Vol. 27, No. 3

ECONOMIC REVIEW

1991 Quarter 3

FEDERAL RESERVE BANK OF CLEVELAND

ECONOMIC REVIEW

1991 Quarter 3
Vol. 27, No. 3

Economic Review is published quarterly by the Research Department of the Federal Reserve Bank of Cleveland. Copies of the *Review* are available through our Public Affairs and Bank Relations Department, 216/579-2157.

Coordinating Economists:
Randall W. Eberts
James B. Thomson

Editors: Tess Ferg
Robin Ratliff
Design: Michael Galka
Typography: Liz Hanna

ISSN 0013-0281

Is There Any Rationale for Reserve Requirements?

by E.J. Stevens

E.J. Stevens is an assistant vice president and economist at the Federal Reserve Bank of Cleveland. The author thanks Randall Eberts, William Gavin, Joseph Haubrich, and Robert Rasche for useful comments, and Diana Dumitru for invaluable research assistance.

Introduction

Reserve requirements have been part of the regulatory apparatus of banking in the United States for more than a century and a half. No matter what their original purpose may have been, maintaining the burden of reserve requirements needs a contemporary rationale that can justify the problems they create.

The problems attributed to reserve requirements are woven into the fabric of financial markets. The burden of meeting the regulation appears to vary unfairly among banks of comparable size. Financial institutions not subject to the regulation engage in many of the same activities as those required to hold reserves. Legislative efforts to overhaul the nation's banking and financial system would be easier if reserve requirements could be eliminated from the set of issues to be considered. Financial reform aside, reducing or eliminating these requirements might be a way to improve the profitability of banking and the willingness of banks to extend credit while under pressure to improve capital. Moreover, even if problem loan and inadequate capital matters were resolved, many analysts believe that reserve requirements still would impair the international competitiveness of U.S. banks.

Two obvious approaches to removing the burden of reserve requirements are to eliminate them altogether or to pay a market rate of interest on reserve balances. This article deals only with the first approach, exploring various rationales for reserve requirements on the premise that there would be no point in paying a market rate of interest on reserves if there were no rationale for requiring reserves in the first place. Perhaps because the requirements have been part of the structure of depository institution markets for so long, their rationale seems obscure and the effect of their elimination even more so. Recent elimination of a portion of reserve requirements has sharpened the issue.[1] If a partial elimination was good, would not complete elimination be better?

After a brief description of the reserve requirements now in place, the discussion is organized around their three traditional rationales: taxation,

■ 1 In December 1990, the reserve requirement on nonpersonal time deposits of less than one and a half years' maturity and on Eurocurrency liabilities was reduced from 3 percent to zero. In all, the change was estimated to have reduced required reserves by almost $14 billion.

TABLE 1

Reserve Requirement Coverage, Fall 1990

Estimated number of depository institutions	34,200
Below $3.4 million exemption	19,300
Nonreporting	12,100
Reporting annually	6,600
Reporting quarterly	600
Not exempt	14,900
Reporting quarterly	5,700
Reporting weekly	9,200

SOURCE: Board of Governors of the Federal Reserve System.

monetary policy, and liquidity.[2] The Federal Reserve transfers most of its net earnings to the Treasury, amounting to about $23 billion in 1990. The portion of the transfer that can be attributed to the reserve requirement "tax," though only a trivial source of Treasury revenue, has had nontrivial distorting effects on financial markets.

The second rationale, monetary policy, became the explicit and only statutory justification for reserve requirements in 1980, although without the requirements, policy could continue to operate just as it does today. Only if monetary policy were to operate in a way in which it has never operated in the past could reserve requirements be rationalized as a way to improve the short-run accuracy of policy implementation.

Finally, and contrary to traditional assertions, modern reserve requirements serve a short-run liquidity function by ensuring a pool of balances for daily private-market distribution to creditworthy illiquid institutions. This liquidity function can be used as a rationale for reserve requirements, however, only if there is reason to avoid relying solely upon the alternatives of daily open market operations and discount window lending to meet the banking system's liquidity needs.

I. The Facts about Current Reserve Requirements

Federal Reserve Regulation D governs reserve requirements, defining assets eligible to be counted as reserves and liabilities subject to the requirement. The Monetary Control Act of 1980 made these requirements applicable to all commercial banks, mutual savings banks, savings and loan associations, credit unions, agencies and branches of foreign banks, and Edge Act corporations operating in the United States.

Reservable liabilities include transactions deposits (that is, accounts that allow unlimited nonautomatic third-party payments), nonpersonal time deposits, and Eurocurrency liabilities. However, in December 1990 the required reserve ratio was set at zero for all but transactions deposits. Eligible assets include vault cash and reserve deposits held at Federal Reserve Banks. Box 1 provides a more-detailed description of the current reserve requirement accounting system.

More than 34,000 institutions now fall within the purview of Regulation D (see table 1). However, over 19,000 small institutions are essentially unaffected because the Garn–St Germain Depository Institutions Act of 1982 mandates a zero reserve ratio for the first $3.4 million of reservable liabilities of any kind.[3] As a result, many of these small institutions need only complete an annual request for data, which allows the Federal Reserve to monitor compliance and to update estimates of the monetary aggregates.

The remaining 14,900 institutions must comply with reserve requirements on a quarterly or biweekly basis, submitting quarterly or weekly accounting records to the Federal Reserve Banks so that compliance with the regulation can be monitored on an ongoing basis. In addition, these same records provide much of the raw data used in compiling weekly and monthly estimates of the monetary aggregates, including the monetary base, M1, M2, and M3. This information is important both for the Federal Reserve's conduct of monetary policy and for other users' efforts to track Fed policy and the economy. Supervisory authorities monitor reporting accuracy as part of the normal examination process.

■ 2 Goodfriend and Hargraves (1983) present a thorough examination of the evolution of the liquidity and monetary policy rationales, and of the revenue aspects of the tax rationale. My assessment of the various rationales differs from theirs in that I place more emphasis on short-run liquidity considerations and view the tax rationale from a broader perspective than revenue. Revenue is both smaller than might be inferred from their discussion and difficult to defend from avoidance.

■ 3 Initially, the Act set the 0 percent reserve requirement at $2 million of reservable liabilities for each institution, with a provision for annual adjustment. See Board of Governors of the Federal Reserve System (1990), table 1.15, footnote 2.

BOX 1

The Details of Required Reserves Accounting

The Monetary Control Act of 1980 stipulates that only transactions and nonpersonal time deposits are reservable, and mandates a further distinction on the basis of an institution's size. Reserve requirements are different for nonpersonal time deposits than for transactions deposits.

The reserve ratio for nonpersonal time deposits (including Eurocurrency liabilities) may be set within the range of 0 to 9 percent and may vary by the maturity of a deposit.[a] Prior to December 1990, the regulation specified a ratio of 3 percent for deposits with an original maturity of less than one and a half years, and zero for longer maturities; now the ratio is zero for all maturities.

The required reserve ratio for transactions deposits depends on the amount of these deposits on an institution's books: 3 percent of the first $40.4 million (of which up to $3.4 million is exempted) and 12 percent of the amount in excess of the $40.4 million break point.[b] The 3 percent ratio and the break point are determined by law, but the Board of Governors has statutory authority to set the higher ratio within a range of 8 percent to 14 percent.

The transactions deposit reserve required for a weekly reporting institution is computed from the average level of transactions deposits during a two-week computation period that ends every other Monday. Reserve assets eligible to satisfy this requirement are drawn from two sources: 1) the average amount of vault cash held during the two-week period ended 28 days prior to the end of the computation period and 2) the average amount of reserve deposits held during the two-week maintenance period ending on the Wednesday two days after the end of the computation period. This arrangement, with the reserve computation and the reserve deposit maintenance periods overlapping on 12 out of 14 days, is referred to as a "contemporaneous reserve requirement."

The operation of transactions deposit reserve requirements may be more readily understood from the vantage point of a weekly reporting institution managing its reserve position. The institution enters a two-week reserve maintenance period knowing the amount of vault cash eligible to meet its requirement. After the second day of the computation period, the institution can begin to maintain reserve deposit balances against its accumulating transactions deposit requirement. After the second Tuesday of the maintenance period, the institution knows the full amount of reserves it must hold to meet the transactions deposit requirement, as well as the amount of reserve deposits it has held over the first 12 days of the maintenance period. The institution then has the opportunity to adjust its reserve deposit balance on the remaining two days of the period to make reserves held equal to the requirement (plus or minus any eligible carry-in and any desired carry-out).

Quarterly reporting institutions operate on a lagged reserve accounting basis. Computation is based on deposits held during a single seven-day period beginning the third Tuesday of March, June, September, and December of each year. Vault cash held during that same seven-day period is deducted from required reserves. Any remainder becomes the required reserve deposit balance to be held on a daily average basis throughout 13 weekly maintenance periods beginning the fourth Thursday following the end of the computation period and ending the day before the next set of 13 maintenance periods begins.

a. Eurocurrency liabilities are a measure of the net foreign funding of U.S. creditors through international facilities of U.S. institutions and through U.S. facilities of foreign institutions.

b. The break, originally $25 million, must be adjusted no later than December 31 of each year by 80 percent of the percentage increase or decrease in total transactions accounts of all depository institutions in the calendar year ending the previous June 30.

NOTE: A more complete description of reserve accounting can be found in Meulendyke (1989), pp. 127–36.

TABLE 2

Composition of Vault Cash and Deposits at Federal Reserve Banks, All Depository Institutions, May 1991

	Millions of dollars
Total vault cash and deposits	56,514
Required reserves	48,033
Applied vault cash	26,775
Reserve deposits	21,258
Other	8,481
Clearing balances	3,504
Surplus vault cash	3,949
Excess reserve deposits	1,028

NOTE: Data are monthly averages of biweekly maintenance period averages. Vault cash includes only the amount held by those depository institutions subject to reserve requirements. The maintenance period in which vault cash can be used to satisfy reserve requirements ends 30 days after the close of a biweekly computation period during which the vault cash was actually held.
SOURCE: Board of Governors of the Federal Reserve System.

Accurate record-keeping is important to each institution, and not just to avoid supervisory difficulties. Missing the required reserve target can be costly: Reserve deficiencies are penalized at a rate two percentage points above the discount rate, while excess reserves do not earn interest. Some leeway is provided through a carryover provision, however. This allows a weekly reporting institution to carry over (for one period only) a deficiency of up to 2 percent of its required reserves by holding an equivalent amount of excess reserves in the next reserve maintenance period, or to use excess reserves of up to 2 percent in meeting its reserve requirement in the next period.[4]

Required reserves are far larger than depository institutions' holdings of reserve deposits at Federal Reserve Banks for several reasons. First, more than half of aggregate reserve requirements in a typical maintenance period are satisfied by vault cash holdings (see table 2). In fact, many institutions meet more than 100 percent of their requirement in this way. Less than 90 percent of eligible vault cash is actually applied toward meeting requirements; the remainder is surplus vault cash (not included in measured excess reserves) held by institutions whose portfolios are not bound by reserve requirements. These "unbound" institutions, including some of the largest weekly reporters, voluntarily hold cash inventories for their teller stations and automated teller machines that more than satisfy their reserve requirements.

Second, about 15 percent of depository institutions' aggregate deposit balances at Federal Reserve Banks are not in reserve deposit accounts but in clearing accounts that yield earnings credits used to offset charges for Reserve Bank services. Maintaining a clearing account provides direct access to these services for institutions that do not need reserve accounts, or supplements a required balance in order to reduce the likelihood of daylight or overnight overdraft problems. An institution arrives at the appropriate level of its clearing balance, in consultation with its Reserve Bank, on the basis of size and the volume and intraday pattern of its transactions. Once determined, the agreed-upon balance must be maintained on an average daily basis during a reserve maintenance period in the same way as for required reserves.[5]

Finally, about 4 percent of depository institutions' aggregate deposit balances at Federal Reserve Banks are simply excess reserves. Aggregate excess reserves tend to fluctuate around a relatively stable level that is related not to the level of interest rates, but to the distribution of excess reserves among different kinds of institutions in response to calendar-related regularities in payment flows and balance-sheet "window dressing." In effect, the typical excess reserve level is simply the combined "small change" in the accounts of many institutions.[6] On the last day of a maintenance period, each holder of

■ **4** The 2 percent carryover provision gives a bank considerable leeway in the deposit balance it must maintain at the Fed on any single day of a 14-day maintenance period. A bank entering a period with no carryover, meeting 55 percent of its required reserve with vault cash (the recent aggregate average), and holding the required amount of deposits on a daily average basis for 13 days of the period could allow its deposit balance on the fourteenth day to deviate from the daily average required amount by as much as 62 percent (= { [.02 x 14] / [1 – .55] } x 100) and still not waste excess reserves or be penalized for a reserve deficiency. However, any bank that meets more than 72 percent of its required reserve with vault cash would be unable to take full advantage of this leeway to cover a single-day reserve deficiency because to do so would mean holding a negative balance on that day.

■ **5** Earnings credits are calculated from the average federal funds rate for the maintenance period during which balances are held. Clearing balances are subject to the same 2 percent carryover provisions as required reserves. However, earnings credits on clearing balances that are not used to offset service charges during the maintenance period can be carried forward up to 52 weeks.

■ **6** For a recent explanation of the determinants of excess reserves, see Partlan, Hamdani, and Camilli (1986).

excess reserves apparently is either unsure of its exact position, or finds that the federal funds rate is insufficient to offset the cost of placing its small amount of excess funds in the market.[7]

II. The Tax Rationale for Reserve Requirements

In a sense, banks are taxed when they are required to hold more non-interest-bearing eligible assets than they would maintain in the absence of reserve requirements. As already noted, not all banks are in this situation: Some voluntarily hold more reserve assets than required and thus are not bound by the requirements. Moreover, even for bound institutions, not all reserve assets represent involuntary holdings, because banks would undoubtedly hold inventories of vault cash even in the absence of reserve requirements. Apart from these observed and unobserved voluntary holdings, however, reserve requirements must tax some combination of bank owners, depositors, and borrowers.

One could argue that the level of many banks' reserve deposits is not substantially different from that needed for clearing purposes and that reserve deposits are therefore not a tax, even though overnight holdings of Fed deposits do not earn interest. It is more likely, however, that in the absence of binding reserve requirements and with the interest-rate levels typical of the last 40 years, banks would find it cheaper to alter the mechanisms of clearing and settlement than to continue to bear the opportunity cost of holding non-interest-bearing overnight Fed deposits.

The repercussions of the tax depend on its incidence, determined by elasticities both of the supply of reservable deposits and of the demand for loans and other services (hereafter referred to simply as "loans"). At one extreme, if financial markets provided perfect substitutes for banks' reservable deposits and loans (perfectly elastic supply and demand, respectively), the tax could not be passed on to customers, and the incidence of the tax would be on the profitability of banking. This would be reflected in the number and value of bank charters. At the other extreme, if banks were sufficiently unique to ensure that financial markets provided no substitutes for reservable deposits or bank loans (perfectly inelastic supply and demand), the whole tax could be passed along to bank customers, and the incidence of the tax would be on them. Phrasing the matter slightly differently, the more elastic the supply of reservable deposits and the demand for bank loans, the more the tax will distort financial flows by diverting bank business to other financial instruments or markets.[8]

Distortions in the Allocation of Funds

Postwar history provides a wealth of financial developments that can be attributed, at least in part, to the distorting effects of reserve requirements.[9] The Monetary Control Act of 1980 may be viewed as one response to several of these distortions. Until the Act was passed, Regulation D applied only to commercial banks that were members of the Federal Reserve System. Membership was mandatory for national banks but voluntary for state-chartered banks. The burden of meeting reserve requirements was one of the factors thought to have contributed to steady erosion in membership of state banks and in chartering of national banks.[10] The Act extended coverage of reserve requirements to all commercial banks, members and nonmembers alike, in effect reducing elasticities of the supply of reservable deposits and of the demand for bank loans at member banks.

The Monetary Control Act also extended coverage of reserve requirements to thrift institutions. Until 1980, thrifts were subject to less burdensome reserve requirements imposed by

■ **7** Every institution always has an incentive to minimize its excess reserves, because excess reserves earn no interest. The carryover provision of the reserve accounting regulation provides one avenue for an interest-rate influence. For example, if an institution foresees higher interest rates in the immediate future, it might try to use excess reserves to prefinance the allowable portion of its next-period reserve requirement. Alternatively, it might hold excess reserves to offset a deliberate reserve deficiency in the previous maintenance period that was induced by expectations of an interest-rate decline. Such deliberate manipulation cannot exert a continuous influence on a single institution's reserves because neither excesses nor deficiencies can be carried over for more than one maintenance period.

■ **8** Recent discussions of a "credit crunch" sometimes reflect differing views about these elasticities. Those arguing that a crunch should not concern policymakers may assume that the elasticities are large enough to ensure that most borrowers not serviced by banks will be accommodated elsewhere. Those recommending that a crunch be offset through monetary policy and supervisory actions may assume that the elasticities are small enough to ensure that many borrowers not serviced by banks will not be serviced at all.

■ **9** The first (unsuccessful) attempt to legislate federal reserve requirements in the United States was motivated by a desire to "distort" the state-chartered "Pet Banks" out of existence and thereby to defeat Andrew Jackson's repudiation of the Second Bank of the United States (Stevens [forthcoming]).

■ **10** A representative statement of this position can be found in Volcker (1980).

TABLE 3

Allocation of Funds: Secular Growth of Debt Instruments and Lending Sectors, 1952–1990

Debt Instruments	Percentage Change[a]
Credit market debt owed by nonfinancial borrowers in the form of:	
U.S. Treasury and agency securities	6.5
Corporate bonds	8.3
Bank loans	8.8
Consumer credit	8.8
Tax-exempt securities	9.0
Mortgages	10.1
Commercial paper	16.5
Total domestic debt instruments	8.4
Foreign debt instruments	7.8
Domestic plus foreign debt instruments	8.4
Lending Sectors	
Credit market debt claims against nonfinancial sectors held by:	
Commercial banks, including reserves	7.9
Required reserves	2.8
Reserve deposits	1.3
Vault cash	6.7
Commercial banks, excluding reserves	8.3
Private domestic nonfinancial sector	8.3
Insurance and pension funds	8.7
Savings institutions	9.1
U.S. government, agencies, and the Federal Reserve	10.0
Other financial sectors	13.4
Foreign holders	13.7

a. Compound annual rate.
SOURCE: Board of Governors of the Federal Reserve System.

individual states and Federal Home Loan Banks. New England thrifts pioneered in the development of interest-bearing transactions accounts, which were free of member-bank reserve requirements. Member commercial banks, in competition, also devised variations of savings accounts to take advantage both of the lower reserve requirements on savings than on transactions deposits and of the ability to pay interest on savings accounts.[11]

Of course, reserve requirements were not the only force at work in shifting deposits from member banks to nonmember banks and thrift institutions, and from transactions accounts to variants of savings accounts. High nominal interest rates in an inflationary environment certainly stimulated efforts to avoid both the prohibition of interest on demand deposits and the opportunity cost of holding non-interest-bearing required reserves. The increasing power and declining cost of telecommunications technology made it economically feasible to sweep balances back and forth between accounts and institutions in order to minimize reservable balances and to pay interest. But member banks' desire to avoid reserve requirements on particular kinds of deposits was clearly an important factor in the evolving distribution of funds among types of accounts and types of depository institutions, as well as between deposits and safe, liquid securities.

Furthermore, the distorting effect of reserve requirements has not been restricted to the deposit side of intermediaries' balance sheets. In the 1960s, sales of loans to a bank's affiliates, with affiliate financing from nondeposit sources such as commercial paper, assumed substantial scale. One clear advantage of this arrangement was that it enabled a banking organization to avoid the reserve requirement, until the requirement was extended to this source of funding in 1970. The same was true of loans booked at foreign affiliates and funded by offshore dollar deposits, until reserve requirements were expanded to cover this distortion also.[12]

Today, an analogous pattern of financing carried out by unaffiliated foreign banks is cited as evidence that reserve requirements place domestic banks at a disadvantage in competing with foreign banks. Similarly, growth of the commercial paper market and of direct lending by life insurance companies and pension funds, all relative to slower secular growth of bank lending, is cited as evidence of reserve requirements' possible distorting effect on the pattern of financial intermediation and credit flows in the economy.

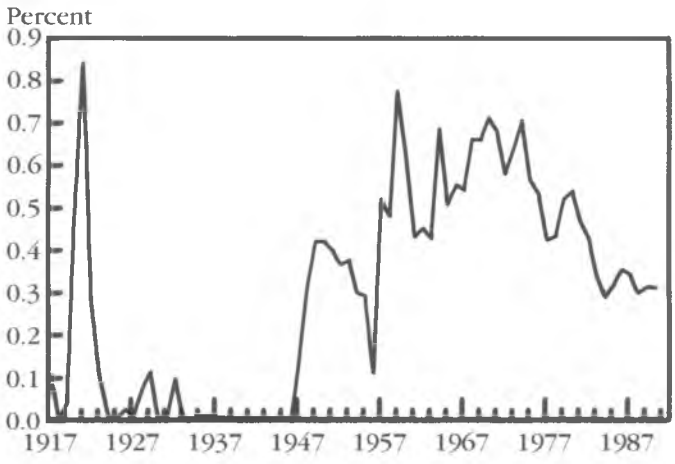
Some suggestion of distortion can be seen in data from the Flow of Funds Accounts, available on a consistent basis since 1952 (table 3). This information can only describe *what has been*, not *what would have been* in the absence of reserve requirements. The trend of bank loan

■ **11** Distortions of this kind were not unique to the postwar period. The low 3 percent reserve requirement against time and savings deposits after 1917 led to cases "... where, to meet the competition of State savings banks, some member banks ... devised a special savings account on which checks [could] be drawn without the presence of the depositor at the bank. These accounts [were] evidenced by savings passbooks in which the bank reserve[d] the right to require 30 days' notice before making payment on a withdrawal. When the account [was] opened, a duplicate passbook [was] left with the bank, which enter[ed] therein the amount of each withdrawal at the time checks on these accounts [were] presented for payment." See Committee on Bank Reserves of the Federal Reserve System (1931), p. 15.

■ **12** These provisions are discussed in Board of Governors of the Federal Reserve System (1971), p. 19.

FIGURE 1

Reserve Requirement Tax as a Percentage of Government Receipts



NOTE: For further explanation of the estimates plotted here, see appendix.
SOURCES: U.S. Treasury Department; Office of Management and Budget; and Board of Governors of the Federal Reserve System.

growth has been lower than the growth trends of mortgages, tax-exempt securities, commercial paper, and other miscellaneous instruments; only the lower growth trend of government and agency securities allowed bank loan growth to be slightly higher than for all debt instruments combined. Commercial bank holdings of claims on all nonfinancial borrowers — a rough measure of the size of the banking system from the asset side of the balance sheet — have grown somewhat more slowly than the holdings of any other intermediary group. More striking is evidence of successful efforts to minimize the reserve requirement tax: The combined reserve deposits and vault cash assets of commercial banks have grown at only about one-third the rates of growth of bank loans and, indeed, of the banking system, largely because the growth rate of reserve deposits has averaged only 1.3 percent since 1952.

The Nature of the Tax

A pure revenue, "seigniorage" rationale for the reserve requirement tax seems weak. Congress has not shown a strong interest in using reserve requirements as a deliberate means of raising revenue. As noted in the preceding section, erosion of the tax base, reflecting the competitive ingenuity that is characteristic of private markets, was repaired by the Monetary Control Act of 1980. However, because this repair was accompanied by reduced tax rates (required reserve ratios), revenues attributable to reserve requirements have not kept pace with other Treasury revenues. As a percentage of Treasury revenue, the tax has never yielded as much as 1 percent and has fallen by more than half since 1974, averaging slightly less than four-tenths of 1 percent in the 1980s (figure 1).[13]

Calling reserve requirements a tax may be something of a misnomer because their rationale may not be revenue, but an implicit license, or user, fee. Just as trucks pay taxes to use the nation's highways, so too may banks (more properly, *depository institutions* since 1980) pay a reserve requirement tax to use unique government services. These include the Federal Reserve services of settlement, same-day irrevocable wire transfer of balances (allowing direct access to the federal funds market), and access to the discount window.[14]

Meeting reserve requirements, however, has not been closely related to use of the nation's central bank services. Nonpersonal time deposit liabilities were one basis for setting the user fee prior to December 1990, but those financial instruments are little different from some of the instruments used in financing nonbanks, which are not subject to the fee. In this sense, institutions subject to the user fee obtained nothing that was not available to institutions not subject to the fee. Since December 1990, the relationship has been closer. A depository institution's corporate charter includes the right to issue transactions deposits; money market mutual funds and credit card services offer closely competing products that limit banks' ability to transfer the tax to holders of transactions deposits. With the ability to issue taxed deposits come associated rights to Federal Reserve services, although there is no necessary connection between the amount of central bank services a bank uses and its tax payment.

■ **13** These same tax estimates have been in an 8.5 percent to 10.5 percent range of after-tax bank profits since 1982 (using actual losses and recoveries rather than provisions for loan losses as the relevant expense item in calculating profit).

■ **14** This view is made explicit in the suggestion that reserve requirements be based not on the level of deposits, but on activity in deposit accounts (Jacoby [1963]). Mayer (1966) presents a different argument: Reserve requirements are an excise tax on the implicit return to holders of non-interest-bearing deposits. He suggests that the tax is a "second-best" way to avoid distorting resource allocation in a world replete with sales and excise taxes on the explicit prices of other items. This assumes, however, that the incidence of the tax is on depositors, which need not be the case if good substitutes are available.

If reserve requirements are indeed an implicit user fee, they are for access only. With few exceptions, explicit fees for Reserve Bank payment services cover the full cost of their provision. Stripping away these services, if the reserve requirement tax is to be considered a user fee, it must be a fee paid for the right to use a Federal Reserve deposit account to settle transactions and for access to the discount window as the lender of last resort.

The tax rationale for reserve requirements is weak. While the requirements have some of the characteristics of a tax, they are neither a dependable and important source of revenue nor a user fee that relates the quantity of services used to the payment made.

III. The Monetary Policy Rationale for Reserve Requirements

Monetary policy has the unique function of controlling the supply of "outside money." In the United States, it is the Federal Reserve that decides how much outside money to make available to the private sector, in the form of currency held by the nonbank public and banks' holdings of vault cash and deposit balances at Reserve Banks. These assets are created, for the most part, by Federal Reserve open market purchases of U.S. government securities and by discount window lending.

Binding reserve requirements introduce an artificial demand for outside money on the part of banks. Two questions arise in looking for a monetary policy rationale for requirements.[15] One is whether they are necessary for monetary control to function, and the other (irrespective of necessity) is whether they improve monetary control by reducing deviations from policy objectives.

Are Reserve Requirements Necessary for Monetary Control?

Reserve requirements are not necessary for monetary control to function as long as, in their absence, there is a demand for the outside money the central bank supplies. With outside money demanded for its own sake, control of its supply provides the "anchor" to money, credit, and prices that defines the role of monetary policy in the economy. For the foreseeable future, the public can be expected to demand currency and the banks to demand vault cash. Managing the supply of one or the other, or the combination of the two assets, should ensure that monetary control can function.[16]

A more mundane question concerns traditional monetary policy operating procedures used in guiding open market operations and discount window lending. Might reserve requirements be necessary because it would be impossible to carry on monetary policy in these familiar forms if vault cash were banks' sole outside money asset?

Here again the answer is no. Controlling the supply of currency assets need not operate any differently than monetary policy operates today. Banks' demand for outside money would consist exclusively of their demand for vault cash, and banks' Fed deposit accounts would retain their utility for making and receiving payments, including the payments involved in open market operations. The only difference would be that the daily target balance of each bank at the close of business would be zero, rather than today's positive amount related to a required reserve. No bank would voluntarily hold deposits that do not pay interest when it could earn interest simply by selling the funds for immediate delivery in the overnight market (unless the overnight rate were zero).[17]

The trillion dollars or so of *private* dollar payments settled directly or indirectly on the books of the Federal Reserve Banks each day provide no basis for banks to demand non-interest-

■ **15** The title and language of the Monetary Control Act of 1980 make clear that reserve requirements were rationalized as a monetary policy device at that time. Depository institutions were instructed to maintain reserves "... as the Board may prescribe by regulation solely for the purpose of implementing monetary policy." See Board of Governors of the Federal Reserve System (1988).

■ **16** A classic discussion of this point may be found in Fama (1980). Sargent and Wallace (1985) examine a related question: whether and how the price level is determined if the monetary base bears a market rate of interest. Fama's discussion is the relevant one here, where currency, including vault cash, does not carry explicit interest and where monetary policy does not seem likely to target or to achieve the deflation rate required to approximate a real, market rate of interest on currency. See also the discussion of clearing balances in section IV.

■ **17** This is the extreme case. It abstracts from any clearing balances banks might want to maintain with the Fed in return for earnings credits used to offset charges for priced services. Only about $3.2 billion of clearing balances were held in July 1991, which would earn about $180 million at a 5.75 percent funds rate, or roughly 20 percent of 1990 total fees for priced services. it also ignores the possibility of requiring clearing balances with no (or wasted) earnings credits to reduce Reserve Bank risk exposure through daylight and overnight overdrafts.

bearing deposit balances overnight.[18] By definition, all of these payments net to zero. Of course, on any particular day some banks will find themselves in a net credit position, receiving more payments than they make, while others will find themselves in an equal and offsetting net debit position. Banks with net credits (or their customers) can lend the needed funds to banks with net debits, with same-day delivery.

Payments do not net to zero for transactions between the private sector and the Fed, the Treasury, or any other institution able to operate outside the private banking system because it holds accounts directly with a Federal Reserve Bank. However, as long as there is no monetary policy reason to change the supply of outside money, the Federal Reserve can be expected to engage in defensive open market operations to offset the net debit or credit created by payments between the private banking system and these other institutions. Inevitable errors in forecasting reserve availability, however, will produce days of oversupply, when banks are left holding some unwanted reserve deposits, or of undersupply, when banks are forced to borrow from the discount window to avoid overdrafts.[19]

Errors in reserve supply should be more noticeable when the target is a zero aggregate stock of reserves rather than a positive stock. The federal funds rate and discount window borrowing would be more volatile, both during a day and day to day, unless the operating procedure for implementing policy were made more continuously rate sensitive, or market forces developed new ways to smooth the rate.

Today, the need for reserve deposits to satisfy reserve requirements provides a market basis for arbitrage that smooths the funds rate in the face of supply errors. If reserves are short in the aggregate and the rate starts to rise relative to the expected level, banks can lend by postponing the accumulation of required reserve deposits; conversely, they can accelerate the accumulation if reserves are oversupplied and the rate starts to fall. The rate tends to spike or to plunge only at the end of a day, when most potential counterparties have closed, and on settlement day (the last day of a maintenance period), when carryover provides the only leeway for banks to postpone or to accelerate reserve accumulation.

Every day would be a settlement day if there were no reserve requirements and therefore limited possibilities for arbitrage. Every bank would want zero Fed deposits every night. An aggregate oversupply would lead borrowers away from the discount window and, if that were not sufficient to correct the oversupply, would drive the rate immediately to zero. An aggregate undersupply would drive the rate high enough to lead banks to the discount window to avoid overdrafts. It is unlikely that new market mechanisms would develop to smooth the rate, given current institutional arrangements. (This issue is discussed more fully in section IV.)

Policy actions (nondefensive open market operations) would have the same immediate effect as errors in reserve supply and might be more difficult for the public to identify in the context of wider daily volatility of the funds rate and of borrowing. Persistence of the visible effects of easing or restraining reserves would eventually distinguish a policy move from the transitory effect of one or more defensive errors. Another likely difference is that, as policy restraint intensified or relaxed, banks would seek new ways to influence the public's holdings of currency. This would allow banks to escape complete reliance on the discount window in avoiding overdrafts and wasted non-interest-bearing reserve deposit balances.

Do Reserve Requirements Improve Monetary Control?

The essence of monetary control lies in supplying the amount of outside money most likely to achieve the policy objective. Although reserve requirements are unnecessary, they might improve monetary control by ensuring a more predictable relationship between a policy objective and the policy instrument used in seeking that objective. Investigating two dominant approaches to policy implementation suggests that even though this rationale cannot be ruled out altogether, it is weak.

■ **18** Banks could still initiate payments at the opening of business, even with zero overnight balances, as long as Reserve Banks continued to permit daylight overdrafts. If daylight overdrafts were prevented, zero overnight balances would preclude banks from initiating same-day payments from their Reserve Bank accounts at the opening of business. However, even in this case, banks would likely find it cheaper to alter the mechanisms of clearing and settlement than to bear the opportunity cost of non-interest-bearing overnight balances. All payments could be processed on private clearing networks, with simultaneous net settlements at a common hour, or with settlement in some medium other than Reserve Bank accounts. For a discussion of the trade-offs among overnight Reserve Bank balances, daylight overdrafts, and private payments innovations, see Stevens (1991); for a discussion of alternative settlement media, see Stevens (1978).

■ **19** Occasional estimates of reserve supply errors can be found (Meek and Levin [1981]; Dewald and Gibson [1967]). However, these are for average levels over a maintenance period, not for the single days relevant to defensive open market operations in the absence of reserve requirements.

One approach to defining the objective/instrument relationship in monetary policy would rely on reserve targeting based on the multiplier concept.[20] Reserve requirements can improve monetary control by making the reserves multiplier more predictable. This can be illustrated within a simple monetarist policy framework. Suppose that 1) the ultimate policy objective is a stable price level, 2) the most reliable route to this objective is to maintain steady growth of an intermediate target for the transactions deposits supplied by banks, and 3) those deposits tend to be a multiple of vault cash, where the predicted multiple is subject to a normally distributed error. Without a reserve requirement, banks will hold no Fed deposits, and assuming no reserve supply errors, deviations from the predicted multiplier will reflect variations in banks' demand for vault cash relative to their deposit liabilities.

Imposing a binding reserve requirement under these circumstances will create an artificial demand for reserve deposits and will constrain variations in the multiplier. Variations in demand for vault cash relative to deposit liabilities will not affect the demand for reserve assets relative to deposit liabilities, which remains a constant, required fraction of bank deposits. All else equal, reserve requirements might improve monetary control by reducing deviations of money from the policy target guiding the supply of reserve assets.

Two matters diminish the persuasiveness of this rationale. One is that, in the absence of reserve requirements, the "noise" introduced into the multiplier by variations in the demand for vault cash is likely to be short run around a stable trend value. Introducing a reserve requirement might produce a multiplier that is more predictable in the short term, but at the cost of introducing longer-run changes in the trend value as banks and their competitors devise substitutes for reservable deposits to avoid the reserve requirement tax.

The other matter is that the Federal Reserve has never used a consistent multiplier procedure.[21] Unless the System were expected to adopt such an approach in the future, improving monetary control by increasing the short-run predictability of a reserves multiplier would represent an irrelevant monetary policy rationale for reserve requirements.[22]

Interest-rate targeting is the alternative approach to monetary policy implementation. As long as the intended interest rate is not set in a vacuum but in the context of a reliable feedback mechanism for controlling a monetary aggregate, nominal GNP, or the price level, the procedure amounts to an indirect method of reserve targeting. The target amount of reserves is the quantity that must actually be supplied in order to maintain the intended interest-rate level for a short period within the feedback process.

Interest-rate targeting in the absence of reserve requirements should not involve the same short-run noise associated with the reserves multiplier approach. Open market operations that seek to stabilize a money market interest rate would tend to accommodate unpredictable short-run variations in the demand for vault cash relative to deposits.[23]

In sum, improving monetary control provides scant rationale for reserve requirements. Only if the Federal Reserve were to adopt a reserves targeting approach to policy implementation, contrary to long-standing practice, could reserve requirements be expected to make the effects of policy actions more predictable in the short run.

IV. The Liquidity Rationale for Reserve Requirements

A third rationale sometimes suggested for reserve requirements is that they serve as a regulatory measure to ensure that banks, individually or in the aggregate, will be able to meet demands

■ **20** A full treatment of the multiplier approach to policy control of the monetary aggregates can be found in Rasche and Johannes (1987).

■ **21** See Goodfriend and Hargraves (1983). Perhaps the closest approximation to the multiplier model was the procedure for controlling M1 used from October 1979 through late 1982. Reserve paths guided open market operations, but the paths were adjusted at and between Federal Open Market Committee (FOMC) meetings to reflect independent judgments about the appropriate federal funds-rate level.

■ **22** Increased predictability was a major goal of the wholesale reform of reserve requirements recommended by members of the Committee on Bank Reserves of the Federal Reserve System in 1931. With hindsight, their rationale was no more relevant then—after the late-1920s explosion of debits/deposit accounts (to which they pointed) and in the midst of the 1929–1933 collapse of the banking system (to which they appeared oblivious)—than now. The Committee apparently had no conception of using defensive open market operations to offset variations in a multiplier. Unfortunately, theirs was the prevailing view within the System after the death of Benjamin Strong in 1928 (see Friedman and Schwartz [1963], especially pp. 407–19). Instead, they recommended legislation (never enacted) to make the required reserve ratio vary with the debits/deposits multiplier.

■ **23** Both reserves and interest-rate targeting are susceptible to the daily implementation errors discussed earlier. Inaccurate estimates of market factors affecting the stock of reserves will produce quantity errors; inaccurate estimates of the needed size or market interpretation of open market operations will produce interest-rate errors.

for payment without delay. Regulators have twin concerns of ensuring banks' solvency (capital adequacy) and banks' liquidity (cash adequacy). The concept of requiring banks to maintain at least a minimum capital/asset ratio to ensure solvency remains in the bedrock of bank supervision; the concept of requiring banks to maintain at least a minimum cash/deposit ratio to ensure liquidity, on the other hand, has long been discounted, but deserves some reconsideration.[24]

Method of Enforcement

Reserve requirements cannot provide a meaningful source of liquidity for an individual bank or for the banking system as long as the requirement is enforced continuously. After all, if a bank were required to keep a 10 percent reserve every day, then it would have only 10 cents available to meet each dollar of deposit withdrawn. A reserve regulation that is continuously enforced can guarantee adequate liquidity only with a 100 percent requirement.

Reserve requirements *can* provide a meaningful source of liquidity as long as they are not enforced continuously. The entire pool of required balances can be used to cover an immediate cash drain and can then be replenished either from asset sales or borrowing or from a return flow of deposits, as time allows. Early proponents of a reserve requirement recognized the inadequacy of continuous enforcement. Their intention was not to prevent a bank from using all of its cash as a source of liquidity when necessary, but to have each bank husband cash in normal times.

Reserve requirements under the National Bank Act (1863), for example, were not enforced daily. A bank whose reserve fell below the requirement was prohibited both from expanding its liabilities through new lending and from paying dividends. When aware of deficient reserves, the Comptroller of the Currency was empowered, but not required, to give a bank 30 days' notice to come into compliance. Failing compliance, the Comptroller was then authorized, but not required, to close the bank.[25]

The same prohibition on new lending and dividend payments appeared in the original Federal Reserve Act. More stringent enforcement developed after 1913, so that by 1935, member banks had little scope to use required reserve deposits even as a short-run source of liquidity. They were expected to maintain required reserve deposits (vault cash was not eligible) for semiweekly, weekly, or semimonthly averaging periods, depending on the bank's size and location (see Board of Governors of the Federal Reserve System [1935], p. 837). Deficiencies were penalized at a rate 2 percent above the discount rate, and while same-day wire service was available for transfers of reserve deposits, daylight overdrafts were not permitted.

After 1935, the scope for relying on required reserves as a short-run source of liquidity gradually increased. In the mid-1950s, averaging had broadened to one- or two-week periods, and the practice of allowing a 2 percent carryover was in place (see American Bankers Association [1957], p. 9). Since 1984, averaging has been permitted within two-week periods for all banks. This enforcement mechanism still prevents banks from relying on required reserves as a source of liquidity for longer than a portion of a reserve maintenance period or, with carryover, for two adjacent periods. Sustained needs for liquidity require secondary reserves and access to the money and interbank-loan markets or, if all else fails, to the discount window. However, within a reserve maintenance period, reserve requirements can enhance banks' liquidity by guaranteeing a pool of deposits from which to fund imbalances, such as those arising from clearing and settlement of checks and electronic payments.

Reserve requirements do not provide this source of liquidity for banks that use only vault cash to cover their entire required reserve position. For institutions in or near this unbound condition, the daily target for a reserve deposit account must be zero; averaging from day to day is not feasible because overnight overdrafts of Fed deposit accounts are penalized.[26] This is

■ **24** As long ago as 1931, the Committee on Bank Reserves of the Federal Reserve System (1931, p. 5) took the position that it was no longer the primary function of legal reserve requirements to ensure or to preserve the liquidity of individual member banks. In 1957, the Economic Policy Commission of the American Bankers Association (1957, p. 14) concluded that " ... those who cling to the old liquidity approach to reserve requirements will therefore be in disagreement with many of the Commission's conclusions. They are also likely to find themselves in disagreement among themselves, because the liquidity approach is not only basically illogical, but inevitably leads into a maze of complicated side issues on which no clear-cut answers are possible."

■ **25** Rodkey (1934) provides a detailed discussion of reserve requirements under the National Bank Act.

■ **26** Overnight overdrafts are costly in that, in addition to the cost of financing a "makeup" balance on a subsequent day, the overdraft is penalized at a rate 2 percent above the effective federal funds rate on the day the overdraft occurred. The ability to run significant daylight overdrafts in Federal Reserve deposit accounts allows banks to cover payments during a day without the need for positive reserve deposit balances at the beginning and end of the day. For a discussion of daylight overdrafts, see Stevens (1991).

one reason why banks enter into clearing balance agreements with their Reserve Banks. By targeting a positive clearing balance, they reduce the chances that unexpected events, especially those late in the day, will result in costly overnight overdrafts or wasted earnings opportunities. Clearing accounts make sense only for institutions that can use the earnings credits from clearing balances. Others may prefer to operate through a correspondent bank rather than through targeting a zero balance in their reserve deposit accounts.

Banks that do use reserve deposits to meet reserve requirements gain liquidity within the immediate confines of a reserve averaging period. Unexpected outflows on a given day can be funded by drawing the reserve deposit balance down as low as zero, as long as this action is offset by holding a large enough balance on future days to maintain the required average balance during a reserve maintenance period. Similarly, unexpected inflows of funds on a particular day do not represent a wasted earnings opportunity if offset by a smaller balance on future days.[27]

The lengthening of reserve averaging periods over the past 50 years has increased the opportunity for banks to use reserve deposits for short-run liquidity management. However, the expanded opportunity has not been fully realized for three reasons. First, as noted earlier, required reserves have grown only one-third as rapidly as the banking system (table 3). Second, reserve deposits have declined from 100 percent to 45 percent of required reserves since 1959, when banks were first permitted to satisfy reserve requirements with vault cash. Third, the value of transactions and, presumably, the potential need for liquidity to cover unexpected imbalances between inflows and outflows of funds have grown far more rapidly than reserve deposits. For example, while banks' reserve deposit balances grew at a 1.3 percent annual rate between 1952 and 1990, the dollar value of payments made from banks' Federal Reserve accounts grew at a 20 percent annual rate.

Development of active same-day reserve account management techniques has supplemented reserve deposit balances in the handling of day-to-day liquidity needs for many banks. Sophisticated computerized systems track movements in reserve deposit accounts during the course of a day; as needs become apparent, same-day transactions are used to fund potential deficits or to lay off surpluses in the money and interbank markets. The extent to which modern reserve requirements have a short-run liquidity rationale depends on the size of the pool of reserve deposits (for an individual bank and in the aggregate) relative to potential liquidity needs, which are heavily influenced by the availability of alternative sources of liquidity.

A Redundant Assurance of Liquidity

Before the Federal Reserve System was established in 1913, the hallmark of adequate liquidity in the banking system was an increase in the ratio of currency to bank deposits without a suspension of specie payments, whether in response to a seasonal increase in currency demand or an incipient banking panic. Typically, this was made possible by running down the cash reserves of banks in Reserve cities, as other banks drew on them. Augmenting the aggregate stock of cash by tapping Treasury and foreign holdings of specie tended to be inadequate.[28]

Since 1913, however, Reserve Banks have been able to augment the aggregate stock of cash in response to increased demand. This provides a choice of regulatory mix in managing short-run liquidity, both in the aggregate and at individual banks. Reserve requirements can be used to ensure a pool of cash in advance of day-to-day potential needs. Reserve averaging and carryover at individual banks can then allow this pool to be redistributed among banks through transactions in the federal funds market and other markets for instruments with same-day payment. Alternatively, the central bank can simply add and absorb cash on a daily basis in response to actual needs. Defensive open market operations and discount window lending can tailor the size and the distribution of the pool to the liquidity needs of the day.

Today, therefore, a liquidity rationale for reserve requirements would need a supporting demonstration of some public benefit connected with retaining a market cash-in-advance facility as an alternative or a supplement to government credit-on-demand in the liquidity mechanism.

■ **27** Some examples may be useful: A bank required to hold an average balance of $100 million can let the balance drop to zero on the first day and then hold $107.7 million on the remaining 13 days. Or, having held $100 million on average over the first seven days, it can let the balance drop to zero on the eighth day and then hold $116.7 million on the remaining six days. Even on the last day, taking carryover into consideration, a bank that has held $100 million on average over the first 13 days and has met 55 percent of its requirement with vault cash could let its balance drop to $38 million on the last day (see footnote 4).

■ **28** A recent review of historical episodes of liquidity strains can be found in Smith (1991).

These public benefits might lie in damping volatility of the federal funds rate and in monitoring credit quality.

As monetary policy and Reserve Bank operations are now structured, reserve requirements have the effect of maintaining a reasonably steady rate signal that is the basic source of short-run information about policy. In the absence of reserve requirements, the federal funds rate would be more volatile from day to day than it is now, all else equal.[29] The nub of the problem is simply that, without the opportunity for arbitrage created by reserve averaging associated with reserve requirements, every bank would want a zero balance overnight (as long as the overnight funds rate were positive) because Fed deposits do not earn interest. Deviations of the daily aggregate supply of Fed deposits from zero, whether from forecasting errors in carrying out defensive open market operations or from deliberate policy adjustments, would cause the rate to spike or to plunge (to the extent that banks were reluctant to use the discount window), because no interday arbitrage would be possible. With greater rate volatility, market participants might have difficulty discerning the funds-rate level intended by policymakers. A more volatile rate may be undesirable if it befogs market perceptions of monetary policy intentions.

Of course, reserve requirements are not the only mechanism for damping funds-rate volatility, and the funds rate is not the only vehicle for conveying monetary policy information. Nonetheless, it is worth considering whether, or what sort of, a rate-smoothing mechanism might develop in the absence of reserve requirements.

- Banks would be unlikely to hold excess reserves in place of today's required reserves. They would need to foresee profits from financing the inventory of non-interest-bearing deposits upon which they would draw for occassional lending when the rate spiked. This would be possible only if the average of expected future overnight funds rates were higher than the permanent cost of financing the inventory. That is, the likelihood of aggregate reserve shortfalls in defensive open market operations and policy adjustments would have to exceed the likelihood of aggregate reserve surpluses. There seems to be no reason to expect such asymmetry.[30]
- For several reasons, clearing balances are an uncertain basis for market arbitrage to smooth the funds rate, even though they pay a market rate of interest as currently administered (see section I and footnote 5). First, because clearing balances are optional, they may be insufficient to support the amount of arbitrage required to smooth the funds rate. Banks now choose this method to pay for only about 20 percent of the $900 million of Reserve Banks' priced services (by holding balances of less than $4 billion). Second, even if antitrust considerations did not preclude making clearing balances the mandatory mode of payment, the volume of balances might be insufficient, being a function of regulatory and competitive forces determining the demand for Reserve Bank services, as well as of the level of interest rates. For example, the entire $870 million of priced services in 1990 would have required balances of $15 billion if the earnings rate were at the mid-1991 5.75 percent level, but only $10.7 billion at the 8.1 percent average funds rate in 1990. Finally, as this example suggests, and as Sargent and Wallace (1985) have pointed out, paying a market rate of interest on reserves may introduce an indeterminacy into the economy that renders moot the whole concern for the funds rate as a policy signal. If the only reason to hold clearing balances is to pay for a fixed value of priced services, then there could be no excess supply or demand for balances because the funds rate would vary inversely with balances to maintain the fixed-dollar value of their yield.
- The discount window is the most likely source of rate smoothing in the absence of interday arbitrage. Aggregate under- and oversupplies of Fed deposits would put pressure on the funds rate, but the degree to which that pressure actually pushed the funds rate up and down would depend on how readily banks approached the window and on how readily Reserve Banks would lend.
- If a clear indication of the policy rate were desirable for policy information purposes, more direct methods could be used. FOMC policy decisions could be announced immediately, rather than after the next regularly scheduled meeting. A more radical change would be to have the Desk make both reserve balances and securities available continuously throughout each day, engaging in repurchase and matched-sale agreements in Treasury securities on demand at announced prices set by the FOMC.

A smoothed policy rate is not a necessity. However, the potential for funds-rate volatility is simply a symptom of deviations between

■ **29** Volatility during the course of a day might also be greater, depending on rules for daylight overdrafts.

■ **30** In Canada, banks are said to hold excess reserves as protection against unexpected net debits, but the Canadian discount rate is market related, with penalties for repeated borrowing (Freedman and Dingle [1986]).

actual supply and zero demand for holding Fed deposits in the absence of the liquidity provided by reserve requirements. Another matter to be considered is that relying exclusively on the central bank to provide day-to-day liquidity would eliminate the role of the funds market in monitoring the credit quality of banks.

A more volatile funds rate would reflect the absence of market supply and demand for overnight holdings of Reserve Bank deposits. When open market operations were completed for a day, the discount window would be the only liquidity mechanism available for adjusting the aggregate supply of Fed deposits. Borrowing at the window would be the sole way for banks that were left short to avoid overdrafts caused by inevitable forecasting errors in the carrying out of defensive open market operations, because no pool of reserve deposits would be available to lend; repaying discount window loans would be the only way to avoid the wasted earnings opportunity of holding a noninterest-bearing overnight deposit. Under these circumstances, banks might come to view access to the window as a right, not a privilege, and to borrow or repay whenever a high or low funds rate suggested that the Desk's injection or withdrawal of Fed deposits had failed to accommodate settlement of the day's payments.

Widespread and continuous reliance on the discount window has a by-product: It supplants market judgments about creditworthiness with regulatory judgments. If the deposit insurance system does not guarantee repayment for all of a bank's creditors, a benefit of a liquidity mechanism that relies on a market-financed advance pool of cash is the credit scrutiny of overnight borrowers by overnight lenders. Of course, monitoring would continue in markets for other forms of bank liabilities even if banks were to become more heavily dependent on the discount window for overnight financing. Nonetheless, the diminished importance of the overnight market for unsecured borrowing, coupled with heightened assurance of official lending, should increase the influence of regulatory opinion and reduce the influence of market evaluations in the short-run management of banks. Moreover, Reserve Banks should then be expected to assert their regulatory judgment as providers of substantial amounts of unsecured daylight overdraft credit, because reserve deposits would no longer provide a buffer between them and general creditor status in the event of a bank failure.

In brief, reserve requirements have a short-run liquidity rationale because banks have no other incentive to hold Fed deposits that do not bear interest. Lacking this artificial demand for cash, both accidental and policy-intended deviations of the stock of Fed deposits from zero each day might impart undesirable volatility to the funds rate. In any case, the burden of meeting the banking system's liquidity needs would fall heavily on credit decisions made at the discount window, reducing the role of market judgments about credit risk.

V. Conclusion

Rationalizing reserve requirements is not easy. They have the aura of a tax, but revenue does not seem to be their purpose. Avoidance erodes the tax base, and regulatory efforts to avoid avoidance have had the effect of reducing the tax rate over time, so that reserve requirements now yield less than half of 1 percent of Treasury revenue. The requirements act as a license fee, entitling some depository institutions to issue reservable transactions accounts and to maintain an account at, buy the services of, and borrow from the Federal Reserve Banks. The question at issue is whether there is a compelling rationale for maintaining the burden of a license fee in the form of reserve requirements.

Monetary policy implementation has been the statutory rationale for reserve requirements since 1980, but policy implementation would be little affected by their elimination. With the interest-rate targeting approach that has been typical of Federal Reserve policy implementation, the absence of reserve requirements could make the federal funds rate more volatile in the very short run, perhaps reducing its value as an indicator of policy intentions. However, changes in policy techniques could offset this problem. If the alternative reserve targeting approach to policy implementation were ever adopted, absence of reserve requirements could make reserve targets less predictable, but only in the very short run.

Reserve requirements can have a liquidity rationale, contrary to traditional assertions that have overlooked reserve averaging provisions as the basis for interday arbitrage in the market for Reserve Bank deposits. A liquidity rationale, however, is only as strong as the preference for having private markets rather than the Federal Reserve manage the supply and distribution of outside money each day. This preference may be reinforced by a desire for greater reliance on the federal funds rate than on the discount rate as the dominant policy instrument, and for greater reliance on FOMC guidance of the federal funds rate than on Board of Governors'

control of the discount rate in managing monetary policy in the short run.

Experience with reserve requirements suggests that their rationale is ultimately irrelevant, because they are an unsustainable regulatory intrusion in competitive markets. Repeated market innovations aimed at avoidance, and regulatory relaxation to avoid avoidance, have allowed required reserves to grow at only one-third the rate of growth of the banking system since 1952. Moreover, reserve deposits have been declining as a share of required reserves, with an increasing number of banks satisfying the requirement through voluntary holdings of vault cash. If the trend of the past 30 years continues, reserve deposits will amount to only 10 percent of required reserves within the next 30 years.

Preserving an effective system of reserve requirements will be difficult if built-in incentives for avoidance and voluntary holdings of vault cash continue to reduce both their burden and their effects. But if reserve requirements have no compelling rationale, why not eliminate them?

Appendix

Estimates plotted in figure 1 are based on the assumption that required reserves finance a portion of Reserve Banks' earning assets. Required reserves must be apportioned between an amount that would be held anyway and an amount held solely because of the requirement. Earning assets include Treasury and agency securities, loans to depository institutions, assets denominated in foreign currencies, and other loans. This assumes that all nonearning assets (for example, gold certificates, Special Drawing Rights, and buildings) are financed by all other liabilities and capital (for example, clearing balances, other deposits, excess reserves, surplus vault cash, currency, capital stock, and surplus).

Because all vault cash applied to required reserves is excluded, the estimates plotted here may be understated after 1959, when vault cash became eligible to satisfy reserve requirements. Using reserve deposits alone ignores the possibility that some banks are induced to hold additional vault cash when the opportunity cost of these funds is simply the cost of holding a smaller deposit balance at the Fed. An estimate based on required reserves *including* applied vault cash would nearly double the tax attributed to reserve requirements, but would be overstated: The erroneous implicit assumption would be that banks would hold no vault cash at all were it not for reserve requirements. An intermediate method suggests that the understated estimates involve less error than choosing to overstate. If banks had maintained the same proportion of vault cash to reserve deposits after 1959 as they did in that year, the estimated tax attributable to reserve requirements would have been 16.5 percent higher in 1989, and the contribution of required reserves to Treasury revenue would have been 0.05 percentage point higher.

The intentional understatement is offset by some independent overstatements. One arises from ignoring the possibility that holdings of clearing balances would be larger in the absence of reserve requirements (see section IV). Reserve Banks' fee income would then be smaller, offset by larger interest income, if banks did not change the quantity of services used. However, the quantity would be unchanged only if the interest income that banks forgo when holding a clearing balance were no higher (per unit of service used) than fees *plus* the value of the service a clearing balance provides in avoiding overdrafts and wasted reserves. This value would be created for some banks by the elimination of reserve requirements, so that clearing balances would be expected to increase.

Another overstatement arises because data limitations make it convenient to exclude from earning assets both foreign-currency-denominated assets (for example, those acquired through dollar-support intervention in the foreign exchange market) and other loans (for instance, those made to the Federal Deposit Insurance Corporation when it assumes a failed bank's debt to the discount window).

The estimates presented here differ from related estimates by Barro (1982) and Goodfriend and Hargraves (1983) in that they include only the Treasury revenue attributable to required reserve deposits; the two earlier estimates deal with Treasury revenue attributable to all outside money issued by the Federal Reserve.

References

American Bankers Association, Economic Policy Commission. *Member Bank Reserve Requirements.* New York, 1957.

Barro, Robert J. "Measuring the Fed's Revenue from Money Creation," National Bureau of Economic Research, Working Paper No. 883, April 1982.

Board of Governors of the Federal Reserve System. *Federal Reserve Bulletin,* vol. 21, no. 12 (December 1935), p. 837.

_____ . *Annual Report,* 1970. Washington, D.C.: Board of Governors, 1971.

_____ . *Federal Reserve Act and Other Statutory Provisions Affecting the Federal Reserve System,* Washington, D.C.: Board of Governors, August 1988, pp. 43 – 44.

_____ . *Federal Reserve Bulletin,* vol. 76, no. 12 (December 1990), p. A8.

Committee on Bank Reserves of the Federal Reserve System. *Member Bank Reserves.* Washington, D.C.: U.S. Government Printing Office, 1931.

Dewald, William G., and William E. Gibson. "Sources of Variation in Member Bank Reserves," *Review of Economics and Statistics,* vol. 49, no. 2 (May 1967), pp. 143 – 50.

Fama, Eugene F. "Banking in the Theory of Finance," *Journal of Monetary Economics,* vol. 6 (1980), pp. 39 – 57.

Freedman, C., and J.F. Dingle. "Monetary Policy Implementation in Canada: Traditional Structure and Recent Developments," in *Changes in Money-Market Instruments and Procedures: Objectives and Implications.* Basle, Switzerland: Bank for International Settlements, March 1986.

Friedman, Milton, and Anna Jacobson Schwartz. *A Monetary History of the United States: 1867–1960.* Princeton, N.J.: Princeton University Press, 1963.

Goodfriend, Marvin, and Monica Hargraves. "A Historical Assessment of the Rationales and Functions of Reserve Requirements," Federal Reserve Bank of Richmond, *Economic Review,* vol. 69, no. 2 (March/April 1983), pp. 3 – 21.

Jacoby, Neil. "The Structure and Use of Variable Bank Reserve Requirements," in Deane Carson, ed., *Banking and Monetary Studies.* Homewood, Ill.: Richard D. Irwin, Inc., 1963.

Mayer, Thomas. "Interest Payments on Required Reserve Balances," *Journal of Finance,* vol. 21, no. 1 (March 1966), pp. 116 – 18.

Meek, Paul, and Fred J. Levin. "Implementing the New Operating Procedures: The View from the Trading Desk," in *New Monetary Control Procedures.* Washington, D.C.: Board of Governors of the Federal Reserve System, Staff Study, 1981.

Meulendyke, Ann-Marie. *U.S. Monetary Policy and Financial Markets.* New York: Federal Reserve Bank of New York, 1989.

Partlan, John C., Kausar Hamdani, and Kathleen M. Camilli. "Reserves Forecasting for Open Market Operations," Federal Reserve Bank of New York, *Quarterly Review,* vol. 11, no. 1 (Spring 1986), pp. 19 – 33.

Rasche, Robert H., and James M. Johannes. *Controlling the Growth of Monetary Aggregates.* Boston: Kluwer Academic Publishers, 1987.

Rodkey, Robert G. *Legal Reserves in American Banking.* Ann Arbor: University of Michigan Press, 1934.

Sargent, Thomas, and Neil Wallace. "Interest on Reserves," *Journal of Monetary Economics,* vol. 15, no. 3 (May 1985), pp. 279 – 90.

Smith, Bruce D. "Bank Panics, Suspensions, and Geography: Some Notes on the 'Contagion of Fear' in Banking," *Economic Inquiry,* vol. 24, no. 2 (April 1991), pp. 230 – 48.

Stevens, E.J. "EFT, Member Bank Reserves and Monetary Policy," *Journal of Contemporary Business,* vol. 7, no. 2 (Spring 1978), pp. 167–85.

_____ . "Pricing Daylight Overdrafts," in George Kaufman, ed., *Research in Financial Services.* Greenwich, Conn.: JAI Press, 1991.

_____ . "The Origins of Reserve Requirements in the United States," Federal Reserve Bank of Cleveland, Working Paper (forthcoming).

Volcker, Paul A. "Statement before the Committee on Banking, Housing, and Urban Affairs, U.S. Senate, February 4, 1980," *Federal Reserve Bulletin,* vol. 66, no. 2 (February 1980), pp. 143 – 48.

Government Consumption, Taxation, and Economic Activity

by Charles T. Carlstrom and Jagadeesh Gokhale

Charles T. Carlstrom and Jagadeesh Gokhale are economists at the Federal Reserve Bank of Cleveland. The authors thank Alan Auerbach and Laurence Kotlikoff for use of their simulation model. They also thank David Altig, Randall Eberts, William Gavin, Sharon Parrott, and John Sturrock for helpful comments.

Introduction

The size of government consumption relative to gross national product (GNP) has grown steadily in Europe and North America over most of the post–World War II period. In real terms, government expenditure in the United States has grown at nearly 4 percent annually over the last four and a half decades. As a percentage of GNP, it rose from approximately 13.7 percent in 1946 to 22.1 percent in 1989.[1]

Until recently, most of the increases in U.S. government spending have been financed through higher taxation (see Meltzer and Richard [1981]). What are the likely effects of such increases on output?[2] How would they differ if deficit financing were used? Our analysis seeks answers to these questions.

Although most increases in government expenditure over the past 45 years have been permanent, there have been a few notable exceptions when government consumption rose temporarily and then came back down to its trend level. These periods have typically been war years, with the World War II and Korean War eras being the most obvious examples. The effects on output of financing such temporary increases depend on whether deficit financing is used, and these effects can be quite different from those arising as a result of a permanent expansion in government spending.

It should be mentioned that increased levels of government spending can affect output directly by altering the conditions of production through the provision of infrastructural inputs. We do not analyze the effects of larger government expenditure on output due to improved productivity of inputs.[3] We also do not aim to provide an explanation for the growth in government expenditure, or to determine the optimal size of government.[4]

■ 1 It should be noted that growth in the share of government expenditure on goods and services in the post–World War II period is mostly due to growth in state and local expenditures. Federal spending as a share of GNP fell in the 1970s, from 10 percent to 8 percent, and remained around 8 percent in the 1980s. Our analysis deals with total federal, state, and local government expenditures on purchases of goods and services.

■ 2 We abstract from the question of whether permanent increases in government expenditure per se are good for the economy.

■ 3 Aschauer (1989) estimates that the public investment component of government expenditure has a positive and significant effect on the level of output.

■ 4 Meltzer and Richard (1981) develop a theory of the size of government.

Neither do we try to explain any particular episode in the United States.

Instead, our analysis is limited to tracing the causal links among higher government expenditure, tax policy, and the level of output. The reason is that increases in government spending —and the timing of taxation enacted to finance them —affect private incentives to work and save over time. Consequently, such increases affect the level of output, interest rates, and other economic variables. We also present some illustrative simulations of the effects of permanent and temporary increases in expenditure with and without deficit financing in a stylized model of the economy.

To conduct the analysis, we use the overlapping generations model developed by Auerbach and Kotlikoff (A-K) (1987), which is calibrated with parameter estimates from various studies based on U.S. data.[5] We present a brief description of this model in section I. Section II discusses the effects of permanent increases in government expenditure. Our simulations show that with no deficit financing, a permanent rise in government consumption leads to lower long-run output. For an increase in expenditure of the magnitude of 4 percent per year, output declines by about 2 percent. With deficit financing, output is higher in the short run, but declines considerably in the long run. Section III deals with the case of temporary increases. There are no long-run effects on output if balanced-budget financing is used. However, short-run effects on output are sensitive to financing considerations. Section IV concludes the paper.

I. The A-K Model

Most studies that have investigated the effects of permanent and temporary changes in government expenditure have used an infinite-horizon representative-agent framework. All agents are assumed to be identical and to live forever. These models typically assume that government revenues are raised by lump-sum taxes that are nondistortionary.[6] These two assumptions imply that the Ricardian equivalence theorem (RET) will be true. This theorem states that the timing of taxes will not matter for private consumption and leisure decisions, because if government expenditures are financed through a deficit rather than by current taxes, the infinitely lived agents will anticipate the future tax liabilities implied by the requirement that the government's intertemporal budget must be balanced. Both output and interest rates will be the same under either of these two financing arrangements.

Under the representative-agent framework, both permanent and temporary increases in government expenditure boost output. A permanent rise in government spending increases output because higher (lump-sum) taxes have a negative income effect that leads individuals to reduce leisure and thus to work harder. Temporary increases also lead to higher interest rates and output. If taxes are raised concurrently with greater government expenditure, they will be higher today than in the future. Individuals' attempts to smooth consumption over time will induce them to save less (or borrow more), causing interest rates to rise. The higher interest rates will induce greater work effort today because of the intertemporal substitution effect.

In this paper, we adopt the A-K overlapping generations model, where individuals in each generation are concerned about their own welfare but not about that of their offspring. This implies that RET will not hold, because if taxes are increased in the future, rather than contemporaneously, some generations will escape the burden of higher taxation. Thus, deficit-financed increases in government expenditure will have different effects compared to those arising from balanced-budget increases. Empirical studies have not yet resolved the debate about the validity of RET.[7]

We also assume that government revenue is generated by income taxation rather than through lump-sum taxation. Unlike lump-sum taxes, income taxes distort the labor–leisure choice by driving a wedge between before- and after-tax wage rates. Income taxes also distort the consumption–saving decision by introducing a gap between before- and after-tax interest rates. Using income taxation rather than lump-sum taxation is largely responsible for the difference in our results compared to those derived from representative-agent models.

The A-K model incorporates perfect foresight on the part of individuals except with regard to the policy change, which is assumed to be unanticipated. The alternative would be to use a model with "myopia," where individuals behave as if economic conditions did not change from period to period. Under the latter assumption, however, it would be difficult to separate the effects of

■ 5 See Wynne (1990) for an example of a representative-agent model used to explain output and interest-rate changes in the United States arising from increased government expenditure during World War II.

■ 6 See, for example, Baxter and King (1990) and Aiyagari, Christiano, and Eichenbaum (1990).

■ 7 A critical evaluation of the theory and evidence on RET is contained in Bernheim (1987).

irrational household behavior from those of the policy change itself. Although perfect foresight is an extreme assumption, it provides a useful benchmark for analysis.

In the A-K model, each cohort is identical, except for size differences due to population growth. Each generation is $1 + n$ times larger than its predecessor, and each has an economic life span of 55 years. The annual utility function is assumed to take a constant elasticity of substitution form given by

$$(1) \qquad u_t = [c_t^{(1-\frac{1}{\rho})} + \alpha l_t^{(1-\frac{1}{\rho})}]^{\frac{1}{(1-\frac{1}{\rho})}} + v(G_t).$$

Here, the parameter ρ is the within-period elasticity of substitution between consumption and leisure, and is the intensity of preference for leisure relative to consumption. Government consumption in period t is represented by G_t, which is exogenous and enters separably in the utility function. This implies that the size of government consumption does not affect the marginal utilities of private consumption and leisure. Some evidence suggests that this assumption may not be completely justified.[8] If we assume that government expenditures are perfect substitutes for private consumption and that taxes are lump-sum, then increases in government expenditure, whether permanent or temporary, will have no effect on either output or interest rates. Thus, the assumption that government expenditure enters separably in the utility function will overstate the effect on output.

Individuals choose consumption and leisure for each period to maximize lifetime utility given by

$$(2) \qquad U = \frac{1}{(1-\frac{1}{\gamma})} \sum_{t=1}^{55} (1+\delta)^{-(t-1)} u_t^{(1-\frac{1}{\gamma})},$$

where t indicates cohort age. The parameter γ is the intertemporal elasticity of substitution, and δ is the pure rate of time preference.

Households maximize utility (equation [2]) subject to a period-by-period budget constraint. The time s budget constraint for individuals aged t is given by

$$(3) \qquad a_{s,t} - a_{s-1,t-1}[1 + r_s(1-\tau_s)] - w_s e_t (1-\tau_s) + c_{s,t} \geq 0.$$

Here, r_s refers to the before-tax rate of interest, τ_s refers to the income tax rate applied in period s, and $a_{s,t}$ refers to the nonhuman wealth held in period s by an individual aged t. The pre-tax wage rate at time s is given by w_s, and the variable e_t is an exogenous productivity parameter for an individual in the t^{th} period of life.

Output in the model is produced by competitive firms that combine capital (K) and labor (L) using a constant-returns-to-scale production technology. The production function is given by

$$(4) \qquad Y_s = K_s^{\theta} L_s^{1-\theta}.$$

Y_s stands for output in period s, and θ is capital's share in production. Note that this functional form implies that government purchases of goods and services do not enter as inputs into the production function. This amounts to ignoring government investment in public services and infrastructure, which could have positive effects on the productivity of private capital and labor, as well as on the level of total output. Aggregate capital and labor supplies are determined from individuals' asset holding and leisure supply decisions:

$$(5) \qquad K_s = (1+n)^{(s-1)} \sum_{t=1}^{55} \frac{a_{t,s-1}}{(1+n)^{t-55}}$$

and

$$(6) \qquad L_s = (1+n)^{s} \sum_{t=1}^{55} \frac{e_t(1-l_{s,t})}{(1+n)^{t-55}}.$$

Equations (5) and (6) represent the capital and labor-market-clearing conditions, where $l_{s,t}$ stands for the leisure of an individual aged t at time s.

Under the assumption of competitive markets, the pre-tax real wage and interest rates are given by

$$(7) \qquad w_s = (1-\theta)(K_s/L_s)^{\theta}$$

and

$$(8) \qquad r_s = \theta(K_s/L_s)^{\theta-1}.$$

We complete our description of the model with the goods-market-clearing condition

$$(9) \qquad Y_s = C_s + G_s + K_{s+1} - K_s,$$

■ 8 Kormendi (1983) and Aschauer (1985) estimate that an extra unit of government consumption, all else equal, reduces private consumption by between 0.2 and 0.4 units.

where

$$(10) \quad C_s = (1+n)^s \sum_{t=1}^{55} \frac{c_{s,t}}{(1+n)^{t-55}}.$$

Equations (8) and (9) assume that the depreciation rate on physical capital is zero.

To solve the model, one must choose values for the model's parameters. Auerbach and Kotlikoff parameterize the model based on findings of various empirical studies. Although we have retained their choice of parameters in the simulations presented here, we do not examine the sensitivity of the results to parametric variation. However, tests of parametric sensitivity in the A-K study indicate that the results are likely to be fairly robust. In any event, the primary purpose of this paper is to examine the qualitative nature of the effects of the policy changes considered.

The parameter ρ in equation (1), which determines how an individual's annual labor supply responds to a change in the wage rate, is set to 0.8.[9] The intertemporal elasticity of substitution, γ, is set to 0.25 based on various estimates.[10] The pure rate of time preference, δ, is set to 0.015. This implies an annual real interest rate of 6.9 percent per year, which is slightly less than the estimated marginal productivity of capital.[11] The leisure preference parameter, α, is set to 1.5; it is chosen so that individuals in the middle of their working lives work approximately 40 percent of their nonsleeping hours. The parameter estimates lie within the ranges estimated in various empirical studies using U.S. data.

The parameter θ in the production function, which determines the share of capital in production, is set to 0.25, approximating the historical share of capital. The constancy of this measure over time suggests the use of a Cobb–Douglas production function. The effects on output due to increased government expenditure will be sensitive to the age-specific productivity profile that is assumed. Rather than assume a flat age-productivity profile, we assume an inverted U-shaped profile. That is, productivity rises and reaches a maximum at about the twenty-fifth year of an individual's working life, and declines thereafter. The variable e_t represents the productivity of an individual aged t and is based on estimates obtained by Welch (1979). The equation used in the following simulations is

$$(11) \quad e_t = 4.47 + 0.033t - 0.00067t^2.$$

The solution to the model is obtained by finding the wage and interest rates, so that labor and capital markets clear in every period, s.

First, we solve the model for the initial steady state, that is, before any policy changes are introduced. It is assumed that in this steady state, the government consumes 15 percent of output and levies a 15 percent proportional income tax to finance it. We selected this rate for our experiments to mimic the level of government expenditure that has prevailed over the post–World War II period. This implies that the government's budget is initially balanced. After a policy change is undertaken, we solve the model for 150 years into the future. This is sufficient to ensure that the model's economy converges to the final steady state after each policy change. Policy changes are assumed to be unanticipated.

II. Permanent Increases in Government Expenditure

Balanced-Budget Increases

In the first simulation, government expenditure is increased permanently by 5 percent of initial steady-state output. Because government consumption was 15 percent of output in the initial steady state, this represents a 33 percent rise, which is financed by a balanced-budget increase in income taxes. Thus, the government's budget is balanced both before and after the upturn in government expenditure.

In the short run, higher income tax rates reduce after-tax wage and interest incomes. These reductions have an income effect on individuals' consumption and labor supply. The decline in after-tax income leads to lower consumption and longer hours worked. However, there are also substitution effects. A lower after-tax wage rate implies that leisure is cheaper and induces individuals to work fewer hours. The reduction in the after-tax interest rate has an intertemporal substitution effect leading to reduced saving and lower labor supply. Because people work in order to consume both today and tomorrow, the lower after-tax interest rate reduces the incentive to work

■ **9** Ghez and Becker (1975), for example, estimate the value of ρ to be 0.83.

■ **10** See, for example, Grossman and Shiller (1981), who estimate γ to lie between 0.07 and 0.35.

■ **11** We estimate that the average rate of return on capital was about 9 percent per year over the past decade.

for greater future consumption. The results show that substitution effects dominate income effects in the short run (see figure 1). Labor falls by 0.5 percent, and saving declines to 1.8 percent, from 3.7 percent of output in the first period. The reduction in hours worked leads to a decline in output of 0.4 percent.

The lower saving rate causes the capital stock to fall in the subsequent period. A lower capital stock increases the marginal productivity of capital, and hence the before-tax interest rate. This helps to mitigate the intertemporal substitution effects, causing the saving rate and hours worked to expand gradually from their new lower levels. As the charts in figure 1 show, the saving rate in the long-run steady state is somewhat lower than in the initial one.

After year six, individuals work longer hours than they did before government expenditure began to rise. The reduction in substitution effects causes income effects to dominate eventually; in the long run, labor supply is higher by 1.1 percent. Output, however, is lower due to the decrease in the capital stock. The charts show that the convergence to the new steady state is gradual. The new steady-state capital stock is reduced by 7.7 percent, and output by 1.2 percent. Private consumption is 7.3 percent lower than it was before government spending rose.

Increases in government expenditure cause output to decline because an income tax is distortionary. That is, the higher taxes distort the labor–leisure and savings decisions of individuals. Baxter and King (1990) show that in a representative-agent model with lump-sum (nondistortionary) taxes, permanent increases in government expenditure actually cause output to be higher. No within-period substitution effect is associated with lump-sum taxes. Higher lump-sum taxes, however, reduce lifetime resources, and individuals optimally choose lower levels of consumption and leisure, so that employment and output are higher. It should be emphasized that increased output does not imply that people are better off. This depends on how much individuals on the margin value private consumption and leisure compared to public consumption.

Deficit-Financed Increases

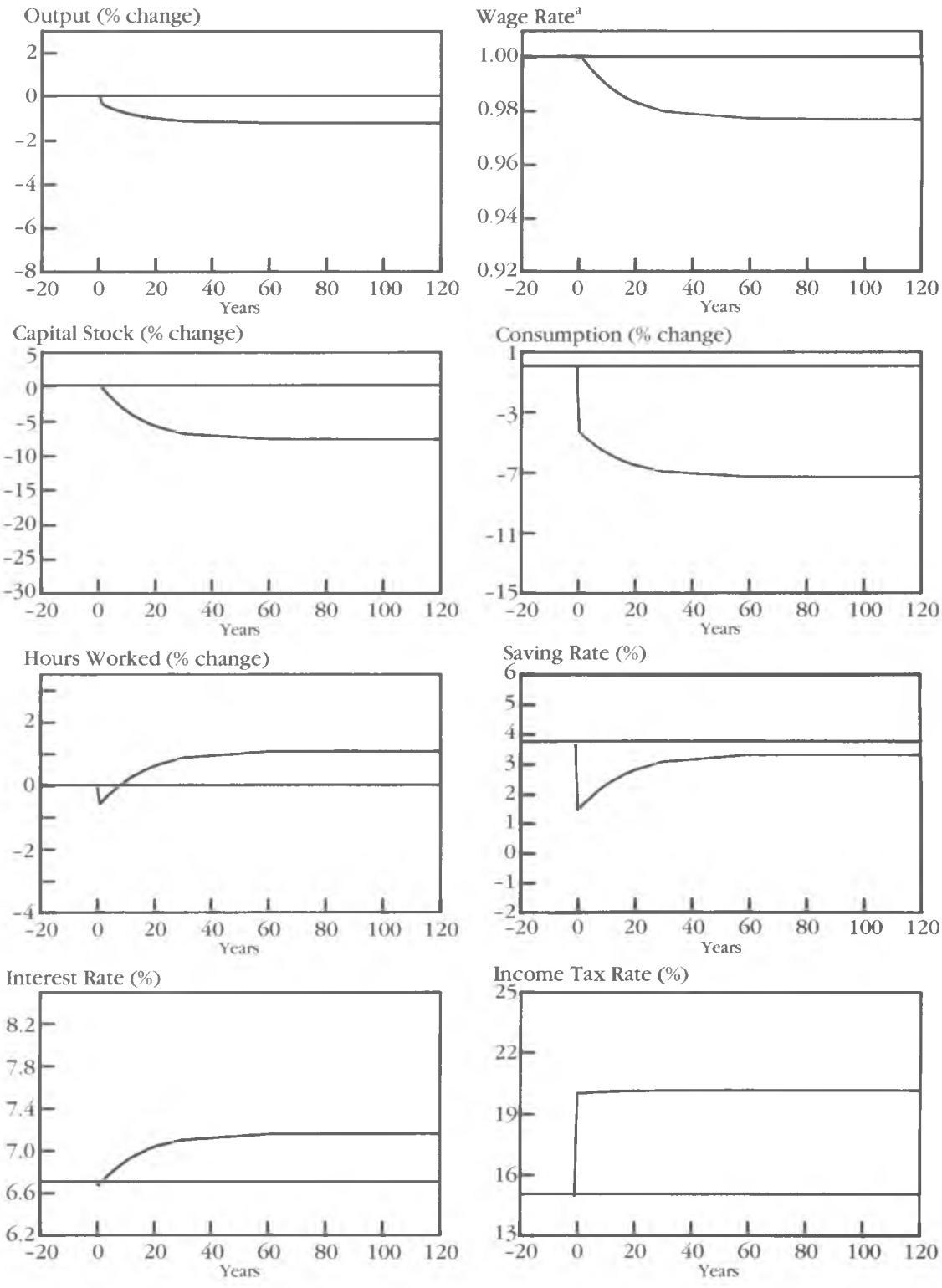
The next simulation shows the effects of an identical increase in government expenditure that is deficit financed. Deficit financing is used for the first 10 years, after which taxes are increased by enough to cover both greater spending and the interest on the government's debt. This time profile of taxation results in intertemporal substitution effects. Lower taxes today compared to tomorrow induce individuals facing higher future taxes to work more today and less tomorrow. Figure 2 shows that labor supply rises by 2.7 percent in the first period. It also causes the younger generations to consume less today in order to save for consumption tomorrow. Aggregate private consumption falls by 2 percent initially, but this is not enough to offset the increase in government consumption. Thus, the economy's saving rate falls from 3.7 percent to 2.3 percent. Furthermore, given the initial stock of capital, the higher labor supply in the short run causes a small rise in the interest rate, from 6.7 percent to 6.8 percent. Higher labor supply also causes output to jump by 2 percent in the first year after the policy change.

A further effect arises from the intergenerational redistribution of resources caused by deficit financing. Since taxes do not increase at all for the first 10 years, some initial older generations escape the burden of higher future taxes. Their lifetime resources expand because of the higher interest rates during this period. This induces greater consumption on the part of the older generations, which helps to explain why the decline in total private consumption is insufficient to offset the increase in government consumption.

When taxes increase after year 10, the intertemporal substitution effects are reversed. Labor supply contracts sharply. This, along with the continual decline in the capital stock, causes output to fall. The interest rate drops dramatically, reflecting the increase in the capital–labor ratio in period 11. It continues to rise thereafter, however, reflecting the increasing marginal productivity of capital, as the capital stock continues to shrink while hours worked expand. In the new long-run steady state, the capital stock is lower by 25.2 percent, and output is reduced by 7.3 percent. This crowding-out effect is much larger than the effect of the balanced-budget increase in government expenditure considered earlier. It reflects the greater distortionary effect of the higher tax rates under deficit financing that are imposed on young and future generations to pay for the redistribution toward the initial older generations.

FIGURE 1

The Effects of Permanent Balanced-Budget Increases in Government Consumption



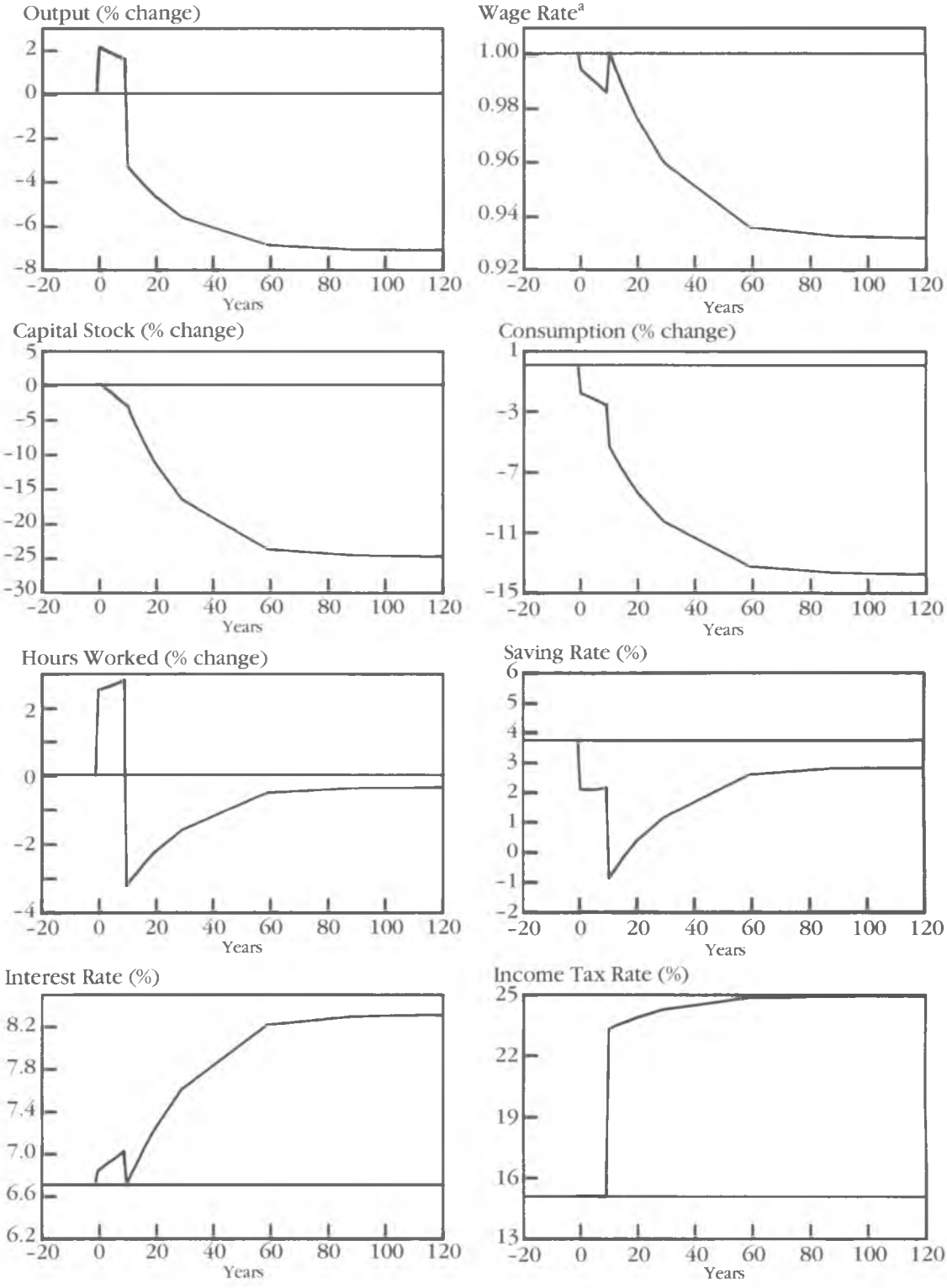
a. The wage rate in the initial steady state is normalized to unity.

NOTE: Horizontal lines represent values in the initial steady state. Percent changes are calculated from the initial steady state.

SOURCE: Authors' calculations.

FIGURE 2

The Effects of Permanent Deficit-Financed Increases in Government Consumption



[a] The wage rate in the initial steady state is normalized to unity.

NOTE: Dashed lines represent values in the initial steady state. Percent changes are calculated from the initial steady state.

SOURCE: Authors' calculations.

III. Temporary Increases in Government Expenditure

Balanced-Budget Increases

The next set of simulations examines the effects of a five-year increase in government expenditure financed by a contemporaneous increase in taxes. One can think of these experiments as being caused by a five-year war, during which taxes are raised to pay for military operations. In the long run, years after the war ends, all variables return to the values they held prior to the expansion of government spending. The reason is that tax rates and the share of government expenditure in output are both identical to their pre-war levels.

The charts in figure 3 show the effects of these policies on capital, labor, and output. Taxes are higher during the war years. Substitution effects dominate income effects, since a five-year tax increase does not reduce lifetime income by much. Because of the intertemporal substitution effect, people choose to work less during the war years when taxes are high, and to work more in later periods when taxes are lower. Labor supply is also reduced due to the within-period substitution effect that operates on the labor–leisure choice.

Labor supply falls by 2.6 percent, causing output to decline 2.0 percent in the first period of the five-year war. Because capital is fixed at the initial steady-state level in the first year, the large negative effect on output in the first period is solely due to the substitution effects on labor supply.

If government expenditure were high for only one year (instead of five), labor supply would fall by 4.0 percent (versus 2.6 percent for the five-year war). The larger decline in labor supply is due to the stronger intertemporal substitution effect in the case of a one-year war. There are two reasons for this. First, unlike the five-year case, lower labor supply during periods of high taxation cannot be spread over time in the one-year case. Second, a greater number of generations will face lower future taxes in a one-year war than in a five-year war. Hence, the first-period effects on labor supply and thus on output are larger in the one-year war.

Given the desire of individuals to smooth their consumption over time in the face of temporarily higher taxes, saving initially falls from 3.7 percent of output to −0.8 percent of output. Thus, although the income-tax rate rises from 15 percent to 20.4 percent in the first year, consumption falls by only 3.0 percent. The dramatic decline in saving shows up in period two, as capital falls by nearly 1.2 percent. Labor supply, consumption, output, and saving continue to be depressed during the second through the fifth years of the war, when taxes are still high. Thus, the capital stock continues to decline until year six. After the war is over and government expenditure returns to its original level, all variables gradually return to their pre-war levels.

Deficit-Financed Increases

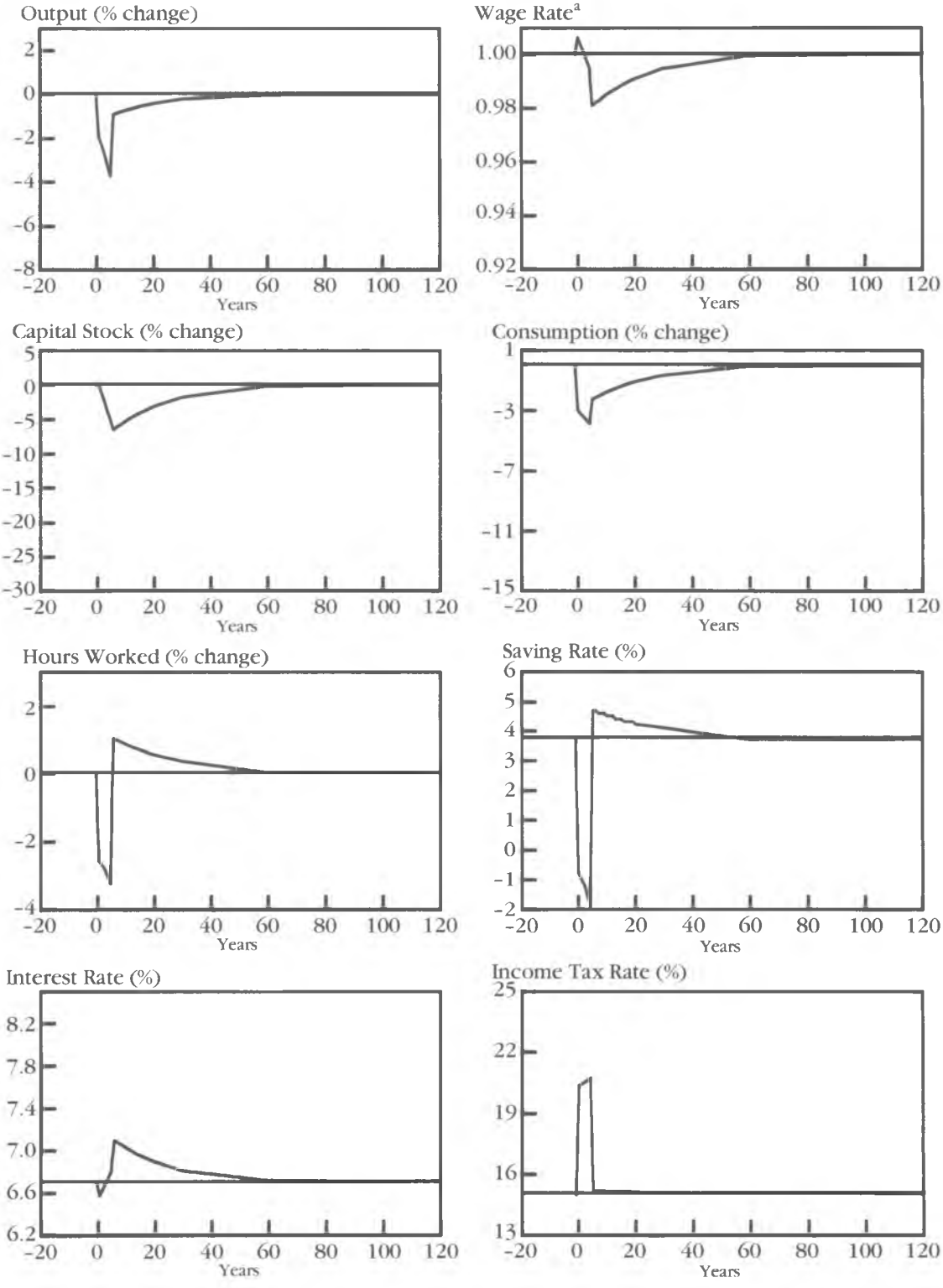
Most temporary increases in government spending are the result of wars, and most wars are deficit financed. That is, taxes are not raised during the war, but only at some time after the war has ended. The final simulation shows the effects of a five-year war when taxes are not increased until the year after the war concludes. Thus, taxes are slightly higher from year six on, rising by just enough to cover the additional interest expense on the war debt.

The charts in figure 4 show the effects that a five-year deficit-financed war can be expected to have on the economy. The tax profile facing private individuals has income and substitution effects, and again, income effects are small and substitution effects dominate. During the war years, taxes are lower than their level in later periods. Hence, individuals choose to work longer hours during the war years and to curtail labor supply in later periods. During the first year of the war, labor supply increases by 1.2 percent. Since capital is fixed during the first period, the higher labor supply causes output to rise by 0.9 percent and leads to a slight increase in the interest rate. Private consumption drops by 0.9 percent as individuals save more for future consumption.

This decrease, however, is insufficient to offset the increase in government consumption. Although private saving rises, aggregate saving is depressed because of the larger decline in government saving (that is, the government saves nothing in the initial steady state and is a net borrower during the war years). This leads to a decline in the capital stock over subsequent years. A lower capital stock, coupled with lower hours worked because of higher taxes, causes output to fall even further. In the long-run steady state, the capital stock is 7.6 percent lower, labor supply is 0.6 percent lower, and output is 2.4 percent lower compared with the initial steady state.

FIGURE 3

The Effects of Temporary Balanced-Budget Increases in Government Consumption



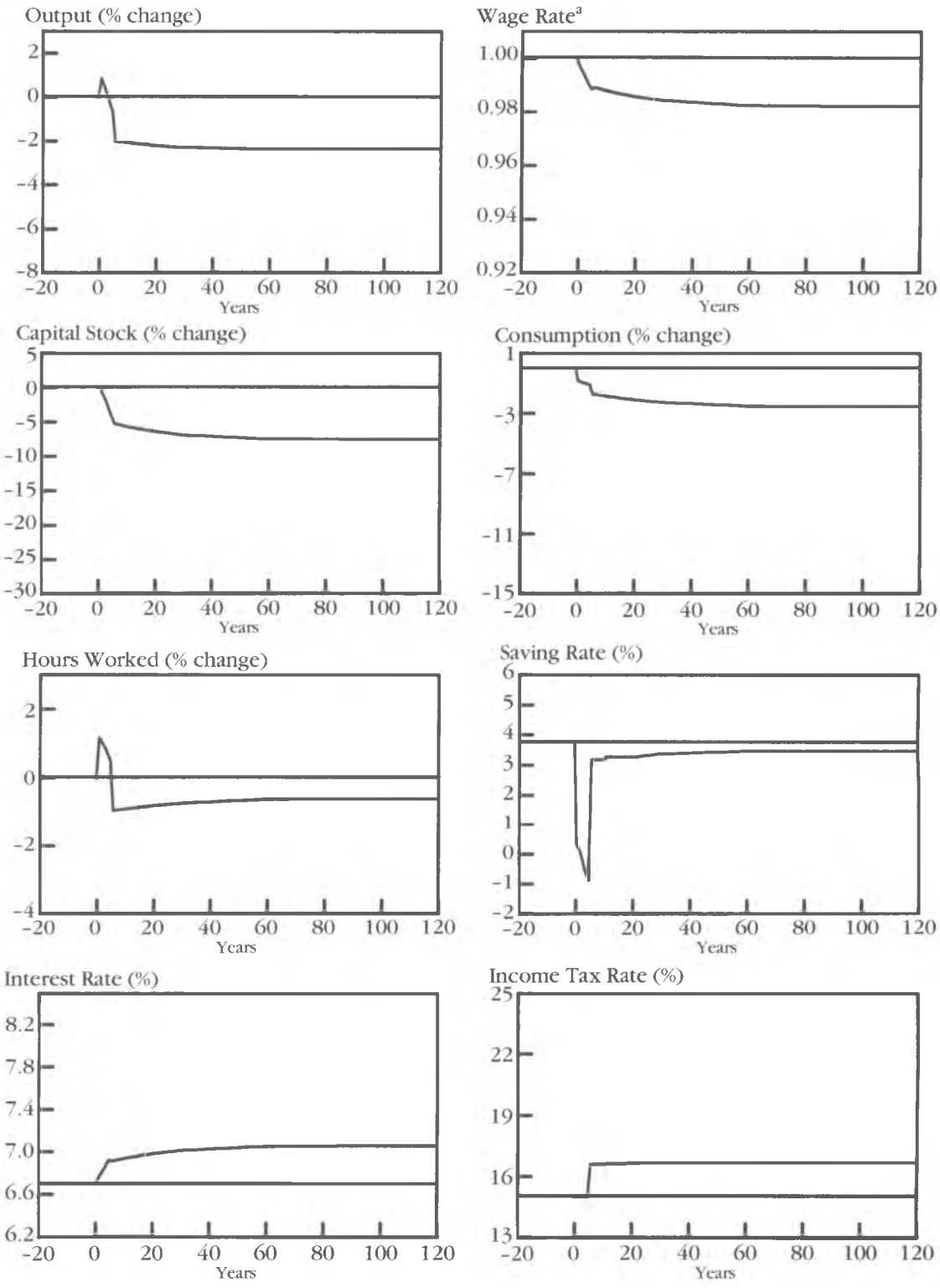
a. The wage rate in the initial steady state is normalized to unity.

NOTE: Horizontal lines represent values in the initial steady state. Percent changes are calculated from the initial steady state.

SOURCE: Authors' calculations.

FIGURE 4

The Effects of Temporary Deficit-Financed Increases in Government Consumption



a. The wage rate in the initial steady state is normalized to unity.

NOTE: Horizontal lines represent values in the initial steady state. Percent changes are calculated from the initial steady state.

SOURCE: Authors' calculations.

IV. Conclusion

This paper has analyzed the effects of both permanent and temporary changes in government expenditure on labor supply, interest rates, output, and the capital stock. Both the short- and long-run effects depend critically on whether the higher expenditures are financed with higher taxes initially or with government budget deficits.

A simulation in which government expenditures increased permanently from 13.7 to 22.1 percent of GNP (as they did over the last four decades) led to a long-run decline in output of 2.1 percent. This number is a benchmark estimate of the effect on output because of permanently higher government consumption. With deficit financing, output is higher in the short run because of the increase in labor supply induced by the intertemporal substitution effects of lower taxes earlier and higher taxes later. However, the long-run steady-state level of output is lower with deficit financing than without it. This occurs because of the higher tax rates necessary under deficit financing to service the accumulated debt.

Temporary increases in government expenditure, if financed by contemporaneous tax hikes, result in temporary declines in output because of the within-period substitution effect of the currently high taxes on the labor–leisure margin of choice. This effect is magnified by the intertemporal substitution effect. Individuals substitute current for future leisure because of the temporary increase in taxes. When a balanced budget is maintained during a temporary increase in government spending, all variables return to their initial steady-state levels in the long run. Under deficit financing, however, long-run output is slightly lower because of the adverse effects on labor supply caused by the higher taxes necessary to service the debt accumulated during the war years.

Unlike the case in the representative-agent model, output increases only in the presence of deficit-financed government expenditure. This is true for both permanent and temporary increases in government spending. When revenue is raised in a balanced-budget fashion, output declines. This is a result of the distortionary nature of taxation that induces intratemporal substitution in favor of working more hours, as well as intertemporal substitution in favor of working when taxes are low.

A further reason for the difference in results between this model and the representative-agent model is the intergenerational redistribution aspect of deficit financing. Some older generations escape higher future tax burdens and as a result consume more than they otherwise would. This leads to higher interest rates that again induce greater work effort on the part of the labor force.

References

Aiyagari, S. Rao, Lawrence J. Christiano, and Martin Eichenbaum. "The Output, Employment, and Interest Rate Effects of Government Consumption," Federal Reserve Bank of Chicago, Working Paper Series on Macroeconomic Issues, No. WP-90-10, June 1990.

Aschauer, David Alan. "Fiscal Policy and Aggregate Demand," *American Economic Review,* vol. 75, no. 1 (March 1985), pp. 117–27.

_____. "Is Government Spending Stimulative?" Federal Reserve Bank of Chicago, Staff Memorandum, 1987.

_____. "Is Public Expenditure Productive?" *Journal of Monetary Economics,* vol. 23, no. 2 (March 1989), pp. 177–200.

Auerbach, Alan J., and Laurence J. Kotlikoff. *Dynamic Fiscal Policy.* Cambridge: Cambridge University Press, 1987.

Baxter, Marianne, and Robert G. King. "Fiscal Policy in General Equilibrium," University of Rochester, Working Paper No. 244, September 1990.

Bernheim, B. Douglas. "Ricardian Equivalence: An Evaluation of Theory and Evidence," in Stanley Fischer, ed., *NBER Macroeconomics Annual II.* Cambridge, Mass.: MIT Press, 1987, pp. 263–304.

Ghez, Gilbert R., and Gary S. Becker. *The Allocation of Time and Goods over the Life Cycle.* New York: National Bureau of Economic Research, 1975.

Grossman, Sanford J., and Robert J. Shiller. "The Determinants of the Variability of Stock Market Prices," *American Economic Review,* vol. 71, no. 2 (May 1981), pp. 222–27.

Kormendi, Roger C. "Government Debt, Government Spending, and Private Sector Behavior," *American Economic Review,* vol. 73, no. 5 (December 1983), pp. 994–1010.

Meltzer, Allan H., and Scott F. Richard. "A Rational Theory of the Size of Government," *Journal of Political Economy,* vol. 89, no. 5 (October 1981), pp. 914–27.

Welch, Finis. "Effects of Cohort Size on Earnings: The Baby Boom Babies' Financial Bust," *Journal of Political Economy,* vol. 87, no. 5 (October 1979), pp. 565–97.

Wynne, Mark A. "The Aggregate Effects of Temporary Government Purchases," Federal Reserve Bank of Dallas, Research Paper No. 9007, April 1990.

Deregulation and the Location of Financial Institution Offices

by Robert B. Avery

Robert B. Avery is a professor in the Department of Consumer Economics and Housing at Cornell University and a research associate at the Federal Reserve Bank of Cleveland. The author gratefully acknowledges useful comments and suggestions from Rosemary Avery, Glenn Canner, Randall Eberts, George Galster, Mark Sniderman, and James Thomson. Fungya Huang provided helpful research assistance.

Introduction

The past 15 years have witnessed major changes in the regulation and structure of the U.S. financial services industry. These changes have been driven by technology, by the emergence of new, largely unregulated competitors, and by the general performance of the economy. Consequently, a wide array of new products and services and more competitive pricing and delivery systems have been made available to consumers. But some argue that these changes have come at a cost, alleging that certain consumers, particularly those in low-income and minority neighborhoods, have been abandoned by the banking system.

Concern has focused primarily on two areas: depository services and mortgage and consumer lending. Consumer groups contend that new market pressures and regulatory freedom have led financial institutions both to establish explicit fees for depository services that had traditionally been offered free of charge and to direct their branch systems to serve more affluent (and profitable) customers. Similar arguments have been made about mortgage and consumer lending, with financial institutions accused of deliberately limiting their lending in poor and minority areas. The industry has countered by noting that if fees have risen, it is because of higher costs; if offices have been closed, it is because they are unprofitable; and if fewer loans have been made in low-income and minority areas, it is because demand there has slipped.

Despite considerable debate in both the media and academic circles, there has been surprisingly little hard data produced to support either argument. Thus, not only are the underlying causes and consequences of change in the financial system at issue, but so are the facts about the size and scope of such change. This article looks at one small aspect of the debate: changes in the location of financial institution offices. Telephone book *Yellow Pages* for 1977 and 1989 are used to estimate the pre- and post-deregulation size and distribution of the financial industry's branch system in the metropolitan areas of Detroit, Cleveland, Philadelphia, Boston, and Atlanta. In assessing these data, I attempt to determine whether a disproportionate number of offices have been closed in low-income and minority neighborhoods over this period, and also whether such neighborhoods are currently served by disproportionately fewer offices. The comparisons control for population and other demographic factors such as housing and employment.

Clearly, restricting the study to five metropolitan areas limits its usefulness. However, all of the cities chosen have been the subject of media allegations of discrimination by their respective banking systems. Each not only has large and geographically segregated minority communities, but also a well-defined banking market with few branching restrictions, offering financial firms a wide range of options with which to respond to changing economic conditions. Thus, one can argue that if changes in the financial services industry have hurt low-income and minority consumers disproportionately over the past 15 years, the effects would likely show up in one of these cities.

I. Background

The financial services industry looked quite different in the mid-1970s than it does today. The consumer depository services market was dominated by commercial banks, but federal and state regulations limited the types of products they could offer, the prices they could charge, and the geographic areas in which they could operate. Restricted in their ability to compete for consumer deposits through prices, banks competed through such nonprice means as extensive branching networks, free or low-cost accounts, and other subsidized services. Savings and loans (thrifts) and credit unions competed with commercial banks for savings-type accounts; however, they could not offer transaction services and were required to operate under price restrictions similar to those that governed commercial banks. In part because of state usury laws, the consumer loan market was highly segmented, with finance companies serving the higher-risk end of the market and commercial banks serving the lower-risk end. The home-loan market was dominated by commercial banks and savings and loans; mortgage bankers played a comparatively small role.

Today, the structure of the industry is considerably different. Starting in 1981, price restrictions on depository services were gradually lifted, and by 1986, they were virtually eliminated. Thrifts, credit unions, money market funds, and even finance companies can now actively compete for any type of consumer depository account. Furthermore, because many state usury laws have been eliminated, the nature of the consumer loan market has also changed. Consumers are now much more likely to secure open-end lines of credit that can be drawn down at their convenience rather than the closed-end contracts tied to a specific purchase that had characterized the industry in the 1970s. Commercial banks, thrifts, and finance companies now appear to compete actively for all segments of the consumer loan market. The mortgage market has seen similar changes. Growth of the secondary market has resulted in considerable standardization of the loan application process and has ensured that mortgage originators have a ready outlet for their loans. This has made it much easier for firms that specialize in originating loans (rather than holding them for their portfolio) to flourish. Moreover, federal preemption of usury ceilings on home-purchase loans has helped to guarantee an adequate flow of mortgage credit.

The effect of these changes on consumers is unclear. On one hand, consumers appear to be the beneficiaries of more competitive pricing in both the depository and loan markets. On the other hand, the shift toward explicit and competitive pricing may have harmed those consumers who enjoyed cross-subsidies under the old, heavily regulated system. The potential for conflicting effects was foretold in 1979 by two consumer groups testifying before Congress on the removal of depository price restrictions. The Consumers Union strongly supported deregulation, yet the Consumer Federation of America hesitated, arguing that the poor might be adversely affected (see Brobeck and Cooper [1991]).

Arguments supporting the view that low-income consumers have been harmed by deregulation can be summarized as follows (see Canner and Maland [1987]):

- Explicit pricing of depository services may price some consumers out of the market, pushing such items as a basic checking account beyond their reach.
- The reduction of bank profit margins stemming from more competitive market conditions may lead depository institutions to close marginal offices, which are more likely to be in low-income neighborhoods. Furthermore, more-lenient federal merger guidelines could accelerate the closure process.
- Competitive forces may move banks upmarket, shifting their business toward more affluent consumers who purchase many products.
- Raised credit standards resulting from the shift toward open-end loans may ration the poor out of the consumer loan market. If financial firms prefer to lend to their depository services customers, consumers priced out of the depository market may be rationed out of the loan market as well.

The gist of these arguments is that the pricing system in effect prior to deregulation favored

low-income consumers, who gave up little in forgone interest because of small account sizes, but benefited substantially from underpriced services. In effect, such pricing amounted to a cross-subsidy of low-income consumers, but because profit margins were high enough, banks were satisfied with the arrangement. Under an explicit pricing system and narrower margins, these same consumers may be priced out of the market unless financial institutions are forced to offer subsidized basic depository accounts. But Canner and Maland (1987) point out that requiring firms to offer such accounts could raise the cost of doing business in poorer neighborhoods and thus lead to office closures there.

Most discussion about the effects of deregulation has focused on low-income consumers. There is a long-standing concern that minorities, even those who are not poor, have been ill served by the financial services industry (Avery and Buynak [1981]). Surveys have consistently shown that minorities are less likely than whites of the same income level to own checking or savings accounts or to use depository institutions for loans. Analysts disagree, however, about whether this is a result of discrimination, differential demand, or sound economic reasons such as cost. Moreover, it is unclear what effect deregulation may have had on minorities. If disproportionately poor service in the minority community stemmed from discrimination, then one might expect conditions to improve as competitive pressures made it more difficult for firms to discriminate. On the other hand, if reduced service arose from cost factors or weak demand, then it might be exacerbated by increased competition and price changes.

Regulatory responses to these potentially adverse effects on low-income (and minority) consumers have been mixed. The 1975 Home Mortgage Disclosure Act and the 1977 Community Reinvestment Act (CRA) established federal regulatory processes to encourage financial institutions to meet the credit needs of their entire community — including low-income areas — as long as such practices were consistent with safe and sound banking practices. Both Acts were strengthened in 1989; however, their specific implications, as well as regulators' ability to take a proactive role in their enforcement, remain uncertain (Avery [1989]).

Federal legislation related to basic depository services has been introduced before Congress many times, but none of these efforts has been successful. In 1986, the Federal Financial Institutions Examination Council approved a policy statement that endorsed and encouraged financial institutions to offer a basic package of depository services to low-income customers (Canner and Maland [1987]). Although the CRA pertains primarily to credit needs, an institution's record of opening and closing offices — as well as the services it provides at specific locations — has been recognized in the CRA assessment procedures (Mitchell [1990]). This link was made more explicit in a joint statement issued by the federal financial institution regulatory agencies in March 1989. The new policy allows provision of basic financial services such as low-cost checking accounts to be considered in determining an institution's CRA rating.

Despite concerns about the impact of deregulation on low-income consumers and on the level of service within the black community in particular, very little systematic evidence has been produced. Results of mortgage lending studies are mixed. Using 1981 data, Avery and Canner (1984) find statistically significant evidence that, controlling for other factors, minority neighborhoods received fewer mortgage loans from commercial banks and savings and loans in only nine of 100 standard metropolitan statistical areas (SMSAs) studied. Using more recent data, however, Bradbury, Case, and Dunham (1989) find substantial evidence of such effects in Boston. In addition, detailed newspaper accounts in Atlanta, Detroit, Cleveland, and Boston all produced evidence that led some to conclude that discrimination existed in these cities' mortgage markets in the late 1980s.[1]

Evidence concerning deregulation's impact on the use of depository services is also inconclusive (Canner and Maland [1987]). Household surveys taken by the Federal Reserve Board in 1977 and 1983 show a decline in the propensity of the lowest-income consumers to use depository accounts over this period. However, Canner and Maland point out that this drop-off can be explained by rising unemployment and demographic changes over the same interval. They also cite a 1986 Federal Reserve Board survey showing that of those respondents who lacked a checking account, none named fees or minimum balance requirements as the reason. Scott (1988), citing a survey of low-income consumers, reports that two-thirds of the respondents who did not have a checking account had *never* had one. Thus, although there is evidence of a large, disproportionately black population of low-income consumers who do not own depository

■ 1 See "The Color of Money," *Atlanta Constitution,* May 1–4, 1988, p. 1; "The Race for Money," *Detroit Free Press,* June 24–27, 1988, p. 1; "Banks Give Poor Areas Few Loans," *The Plain Dealer,* October 10, 1989, p. 1; and "Inequities Are Cited in Hub Mortgages," *The Boston Globe,* January 1, 1989, p. 1.

accounts, it is unclear whether the size of this population has increased since deregulation.

Another potential means of evaluating the impact of changes in the financial services industry on low-income and minority consumers is to look at office closings and openings. If low-income and minority areas have suffered a disproportionate number of such closures over the past 15 years, this could signal a reduction in services in these neighborhoods. Unfortunately, few studies of office closures have been conducted.[2] Section II attempts to fill this gap by comparing the financial industry branch systems in Detroit, Cleveland, Philadelphia, Boston, and Atlanta at the onset of deregulation in 1977 against the systems in place in 1989–1990. The purpose of these comparisons is twofold: to determine whether a disproportionate number of offices were closed in low-income and minority neighborhoods over this period, and to test whether such neighborhoods are currently being served by disproportionately fewer offices.

II. Empirical Setting

The empirical procedures used to examine each of the five cities were similar. I selected the geographic areas covered by the "center city" *Yellow Pages* in each metropolitan region as the study areas for each city. Typically, this zone included the city proper and most inner suburbs. For Boston and Cleveland, however, substantial portions of the outer suburbs were included as well. Except for Atlanta, all areas were of roughly equal population.[3]

I compiled basic data on office locations as follows: The 1977 and 1989–1990 *Yellow Pages* for each city were used to compile address lists for four separate types of institutions: commercial banks, thrifts (savings and loans and mutual savings banks), check cashing companies, and loan (both business and consumer finance) and mortgage companies.[4] Institutions included under the headings *Banks, Savings and Loans, Check Cashing Service, Financing, Loans,* or *Mortgages* were added to the lists. I classified offices listed under multiple headings according to their primary activity. For example, a bank office was counted as a commercial bank unless it was clearly only a loan production office. Commercial and mutual savings bank addresses were also cross-checked against the June 1977 and June 1988 Summary of Deposits address list filed with federal regulators, resulting in the addition of a few offices not listed in the *Yellow Pages*. I did not count drive-in windows and automated teller machines (ATMs) unless they either had separate addresses (and were listed in the *Yellow Pages*) or qualified as separate offices under federal guidelines.

Institutional offices were further sorted and aggregated by U.S. Postal Service five-digit ZIP Code areas (ZCAs) corresponding to the study area of each city. In total, 230 ZCAs were used.[5] Offices outside the study areas were discarded even though listed in the *Yellow Pages*.

The decision to aggregate data to the ZCA level was based on several factors. First, it is comparatively easy to classify addresses by ZCA with a high degree of accuracy. Second, ZCAs are large enough (30,000 residents on average) to encompass both residential areas and the business districts that serve them. This is not so for some other measures, including census tracts. Although census tracts are designed to be economically and demographically homogeneous, they are comparatively small (4,000 to 5,000 persons) in large metropolitan areas. Thus, many residential census tracts contain few business offices, yet are located next to business districts that provide ready access to their residents.[6] Though this is not necessarily a drawback for studies that use households as their unit of analysis, it poses a real problem for studies such as this one that use financial institution offices as the observational unit.[7]

Using ZCAs also has disadvantages. For instance, these areas were set up for the

■ **2** One exception is a report in *The New York Times* (January 30, 1989) showing that bank closures in the New York SMSA between 1985 and 1988 were disproportionately located in low-income areas. Dennis (1984) reports evidence from a Federal Reserve Board study showing that the overall ratio of commercial bank openings to closures fell from 5:1 in 1979 to 1.9:1 in 1983.

■ **3** The Atlanta study area included 825,000 residents, while the other four areas ranged from 1,400,000 to 1,650,000 residents.

■ **4** Phone book publication dates were as follows: 1977 and 1989 (no month given) for Atlanta, January 1978 and 1990 for Boston, May 1977 and 1989 for Cleveland, September 1977 and 1988 for Detroit, and March 1977 and 1990 for Philadelphia.

■ **5** Twenty-eight of the 258 ZCAs corresponding to the study areas were excluded because they contained too few residents. This criterion eliminated the central business districts of each city.

■ **6** Cuyahoga County, Ohio (Cleveland), for example, contains 357 census tracts but only 50 ZCAs. In 1989, an average of 4,010 people lived in each census tract, compared with 28,634 people in each ZCA. The average number of commercial banking offices in these ZCAs was 5.6, while census tracts averaged 0.8. More than half of the census tracts had no banking offices at all.

■ **7** One alternative would be to consider offices within contiguous census tracts as accessible to an individual. However, this procedure might erase many of the inherent advantages of homogeneity that make census tract data attractive in the first place.

TABLE 1

Sample Characteristics, by ZCAs

	Atlanta	Boston	Cleveland	Detroit	Philadelphia	Total
Median annual household income, 1989						
Average ZCA median	$30,964	$36,389	$32,132	$25,846	$24,051	$30,509
Percent of ZCAs above $30,000	45.5	61.5	59.6	33.3	18.6	45.7
Percent of ZCAs between $20,000 and $30,000	30.3	27.7	27.7	30.9	48.8	32.6
Percent of ZCAs below $20,000	24.2	10.8	12.8	35.7	32.6	21.7
Racial composition, 1989						
Average percent black	38.1	8.9	17.3	41.9	34.6	25.7
Percent of ZCAs below 10% black	45.5	80.0	66.0	31.0	41.9	56.1
Percent of ZCAs between 10% and 50% black	15.2	15.4	17.0	28.6	23.3	19.6
Percent of ZCAs above 50% black	39.4	4.6	17.0	40.5	34.9	24.3
Housing, 1980						
Average median value	$53,875	$58,217	$53,544	$28,953	$28,087	$45,662
Number of units per capita	0.43	0.40	0.39	0.39	0.40	0.40
Employment[a]						
Employees per capita, 1986	0.94	0.51	0.46	0.39	0.30	0.50
Firms per 10,000 people, 1986	41.1	25.8	25.6	21.7	16.2	25.4
Percent white collar, 1980	63.7	65.0	56.3	49.4	54.6	58.2
Population						
Per ZCA, 1977[b]	22,889	24,866	32,960	41,524	41,063	32,306
Per ZCA, 1989	24,940	24,672	30,059	34,569	37,734	30,061
ZCA distribution						
Number of ZCAs	33	65	47	42	43	230
Percent of ZCAs in center city[c]	54.5	33.8	29.8	61.9	95.3	52.6

a. 1986 employment figures are deflated to per capita terms using 1989 population estimates.
b. 1977 population figures are estimated as the weighted average of 1980 (weight of 0.7) and 1970 (weight of 0.3) population values.
c. A ZCA is considered "center city" if the majority of its area falls within the boundaries of the city proper.
NOTE: Sample excludes a total of 11 central-business-district ZCAs and 17 other ZCAs with fewer than 5,000 residents in 1989.
SOURCE: Author's calculations based on CACI data.

convenience of the Postal Service and its ground transportation system, not for statistical analysis. Thus, boundaries do not necessarily correspond to natural socioeconomic divisions and in many cases cut across city or county lines. ZCAs also suffer from the same problem as census tracts in that residents on the edge of one area may do their shopping in another. Nevertheless, ZCAs do vary substantially in their economic and racial composition, even if not by design. If financial institutions differentially serve black and low-income neighborhoods, gross patterns should be apparent at the ZCA level (though more accurate analysis might require a different unit of geographic aggregation).

Independent variables, also defined at the five-digit ZCA level, were primarily constructed from data reported in *The Sourcebook of Demographics and Buying Power for Every ZIP Code in the USA*, published by Consolidated Analysis Centers, Inc. (CACI) in 1989. CACI aligns census data with ZCA boundaries to estimate 1980 measures of median household income, median owner-occupied housing value, population (total and by race), and number of housing units (a proxy for household size). The organization also provides 1989 estimates of population and median household income by ZCA, 1986 estimates of the number of firms and employees operating in each ZCA (based on independent information), and 1980 white-collar employment figures (based on census data).

Characteristics of the sample, broken down by city, are given in table 1. Although the five city samples correspond to areas of roughly equal size, they reflect differing demographic characteristics, with Detroit and Philadelphia clustered into one group, Cleveland and Boston

TABLE 2

Number of Offices per 10,000 People, 1977 and 1989

	Atlanta	Boston	Cleveland	Detroit	Philadelphia	Total
Commercial banks						
1977	2.76	1.74	1.73	1.46	1.17	1.73
1989	3.65	1.70	1.96	1.60	1.30	1.94
Thrift institutions						
1977	0.82	1.64	1.35	0.34	0.96	1.10
1989	0.98	1.38	1.83	0.42	1.16	1.20
Check cashing companies						
1977	0.03	0.01	0.05	0.01	0.25	0.07
1989	0.50	0.10	0.18	0.19	0.94	0.35
Loan and mortgage companies						
1977	4.67	0.81	1.32	0.62	0.66	1.41
1989	5.04	1.51	0.84	0.31	0.36	1.44
Total						
1977	8.27	4.20	4.45	2.44	3.04	4.30
1989	10.17	4.68	4.81	2.53	3.76	4.93

SOURCE: Author's calculations based on *Yellow Pages* data.

into another, and Atlanta showing characteristics of both pairs.

For Detroit and Philadelphia, most of the study-area ZCAs are located in the center city. Although each center city contains many middle-income neighborhoods, most of the middle- and upper-income suburbs are excluded. The racial composition of the middle-class neighborhoods of the two cities differs somewhat. Philadelphia contains more middle-income white ethnic areas, while Detroit's middle-class neighborhoods are more likely to be black. Each city suffered a significant decline in population between 1977 and 1989 (16.7 percent in Detroit and 8.1 percent in Philadelphia). Housing prices, median family income, and employment are similar, but significantly below those of the other three cities. About one-third of both cities' ZCAs are more than 50 percent black and have median annual household incomes of less than $20,000.

Detroit's and Philadelphia's commercial banking markets are also comparable. Each city is dominated by five or six large branch-banking systems that have undergone significant change since 1977 (through mergers and consolidation in Detroit and through purchases by out-of-area banks in Philadelphia). Their thrift markets differ somewhat, though. Detroit has comparatively few thrifts, whereas Philadelphia has many small, neighborhood thrifts plus two large branch systems.

Data for the Cleveland and Boston study areas also track fairly closely. Unlike Philadelphia and Detroit, each contains many of the cities' suburbs, with only about one-third of the study-area ZCAs located in the center city. In addition, fewer than 20 percent of each city's study-area ZCAs have black majorities or median annual household incomes of less than $20,000, and median housing values are almost twice those of Philadelphia and Detroit. Employment data also differ between the two pairs, with more employees per capita and more white-collar workers in Boston and Cleveland.

Both Boston and Cleveland have several areawide branch-banking systems. Consolidations occurred between 1977 and 1989, generally through holding companies rather than mergers. Both cities also have large, competitive thrift systems.

The Atlanta study area differs from the other four in several ways. As noted above, Atlanta's sample population is only slightly more than half that of the other four cities. Moreover, Atlanta's population is growing, whereas that of the other cities is contracting. Housing values are similar to those of Boston and Cleveland, while racial composition is comparable to that of Philadelphia and Detroit. Median income and the percentage of study-area ZCAs located in the center city fall between the Cleveland/Boston and Philadelphia/Detroit range. The status of Atlanta

TABLE 3

Number of Offices per 10,000 People by Race and Income, 1977 and 1989

	Median Annual Household Income[a]			Percent Black[a]		
	Above $30,000	$20,000–$30,000	Below $20,000	Below 10	10–50	Above 50
Commercial banks						
1977	1.93	1.66	1.40	1.90	1.73	1.32
1989	2.29	1.77	1.47	2.25	1.91	1.24
Thrift institutions						
1977	1.44	1.02	0.50	1.49	0.87	0.38
1989	1.64	1.03	0.54	1.67	1.00	0.28
Check cashing companies						
1977	0.00	0.05	0.22	0.02	0.04	0.18
1989	0.08	0.46	0.73	0.15	0.43	0.74
Loan and mortgage companies						
1977	1.98	1.03	0.77	1.77	1.15	0.77
1989	2.40	0.80	0.42	2.12	0.81	0.41
Total						
1977	5.35	3.76	2.88	5.19	3.78	2.66
1989	6.41	4.06	3.15	6.19	4.16	2.67
Number of ZCAs	105	75	50	129	45	56

a. Based on ZCAs sorted by 1989 characteristics.
SOURCE: Author's calculations.

as a regional distribution center is reflected in its large number of firms and employees.

Atlanta not only has the highest number of banking offices per capita of the five study sites, but its banking industry (particularly branch banking) grew dramatically over the 13 years covered here. The number of mortgage company offices, including many regional headquarters, also rose considerably and at a much higher rate than in any of the other cities.

III. Results

Modest growth occurred in the per capita number of offices for almost all institution types and cities between 1977 and 1989 (table 2). Overall, per capita growth was up 12 percent for commercial bank offices, 9 percent for thrift offices, 500 percent for check cashing offices, and 2 percent for loan and mortgage company offices. The only sectors showing a decline in service were commercial banks and thrifts in Boston and loan and mortgage companies in Cleveland, Detroit, and Philadelphia.[8] The uptick in the per capita number of branches for each type of institution seems to contradict the commonly held belief that deregulation would lead to a reduced number of "brick and mortar" offices. Indeed, branch services seem to have grown over this period.

Growth in the number of offices between 1977 and 1989 does not appear to be uniform across socioeconomic groups (table 3). While the per capita number of thrift and commercial bank offices jumped 14 percent in predominantly white and integrated ZCAs, areas that were more than 50 percent black showed an 11 percent decline. Interestingly, this difference does not show up when ZCAs are arrayed by income, even though

8 The latter figures are somewhat deceptive because they reflect a change in the mix between mortgage and loan companies. In all five cities, loan and finance companies showed a substantial decline in the per capita number of offices over the study period, while mortgage company offices grew in importance. Atlanta is a large regional mortgage center and thus has an artificially inflated number of mortgage production offices. The Boston real estate market also was very active during the 1977–1989 period, and its mortgage company offices grew rapidly.

TABLE 4

City Differences in Commercial Banks' and Thrifts' Level of Service Due to Race or Income

	Atlanta	Boston	Cleveland	Detroit	Philadelphia	Total
Commercial banks						
10%–50% black	0.61	−0.70	0.37	−0.82[a]	−0.63	−0.38
	(1.83)	(0.50)	(0.45)	(0.48)	(0.38)	(0.31)
Above 50% black	−2.53[a]	−1.35	−0.84[a]	−1.16[b]	−0.94[b]	−1.35[b]
	(1.35)	(0.86)	(0.45)	(0.44)	(0.34)	(0.31)
R^2	0.13	0.06	0.10	0.16	0.17	0.21
$20,000–$30,000 income	−0.98	0.24	−1.02[b]	−0.41	−0.48	−0.44
	(1.49)	(0.42)	(0.37)	(0.49)	(0.43)	(0.28)
Below $20,000 income	−2.63	0.01	−0.51	−0.63	−0.61	−0.80[b]
	(1.60)	(0.61)	(0.50)	(0.47)	(0.46)	(0.33)
R^2	0.08	0.01	0.15	0.04	0.04	0.17
Thrift institutions						
10%–50% black	−0.73	−0.38	−0.38	−0.45[b]	−0.79[b]	−0.57[b]
	(0.53)	(0.31)	(0.42)	(0.20)	(0.27)	(0.15)
Above 50% black	−1.46[b]	−1.37[b]	−1.93[b]	−0.59[b]	−1.40[b]	−1.28[b]
	(0.39)	(0.54)	(0.42)	(0.18)	(0.24)	(0.15)
R^2	0.32	0.11	0.33	0.22	0.46	0.38
$20,000–$30,000 income	−1.16[b]	0.01	−1.42[b]	−0.35[a]	−0.20	−0.56[b]
	(0.44)	(0.26)	(0.36)	(0.19)	(0.35)	(0.15)
Below $20,000 income	−1.22[b]	−0.70[a]	−1.12[b]	−0.59[b]	−0.96[b]	−0.93[b]
	(0.47)	(0.38)	(0.49)	(0.18)	(0.37)	(0.17)
R^2	0.25	0.06	0.28	0.21	0.19	0.28

a. Statistically significant at the 10 percent level.
b. Statistically significant at the 5 percent level.
NOTE: Dependent variable: number of offices per 10,000 people in 1989. Coefficients are reported for two separate regressions, one for income and one for race. Each regression had an intercept and two dummy variables. Total regressions (column 6) had separate intercepts for each city. Standard errors are in parentheses.
SOURCE: Author's calculations.

the race and income divisions are designed to separate the sample into groups of similar size. The per capita number of thrift and commercial bank offices increased 6 percent in the poorest ZCAs (those with a median annual household income of less than $20,000) — a growth rate below that of the richest areas (17 percent) but above that of the middle-income areas (4 percent).

Check cashing and loan and mortgage companies show a more consistent relationship with race and income. Check cashing companies grew most rapidly in low-income and predominantly black areas, while the number of loan and mortgage company offices contracted substantially in all but the predominantly white and high-income areas. The latter figures reflect the predominance of mortgage companies in high-income areas and of finance companies in low- and middle-income and black areas.

Although the *change* in the number of financial institution offices between 1977 and 1989 does not appear to be strongly related to income, there is a significant correlation between income and the number of offices existing in 1989. On a per capita basis, low-income areas had 35 percent fewer commercial bank offices and less than one-third as many thrift offices as high-income areas. These differences are even larger when predominantly black areas are compared with predominantly white areas.

City differences in the level of service provided by commercial banks and thrifts are shown in table 4. Coefficients from simple regressions differentiating only race and income (separately) are given for each city. The coefficients for the two racial dummy variables reflect the gross difference in the number of offices per capita between integrated/predominantly black areas and predominantly white areas for each city in 1989. Coefficients for the two income dummies

TABLE 5

Factors Affecting Financial Intermediaries' Level of Service

	Commercial Banks	Thrift Institutions	Check Cashing Companies	Loan and Mortgage Companies	Total
Intercept	−2.26[a]	1.12[a]	0.33	−3.66[a]	−4.46[a]
	(0.70)	(0.50)	(0.26)	(1.66)	(2.16)
10%–50% black	−0.10	−0.46[a]	0.14	−0.46	−0.87
	(0.24)	(0.17)	(0.09)	(0.56)	(0.73)
Above 50% black	−0.09	−0.94[a]	0.31[a]	−0.28	−1.00
	(0.27)	(0.20)	(0.10)	(0.65)	(0.85)
$20,000–$30,000 income	0.14	−0.11	0.07	−0.24	−0.13
	(0.27)	(0.20)	(0.10)	(0.65)	(0.85)
Below $20,000 income	−0.13	−0.13	0.20	−0.25	−0.31
	(0.39)	(0.28)	(0.14)	(0.92)	(1.20)
Center city	−0.17	0.10	−0.09	−0.07	−0.24
	(0.24)	(0.17)	(0.09)	(0.56)	(0.73)
White collar (%)	−0.011	0.012	−0.004	0.018	0.014
	(0.013)	(0.009)	(0.005)	(0.031)	(0.041)
Home value ($10,000)	0.19[a]	−0.03	−0.03	0.21	0.33
	(0.07)	(0.05)	(0.03)	(0.16)	(0.21)
Housing units per capita	6.80[a]	0.42	0.18	4.17	11.57[a]
	(1.78)	(1.28)	(0.65)	(4.23)	(5.51)
Firms per 10,000 people	0.024[a]	0.11[a]	0.002	0.03[a]	0.07[a]
	(0.005)	(0.003)	(0.002)	(0.01)	(0.02)
Employees per capita	1.38[a]	−0.03	0.07	0.32	1.74[a]
	(0.21)	(0.15)	(0.08)	(0.49)	(0.63)
Boston	−0.36	−0.67[a]	0.01	0.33	−0.69
	(0.24)	(0.17)	(0.09)	(0.58)	(0.75)
Detroit	0.33	−1.08[a]	−0.19[b]	0.46	−0.49
	(0.27)	(0.19)	(0.10)	(0.64)	(0.83)
Philadelphia	0.33	−0.44[b]	0.64[a]	0.64	1.17
	(0.31)	(0.22)	(0.11)	(0.74)	(0.96)
Atlanta	0.55[b]	−0.92[a]	0.22[a]	3.32[a]	3.16[a]
	(0.30)	(0.21)	(0.11)	(0.70)	(0.91)
R^2	0.67	0.45	0.48	0.39	0.56

a. Statistically significant at the 5 percent level.
b. Statistically significant at the 10 percent level.
NOTE: Dependent variable: number of offices per 10,000 people in 1989. City intercepts reflect the difference between each of the included cities and Cleveland. Standard errors are in parentheses.
SOURCE: Author's calculations.

reflect similar differences between middle- and low-income neighborhoods and high-income neighborhoods.

In all five cities, predominantly black areas have significantly fewer commercial bank offices per capita than predominantly white areas. Differences range from more than 2.50 offices per 10,000 people in Atlanta to 0.85 offices in Cleveland and are statistically significant in all cases except Boston. Similar, though less significant, differences show up across income groups as well. The number of thrift offices per capita is also related to both race and income. In all cases, the thrift differences are more statistically significant than the commercial bank differences, although the magnitude of the former is larger only for Boston, Cleveland, and Philadelphia. One explanation for this finding is that the thrift regressions have a better overall fit (R^2), reflecting a more consistent relationship between income/race and office location.

Clearly, conclusions drawn from simple regressions such as these can be misleading. Black and low-income areas may be less desirable to financial institutions not because of race or income per se, but because of other factors that are correlated with race and income, such as housing values and business employment. Moreover,

TABLE 6

Factors Affecting the Change in Financial Intermediaries' Service between 1977 and 1989

	Commercial Banks	Thrift Institutions	Check Cashing Companies	Loan and Mortgage Companies	Total
Intercept	−1.18[a]	1.04[a]	0.31	−2.28	−2.11
	(0.58)	(0.46)	(0.22)	(1.57)	(1.68)
10%–50% black	−0.08	−0.13	0.14[b]	−0.13	−0.20
	(0.19)	(0.16)	(0.07)	(0.53)	(0.57)
Above 50% black	−0.14	−0.54[a]	0.20[a]	−0.03	−0.51
	(0.23)	(0.18)	(0.08)	(0.62)	(0.66)
$20,000–$30,000 income	−0.04	0.12	0.09	0.20	0.37
	(0.23)	(0.18)	(0.08)	(0.61)	(0.66)
Below $20,000 income	−0.09	0.45[b]	0.08	0.48	0.93
	(0.32)	(0.26)	(0.12)	(0.87)	(0.93)
Center city	−0.24	−0.09	−0.02	0.52	0.17
	(0.20)	(0.16)	(0.07)	(0.53)	(0.57)
White collar (%)	−0.017	0.016[b]	−0.0004	0.011	0.010
	(0.010)	(0.009)	(0.004)	(0.030)	(0.032)
Home value ($10,000)	0.10[b]	−0.07	−0.04[b]	0.35[a]	0.34[a]
	(0.06)	(0.05)	(0.02)	(0.15)	(0.16)
Housing units per capita	3.79[a]	−2.96[a]	0.25	−0.82	−0.23
	(1.47)	(1.18)	(0.55)	(4.00)	(4.28)
Firms per 10,000 people	0.015[a]	0.004	0.0003	−0.008	0.011
	(0.004)	(0.003)	(0.002)	(0.011)	(0.012)
Employees per capita	0.16	0.07	0.01	−0.87[b]	−0.55
	(0.17)	(0.14)	(0.08)	(0.46)	(0.49)
Boston	−0.21	−0.90[a]	−0.11	0.95[b]	−0.16
	(0.20)	(0.16)	(0.08)	(0.55)	(0.59)
Detroit	0.25	−0.38[a]	−0.19	0.74	0.50
	(0.22)	(0.18)	(0.10)	(0.60)	(0.65)
Philadelphia	0.49[b]	−0.32	0.42[a]	0.40	0.99
	(0.26)	(0.21)	(0.10)	(0.70)	(0.75)
Atlanta	0.42	−0.33	0.27[a]	1.14[b]	1.50[a]
	(0.24)	(0.20)	(0.09)	(0.67)	(0.71)
R^2	0.32	0.19	0.41	0.13	0.13

a. Statistically significant at the 5 percent level.
b. Statistically significant at the 10 percent level.
NOTE: Dependent variable: change in the number of offices per 10,000 people, 1977–1989. City intercepts reflect the difference between each of the included cities and Cleveland. Standard errors are in parentheses.
SOURCE: Author's calculations.

because income and race are themselves highly correlated, it is difficult to determine which of the two factors is more important in predicting financial institution behavior. To address this concern, I ran regressions for each institution type controlling for median home values, per capita number of owner-occupied homes, number of firms and employees, percentage of employed residents with white-collar jobs, and dummy variables for race, income, center city location, and each sample city. Results are presented in table 5.

The estimated difference in commercial banks' level of service resulting from neighborhood racial and income characteristics shrinks considerably when other factors are controlled for: Home values, employment, and the number of housing units appear to be more important determinants. By contrast, neighborhood racial composition (but not income) is still a strong predictor of thrift institution behavior. Except for check cashing offices in predominantly black areas, racial and income characteristics do not appear to play a significant role in the location of either check cashing or mortgage and loan offices.

Similar conclusions emerge about the change in the number of offices between 1977 and 1989 (table 6). Racial and income effects all

TABLE 7

City Differences in Commercial Banks' and Thrifts' Level of Service Due to Race and Income

	Atlanta	Boston	Cleveland	Detroit	Philadelphia
Commercial banks					
10%–50% black	2.11	−0.15	−0.65	−0.60	−0.58[a]
	(1.45)	(0.44)	(0.40)	(0.79)	(0.32)
Above 50% black	3.33	0.05	−0.26	−0.77	−0.49
	(2.20)	(0.74)	(0.46)	(0.81)	(0.35)
$20,000–$30,000 income	−0.31	0.14	−0.04	0.92	0.51
	(1.48)	(0.45)	(0.55)	(0.73)	(0.51)
Below $20,000 income	−0.66	−0.50	−0.15	0.71	0.80
	(1.91)	(0.68)	(0.76)	(0.89)	(0.74)
R^2	0.86	0.62	0.62	0.38	0.64
Thrift institutions					
10%–50% black	0.31	−0.15	−1.29[b]	−0.18	−0.54[a]
	(0.70)	(0.40)	(0.28)	(0.33)	(0.28)
Above 50% black	0.67	−0.89	−1.12[b]	−0.13	−0.84[b]
	(1.05)	(0.67)	(0.32)	(0.34)	(0.31)
$20,000–$30,000 income	0.46	−0.08	−0.62	0.22	0.18
	(0.71)	(0.41)	(0.38)	(0.30)	(0.45)
Below $20,000 income	1.21	−0.40	−0.38	0.15	−0.31
	(0.92)	(0.62)	(0.54)	(0.37)	(0.64)
R^2	0.70	0.24	0.84	0.42	0.65

a. Statistically significant at the 10 percent level.
b. Statistically significant at the 5 percent level.
NOTE: Dependent variable: number of offices per 10,000 people in 1989. Regressions are similar to those in table 5. Coefficients for variables other than race and income are available upon request. Standard errors are in parentheses.
SOURCE: Author's calculations.

but disappear when other factors are controlled for in the commercial bank regression, but thrift institutions appear to have significantly reduced their presence in predominantly black areas. Surprisingly, ceteris paribus, the number of thrift offices in low-income areas seems to have expanded. These effects nearly offset each other in low-income black areas; thus, it is middle- and high-income black neighborhoods that seem to have suffered the greatest decline in service.

Finally, regressions similar to those presented in table 5 were run for commercial banks and thrifts at the individual city level (see table 7, which reports only the coefficients for income and race). Although few of these coefficients are statistically significant (in part because of the small sample sizes), they suggest that the aggregate regressions may mask individual city differences. For example, ceteris paribus, predominantly black areas are served by comparatively more offices in Atlanta than in Cleveland, Detroit, and Philadelphia. The only statistically significant effects are differences based on race for Cleveland and Philadelphia thrifts. In both cases, integrated and predominantly black areas are much less likely to be served by thrifts than are predominantly white areas.[9]

IV. Conclusion

This study finds little evidence that commercial-bank branch services in low-income and minority neighborhoods have been disproportionately reduced since 1977 in any of the five cities examined. Changes in the per capita number of commercial bank offices between 1977 and 1989 differ

■ 9 I also ran other regressions to test the robustness of the results presented in this section. Changes in the level of services were fit as functions of the change in ZCAs' racial composition and income levels. Racial and income effects were represented by their 1977 and 1989 values and as continuous variables. I also used additional control variables such as the percentage of the population living below the poverty level, CACI-constructed indices reflecting the "purchasing potential" for saving and borrowing, and age of the housing stock. In no case did these additions or changes alter the conclusions reported in this section in any substantial way.

only slightly between predominantly black or low-income ZCAs and those that are high-income or predominantly white. Moreover, these differences are not statistically significant and nearly disappear when other demographic factors such as housing and employment are controlled for. Evidence also suggests that once these other factors are taken into account, the number of offices in low-income and predominantly black neighborhoods is similar to that of other areas. This finding holds both in the aggregate and, for the most part, in the five cities individually.

The results also indicate that thrift institutions have been more likely to close offices in predominantly black (but not low-income) neighborhoods during the past 15 years and that, currently, thrifts are less likely to be located in these areas. The aggregate results seem to be driven primarily by the behavior of thrifts in Cleveland and Philadelphia. Some of this effect may be traceable to the fact that firms acquiring the branch networks of failed savings and loans were more likely to shut down inner-city offices than those in the suburbs. But this does not explain why offices in minority rather than low-income areas were closed.

Finally, evidence shows that check cashing companies have been more likely to open offices in predominantly black areas, and that once other variables are controlled for, race and income appear to play no significant role in the change in loan and mortgage company office location.

It is interesting to note that despite claims that deregulation would lead to fewer financial institution offices overall, the number of branches of each type of firm used in this study actually increased over the sample period. This finding is true both in absolute and in per capita terms and appears to hold for each of the cities studied, even though their patterns of demographic and economic growth differ considerably. Thus, failure to observe significant differential effects in low-income and minority areas should be viewed in light of the fact that some of the overall predictions regarding deregulation may not have materialized.

On the surface, these findings lend little support to those who allege that the financial services industry has weakened its commitment to low-income and minority areas over the past decade and a half. However, caution should be used in extrapolating too much from the results. Sample sizes used here are comparatively small, and the unit of analysis, ZCAs, is not ideal. Furthermore, there is enough evidence of heterogeneity in the cities selected to suggest that the results may not apply to other localities.

One should also bear in mind that office closings are not the only signal of management decisions to reduce service in an area. Office staffs and hours can be cut back, and purchases of higher-priced, more technologically advanced equipment such as ATMs can be put on hold. Indeed, given the relatively low office-space prices in many poor and minority neighborhoods, it may be quite possible for a financial institution to run a scaled-down office on a profitable basis even if demand has dropped off.

Thus, further research on the quality of service may be necessary before definitive conclusions can be drawn about the impact of changes in the financial services industry on minorities and the poor.

References

Avery, Robert B. "Making Judgments about Mortgage Lending Patterns," Federal Reserve Bank of Cleveland, *Economic Commentary,* December 15, 1989.

_____ , **and Thomas M. Buynak.** "Mortgage Redlining: Some New Evidence," Federal Reserve Bank of Cleveland, *Economic Review,* Summer 1981, pp. 18 – 32.

_____ , **and Glenn B. Canner.** "Mortgage Redlining: A Multicity Cross-Section Analysis," Board of Governors of the Federal Reserve System, Working Paper, 1984.

Bradbury, Katharine L., Karl E. Case, and Constance R. Dunham. "Geographic Patterns of Mortgage Lending in Boston, 1982–1987," Federal Reserve Bank of Boston, *New England Economic Review,* September/October 1989, pp. 3 – 30.

Brobeck, Stephen, and Mark Cooper. "Economic Deregulation and the Least Affluent: Consumer Protection Strategies," in *Consumer Closeups, Vol. 2.* Ithaca, N.Y.: Cornell University Press, 1991.

Canner, Glenn B., and Ellen Maland. "Basic Banking," *Federal Reserve Bulletin,* vol. 73, no. 4 (April 1987), pp. 255 – 69.

Consolidated Analysis Centers, Inc. *The Sourcebook of Demographics and Buying Power for Every ZIP Code in the USA.* Fairfax, Va.: CACI, 1989.

Dennis, Warren L. "Brick-and-Mortar Branches in the New Financial Services Era," *American Banker,* September 11, 1984, p. 5.

Mitchell, Jeremy. *Access to Basic Banking Services: The Problems of Low-Income American Consumers.* Rhode Island Consumers Council, 1990.

Scott, Charlotte H. "Low-Income Banking Needs and Services," *Journal of Retail Banking,* vol. 10, no. 3 (Fall 1988), pp. 32 – 40.

Price Stability

Conference Proceedings Offered

The papers in this special issue of the *Journal of Money, Credit, and Banking* were presented and discussed at a conference on "Price Stability" held at the Federal Reserve Bank of Cleveland on November 9–10, 1990. The purpose of the conference was to encourage research and discussion on the costs and benefits of adopting a policy to achieve and maintain price stability.

Contents:

To order a copy of the conference proceedings, please send $8.00 (U.S.) in a check or money order drawn on a U.S. bank. Make checks payable to the Federal Reserve Bank of Cleveland. Complete and detach the form and mail to:

Federal Reserve Bank of Cleveland
Research Department
P.O. Box 6387
Cleveland, Ohio 44101

Please send the Price Stability Conference proceedings to:

Name

Address

City

State Zip Code

Country

PLEASE PRINT

Third Quarter Working Papers

Current *Working Papers* of the Cleveland Federal Reserve Bank are listed in each quarterly issue of the *Economic Review.* Copies of specific papers may be requested by completing and mailing the attached form below.

Single copies of individual papers will be sent free of charge to those who request them. A mailing list service for personal subscribers, however, is not available.

Institutional subscribers, such as libraries and other organizations, will be placed on a mailing list upon request and will automatically receive *Working Papers* as they are published.

■ **9109**
The Risk Premium in Forward Foreign Exchange Markets and G-3 Central Bank Intervention: Evidence of Daily Effects, 1985–1990
by Richard T. Baillie and William P. Osterberg

■ **9110**
On Flexibility, Capital Structure, and Investment Decisions for the Insured Bank
by Peter Ritchken, James Thomson, Ray DeGennaro, and Anlong Li

■ **9111**
Optimal Bank Portfolio Choice under Fixed-Rate Deposit Insurance
by Anlong Li

■ **9112**
Troubled Savings and Loan Institutions: Voluntary Restructuring under Insolvency
by Ramon P. DeGennaro, Larry H. Lang, and James B. Thomson

Please complete and detach the form below and mail to:

Research Department
Federal Reserve Bank of Cleveland
P.O. Box 6387
Cleveland, Ohio 44101

Please send the following Working Paper(s):

Check item(s) requested

☐ **9109** ☐ **9110** ☐ **9112**
☐ **9111**

Send to:
Please print

Name

Address

City State Zip