entry of banking organizations into the insurance industry, generally favor it. The banking industry generally opposes the requirement because it limits the price that banking organizations can charge for credit insurance.

In November 1983, the Federal Reserve Board invited public comment on a proposal to eliminate the rate reduction rule. The proposed elimination was prompted by public comments received in connection with the 1983 revision of Regulation Y. On June 25, 1986, the Board voted to rescind its longstanding rate reduction requirement, citing the incongruity of imposing pricing restrictions on credit insurance underwriting activities but not on other nonbanking activities, and the lack of evidence of the adverse effects cited in its 1972 ruling.

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*The Board has also been willing to accept a combination of rate reductions and increased policy benefits for the necessary public benefits.

chases, borrower perceptions about lender recommendations to buy credit insurance, and overall borrower attitudes toward this product. Based upon these survey results, some inferences are drawn as to the likely validity of some of the criticisms levied at the sale of this insurance product.

Section I describes the nature and primary types of credit insurance. Section II focuses on various marketing and sales abuses (including tie-in sales) that have been alleged by some industry critics. The third section presents an analysis of the results of the 1985 Federal Reserve Board survey of borrower experiences with credit insurance. These results are compared to those found in a similar Board-sponsored survey conducted in 1977.

Two important conclusions emerge from the consumer surveys. First, consumers believe that creditors base their decisions to grant credit on factors other than consumer decisions whether to purchase credit insurance. Second, consumers who purchase credit insurance believe it is a valuable product and would be inclined to purchase insurance in the future. The final portion of the paper summarizes the findings.

I. Credit Insurance

Credit insurance typically is sold to borrowers in connection with the extension of credit by a lender, usually a financial institution or retailer. It is designed to ensure the repayment of a borrower's debt in the event of death, disability or loss of property. The types of credit extensions that are usually covered include automobile loans, personal loans, and installment purchases of appliances as well as other consumer goods[3]. Generally, credit insurance is sold to a lender by an insurance underwriter on a group basis. The lender holds the policy and issues a certificate of insurance to any borrower who purchases credit insurance. The lender is named beneficiary and directly receives any payments made on submitted claims.

There are three basic types of credit insurance: credit life, credit accident and health, and credit property insurance. Credit life is the most commonly purchased type of credit insurance and provides for the repayment of a loan in the event of the borrower's death. Credit life insurance first appeared in the early 1900s to insure automobile loans. It typically is written as declining term insurance, that is, coverage decreases as the loan is repaid. At the beginning of 1985, there were nearly 66 million credit life policies in existence in the U.S. with in-force coverage of $190 billion.[4]

Accident and health insurance (A&H) is also known as credit disability insurance. A&H credit insurance is designed to repay a borrower's debt in the event of a loss of income due to illness or injury. A&H credit insurance entails greater risk of loss to the underwriter and is more difficult to administer than credit life. Consequently, it is more costly to offer than credit life insurance. Borrowers may be required to be employed at the time that coverage is extended and usually face restrictions concerning pre-existing health conditions. Frequently, A&H policies feature a "retroactive" clause that requires a borrower to be disabled for a specified time before insurance payments begin. Once this time requirement is met, however, insurance payments are made retroactively to the first day of disability.

A third type of credit insurance is credit property insurance, which provides coverage for personal property purchased with a loan. It may also insure collateral property.

Credit insurance policies are written by various types of insurance companies. Those that deal primarily in credit policies are known as "specialty" companies and are the largest issuers of credit insurance policies. A second type of credit insurer is a "captive" insurer — a firm that is owned by a single creditor or group of creditors through a second company, usually a "reinsurer." A third type of credit insurer is the general or full-line life insurance company.

II. Credit Insurance — Consumer Issues

Credit insurance, particularly credit life insurance, has characteristics that distinguish it from other types of insurance. For example, unlike regular life insurance, it is made available in small amounts of coverage, and its premium rate does not depend on the insured's age or health (although credit life insurance is usually not made available to borrowers over the age of 65). It is usually sold by the creditor directly at a premium rate that is constant regardless of the size of the loan or its maturity. Generally, no proof of insurability is required, and credit insurance usually cannot be cancelled. As a result of these characteristics, credit insurance may offer important advantages to certain borrowers who find it to be a convenient and economical way to purchase protection against debt default.

Industry critics, however, contend that while credit insurance offers borrowers some advantages, its sale has often been associated with abusive and even illegal practices. Their criticism has centered on several issues including the cost of credit insurance and the manner in which credit insurance has been marketed and sold. These issues present difficult questions, and they warrant further discussion.

Credit Insurance Rates

One important concern of industry critics is that credit insurance is relatively expensive, particularly in comparison with other types of insurance such as term life insurance. Lenders and insurers have responded by arguing that the circumstances in which credit insurance is sold justify higher premium rates. They argue that the administrative costs of providing credit insurance are high compared to other forms of insurance. Indeed, the small average size of credit insurance policies and the presence of some fixed costs in administrating and servicing policies suggests that there may be some validity to this point. Also, they argue that credit insurance sales are subject to an "adverse selection" process that permits purchasers of varying ages to obtain credit insurance at the same premium rate. Typical term life policies account for variations in risk by charging different rates to individuals with different risk profiles (for example, different ages, health,

sex, marital status, or different personal habits such as smoking or nonsmoking.)

The cost issue does not lend itself to an easy resolution. Most observers agree that credit insurance rates should be set at a level that will allow for the payment of claims, provide reasonable lender compensation, and ensure normal profits to insurance underwriters. To achieve these goals, the National Association of Insurance Commissioners recommends that states set *prima facie* maximum rates at levels that will generate a target "loss ratio" (ratio of premiums paid out to premiums collected) of 60 percent. Maximum allowable rates for credit life insurance (and actual loss ratios), however, vary widely, ranging from as much as $1.00 per hundred dollars of insurance in some states to as little as $0.28 per hundred dollars in others.

Wide variations in maximum allowable credit insurance rates among states, moreover, are not well explained by what are believed to be only minor differences in the costs of providing insurance in different states. Rather, industry critics contend that the allegedly high *prima facie* rates found in certain states result from several factors, including a lack of organized consumer pressure for lower rates, a low level of concern by state insurance regulators, strong industry lobbies that seek to maintain existing rate structures, and market conditions that are perceived as conducive to noncompetitive pricing behavior.

The level at which legal maximum rates are set is a concern because in most states lenders tend to charge the highest rate permitted. This practice exists because lenders are typically compensated for credit insurance sales by receiving a portion of the collected premiums (up to 60 percent in some states). Although state laws generally limit the size of this commission and prohibit lenders from marking up the cost of insurance to borrowers, lenders (by sharing in the premiums collected) as well as insurers profit from charging higher premiums.

Lenders have the ability to charge maximum allowable rates only when borrowers have an inelastic demand for credit insurance since revenue to the lender would then increase as price rises to the state

ceiling rate. This demand inelasticity might derive from several sources. Borrowers may be unaware of alternative sources of credit insurance or of substitute products (such as increasing existing life insurance coverage). Inelastic demand also could be the result of a desire to minimize search costs for alternative sources of credit insurance — especially since the cost of credit insurance typically accounts for a small proportion of total loan costs.

Tying Arrangements and Credit Insurance

A second major issue that surrounds credit insurance is that of "tie-in" sales between the granting of credit and the sale of credit insurance. Tie-in sales or "tying arrangements" occur when the purchaser of some product (the tying good) agrees or is required to purchase a second good (the tied good) from the seller as a condition to the purchase of the first good. Involuntary tie-ins through explicit contractual arrangements are generally prohibited under various federal laws including Section 3 of the Clayton Act, Section 1 of the Sherman Antitrust Act, and Section 106 of the Bank Holding Company Act.

The economic rationale for tying arrangements has been explored thoroughly in the antitrust literature by such authors as Singer, Scherer, and Edwards.[5] This literature argues that tying arrangements may accomplish several objectives for the seller. One, firms may realize sales economies by distributing tied products together. Two, tying arrangements have been used to protect the reputation of a firm's products by ensuring that compatible joint inputs are used in production processes. Three, tying arrangements have been used to circumvent price controls such as usury restrictions on consumer finance rates.[6]

In the case of credit insurance, much of the debate over tie-ins centers on whether the tying of credit and credit insurance is due to a lack of competition. That is, under what conditions can lenders coerce borrowers into purchasing credit insurance by threatening, either explicitly or implicitly, to withhold credit unless the borrowers also buy credit insurance? Eisenbeis and Schweitzer have argued that such coercion is likely to be more successful in markets where lenders enjoy some degree of monopoly power in the granting of credit.[7] An example of such a market might be one that exhibited high concentration, had few lenders, maintained restricted entry conditions, and presented high search costs for alternative sources of credit.[8]

Other Consumer Issues

Some industry observers have criticized other aspects of the marketing and sale of credit insurance. They argue that the extent of coverage has frequently been misrepresented to consumers. In addition, they allege that consumers have suffered from fraudulent and deceptive claims practices (such as not being provided a copy of the insurance policy or being subject to an extremely narrow definition of "disability"). They also argue that credit insurance often is sold in excessive amounts, such as when creditors base the amount of coverage on the sum of monthly payments ("gross coverage") rather than the outstanding principal balance ("net coverage"). At present, few states require coverage to be made on a net basis.

Critics also argue that coverage sometimes is sold for periods that exceed the term of the loan and that unearned premiums often are not refunded when loans are prepaid or refinanced. These and other abuses have been discussed more extensively in a number of previous studies of credit insurance practices.[9] While the extent of these practices has always been a matter of intense debate, examples from several recent court cases provide some evidence that they exist.[10]

III. Studies of Credit Insurance

Credit insurance has been discussed widely but has been the subject of relatively few empirical studies. Important studies of credit insurance include efforts by the National Association of Insurance Commissioners (NAIC, 1970), Hubbard (1973), Huber (1976), and Eisenbeis and Schweitzer (1979).[11] The NAIC study surveyed state insurance regulators and reported on the frequency of consumer complaints arising from coercive selling practices. A more comprehensive study conducted at Ohio University (Hubbard) attempted to determine consumer attitudes toward credit insurance and the extent to which consumers may have been pressured into buying it. A consumer survey was used to identify consumer perceptions about tie-in sales of credit insurance. Huber, in an examination of the sale of credit insurance by retailers, focused on the demand for credit insurance and how it varies by different groups of consumers.

The most comprehensive empirical study of credit insurance tie-in sales was the 1979 study by Eisenbeis and Schweitzer. Using the results of two surveys — one of consumers and the other of bank holding companies — the authors constructed an analytical framework that enabled the existence of tie-in insurance sales to be revealed by a high proportion of joint purchases of credit and credit insurance, by borrower perceptions of and resentment at being forced to make insurance purchases, and by creditor conduct that is thought to promote tying arrangements.

The study found that a relatively high proportion of borrowers purchased credit insurance but that these high penetration rates probably did not indicate coercion. Their conclusion was based upon generally favorable consumer perceptions of credit insurance and the low reported incidence of survey responses that indicated that credit insurance had been required or strongly recommended. In addition, an examination of insurance selling practices by bank holding companies revealed procedures that seemed to make coercive selling practices unlikely.

TABLE 1

Proportion of Borrowers That Had Credit Insurance and the Proportion That Did Not Know Whether They Had Credit Insurance in 1977 and 1985, by Institutional Source*

(Percent)

Source	Had Insurance		Did Not Know	
	1977	1985	1977	1985
Retailer, dealer, contractor	41.4	52.4	11.3	*
Bank or savings and loan	63.0	66.9	4.0	1.9
Finance company	76.8	69.7	6.6	*
Credit union	71.8	60.5	7.1	4.0
Other	28.6	62.3	*	1.3
Total	63.9	64.7	6.0	2.2

*Includes only the most recent loan with regular monthly payments of at least $25 for each family. Excludes mortgage loans and credit card debts.

**Less than 0.5 percent.

SOURCE: Durkin and Elliehausen, *1977 Consumer Credit Survey* and University of Michigan, Survey Research Center, Survey of Consumer Attitudes, December 1985.

The 1985 Survey

The Eisenbeis-Schweitzer study (1979) was based primarily on the results of the *1977 Consumer Credit Survey*. Sponsored by the Board of Governors of the Federal Reserve System, the Office of the Comptroller of the Currency, and the Federal Deposit Insurance Corporation, that survey collected detailed information on the credit insurance experiences of approximately 2,500 families selected to be representative of all families residing in the United States.

In December 1985, the Federal Reserve Board, at the request of the Consumer Advisory Council (CAC), sponsored credit insurance questions on the University of Michigan monthly Survey of Consumer Attitudes. The CAC request was based on a perception that substantial changes may have taken place in the credit insurance market in recent years.

The 1985 survey examined consumer experiences with credit insurance and contains the responses of 652 representative U.S. families reporting at least one nonmortgage closed-end loan.[12]

This paper reports the results of the 1985 survey and compares some of those results to those of the 1977 survey. The analytical approach used to investigate the seriousness of consumer abuses in the sale of credit insurance is the same as that developed in the Eisenbeis-Schweitzer study. In this approach, the presence of excessive costs or unfair or abusive sales practices, including coercive tying arrangements, would be revealed by adverse consumer experiences and attitudes of resentment toward credit insurance.

Within the Eisenbeis-Schweitzer framework, consumer surveys help to determine whether credit insurance is purchased even though it is viewed

TABLE 2

Credit Insurance Penetration Rates by Family Characteristics
(Percent of Borrowers in Each Subgroup)

Characteristic	Have Insurance		Do Not Know	
	1977	1985	1977	1985
Income				
Less than $15,000	64.5	75.3	5.4	1.1
$15,000-$24,999	64.2	65.2	4.7	1.1
$25,000-$34,999	64.2	78.2	4.3	2.4
More than $35,000	62.2	49.4	7.9	3.1
Education (highest grade)				
Some high school or less	68.1	84.8	7.3	*
High school diploma	65.5	65.3	5.7	1.7
Some college or more	59.1	59.7	5.1	2.9
Race				
White	63.1	65.1	5.1	2.3
Nonwhite	65.8	62.8	10.5	*
Age (years)				
Under 35	62.6	55.6	7.4	2.7
35 - 54	64.8	74.9	3.9	1.6
55 and over	63.6	66.1	7.1	1.6

*Less than 0.5 percent.

SOURCE: Durkin and Elliehausen, *1977 Consumer Credit Survey* and University of Michigan, Survey Research Center, Survey of Consumer Attitudes, December 1985.

TABLE 3

Specific Source of Credit Insurance and Reason for Selection of Source, 1985

Specific source	Percent
Lender	89.9
Other firm	10.1
Total	100.0

Reason for selection of lender*	
Required	8.2
Was available from lender	28.6
Convenience	30.1
Automatically included with loan	14.1
Cost	4.1
Other	14.9
Total	100.0

Reasons for selection of source other than lender*	
Cost	13.6
Familiarity	36.4
Other	50.0
Total	100.0

*First reason cited for selection by respondent.

SOURCE: University of Michigan, Survey Research Center, Survey of Consumer Attitudes, December 1985.

TABLE 4

Consumer Perceptions of Recommendations by Creditor About Purchasing Credit Insurance in 1977 and 1985

(Percent Distribution of Families)

Responses	Families with credit insurance		Families without credit insurance	
	1977	1985	1977	1985
Never mentioned	7.1	14.8	51.6	45.2
Mentioned but not recommended	15.0	44.7	22.6	35.5
Recommended	33.1	16.4	17.0	12.9
Strongly recommended	13.2	6.3	2.3	2.6
Required	26.1	13.8	n.a.	n.a.
Other*	3.5	**	0.6	**
Don't know	2.1	3.9	5.9	3.9
Total	100	100	100	100

*Includes respondents who said they requested insurance.

**Less than 0.5 percent.

n.a. not applicable

SOURCE: Durkin and Elliehausen, *1977 Consumer Credit Survey* and University of Michigan, Survey Research Center, Survey of Consumer Attitudes, December 1985.

unfavorably. Moreover, high sales penetration rates among borrowers may be a signal that involuntary tying is occurring if it is accompanied by consumer perceptions of coercion. The following, therefore, specifically examines the frequency of credit insurance purchases, borrower perceptions of creditor recommendations to buy insurance, and consumer attitudes toward credit insurance.

Frequency of Credit Insurance in Consumer Loan Transactions

The December 1985 survey indicates that slightly less than two-thirds (64.7 percent) of all borrowers purchased credit insurance to cover their most recent closed-end consumer loan with regular monthly payments of at least $25 (see Table 1).[13] The percentage of credit insurance buyers compares to a nearly equivalent 63.9 percent in 1977, and indicates that consumers continue to be frequent buyers of credit insurance.[14]

As indicated by the smaller proportion of "don't know" responses, borrowers in the 1985 survey also seemed to be more aware of whether they actually purchased credit insurance than their 1977 counterparts. Critics frequently argue that the sale of credit

insurance often is "buried" within loan documentation to such an extent that consumers do not know that they are purchasing credit insurance. In 1985, only 2.2 percent of all borrowing families reported that they did not know whether they had credit insurance coverage on their outstanding loan. This contrasts with nearly 6 percent of borrowers in 1977. The explanation for this statistically significant improvement in awareness is a matter of speculation, but it could be related to efforts by consumer advocacy groups and state insurance regulators to promote more open marketing practices. It could also be attributable to the effects of Regulation Z which requires borrowers to sign a statement indicating their desire to purchase credit insurance.[15]

An important issue regarding credit insurance has been that of penetration rates — the percentage of qualified borrowers who actually purchase credit insurance. Concern has focused on the possibility that high penetration rates may indicate successful coercion. Both the 1977 and 1985 surveys collected information on penetration rates by type of creditor, and found that the purchase of coverage was most common for loans obtained from finance com-

TABLE 5

Consumer Perceptions of Recommendations by Creditor About Purchasing Credit Insurance, by Type of Lender in 1985*

(Percent of Families with Credit Insurance)

Responses	Bank	Finance company	Credit union	Retailer, dealer, contractor	Other
Creditor never mentioned insurance	13.4	21.7	8.9	**	20.2
Mentioned but not recommended	42.5	43.5	64.4	54.5	38.2
Recommended	14.9	**	8.9	45.5	21.3
Strongly recommended	9.7	**	4.4	**	4.5
Required	14.9	21.7	6.7	**	15.7
Don't know	4.5	13.0	6.7	**	**
Total	100	100	100	100	100

*Consumers with credit insurance.
**Less than 0.5 percent.
SOURCE: University of Michigan, Survey Research Center, Survey of Consumer Attitudes, December 1985.

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panies. In 1985, for example, 69.7 percent of finance company borrowers were covered by some type of credit insurance. Penetration rates for commercial banks and savings institutions were nearly as high at 67 percent. Credit insurance sales appear to be less frequent for credit unions (61 percent) and for retailers, dealers, and contractors (52.4 percent), probably because fewer such lenders offer credit insurance.

One of the more interesting aspects of credit insurance is the tendency of penetration rates to vary according to income class and education (Table 2). The 1985 data indicate that higher income ($35,000 or more) and better educated (at least a high school diploma) borrowers were less likely to have credit insurance than other borrower groups. These findings seem reasonable given that individuals with more education and higher annual incomes typically have greater net worth on which to rely in emergencies and are more likely to have other forms of insurance.

For example, information obtained from the *1983 Survey of Consumer Finances*[16] indicates that only 55 percent of families with incomes below $15,000 in 1983 were covered by some type of life insurance plan. In contrast, 94 percent of families with incomes above $35,000 had such coverage in that year. High income individuals may also be perceived as better credit risks, and thus may be subject to less pressure to purchase credit insurance.

Most borrowers who buy credit insurance obtain it from their lender. In 1985, 90 percent of borrowers with credit insurance reported that they obtained the insurance from the lender (Table 3). Among such borrowers, the two most frequently cited explanations for this selection were convenience and availability. Among borrowers who obtained insurance from a source other than the creditor, the principal reason cited for their choice was familiarity (prior experience) with that insurer. There was a small but statistically significant increase from 2 percent in 1977 to 10.1 percent in 1985 in the proportion of borrowers who reported that they obtained credit insurance from someone other than the creditor. This suggests that borrowers have developed a greater awareness of alternative sources of credit insurance.

Recommendations to Buy Credit Insurance: Borrower Perceptions

Credit insurance industry critics claim that the strong tendency for borrowers to purchase credit insurance from their lender is evidence of coercion. To evaluate this claim, the 1985 survey collected information on consumer perceptions of creditor recommendations on the purchase of insurance.

The 1985 survey (Table 4) indicates that 20.1 percent of borrowers with credit insurance have the impression that credit insurance was either required or strongly recommended by their creditor. In marked contrast, 39.3 percent of credit insurance purchasers in 1977 thought that the creditor either required or strongly recommended the purchase of credit insurance.[17]

Requiring credit insurance, however, does not necessarily indicate the existence of illegal behavior. In many states, creditors may legally require the purchase of credit insurance as a condition to receiving credit. They may not, however, require that such insurance be purchased from a particular source (especially the creditor). Furthermore, the cost of credit insurance must be reflected in the calculation of the loan's annual percentage rate.[18]

Table 5 suggests that customers of finance companies more frequently believed credit insurance to be required than borrowers obtaining credit elsewhere. Comparison of these data with the 1977 survey indicates virtually no change in the proportion of finance company borrowers who reported that the purchase of credit insurance was required (data not shown in tables).

To gain further insight into the question of whether borrowers are subjected to undue pressure by creditors to purchase insurance, survey respondents were asked whether they felt their decision to purchase credit insurance made a difference in whether the creditor would grant the loan (borrowers who reported that credit insurance was required were not asked this question). In 1985, borrowers with credit insurance and those without it, held similar views. Overwhelmingly (approximately 95 percent), borrowers expressed the belief that their decision regarding the purchase of credit

TABLE 6

Consumer Perceptions of Whether Taking Credit Insurance Made A Difference in Obtaining the Loan in 1977 and 1985

(Percent Distribution of Families)

Importance of taking insurance*	Families with credit insurance		Families without credit insurance		Families with credit insurance from a finance company
	1977	1985	1977	1985	1985
Made a difference	12.4	3.9	6.9	3.8	**
Irrelevant to loan decision	80.3	94.2	91.0	96.2	100
Don't know	7.2	1.9	2.1	**	**
Total	100	100	100	100	100

*Excludes those who said credit insurance was required.

**Less than 0.5 percent.

SOURCE: Durkin and Elliehausen, *1977 Consumer Credit Survey* and University of Michigan, Survey Research Center, Survey of Consumer Attitudes, December 1985.

TABLE 7

Consumer Attitudes Toward Credit Insurance in 1977 and 1985

(Percent Distribution of Families)

Responses	Families with credit insurance		Families without credit insurance	
	1977	1985	1977	1985
Good	86.7	89.9	59.8	56.4
Good with qualifications	8.6	2.9	18.9	8.3
Neither good nor bad	2.1	1.9	9.1	6.4
Bad with qualifications	*	*	2.7	2.6
Bad	2.2	5.2	9.5	26.3
Total	100	100	100	100

*Less than 0.5 percent.

SOURCE: Durkin and Elliehausen, *1977 Consumer Credit Survey* and University of Michigan, Survey Research Center, Survey of Consumer Attitudes, December 1985.

insurance had no effect on the creditor's decision to grant the loan (Table 6). These results strongly suggest that most borrowers did not feel pressured by lenders into purchasing credit insurance as a condition for obtaining credit. Moreover, comparisons between the two consumer surveys indicate that significantly fewer borrowers in 1985 than in 1977 believed that the creditor's decision to grant credit was affected by their choice of whether or not to purchase credit insurance (Table 6).

Borrower Attitudes Toward Credit Insurance

As noted, survey findings that the purchase of credit insurance was required by some creditors do not provide direct evidence of the existence of illegal tying practices. Nonetheless, survey information can be used to explore whether respondents perceived that lenders exerted pressures to engage in involuntary tying. Specifically, since coercive pressures are likely to generate resentment by borrowers

TABLE 8

Favorable Attitude Toward Credit Insurance Among Selected Groups of Credit Users in 1977 and 1985

(Percentage of Families in Each Subgroup)*

Characteristic	Families with credit insurance		Families without credit insurance	
	1977	1985	1977	1985
All families	95.3	92.8	78.7	64.7
Income				
Less than $15,000	96.0	88.6	75.6	68.2
$15,000-$24,999	93.3	98.3	82.3	50.0
$25,000-$34,999	97.1	93.8	79.2	73.9
More than $35,000	95.7	91.4	81.4	65.4
Education (highest grade)				
Some high school or less	97.6	96.0	87.5	44.4
High school diploma	96.1	97.4	82.4	59.7
Some college or more	92.4	88.3	72.2	70.8
Race				
White	94.9	92.2	78.4	63.3
Nonwhite	96.6	100	82.5	81.3
Age (years)				
Under 35	95.7	92.7	81.9	62.0
35-54	94.7	94.4	72.0	68.9
55 and over	95.2	87.8	86.0	68.4
Source of loan				
Bank, savings and loan	93.8	95.7	75.6	68.0
Credit union	93.8	95.7	75.6	68.0
Finance company	95.7	87.0	82.6	80.0
Retailer, dealer, contractor	94.6	100	88.5	80.0
Other	100	91.7	100	42.9
Amount financed				
Less than 300	100	**	88.2	**
300-999	93.2	100	87.5	69.2
1,000 or more	95.3	91.5	74.9	63.4

*Includes families that responded that purchase of credit insurance was a "good idea" or "good with qualifications."

**Less than 0.5 percent.

SOURCE: Durkin and Elliehausen, *1977 Consumer Credit Survey* and University of Michigan, Survey Research Center, Survey of Consumer Attitudes, December 1985.

toward credit insurance, survey responses could reveal such adverse reactions. Adverse reactions also might be expected if borrowers felt that the cost of credit insurance was excessive, or if lenders engaged in any of the abusive sales practices cited earlier.

Borrowers were questioned about their general attitude toward the purchase of credit insurance in both the 1985 and 1977 surveys. Both sets of responses indicate that about 90 percent of all borrowers who were covered by credit insurance thought buying the insurance was a "good idea" (Table 7). Only 5.2 percent of borrowers who had credit insurance in 1985 thought that it was a "bad idea" to purchase such insurance. Even among borrowers without coverage, 56 percent in 1985 stated that its purchase was a "good idea."

A cross-tabulation of consumer attitudes toward credit insurance with selected family characteristics indicates that few differences exist in responses among different subgroups of families (Table 8). In nearly all categories, 90 percent or more of the respondents with credit insurance exhibited a favorable attitude toward the purchase of credit insurance.

Finally, to evaluate further consumer perceptions about the purchase of credit insurance, each borrower with credit insurance was asked whether they would be inclined to purchase credit insurance in the future. Ninety-four percent of the respondents indicated that they would be inclined to purchase credit insurance again (Table 9). The most frequently cited reason (mentioned by 83 percent of respondents) for such a preference was that credit insurance serves a valuable purpose.

TABLE 9

Willingness of Families with Credit Insurance to Purchase Such Insurance at a Future Time

(Percent)

Characteristic	Inclined to purchase again	Inclined not to purchase again	Total
Percent of families	94.3	5.7	100
Primary reason for inclination			
Cost	*	28.6	100
Provides valuable service	82.9	—	100
Don't think they need it	—	28.6	100
Other	16.7	42.9	100
Total	100	100	100

*Less than 0.5 percent.

SOURCE: University of Michigan, Survey Research Center, *Survey of Consumer Attitudes*, December 1985.

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IV. Summary and Conclusion

This study has reviewed some of the issues that surround credit insurance, including claims of excessive cost and abusive marketing and sales practices, such as tie-in sales. While the study provides no direct evidence on the validity of such criticisms, it does provide evidence on recent borrower experiences with, and attitudes toward, credit insurance. It is reasonable to assume that the presence of excessive costs or abusive selling practices would be reflected in borrower expressions of dissatisfaction with or resentment toward credit insurance.

The study is based primarily on evidence from the University of Michigan Survey of Consumer Attitudes that was conducted in December 1985. This survey provides information on the frequency of borrower purchases of credit insurance, borrower perceptions about lender recommendations to buy credit insurance, and overall borrower attitudes toward credit insurance. Results from this survey were analyzed and compared to those of a similar 1977 survey sponsored by the Federal Reserve Board.

The results of the 1985 survey indicate that nearly two-thirds of families that borrow, purchase credit insurance; furthermore, most purchasers view credit insurance favorably. The survey reveals that about one-fifth of borrowers who purchased credit insurance believed such coverage was required or strongly recommended by the creditor. However, excluding borrowers who said they were required to purchase credit insurance, few believed that their decision to purchase or not to purchase credit insurance had any effect on the lender's decision to grant credit.

The 1985 survey found that the large proportion of borrowers who were aware that they had purchased credit insurance has not changed in recent years. However, significantly fewer borrowers surveyed in 1985 were unaware of whether they actually purchased credit insurance than were in 1977. The decline in the number of such unaware borrowers may help alleviate concerns about the alleged sales practice of "burying" credit insurance within the loan document.

The 1985 survey also found a significant decline in the proportion of borrowers with credit insurance who felt that the insurance was either required or strongly recommended. Although this decline must be interpreted with caution (some states permit creditors to require the purchase of credit insurance), it may be evidence of fewer involuntary credit insurance tie-in sales. This conclusion is supported by additional survey results that indicate that in 1985, 94 percent of borrowers with credit insurance felt that their decision to buy credit insurance had no effect on the creditor's decision to grant credit. This compares to 80 percent in 1977.

Finally, the 1985 survey revealed that nine-tenths of borrowers who bought credit insurance thought the purchase was a "good idea," and would buy it again. Among borrowers who purchased credit insurance, there was little change in attitudes toward the desirability of credit insurance between 1977 and 1985. These findings are consistent with the view that creditors in general do not subject borrowers to undue pressure to purchase a product (credit insurance) that they do not want.

Overall, the 1985 survey results suggest that the widespread abuses alleged by industry critics are not perceived by most borrowers as important concerns. Thus, although this study does not contend that all past criticisms of the credit insurance industry were unwarranted, it suggests that the prevalence of such abuses has declined or may have been overstated.

FOOTNOTES

1. On May 10, 1984, the Massachusetts Banking Department implemented Regulation 209 CMR 2.00 (Mass. Reg. No. 415). This regulation requires state-chartered savings banks, cooperative banks, credit unions and trusts to seek at least three bids from insurers and to accept the lowest qualified bid for the provision of credit insurance to loan customers. Federally chartered banks, finance companies, and automobile dealers are exempt from this regulation.

2. Application by Citicorp, New York, New York, pursuant to section 4(c)(8) of the Bank Holding Company Act, to engage in the underwriting of home mortgage redemption insurance; approved by the Board of Governors of the Federal Reserve System (March, 1986).

3. Credit insurance is available for virtually all kinds of consumer credit. However, unlike credit insurance for consumer installment loans, which usually is sold directly by the loan officer or retail merchant, credit insurance for home purchase loans and credit cards typically is solicited by mail by parties unrelated to the creditor.

4. Credit life insurance is a relatively small segment of the life insurance industry. At the beginning of 1985, credit life insurance policies accounted for approximately 17 percent of the number of all life insurance policies (issued and in force in the U.S.) but only three percent of the amount of coverage in force. Similarly, premium receipts from credit life insurance policies accounted for only four percent of total life insurance premiums.

5. See, for example, Eugene Singer, *Antitrust Economics: Selected Legal Cases and Economic Models* (Englewood Cliffs, N.J.: Prentice Hall, 1968); Frederick Scherer, *Industrial Market Structure and Economic Performance* (Chicago: Rand McNally, 1970); and Franklin R. Edwards, "Economics of 'Tying' Arrangements: Some Proposed Guidelines for Bank Holding Company Regulation," *Antitrust Law and Economics Review,* Vol. 6, 1973.

6. See Scherer for a discussion of the advantages of tying arrangements, pp. 505-507.

7. Robert A. Eisenbeis and Paul R. Schweitzer, "Tie-Ins Between the Granting of Credit and Sale of Insurance by Bank Holding Companies and Other Lenders," *Staff Study,* 101, Board of Governors of the Federal Reserve System (February 1979).

8. It is not clear, however, that the monopoly extension argument provides a satisfactory explanation for the apparent tying of credit and insurance. In the case where a lender has some degree of monopoly power in the market for, say, consumer loans, it is questionable that the lender could increase profits by "forcing" borrowers to pay an above-market price for insurance which otherwise is supplied competitively. One reason is that such an arrangement would reduce the demand for loans and, thus, the interest rate on loans would have to be lower. It is by no means a straightforward proposition that the higher income on credit insurance would more than offset the reduced income from lending. (For a firm with monopoly power, tying arrangements could comprise a convenient means of price discrimination according to the difference in demand for the monopolized good. In such a case, there could be gains if the tied good is otherwise competitively supplied. Critics of credit insurance tying arrangements,

however, have not argued that lenders have used credit insurance to price-discriminate among borrowers.)

The more likely situation that would be consistent with the Eisenbeis-Schweitzer position is that the conditions that lend themselves to a less competitive loan market also result in some degree of monopoly power for providers of credit insurance. If this were the case, the provision of credit and credit insurance by the same firm could be accounted for by cost advantages connected with the joint production of the two services. That is, it is cheaper for one firm to provide credit and insurance to a customer than to have the customer contract with two different firms.

To the extent that there are cost advantages to jointly producing credit and certain insurance services (e.g., insurance brokerage services), they should apply regardless of the degree of competition in a given market. Thus, even in highly competitive markets, credit and insurance brokerage services could be supplied by individual firms. Indeed, given these efficiencies, we would expect to observe borrowers obtaining credit and insurance services from the same firms. Explicit or implicit enforcement of tying arrangements would not be needed. The cost advantages of joint production, however, do not rule out the possibility that the market for credit insurance itself necessarily will be competitive. Therefore, the earlier discussion suggesting higher-than-competitive rates on credit insurance coverage is consistent with the existence of efficiencies in the joint provision of credit and credit insurance.

9. See, for example, National Association of Insurance Commissioners, "A Background Study of the Regulation of Credit Life and Disability Insurance," (Milwaukee: Executive Secretary of NAIC, 1970). Also, Joel Huber, "Credit Insurance on Retail Purchases: What Does the Public Feel?" *Cambridge Reports,* Second Quarter, 1976; Charles L. Hubbard, ed., *Consumer Credit Life and Disability Insurance* (Ohio University, College of Business Administration, 1973); Tracy Dobson, "Credit Insurance: The Hidden Insurance," *Michigan Bar Journal,* February 1986.

10. Recent evidence of credit insurance abuses is provided by a June 1985 settlement agreement between Thorp Loan and Thrift Company and the state of Minnesota. The agreement required the finance company to refund nearly $7 million in premiums to borrowers who were subjected to abusive marketing practices in which insurance coverages were added to consumers' loans without their knowledge or consent.

11. See footnote 8.

12. The respondents were selected in a way that ensures that they are representative of all U.S. families residing in the 48 contiguous states. Telephone interviews were conducted with the family member determined to be most financially knowledgeable.

13. The survey excludes mortgage loans, credit card debts and other loans with irregular payment schedules. In 1985, 17.6 percent of borrowers reported they only had credit life insurance coverage, 1.6 percent had only credit accident or health insurance, and 43.4 percent of borrowers stated they had both types of coverage.

14. The small increase in the proportion of families with credit insurance between 1977 and 1985 is within the associated sampling error. Therefore, it cannot be concluded that the proportion of consumers with such insurance in 1985 is greater than the comparable proportion in 1977.

15. Regulation Z of the Federal Reserve requires that a borrower sign an affirmative written request whenever a borrower purchases credit insurance from a lender who does not require such insurance (12 CFR S226.4d).

16. Robert B. Avery and others, 1983 Survey of Consumer Finances, Board of Governors of the Federal Reserve System: Washington, D.C., forthcoming.

17. Hubbard (see footnote 9) reported that 19.7 percent of borrowers (who purchased credit insurance) surveyed in 1970 state that its purchase was required by the creditor.

18. Title 1 of the Consumer Credit Protection Act of 1968; also known as the Truth-in-Lending Act (15 USC 1605B).

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Japanese Monetary Policy, Flow of Funds, and Domestic Financial Liberalization

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While financial liberalization has fundamentally altered Japan's financial institutions and markets, in particular, the flow of funds, it has not yet had a dramatic effect on the instruments and strategy of monetary policy. The framework in which the Bank of Japan conducts its policy is, nevertheless, on the verge of a major change as Japan considers establishing a short-term market for government securities.

The liberalization of Japan's domestic financial system has been ongoing since the mid-1970s. Prior to that time, the financial system was highly constrained by regulation and administrative guidance by the Ministry of Finance (MOF) and the Bank of Japan (BOJ). It was characterized by interest rate ceilings on deposits and loans, limited portfolio opportunities for market participants, undeveloped securities markets, and restrictions on international capital movements. This highly structured, segmented, and regulated system was designed to support export-led economic growth, industrialization, and high personal savings, and to provide a simple conduit for transferring the large surplus of the personal sector to finance the large deficits of the corporate sector.

The oil-price shock of 1973-74 and the associated end of the "high growth period" were the primary catalysts for financial liberalization. In particular, the impact of reduced economic growth on the established flow of funds patterns set the liberalization process in motion[1].

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Since then, specific reforms have been designed to increase the role of market forces by relaxing interest rate constraints, broadening portfolio opportunities for market participants, expanding existing securities markets and developing new ones especially for government debt. To increase Japan's role in the international financial system, other reforms aimed at increasing capital flows in and out of Japan, widening access by foreign financial institutions to the domestic flow of funds, and "internationalizing" the yen.

The changes in the flow of funds after 1973-74 and in the structure of the financial system as a result of liberalization have fundamentally altered the financial environment for Japanese monetary policy. As a result, the BOJ has had to consider alternative policy instruments, short-run tactics, and even longer run strategies of monetary policy.

This paper focuses on the changing financial environment for monetary policy in Japan and its impact on the conduct and impact of monetary policy. The subject is developed in four steps. First, we outline the major features of the flow of funds prior to liberalization and describe how the monetary policy of the BOJ relied on these flow of fund patterns and the highly regulated nature of the financial system. Second, we indicate the major changes in the flow of funds that followed the first oil-price shock of 1973-74 and that resulted from liberalization. Third, we indicate how these

changes have altered the domestic financial environment facing the BOJ and review the response of BOJ policy to these changes. The paper concludes with some comments on a new policy instrument for the BOJ.

Since the focus of the paper is on the changing financial environment for monetary policy, we need to date the emergence of the new environment. As mentioned, the major catalyst for liberalization was the downward shift in economic growth induced by the oil-price shock of 1973 and the impact of slower growth on the flow of funds. Nevertheless, 1976 often is regarded as the official start of liberalization because that was the year the MOF officially recog-

nized a competitive money market for repurchase agreements in government securities, known as the *gensaki* market. Thus, the years from 1973 through 1976 may be regarded as the period over which the new environment for BOJ policy emerged.

Financial liberalization in Japan, however, has been a more continuous and less crisis-oriented process than liberalization in the U.S. Hence, we do not observe sharp and discrete changes in the conduct of monetary policy in response to changes in Japan's financial environment (Cargill, 1985a and 1985b). Rather, the transition of BOJ policy is reflected in new and slowly evolving tactics and strategies of monetary policy.

I. The Financial Environment Prior to Liberalization

Two characteristics of the financial environment prior to liberalization provided a foundation for BOJ policy. First, there were well-established flow of funds patterns between major nonfinancial and financial sectors of the economy and, second, there were extensive interest rate and portfolio constraints on all major market participants. These characteristics ensured a close relationship between the BOJ's policy instruments and final policy targets.

Table 1 reports the surplus and deficit position of four major nonfinancial sectors in Japan as a percentage of GNP for the period 1965-84[2].

Prior to 1973, the flow of funds was characterized by large personal sector surpluses, large corporate sector deficits, and comparatively small public sector deficits. The personal sector surplus averaged 9.2 percent of GNP over the period 1965-72, whereas the corporate and public sector deficits averaged 6.5 percent and 2.6 percent of GNP, respectively.

The public sector deficits were concentrated in public corporations and local government entities rather than in the central government. In fact, the central government ran small surpluses during most of the 1965-72 period. Net financial flows between Japan and the rest of the world were small, reflecting Japan's tendency toward current account balance. In addition, a variety of restrictions on capital flows ensured Japan's international financial isolation.

The personal sector surpluses were held primarily in the form of currency and of liabilities issued by

private and public financial institutions (see Box). Such deposits and currency holdings accounted for 67 percent of the personal sector's uses of funds over the 1965-72 period.

The corporate sector deficits were financed primarily by financial institutions as opposed to open money and capital markets. Over the period 1965-72, loans from private and public financial institutions accounted for 86.6 percent of the corporate sector's sources of funds. Financial institutions were designed to serve the borrowing needs of the business sector in general, and the corporate sector in particular[3].

Corporations relied on indirect rather than direct financing for several reasons. Equities were not an attractive funding source because of the tax advantages of debt over equity, because of the practice of issuing stock at par value rather than market value, and because of the existence of extensive regulations regarding new stock issues. Domestic money and capital markets were undeveloped prior to liberalization and extensive regulation of capital flows prevented Japan's corporations from using foreign capital markets as a source of funding.

Private financial institutions acted as the primary conduit for funds between the personal and corporate sectors, but were themselves linked through a relatively free interbank market. This interbank market is similar in function and structure to the federal funds market in the U.S. and was one of only two markets not subject to extensive regulation and

administrative guidance. The other market was an unofficial *gensaki* market or repurchase market in government securities that emerged in the late 1960s[4].

Table 2 reports the net interbank position of the city banks, other banks, other private financial institutions, and the Bank of Japan in terms of their interbank financial assets less interbank liabilities over the period 1969-84. The city banks were continual net demanders of funds from the interbank market, while other private financial institutions were continual net suppliers of funds. After 1971, the BOJ initiated a form of open market operations

in the bill component of the market consisting mainly of purchases of bills, and thus became a net supplier of funds.

The net demand position of the city banks resulted from their central role in serving the borrowing needs of the largest and fastest growing corporations in Japan. Corporations depended on city banks for a major part of their external funding because the city banks were the largest and most convenient of the private financial intermediaries with offices throughout the country and the world. City banks also had access to BOJ direct credit on a continual basis, while corporations did not have

TABLE 1

Surplus or Deficit (−) Position of Major Nonfinancial Sectors in Japan, 1965-84
(As a percent of GNP)

Year	Personal	Corporate Business	Central Government	Public Sector Public Corporations & Local Authorities	Total	Rest of World
1965	7.9	−4.5	0.0	−3.2	−3.2	−1.1
1966	9.1	−4.8	−0.8	−3.3	−4.1	−1.2
1967	9.4	−7.3	−0.7	−2.4	−3.1	0.2
1968	9.1	−6.7	0.0	−2.8	−2.8	−0.7
1969	8.7	−6.9	0.6	−2.2	−2.8	−1.3
1970	8.2	−7.2	1.3	−2.3	−1.0	−1.0
1971	9.6	−6.3	0.9	−2.8	−1.9	−2.5
1972	11.5	−7.9	0.6	−3.3	−2.7	−2.2
1973	8.8	−7.6	1.1	−3.9	−2.8	0.0
1974	10.3	−8.5	0.7	−4.4	−3.7	1.0
1975	10.5	−4.1	−2.7	−4.6	−7.3	0.1
1976	11.4	−3.9	−3.5	−4.1	−7.6	0.6
1977	11.2	−2.6	−4.0	−3.3	−7.3	−1.5
1978	11.1	−1.0	−5.4	−3.7	−9.1	−1.7
1979	9.2	−3.1	−4.5	−3.5	−8.0	0.9
1980	8.3	−3.5	−3.2	−3.6	−6.8	1.1
1981	11.2	−3.1	−3.8	−3.6	−7.4	−0.5
1982	10.6	−3.7	−3.8	−3.1	−6.9	−0.9
1983	10.5	−3.6	−4.0	−2.8	−6.8	−2.1
1984	9.6	−2.2	−3.0	−2.6	−5.6	−3.0
1965-72 Average	9.2	−6.5	0.2	−2.8	−2.6	−1.2
1976-84 Average	10.3	−3.0	−3.9	−3.4	−7.3	−0.8

Note: Flow of funds positions are on a calendar year basis for the period 1965-81 and fiscal year basis for 1982-84. The personal sector includes households and unincorporated businesses.

Source: Bank of Japan, Flow of Funds Accounts

Japan's Intermediation Market

Six classes of financial institutions constitute Japan's intermediation market. First, there are 13 large city banks with head offices located in the major population centers, such as Tokyo and Osaka, and branches throughout the country. The city banks are a major source of funds to the corporate sector and hold the major part of corporate deposits. Business loans made by city banks must be short-term. City banks are not prohibited from making consumer or mortgage loans, but they concentrate almost exclusively on providing financial services to the corporate sector, especially the larger corporations.

Second, there are 63 regional banks that are smaller than the city banks but structured along similar lines in that they serve the short-term borrowing needs of small- to medium-sized corporations.

Third, three credit banks provide for the longer term funding needs of the corporate sector and obtain funds by issuing bank debentures.

Fourth, seven trust banks specialize in long-term lending and financial management; they obtain funds from trust accounts.

Fifth, a number of public financial institutions, among which the Postal Savings System is of major importance, play an important role in transferring funds from the personal sector to public enterprises. Postal savings deposits represent a large part of the personal sector's financial assets because of their favorable tax treatment compared to bank deposits. There is, in addition, an extensive network of postal savings offices in Japan. Postal savings funds are transferred via the Trust Fund Bureau of the Ministry of Finance to a variety of private and public entities to support specific government policies.

Sixth, a large number of small and specialized financial institutions are designed to meet the funding needs of small and specialized business activities as well as to provide funds to the personal sector. Compared to the first five types, these institutions play a minor role in the flow of funds.

access to open money and capital markets. Most importantly, city banks played a leadership role in the large groupings of firms that continue to dominate the industrial structure of Japan[5].

The corporate sector's greater dependence on city banks rather than other financial institutions for external financing accounted for the continued net demand position of the city banks in the interbank market. Other banks and private financial institutions (see Box) were net suppliers of funds to the interbank market. Thus, funds from these other institutions flowed to the corporate sector both directly and indirectly via the interbank market and the city banks.

Prior to liberalization, almost 90 percent of the BOJ's loans and discounts to financial institutions were made to the city banks. The BOJ encouraged city bank dependence on the discount window both by restricting all financial institutions, including city banks, to a small set of sources of funds subject to interest rate controls and by keeping the discount rate at a level significantly lower than the interbank loan rate.

Prior to liberalization, virtually all interest rates in Japan were regulated in one form or another with the only significant exceptions being the interbank[6] rate and the *gensaki* rate. Thus, interest rates were not sensitive to market forces and were not used by the BOJ in a systematic manner to influence spending during periods of tight or easy monetary policy. The overall objective of interest rate control was to achieve a "low interest rate" environment to stimulate corporate investment spending.

Within Japan's financial environment, a variety of portfolio constraints sharply segmented financial institutions and limited sources and uses of funds for all market participants. Banks were not authorized to issue market-sensitive large CDs, and were limited in the variety of deposit accounts they could use to obtain funds. Corporations faced a variety of regulations and administrative guidance that provided strong disincentives to substitute direct for indirect finance. Since banks were segmented according to loan maturity, corporations were restricted to obtaining short-term and long-term funding from specific types of institutions. Both banks and corporations were severely restricted from obtaining funds in the foreign market.

Monetary Policy Prior to Liberalization

The financial environment that existed in Japan prior to liberalization supported a close relationship between the BOJ's policy instruments and final policy targets and also defined a specific transmission process for BOJ policy. During this earlier period, the major policy instruments of the BOJ were credit rationing at the discount window, variations in the discount rate, purchases and sales of commercial bills in the interbank market, and loan limits on individual banks referred to as "window guidance". These instruments were used to control the volume of loans to the corporate sector by financial institutions in general, and the banking system in particular. Since the corporate sector had limited access to securities markets to satisfy external funding requirements, the BOJ could thereby influence corporate investment spending and, hence, the overall level of economic activity.

By determining the amount of reserves available to the banking system the BOJ was able to set the ultimate constraint on credit creation. Reserves were supplied through the discount window and a type of open market operation in the interbank market. To achieve the targeted path of bank reserves, the BOJ varied the amount of direct credit to the city banks and conducted operations in the bill component of the interbank market. The BOJ used the discount window not only as a means for determining the total reserve base but, just as importantly, to ration credit to the city banks.

Unlike other institutions, city banks had continuous access to BOJ credit and were always willing to take as much credit as the BOJ was willing to provide because the discount rate was maintained at a level below the interbank rate. As a result, the BOJ did not employ changes in the discount rate to affect the costs and thereby the willingness of city banks to

TABLE 2

Net Position of Interbank Assets and Liabilities of Private Financial Institutions and the Bank of Japan, 1969-84
(¥ 100 millions)

Year	City Banks	Other Banks	Other Private Institutions	Bank of Japan
1969	− 14,781	5,000	9,781	−
1970	− 20,560	7,516	13,044	−
1971	− 18,322	7,810	10,512	−
1972	− 27,098	7,313	12,625	7,160
1973	− 52,547	4,347	7,875	40,325
1974	− 72,371	5,533	25,008	41,831
1975	− 62,113	11,849	27,027	23,237
1976	− 70,272	10,891	34,381	25,000
1977	− 76,320	9,058	37,262	30,000
1978	− 76,979	6,121	42,358	28,500
1979	− 83,682	11,498	36,684	35,500
1980	− 70,848	6,857	31,991	32,000
1981	− 50,677	10,338	31,339	9,000
1982	− 52,424	22,011	12,413	18,000
1983	− 50,187	19,445	12,745	17,997
1984	− 84,758	17,319	33,301	15,982

Note: End-of-year basis for 1969-81 and end-of March 1982-84

Source: Bank of Japan, Flow of Funds Accounts

borrow and lend, but rather to achieve an "announcement effect," that is, to signal its intentions with respect to credit expansion.

The BOJ imposed "window guidance" lending limits on individual banks, including city banks, regional banks, and other types of financial institutions. City banks were the primary focal point of window guidance and their dependence on BOJ direct credit increased the probability that the loan limits would be respected. Also, the BOJ took into account existing market shares among different segments of the market in setting the limits and thus ensured that institutions not dependent on BOJ direct credit also would adhere to the limits. The BOJ fostered the attitude that adherence to the limits by all institutions would be in their best interest because it would allow them to maintain their market shares[7].

The interbank rate played an important role in the transmission of BOJ policy and as a policy indicator.

In terms of the transmission process, the interbank rate influenced the cost of funds to city banks, and this cost was passed on to the corporate borrowers in the form of higher deposit/loan ratios[8]. Thus, even in the absence of a change in the corporate loan rate, increased interbank rates raised the effective cost of borrowing. Increases in the official discount rate would amplify this effect since loan rates were tied to the discount rate. While this aspect of the transmission process relied on an interest rate-expenditure effect, it was secondary to the credit availability effect achieved by varying the reserve base, administrative guidance imposed on city banks at the discount window, and window-guidance on loan limits.

The interbank market ensured that BOJ policy spread beyond the city banks to institutions other than the city banks[9]. For example, regional banks and other financial institutions were induced by changes in the interbank rate to substitute interbank assets for business loans. Regulated loan and deposit rates ensured the existence of significant substitution effects between interbank assets and business loans in response to changes in the interbank rate.

As a policy indicator, the interbank rate reflected the pressure placed on the city banks. Portfolio restrictions on the sources of bank funds and interest rate ceilings forced the city banks to use the interbank market as a source of funds whenever the BOJ restricted funds at the discount window or through slower purchases of bills.

Thus, the BOJ's policy instruments influenced the ability of financial institutions to extend credit to the corporate sector. And since corporations depended heavily on intermediation finance, business investment also was sensitive to the BOJ's policy instruments. The well-defined flow of funds patterns ensured that BOJ influence over the city banks would translate into influence over all major financial institutions. The portfolio and interest rate restrictions on the sources of funds limited the ability of financial institutions to attract funds in an effort to offset BOJ intentions. The limited sources of funding available to the corporate sector ensured that influence over private intermediation credit would translate into influence over corporate spending.

II.   Initiation of Financial Liberalization

The financial system that existed prior to the start of liberalization (1973-76) served well the industrial objectives of Japan. It supported a high rate of real economic growth through the early 1970s and provided a framework for BOJ policy that enabled the Bank of Japan to support the rapid growth while maintaining reasonable price stability[10]. However, because this financial structure was incompatible

with the economic environment that emerged after the oil-price shock of 1973, the process of liberalization began.

Reduced economic growth as a result of the oil price shock in 1973 dramatically affected the flow of funds patterns in Japan. Growth declined from a 10 percent level to a 3-5 percent level that continues to the present. While the personal sector surplus

remained at about 10 percent of GNP after 1973, the relative positions of the corporate and central government deficits changed. The corporate sector deficit declined by almost 50 percent as a result of the reduced need for external funding in a slower growth environment, while the total public sector deficit roughly doubled.

The changes in flow of funds created pressures that could only be relieved by a less constrained financial system. The detailed causes of this liberalization are beyond the scope of this paper[11]. Instead, we focus on the role of the increased government sector deficit on the liberalization process[12].

Government debt was not sold in an open market but placed with a "captive" syndicate of banks and security companies at below-market rates. Syndicate members did not object to this practice prior to 1973 because the amount of debt was small. In addition, the BOJ was willing to purchase the debt from the banks at prices that guaranteed no capital loss and security companies were permitted to operate an unofficial *gensaki* market based on government debt.

After 1975, the increased government deficits made the amount of debt placed annually large. This influenced the liberalization process in two ways. First, in 1978, the BOJ no longer guaranteed that the debt would be purchased at favorable prices. Increasing market resistance forced the MOF to make a number of concessions, the most important of which were the decisions to offer medium-term debt at market prices and to reduce the holding period for syndicate members.

Second, the rising volume of government debt led to the emergence of a growing secondary market. This market was not regulated and provided a market-determined rate of interest that made it difficult to enforce deposit rate ceilings, especially for large corporate depositors who were becoming less dependent on the banking system and who wanted to shift deposits to higher yielding assets. A number of observers have judged the growth of the secondary bond market in government securities to be a major force for liberalization by the time of the late 1970s (Bank of Japan, December 1982b).

The impact of government debt and other forces therefore initiated financial liberalization in Japan. Liberalization has been ongoing for more than a decade now, and, combined with the changes in the flow of funds, has fundamentally altered the financial environment for BOJ policy. While the Japanese financial system remains highly regulated, market forces now play a more important role in allocating funds. Both money and capital markets have expanded, and controls over international capital flows have been relaxed.

Regulators have permitted financial institutions to offer a wider range of deposits (including deposits not subject to ceilings, such as large CDs), and have adjusted deposit rate ceilings more frequently. They also have relaxed controls over loan rates.

The volume of large CDs has expanded since their authorization in 1979, as has the volume of *gensaki* trade after official recognition in 1976. A yen-dominated bankers' acceptance market has recently been established, and regulators are considering establishing a short-term or T-bill market for government debt. The long-term securities market has expanded greatly from the increase in outstanding government debt.

In 1980, Japan accepted as a general principle the idea that international capital flows should not be restricted. Since that date, there has been a significant increase in funds flowing into and out of Japan. In addition, Japan has increased access by foreign financial institutions, and taken other steps to make the yen more acceptable as an international investment and reserve asset.

III. Changing Domestic Environment for Monetary Policy

The pre-liberalization transmission of monetary policy in Japan can be summarized by Figure 1. This transmission process was based on a well-defined flow of funds pattern between financial and nonfinancial sectors and an extensive set of interest rate and portfolio constraints on market participants.

Monetary policy focused on *credit* as the intermediate target and employed credit allocation controls to achieve the desired targets for credit. Although the BOJ used the interbank rate as an operating variable and policy indicator, it did not emphasize the interest rate-expenditure channel of monetary policy. Variations in the interbank rate were designed to influence the portfolio decisions of noncity banks with the overall objective of controlling the quantity rather than the price of intermediation credit.

Change in the flow of funds patterns after 1973 along with the liberalization process reduced the role of private intermediation credit as a determinant of spending and weakened the ability of the BOJ to control intermediation credit in general.

The most significant change for BOJ policy was a gradual decline in the role of indirect finance (Table 3). The corporate sector, now a smaller deficit unit, gained increased flexibility to obtain funds in open markets. Money markets themselves expanded, as did long-term security markets for government debt. While Japan does not yet possess a set of open money and capital markets matching the depth and breadth of those in the U.S., direct financial transactions have steadily increased in importance.
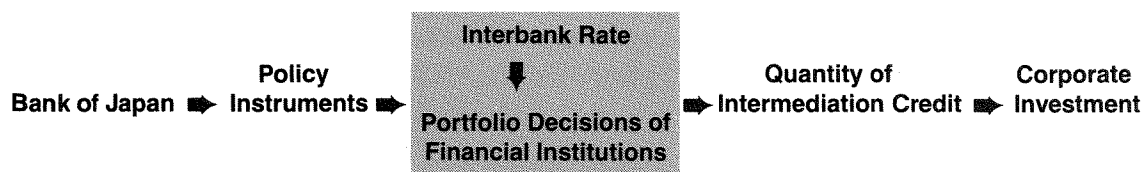
A discrete shift in the deficit position of the corporate and public sectors was associated with the decline in intermediation finance. The reduced need for external funding by the corporate sector and changes in the financial system as a result of liberalization lessened the dependence of the corporate sector, especially large corporations, on the banking system. Accompanying the absolute decline in the corporate sector's funding requirements has been a shift, made possible by liberalization, in its sources of funding. While the major increase in securities market activities is associated with the mounting size of outstanding government debt, corporations have taken advantage of the growing market as a source of external funding. Issues of securities accounted for 14.2 percent of the funds raised by the corporate sector over the 1973-83 period, compared to 10.8 percent over the 1965-72 period.

The declining dependence of the corporate sector on bank credit has, in turn, been responsible for a decline in the market share of city banks. In almost every year since 1962, city banks have lost market share to other private financial institutions. The actual percentage of city bank assets to total assets of private financial institutions dropped from 32.1 percent in 1969 to 26.1 percent in 1983.

In addition to the decline in city banks' market share of private intermediation, a shift in flows away from private to public intermediaries also may impede BOJ policy. Government financial institutions accounted for 16.1 percent of the total flow of funds to final borrowers (Table 3) in 1972, but by 1982, their contribution had increased to 29.2 percent. Funds transferred through public intermediaries are believed to be less sensitive to BOJ policy than those transferred through private intermediaries.

Figure 1
Monetary Policy Transmission —
Before Liberalization

Bank of Japan ➡ Policy Instruments ➡ Interbank Rate ⬇ Portfolio Decisions of Financial Institutions ➡ Quantity of Intermediation Credit ➡ Corporate Investment

Liberalization also has reduced the relative size of the interbank market in the flow of funds, and allowed city banks to reduce their dependence on BOJ direct credit. Although the interbank loan market remains central to the transmission of BOJ policy, the rapid growth of new money market instruments — in both yen and foreign currencies — has reduced its relative importance. Prior to liberalization, the interbank market represented approximately 70 percent of total money market transactions; by June 1985 (Toshihiko Fukui, 1986), it represented only 27.4 percent.

The Bank of Japan's pre-liberalization monetary policy tactics were based on the strong incentive of city banks to borrow from the BOJ. As city banks now have the ability to offer financial assets that are more market-sensitive, especially large CDs, they have become less dependent on BOJ credit. The Bank of Japan's loans and discounts to city banks have consequently declined as a percentage of city banks' liabilities during the past ten years. In addition, while city banks are still the major recipients of BOJ credit, other institutions have become more dependent on BOJ credit than in the past.

In sum, corporations now have sources of funding other than bank credit. Banks and other financial institutions also have use of expanded sources of funding that have made them less dependent on both the BOJ for direct credit and the interbank market. Liberalization has also increased both the role of interest rates in portfolio management and the interest-sensitivity of private spending [13].

Implications for Monetary Policy

Together, these developments have forced the BOJ to consider new operating tactics and even new strategies for monetary policy. The BOJ has responded in several ways, although the changes have evolved slowly. One does not observe in Japan the discrete changes in either tactics or strategies of the kind exemplified by the Federal Reserve's announced shift in policy in October 1979.

First, as liberalization has rendered interest rates more responsive to market forces, the BOJ has increasingly emphasized the interest rate-expenditure paradigm in the transmission of monetary policy to influence spending decisions. It has increasingly used policy instruments that are cap-

TABLE 3

Flow of Funds Channels from Lenders to Final Borrowers, 1965-82

(As a percent of total)

| Year | Financial Intermediaries | | | Securities Market |
	Private	Public	Total	
1965	78.6	15.5	94.1	5.9
1966	78.4	19.3	97.7	2.3
1967	77.4	16.2	93.7	6.4
1968	72.5	18.4	90.9	9.1
1969	73.3	16.9	90.2	9.8
1970	71.0	16.7	87.7	12.3
1971	70.2	16.2	86.4	13.6
1972	77.5	16.1	93.6	6.4
1973	74.6	18.6	93.2	6.8
1974	69.0	21.1	90.1	9.9
1975	69.8	23.3	93.1	6.9
1976	67.4	23.7	91.1	8.9
1977	60.5	29.2	89.7	10.3
1978	62.4	25.4	87.8	12.2
1979	59.3	28.6	87.9	12.1
1980	54.9	31.2	86.1	13.9
1981	61.4	25.5	86.9	13.1
1982	56.1	29.2	85.3	14.7

Source: Yoshio Suzuki (1984)

able of influencing interest rates within a market environment.

Second, the BOJ has come to regard open market operations as a more flexible instrument for influencing interest rates than either the discount window or window guidance. At this time, however, the BOJ does not have a flexible open market operation policy instrument because there is no competitive short-term government securities market. Instead, it has confined its open market operations to the interbank market and, recently, conducted operations in large CDs.

The increasing emphasis on open market operations also has been a response to the declining role of credit as an intermediate target. In 1972, loans made by private financial institutions represented 27.2 percent of the financial assets of all sectors; by 1984, they had declined to 21.8 percent of all assets. Claims on the rest of the world and the central government increased in relative importance.

The de-emphasis on credit control received official sanction in 1978 when the BOJ began to publish projections of the money supply for each quarter. The BOJ, at least officially, now regards the money supply as the primary measure of liquidity in the economy. This has led some observers such as Milton Friedman (1983) to suggest that the BOJ is now following a monetarist strategy of stable monetary growth. Despite the frequent reference in BOJ publications to the role of money, there is reason to believe that the BOJ's conversion to monetarism is less than complete (see Michael M. Hutchison in this *Economic Review*).

Third, the BOJ has reduced the role of direct credit allocation instruments such as window guidance. Although window guidance limits are still imposed, they are now part of a so-called voluntary system in which individual banks take a leading role in setting the limits[14].

The BOJ's shift from a credit-control paradigm toward an interest rate-expenditure paradigm is, in essence, a modification of its earlier policy framework. The BOJ has added another channel and another policy instrument that emphasizes the relationship between the interbank rate and interest rates in general. It continues to focus on the interbank rate, bank credit in general and city bank credit in particular, and it still relies on various types of administrative guidance to influence the portfolio behavior of financial institutions.

The pre-liberalization transmission process has not been replaced, but augmented. The BOJ's policy instruments are still directed toward influencing the flow of intermediation credit, but are now also concerned with influencing the *cost* of credit and interest rates in general, that is, with influencing fund flows through primary or direct markets as well as through intermediation markets. The new transmission process is sketched in Figure 2.

Figure 2

Monetary Policy Transmission — After Liberalization
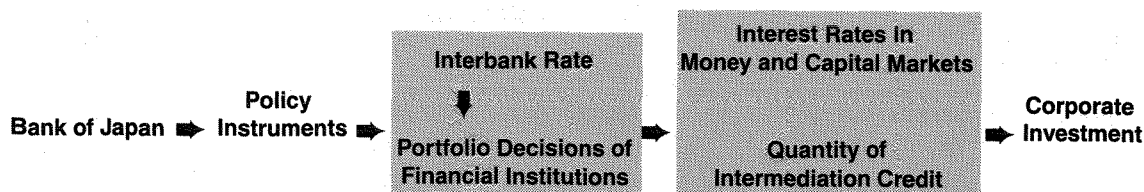
IV. Conclusion

The effective monetary and credit policies of the Bank of Japan are in transition as the Bank re-evaluates and adjusts them in response to the new financial environment of the 1980s. The BOJ has increasingly expressed concern that familiar instruments such as the discount window and window guidance cannot continue to provide the basis for an effective policy in the new environment. In this regard, BOJ has strongly advocated the establishment of an open and competitive market in short-term government securities. Such a market would yield a flexible policy instrument for affecting interest rates directly as well as via the intermediaries' access to reserves.

Japan's Ministry of Finance has not been receptive to establishing such a market in short-term government securities. At present, the BOJ is required to purchase and hold most of the short-term government debt since the MOF prices the debt at such low rates that syndicate members refuse to purchase it. This state of affairs cannot continue.

At the time of this writing, the outcome of the short-term government securities market issue has not been decided. But if the past is any indication, the MOF will be required to make short-term government debt more responsive to market forces. When this occurs, the BOJ will obtain a new and major policy instrument that will further emphasize interest rate effects.

FOOTNOTES

1. This is not to ignore a variety of other factors such as binding interest rate ceilings, advances in computer technology, and financial innovations introduced by the private market that have played a role in the liberalization process but have not been dominant.

Authoritative discussions of the financial system in Japan and the recent changes are provided by Yoshio Suzuki (1980 and 1986). Other references include Thomas F. Cargill (1985a, 1985b), Charles Pigott (1983), and Shoichi Royama (1983-84). Raymond W. Goldsmith (1983) provides an overview of the development of Japan's financial system from 1868 through 1977.

2. The flow of funds accounts in Japan are published by the BOJ and are similar in construction to those for the U.S. They reflect the financial aspects of the real saving and investment decisions of the major nonfinancial sectors of the economy: public or government, corporate business, personal, and rest of the world sectors.

In the Japanese accounts, the business sector refers only to incorporated businesses; the personal sector includes both households and unincorporated businesses. The practice of highlighting the corporate sector and de-emphasizing unincorporated firms reflects the importance of the corporate sector in the Japanese economy.

3. The flow of funds accounts do not provide detailed information on consumer and mortgage credit. However, consumer and mortgage credit comprised a relatively small part of the lending activities of financial institutions.

4. The repurchase market for government securities, or *gensaki* market, emerged in the late 1960s and was not officially recognized until 1976. It was Japan's only competitive short-term money market. The interbank market differed from the *gensaki* market in that transactions and interest rates in the interbank market were subject to administrative influence; participation in the market was limited to financial institutions.

5. The firm groupings are often referred to as the "main bank system." They form a unique Japanese structure of financial and nonfinancial firms interrelated by service, production,and financial relationships, and supported by extensive reciprocal holdings of equities. The phrase "main bank system" is derived from the fact that a city bank stands at the center of the structure and provides financial resources and financial services, and acts as a general spokesperson for the firms in the grouping.

The main bank system is discussed in more detail by C. D. Elston (1981). Iwao Nakatani (1984) presents empirical research on the behavioral characteristics of group and nongroup firms.

6. BOJ administrative influence over the interbank rate rendered it less sensitive to market forces than the *gensaki* rate. See also footnote 4.

7. An interesting insight into the interaction between the BOJ and the banks that form the basis of window guidance is provided by Tadashi Yasuda (1981).

8. Japanese banks typically imposed large deposit/loan ratios on their borrowers and adjusted these ratios according to the availability of funds. Based on survey information (Masahiko Takeda, 1985, p. 77), the deposit/loan ratio averaged about 45 percent prior to liberalization.

9. Suzuki (1980) has developed a detailed theoretical and empirical model of how the BOJ influenced the lending decisions of financial institutions.

10. In fact, several researchers (Hamada and Hayashi, 1985 and Pigott, 1978) investigating the natural-rate hypothesis in Japan have found that countercyclical monetary policy appears to have been effective at least through the late 1970s. Their findings reject the natural-rate hypothesis and are inconsistent with some of the empirical research for the U.S. Pigott suggests that the explanation for the Japanese results may reside in the

regulated and narrow flow-of-funds channels that domi-
nated the Japanese financial system for much of the post-
war period.

11. References to this subject can be found in footnote 1.

12. The role of government deficits as a catalyst for finan-
cial reform in Japan and a number of countries in the
Pacific Basin regions is discussed by Michael M.
Hutchison (1985).

13. M. A. Akhtar (1983) estimated aggregate demand
functions for Japan over the period from 1962 through
1982, and found that the interest rate effect had become an
important determinant of total spending by the mid-1970s.

14. Robert A. Feldman (1983, p. 198), however, suggests
that it is difficult to determine empirically the extent to which
window guidance is still effective.

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Japan's "Money Focused" Monetary Policy

Michael M. Hutchison*

This article studies the evolution of the Bank of Japan's methods of implementing monetary policy since the move to floating exchange rates in 1973. Analysis of both institutional changes and empirical data on the central bank's behavior suggests that the Bank of Japan has followed a flexible approach to monetary policy. Japan's move away from direct credit controls toward more flexible short-term interest rates over the past decade does not represent a "money-focused" monetary policy in the sense of a close adherence to a constant money growth rule.

The Bank of Japan's success in maintaining the lowest rate of price inflation among the major industrial countries since the mid-1970s has been a source of envy for many central bankers, especially since low inflation was accomplished without a major recession even after the second oil price shock in 1979. There are many reasons for this success, but the dominant view cites the gradual deceleration of trend money growth over the last decade (Chart 1) as the Bank of Japan moved to a so-called "money focused" monetary policy (Suzuki, 1985).

A number of academic economists and others have therefore pointed to monetary policy in Japan as a potential model, at least in part, for the Federal Reserve to emulate. Some of these economists have interpreted the Bank of Japan's policy as following classic "monetarist policy prescriptions"[1], even though the Bank of Japan does not publicly state a policy objective that suggests a traditional monetarist strategy of strict adherence to a pre-determined

money growth rule. An Executive Director of the Bank of Japan has stated that ". . . even though the Bank of Japan emphasizes the money supply, we are not blind to other indicators. We consider money supply movements in an overall framework that includes prices, output, the balance of payments, interest rates at home and abroad, and attitudes of financial intermediaries to lending."[2]

The objective of this paper is to investigate the extent to which monetary policy in Japan has followed a "monetarist" strategy in practice, as opposed to the publicly stated policy of an eclectic approach. This article studies the constraints on policy in Japan and the evolution of the Bank of Japan's methods of implementing monetary policy since the move to floating exchange rates in 1973. (The pre-1973 obligation to fix the yen/dollar rate closely tied Japanese monetary policy to foreign influences and thereby limited the Bank of Japan's discretion.) It analyses both institutional changes and empirical data on the behavior of the Bank of Japan.

Our approach does not attempt to answer the broader questions of why inflation has been low and output stable in Japan over the last decade. By focusing on the Bank of Japan's behavior, however, we are able to shed light on whether Japan's success with managing inflation was occurring in tandem with the implementation of a so-called monetarist policy strategy.

The paper is divided into four sections. The first presents a simple framework for understanding the process of monetary policy and distinguishing between monetarist policy and nonmonetarist policy. This section defines terms and draws out both institutional factors and empirical regularities that are likely to be associated with a monetarist policy strategy. The second section investigates the institutional aspects of the evolution of the Bank of Japan's operating techniques and procedures over the last decade. The institutional evidence is compared to the *a priori* predictions associated with a monetarist strategy. The third section of the paper is empirical, and investigates whether the Japanese experience fits a number of implications and predictions of traditional monetarism. The final section draws some policy implications from the analysis.

I. Defining A "Monetarist" Policy: Tactics and Strategy

Monetary policy may conceptually be divided into several operational stages that help to distinguish a "monetarist" policy from a discretionary counter-cyclical policy. Schematically, the basic stages may be represented as (Cargill and Garcia, 1985):

Tactics	Strategy	
Instruments ——→	Intermediate ——→	Goals
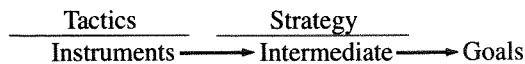
The goals of monetary policy generally are set in terms of growth of real GNP, employment, and prices, with perhaps a balance of payments or exchange rate objective or constraint. The instruments of policy are variables over which the central bank has more or less direct control, such as the level of borrowed and nonborrowed reserves, interbank interest rates, the discount rate, the level of reserve requirements and, perhaps, the quantity of bank lending.

In general, the policy instruments do not affect the ultimate policy goals directly. Thus, in manipulating its instruments to achieve the ultimate goals of policy, central banks generally set targets for some intermediate variables. The intermediate variables, such as various money aggregates or market interest rates, are assumed to exert an important influence on the variables that have been selected as the ultimate goals of policy. Presumably, the central bank can exert greater direct control (less "slippage") over the intermediate variables than over the ultimate policy goals through its manipulation of operating instruments. In other words, the intermediate variables are used as links in the implementation of policy.

The strategy of monetary policy involves both the choice of the intermediate target variables and the target ranges deemed necessary to obtain the desired final policy goals. The tactics of policy involve the choice of operating instrument variables designed to control the intermediate targets.

The most important distinction between "monetarists" and "non-monetarists" in terms of policy prescriptions involves the appropriate monetary policy strategy, that is, the choice of intermediate target and the stand on whether intermediate targets should be varied to attempt to counteract business cycle fluctuations. To be specific, a monetarist strategy would choose a money aggregate as an intermediate target (as opposed to market interest rates or a broad measure of credit) and set it to grow at a fairly steady rate — some would suggest a constant rate (Friedman, 1960). Traditional monetarist policy strategy argues against varying the intermediate target in counter-cyclical policy moves designed to "fine tune" the economy. Its reasoning is that such attempts usually lead to greater uncertainty in the economy, and exacerbate, rather than dampen, swings in the business cycle.

The pursuit of a monetarist policy strategy is likely to be associated with a particular institutional framework and a number of empirical implications, several of which are investigated below for Japan's experience. The institutional framework must make available policy instruments that are effective in targeting money as an intermediate objective. Enough variation in the operating instruments (for example, interbank interest rates) must be allowed within the framework to permit fairly precise monetary control if a monetary strategy is followed. That is, the tactics of policy must be consistent with a monetarist strategy.

In terms of empirical predictions, the transition from a non-monetarist to a monetarist policy regime

is expected to be associated with less money variability and, perhaps, greater interest rate variability (to the extent that maintaining steady money growth precludes the central bank from "smoothing" interest rate fluctuations). More generally, the stochastic time series properties of the money stock normally would be significantly different under the two regimes. In particular, one would expect stronger negative correlations between money growth in the present period and its past values under a monetarist regime because any past deviations from constant money growth would tend to be offset in current and future periods.

A final point concerns the feedback relationship between the central bank's operating instruments and the intermediate target. Under a monetarist policy regime, there would be two-way feedback between the control instruments and the intermediate target: the operating instruments would be systematically set to move future money growth toward the targeted range. Also, the central bank would systematically consider past money growth (particularly swings outside the target range) when it determines the current value of its operating instrument.

II. Monetary Policy in Japan: Institutional Features

The traditional tactics of monetary policy in Japan have emphasized control of interbank interest rates, direct credit controls on commercial bank lending, and changes in both the official discount rate and reserve requirement ratios.

Monetary policy by the Bank of Japan on a day-to-day basis has traditionally focused on control of the interbank money market, which consists largely of call loans and commercial bills traded among financial institutions. Similar to the role of the Federal Reserve in the federal funds market in the United States, the Bank of Japan is able to exert control over interbank interest rates by influencing the level of aggregate reserves available to the banking system. Japanese financial institutions are required to maintain legal reserves on their deposit liabilities with the Bank of Japan. By exerting various degrees of aggregate "reserve restraint," the central bank can influence conditions in the interbank market where banks trade reserves among themselves and thereby affect the call money and commercial bill interest rates.

The link between the Bank of Japan's restraint on bank reserves and interbank interest rates has traditionally been rather direct. In particular, a large percentage of total reserve assets posted at the Bank of Japan by financial institutions are "borrowed reserves" subject to recall at the discretion of the monetary authorities.[3]

The reserve requirements system in Japan amounts to a mix between a contemporaneous and a lagged reserve system.[4] Financial institutions affiliated with the system are required to place legal reserves (vault cash is not included) with the Bank of Japan, in an amount equal to the monthly average of outstanding deposits (calculated from the first day to the last day of the month) times the reserve ratio, during a reserve maintenance period beginning from the 16th day of the month through the 15th day of the following month. Each institution can choose its daily rate of reserve accumulation *during* a given reserve maintenance period. The "reserve progress ratio" on any day is the ratio for the current maintenance period of reserve deposits accumulated to reserve deposits required for the period.

The Bank of Japan is able to raise interbank interest rates by limiting overall credit provisions to financial institutions, and thereby maintain a low aggregate reserve progress ratio during the greater part of the reserve maintenance period. As financial institutions attempt to meet the required reserves ratio by the end of the maintenance period and run up against the Bank of Japan's greater reluctance to extend more credit, they turn to the interbank market. Greater competition for funds in the interbank market cause interbank interest rates to rise.

Although the Bank of Japan adjusts its credit to financial institutions to allow financial institutions' reserve deposits (eventually) to meet their legal reserve requirements, interbank interest rates nevertheless tend to rise during periods of "reserve restraint." This is because the Bank of Japan's "moral suasion" during periods of restraint causes financial institutions to become reluctant to extend their borrowed reserves credit lines, and to prefer to purchase reserves from the interbank market.

In effect, the Bank of Japan's attitude toward lending comprises an important, although supplementary, element in the Bank's control over interbank interest rates. It causes financial institutions to distinguish between reserves obtained directly from central bank credit and reserves obtained through the interbank market. Moreover, the Bank of Japan's lending operations have an especially large influence over interbank rates because excess reserves held by financial institutions are generally very small.[5]

Another instrument of monetary control in Japan that has been important as a supplementary measure is the central bank's direct quantitative control over commercial bank lending (so-called "window guidance"). Window guidance is also a form of "moral suasion" that has been used at times of monetary restraint when the Bank of Japan wanted to limit deposits and money creation by limiting the increase in the total loan volume of individual banks.

Individual banks have apparently not resisted "window guidance" partly because of their heavy dependence on borrowed reserves from the Bank of Japan, and partly because they perceive that long-term customer relations would not be adversely affected by following credit controls during periods of general credit restraint. Moreover, during periods of monetary restraint (when interbank rates are rising) the cost of funds to banks increases. Since their loan rates are also subject to administrative "guidance" and, as a consequence, are fairly rigid (Suzuki, 1985; p. 6), this induces them to reduce their lending.[6]

Although monetary control in Japan has traditionally worked primarily through Bank of Japan's credit adjustments and, as a supplementary measure, direct controls on bank lending, changes in the official discount rate and reserve requirement ratios also have been important instruments.[7] These latter instruments are employed much less frequently, and have served both to "signal" and to make responses

Chart 1
Money, Interest Rates, Output and Prices*
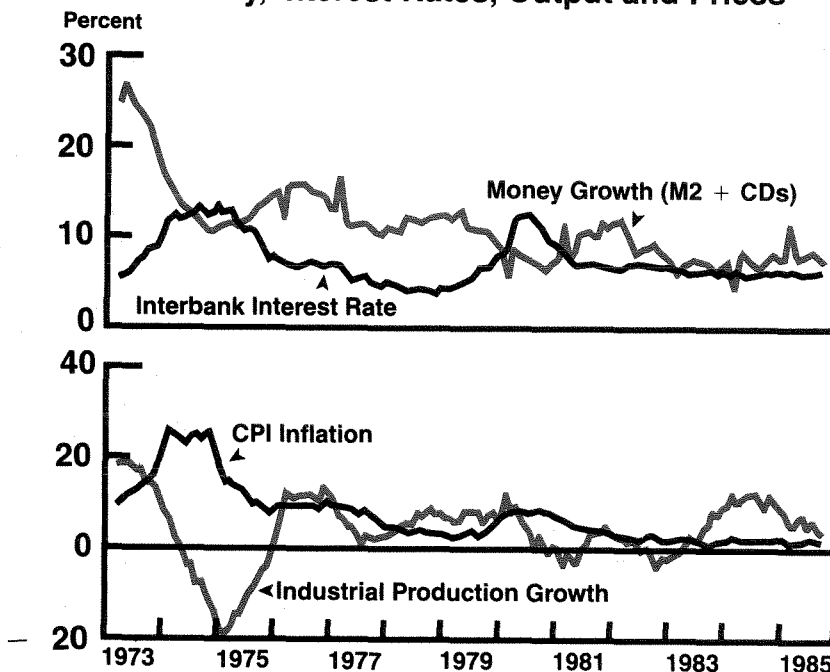
*Growth rates are calculated against same month of previous year.

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to changing economic conditions and significant changes in underlying policies.

The Bank of Japan has used a number of separate instruments to accommodate seasonal fluctuations in money demand, as opposed to implementing short and medium-term policy actions and accommodating longer term money demand growth. Largely in response to seasonal "surplus" funds, the Bank of Japan sells bills of exchange drawn on itself to short-term money market dealers to tighten money market conditions. Similarly, the Bank purchases private commercial bills possessed by financial institutions (again via short-term money market dealers) in large part to provide credit to accommodate seasonal shortages in the interbank market. These operations are analogous to Federal Reserve repurchase agreements (repos) and matched sale-purchases of securities designed to even out seasonal money market swings.

In contrast, the Bank of Japan supplies base money growth over longer periods largely by purchasing government securities (10-year government bonds) directly from financial institutions. Prior to 1963, the Bank of Japan concentrated most credit expansion in direct lendings to financial institutions. Analogous Federal Reserve operations are outright purchases of government bills and coupon securities.

Changes in Monetary Policy Tactics

The Bank of Japan's basic tactics for implementing monetary policy have changed in two major ways since the mid-1970s. The Bank has encouraged greater interest rate flexibility and de-emphasized credit controls, although adjusting reserves and controlling interbank interest rates through its lending to financial institutions remain the predominant instruments of short- and medium-term monetary policy.

Policymakers now attach greater emphasis on daily movements in interest rates as an instrument of policy. This new emphasis is reflected in Table 1 which shows increasingly frequent daily changes in the interbank interest rate.[8] Since 1981, the Bank of Japan has also spurred interest rate flexibility through sales of short-term government Treasury bills. These sales have facilitated interest rate arbitrage between the interbank and open markets. Moreover, the terms on which the Bank of Japan has purchased government bonds from financial institutions since 1978 have also gradually come to reflect market forces.[9]

Policymakers also have de-emphasized direct quantitative controls on bank lending.[10] In particular, they have removed "window guidance" as a binding condition on bank lending and, therefore, as a means of monetary control in recent years.[11]

TABLE 1

Interest Rate Changes in Japan

A. Number of Changes Per Year in Unconditional Call Money Interbank Interest Rate

1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
8	20	58	82	178	205	204	202	179	199

B. Number of Changes Per Year in the Official Discount Rate

1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
0	3	1	3	4	2	0	1	0	0

Source: Fukui (1985)

Changes in the relative emphasis of operating instruments and greater flexibility in the interbank interest rate operating target have occurred in tandem with the liberalization of open market interest rates in Japan. Greater flexibility of open market interest rates and development of secondary securities markets have increased the importance of the interest rate channel in transmitting monetary policy to the economy (Suzuki 1985, Cargill 1986). In this sense, a broader "opportunity set," or selection, of channels of transmission are now available to the Bank of Japan in its pursuit of monetary policy objectives.

Taken in this context, neither the relaxation of controls on commercial bank lending nor greater emphasis on interbank day-to-day interest rate flexibility necessarily represents a move to the monetarist strategy of targeting a money aggregate. The switch in the Bank of Japan's tactics is equally consistent with targeting open market interest rates as an intermediate objective. However, in light of

Japan's move to floating exchange rates, and consequent elimination of the formal obligation to pursue a monetary policy strategy consistent with maintaining fixed exchange rate parities, the shift in policy tactics is broadly consistent, or at least compatible, with the hypothesis that the Bank of Japan has adopted a monetarist strategy.

Other institutional evidence also appears consistent with the view that the Bank of Japan is now placing greater emphasis on the control of money aggregates than in the past. This evidence includes both the number of policy statements by the Bank of Japan since the mid-1970s[12] and the announcement since July 1978 of quarterly money "projections" as a broad measure of money growth (M2 + CDs).[13] Moreover, while officials of the Bank of Japan indicate that they are paying greater attention to the growth of money aggregates in conducting policy, they also stress that they are giving a smaller role to lending by financial institutions as an intermediate target (Fukui, 1986).

III. Short-term Monetary Policy in Japan: Empirical Regularities

Traditional monetarism makes extensive use of money aggregates as an intermediate target. In this section, we study the empirical evidence on the extent to which the Japanese central bank's presumed "money focused" policy follows the traditional model.[14]

Since interbank interest rates remain the Bank of Japan's direct operating target, we look at the extent to which the central bank attempts to maintain money growth along a predetermined path by systematically changing the interbank interest rate. As discussed, one would expect to observe significantly less money variability and significantly greater interest rate variability under a money targeting regime.

Data Trends

Table 2 shows the means and standard deviations of several key monthly economic statistics in Japan (M2 + CDs, interest rates, industrial production and consumer price inflation) for the floating

exchange rate period 1973-1985. The post-1973 sample was chosen because it represents a fundamental departure from the money supply process associated with a fixed exchange rate regime, and also because empirical work by Ōkubo (1983) and Hamada and Hayashi (1985) suggests that the money supply process shifted in 1973[15]. Moreover, work by Blundell-Wignall, et al. (1984) and Hamada and Hayashi (1985) suggest structural change in the money demand function in 1973 that was potentially related to shifts in monetary regimes.

The focus on the post-1973 period is important. A number of researchers (for example, Meltzer 1985 and Friedman 1985) have contrasted the fixed and floating rate periods. They have emphasized the switch in monetary regimes and the simultaneous falling-off in the average rate of money (M2 + CD) growth from 16.2 percent (s.a.a.r.) between the first quarter of 1960 and the first quarter of 1973 to 10 percent between the second quarter of 1973 and the

third quarter of 1985, and the decline in money variability (the standard deviation fell from 12 percent to 3 percent the two periods).

The pre-1973 period, however, cannot be reasonably considered a discretionary policy regime and used as a basis of comparison. Under the fixed exchange rate system that prevailed before 1973, the central bank was given only a limited degree of discretion in its conduct of policy. The need to maintain fixed exchange parities meant that domestic monetary policy was subject to foreign money shocks. Moreover, as emphasized by Ōkina (1985), structural change after the mid-1970s could be associated with the first oil shock as well as a switch in monetary policy rules or the shift to floating exchange rates. Our analysis of the extent to which the Bank of Japan has followed "monetarist" policy prescriptions therefore focuses on the period since 1973.

Also shown in Table 2 is a division of the sample into periods before and after July 1978 — the date of the first quarterly money supply "projection" in Japan. Although it is difficult to pinpoint the date of an abrupt shift in the Bank of Japan's policy regime, most Japanese policymakers have indicated the latter 1970s as a time of gradual change and would clearly include the post-1978 period as falling within the new "money focused" regime.

Table 2 and Chart 1 clearly indicate that average money growth and inflation in Japan have been declining since the mid-1970s. Somewhat surprisingly, the month-to-month variance of money around both its mean and (declining) trend growth has increased since the introduction of money "forecasts" in July 1978. This is true whether money growth is measured on a month-to-month, quarter-to-quarter, or semi-annual basis. And even though the interbank interest rate moves more frequently on

TABLE 2

Key Economic Statistics in Japan
(March 1973-September 1985)

Variables (Month-to-Month Percent Change at Annual Rates)	Full Sample March 1973- Sept. 1985	First Period March 1973- July 1978	Second Period August 1978- September 1985
M2 + CD (s.a)			
Mean	10.0	12.4	8.3
Std. Dev.	8.7	7.4	9.3
Std. Dev. Around Trend Money*	8.4	7.3	9.2
Interbank Interest Rate (Level)			
Mean	7.53	8.26	6.98
Std. Dev.	2.51	2.98	1.92
Industrial Production (s.a)			
Mean	3.2	1.6	4.4
Std. Dev.	16.3	17.0	15.7
Consumer Price Index (s.a)			
Mean	6.8	11.3	3.4
Std. Dev.	8.6	10.3	5.0

*Trend Money Growth Equation: M = 15.27 − .055T,
$$(4.31)(-1.54)$$

where M = M2 + CD (Monthly percent change at annual rate). Estimation period is March 1973 through September 1985. R = .009; SER = 3.59; $\overline{M}$ = 10.3. Trend money at time t is the predicted value, $\hat{M}_t$, from the regression.

a day-to-day basis than before (Table 1), Table 2 and Chart 1 clearly show that its monthly variability has declined somewhat since July 1978. Put differently, its monthly variability has not increased as one might have expected if the Bank of Japan had closely followed monetary targeting.[16] The variability of output growth, in contrast, is roughly the same in both periods. Mean output growth, however, rose sharply from 1.6 percent during the period 1973-1978 to 4.4 during the period 1978-1985.

Another summary measure of interest is the autocorrelation function of money (expressed in month-to-month percent changes), which is the correlation of money with its past values. The function is useful in determining whether there is any particular pattern in the money time series. A sharp shift in the autocorrelation functions between pre- and post-1978 periods would indicate a major difference in the time series pattern of money. The switch

toward a more monetarist regime (constant money growth rule) would lead one to expect, *a priori,* greater negative autocorrelations because any past deviations from constant money growth (picked up in the constant term) would presumably be offset in current and future periods.

A comparison of the two periods, shown in Chart 2, indicates that the stochastic process generating M2 + CDs in Japan was virtually unchanged between the two periods, although the first two autocorrelations increased slightly. Both series are clearly dominated by seasonality factors, but all the autocorrelations are nevertheless very close. There is no evidence of a significant and systematic move to a constant money growth rule.

Causality Tests

The discussion above emphasizes that one should observe a systematic two-way feedback between the operating control instrument and the intermediate

Chart 2

Autocorrelation Function of M2 + CDs*

First Period: March 1973 - July 1978

Second Period: August 1978 - September 1985
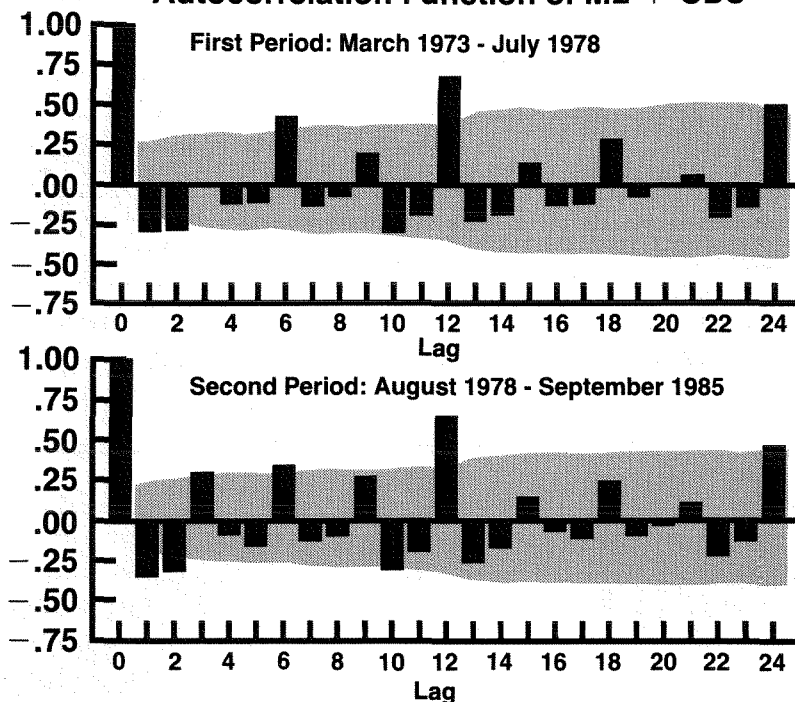
*Shading indicates within two standard errors.

money target under a monetarist policy strategy. We used the Granger causality method to investigate this relationship for the Bank of Japan's policy actions (Granger, 1969).

The Granger causality method asserts that a variable x "Granger causes" a variable y if fluctuations in x can be used to predict subsequent movements in y after taking into account other relevant information (such as past values of y and a third variable, z). Similarly, y "Granger causes" x if fluctuations in y can be used to predict subsequent movements in x. When x "Granger causes" y, and y "Granger causes" x, two-way feedback exists between the variables. The phrase "Granger causes" is substituted for "causes" in order to emphasize the particular statistical definition used and its statistical shortcomings (such as the limited information set, potential contemporaneous correlation between the endogenous variables, lag length selection, and sample period).

We investigated causality in the context of a three-variable, reduced-form system for the process generating money (M_t), interest rates (i_t) and nominal retail sales (S_t) in Japan. Our main focus was the relationship between money and interest rates. Retail sales were included to control for the response of money and interest rates to business cycle fluctuations. Nominal values were used to capture both output and price movements and therefore to save degrees of freedom. Retail sales rather than GNP was used because only the former is available on a monthly basis. Our maintained structure therefore is a system where M_t, i_t and S_t are jointly determined endogenous variables. The reduced-form of the model is:

TABLE 3

Tests of Granger Causality Between Money, Interest Rates and Retail Sales

(F-statistics for test that the row variable does not cause the column variables[a])

A. Full Sample 1973.3 - 1985.9

	S	i	M
S	2.93*	.50	1.43
i	.83	3.59*	3.81*
M	.67	.69	5.74*

B. First Subperiod 1973.3 - 1978.7

	S	i	M
S	.75	.99	1.32
i	.65	1.04	1.08
M	.73	1.06	1.71

C. Second Subperiod 1978.8 - 1985.9

	S	i	M
S	1.40	.52	1.32
i	.75	1.59	1.70**
M	.89	.74	3.27*

[a]Results are from a 3-variable VAR system estimated with monthly data using 12 lags for each variable. S is nominal retail sales, i is the call money rate, and M is M2 + CDs. All variables calculated in monthly percent changes.
*Significant at the 1 percent level.
**Significant at the 5 percent level.

$$M_t = L(\pi_{11})^G M_{t-1} + L(\pi_{12})^P i_{t-1} + L(\pi_{13})^N S_{t-1} + \mu_{1t} \qquad (1)$$

$$i_t = L(\pi_{21})^G M_{t-1} + L(\pi_{22})^P i_{t-1} + L(\pi_{23})^N S_{t-1} + \mu_{2t}$$

$$S_t = L(\pi_{31})^G M_{t-1} + L(\pi_{32})^P i_{t-1} + L(\pi_{33})^N S_{t-1} + \mu_{3t}$$

where

M_t = M2 + CDs (percent change)

i_t = call money rates (percent change)

S_t = nominal retail sales (percent change)

$L(.)^j$ = the polynomial lag operator of order j, that is, $L(\pi_{11})^{12} M_{t-1}$ represents the 12 coefficient values on money lagged one to twelve periods.

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The πs are nonlinear functions of the parameters of the maintained structure.

The equations in 1 are the standard equations for the Granger variant of causality testing. To the extent that interest rates are the primary monetary operating instrument in Japan, and rate changes influence the money aggregates, $L(\pi_{12})$ should be a non-zero coefficient vector, that is, i "Granger causes" M in the sense that past values of interest rates add relevant information to predicting money. Similarly, if the Bank of Japan were systematically shifting its operating instrument — call money rates — in response to a money aggregate intermediate objective, then the $L(\pi_{21})$ coefficient vector would be non-zero (M "Granger causes" i). If both the $L(\pi_{12}) = O$ hypothesis and the $L(\pi_{21}) = O$ hypothesis could be rejected, then there would be "feedback" between money and interest rates as the basic money targeting model (with short-term interest rates as the primary operating instruments) predicts.

Table 3 presents the F-statistic test results from estimating the equation system 1. Money, interest rates, and retail sales were expressed in monthly percent changes to create stationary series. All series were seasonally unadjusted, and seasonal dummy variables were included in the regressions to control for seasonal factors.

Lag length selection (parameters G, P and N in system 1) is potentially very important to the causality test results. Twelve monthly lags were chosen for all of the variables in the tests, but no pretesting of various lag lengths was conducted. The twelve monthly lags were chosen based on various policy statements by officials of the Bank of Japan regarding the period of monetary targeting.[17]

The full sample (March 1973-September 1985) results suggest significant unidirectional causality running from interest rates to money, but no feedback causality from money to interest rates. Evidence for the former lies in the highly significant (at the one percent level of confidence) coefficient of lagged interest rates in the money equation in Table 3 (given a 3.81 F-statistic). The full-sample results indicate that money adds no additional explanatory power to that imbedded in past interest rates and retail sales in predicting interbank interest rates (the F-statistic is 0.69).

These results are consistent with the Bank of Japan's policy statements and the preceding discussion that the primary operating instrument of monetary policy was the interbank interest rate, and that interest rates are an important channel for transmitting monetary policy to the economy. Interest rates clearly lead money in these results. However, the results are not consistent with a practice of systematic changes to the interbank rate operating control variable in response to deviations of money. If money were an intermediate target closely followed by the Bank of Japan, then one would expect to find two-way "feedback" between the money and interest rate series.[18]

It is possible, however, that the Bank of Japan placed less emphasis on money in the period before the beginning of the announced money projections in July 1978. Then one may suspect that the full sample results could be contaminated by the inclusion of the earlier period. In particular, there is the possibility that the August 1978-September 1985 period would show feedback causality running from money to interest rates, whereas the earlier March 1973-July 1978 period would not.[19]

Table 3 results do, in fact, suggest a discernible shift in the causal relationships between money and interest rates. In particular, they indicate no evidence to suggest that money "Granger causes" interest rates or that interest rates "Granger cause" money during the March 1973-July 1978 period. In contrast, during the July 1978-September 1985 period following the beginning of money supply "projections," there is clear causality running from interest rates to money. Again, however, this causality is unidirectional, and money growth was found not to Granger cause interest rates even in the more recent period. Thus, it appears that the 1978-85 period is dominating the full sample period results.

For the 1978-85 period, there is evidence that changes in call money helped predict changes in money growth but not that money growth *systematically* helps to predict the call money rate policy instrument as would be the case if a precise money target were followed by the Bank of Japan. This finding nonetheless is consistent with the Bank's policy pronouncements that it has placed *greater* emphasis in recent years on the control of interbank interest rates as the primary operating

variable in implementing monetary policy. It is also consistent with the commonly accepted view that interest rate fluctuations have grown in importance as a channel of monetary policy transmission to the economy.

Overall, these causality test results provide some support for the view that, in recent years, the monetary authorities in Japan have placed a great deal more emphasis on interest rates, as opposed to direct credit controls, as an operating target in controlling the economy, including money fluctuations. There is, however, *no* evidence that the introduction of money "projections" in Japan in July 1978 was associated with a statistically significant and stable policy feedback rule running from money to interest rates. Hence, there is little evidence to suggest that the Bank of Japan has closely adhered to monetary targeting. It is noteworthy that this conclusion also is consistent with the descriptive statistics presented in Table 2. Those statistics show that although average money growth has declined steadily since the mid-1970s, its variance around trend has remained largely unchanged since the advent of floating exchange rates in 1973.

These results are consistent with other research on the relations between interest rates and money in Japan, although the present interpretation of the evidence is somewhat different. Ōkubo (1983) uses the relative power contribution method to analyze causal relations among money, income, prices, and interest rates in Japan during several sample periods. Similar to the results presented above, Ōkubo finds strong *unidirectional* causality running from the call money rate to money after 1974 and also concludes that this evidence ". . . supports the usual contention that monetary control in Japan is effected not by changes in the (monetary) base, but rather by adjustment of policy-influenced interest rates" (p. 129). With no additional evidence, however, he also implies that these results are consistent with an "explicitly money-supply oriented" Bank of Japan policy. The analysis above questions Ōkubo's interpretation of the regime shift in the early 1970s.

Okina (1985), in a somewhat different context, also expresses some doubt on the significance of the shift in the Bank of Japan's operating procedures. He points to both the switch in exchange rate regimes and the aftermath of the first oil price shock as potential alternative candidates to explain lower Japanese money and income variability between the pre- and post-1973 periods.

IV.   Conclusion and Policy Implications

The environment in which monetary policy in Japan is conducted has changed significantly since the move to floating exchange rates in 1973. Along with relaxation of a formal exchange rate objective, the Bank of Japan's behavior has been modified by a gradual liberalization of the Japanese financial system: interest rate decontrol, the development of new financial instruments and financial markets, and fewer constraints on the asset and liability choices of investors, borrowers, and financial institutions.

These developments, in turn, have broadened the "opportunity set" of monetary policy instruments available to the Bank of Japan. In particular, the transmission of interest rate changes to economic activity is now more significant in the emerging deregulated Japanese financial environment. Partly in response to these changes, the Bank of Japan has emphasized interbank interest rates as the primary operating instrument of policy to a greater extent

than before, and has virtually discontinued direct controls over commercial bank lending.

The empirical results suggest that the move away from direct credit controls ("window guidance") toward more flexible short-term interest rates does not represent a "money focused" monetary policy in the sense of a close adherence to a constant money growth rule. In particular, money variability has not declined in recent years in contrast to interest rate variability.

Moreover, it does not appear that up to a year's lagged values of money help to explain fluctuations in the operating control variable of the central bank (interbank interest rates). This indicates that the Bank of Japan has not systematically moved interbank interest rates in response to deviations of money growth from its narrow targeted range since either the move to floating exchange rates in 1973 or the announcement of money projections starting in

1978. Nevertheless, we found clear causality running from interest rates to money in the later period (1978-1985), indicating the greater importance of the interest rate channel in transmitting monetary policy changes to the economy in a deregulated financial environment.

A cautious interpretation of these results is appropriate. No statistical evidence was found to suggest a systematic "causal feedback" between money and interest rates as even loose adherence to a money supply rule would generate. Moreover, neither the institutional nor the empirical evidence suggests that the Bank of Japan controls its interbank interest rate operating instrument in a systematic fashion designed to maintain control (up to a year) of money aggregates along a fixed or gradually evolving predetermined growth path. The evidence suggests that a more flexible approach to policy is followed, and that Japan's success at maintaining low and stable inflation and stable output growth cannot be attributed to its adoption of traditional monetarist policy prescriptions.[20]

The task remains to identify the source of the Bank of Japan's success at slowing money growth. Conscious policy action by the central bank may have been responsible, but at least three other factors may have lowered the trend rate of money demand growth. First, lower average inflation, perhaps associated with the rapid increase in interest rates by the Bank of Japan in response to the second oil shock, may have created less nominal money demand growth. Second, the sharp drop in the growth rate of potential real GNP in Japan following the first oil price shock in 1973 may have lowered the trend growth of real money demand.

Third, and perhaps most intriguing, the decline in trend money growth in Japan may simply be associated with the shift in the flows of funds away from intermediary channels of finance toward direct finance.[21] In particular, this shift has tended to slow the growth of the banking sector and its liabilities — a good part of which constitute broad money in Japan.

The empirical evidence suggests that these explanations, and other potential explanations as well, serve as credible alternatives to the conventional wisdom that attributes slower Japanese money growth to a conscious systematic shift in the Bank of Japan's behavior since the latter 1970s.

FOOTNOTES

1. See Friedman (1985) and Greenwood (1985). Friedman, for example, recently stated that ". . . the Bank of Japan has been the least monetarist central bank in its rhetoric, the most monetarist in its policy . . ." of all the major central banks.

2. Shimamoto, 1982, p. 82. Similarly, Suzuki (1985) recently stated that ". . . the policy attitude of the Bank of Japan over the past years . . . is in my interpretation neither that of a post-Keynesian 'discretionary fine tuning' nor that of an 'x percent rule.' It is discretionary in that it allows for gradual tuning of monetary growth, and it conforms to a rule in the sense that it stabilizes money growth as much as possible and gives information to the public about policy in the form of forecast announcements. An appropriate term may be 'eclectic gradualism.'"

3. Lendings to financial institutions by the Bank of Japan may be withdrawn at any time at the option of the Bank (Fukui, 1986; p. 5).

4. The following discussion draws heavily on Fukui (1986), particularly pages 3-4.

5. The Bank of Japan's ability to control money and credit is also helped by the fact that almost all financial institutions in Japan are required to join the reserve requirement system. Moreover, all deposits by the general public at financial institutions are reservable, with the exception of "new money in trust," supplied by trust banks since the end of 1985.

6. The loan rates of deposit banks are less flexible than interbank rates because prime lending rates are linked to the official discount rate, and the cost of funds is still regulated except for CDs and money market certificates (Suzuki, 1985; p. 6).

7. The Bank of Japan provides financial institutions with loans at the official discount rate. Since the discount rate is below the interbank call and bill money rates, there is ordinarily an excess demand for the Bank's funds, which the Bank manages by rationing credit at its own discretion (Fukui, 1986; p. 5).

8. Fukui (1986, pp. 14-15) has identified three stages of interbank market liberalization that have allowed greater interest rate flexibility: (i) 1978-79, when the "quotation system" for call and bill rates (in which money market dealers operated as brokers and consulted with borrowers and lenders to determine "quotations" according to a formula based on a consensus between borrowers and lenders, changes in rates were infrequent) was abolished, and a diversification of maturities of instruments traded was developed; (ii) 1980-1982, when a liberalization of controls allowed arbitrage opportunities to develop to link the interbank and open markets; (iii) 1983 onward, when there was a further relaxation of controls on various transactions and introduction of new financial instruments.

9. The Bank of Japan is eager to expand the role of Treasury bills in its money market operations because the

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bills are believed to offer the greatest degree of control. That is, T-bill operations influence interest rates in open markets directly whereas interbank rates are an indirect means of influencing market rates. The T-bill market nonetheless remains undeveloped, and the Bank of Japan's operations on these instruments are not conventional "open market" operations. In particular, the Bank of Japan is reluctant to repurchase Treasury bills sold to absorb funds because of its desire to see larger private holdings of these instruments.

10. According to an Executive Director of the Bank of Japan, ". . . in money supply management, interbank rate operations are the main tool, and window guidance is only a supplementary or stopgap measure. With this attitude, and in response to the growing monetary relaxation since the middle of 1980, the Bank of Japan has permitted city banks, long-term credit banks and all other financial intermediaries to lend as they wish." (Shimamoto, 1982; p. 83).

11. The Bank of Japan has expressed its willingness to reimpose credit controls on bank lending if controls seem desirable, however.

12. Suzuki (1985), for example, notes that . . . "Japan also shifted to a money focus as its intermediate objective in the last half of the 1970s" (p. 7-6). Moreover, Fukui (1986) notes ". . . As for intermediate objectives of monetary policy, emphasis has been placed on the control of money supply instead of ceilings on increases in lending by financial institutions to the non-banking sector" (p. 17).

13. The Bank of Japan publishes projections of the rate of increase in the average outstanding M2 + CDs each quarter over the corresponding quarter of the previous year. These projections tend to move gradually over time. For example, recent projection ranges were: 1978.3 - 1979.4, 11-12%; 1980.1 - 1981.2, 7-8%; 1981.4 - 1982.3, 9-10%; and 1982.4 - 1983.4, 8-9%.

14. Various Japanese policymakers and government economists have emphasized the introduction of broad money (M2 + CDs) as an important intermediate indicator. See, for example, Shimamoto, 1982; p. 82 and Suzuki, 1985; p. 5.

15. Hamada and Hayashi (1985) estimate money supply equations as functions of lagged money growth, lagged inflation, lagged industrial production growth, and lagged reserves to test Barro's anticipated money neutrality hypothesis. They find a significant shift in the function with the move to floating exchange rates in February 1973, but not at other potential shift points (December 1970, December 1973 or December 1974). There is doubt, however, whether the direct approach of estimating money equations as functions of ultimate policy variables to test for the degree of "policy discretion can disentangle money supply from money demand influences. See DeRosa & Stern (1977).

16. Meltzer (1985) notes that, in his estimation forecast error, variances for output and prices were reduced following the Bank of Japan's move to announce projections of money growth. He suggests that these announcements, if credible, increase information about money growth and reduce uncertainty (p. 40). Seemingly at odds with this interpretation, however, is that the variance of forecast errors of the M1 money stock and money growth variability generally increased after the move to announce projections (Meltzer, 1985; p. 15).

17. For example, an Executive Director of the Bank of Japan has stated that ". . . the Bank of Japan follows the money supply not weekly, but rather monthly and quarterly" (Shimamoto, 1982; p. 81). The Director of the Bank of Japan's Institute for Monetary and Economic Studies, in contrast, recently stated that, "there are three principal features of monetary targeting as practiced by the Bank of Japan since 1975. First, broad money (M2 + CDs) is chosen as the most important intermediate target. Second, the period of targeting is not a week, a month, or a quarter, but a year. Third, the target is not announced, but the forecast is announced quarterly in terms of the percentage increase over the previous year in the average money stock of the quarter concerned" (Suzuki, 1985; p. 5).

18. It is important to emphasize that, strictly speaking, feedback from actual money changes as deviations from the target range is what should be "causing" changes in the call money rate when money targeting is followed. However, as long as the target is not moved frequently, the Granger tests presented in the test should capture this variability from the target ranges. As footnote 13 indicates, changes in the Japanese "monetary projections" have been infrequent since 1978. Moreover, the Bank of Japan emphasizes that money projections are not to be interpreted as money targets in the United States.

19. Ōkubo (1983), for example, deletes the period immediately after 1973 ". . . to avoid the influence of the disorganized quarters at the time of the first oil crisis" (p. 117).

20. This interpretation also has been expressed by a number of Bank of Japan officials. For example, . . . "Thus, the attitude of Bank of Japan toward the money supply is, in a word, pragmatic. Given uncertainty, shifts in functions, and instabilities, we believe this stance most appropriate to conditions at home and abroad." (Shimamoto, 1982; p. 82).

21. See Cargill (in this *Economic Review*) for a detailed discussion of the shift in the flows of funds in Japan and its importance for increasing the role of direct finance, as opposed to indirect finance working through the banking system, in channeling funds from the surplus (household) sector to the deficit sectors (government and corporate sector) since the mid-1970s.

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Deposit Rate Deregulation and the Demand for Transactions Media

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The deregulation of deposit rates on personal checking accounts has caused a large portion of the M1 monetary aggregate to become interest-bearing and has raised the question of whether the demand for M1 might also have been affected. This article compares the behavior of deregulated components of M1 with that of the regulated components prior to deregulation. We find that the short-run open-market interest rate elasticities of demand for the noninterest-bearing components prior to deregulation are considerably lower than the elasticities of the deregulated interest-bearing deposits. Deposit rate deregulation, therefore, appears to have made the demand for M1 much more sensitive to interest rate changes.

Many analysts argue that the traditional relationship between M1 and the economy no longer holds. As supporting evidence, they cite the apparent contradiction between M1's historically high annual growth rate of approximately 11 percent between September 1984 and September 1985 and the lack of a resurgence of high inflation that would normally be associated with such rapid money growth. Some have attributed this changed behavior to the elimination of deposit rate ceilings, claiming that the elimination has altered the relationship between the demand for M1 and interest rates, income, or both. In this article, we examine the behavior of each of the components of M1 to see whether deregulation can explain M1's recent unusual behavior.

Deposit rates on personal checking accounts have been deregulated very rapidly during the past few years through the authorization of NOW (Negotiable Order of Withdrawal) accounts nationwide on December 31, 1980 and Super NOW accounts on January 5, 1983. While the NOW account was restricted to pay a maximum of 5¼ percent interest, the Super NOW was totally free of interest rate ceilings. When introduced, the Super NOW had a $2500 minimum balance requirement, but the requirement was reduced to $1000 on January 1, 1985 and dropped entirely on January 1, 1986, thus eliminating the regulatory distinction between NOW and Super NOW accounts.

Personal interest-bearing checking accounts now are free of all regulatory deposit rate or minimum balance restrictions, although individual institutions are free to impose their own minimum balance requirements.[1] Businesses, however, are still limited to holding noninterest-bearing demand deposits.

This deregulation of personal checking accounts raises a number of questions about how the monetary aggregates will behave because balances in the new accounts are counted in the checkable deposit component of M1 — the narrowly defined monetary

aggregate.[2] Some have suggested that these accounts may have attracted funds from savings-type balances that were previously counted only in the broader monetary aggregates, such as M2 or M3.[3] If true, shifts into the new accounts may have altered the behavior of M1 and changed the relationships between M1 and the economy.

Even if such portfolio shifts did not occur, deposit rate deregulation has the potential to change the income and interest rate elasticities of the demand for checkable deposits and, perhaps, even of currency. This also would change the behavior of the

monetary aggregates and prevent them from providing the signals for monetary policy they have in the past.

In this paper, we explore these issues. Section I provides a brief sketch of the deregulation of checkable deposits and the impact of those changes on the composition of the monetary aggregates. In Section II, we outline a microeconomic model of the demand for various transactions media and discuss the likely impact of deregulation on that demand. Section III presents our empirical evidence. Finally, Section IV contains a summary and conclusions.

I.   The Changing Composition of the Monetary Aggregates

Over the last decade, the composition of M1 has undergone a major shift (See Chart 1). The shift began with the gradual adoption of NOW accounts, which were first available on an experimental basis in New England. NOWs and a number of like accounts — ATS at banks and share drafts at credit unions that will hereafter be referred to as NOWs — raised the explicit interest paid on transaction balances from zero to a maximum of 5¼ percent.[4]

Following their authorization nationwide on December 31, 1980 for banks and thrifts, NOWs grew very rapidly. As Chart 2 shows, even after the initial large shift into NOWs was completed in 1981, interest-bearing checking accounts continued to grow more rapidly than M1's other components. At the beginning of 1980, only 5 percent of households had interest-bearing checking accounts; by 1985, over 35 percent had them. As of mid-1986,

Chart 1
Composition of M1
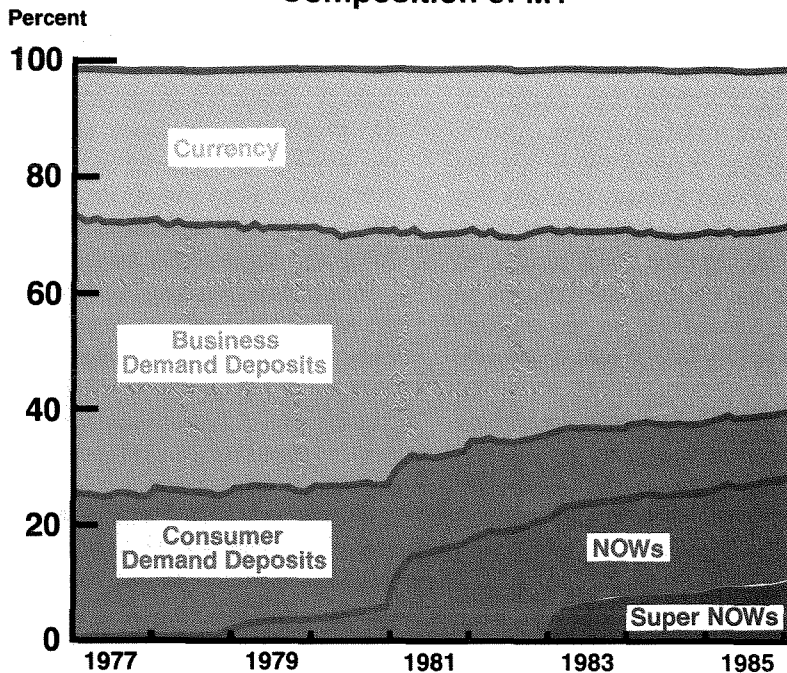
Percent

interest-bearing checking account deposits amounted to $200 billion; and they comprised over 30 percent of M1, and over 70 percent of personal transaction deposits.

## Sources of Interest-Bearing Checkable Deposits

The source of funds moved to interest bearing-checkable deposit balances included in M1 may be an indicator of how M1 will behave. If NOW accounts attracted balances from savings or time accounts, those balances may behave more like savings balances than transaction balances and impart a savings quality to M1. One piece of evidence suggesting that NOWs and Super NOWs may have attracted a sizable portion of funds from non-transaction balances is that the average balances in these transaction accounts are substantially higher (at approximately $5,000 and $13,000, respectively) than the average balance (of approximately $1,500) in personal checking accounts prior to the nationwide authorization of NOWs.[5]

During the introductory NOW period, surveys and studies suggested that about 25 percent of the new money shifted into NOWs came from nontransaction sources.[6] These funds, generally believed to have been shifted from savings accounts and time certificates, may be more interest-sensitive than demand deposits, and therefore may have made M1 more interest-sensitive.

However, there undoubtedly also was a major shift of demand deposits into NOWs during the introductory period. Chart 3 shows, for example, a sharp drop in demand deposits coinciding with the initial sharp increase in NOW balances in early 1981. Our statistical estimates of that shift are consistent with the earlier estimates — they show that about 71 cents of each dollar moved into NOWs came from demand deposits.[7]

NOWs, while apparently more attractive than demand deposits for many consumers, were only partially deregulated (since they had a ceiling rate of 5¼ percent) in contrast to the Super NOW, which offered depositors a full transaction account free of

Chart 2
Growth Rates of M1 and its Components
### (Annual Rate of Change)
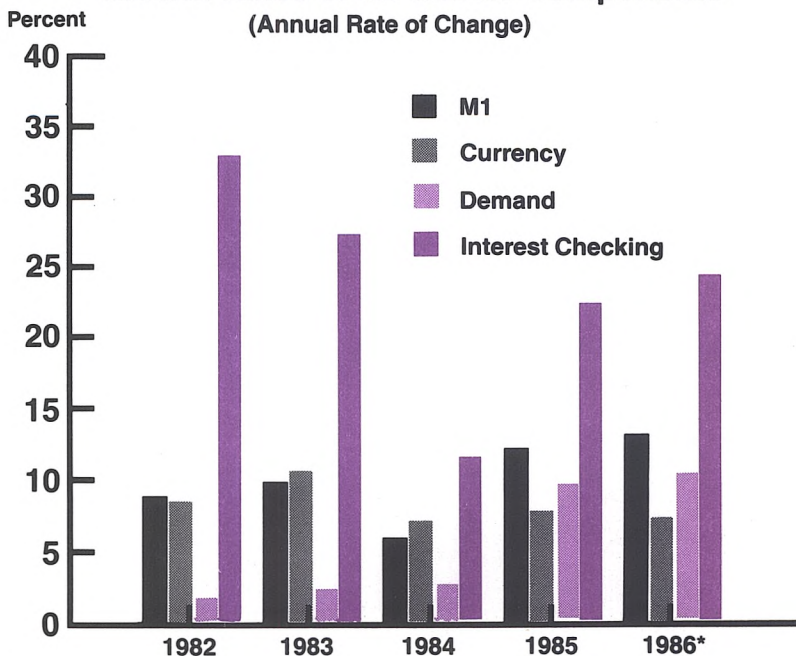
(*Preliminary estimates using first 6 months of 1986)

any interest ceilings. Thus, one might expect many customers to prefer the Super NOW over the NOW. In fact, the Super NOW was very popular and caused a dramatic shift in the composition of M1. By year-end 1985, Super NOWs represented over 10 percent of M1. Chart 3 also suggests that a majority of Super NOW deposits came from NOW accounts[8], although other explanations are possible. The growth in Super NOWs for example, is not inconsistent with a significant inflow from such nontransaction sources as passbook savings or time accounts.

In sum, deregulation has dramatically changed the composition of M1 by making a large portion of it interest-bearing. A future sharp increase in interest rates could well induce flows from the remaining noninterest-bearing demand deposits still held by households into interest-bearing accounts. To understand better the impact of these actual and potential changes, we present the theoretical effects of deregulation and empirical estimates of their magnitude in the following sections.

Chart 3
Transaction and Savings Deposits Over Time

50
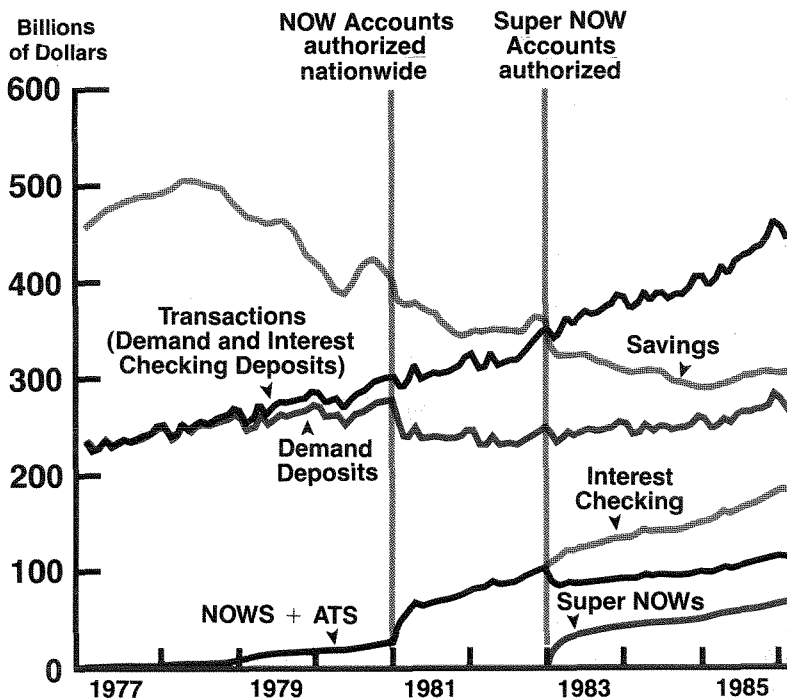
II. Theoretical Framework

The effects of removing interest rate ceilings on deposit accounts depend on how easy it was for depository institutions to circumvent the ceilings through nonprice competition in the first place. A profit-maximizing depository institution would expend resources (both interest and noninterest) on attracting and holding various kinds of deposits to equate the marginal costs of different types of deposits, including transaction deposits. However, depositors' returns need not be equal to the marginal costs of attracting deposits if nonpriced services are not perfect substitutes for cash interest payments.

At one extreme, some economists (for example, Klein, 1974) have argued that ceilings can be circumvented costlessly through nonprice competition. If this were correct, deposit rate deregulation would have no effects. At the other extreme, much of the traditional money demand literature (see Judd and Scadding, 1982, for a review) assumes that the ceilings were perfectly enforced so that deposits for which the payment of interest is prohibited earn no return, even in terms of nonpriced services.

An intermediate position is that binding deposit rate ceilings drive a wedge between depositories' marginal costs of deposits and depositors' marginal returns because of the inefficiencies of nonprice competition (see Keeley and Zimmerman, 1985). That is, in general, depositors value the implicit payments (of nonprice competition) at less than their cost because people generally prefer cash to payments in kind. In other words, barter is less efficient than monetary exchange.

The view that nonprice competition is inefficient implies that removing a deposit rate ceiling would increase the return depositors receive without affecting depositories' marginal costs. Such an increase in depositors' returns should lead to a one-time increase in the quantity of deposits in the affected account. In addition, as we discuss in more detail later, the increase in the level of depositors' returns may affect the interest elasticities of demand for deposits as well.

There is strong evidence supporting the view that nonprice competition is inefficient: NOW accounts succeeded in attracting large quantities of deposits previously held in demand deposits (as well as funds from other accounts), and Super NOW accounts attracted funds from NOWs. These large shifts would not have occurred if depositories had been able to circumvent the ceilings costlessly. Thus, in the aggregate, depositors' returns on Super NOW accounts likely exceeded returns on NOWs, and the returns on NOWs likely exceeded the returns on demand deposits.[9]

The other, more commonly discussed (Santomero and Siegel, 1985), effect of deposit rate deregulation is that deregulation may make deposit rates vary more closely with open market interest rates.[10] This effect is presumably due to the higher cost of varying implicit rather than explicit interest payments, at least in the short-run. However, as Flannery (1982) has argued, explicit retail deposit rates (adjusted for reserve requirements) are not expected to vary one-for-one with open market rates because there are adjustment costs to changing them too. Thus, the importance of this effect is an empirical question.

Although the most important type of deregulation of transaction accounts was the raising and then removing of the deposit ceilings on them, ceilings on term accounts and limited transactions accounts such as the money market deposit account (MMDA) also have been removed. Thus, rates on these other accounts also may vary more than before. Since the other accounts may be substitutes for transaction accounts to a certain degree, the increased variation in term accounts' interest rates also may affect the demand for transaction accounts and currency.

Interest and Income Elasticities

In sum, deposit rate deregulation may have increased the return and/or the covariation of deposit rates with respect to open market rates. Below, we analyze these potential effects on the sensitivity of the demand for transaction deposits to changes in income or open market interest rates. We begin by discussing the implications of a simple inventory model of money demand, and then consider a more general model of asset demand.

An Inventory Model

Much of the literature on deregulation's effects

has used the simple inventory model of money demand.[11] This model, developed by Baumol (1952), assumes that persons minimize the inventory costs of holding transaction balances by holding most of their financial wealth in one asset, such as a bond. This model implies that the demand for real transaction balances D can be written as [12]:

$$\ln D = \alpha + \beta_1 \ln Y - \beta_2 \ln(r - r_d) \qquad (1)$$

where D = real transaction balances
  Y = real income
  r = open-market interest rate
  r_d = rate on deposits
  α = a parameter that depends on the transactions costs of selling bonds (assumed to be constant)
  β_1 = elasticity of demand with respect to income
  β_2 = elasticity of demand with respect to the opportunity cost of holding deposits.

Differentiating $\ln D$ with respect to $\ln r$ gives:

$$\frac{d\ln D}{d\ln r} = \eta_r^D = -\beta_2\left(\frac{r}{r-r_d}\right)\left(1 - \frac{\delta r_d}{\delta r}\right) \qquad (2)$$

This equation shows that the elasticity of D with respect to the market rate r, η_r^D, depends on two factors with opposite effects: how close r_d is to r and the covariation of r_d with respect to r. The closer the level of the rate on deposits to the open market rate (that is, the closer r_d is to r), the greater the elasticity; but the greater the covariation of r_d with respect to r, the lower the elasticity.

This model can be used to analyze how the interest elasticities of various transaction media, which are deregulated to different degrees with regard to interest payments, might compare with one another. The most highly regulated transaction medium in a sense is currency, on which the own rate is zero. This model predicts, therefore, that the interest elasticity of currency should be $-\beta_2$.

As mentioned previously, checkable deposits were subject to varying degrees of regulation regarding the payment of interest, with demand deposits being the most highly regulated, Super NOWs the least regulated, and ordinary NOWs at an intermediate stage. If nonprice competition were inefficient, then these varying degrees of regulation would translate into own rates of interest (implicit plus explicit) on transaction media with the following ranking:

$$0 = r_{currency} < r_{demand\ deposits} < r_{NOWs} < r_{Super\ NOWs} \qquad (3)$$

If the own rate of interest on each of these accounts does not vary with open market rates, then equation 2 implies that Super NOWs should be the most interest-elastic (in absolute value) and currency the least, with demand deposits and NOWs in between:

$$\eta_{currency} < \eta_{demand\ deposits} < \eta_{NOWs} < \eta_{Super\ NOWs} \qquad (4)$$

This ranking would still hold even if the covariation of r_d with r, were not zero (which it is not for the Super NOW, for example), as long as it is small compared to the differences in the levels of r_d due to the inefficiencies of nonprice competition. This result, however, is due to the logarithmic form of the demand function, which in turn comes from the inventory-cost minimizing basis of the model. A more general asset demand function would not necessarily reproduce this implication about the ranking of elasticities.

The Short-Run Versus Long Run

Although the covariation of deposit rates with open-market rates may be low in the short-run, especially for implicit interest payments, in the long-run, it is likely that competitive forces would push (implicit plus explicit) deposit rates towards open market rates until they equalled the open market rate times one minus the reserve requirement. Thus, even though the ranking in equation 4 might hold in the short-run, it would seem much less likely to hold in the long-run because in the long-run, r_d would adjust fully to changes in r.

Thus, deregulation may have substantial effects on the short-run interest elasticities yet not affect long-run elasticities. In the empirical analysis, the model we employ allows for differences between long-run and short-run elasticities.

A Generalized Asset Demand Model

The simple inventory model has been criticized on a number of grounds. For one, if reserve requirements were eliminated and deposit rates equalled

open market rates, the model would collapse. A more general model, similar to that discussed in Santomero and Siegal (1985), which does not suffer from this drawback, views the demand for (real) transaction balances as a generalized asset demand that depends on the own rate of return, rates of return on substitute assets (including the open market instrument), and income or wealth:

$$D = f(\overset{+}{r_d}, \overset{-}{r_{s1}}, \overset{-}{r_{s2}}, \ldots, \overset{-}{r_{sn}}, \overset{-}{r}, \overset{+}{Y})\qquad(5)$$

where r_{si} is the rate of return on a substitute asset i, and Y is real income (or wealth). Taking the derivative of equation 5 with respect to the open market rate r gives:

$$\frac{dD}{dr} = \frac{\overset{+}{\delta D}}{\delta r_d}\frac{\overset{+}{\delta r_d}}{\delta r} + \frac{\overset{-}{\delta D}}{\delta r_{s1}}\frac{\overset{+}{\delta r_{s1}}}{\delta r}$$

$$+ \cdots + \frac{\overset{-}{\delta D}}{\delta r_{sn}}\frac{\overset{+}{\delta r_{sn}}}{\delta r} + \frac{\overset{-}{\delta D}}{\delta r}.\qquad(6)$$

This formulation has several implications about the effects of deposit rate deregulation — both deregulation of own rates and rates on substitute bank deposits — on the sensitivity of transactions media to the open market rate, r. First, deregulation of the own rate may increase $\delta r_d/\delta r$. This alone would lessen the interest-sensitivity (in absolute terms) of checkable deposits. Second, deregulation of substitute deposits would likely increase $\delta r_{si}/\delta r$, and thus increase the sensitivity of D with respect to r (holding constant the own rate).

Third, by eliminating the inefficiency of nonprice competition, deregulation would increase the level of r_d and thus the partial derivatives in equation 6

would be evaluated at a higher level of r_d. Such an increase in the level of r_d would cause portfolio shifts into transaction deposits, but without a knowledge of the specific functional form of equation 5, it is not possible to judge what the effect would be on interest and income elasticities.

It appears that, in general, theory cannot predict the net effect of deregulation on the interest-sensitivity of checkable deposits with one exception. The deregulation of checkable deposit rates as well as the deregulation of other deposit rates should increase the interest-sensitivity of the demand for currency (since $r_d = 0$), assuming that deposits are substitutes for currency and that rates on checkable and other deposits would vary more closely with open market rates after deregulation.

Income Elasticity

Deregulation may also have altered the income elasticity of demand for currency and bank transaction deposits. The simple inventory model implies that the income elasticity of the demand for all types of transaction media, including fully deregulated accounts, would be unaffected by deregulation (and equal to β_1) as long as $r_d < r$. In contrast, the more general model of asset demand suggests that, as r_d approaches r with deregulation, more and more investment funds may be held in bank transaction deposits because there are costs to holding multiple investments or switching funds from the open-market instrument into bank deposits. If so, the income elasticities of deregulated accounts may differ from those of regulated accounts if the income elasticity of demand for investment balances differs from that for transaction balances.

III. Empirical Results

The traditional approach to studying the effects of deposit rate deregulation on the behavior of transactions media has been to try to determine if the behavior of an aggregate, such as M1 or M2, changed with deregulation (see, for example, Judd, 1983 and Judd and Motley, 1984). This paper takes a different approach, and tries to determine how deregulation might have affected the behavior of each *component* of the M1 monetary aggregate.

Our approach has several potential advantages. First, it may be better able to determine whether deregulation had an effect. Deregulation of personal checkable deposit accounts has been phased in gradually along with deregulation of noncheckable deposits and limited checking accounts and reductions in reserve requirements. Thus, it may be difficult to detect an abrupt change resulting from deregulation by examining an aggregate's behavior

at any one time even though a deregulated account may behave much differently from a regulated one.

Second, our approach may yield more information about deregulation's effects. In particular, only an analysis of the behavior of the components of M1 can test the ranking of short-run interest elasticities of demand implied by the inventory model of money demand. The model implies, under certain assumptions, that the most deregulated media would be the most interest-elastic. Our analysis allows us to test this hypothesis directly by comparing the elasticities of currency, demand deposits, NOW, and Super NOW accounts. By analyzing only the behavior of an aggregate, one cannot compare the demand elasticities of different transactions media that have been deregulated to varying degrees.

Finally, our approach may yield more insight into the future behavior of transactions deposits. Since the final step of deregulation was completed just this year, the behavior of the Super NOW account — a prototype of a fully deregulated account — may give a better indication of the future behavior of transactions deposits than the past behavior of an aggregate dominated by regulated and partially deregulated deposit accounts.

Below, we present estimates of the interest and income elasticities of various transactions media: currency, demand deposits, NOWs, and Super NOWs. We also present estimates for money market deposit accounts (MMDAs) for purposes of comparison. However, before presenting estimates of income and interest elasticities of demand, we present some evidence on how the own interest rates on two deregulated accounts — MMDAs and Super NOWs — have behaved to shed light on the hypothesis that deregulation will increase the covariation of deposit rates with respect to the open market rate.

Covariation of Deposit Rates with Open-Market Rates

The hypothesis that deposit rate deregulation will increase the covariation of deposit rates with respect to open-market rates cannot easily be tested directly because there were no direct measures of (implicit) deposit rates prior to deregulation. However, an extreme version of this hypothesis — that deregulated deposit rates will equal the open-market rate times one minus the reserve requirement — can be tested. An alternative hypothesis suggested by Flannery (1982) is that deposit rates respond sluggishly

TABLE 1

Interest Rate Regressions

Linear Model: $r_{d_t} = a + \beta i_{T\text{-bill}_t} + \epsilon_t$

	a	β	R²	Period
MMDA	.014*** (.0036)	.72*** (.041)	.90	83.03-86.02
Super NOW	.032*** (.0030)	.39*** (.030)	.82	83.04-86.02

Adjustment Model: $r_{d_t} = a + (1-\lambda)r_{d_{t-1}} + \lambda\beta i_{T\text{-bill}_t} + \epsilon_t$

	a	1-λ	λβ	β	R²	Period
MMDA	−.000020 (.0013)	.66*** (.035)	.30*** (.025)	.88	.99	83.03-86.02
Super NOW	.0025 (.0018)	.82*** (.043)	.11*** (.018)	.61	.98	83.04-86.02

***Significantly different from zero at the 1 percent level.
Monthly data. Standard errors in parentheses.

with respect to open-market rates because of adjustment costs. Tests of these hypotheses for Super NOWs and MMDAs are presented in Table 1, which contains regressions of MMDA and Super NOW rates on the three-month T-bill rate using monthly data.[13]

The hypothesis that deposit rates should equal the reserve-adjusted open market rate implies that, in a linear regression of a deregulated deposit rate on the open-market rate (which we measure as the continuous-time, annualized 3-month T-bill effective yield), the constant term should be zero and the slope equal to one minus the reserve requirement. Estimates of the first set of regressions reject this hypothesis. They both show positive and statistically significant constant terms and slopes of less than one minus the reserve requirement (the reserve requirements are zero for personal and .03 for nonpersonal MMDAs, and .12 for Super NOWs).[14]

One interpretation of the type of deposit rate behavior implied by these results is that there are adjustment costs involved in varying the rate on deposits. In the long-run, bank deposits would be priced competitively (after adjusting for reserve requirements), but in the short-run, the rate on deposits would vary less than one-for-one with open-market rates.

To test directly for sluggish adjustment of deposit rates, we estimated a standard "adjustment" model in which a fraction of the difference, λ, between actual deposit rate and the equilibrium deposit rate is assumed to be eliminated in each period. The second set of regressions in Table 1 contain estimates of this model. For the MMDA, the estimated adjustment coefficient λ is about one-third and the long-run effect of an increase in the T-bill rate on the deposit rate is somewhat less than unity (.88). A one percentage point increase in the bill rate leads to only a .30 point increase in the MMDA rate in one month.

Super NOW rates behave even more sluggishly, with an adjustment coefficient of .18 and a one-month response of only .11 percentage point to a 1 point increase in the T-bill rate. Part of this greater sluggishness may be due to the much higher reserve requirements on Super NOWs, but the large differences cannot be explained by reserve requirements alone. The explanation may lie in the greater costs involved in opening Super NOW accounts, which increase the associated adjustment costs. Another reason may be that tax incentives make implicit interest a larger part of the return from holding Super NOWs.

In sum, deposit rates on retail deposit accounts do not move one-for-one with open-market rates, at least in the short-run. Even the MMDA, which is not subject to a reserve requirement (on personal accounts), responds sluggishly in the short-run to changes in open-market rates. The Super NOW exhibits even more sluggish behavior. It seems likely that (before deregulation) implicit rates on checking deposits behaved at least as sluggishly and perhaps even more so than Super NOW rates.

While not definitive evidence, the sluggish behavior of the Super NOW rate suggests that the main effect of deposit rate deregulation will be to increase the short-run variation in the relative opportunity cost of transaction deposits. If the elasticity of demand for transaction deposits with respect to that cost were constant, the increased relative variation would imply an increase in the responsiveness of the transactions deposits to changes in the open-market rate.

Effects of Deregulation on Interest and Income Elasticities

Perhaps the most direct way to determine the effect of deposit rate deregulation on the interest and income elasticities of demand for checkable deposits is to compare the elasticities of demand of fully and partially deregulated deposit accounts with each other and with transactions media prohibited from paying interest. Below, we present such comparisons.

Estimates of interest and income elasticities of specific transactions media were obtained from the following partial-adjustment form of the real money demand function that has been widely used in past studies:

$$\ln(D_{it}) = \alpha + (1 - \lambda)\ln(D_{it-1})$$
$$+ \lambda\beta_1\ln(r) + \lambda\beta_2\ln(Y)$$
$$+ \beta_3 T_1 + \ldots + \beta_{13}T_{11}$$
$$+ \beta_{14} \text{ Trend} \qquad (7)$$

where:

D_{it} = real deposits at time t of type i

r = the nominal open-market interest rate

Y = real income

$T_1, \ldots, T_{11}$ = monthly seasonal dummies

Trend = a linear time trend variable

Monthly data (not seasonally adjusted) from different subperiods within the time frame of January 1959 through February 1986 were used to estimate the parameters of equation 7. The CPI-UXL series, which uses the rental equivalence method of computing housing costs, was used to deflate all nominal variables. (This measure avoids the built-in correlation between interest rates and housing cost, and hence the price level, in the older CPI-U series which included the mortgage costs of housing. See Huizinga and Mishkin, 1985.) The nominal open-market interest rate is the 3-month T-bill rate (converted to a continuous-time yield from the bank-discount basis), and real income is personal income.

In Table 2, estimated interest and income elasticities are presented for three at least partially deregulated deposit accounts: the Super NOW, NOW, and MMDA, and are compared with estimated interest and income elasticities for demand deposits and currency held by the public both prior to and after deregulation.

Estimates for the NOW account are presented separately for the periods before and after the Super NOW was introduced because of a possible change in its interest elasticity. It appears that Super NOWs were successful in attracting substantial deposits

TABLE 2

Interest and Income Elasticities of Deregulated Accounts Compared to Regulated Accounts

	$\lambda\eta_i$	$\lambda\eta_y$	η_i	$(1-\lambda)$	Period
MMDA	−.15***	−.096	−.45	.67***	83.04-86.02
	(.026)	(.29)		(.046)	
Super NOW	−.090***	.26	−.38	.76***	83.04-86.02
	(.020)	(.24)		(.042)	
Now Pre-Super NOW	−.12***	.90	−.29	.58	81.04-82.12
	(.041)	(.88)		(.30)	
Now Post-Super NOW	−.045***	.057	−.56	.92***	83.04-86.02
	(.019)	(.20)		(.051)	
Demand Deposits Pre-NOW	−.017***	.20***	−.19	.91***	59.01-80.10
	(.0023)	(.036)		(.019)	
Currency *(Held by Public)* Pre-NOW	−.0050***	.047***	−.10	.95***	59.01-80.10
	(.00094)	(.0115)		(.016)	
Demand Deposits Post-NOW	−.044***	.31**	−.44	.90***	81.04-86.02
	(.010)	(.11)		(.041)	
Currency *(Held by Public)* Post-NOW	−.0090*	−.028	−.45	.98***	81.04-86.02
	(.0047)	(.043)		(.050)	
Demand Deposits Post-Super NOW	−.064***	.32	−.28	.77***	83.04-86.02
	(.019)	(.20)		(.075)	
Currency *(Held by Public)* Post-Super NOW	−.0073	−.0019	−.10	.93***	83.04-86.02
	(.0095)	(.099)		(.16)	

*** Significant at the 1% level.
** Significant at the 5% level.
* Significant at the 10% level.

Standard errors in parentheses.

from NOWs. Since the most interest-sensitive funds in NOWs likely shifted into Super NOWs, NOWs might have become less interest-elastic after Super NOWs became available.

Finally, the first three months after an account was introduced were excluded from the sample periods to allow for portfolio adjustment not related to the explanatory variables. For similar reasons, the two months prior to the introduction of NOWs were excluded from the sample used to estimate the models for demand deposits and currency.[15]

The estimated short-run (one-month) interest elasticities presented in the first column of Table 2 are relatively high for both Super NOW accounts and NOW accounts prior to the introduction of Super NOWs, averaging around $-.10$. This compares to the interest elasticities of demand deposits and currency of $-.017$ and $-.005$, respectively. In fact, the estimated short-run interest elasticity of the Super NOW is closer to the elasticity of the MMDA — an account used primarily for savings, not transactions — than the elasticity of either demand deposits or currency prior to deregulation. The NOW account appears to have become less interest-elastic after the introduction of Super NOWs, but it still is much higher than the short-run interest elasticity of demand deposits or currency prior to deregulation.

The results for demand deposits during the post-deregulation period suggest that their short-run interest elasticity increased over time. For example, the estimated short-run interest elasticity was $-.044$ during the 1981.04-1986.02 post-NOW period and $-.064$ during the 1983.04-1986.02 post-Super NOW period, compared to an estimated elasticity of only $-.017$ during the 1959.01-1980.10 pre-NOW period. Nevertheless, these higher elasticities are still far below those of Super NOWs and even conventional NOWs during the pre-Super NOW period.

The estimated short-run interest elasticities of demand for currency for all periods are considerably lower (in absolute value) than the elasticities of Super NOWs, NOWs or demand deposits as theory predicts. However, there is some indication that the interest elasticity of currency may be higher in the post-NOW period.

For the Super NOW and NOW, the estimated long-run elasticities appear to be larger than that of demand deposits prior to the introduction of NOWs. In addition, the speed of adjustment, λ, for the Super NOW is much greater than that for either demand deposits or currency. The holding of more savings-type funds in these accounts could account for this faster adjustment if savings balances react more quickly than transaction balances to changes in interest rates. The rapid speed of adjustment for the MMDA, which presumably consists mostly of savings balances, provides supporting evidence. In addition, the point estimate of λ for NOWs prior to the introduction of Super NOWs (although not statistically significant) also is higher than those of demand deposits or currency.

The results on income elasticities are less clear-cut than those on interest elasticities. Although the point estimates of the income elasticities of Super NOW and NOW accounts are generally larger than those of either currency or demand deposits, their standard errors also are large and none of the estimates is statistically significant. As a result, it is not possible to determine whether these accounts are more income-elastic than currency or demand deposits. The estimated income elasticity for the MMDA also is not statistically significant, possibly because its balances are of a longer term investment nature and therefore do not respond to monthly fluctuations in income.

Interpretation of Results

The results on the demand for various transactions media suggest that deregulation has increased the absolute value of the media's short-run interest elasticities. One interpretation of these results is that they confirm the hypothesis of the traditional inventory model that a higher level of rates on deregulated accounts in conjunction with relatively little own rate variation causes the demand for deregulated accounts to be more interest elastic, at least in the short-run. This interpretation is consistent with both the lower interest elasticity of demand for currency (whose own rate is zero) compared to that for demand deposits (whose implicit rate is greater than zero), and the higher elasticity of Super NOW accounts compared to that of demand deposits.

These results are also consistent with the notion that lifting the ceilings on consumer checkable accounts has reduced the inefficiencies of nonprice

competition and thus increased the effective rate depositors receive.

An alternative explanation might be that Super NOWs and NOWs contain more savings-type balances than do demand deposits, and that savings balances are more sensitive at the margin to interest rate changes.

The interest elasticity results are consistent with our finding that the own rates on Super NOWs do not vary closely with open market rates in the short-run. As a result, a change in market rates causes a larger *percentage* change in the opportunity cost of holding Super NOWs. Since the inventory model of money demand implies that the elasticity of demand with respect to the opportunity cost is constant, greater variability in the opportunity cost of deregulated accounts would explain why those accounts apparently have higher interest-sensitivities with respect to market rates.

One Additional Test

One additional test of this hypothesis is to estimate the interest-sensitivity of the demand for a deregulated account with respect to its opportunity cost rather than the open market rate. If the hypothesis were correct, the short-run interest elasticity of demand with respect to the opportunity cost for a deregulated account should be much closer to that of a regulated account with respect to the open market rate.

This type of test can be carried out best for the Super NOW since it is the only checkable deposit entirely free from interest ceilings and for which data are available on its own rate. However, as discussed previously, it is likely that Super NOWs do pay some implicit interest. Using its explicit rate as a measure of the total rate therefore probably biases the measured opportunity cost upward, and thus the estimated interest-sensitivity.

The results of estimating the model described by equation 7 for Super NOWs, but using the log of the *difference* between the open-market rate (the three-month Treasury bill rate) and the Super NOW rate are as follows. As expected, the estimated short-run elasticity with respect to the opportunity cost is much lower (in absolute value) than the elasticity

TABLE 3

Interest and Income Elasticities of M1 before and after the Nationwide Introduction of NOWs

Separate Models

	$\lambda\eta_i$	$\lambda\eta_y$	η_i	$(1-\lambda)$	Period
M1 Before NOWs	− .012***	.19***	− .09	.86***	59.01-80.10
	(.0016)	(.033)		(.026)	
M1 After NOWs	− .041***	.19***	− .82	.95***	81.04-86.02
	(.0079)	(.77)		(.044)	

Fully Interactive Model
(Tests of the statistical significance of the difference between periods 59.01-80.10, 81.04-86.02)

	$\lambda\eta_i$	$\Delta^a\lambda\eta_i$	$\lambda\eta_y$	$\Delta^a\lambda\eta_y$	$(1-\lambda)$	$\Delta^a(1-\lambda)$
M1 Pooled Data	− .012***	− .028***	.19***	.0007	.86***	.087
	(.0016)	(.0086)	(.033)	(.089)	(.025)	(.053)

ª The symbol Δ is used to denote the change in the parameter during the 81.04-86.02 period.
*** Significant at the 1 percent level.
** Significant at the 5 percent level.
* Significant at the 10 percent level.
Standard errors in parentheses.

with respect to the open market rate as reported in Table 2. (− .026 versus − .090). The estimated short-run elasticity with respect to the opportunity cost is close to the elasticity of demand deposits with respect to the market rate in the pre-NOW period (− .017). Thus, this result also is consistent with the prediction of the traditional inventory demand model that deregulation will increase the short-run elasticity with respect to the open-market rate if the own rate does not vary strongly with the open-market rate.

Effects on M1

One implication of these results is that the deregulation of rates should have increased the interest-sensitivity of an aggregate such as M1, which includes NOW and Super NOW accounts. The interest elasticity of an aggregate such as M1 is a weighted sum of the interest elasticities of the aggregates' components — the weights being each component's share of the aggregate. Below, we test the hypothesis by comparing the short-run interest elasticity of M1 before and after the introduction of NOWs. The results of this test are presented in Table 3.

To determine whether the short-run interest elasticity of demand for M1 increased after NOWs were introduced nationwide in January 1981, we estimated the basic model described by equation 7 separately for the two periods 1959.01 - 1980.10 and 1981.04 - 1986.02. The first three months of 1981 were excluded because NOW accounts were in an adjustment phase then, and possibly attracted funds not previously held in checkable deposit accounts. The last two months of 1980 were excluded because many banks promoted the new accounts by offering high rates on retail RPs at the time.

TABLE 4

Interest and Income Elasticities of Demand Deposits and Publicly-Held Currency Before and After the Introduction of Nationwide NOWs

Separate Models

	$\lambda\eta_I$	$\lambda\eta_y$	η_I	$(1-\lambda)$	Period
Demand Deposits Before NOWs	− .017*** (.0022)	.20*** (.036)	− .19	.91*** (.019)	59.01-80.10
Demand Deposits After NOWs	− .044*** (.010)	.31*** (.12)	− .44	.90*** (.041)	81.04-86.02
Currency Before NOWs	− .0050*** (.00094)	.047*** (.011)	− .10	.95*** (.016)	59.01-80.10
Currency After NOWs	− .0090*** (.0047)	− .027 (.043)	− .45	.98*** (.050)	81.04-86.02

Fully Interactive Model

	$\lambda\eta_I$	$\Delta\lambda\eta_I$	$\lambda\eta_y$	$\Delta\lambda\eta_y$	$(1-\lambda)$	$\Delta(1-\lambda)$	Period
Demand Deposits	− .017*** (.0022)	− .028*** (.011)	.19*** (.035)	.12 (.13)	.92 (.018)	− .016 (.047)	59.01-80.10 81.04-86.02
Currency	− .0050*** (.00092)	− .0040 (.0056)	.047*** (.011)	− .074 (.052)	.95 (.016)	.026 (.060)	59.01-80.10 81.04-86.02

***Significant at the 1% level
**Significant at the 5% level
*Significant at the 10% level

Standard errors in parentheses.

The results indicate that the short-run interest-sensitivity of M1 apparently more than tripled (in absolute value) from $-.012$ to $-.041$. To test whether this increase was statistically significant, the data from the two periods were pooled and a fully interactive version of equation 7 was estimated on the pooled sample, allowing each parameter to take on different values in the two periods. In the bottom part of Table 3, T-tests are presented of whether the key parameters in the post-NOW period are statistically significantly different from those in the pre-NOW period. The tests show that the increase in interest elasticity was statistically significant at the 1 percent level, whereas neither income elasticity nor the adjustment parameter changed by a statistically significant amount. Thus, the results provide very strong evidence that the short-run interest elasticity of M1 in the period after NOWs were authorized nationwide was higher (in absolute value) than before. This result is consistent with the much higher interest elasticities of Super NOWs and NOWs, but does not prove that their introduction was the sole cause of the increase in interest-sensitivity of M1.

Another possible cause of M1's increased interest-sensitivity is an increase in the interest-sensitivity of the other components of M1 as well, perhaps due to the deregulation of noncheckable accounts, such as the money market certificate, and limited checking accounts, such as the MMDA. To test this hypothesis, we estimated the model described by equation 7 for demand deposits and currency before and after the nationwide introduction of NOWs. The results are reported in Table 4. The point estimates of the interest elasticities of demand deposits and currency are higher (in absolute value) in the post-NOW period. However, only the increase in the demand deposit interest elasticity is statistically significant.

The increase in the estimated interest-elasticity for demand deposits may be due to a switch by consumers into NOWs and Super NOWs that left businesses holding an increased portion of demand deposits. It also might be due to deregulation of other accounts that are substitutes for demand deposits. Whatever the reason, the increase in the interest elasticity of demand deposits is part of the explanation for the increased interest elasticity of M1. (It is also possible that currency contributed to the increase, but we cannot determine statistically whether it did.)[16] Also, Super NOWs and/or NOWs contributed to the increase since the elasticity of M1 in the post-Super NOW period exceeds the elasticities of either currency or demand deposits.

Because of an increase in the short-run interest elasticity of each of the components of the M1 monetary aggregate after deregulation, M1 is now more interest-sensitive — about 4 times more sensitive according to our findings. Thus, M1 should show wider variations in response to exogenous interest-rate changes now than before deregulation.

IV. Summary and Conclusions

Deposit rate deregulation has caused a major change in the composition of M1. As of mid-1986, 30 percent of M1 consisted of interest-bearing checking accounts. This changed composition of M1 and the associated rapid growth of its interest-paying components has raised the question of whether deposit rate deregulation has also changed the demand for M1.

The empirical results presented in this paper suggest that the short-run elasticity of demand for M1 with respect to the open market rate has been affected, but that there were no statistically significant changes in other parameters of the demand function. Specifically, our results suggest that the short-run interest elasticities of demand for NOW and Super NOW deposits exceed those of either demand deposits or publicly held currency prior to the nationwide authorization of NOW accounts.

One explanation for these higher interest elasticities is that deposit rate deregulation has increased the total (implicit plus explicit) returns to depositors by lessening the inefficiencies of non-price competition while not increasing, at least by much, the short-run covariation of total deposit returns with respect to the open market rate. The combination of these two factors, in turn, has led to increased variation in the relative opportunity cost of NOW and Super NOW deposits. Assuming the elasticity of demand with respect to the opportunity cost is constant implies that the short-run interest

elasticity of these accounts with respect to the open-market rate has increased.

An additional factor accounting for the increase in the short-run interest-sensitivity of M1 is the apparent coincident increase in the interest-sensitivity of demand deposits with the nationwide introduction of NOW accounts. Also, there appears to be an increase in the short-run interest elasticity of currency associated with the introduction of money market certificates — an important first step in the deregulation of deposit rates on nontransaction accounts.

Not only has deposit rate deregulation apparently changed the short-run behavior of the M1 monetary aggregate, it is also likely to make the composition of M1 more variable than before. This is because the demand for the interest-bearing components of M1

appears to be much more interest-elastic than the noninterest-bearing components, at least in the short-run. Moreover, deposit rate deregulation has apparently indirectly increased the short-run interest elasticity of demand for the noninterest-bearing components.

These changes in demand raise questions for monetary policy under virtually any view of what money is and how money is related to other aspects of the economy. For one, they suggest that the traditional relationships between M1 and the economy have changed. For another, they raise an even more basic question of whether an aggregate comprised of both interest-bearing and noninterest-bearing components with different interest elasticities and changing relative prices is useful as a guide to monetary policy.

FOOTNOTES

1. While deregulation has made interest-bearing checking accounts available to all consumers, the prohibition against the payment of interest on traditional noninterest-bearing demand deposits remains. Hence, consumers have the option of either interest-bearing NOW or Super NOW accounts, or noninterest-bearing checking accounts, which typically have both lower minimum balance requirements and lower fees.

2. M1 ($639.9 billion as of December 1985, not seasonally adjusted) is defined to include only financial assets that are used as media of exchange. It includes publicly held currency ($173.1 billion), travelers checks ($5.5 billion), net demand deposits at banks ($281.3 billion), and other checkable deposits consisting of NOWs, Automatic Transfer Service (ATS) accounts, credit union share drafts and demand deposits at thrifts ($115.8 billion), and Super NOWs ($64.2 billion).

3. The broader monetary aggregate, M2, includes both transaction balances reported in M1, and savings-type balances, such as MMDAs, savings deposits, small time certificates, general purpose money market mutual fund shares, and other short-term financial assets. M3 is an even broader aggregate. In addition to M2, it includes large-denomination time deposits, term RPs and Eurodollars, and institution-only money market funds. Because both M2 and M3 contain both savings and transaction balances, they are much less likely to be affected by portfolio shifts between transaction and savings balances than M1 which contains only transaction balances.

4. Ceilings for banks and savings and loans were 5¼ percent, while during some periods, credit union share drafts were allowed to pay higher rates.

5. Data on NOW and Super NOW balances are from the Federal Reserve Board's "Quarterly Survey of Number of Selected Deposit Accounts" for November 1985. Personal checking account average balances for 1980 are from the

Functional Cost Analysis, published by the Federal Reserve Banks. Average account balances in NOWs and Super NOWs are well above typical minimum balance requirements for free NOW and Super NOW accounts which averaged $1073 and $3300 respectively, as reported in Sheshunoff and Company's study entitled "Pricing Bank Services and Loans," 1985.

6. See *Federal Reserve Bulletin,* July 1981, page 542.

7. The statistical estimates are from a statistical model in which the change in demand deposits was regressed on the change in NOW deposits and changes in interest rates, a time trend, seasonal factors, and a dummy variable for the period covered by the special credit restraint program in 1980. The model was estimated for the period from February 1959 through June 1981 to include the first six-month adjustment period following the nationwide introduction of NOW accounts. A $1.00 increase in NOWs (including ATS accounts) was estimated to result in a statistically significant $.71 decline in demand deposits.

8. We were unable to obtain a statistically significant estimate of the shift from NOWs into Super NOWs.

9. There are reasons that not all (personal) transaction deposits shifted into Super NOWs even though their total returns likely exceeded those on other transaction deposits. For one thing, implicit interest is nontaxable, explicit interest is taxable and transactions fees are not deductible. Thus, some depositors with high transactions needs, small average balances, or high tax rates might prefer to receive nontaxable implicit interest through "free" transaction deposits that earn no explicit interest rather than receive taxable interest and pay (nondeductible) transaction fees.

Similarly, many depositories continue to require minimum balances in Super NOW accounts as a method of compensation for the transaction services they provide rather than

charge fees directly. This is sensible even though such balances incur the implicit reserve tax because this tax is still far lower than the typical personal marginal income tax rate.

10. In addition, the gradual reduction in reserve requirements that has been occurring may increase the absolute (but not relative) variation of interest payments on transaction deposit accounts with open-market rates. The ratio of required reserves to checkable deposits has declined from over 22 percent in the early 1940s to about 10 percent now; there was a 40 percent decline in the time since the Monetary Control Act of 1980 was passed. As reserve requirements decline, we expect that the absolute variation in interest rates on reservable deposits accounts with respect to open-market rates will increase. This increased variation, in turn, may affect the degree to which persons substitute among different accounts and among deposit and nondeposit investments depending on whether demand depends on the absolute or relative variation in rates.

11. See, for example, the discussion in Simpson (1984).

12. The simple model derived by Baumol implies income and interest elasticities should be one-half. However, a more general formulation is silent on the magnitude of these parameters.

13. All interest rates are continuous time annual yields, and thus have the same dimension.

14. To determine whether our use of the T-bill rate as a measure of the open-market rate was appropriate, we regressed the T-bill rate on the Federal Funds and 1-month CD rates (two other open-market rates). The results are as follows:

	α	β	R^2	Period
Federal Funds	−.0068 (.0048)	1.08*** (.056)	.92	83.03-86.02
1-Month CD:	−.0033 (.0036)	1.05*** (.041)	.95	83.03-86.02

***Significant at the 1% level

These regressions have zero intercepts and unitary slopes, as expected, and confirm that the T-bill rate is a good measure of an open-market rate.

15. The model described by equation 7 in Table 2 was also estimated in first difference form as a check on the robustness of the estimates (see Plosser and Schwert, 1977 and 1978, and Plosser, Schwert and White, 1982). Also, the model was estimated excluding the first six months after the account was offered to allow for a longer adjustment not related to the explanatory variables. The results, however, are relatively robust with respect to these two changes.

16. It is possible that the interest elasticity of the demand for currency increased when nontransactions accounts were deregulated. If so, the test reported in Table 4 has little power because the wrong breakpoint was used. Using June 1978 as the breakpoint — the date the 6-month money market certificate was authorized and the date many argue was the first important step in deregulating the interest rates on noncheckable accounts — we found that the estimated short-run interest elasticity of currency increased by a statistically significant amount. In fact, it more than doubled from −.014 to −.031.

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Financial Deregulation, Interest Rates, and the Housing Cycle

Adrian W. Throop*

Thrift institutions supplying nearly half of the total credit needs of housing have experienced recurrent bouts of deposit outflows during periods of high interest rates. Such outflows would have had a significant impact on the pace of residential investment to the extent that the market for mortgage credit was not fully integrated with money and capital markets. In recent years, financial deregulation has tended increasingly to integrate the mortgage market with other financial markets. This article estimates the magnitude of credit availability effects on residential investment from disintermediation at thrifts both before and after financial deregulation, as well as the effect that this deregulation has had on the cyclical volatility of interest rates.

In recent years, financial deregulation has tended to integrate the market for mortgage credit with the money and capital markets. This article examines how the extent of integration has changed the cyclical behavior of interest rates and residential investment.

Three major factors insulated the mortgage market from other financial markets in the past: 1) Regulation Q ceilings on the interest rates paid on deposits at thrift institutions that specialize in housing finance, 2) usury ceilings on mortgage loans, and 3) a limited secondary market for mortgage loans. The disintermediation created by ceilings on deposit rates tended to restrict deposit flows into thrift institutions in periods of tight credit. The thrift institutions had difficulty offsetting the lack of deposit inflows by selling off mortgage loans from their portfolio because of a limited secondary market as well as an unwillingness to show capital losses. Also, usury ceilings reinforced the short-run tendency of mortgage lenders to ration credit by means other than interest rates. To the extent that restrictions on the availability of mortgage credit at

thrift institutions could not be offset by other lenders, the result was more severe fluctuations in residential investment.

Since most ceilings on deposit rates and usury ceilings on mortgage rates were removed in the late 1970s and early 1980s, housing should now be able to compete on a more nearly equal basis for funds; and swings in housing construction should be dampened. Nevertheless, housing still is likely to be affected by tight credit conditions more than other sectors of the economy because housing demand has a relatively high sensitivity to interest rates. An additional consequence of financial deregulation should be a greater volatility in the general level of interest rates. This follows because the overall supply of credit is now being rationed to a greater degree by price, and also because tight credit conditions now strike less specifically on housing.[1]

This article estimates the degree to which financial deregulation has both moderated the cycle in residential investment and contributed to greater volatility in market interest rates. Section I provides a simplified theoretical framework for analyzing the effects of tight credit conditions on the cyclical behavior of residential investment and interest rates in regulated versus unregulated financial environments, and discusses its applicability to recent housing cycles. Sections II and III identify past

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periods when regulatory constraints were at least partly binding and disintermediation at thrifts resulted in less residential investment than would have occurred in a deregulated financial environment. To make the identification, a model of the housing market based purely on demand factors was constructed, and then was tested for the additional influence of deposit inflows at thrift institutions during periods of disintermediation.

Next, Section IV compares the cyclical behavior of market interest rates and housing activity in periods of binding regulatory constraints with what they would have been in a deregulated financial environment. For this purpose, the model of residential investment was embedded in a small-scale structural macroeconomic model. The degree to which financial deregulation has made interest rates more volatile and swings in the housing cycle less severe was then simulated by removing the estimated effect of deposit flows on housing activity. Finally, Section V provides a summary of the main findings.

I. The Availability of Credit to Housing

Theoretical Framework

We begin with a simplified theoretical framework for analyzing the effect of regulatory constraints on residential investment. For this purpose, consider a rudimentary financial system in which a regulated set of financial intermediaries provides housing finance, whereas borrowers in other sectors of the economy obtain credit in the open market without the use of intermediaries. The demand for credit in each of these sectors is assumed to be independent of the demand for credit in the other, but suppliers of credit shift freely between the two markets in response to relative interest rates. Without loss of generality, the cost of intermediation is assumed to be zero, so that the supply of deposits to the financial intermediaries is identical with the supply of mortgage credit to ultimate borrowers. We also, at least initially, abstract from problems related to the maturity structure of interest rates.

This model contains two demand functions and two supply functions. The demand for mortgage loans, D_m, depends upon the mortgage rate, i_m, which, in the unregulated financial environment, is equal to the deposit rate, i_d; and the demand for other types of credit, D_o, is a function of the interest rate in the open market, i_o. The supply of credit to financial intermediaries, S_m, and thus ultimate mortgage borrowers, depends upon both the deposit rate, i_d, and the open market rate, i_o. The supply of credit to the open market, S_o, is a function of these two rates as well.

An initial full equilibrium in the two markets is depicted in Panel A of Figure 1, where, for simplicity, we assume that at the outset the deposit rate (and mortgage rate) is the same as the interest rate in the open market. Each of the initial supply functions is drawn on the assumption of an equilibrium value of the interest rate in the other market.

Consider now an increase in the demand for credit in the open market, which has the effect of shifting the demand schedule from D_o to D'_o. In an unregulated financial environment, the resulting higher interest rate in the open market would shift the supply of funds in the intermediated market, S_m, to the left, raising the mortgage rate and deposit rate as well. These higher rates would, in turn, shift the supply of funds in the open market, S_o, to the left and raise the interest rate in the open market still further, and so forth.

The ultimate configuration of interest rates between the two markets depends upon the substitutability in supply between the two markets and the relative elasticities of demand. As long as lenders do not regard market instruments and thrift deposits as perfect substitutes, open market rates would rise by somewhat more than deposit and mortgage rates. Even in the unregulated environment, residential investment would fall as more funds flow toward open market.

The outcome in this unregulated financial environment contrasts with that when a ceiling is imposed on the deposit rate at financial intermediaries at the initial level of interest rates, shown in Panel B. Since the deposit rate cannot change, the

supply schedule for credit to the open market now remains fixed when the demand for credit rises in that market. The resulting increase in the interest rate in the open market then causes a shift of funds away from deposits at intermediaries, and reduces the supply of deposits from S_m to S'_m.

The resulting decline in mortgage credit and housing activity at the controlled level of the deposit rate will be greater than in the case of uncontrolled intermediaries ($Q_m - Q'_m$ is greater in Panel B than in A). Also, the difference in the impact on housing between the regulated and unregulated financial environments will be greater the larger is the substitutability in supply between the two markets.[2]

The deposit rate ceiling reduces residential investment by more than would otherwise occur because of the temporary market disequilibrium and resulting restriction in the availability of credit. Compared to the unregulated environment, interest

rates in the open market rise by less. As a result, nonhousing activity rises more, and residential investment therefore falls by more than in an unregulated situation. Note also that, although in this example interest rates rise because of an increase in the demand for credit, a similar difference between controlled and uncontrolled environments exists if interest rates were to rise because of a restriction in the supply of credit (as, for example, due to monetary policy).

The excess of mortgage credit demanded over that supplied, which results from the disequilibrium created by the deposit rate ceiling, must somehow be rationed.[3] If usury ceilings on mortgage loans were binding, mortgage credit would be rationed by means other than the mortgage rate, such as by increasing down payments or simply by refusing to lend. Alternatively, if usury ceilings on mortgage loans were not binding, the mortgage rate could rise

Figure 1
Interest Rate Ceilings and the Availability
of Credit to Housing

A. No Interest Rate Ceiling on Deposits

B. With Interest Rate Ceiling on Deposits
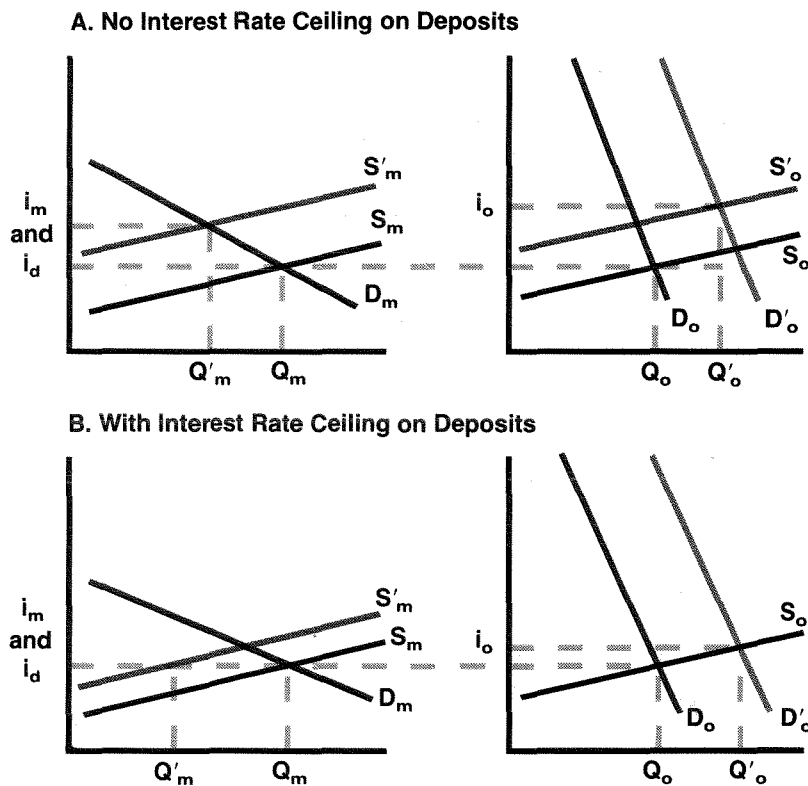
relative to the deposit rate to ration the available supply of funds. In the short-run, however, mortgage rates are slow to adjust to market forces while other dimensions of price tend to be altered first. Still, the argument about the effect of disintermediation on the availability of credit to housing does not depend on the exact means used to ration the restricted supply of mortgage credit.

This simple model captures the essence of the credit availability effects generated by deposit rate ceilings at thrift institutions. However, because thrift institutions generally supply no more than half of total residential home mortgage credit, these availability effects could be offset by other lenders less subject to deposit rate regulation than thrifts. The extent of offset depends on the substitutability of other investments for mortgage loans. Unless mortgage loans and investments in the portfolios of these other lenders were perfect substitutes, restricting credit availability at thrifts could still have some impact on the total supply of mortgage credit and residential construction.

In addition, thrift institutions themselves may be able to reduce the effects of deposit rate ceilings by tapping alternative sources of funds. If these alternative sources were not perfectly substitutable for regulated deposits, however, some credit availability effects due to disintermediation may remain.

Regulation Q and Government Support of the Mortgage Market

We now turn to a discussion of the degree to which Regulation Q has affected different types of mortgage lenders, as well as the major alternative sources of funds available to thrifts. Regulation Q ceilings were imposed on deposit rates at commercial banks in the 1930s. Their purpose was to prevent excessive competition for funds, which was thought to have been one of the major causes of bank failures. Because market rates of interest typically were below the ceilings, these ceilings had little effect on the financial system until the mid-1960s. As the ceilings became binding, however, they were extended to savings and loan associations and mutual savings banks, although these institutions were given a favorable rate differential over commercial banks in an attempt to protect the flow of

housing credit through them. The differential ceilings prevented an outflow of funds from thrifts to banks but did little to prevent outflows into unregulated intermediaries and to the open market during periods of disintermediation in 1966-67, 1967-70, and 1973-74 brought on by rising interest rates.

Commercial banks were generally able to adjust to periods of disintermediation better than thrifts for several reasons. First, in the earlier years, commercial banks had relatively large holdings of government securities that could be sold off to offset the effects of deposit outflows. Second, banks sought to overcome the effects of disintermediation by developing new sources of funds — the most important of which were Eurodollar borrowings and issues of bank-related commercial paper. Third, Regulation Q ceilings were lifted on large negotiable CDs maturing in 30 to 89 days in 1970, and on all such CDs in 1973.

In contrast, thrifts did not have large holdings of secondary reserves. They were slow to develop new sources of funds beyond Federal Home Loan Bank advances, and they did not begin to issue significant amounts of large CDs until the late 1970s. Since thrift institutions are the main suppliers of mortgage credit, there was a potential for significant credit availability effects on residential investment during the periods of disintermediation.

Government-sponsored agencies have pursued activities to offset some of the effects of disintermediation[4]. The most important offset for thrifts has consisted of advances from Federal Home Loan Banks, which tend to rise in periods of disintermediation and weak housing activity, and to fall in other periods. Since Federal Home Loan Banks obtain the funds for these advances by borrowing in the open market — a practice that puts further pressure on market interest rates, their activities have tended to generate further disintermediation at thrifts. Nevertheless, the net effect of Federal Home Loan Bank advances has probably been to reduce credit availability effects on residential investment, at least in the short-run.

The Federal National Mortgage Association (FNMA or "Fannie Mae") and, to a lesser extent, the Federal Home Loan Mortgage Corporation (FHLMC or "Freddie Mac") have also tended to

offset some of the effects of disintermediation. They have done so by issuing debt and using the proceeds to buy mortgage loans from thrifts. Constituting another source of support have been sales of federally guaranteed participations in mortgage pools by the Government National Mortgage Association (GNMA or "Ginnie Mae) and Freddie Mac. These pools, which tap broader sources of mortgage finance than just deposits at thrifts, became important after 1970. However, the activities of FNMA and the other agencies have been less countercyclical than those of the Federal Home Loan Banks.

## Recent Financial Deregulation

Although the extent of countercyclical support to mortgage finance by government agencies has not changed much in recent years, financial deregulation has integrated the mortgage market more completely with money and capital markets. The first major element of deregulation affecting housing was a relaxation of Regulation Q ceilings in June 1978. This relaxation allowed both thrifts and commercial banks to issue Money Market Certificates with an interest rate tied to the rate on six-month Treasury Bills.[5] Subsequently, the Deregulation and Monetary Control Act of 1980 authorized the phase-out and ultimate elimination of all limitations on

interest and dividends paid on deposits and accounts at depository institutions. The phase-out period lasted until April 1986, but substantial deregulation took place almost immediately.[6] In addition, the Deregulation and Monetary Control Act eliminated state usury ceilings for residential mortgage loans and broadened the asset powers of thrift institutions.

These changes have enhanced the ability of thrift institutions to attract funds in periods of tight credit and given them more flexibility in managing their assets. As shown in Chart 1, however, sharp cycles in the flow of real, or inflation-adjusted, deposits to thrifts were not eliminated. Even after the introduction of Money Market Certificates in June 1978, the total flow of real deposits into thrifts varied sharply and inversely with the overall level of interest rates. Nevertheless, the fact that movements in deposit inflows continued to be associated with changes in interest rates does not necessarily indicate that regulation effectively continues to constrain housing finance. Nor are earlier cycles in deposit flows *necessarily* evidence of effectively binding regulatory constraints in those periods.

Deposit inflows to thrifts would tend to follow a cyclical pattern in response to variations in interest rates even in a completely unregulated financial environment. Outflows of deposits could still occur

Chart 1

Real Deposits at Thrift Institutions

(Quarterly Percent Change at Annual Rates)
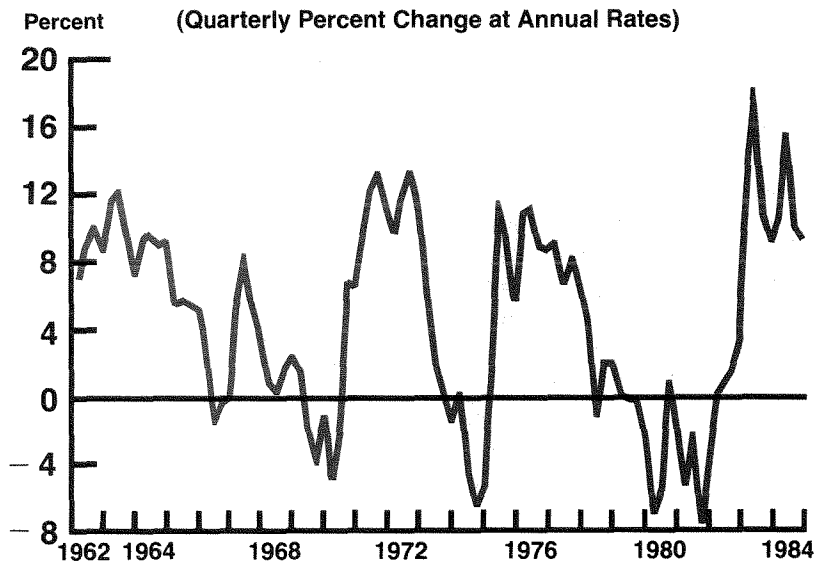
in such an environment when the *demand* for mortgage finance is curtailed by high levels of mortgage rates, thus reducing the amount of deposits that thrift institutions are willing to supply.

In Section III, we will estimate the impact that regulatory constraints have had on residential investment through restricting the supply of mortgage credit from thrifts. As part of this analysis, we examine whether credit availability effects at thrifts continued to play a role after 1978 or whether the fluctuation in deposit flows at thrifts in the post-1978 years was purely demand-induced.

II. An Empirical Model of Residential Investment

In this section, we develop an econometric model of residential investment in which the demand of housing in combination with the current stock of housing determines the current relative price of housing. The amount of residential investment then responds to the profitability of construction as determined by the relative price of housing[7].

We begin with an analysis of the determinants of the demand for the stock of housing. The per capita real demand for the stock of housing is assumed to depend upon per capita permanent real disposable income and the nominal user cost of capital in housing relative to the general price level. Thus,

$$\frac{K^*}{N} = b_0 \left(\frac{YDP}{N}\right)^{b_1} \left(\frac{P_u}{P}\right)^{-b_2} \tag{1}$$

where K^* = quantity of housing demanded in 1972 dollars

N = population

YDP = permanent disposable income in 1972 dollars[8]

P_u = nominal user cost of housing capital

P = general price level.

The nominal user cost of housing capital, P_u, is the per period payment for capital and is analogous to a wage rate for labor. In the absence of taxes, the nominal user cost in the current period can be shown to be proportionate to the asset price of housing according to the formula:

$$P_u = P_h(i - \dot{p} + d) \tag{2}$$

where: P_u = nominal user cost of capital

P_h = asset price of housing

i = market rate of interest

$\dot{p}$ = expected rate of inflation

d = rate of physical depreciation of housing assets.

Thus, the nominal user cost, P_u, equals some fraction of the asset price of housing, P_h, determined by the market rate of interest, i, the expected rate of inflation, $\dot{p}$, and the rate of physical depreciation, d. The rate of interest, i, is equal to the nominal cost of capital so that $i - \dot{p}$ is the corresponding real long-term rate of interest.[9] The ratio of the nominal user cost to the asset price of housing (equal to $i - \dot{p} + d$) is referred to as the real user cost, UC.

The real user costs for owner-occupied and rental units differ because of the effects of taxation.[10] We employ a weighted average of these costs — with weights of three-fourths and one-fourth, respectively — to obtain the aggregate real user cost, UC. P_u from equation 2 can then be substituted into equation 1 to obtain:

$$\frac{K^*}{N} = b_0 \left(\frac{YDP}{N}\right)^{b_1} \left(\frac{UC \cdot P_h}{P}\right)^{-b_2} \tag{3}$$

or

$$\ln K^* = \ln b_0 + 1 - b_1 \ln N + b_1 \ln YDP - b_2 \ln UC - b_2 \ln\left(\frac{P_h}{P}\right) \tag{3a}$$

Thus, the stock of housing demanded is a function of population, permanent disposable income, and the real asset price of housing, as well as tax factors, the depreciation rate, and the real interest rate contained in the real user cost ratio, UC.

In the short-run, the current stock of housing, K, is fixed, and the real asset price of housing, P_h/P, adjusts to clear the market for housing, as shown in Panel A of Figure 2. Setting K equal to K* and rearranging terms, this equilibrium condition implies:

$$\ln\left(\frac{P_h}{P}\right) = \frac{1}{b_2}\ln b_0 + \frac{1-b_1}{b_2}\ln N \qquad (4)$$
$$+ \frac{b_1}{b_2}\ln YDP - \ln UC - \frac{1}{b_2}\ln K$$

With a given stock of housing, an increase in population or permanent income drives up the real asset price of housing until the higher relative user cost equates the quantity demanded with the available stock. Conversely, an increase in the current housing stock reduces the real asset price, and hence the relative user cost, until the increase in the quantity demanded equals the increase in the stock available. Finally, a change in the real interest rate, the effective tax on the cost of capital, or the depreciation rate would produce offsetting changes in the real asset price of housing until the relative user cost is the same as before.

The supply of residential investment in the model is characterized by a conventional supply function. Because of capacity constraints, marginal costs increase with the rate of construction. The amount of building is therefore an increasing function of the real asset price of housing, scaled by the size of the existing capital stock:
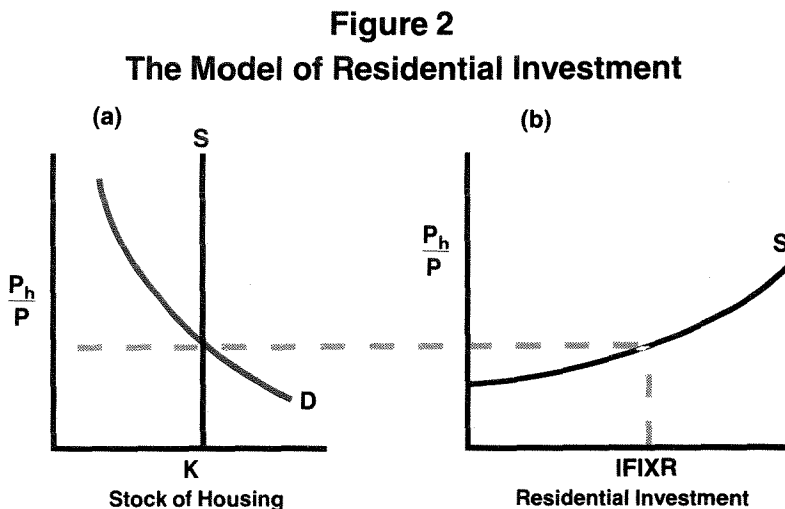
$$IFIXR = a_0\left(\frac{P_h}{P}\right)^{a_1} K \qquad (5)$$

or

$$\ln IFIXR = \ln a_0 + a_1 \ln\left(\frac{P_h}{P}\right) + \ln K \qquad (5a)$$

This supply function for residential investment is shown in Panel B of Figure 2. Gross real residential investment can therefore be obtained by substituting the determinants of the real asset price of housing in equation 4 into equation 5a, giving.

$$\ln IFXR = \ln a_0 + \frac{a_1}{b_2}\ln b_0 \qquad (6)$$
$$+ \frac{a_1}{b_2}(1-b_1)\ln N$$
$$+ \frac{a_1 b_1}{b_2}\ln YDP - a_1\ln UC$$
$$+ \left(1 - \frac{a_1}{b_2}\right)\ln K$$

Figure 2
The Model of Residential Investment

(a)

$\frac{P_h}{P}$

K
Stock of Housing

(b)

$\frac{P_h}{P}$

IFIXR
Residential Investment

Several modifications were made to this basic equation to reflect institutional realities in the housing market. First, a dummy variable, CC, having a value of 1 for the second and third quarters of 1980 and zero otherwise, was added to capture the effect of President Carter's credit control program that caused a temporary decline in the availability of credit. Second, all the explanatory variables were lagged three quarters to allow for an interval between a change in underlying supply and demand conditions and the response of housing asset prices and building activity.

A third modification was a change in the measurement of the real user cost. In principle, this measurement should contain the real after-tax mortgage rate and non-price terms of mortgage credit. However, mortgage rates tend to move sluggishly, with most adjustment in the short-run taking place in the hard-to-measure nonprice terms of credit. Therefore, a distributed lag on the real after-tax 6-month commercial paper rate was used instead.[11] The real after-tax commercial paper rate was first used to define the user cost for owner-occupied and rental housing. Then the resulting real aggregate user cost, UC, was entered into the investment equation in distributed lag form. The best fitting distributed lag was three quarters in length. This lag covers the interval between changes in short-term interest rates and the response in the cost of mortgage credit as well as the time it takes for builders to respond to the resulting change in housing prices. Also, short-term interest rates enter directly into the construction costs of builders.

III. Testing for Credit Availability Effects

The model of residential investment in the preceding section assumes that housing construction is driven by the demand factors determining housing prices and the response of builders to the profitability of new construction. The availability of credit to housing was not viewed as an additional constraint on residential investment. More specifically, the real after-tax interest rate in the real user cost of housing capital was assumed to depend only upon open market interest rates (as represented by the 6-month commercial paper rate) and not on variables specific to housing.

Previous researchers, in contrast, have found evidence of significant credit availability effects on residential investment in three periods: 1966.Q3-1967.Q1, 1969.Q3-1970.Q3, and 1973.Q4-1975.Q2.[12] As shown in Chart 1, these periods correspond to times of severe disintermediation at thrift institutions, when Regulation Q ceilings were binding and growth in real deposits fell to less than a 1-percent annual rate. If restrictions on credit availability resulting from deposit outflows were not fully offset by adjustments of thrift institutions themselves or by increased quantities of credit from other lenders in the mortgage market, the user cost of housing capital would rise by significantly more than open market interest rates in these periods. A greater reduction in housing demanded and residential investment than could be captured by the model would result; and the model's prediction error in these periods would tend to be associated with the extent of deposit outflows.

Even after the major relaxation of Regulation Q ceilings in June 1978 that allowed the introduction of Money Market Certificates, thrift institutions suffered another major slowing in deposit flows between 1979.Q3 and 1982.Q1. For this most recent period, a question of particular importance is whether the remaining regulatory constraints contributed significantly to the slowdown in deposit flows or whether the slowdown reflected only the response of housing *demand* to variations in the general level of real interest rates. As shown earlier, even in an unregulated market, thrift institutions would be expected to raise their deposit rates less than other market rates when higher real interest rates produce a contraction in residential investment. Deposit flows would slow as a result, even in the absence of significant credit availability effects on housing.

We tested for the presence of credit availability effects on residential investment by adding variables to the basic model that have values equal to the percentage change in real deposits at thrift institutions, lagged either 1 or 2 quarters (DF1 and DF2), for each period of severe disintermediation, and a

value of zero otherwise.[13] The same deposit flow variables for all the other remaining quarters (DF1:OTHER and DF2:OTHER) were also included as controls to make sure that lagged deposit flows were not picking up normal variations in residential investment not adequately captured by the basic model. Finally, since the relationship between credit availability effects and deposit flows is hypothesized to be a marginal one occurring only in periods of severe disintermediation, dummy variables (DUM) allowing for shifts in the intercept term were also entered for each period of severe disintermediation. The resulting estimate of the complete model (with t statistics given in parentheses) is shown as equation 1 in the table.

The explanatory variables in the basic model all have theoretically plausible signs and are statistically significant at greater than the 1 percent level. In addition, the Carter credit controls have a significant impact, even if only for a brief period. Most importantly, the deposit flow variables measuring potential credit availability effects on residential investment are statistically significant at either 1 or 2 lags in each of the first three periods of severe disintermediation, but not in the fourth period that occurred after the introduction of Money Market Certificates in 1978.

Although the deposit flow variable at 2 lags in the first period of disintermediation (DF2: 66-67) is significant at only the 15 percent level in equation 1 of the table, it becomes significant at better than a 1 percent level when other insignificant variables are dropped, as shown in equation 2 of the same table. The deposit flow variable at 2 lags for the third period of disintermediation (DF2: 73-75) is significant at only the 10 percent level in both equations 1 and 2. To simulate the effect of financial deregulation, we accept the hypothesis of credit availability effects in that period even though the statistical basis for doing so is somewhat weak. This assumption tends to maximize the potential effect that financial deregulation can have on the simulated behavior of the economy.

Finally, neither of the deposit flow variables for the remaining quarters (DF1:OTHER and DF2:OTHER) is statistically significant. The lack of statistical significance for these control variables indicates that the deposit flow variables in periods of

Estimated Model of Real Residential Investment
(Sample Period: 1962.Q1 - 1984.Q4)

Terms	Equation 1	Equation 2
Constant	−85.0 (−3.35)*	−80.1 (−3.65)*
$\ln N_{-3}$	12.7 (3.60)*	12.0 (3.96)*
$\ln YDP_{-3}$	2.21 (2.38)*	2.58 (3.19)*
$\sum_{i=0}^{3} \ln UC_{-i}$	−1.05 (−4.13)*	−1.15 (−5.55)*
$\ln K_{-3}$	−11.0 (−3.85)*	−10.7 (−4.40)*
CC	−.125 (−3.43)*	−.127 (−4.38)*
DF1: OTHER	−.0226 (−.169)	
DF2: OTHER	−.0551 (−.411)	
DUM: 66-67	−.104 (−3.46)*	−.107 (−3.84)*
DF1: 66-67	−2.14 (−.497)	
DF2: 66-67	1.53 (1.11)	2.22 (3.56)*
DUM: 69-70	−.0142 (−.524)	
DF1: 69-70	1.53 (2.69)*	1.52 (3.13)*
DF2: 69-70	.182 (.409)	
DUM: 73-75	−.00402 (−.134)	
DF1: 73-75	−.00392 (−.00751)	
DF2: 73-75	.631 (1.23)	.554 (1.22)
DUM: 79-82	.00521 (.180)	
DF1: 79-82	−.0136 (−.0282)	
DF2: 79-82	.285 (.686)	
e_{-1}	1.25 (11.0)*	1.21 (11.2)*
e_{-2}	−.302 (−2.80)*	−.265 (−2.61)*
$\bar{R}^{-2}$	.965	.969
SER	.0352	.0334
D.W.	2.09	2.07

t-statistics in parentheses.
*Significantly different from zero at the one percent level.

severe disintermediation are not simply picking up normal variations in residential investment not adequately captured by the basic model.

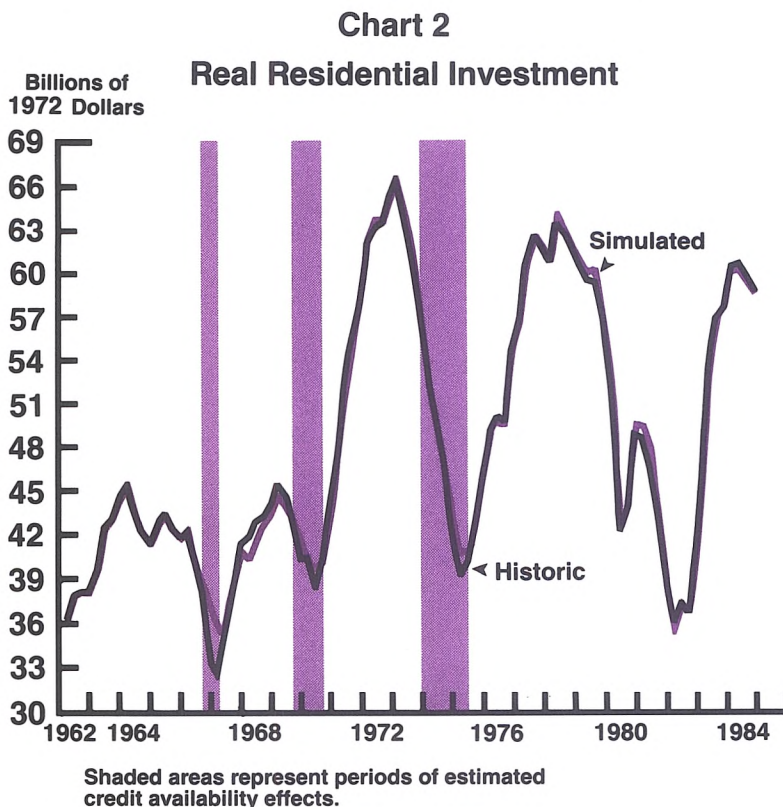Thus, the evidence indicates that financial regulation created distinct credit availability effects during periods of severe disintermediation at thrifts prior to 1978 but not afterwards, and that the extent of these credit availability effects was closely related to marginal variations in deposit inflows.[14]

IV. Simulated Effects of Financial Deregulation

Although credit availability effects on housing appear to have been present in periods of disintermediation prior to 1978, the quantitative magnitude of these effects and their impact on the cyclical behavior of both residential investment and interest rates remains to be examined. For this purpose the model of residential investment estimated in equation 2 of the table, including significant deposit flow effects, was embedded in a small-scale structural model of the economy.[15] Historical errors in each equation of the model were added back so that a dynamic simulation could replicate history exactly. Then, the degree to which financial deregulation would have made interest rates more volatile and lessened the severity of the housing cycle was determined by setting the coefficients of the deposit flow variables (including intercept dummies) in equation 2 equal to zero and re-simulating the model. The paths of monetary growth, as measured by M1, and all other exogenous variables were kept unchanged in the simulation, giving interest rates full scope to adjust.[16]

The key short-term interest rate in the model that drives the general level of interest rates is the 6-month commercial paper rate. Charts 2 and 3 show the difference between the historical paths of real

Chart 2
Real Residential Investment

Billions of 1972 Dollars

Shaded areas represent periods of estimated credit availability effects.

residential investment and the real 6-month commercial paper rate over the 1962 to 1984 period compared to those resulting from the simulation where no credit availability effects are allowed to operate through deposit flows. In that simulation, the lack of any credit availability effects directed specifically at housing in periods of tight credit reduces the cyclical variability of residential investment. While the absence of such credit availability effects put greater pressure on the general level of interest rates in those periods, it also tends to dampen interest-sensitive expenditures in *all* sectors of the economy and not in housing alone. The result is a net benefit for housing as the impact of tighter credit conditions is more evenly distributed.
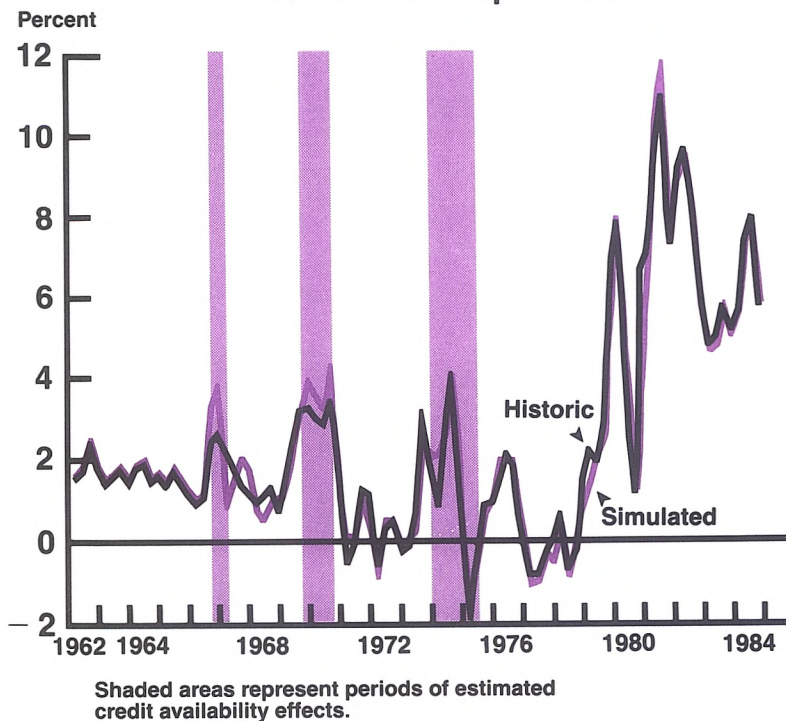
An absence of credit availability effects was simulated to increase residential investment by up to 12 percent in some quarters during the periods of severe disintermediation in 1966.Q3-1967.Q1, 1969.Q3-1970.Q3 and 1973.Q4-1975.Q2. However, because of the overall sensitivity of the demand for housing to interest rates and the fact that

Regulation Q ceilings were binding during only part of the historical period, the reduction in the *overall* cyclical variability of residential investment resulting from the elimination of credit availability effects is estimated to be relatively small.

A quantitative measure of cyclical variability is the standard deviation in percentage terms of a variable from its trend. The lower this standard deviation, the less the variability. For the period 1966 to 1975, the standard deviation of residential investment from its trend fell from 18.9 percent to 18.3 percent in the simulated absence of credit availability effects, reducing overall variability by only 3.2 percent.

Both this statistic and a visual examination of Chart 2 confirm that the major reason for cycles in residential investment in the past has been the relatively high sensitivity of housing demand to interest rates rather than the credit availability effects caused by interest rate ceilings and other financial regulations.

Chart 3
Real Commercial Paper Rate

Shaded areas represent periods of estimated credit availability effects.

At the same time that it has reduced the variability of residential investment, financial deregulation has increased the volatility of interest rates. The simulation shows that, in the absence of the credit availability effects associated with interest rate ceilings and other financial regulations, real interest rates would have risen by somewhat larger amounts in periods of tight credit. However, because credit availability effects are estimated to be quite small, the overall increase in the variability of real interest rates is also relatively small. Thus, in the 1966 to 1975 period, the standard deviation of the real commercial paper rate from its mean rose from 131 basis points in the historical observation to 141 basis points in the simulation, giving only a 7.6 percent increase in the variability of real short-term interest rates.

The removal of credit availability effects in past periods of tight credit would have raised real GNP somewhat in those periods. This is because the boost to interest rates from eliminating credit availability effects would have raised the income velocity of M1. With an unchanged path of growth for M1, the rise in its income velocity would have raised the level of GNP. Thus, the higher level of residential investment would not have been fully offset by reductions in other types of interest-sensitive expenditures. Since periods of significant credit availability effects tended to coincide with either growth recessions or actual recessions, financial deregulation would have had an overall stabilizing effect on the economy. The overall degree of cyclical variability as measured by the standard deviation of real GNP from trend in percentage terms would have been reduced only slightly, however — from 3.0 percent to 2.97 percent in the simulation. Thus, we estimate that eliminating credit availability effects would have stabilized the economy as a whole to an even smaller degree than it would have moderated cycles in residential investment.

V. Conclusions

Thrift institutions supplying nearly half of the total credit needs of housing have experienced recurrent bouts of deposit outflows during periods of high interest rates. Earlier periods of disintermediation at thrifts appear to have been related mainly to the effects of Regulation Q ceilings. However, even after the substantial relaxation of Regulation Q ceilings in 1978 allowing the introduction of Money Market Certificates, thrifts experienced deposit outflows in the next period of high interest rates. Manifestly, disintermediation at thrifts can occur with or without pervasive Regulation Q ceilings. Indeed, since residential investment is highly interest-sensitive, strong cycles in deposit flows at thrifts would be expected to occur even in completely unregulated markets since the thrifts' needs for deposits vary with the amount of mortgage loans demanded.

In general, analysts have linked significant credit availability effects on residential investment with earlier periods of disintermediation. However, even in those periods of disintermediation, the flow of credit to housing need not have been reduced if thrifts could have sold off assets in secondary markets or borrowed from government agencies while other lenders provided alternative sources of housing finance. Similarly, the disintermediation occurring at thrifts after 1978 does not necessarily indicate significant credit availability effects. The extent of credit availability effects in both the earlier and more recent periods is an empirical issue.

We have tested for the influence of disintermediation at thrifts on residential investment in the context of an econometric model of the housing market. Statistically significant credit availability effects on residential investment were found for the periods of 1966.Q3-1967.Q1, 1969.Q3-1970.Q3, and 1973.Q4-1975.Q2, but not for the most recent period of disintermediation, 1979.Q3-1982.Q1, which followed a substantial relaxation of Regulation Q.

Regulatory restrictions are estimated to have reduced residential investment by up to 12 percent in some quarters during the three earlier periods. However, those periods were relatively short, and residential investment is highly cyclical even in the absence of credit availability effects. As a result, we estimate regulatory restrictions to have accounted for only about 3 percent of the total variability of residential investment in the 1965 to 1975 period.

Credit availability effects on housing, when they were found, were estimated to have reduced the overall variability of real short-term interest rates by only 7 to 8 percent. This reduction in the volatility of interest rates resulted from financial regulations that tended to concentrate the effects of tight credit on residential investment. Conversely, financial deregulation since the mid-1970s has increased the volatility of interest rates, but only to the same modest degree of 7 to 8 percent. The much higher variability in real interest rates experienced since the late 1970s cannot be explained by the estimated effects of financial deregulation.

FOOTNOTES

1. More than a decade ago, Duesenberry (1969) anticipated that financial deregulation would result in more variation in interest rates over the business cycle. More recent discussions of this point are Lombra (1984) and Keaton (1986). The quantitative importance of this effect has been a matter of considerable dispute, however. Two extreme views are Arcelus and Meltzer (1973) and Wojilower (1980).

2. These two points are most easily demonstrated in the simplest case where the total supply of credit to the two markets is fixed. Since there is a smaller increase in open market interest rates, and hence movement along the demand curve, D'_o, when the deposit rate is controlled, there is a larger increase in credit supplied to the open market. Given that the aggregate supply of credit is fixed, the quantity of credit supplied to the mortgage market must then fall to a larger extent when deposit rates are regulated.

Introducing some positive response of the total supply of credit with respect to interest rates increases the size of the impact of deposit rate ceilings on the availability of credit to housing. In this situation, the amount of credit available to the mortgage market declines by more when deposit rates are regulated not only because the rise in the interest rate paid by the competing open-market sector is less, but also because the total amount of credit available to both sectors is reduced by the relatively lower interest rate.

3. The important distinction between this type of disequilibrium credit rationing and that which can occur even in market equilibrium is discussed in Baltensperger (1978).

4. Useful surveys of the impact of government-sponsored agencies on the mortgage market include Grebler (1977), Hicks (1978), and Hendershott and Villani (1977, Ch. 3).

5. The effect of the introduction of Money Market Certificates on housing starts in the 1978-79 expansion has been explored in Jaffee and Rosen (1979). A limitation of this study is that the introduction of Money Market Certificates is assumed to have no effect on the general level of interest rates. More specifically, in their simulation, the Federal Reserve is assumed to follow an interest rate target. However, when the Federal Reserve targets the stock of money, rather than interest rates, the stimulus to housing from the introduction of Money Market Certificates (or other relaxations of restrictive regulations) would be blunted by upward pressure on market interest rates. The present study allows for such interest rate effects by incorporating a model of residential investment into a complete macroeconomic model.

6. The details and economic implications of the Deregulation and Monetary Control Act of 1980 are analyzed in Cargill and Garcia (1982).

7. For further elaboration of this approach, see De Leeuw and Gramlich (1969) and Kearl (1979).

8. Permanent disposable income is calculated as a 15-quarter distributed lag on disposable income with geometrically declining weights adjusted for the trend in income:

$$YDP = \sum_{i=0}^{15} (1-\alpha) \, \alpha^i \, (1+T)^i \, YD_{-i}$$

The parameter α, chosen to minimize the error in the equation, is equal to 0.5.

9. Hall (1977) and Jorgensen (1963) offer a different interpretation of this formula in which the appropriate interest rate is the real short-term rate even though the capital good is a long-lived asset. For criticisms of their approach and support for the more traditional one, see comments and discussion in Hall (1977) and Throop (1984).

10. Income from rental housing is taxed at the rate, c, applicable to either corporate or individual income after deductions are made for depreciation. If the present value of depreciation allowances per dollar of investment is denoted by z, the nominal user cost of capital invested in rental housing can be shown to be:

$$P^r_u = P^r_h \left[\frac{(1-cz)}{1-c} \right] [(1-c)i - \dot{p} + d + tp(1-c)] = P^r_h \cdot UCR$$

where tp is the property tax rate.

The return on owner-occupied capital takes the implicit form of the services provided, and therefore is not taxed. Consequently, the nominal user cost of owner-occupied housing capital is:

$$P^o_u = P^o_h [(1-t)i - \dot{p} + d + tp(1-t)] = P^o_h \cdot UCO$$

The appropriate tax rate, t, for owner-occupied housing is the average marginal tax rate for households, while the higher valued corporate tax rate is used for rental housing. For derivations of these formulas, see Ott, Ott, and Yoo (1975) or Throop (1984).

Data on the stock of housing, the corporate tax rate, the property tax rate, and the present value of depreciation come from the Board of Governors. The data series for the average marginal tax rate on household income is from Barro and Shahasakul (1983). The latter series has been updated by the Economics Research Group of Goldman Sachs and the author.

11. The estimated equation for forecasting U.S. inflation over the maturity of the 6-month commercial paper rate is:

$$\dot{p}_{i+2} = -.141 + .463 \sum_{i=0}^{16} M1_{-1} + .552 \sum_{i=0}^{10} \dot{p}_{-i}$$
$$(-.486) \qquad (3.11) \qquad (4.24)$$

$$R^2 = .812 \quad S.E. = 1.26 \quad D.W. = 1.09$$

Equations based on monetary growth overpredict inflation in 1982 and 1983 by a substantial margin because of an unusual decline in M1 velocity. However, because the demand for M1 was stable, the decline in M1 velocity can be explained statistically by the decline in inflation and nominal interest rates that occurred in the period. When M1-growth is adjusted for this effect, it continues to predict the growth of nominal income and inflation reasonably well. Consequently, for this period, an adjusted M1-growth was used in the inflation forecasting equation instead of actual

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M1-growth. The adjustment factors that were used are described in Judd and McElhattan (1983). For an analysis of the effect of the decline in velocity on inflation and why it occurred, see Throop (1984a,b).

The expected inflation term in the real interest rate was given a weight of only one-half, which effectively weights the real interest rate by one-half and the nominal interest rate by one-half. This weight was determined by fitting the model with weights on expected inflation ranging from zero to one. The significance of the nominal interest rate is due to the fact that a higher ratio of nominal mortgage payments to current income makes borrowers less able to borrow and lenders less willing to lend.

12. See, for example, the housing sector in the MPS econometric model of the U.S. economy, as described in Brayton and Mauskopf (1985).

13. The exact periods of severe disintermediation are defined as intervals of less than 1-percent growth in real deposits with a 1-quarter lag to allow for the time between a change in deposit flows and significant effects on expenditures.

14. These results do not appear to be particularly sensitive to the precise methodology used. For example, ordinary dummy variables take on significantly negative signs during the first three periods of severe disintermediation, but are not generally significant in either the fourth period of severe disintermediation or in the control period. Moreover, the size of the estimated quantitative effects on residential investment in the first three periods obtained by using dummy variables is roughly the same as that estimated with deposit flow variables.

The finding of an absence of credit availability effects after 1978 is consistent with the work of Jaffee and Rosen (1979) and Furlong (1985). Jaffee and Rosen found that the growth rate of small-denomination deposits at savings institutions had a significant impact on mortgage rates prior to 1979, but Furlong shows that this relationship ceased to hold in subsequent years.

15. The theory underlying the model follows the mainline neo-Keynesian view embodied in most large-scale structural econometric models. In the short-run, the slow speed of adjustment of wages and prices allows monetary policy and other factors to influence real interest rates, which, in turn, drive real aggregate demand and output. However, in the long-run, real interest rates are determined by the balance between saving and investment at full employment. Particular attention is paid in the model to the way that real interest rates enter into the cost of capital for specific types of investment.

An earlier version of this structural model of the economy is described in summary form in Throop (1985) and in greater detail in Throop (1984c). Both publications are available upon request. Additional equations for the demand for M1, the unemployment rate, the share of personal disposable income in GNP, and the inflation rate have been included in the current version of the model. A complete description of the current version and simulations of its dynamic properties will be published in a forthcoming issue of the *Economic Review*.

16. Actual values of M1 could not be reproduced exactly in this simulation of the effects of deregulation because of the dynamic properties of the model. Interest rates affect both the demand for M1, given the level of income, and the level of income itself, with distributed lags. Thus, only a fraction of the total direct and indirect effects on M1 from a change in interest rates occurs within the current period.

If interest rates were changed enough to hit an M1 path exactly in the current period, then the lagged effects of the change in interest rates would have to be offset in future periods, resulting in future interest rate movements in the opposite direction. To reproduce the M1 path exactly in each period may require ever larger changes in interest rates over time. This is an example of instrument instability. See, for example, Holbrook (1972). A degree of interest rate smoothing was therefore required. Still, the average deviation of simulated M1 from historical M1 was only half a billion dollars.

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