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Federal Reserve Pricing—A New Era

By Peggy Brockschmidt and Carl Gambs

The provision of services to member banks has always been an integral part of Federal Reserve operations. One of the reasons for the creation of the Federal Reserve System in 1913 was a general dissatisfaction with the nation's payment system and the desire to create an institution that could facilitate interregional transfers of funds.[1] Throughout its history, therefore, the Federal Reserve has had an important role in the payments system. In addition to payments services, the Federal Reserve also has provided a number of services in the securities area which can be viewed as an outgrowth of its role as the fiscal agent of the U.S. government.

Central bank provision of services to depository institutions is not unique to the United States, although the extent to which such services are provided varies widely among central banks.[2] In Canada and the United Kingdom, for example, the only services made available by the central bank are the provision of currency and coin and the use of deposits for settlement purposes. In West Germany and Switzerland, on the other hand, the central bank has provided an array of services similar to those provided by the Federal Reserve.

The Federal Reserve traditionally has provided its services only to member banks and has not charged banks for those services. The noninterest-bearing reserves that member banks are required to hold have been thought to

[1] The National Monetary Commission had made a special study of the clearing system and had concluded that it was seriously deficient. See U.S. Congress, Senate, National Monetary Commission, *Clearing Houses,* by James Graham Cannon, S. Doc. 491, 61st Cong., 2d sess., 1910. The commission's report noted, "We have no effective agency covering the entire country which affords necessary facilities for making domestic exchanges between different localities and sections, or which can prevent disastrous disruption of all such exchanges in time of serious trouble." Its proposed National Reserve Association was specifically authorized to handle checks and transfer funds among banks. See U.S. Congress, Senate, National Monetary Commission, *Report,* S. Doc. 234, 62d Cong., 2d sess., Washington, D.C.: Government Printing Office, 1912, pp. 7-8, 62-63.

Section 16 of the Federal Reserve Act dealt with these concerns by specifically authorizing the Reserve Banks to accept checks for collection.

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[2] A survey of services provided by foreign central banks is found in U.S. Congress, Senate, "Universal Reserve Requirements, Interest on Reserves, and Charges for Services: A Comparison of 12 Central Banks with the Federal Reserve System," by Evan Migdail and Steven M. Roberts, *Federal Reserve Requirements Act of 1978, Hearings before the Committee on Banking, Housing, and Urban Affairs on S. 3304.* 95th Cong., 1st sess., 1978, pp. 304-31.

be adequate to cover the cost of providing services. However, the Depository Institutions Deregulation and Monetary Control Act of 1980 (DIDMCA) drastically alters this situation. DIDMCA requires that the Federal Reserve provide services on an equal basis to all depository institutions, and further requires that the Federal Reserve charge both member and nonmember institutions for services provided. Because of these requirements, a new era has begun in the provision of Federal Reserve services.

This article provides an overview of Federal Reserve pricing, explains the rationale for pricing, and outlines some of the implications of the new era that the Federal Reserve is entering. The first section of the article briefly describes the various services offered by the Federal Reserve and provides data on the extent to which these services are used by Tenth District member banks. The background of DIDMCA and its pricing provisions are then presented, followed by a discussion of the Federal Reserve's pricing principles. The article then discusses the implementation of pricing of individual services and the economic case for pricing. Finally, the implications of Federal Reserve pricing are analyzed.

FEDERAL RESERVE SERVICES

The operations of the Federal Reserve System are conducted through 12 regional Federal Reserve Banks. The Banks help to provide an efficient nationwide payments system, act as the U.S. government's bank, or "fiscal agent," and provide several related securities services to member banks.[3]

[3] For a more detailed discussion of services provided by the Federal Reserve, see *Federal Reserve Services,* Federal Reserve Bank of Kansas City, September 1980. Regulations and operating letters of the Federal Reserve also provide extensive information on various specific services.

Payments System

The Federal Reserve Banks, along with their 25 branches and 11 regional check processing centers (RCPC's), play a major role in the payments mechanism through their operational and regulatory presence in check collection, automated clearing houses (ACH's), wire transfer of funds and securities, and the distribution of coin and currency. Since these services in the past have been directly provided only to member commercial banks, this role of the Federal Reserve has sometimes been referred to as being a "bankers' bank."

Check Collection. In 1980, 34 billion checks were written in the United States. Of this total, approximately 45 percent passed through at least one Federal Reserve office. After the deposit with the Federal Reserve of a cash letter, which is a group of checks deposited by one institution, a check is sorted to the institution on which it is drawn and then delivered to that institution or to its processor. Credit and payment for cash letters are done through accounts maintained at the Federal Reserve. An institution's own account or a correspondent's account may be used for these debits and credits.

The availability of credit for checks deposited with the Federal Reserve is predetermined by the location of the institution on which the check is drawn and the time of day the checks are received at the Federal Reserve. Later deadlines are available if the depositor does additional sorting prior to the deposit so that the Federal Reserve does minimal sorting.

Although all member banks are eligible to deposit items, many choose not to, preferring instead to deposit items with large correspondent banks. Generally, the larger the institution, the more likely it is to deposit. Only about one-fourth of Tenth District member banks directly deposit cash letters. Of this group of about 200 banks, one-fifth take advantage of a "mixed" or "unsorted" cash letter program,

which allows them to deposit all checks, regardless of availability, in one cash letter. Only small banks—those with fewer than 5,000 items each day—are eligible for this program.[4] Other institutions deposit sorted cash letters, which separate items by the location of the institution on which the check is drawn.

ACH. Electronic exchanges provide a small, but rapidly growing, means of payment that can substitute for checks. In 1980, more than 227 million ACH items were processed by the Federal Reserve System. While U.S. government payments account for the bulk of all items, privately originated items furnish a rising proportion of the total. Currently, all institutions that are members of either the Federal Reserve or their regional automated clearing house associations are eligible to send items. ACH associations set rules of operation, but the Federal Reserve processes items, delivers them, and debits and credits accounts for payment.

Funds Transfer. An electronic communications network linking all Reserve Banks and many depository institutions provides for wire transfer of funds from one Federal Reserve account to another. Forty-three million transfers with an average value of $1.8 million were sent in 1980. Wire transfers are used primarily for transactions in federal funds and repurchase agreements and for transfers of corporate funds. Institutions not directly linked to the communications network may call the Federal Reserve to request transfers and may receive telephone notification of receipt of a funds transfer to their account.

Funds transfers are one of the most extensively used Federal Reserve services. In one week in May 1980, 84 percent of Tenth District member banks sent at least one wire, and 91 percent received at least one. Banks with under $10 million in total deposits generally make only limited use of many Federal Reserve services; however, even two-thirds of these smaller banks use funds transfer services. Direct access to the funds transfer network through an in-house terminal encourages funds transfer use, and about one-quarter of all Tenth District member banks have such a terminal.

Net Settlement. The net settlement service provides a mechanism for posting to a number of accounts at the Federal Reserve a series of debits and credits that settle many underlying transactions. For example, a local check clearing house may process many transactions for its members. At the end of a day, the clearing house nets out all transactions and the Federal Reserve posts only one debit or credit for each clearing house member.

Currency and Coin. The Federal Reserve distributes currency and coin to commercial banks by armored carrier or mail. In addition, the Federal Reserve examines returned currency, destroys unfit currency, and prepares fit currency for redistribution. Most coin is delivered loose in bags, although some Federal Reserve offices provide wrapped coin at an additional charge.

Delivery of currency and coin is a widely used Federal Reserve service. In 1979, 95 percent of all Tenth District member banks received shipments. Frequency of service depends on both the size and the location of an institution. Large banks in Federal Reserve cities generally receive currency and coin daily, while small banks outside Federal Reserve cities might receive shipments only once every two weeks.

Fiscal Agent

The Federal Reserve is responsible for the initial sale of all U.S. government and most government agency debt instruments and for the subsequent payment of interest and principal on these securities. The Federal Reserve

[4] In the Tenth District, the deposit limit has been raised to 10,000 items, effective August 1, 1981.

also moves government funds initially deposited in Treasury Tax and Loan accounts or other Treasury accounts at depository institutions to Treasury accounts at the Reserve Banks. As fiscal agent, the Federal Reserve deals with depository institutions, businesses, and individuals rather than limiting its services to member banks. Since the Reserve Banks are reimbursed by the Treasury for services they perform as fiscal agents, these services will not be priced.

Related Securities Services

As an offshoot of its role as issuer of U.S. government securities, the Federal Reserve holds securities in safekeeping for member banks. Banks have a number of reasons to keep the securities they own outside their own vaults. Easier access to national money markets, increased security, and pledging requirements have induced most member banks to store securities with the Federal Reserve.

Book-Entry Safekeeping. Marketable government securities are issued in both book-entry form (a record stored in a computer) and in definitive (paper) form. All Treasury and most agency securities owned or held by member banks may be stored at the Federal Reserve in book-entry form for safekeeping.[5] Banks may open separate accounts for various activities or may hold securities in a general account.

Book-entry form facilitates transfers between separate accounts of the same institution and between institutions. Transfers of book-entry securities from one institution to another, sometimes known as CPD (Commissioner of the Public Debt) transfers, are made through the same communications network used for wire transfer of funds.

Definitive Safekeeping. In addition to the Treasury and agency securities held in book-entry form for member banks, the Federal Reserve also holds, in definitive form, municipal and corporate securities owned by certain member banks. Some securities held in safekeeping are pledged as collateral for Treasury deposits at the member bank, for other public funds, or for borrowings from the Federal Reserve, but many other securities are unpledged.

Purchase and Sale. Most Reserve Banks, as a service to member banks outside Federal Reserve cities, will buy and sell Treasury and agency securities in the secondary market. This service is a very limited one, and investment advice is not included.

Noncash Collection

Items such as matured municipal and corporate coupons, matured municipal and corporate securities, and bankers' acceptances may be presented for collection to the Federal Reserve by member banks. Items are then presented to the paying agent for that security by the Federal Reserve. Coupons and matured securities held in definitive safekeeping at the Federal Reserve are also collected.

PRICING AND THE MONETARY CONTROL ACT

The Federal Reserve first announced its intent to consider pricing its services in 1975, although it later stated that pricing would not begin until the issue of declining Federal Reserve membership had been resolved. A specific schedule of check and ACH prices was

[5] Definitive securities deposited with the Federal Reserve are converted to book-entry form if possible. Agency securities not eligible for book-entry form include short-term instruments of the Federal Home Loan Bank System and the Farm Credit System, and mortgage participation certificates issued by the Government National Mortgage Association, the Federal Home Loan Mortgage Corporation, and the Farmers Home Administration.

published for comment in 1978,[6] along with a brief discussion of the objectives of pricing and of the cost methodology employed. However, no further work on pricing was made public until the passage of the 1980 Act.

The 1980 Legislation

The passage of the DIDMCA on March 31, 1980, marked the culmination of efforts by Congress and the financial community to reform the financial structure of the United States. As such, it represents the single most important piece of financial legislation since the banking legislation of the 1930s.[7]

Long-standing pressures for reform of the financial structure had resulted in the establishment of a number of study groups. The Commission on Money and Credit (1964), the Hunt Commission (1972), and the Financial Institutions and the Nation's Economy study (1975) all proposed major changes. The specific thrust for passage of a package of financial reforms was provided by the U.S. Court of Appeals in April 1979. Federal regulators had previously authorized automatic transfer accounts at banks and share draft accounts at credit unions. The Appeals Court ruled that regulators did not have the power to take those actions and that Congressional approval for such accounts would have to be obtained if the accounts were to continue after December 31, 1979. A temporary authorization by Congress extended the deadline to March 31, 1980. The high level of interest rates in early 1980 was an additional spur to the passage of the legislation. Since market rates were well above the usury and deposit ceiling rates, a number of distortions occurred in financial flows. In response, a sweeping legislative package that dealt with most of the important issues was passed by Congress.

Title I—The Monetary Control Act of 1980—authorized the Federal Reserve to collect financial information relevant to monetary policy from all depository institutions, to require reserves against specific types of deposits, and to price Federal Reserve services and provide equal access to those services.

Other areas of the legislation removed ceilings on interest rates or made them more responsive to market changes. Regulation Q, which limits interest rates paid at banks and savings and loan associations, is to be gradually phased out. Also, state mortgage rate ceilings have been eliminated temporarily, and the ceiling on small business and agricultural loans has been tied to a market-based rate.

Permanent authority was granted for automatic transfer accounts and share drafts, and NOW account authority (formerly limited to New England, New York, and New Jersey) was extended to all 50 states. Also, savings and loans were granted new powers in the areas of consumer loans, credit cards, and trust activities. The final sections of the Act simplified some provisions of Regulation Z (Truth in Lending), made minor revisions in national banking laws, urged regulatory simplification, and provided a temporary moratorium on foreign acqusition of U.S. financial organizations.

MCA and Pricing

The Monetary Control Act (MCA) gave the Federal Reserve new powers and responsibilities in pricing its services by adding a new section to the Federal Reserve Act. This amendment required that the Board of Governors publish for comment a set of pricing principles and a fee schedule by September 1, 1980, and

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[6] See Press Release from the Board of Governors of the Federal Reserve System, "Proposal for Pricing of Federal Reserve Check Collection and Automated Clearing and Settlement Services," Washington, D.C., November 17, 1978.

[7] For a more detailed discussion of the Act, see "The Depository Institutions Deregulation and Monetary Control Act of 1980," *Economic Perspectives,* Federal Reserve Bank of Chicago, September/October 1980.

further required that pricing and access begin by September 1, 1981. Specific services to be priced and some principles to be used in setting prices were listed in the Act. Finally, the Act provided that reductions in the volume of operations at the Reserve Banks were to be followed by commensurate budget cuts.

FEDERAL RESERVE PRICING PRINCIPLES

The Federal Reserve has adopted seven pricing principles to promote the goals of economic efficiency, innovation, and equity among providers and users of Federal Reserve services. Four of these principles were mandated by Congress in the MCA—explicit pricing, equal access, full recovery of costs, and charging for float. The remaining three principles were added by the Board of Governors and include recovery of costs within a service area, flexible administration, and incentive pricing.[8]

Explicit Pricing

To foster economic efficiency and competition, Congress mandated that charges for services be explicit. Alternatively, services might have been made available as an implicit return for holding balances with the Federal Reserve. Since the early years of the Federal Reserve System, services have been offered at no explicit charge to member banks as an inducement to membership. Similarly, in the correspondent banking industry, respondent institutions hold balances with their correspondent to meet state reserve requirements and to compensate the correspondent for the services it provides. Critics have maintained, however, that a more efficient distribution of resources and greater price competition would result from the setting of explicit fees, as relative costs could then be more easily compared.

Equal Access

To ensure equity among users of services, Congress required that availability and pricing of services be the same for both member and nonmember depository institutions. Some discussions, underway when the membership question was still unresolved and reserve requirements were unequal, had suggested that lower prices be charged to member banks as a partial offset to their higher reserve levels.

Full Recovery of Costs

To ensure equity among providers of services, Congress required the Federal Reserve to recover all costs of producing services, including a markup equivalent to a profit margin for a private firm.[9] This principle encourages the Federal Reserve to act as a private, profit-maximizing firm would act. Pricing below its full costs would give the Federal Reserve an unfair competitive advantage over private sector competitors, while pricing above full costs would take advantage of the Federal Reserve's near-monopoly in some services. Costs are required to be recovered only "in the long run" so that large volume shifts or development costs will not unduly affect price changes. However, with the exception of ACH services, prices are initially based on current average costs.

The Federal Reserve, as a quasi-govern-

[8] See Press Release from the Board of Governors of the Federal Reserve System, "Fee Schedules and Pricing Principles for Federal Reserve Bank Services," Washington, D.C., December 31, 1980.

[9] The private sector adjustment factor "takes into account the taxes that would have been paid and the return on capital that would have been provided had the services been furnished by a private business firm" and is currently set at 16 percent. This factor, which will be used to mark up all costs except transportation and ACH costs, is a substantial increase over the 12 percent markup proposed in September 1980.

For a further discussion of the private sector adjustment factor, see Appendix I, "Fee Schedules and Pricing Principles for Federal Reserve Bank Services."

mental entity, has public responsibilities that will sometimes prevent it from acting as its private competitors would. Therefore, this principle allows the Federal Reserve an exception to full-cost recovery in two special cases that are reiterated in the principles added by the Board of Governors. The exceptions are "due regard to competitive factors" and "provision of an adequate level of such services nationwide."

Interest on Float

Float arises when credit is given to some institutions before payment is obtained from others. Increased Federal Reserve float, all else equal, will decrease Treasury revenues since the Federal Reserve securities portfolio must be reduced to offset the effect on reserves of increased float. Congress has added this principle to ensure that the Federal Reserve either eliminate float or recover its cost. Either action would have the effect of increasing Treasury revenues.

Recovery of Costs in Each Service Area

Congress required that the total revenues for all priced services match costs of all services. The Board of Governors narrowed that principle and required that revenues cover costs in each service area. Therefore, as an example, revenues from wire transfer services cannot be used to cover a portion of check collection costs. An exception to full-cost recovery is made for abrupt volume shifts that temporarily put short-run costs above long-run costs. Also, this principle reiterates that providing a minimum level of services nationwide might require subsidization of some services.

Flexible Administration

Service levels and accompanying fees will be changed in the future in response to changes to market demand or in the costs of providing services. For example, pricing may well reduce the demand for secondary market purchase and sale of securities, in which case the service could be dropped. Alternatively, some other services that complement existing services might be added. Current plans call for a review of prices at least annually.

Incentive Pricing

Special prices may be set to encourage efficient utilization of resources. First, the Federal Reserve might assess lower charges for work done outside of peak hours. For example, deposit of checks and sending of wire transfers early in the day would allow better distribution of workload. Second, incentive pricing such as that used for ACH services can be used to induce long-run improvements in the payments mechanism. The use of long-run ACH costs that are estimated to be substantially lower than short-run costs will encourage ACH and discourage growth in check volume.

IMPLEMENTATION OF PRICING

The implementation of service pricing required decisions on the schedule for beginning the pricing of each service, on the level at which prices would be set, and on clearing balances and billing procedures. These decisions were made by the Board of Governors and are standard throughout the Federal Reserve System.

Schedule

As noted earlier, the Monetary Control Act requires the Federal Reserve to begin to put its schedule of fees into effect by September 1, 1981. To allow both the System and users of Federal Reserve services a gradual adjustment, the services will be priced, and access given to nonmembers, in stages (Table 1). Basic wire transfer and net settlement charges began on January 29, 1981. Check collection charges, which account for about 70 percent of the dollar cost of all Federal Reserve priced services, are scheduled to begin August 1, 1981,

along with charges for ACH service. Securities services and noncash collection pricing begins in October 1981, while currency and coin transportation charges will begin in January 1982.

Level of Pricing

As previously discussed, prices are being set to recover costs plus a private sector adjustment factor, or markup. For those services that are uniform and capital-intensive—such as wire transfer and ACH—a single national price has been set to recover all national costs. For labor-intensive services such as securities services, varying labor costs among Federal Reserve Districts led to pricing at the District level. In the cases of check collection and currency and coin services, where transportation costs are an important factor in cost variance, smaller geographic areas were used to match costs and revenues.

Clearing Balances and Billing

The pricing principle requiring equal access for member and nonmember institutions states that special requirements, such as a reserve balance sufficient for clearing purposes, may be imposed on certain institutions. In the early years of the nonmember phaseup to full reserve requirements, few of these institutions would have reserve balances large enough to clear a significant volume of transactions. Later, when reserve requirements for member banks are reduced to their new levels, many members will have inadequate balances. An additional "clearing balance" requirement can be imposed on any institution with inadequate required reserve balances in order to prevent overdrafts to its account.[10]

To compensate institutions for holding such balances, earnings credits will be accrued that can offset charges for the use of services. Each month, a bill showing total charges and any earnings credits will be sent to institutions using services, and charges in excess of earnings credits will be assessed against the reserve or clearing account. As an alternative to clearing balances, institutions can elect to have debits, credits, and service charges flow through a correspondent's account.

Table 1
PRICED SERVICES

Service	Date	Pricing Level
Wire Transfer	January 29, 1981*	National
Net Settlement	January 29, 1981†	National
Check Collection	August 1, 1981	District/Office
ACH	August 1, 1981	National
Securities‡	October 1, 1981	District§
Noncash Collection	October 1, 1981	District
Cash Transportation	January 1982	Route

*Immediate advice charges delayed to March 26, 1981.
†Clearing houses associated with Reserve Banks exempted in 1981.
‡Fiscal agent services are not priced.
§National price for on-line securities transfers. Office pricing in one Federal Reserve district.

THE CASE FOR PRICING

The pricing provisions of the MCA outlined above have a certain basic rationale that are discussed in this section.

Economic Efficiency

The primary rationale for pricing Federal Reserve services is the promotion of economic efficiency. Economic efficiency has two characteristics that are important for Federal Reserve pricing. First, it requires that the consumers of goods and services cannot be made better off by changing the mix of goods and services produced with a given quantity of

10 See Press Release from the Board of Governors of the Federal Reserve System, "Procedures for Administration of Clearing Balances, Service Charges and Interim Price and Service Changes," Washington, D.C., February 27, 1981.

resources. Second, it requires that a given quantity of goods and services be produced using the least costly combination of resources that is possible.[11] Providing Federal Reserve services free of charge will, in general, lead to inefficiency in the sense that consumers could be made better off with a somewhat different mix of goods and services. Services produced by the Federal Reserve will be used because they are free, even though the resources used to produce the service might be used to produce goods that are more highly valued by consumers. Providing services free may also lead to inefficiency in the sense that a given quantity of goods and services may not be produced in the least costly fashion.

In a market economy, efficiency requires that goods be priced so that the price of each good is equal to the marginal, or incremental, cost of producing that good. If this condition is met, consumption decisions can be made on the basis of the cost of the resources used in producing each good or service. Goods and services that would cost more to produce than consumers are willing to pay will not be produced. If this condition is not met and some good is sold below the marginal cost of producing it, consumers will consume "too much" of that good. That is, the consumer satisfaction produced by a given amount of resources used to produce the "underpriced" good will be less than could be realized if the resources were used to produce other goods.

For example, the provision by the Federal Reserve of check collection services without charge has tended to lead to a higher than optimal number of checks being written, since free Federal Reserve check processing has led to lower service charges for consumers. If Federal Reserve charges for check collection services are passed on to the users of these services, it would tend to result in fewer resources being devoted to check collection and more resources being devoted to other, more highly desired activities.[12]

Providing Federal Reserve services without charge may also have led to services being produced at a higher cost than would be the case if the services were priced. In a market economy, goods and services tend to be produced by the least-cost producer because that producer will offer them at the lowest price. It may be that some of the services currently produced by the Federal Reserve could be produced at a lower cost by the private sector. However, the fact that the Federal Reserve has offered these services without charge has meant that it would continue to produce the services, even if private firms could do so at a lower cost. Pricing of Federal Reserve services can thus be expected to improve economic efficiency, since a lower cost producer may be able to take business away from the Federal Reserve, freeing resources for other uses.

Equity

The pricing provisions of the Monetary Control Act were also framed with equity considerations in mind. It was believed that it was unfair to potential private producers of financial services to have a quasi-governmental institution, the Federal Reserve, providing financial services without charging for them, since it is extremely difficult to compete with an entity that provides services free. To make competition between the Federal Reserve and the private sector as equitable as possible, the MCA

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[11] For a general discussion of economic efficiency, see Tibor Scitovsky, *Welfare and Competition*, rev. ed., Homewood, Ill.: Richard D. Irwin, Inc., 1971.

[12] However, if, as is currently the case, regulation restricts interest payments on checking accounts, it is likely that many depository institutions will absorb all or part of the charges levied by the Federal Reserve rather than pass them on fully to their customers.

provided that the Federal Reserve mark up its costs to take account of certain costs borne by the private sector, but not by the Federal Reserve.[13]

There was also a recognition that it would be inequitable to continue to provide services only to member banks in a regime where all depository institutions face the same reserve requirements. For this reason, the MCA granted all depository institutions equal access to Federal Reserve services.

Treasury Revenue

Reserve requirements for Federal Reserve member banks were mandated by the Federal Reserve Act as they had been in the National Banking Act. It has long been recognized that these reserve requirements have an impact similar to that of a tax. Institutions subject to the Federal Reserve's reserve requirements must hold a proportion of their assets in the noninterest-bearing liabilities of the Federal Reserve (either currency or deposits). Reserve requirements reduce the earnings of institutions subject to them since, in their absence, at least a portion of the funds held in noninterest-bearing reserves could be placed in interest-bearing assets. Reserve requirements produce revenue for the U.S. Treasury, since their existence leads to a higher level of Federal Reserve liabilities and, hence, assets and, in turn, to a higher level of earnings on the Federal Reserve's security portfolio. Virtually 100 percent of any increase or decrease in Federal Reserve earnings is an increase or decrease in Treasury revenues.

The MCA imposed reserve requirements on nonmember depository institutions for the first time, but the reductions in the reserve requirements of member banks were so large that the overall level of reserves held with the Federal Reserve will be reduced. As a result, there could be a reduction in Federal Reserve revenue and, hence, Treasury revenue. The recognition of this fact led to a desire on the part of Congress to see Federal Reserve services priced in order to offset much of the revenue loss.[14]

Pricing Exceptions

It should be recognized that some of the services provided by the Federal Reserve are basic central bank functions and as such should not be priced. For example, while the MCA lists coin and currency services as an area for pricing, only transportation costs will be recovered through pricing. The legislative history of the Act makes clear that Congress did not intend for the Federal Reserve to charge for all coin and currency services. Senator Proxmire, in his explanation of the bill, noted that,

> No charges are required for services of a governmental nature, such as the disbursement and receipt of new or fit coin and currency. Although the Federal Reserve will be required to charge for its coin and currency services, this provision will not interfere with the Federal Reserve's responsibility to provide the nation with currency and coin of a high quality nor with the Federal Reserve's ability to expand or contract the amount of currency and coin in response to the public's demand.[15]

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[13] These costs are corporate income taxes and the cost of capital funds.

[14] The revenue estimates provided to Congress suggested that, in the long run, the loss from lower reserve requirements would exceed the income from pricing by about $179 million.

[15] See U.S. Congress, Senate, remarks of Senator William Proxmire, 96th Cong., 2d sess., March 27, 1980, *Congressional Record* (daily ed.), p. S3168.

Similarly, the Federal Reserve does not intend to charge for the safekeeping of securities that are held at the Federal Reserve as collateral for either U.S. Treasury deposits or borrowing from the Federal Reserve.

While these exceptions to pricing are relatively straightforward, another exception contained in the MCA is likely to prove more difficult to apply. The MCA states that "over the long run, fees shall be established on the basis of all direct and indirect costs . . .*except that the pricing principles shall give due regard to competitive factors and the provision of an adequate level of such services nationwide* (emphasis added)."

It is not clear what the reference to competitive factors refers to, but one possibility is that it is intended to give the Federal Reserve leeway to respond to predatory pricing.[16] The reference to "the provision of an adequate level of such services nationwide" is only slightly more precise, but appears to reflect the view of Congress that it might be desirable to have the Federal Reserve subsidize certain services to certain areas. For example, it might provide services to geographically remote institutions at prices below the cost of providing the services.

In general, it will not be possible for the Federal Reserve to provide service to one group below cost while making up the loss by charging another group a price above cost. If such a tactic were attempted, competitors would likely provide service to the "overcharged" group at a lower price and take the business away from the Federal Reserve. Thus, the only viable way to provide subsidized services is to do so at the expense of the Federal Reserve and thus ultimately at the expense of Treasury revenue. In practice, it will be extremely difficult to determine whether a particular situation merits a subsidy.

IMPLICATIONS OF PRICING

Pricing of Federal Reserve services will affect the relationship between correspondent banks and their respondents as well as the role of the Federal Reserve in the payments mechanism. These changes should, in the long run, promote the efficiency of the payments mechanism, although the speed and magnitude of these changes are uncertain.

One immediate effect of pricing on correspondent banking will be a marked increase in the cost of providing services to respondent institutions. Any increase in costs not passed on to respondents must, of course, be absorbed by the correspondent. For some member correspondents, these initial increases in costs may outweigh the positive effect of reduced reserve requirements, and the net income impact of the Monetary Control Act will be negative for a short period. In later years, when member bank reserve requirements have been fully phased down to new levels, the net impact on earnings should be positive for virtually all member banks.

A longer run effect of pricing will be a greater shift toward explicit pricing of correspondent services rather than an account analysis-based pricing schedule. (Account analysis compares revenue generated by compensating balances held by a respondent with costs for a limited number of standard services.) Additionally, the proportion of income generated by fees relative to balances should grow further. Correspondent balances have long been a useful way to compensate for services. Correspondents consider the balances to be a dependable, low-cost source of loanable funds. For respondent banks, the balances serve two purposes. Besides compensating the correspondent for services provided, the balances also can be used to meet state reserve

[16] The term "predatory pricing" is used to describe temporarily pricing below cost in order to drive competition out of business.

requirements. However, since the Monetary Control Act imposed Federal Reserve reserve requirements on all depository institutions, many states have eliminated separate reserve requirements for nonmember banks. Correspondent balances may not be used to meet Federal Reserve reserve requirements; therefore, one purpose of the compensating balance has been eliminated. Respondents will be examining their correspondents' balance requirements more closely. Explicit fees for all services are likely results of this closer scrutiny, as they permit easier price comparison between alternative suppliers of correspondent services.

A major effect of pricing on the Federal Reserve will stem from its new role as a competitor in supplying priced correspondent services. In the past, Federal Reserve operations have been conducted with the goal of minimizing expense. In the future, however, operating with a focus on net revenues will require many procedural and structural changes. The number of potential customers also has been expanded, from 5,500 member banks to 40,000 depository institutions.

Pricing also will affect the menu of services offered by the Federal Reserve. Changes in services are likely to be more frequent, and variations between Districts may be greater than they are today because of varying market conditions. Some Reserve Banks may provide new or expanded services because demand exists in their market areas. Others may reduce service levels or take a passive position in the marketplace because the private sector adequately meets respondent needs.

The Federal Reserve's commitment to providing a minimum level of service nationwide might lead it to become a "supplier of last resort" for small or remote institutions. If private sector competitors choose to withdraw from serving particular segments of the market and if the full cost of serving those less profitable institutions is included in Federal Reserve prices, those charges will exceed correspondent charges. The Federal Reserve's volume would then be reduced in more profitable areas, and its effectiveness as an operator in the payments mechanism would be lessened. If, instead, the Federal Reserve subsidizes such institutions, economic efficiency could be reduced and Treasury revenue would be lessened.

New methods of operation in the payments system will undoubtedly arise because of the pricing of Federal Reserve services. Establishment of local check clearing house associations, greater use of direct check exchanges between large banks, and local exchange of currency and coin are all logical reactions to pricing and will promote a more efficient payments system. In the past, however, the major operational presence of the Federal Reserve enabled it to set standards for the industry. For example, machine-readable encoding of checks was encouraged by the requirement that checks deposited with the Federal Reserve be encoded. A greatly diminished market share for the Federal Reserve could lead to development of regulations that are less responsive to varying or changing conditions than are current Federal Reserve guidelines.

Willingness to accept major innovations in the payments system could also be reduced by pricing of Federal Reserve services. The System has been a major supporter of past efforts to speed the payments system. Reserve Banks have provided financial support for ACH operations by furnishing processing and transportation, and subsidization of ACH prices is scheduled to continue until the mid-1980s. In the future, innovations that require subsidization by the Federal Reserve will be subject to greater public scrutiny. The pricing principles require that notice must be given of subsidization, and progress toward matching costs and revenues must be monitored. If opposition to continued subsidization of projects develops, the speed of

technological progress in the payments system could be slowed.

SUMMARY AND CONCLUSION

The Monetary Control Act has dramatically altered the relationship between depository institutions and the Federal Reserve. Nearly all such institutions are now subject to Federal Reserve reporting and reserve requirements, and all institutions now have access to Federal Reserve services. The Act's requirement that the Federal Reserve begin pricing services subjects it to the disciplines of the marketplace for the first time and makes it a major competitor in the market for correspondent banking services.

The economic goals underlying the pricing provisions of the Monetary Control Act include greater efficiency and innovation in the payments mechanism as well as equity toward private suppliers of correspondent banking services. The principles specified by Congress and the Board of Governors provide a framework for achieving these goals and should help to promote desirable changes in the payments systems. Major innovations, if they require subsidization, will be more closely scrutinized and could be more difficult to encourage. Changes in methods could result in lower volumes of operations at the Federal Reserve as depository institutions seek to avoid charges for services that had been free. However, the vast experience of the Federal Reserve, along with its public responsibilities, will probably give it a significant role in most areas of the payments system for the foreseeable future.

The Financing of Federal Deficits: An Analysis of Crowding Out

By V. Vance Roley

The large federal deficits since the 1974-75 recession have rekindled interest in the economic consequences of both the size and the method used to finance federal deficits. One of the principal reasons for this concern is the possibility that deficits crowd out a significant amount of private expenditures and perhaps generate higher inflation. When increases in government spending occur, for example, crowding out takes the form of an expanded government sector at the expense of the private sector. Moreover, interest-sensitive expenditures in the private sector are the principal targets of any crowding out. Thus, private capital formation—which is usually thought to be responsive to changes in interest rates—could be retarded if crowding out occurs. In turn, a slower rate of capital formation would have further adverse consequences on labor productivity growth by reducing the amount of productive capital available to each worker.

Most agree that in a world of unemployed resources, money-financed deficits eliminate the possibility of significant crowding out. However, considerable uncertainty exists concerning the consequences of debt-financed deficits, with a common presumption among those favoring mandatory balanced budgets that debt-financed deficits may crowd out an equal amount of private expenditures. The purpose of this article is to review the analytical model often used to assess the relative qualitative impacts of money versus debt financing of federal deficits, and then to empirically analyze the crowding out question in the context of this model.

In the first section of this article, the changing composition of federal deficit financing over the last two decades is examined. The historical data reveal the greater reliance that has recently been placed on debt financing. In the second section, the issues surrounding the relative effects of money and debt financing of deficits are presented using a familiar analytical model. In the context of this model, empirical estimates are presented in the third section to assess the short-run consequences of alternative forms of deficit financing. The main conclusions of the article are summarized in the final section.

FEDERAL DEFICIT FINANCING OVER THE LAST TWO DECADES

Federal deficits arise when federal government expenditures are larger than revenues.

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Because of automatic stabilizers built into the expenditure and revenue functions of the federal government, deficits normally occur during recessions and at least the early part of the subsequent recovery. On the expenditure side, unemployment and other forms of compensation increase during recessions resulting in larger federal expenditures. On the revenue side, the growth of personal and corporate income often slows which reduces the growth of federal income tax revenue. Moreover, special legislation, such as a tax cut, is also often put in place during recessions to expedite economic recovery. All of these factors increase the gap between federal expenditures and revenues, thereby increasing the size of the federal deficit, or reducing the size of the surplus.

As with households and businesses, whenever revenues are less than expenditures, the federal government must finance the difference by borrowing. Borrowing by the federal government is in the form of new issues of Treasury securities. In the absence of any action by the Federal Reserve, the federal deficit would be entirely debt financed. However, the Federal Reserve through its open market operations buys and sells Treasury securities in order to exert control over the monetary aggregates. Over periods of time as long as a year, for example, the Federal Reserve is normally a net purchaser of Treasury securities so as to enable the monetary aggregates to grow at rates consistent with a desirable rate of overall economic growth. In examining how the deficit is financed, therefore, it is useful to consolidate the balance sheets of the federal government and the Federal Reserve. As a result, deficit financing can be viewed as consisting mainly of the change in the amount of Treasury securities held privately—that is, the net change in the total amount of Treasury securities outstanding minus the net change in Federal Reserve holdings—plus the change in the monetary base resulting from open market purchases or sales of Treasury securities by the Federal Reserve. For example, if the Federal Reserve purchases Treasury securities equal to the amount of the federal deficit, then the deficit is entirely money financed. That is, currency held by the public and reserves of depository institutions would increase by the same amount as the deficit, given unchanged levels of other sources of the monetary base. Thus, the money-debt composition of the federal deficit depends on the monetary policy actions taken by the Federal Reserve.

The amount and composition of federal deficit financing since 1959 are reported in Table 1. Over a given five-year period, the sum of the change in net Treasury securities outstanding plus the change in Federal Reserve holdings of Treasury securities roughly corresponds to the size of the cumulative deficits.[1] For example, in the 1969-74 period, the cumulative deficit—the sum of the deficits (or surpluses) which occurred in 1970, 1971, 1972, 1973, and 1974—was $68.4 billion, while the Treasury's total debt increased by $61.5 billion. Similarly, in the 1974-79 period, the cumulative deficit was $212.8 billion, while total Treasury debt increased by $290.0 billion.

The composition of the financing of the federal government's debt has varied sharply since 1959. In the 1959-64 period, net issues of Treasury securities accounted for 38.5 percent of the funding, implying that 61.5 percent or $10.4 billion was money financed through Federal Reserve purchases of Treasury securities. In turn, the monetary base rose by $6.8 billion, reflecting this increase in Federal Reserve holdings.[2] In contrast to the 1959-64

[1] In a given year the federal deficit as measured in this article does not necessarily equal the change in Treasury debt outstanding because, among other reasons, the deficit as measured in the National Income Accounts is an accrual rather than a cash flow measure.

[2] The monetary base not only changes due to open market purchases or sales of Treasury securities, but also with

Table 1
THE COMPOSITION OF FEDERAL DEFICIT FINANCING

Years	Absolute Changes (In Billions of Dollars)					Ratio of Net Treasury Securities Outstanding to Total (in Percent)	Average Annual Growth Rates (in Percent)	
		Treasury Securities						
	Cumulative Deficit*	Net Outstandings†	Federal Reserve Holdings	Total Debt	Monetary Base‡		Net Treasury Securities Outstanding	Monetary Base
1959-64	8.1	6.5	10.4	16.9	6.8	38.5	0.8	2.7
1964-69	12.1	− 1.1	20.1	19.0	18.5	− 5.8	− 0.1	6.0
1969-74	68.4	38.2	23.3	61.5	30.0	62.1	4.1	7.1
1974-79	212.8	253.0	37.0	290.0	43.9	87.2	17.3	7.3
1980	61.3	83.2	3.9	87.1	10.9	95.5	18.1	7.4

*Sum of annual federal deficits (U.S. Department of Commerce, Bureau of Economic Analysis).
†Sum of annual net issues of Treasury securities, excluding Federal Reserve purchases (Board of Governors of the Federal Reserve System, *Flow of Funds Accounts*).
‡Not adjusted for reserve requirement changes (Board of Governors of the Federal Reserve System).

period, Federal Reserve purchases of Treasury securities in the 1964-69 period were larger than the total debt accumulated by the federal government. Thus, during this five-year period, not only was the accumulated debt totally money financed, but the net debt outstanding actually declined by $1.1 billion. During the 1970s, the composition of deficit financing once again shifted toward Treasury securities, with the ratio of net issues of Treasury securities to total Treasury security issues reaching 62.1 percent for the 1969-74 period, and then rising substantially to 87.2 percent for the 1974-79 period. This ratio increased further to 95.5 percent in 1980. Hence, there has been a marked uptrend in the proportion of the deficit that has been debt financed.

changes in member bank borrowing, Federal Reserve float, and purchases or sales of U.S. agency securities among other factors. Over periods of time as long as those in Table 1, however, changes in the monetary base primarily reflect open market purchases of Treasury securities.

The variations in the composition of deficit financing may be explained primarily by the interaction of monetary policy and the absolute size of cumulative deficits. Over the two decades exhibited in Table 1, the growth of the monetary base was fairly stable, although it increased from 2.7 percent in the 1959-64 period to 7.3 percent in 1974-79. This relatively steady growth reflected in part the Federal Reserve's desire to exert a stabilizing influence on the growth of the monetary aggregates.[3] Because monetary base growth was fairly stable, any fluctuations in the size of the deficit were

[3] While the Federal Reserve has not used the monetary base as a policy instrument to exert control over money, over long periods the growth of the monetary base is related to money growth. Monetary base growth therefore reflects to some extent the policy intentions of the Federal Reserve over periods as long as five years. For a detailed discussion of the money-base relationship, see Jerry L. Jordan, "Elements of Money Stock Determination," Federal Reserve Bank of St. Louis *Review*, October 1969, pp. 10-19.

reflected in net issues of Treasury securities. In particular, when the deficit increased in response to the recessions in the 1959-64, 1969-74, and 1974-79 periods, net Treasury securities outstanding expanded. In addition to recessions, the surge in inflation in the 1970s widened the gap between federal expenditures and revenue, although the deficit in inflation-adjusted or real terms expanded much less rapidly. Nevertheless, the rise in the deficit due to inflation was again reflected in the growth of Treasury securities.

An implication of past trends in deficit financing is that during recessionary periods with large deficits, the deficits are largely financed by debt—that is, by issuing Treasury securities to private investors. Thus, if in the short run these debt-financed deficits crowd out a significant amount of private spending, the stimulative impact of the deficit may be significantly reduced or even eliminated. This issue is examined in a simple analytical framework in the next section, and an empirical assessment is presented in the third section.

ANALYTICAL ISSUES

In this section, a standard theoretical model of the economy, the IS-LM model, is reviewed in order to isolate the analytical issues associated with crowding out. Six different permutations of the model are examined to illustrate a range of possibilities concerning the degree of crowding out. These possibilities include cases where an increase in government spending merely replaces an equal amount of private spending—that is, complete crowding out—and other scenarios where total spending increases without any inflationary pressure.

The standard IS-LM model is a general model of the economy that separately represents the commodity market—the market for goods and services—and financial markets. In the model, the IS curve represents those combinations of income and the interest rate that satisfy equilibrium conditions in the market for goods and services. Three distinct sources of spending are usually considered in the commodity market—consumption expenditures, investment expenditures, and government expenditures. Total spending is thought to respond negatively to changes in the interest rate. For example, given a decrease in the interest rate, more potential investment projects involving purchases of structures and equipment are profitable because of an increase in the spread between the rate of return on these investment projects and the cost of financial capital, which is represented here by a single interest rate. Thus, there is a negative relationship between income and the interest rate in the commodity market as illustrated by the IS curve in Figure 1.

It should be noted that the IS curve describes commodity market equilibrium for a given level of government spending. Any increase in government expenditures or reduction in autonomous tax receipts, or any combination that increases the government deficit, shifts the entire IS curve to the right. In the case of increased government spending, aggregate demand will rise and result in higher income levels at any given interest rate. In the case of reduced autonomous tax receipts, the disposable income of households will increase and again result in higher levels of aggregate demand and, hence, income at any given interest rate. The impact of an increase in the federal deficit is illustrated in Figure 2 by a shift in the IS curve from IS_0 to IS_1.

Also in Figure 1, the LM curve is shown to represent those combinations of income and the interest rate consistent with financial market equilibrium. In the most basic version of this model, it is assumed that all financial assets are grouped into two broad aggregates labeled "money" and "bonds." Because of this aggregation, distinctions between Treasury securities and private securities—such as cor-

Figure 1
THE IS-LM MODEL

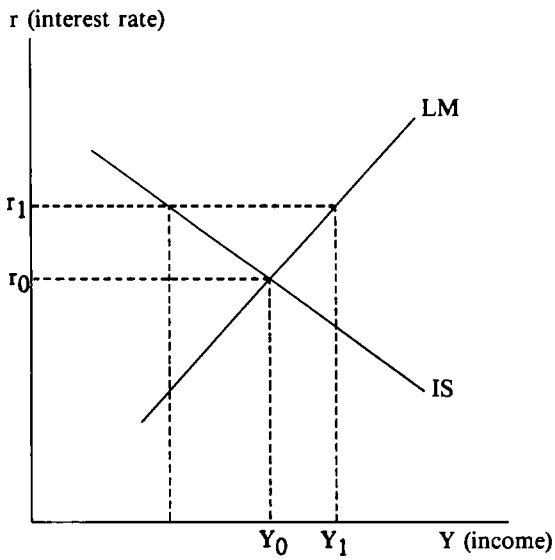
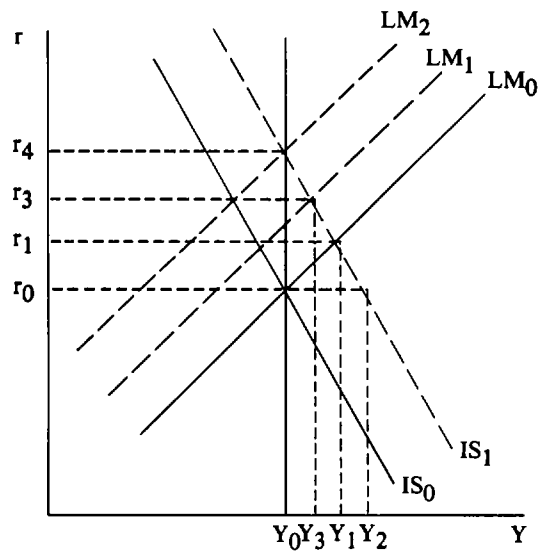


Figure 2
CROWDING OUT IN THE IS-LM MODEL



porate bonds, equities (stocks), and mortgages —are not made. In this two-asset version of the model, only one of the financial markets has to be examined. In particular, for a given amount of investors' investable wealth, if the demand for money is known, then the demand for bonds simply equals the remaining amount of wealth, and vice versa. The usual convention of considering the money market, the supply of and demand for money, is followed here.

As implied by the positive slope of the LM curve in Figure 1, higher interest rates are associated with higher levels of income for equilibrium to occur in financial markets, and vice versa. For any increase in income, for example from Y_0 to Y_1, the demand for transactions balances increases at the initial level of the interest rate, r_0. Under the assumption that the Federal Reserve sets the supply of money at a given level, individuals attempt to sell part of their bond holdings to satisfy their increased demand for money, thereby causing the interest rate to rise to r_1.[4]

The demand for money may also depend on wealth—defined here as consisting of the monetary base, equities, and privately held Treasury securities.[5] An increase in wealth is

[4] In the remainder of this article a distinction will not be made between money and the monetary base. Given a constant money multiplier, for example, the money market may be equivalently expressed in terms of the base or money.

[5] See, for example, Milton Friedman, "The Demand for Money: Some Theoretical and Empirical Results," *Journal of Political Economy,* August 1959, pp. 327-51. The definition of wealth used here follows from the consolidation of the nonfinancial business, financial business, and individuals into a single private sector. Other types of financial assets—such as nongovernment deposits at commercial banks and corporate bonds—are not included in measured wealth because they cancel out when the private sector is aggregated. For example, corporate bonds are liabilities of businesses and assets of the remainder of the nonbank public.

often presumed to increase the demand for money at any combination of the interest rate and income because some portion of the increase may be desired to be held in money. At a given level of income, individuals respond to an increase in wealth by attempting to sell bonds to bolster their money holdings. As before, the result is that the rate will increase until individuals are content to hold the existing amount of money. An increase in wealth, therefore, shifts the LM curve to the left from LM_0 to LM_1 in Figure 2. That is, at the current level of income, Y_0, money market equilibrium is obtained at a higher interest rate.

By combining the LM and IS curves, the overall equilibrium of the economy may be determined. In Figure 1, this equilibrium is represented by the combination, income and interest rate Y_0 and r_0, which occurs at the intersection of the LM and IS curves. If the economy is initially operating at a point not at the intersection of these curves, excess supply or demand in the money market will cause the interest rate to move in the direction that equilibrates the economy.

Various case applications of this basic model are described below to examine the consequences of debt-financed federal deficits.[6] The controversy over the relative impact of money versus debt financing of deficits centers especially on the impact of debt-financing, as there is little debate on the stimulative impact of increases in money. In particular, it is generally agreed that when the money supply is increased, the level of income increases beyond Y_0 in Figure 1 in the absence of fully utilized resources. This result follows because the increase in the supply of money causes the interest rate to fall at any given level of income, as individuals attempt to reduce excess money holdings by purchasing bonds, thereby shifting the LM curve to the right. Thus, in this case, equilibrium income will be greater than the initial level of income.[7]

Full Resource Utilization

When all factors of production are fully employed, fiscal stimulus unambiguously leads to crowding out.[8] A rise in the federal deficit resulting from an increase in government spending or a reduction in taxes initially influences the economy by increasing aggregate demand —that is, the IS curve shifts from IS_0 to IS_1 in Figure 2. If the economy is already fully employing all available resources in producing output equal to Y_0, however, the additional fiscal stimulus raises aggregate demand, Y_1, above aggregate supply, Y_0, generating pressure on prices. In the most simple case in which wealth does not affect the demand for

[6] The labels attached to these various cases are chosen merely for convenience, and all economists may not agree with the implied characterizations. In addition, the analysis presented below is in terms of the traditional static effects associated with the IS-LM framework. For dynamic analyses, see Alan S. Blinder and Robert M. Solow, "Does Fiscal Policy Matter?" *Journal of Public Economics,* November 1973, pp. 319-37; and James Tobin and Willem Buiter, "Long-Run Effects of Fiscal and Monetary Policy on Aggregate Demand," in Stein, ed., *Monetarism,* North-Holland, 1976, pp. 273-309.

[7] Given the presence of wealth in the money demand function, part of the rightward shift of the LM curve is offset by a leftward shift due to the higher level of wealth. However, it is unlikely that this leftward shift is greater than the rightward shift implying that on balance the LM curve shifts to the right.

[8] At one time, supply constraints appeared to be a rationale advanced by some monetarists to justify their belief that bond-financed fiscal stimulus is ineffective. See, for example, Milton Friedman, "A Theoretical Framework for Monetary Analysis," *Journal of Political Economy,* March/April 1970, pp. 193-238. The crowding-out debate does not, however, currently center on this case, as most economists would probably agree that binding supply constraints eliminate the effectiveness of expansionary fiscal policy. Nevertheless, fiscal policy directed toward increasing aggregate supply itself—as recently advocated—may promote output growth in the intermediate to long run.

money or aggregate spending, the rise in the price level reduces real, or inflation-adjusted, money holdings if the deficit is bond financed.[9] To restore real money balances to their previous level, individuals try to sell bonds which cause the interest rate to rise—that is, the LM curve shifts to the left until a new equilibrium is obtained at Y_0 and r_4. At this new equilibrium, aggregate demand and supply are again equal, but the interest rate has risen to r_4 due to the smaller amount of real money balances in the economy. The impact of money financed deficits is the same in this case, despite the initial rightward shift in the LM curve.

If the fiscal stimulus takes the form of increased government spending, an equal amount of real private spending is crowded out. Because total real spending is the same as before at the new equilibrium and real government spending has increased, this result necessarily follows. The amount of private spending that has been crowded out is equal to $Y_2 - Y_0$, where Y_2 represents the amount of total spending that would have resulted in the absence of any change in the interest rate. Thus, the increase in the interest rate to r_4 has crowded out some interest-sensitive private spending.

If the fiscal stimulus takes the form of a bond-financed decrease in taxes with real government spending constant, the shares of the government and private sector spending remain unchanged. Nevertheless, the rise in the interest rate results in a larger share of noninterest-sensitive private spending and a smaller share of interest-sensitive spending. To the extent that this represents a movement from investment spending toward consumption spending, the growth of productive capacity is adversely affected.

Ultrarationality

Another case that implies complete crowding out of private expenditures in response to bond-financed increases in government spending invokes strong assumptions about the "rationality" of private sector participants.[10] In particular, individuals are assumed to view bond-financed deficits and private investment expenditures as perfect substitutes. The implication of this assumption is that the private sector precisely matches any increase in a bond-financed deficit by a reduction in investment spending. This response negates the effect of an expansionary fiscal policy, implying that aggregate spending and therefore the IS curve remains at its original position.

Similarly, even if wealth affects the demand for money, the ultrarationality assumption implies that Treasury securities merely replace an equal amount of private capital, thereby leaving total wealth unchanged. From this result, it follows that a bond-financed increase in the federal deficit does not affect total wealth. Thus, the LM curve also remains at its original position, implying that bond-financed deficits do not move the economy away from its equilibrium at Y_0 and r_0 in Figure 2.

Increased government spending, therefore, crowds out an equal amount of private spending, and a tax reduction has no effect on aggregate private spending as in the previous case.

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[9] To simplify the analysis, it is assumed throughout this article that changes in wealth do not affect aggregate demand. For an analysis of crowding out that includes these effects, see Alan S. Blinder and Robert M. Solow, "Does Fiscal Policy Matter?" *Journal of Public Economics,* November 1973, pp. 319-37.

[10] See, for example, Paul A. David and John L. Scadding, "Private Savings: Ultrarationality, Aggregation, and 'Denison's Law'," *Journal of Political Economy,* March/April 1974, pp. 225-49. Despite interpretations to the contrary, Milton Friedman also appears to rely on the ultrarationality assumption in describing the ineffectiveness of bond-financed fiscal policy in "Comments on the Critics," *Journal of Political Economy,* September/October 1972, pp. 906-50.

In contrast to the previous case, however, these policy actions do not cause the interest rate to rise. Nevertheless, investment spending is reduced by an amount equal to the rise in government spending, and a reduction in taxes shifts private spending toward consumption and away from investment.

Strong Monetarist Position

The impact of debt-financed deficits in this and the subsequent three cases depends on assumptions about the proper theoretical representation of financial markets—that is, the LM curve.[11] Of these cases, the one that unambiguously implies complete crowding out from a rise in bond-financed government spending is labeled here as the "strong monetarist position," although it would be more appropriate to call it the "straw-man monetarist position," as the underlying assumption has been widely disavowed.

The key assumption in this case is that the demand for money is totally insensitive to changes in the interest rate. In the absence of any wealth effects, the demand for money then becomes entirely dependent on the level of income—that is, the LM curve is vertical. Because of this interest insensitivity, the supply of money effectively limits the amount of real spending in the economy, implying that the level of income is determined in the money market, as represented by the vertical line at Y_0 in Figure 2.

The impact of bond-financed deficits on real private spending is the same in this case as that in the "full resource utilization" case considered previously. However, instead of a rise in both prices and the interest rate, only the interest rate increases in the strong monetarist case. For a stimulative fiscal action, aggregate demand initially increases as before, shifting the IS curve from IS_0 to IS_1 in Figure 2. However, because the supply of money limits the amount of transactions in the economy, the interest rate must rise to equate aggregate demand in the commodity market to that determined in the money market. Thus, the interest rate rises until it reaches r_4 in Figure 2, the point at which enough interest-sensitive private spending is crowded out to enable the initial level of income, Y_0, to be obtained.

Weak Monetarist Position

With more conventional assumptions about the demand for money, the monetarist position of substantial if not complete crowding out of private spending is an open question. However, a general representation of money demand including both interest sensitivity and wealth effects does have a special case that leads to monetarist results.[12] Moreover, the "strong monetarist position" can also be viewed as a special case of this general representation of money demand.

The most straightforward manner to illustrate this position is to consider the impact of bond-financed deficits in steps. First, with some interest responsiveness in the demand for money, the IS and LM curves are as exhibited in Figure 1. Fiscal stimulus causes the IS curve to shift from IS_0 to IS_1 in Figure 2, which implies that income rises from Y_0 to Y_1, and the interest rate increases from r_0 to r_1 in response to the higher demand for transactions balances. Notice that at this point some interest-sensitive private spending is crowded out—in particular,

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[11] The analysis in the remainder of this section draws heavily on a recent article by Benjamin Friedman. However, Friedman did not present empirical estimates analogous to those presented below in the third section. See Benjamin M. Friedman, "Crowding Out or Crowding In? Economic Consequences of Financing Government Deficits," *Brookings Papers on Economic Activity*, No. 3, 1978, pp. 593-641.

[12] For a further analysis of this case, see footnote 6.

an amount equal to $Y_2 - Y_1$, where Y_2 equals the level of income that would have occurred had the interest rate remained unchanged. Because this crowding out arises from the increased transactions demand for money, this amount may be conveniently labeled *transactions crowding out.*

Next, with wealth in the demand for money due to the additional role money could play as an asset in investors' portfolios, the bond-financed deficit also increases the demand for money. As mentioned previously, such wealth-induced increases cause the interest rate to rise as investors attempt to sell bonds to increase their money holdings. Thus, the LM curve shifts to the left from LM_0. This additional rise in the interest rate to r_3 crowds out an additional amount of private spending equal to $Y_1 - Y_3$. Because portfolio motives for holding money are responsible for the interest rate rise, this amount may be labeled *portfolio crowding out.* If the portfolio crowding out effect is large enough so that it raises the interest rate to r_4, bond-financed fiscal stimulus has the same crowding out effect as the previous case. However, if portfolio crowding out is small, then total crowding out, which is equal to transactions plus portfolio crowding out, or $Y_2 - Y_3$, will not be of sufficient magnitude to prevent a rise in total income. Thus, the impact of bond-financed deficits in this case is an empirical question that centers on the magnitude of the portfolio crowding-out effect.

Strong Nonmonetarist Position

The nonmonetarist position that bond-financed fiscal stimulus leads to a rise in income unambiguously follows from the IS-LM framework if two conditions are met. First, the demand for money and therefore the LM curve is interest sensitive, as in Figure 1. Second, the portfolio motive for holding money is not relevant, implying that wealth is not a determinant of money demand.[13]

The analysis associated with this case is precisely that of the first step used to illustrate the "weak monetarist position." In particular, bond financed deficits cause both income and the interest rate to rise, although some interest-sensitive private spending is effected through transactions crowding out. However, in this case the portfolio crowding-out effect is assumed to be zero thereby ensuring no leftward movement in the LM curve.

Weak Nonmonetarist Position

Similar to the "weak monetarist position," the "weak nonmonetarist position" is associated here with a general model that may lead to either monetarist or nonmonetarist conclusions depending on the extent of portfolio crowding out. This model, in fact, includes all of those cases considered previously, except ultrarationality, as special cases and therefore offers the most fruitful framework for empirical analysis. The analysis associated with this case differs from those of the "strong nonmonetarist" and "weak monetarist positions" in that instead of either no change or a leftward shift in the LM curve, debt financed deficits may actually cause portfolio crowding in—that is, the LM curve may shift to the right and offset some portion of transactions crowding out. Such a shift further implies that a debt-financed fiscal action leads unambiguously to an expansion of economic activity in the absence of full resource utilization, and even less total crowding out than associated with the "strong

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[13] See, for example, Albert Ando and Karl Shell, "Appendix: Demand for Money in a General Portfolio Model in the Presence of an Asset that Dominates Money," in Fromm and Klein, eds., *The Brookings Model: Perspective and Recent Developments,* North-Holland, 1975, pp. 560-63. An even stronger nonmonetarist position would have no interest sensitivity in the commodity market thereby implying that monetary policy has no effect. In all of the cases examined here, however, it is assumed that the commodity market exhibits interest sensitivity as illustrated in Figure 1.

nonmonetarist position." All previous cases excluded portfolio crowding in as a logical possibility.

The "weak nonmonetarist" model differs from those considered previously in that the simple money-bond distinction is generalized to include four financial assets. The four assets considered are money, short-term Treasury securities, long-term Treasury securities, and equities. In this expanded model, the deficit may be financed by increasing money or either of two different maturities of Treasury securities. In the two-asset model, the broad asset category labeled "bonds" consisted of both maturities of Treasury securities and equities.

The representation of the commodity market remains identical to that of the previous version of the model. However, in the expanded model there are three categories of interest-bearing securities, implying that three different interest rates are determined. It is therefore no longer valid to describe the analytical results in terms of "the interest rate." Instead, the link between financial markets and commodity markets must be specified in terms of one or more of the three interest rates determined in the model. In this respect, the yield on equity is often thought to be an important determinant of business fixed investment expenditures, implying that the relevant interest rate in the IS-LM curve diagram is the equity yield.[14] Thus, the consequences of debt financed deficits center on the impact of debt financing on the equilibrium value of the equity yield.

As in the two-asset model, one of the financial markets may be eliminated from the analysis because it merely supplies extraneous information. In particular, as long as the demands for any three financial assets are known, it necessarily follows that the fourth equals the remaining amount of investable wealth. To facilitate the comparison between the two-asset and four-asset models, the equity market is eliminated and the equity yield is represented as being determined in the money market. Because the level of commodity market activity is dependent on the equity yield, the derivation of the IS and LM curves proceed exactly as before, with the joint equilibrium of the commodity and financial markets determined at the intersection of the IS and LM curves.

With the presence of two additional assets, the demand for money depends not only on income and wealth but also on the interest rates on short-term Treasury securities, r_S, and long-term Treasury securities, r_B. The demand for money is assumed to be negatively related to these two interest rates as well as the equity yield, r_E.[15] As before, an increase in wealth increases the demand for money at any given combination of the equity yield and income, implying that the LM curve shifts to the left toward LM_1 in Figure 2. However, increases in either of the Treasury security yields, r_S or r_B, reduce the demand for money at any given combination of the equity yield and income which results in a rightward shift in the LM

[14] See, for example, James Tobin, "An Essay on Principles of Debt Management," in *Fiscal and Debt Management Policies,* Commission on Money and Credit, Prentice-Hall, 1963, pp. 143-218; and James Tobin, "A General Equilibrium Approach to Monetary Theory," *Journal of Money, Credit, and Banking,* February 1969, pp. 15-29. By including corporate bonds in the model, the relevant cost of capital may be represented by a weighted average of the bond yield and the equity yield. For an example of the use of such a variable in an empirical analysis of business fixed investment, see Peter K. Clark, "Investment in the 1970s: Theory, Performance, and Prediction," *Brookings Papers on Economic Activity,* No. 1, 1979, pp. 73-113.

[15] The assumed relationships between interest rates and the demand for money are broadly consistent with empirical studies examining the determinants of money demand. See, for example, Stephen M. Goldfeld, "The Demand for Money Revisited," *Brookings Papers on Economic Activity,* No. 3, 1973, pp. 577-638; and Michael J. Hamburger, "Behavior of the Money Stock: Is There a Puzzle?" *Journal of Monetary Economics,* July 1977, pp. 265-88.

curve.[16] If the short-term interest rate rises, for example, individuals are induced to transfer a portion of their noninterest-bearing money balances into short-term securities.

The economic consequences of short-term or long-term debt financed deficits depend on the extent that the wealth effect associated with the larger amount of Treasury securities is offset by increases in short-term and long-term Treasury security yields. It is entirely possible that the wealth effect is more than fully offset, resulting in portfolio crowding in—that is, the LM curve may actually shift to the right. Such a shift would imply that the total crowding-out effect is even less than that associated with transactions crowding out. Differences could also emerge due to differential impacts of short-term and long-term interest rates on the demand for money. Because the ultimate impact on the LM curve and therefore the extent of portfolio crowding out can be determined only by assigning relative magnitudes to the impacts associated with the movements of wealth, short-term interest rates, and long-term interest rates, empirical estimates are presented below to assess the key magnitudes involved.

EMPIRICAL RESULTS

In this section, empirical evidence is provided to determine the impacts of money and debt financing of deficits. The evidence is obtained from an empirical model of the financial sector of the economy corresponding to the "weak nonmonetarist" model discussed above. To determine the impacts, the procedure employed is to estimate a four-equation model consisting of the demands for money, short-term Treasury securities, long-term Treasury securities, and equity. Then experiments are performed to find the direction of change in the equity yield corresponding to increases in the supplies of money and the two maturities of Treasury securities.[17] If these experiments indicate that increases in money-financed and debt-financed deficits cause the equity yield to fall, the implication is that the LM curve has shifted to the right—for example, from LM_0 in Figure 1. This result further implies that portfolio crowding in is prevalent, with the total crowding-out effect being smaller than that implied by transactions crowding out. In such a case, stimulative fiscal policy actions will increase aggregate demand in the economy. On the other hand, if the equity yield rises in the experiments, the LM curve has shifted to the left due to portfolio crowding out—for example, from LM_0 to LM_2 in Figure 2. With this result, the total crowding-out effect may be substantial and even leave aggregate demand unchanged in response to stimulative fiscal policy actions.

The model underlying the empirical analysis is represented in linear form as:

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16 As indicated in the text, the LM curve represents only conditional money market equilibrium, and not complete financial market equilibrium. Thus, whenever supply or demand conditions in the short- and long-term Treasury security markets cause the respective yields to change, the demand for money is affected thereby causing the LM curve to shift. For further discussion of this methodology, see Benjamin M. Friedman, "Crowding Out or Crowding In? Economic Consequences of Financing Government Deficits," *Brookings Papers on Economic Activity,* No. 3, 1978, pp. 593-641. An alternative framework which replaces the LM curve as represented here with a curve representing equilibrium in all financial markets may be found, for example, in Darrel Cohen and J. Stuart McMenamin, "The Role of Fiscal Policy in a Financially Disaggregated Macroeconomic Model," *Journal of Money, Credit, and Banking,* August 1978, pp. 322-36. The overall effects are identical in both frameworks as they merely represent the same model somewhat differently.

17 The results reported in this section are qualitative—that is, they concern the direction of change and not the actual magnitude of the change. To derive quantitative results, the nonfinancial sector of the economy must also be modeled. The main controversy surrounding crowding out, however, involves shifts in the LM curve, which may be examined qualitatively.

$$
(1) \quad \begin{aligned}
M^D &= m_0 + m_1 r_S + m_2 r_B + m_3 r_E + M_4 W + m_5 Y \\
S^D &= s_0 + s_1 r_S + s_2 r_B + s_3 r_E + s_4 W + s_5 Y \\
B^D &= b_0 + b_1 r_S + b_2 r_B + s_3 r_E + b_4 W + b_5 Y \\
E^D &= e_0 + e_1 r_S + e_2 r_B + e_3 r_E + e_4 W + e_5 Y
\end{aligned}
$$

where M^D, S^D, B^D, and E^D are the demands for money, short-term Treasury securities, long-term Treasury securities (bonds), and equities. The lower case letters—for example, m_0, m_1, m_2, m_3, m_4, and m_5—represent coefficients to be estimated. The demands for the four types of securities are constrained by the total amount of wealth, which is represented as:

$$
(2) \quad W = M^D + S^D + B^D + E^D.
$$

This implies that any three of the asset demands may be estimated and the fourth may be derived from the wealth constraint represented by equation (2). Assuming that the supplies of the different assets are given and that markets clear, any three of the above asset demands may be used to solve for the three yields determined by the model.

The coefficient estimates of the linearized asset demands are derived from a disaggregated structural model of the Treasury and equity markets described in detail elsewhere.[18] Equations are separately estimated for short-term Treasury securities, long-term Treasury securities, and equities over the sample period beginning in 1960:I and ending in 1975:IV, and the money demand equation is determined from the wealth identity.[19] The estimated coefficients for the linear version of the model corresponding to the asset demands in equation (1) are presented in Table 2.[20] The coefficients associated with changes in income were not derived because they are not needed to determine the qualitative impact of debt and money financing of deficits—that is, shifts of the LM curve.

The short-run consequences of money and debt financing of deficits are determined by setting the demands in equation (1) equal to the given supplies of the assets, and then solving for the values of the three endogenous yields—r_S, r_B, and r_E—that equate the demands with the supplies. The impacts associated with money and debt financing of deficits are determined by separately increasing the supplies of short-term Treasury securities, long-term Treasury securities, and money, and then solving for the new values of the yields. As indicated in Table 3, an increase in the supply of money causes a reduction in all of the interest rates. This is the standard result which implies that the LM curve in Figure 2 shifts to the right offsetting some portion of transactions crowding out, $Y_2 - Y_1$.

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18 See V. Vance Roley, "A Disaggregated Structural Model of the Treasury Securities, Corporate Bond, and Equity Markets: Estimation and Simulation Results," working paper RWP 80-11, Federal Reserve Bank of Kansas City, 1980.

19 It is unnecessary to solve the money demand explicitly. The three estimated demands are sufficient to determine the three endogenous yields. However, as is often suggested in the literature, the plausibility of the residual equation should always be examined. See William C. Brainard and James Tobin, "Pitfalls in Financial Model Building," *American Economic Review*, March 1968, pp. 99-122.

20 The coefficient estimates are derived from the impact elasticities implied by the model using the actual values of S^D, B^D, E^D, r_S, r_B, r_E, and W that occurred in 1975:IV. The impact elasticities for the interest rates were obtained by separately increasing the three interest rates by 1 percent, and then solving for the percentage change in the corresponding market demands. This procedure was followed for each quarterly period beginning in 1960:I and ending in 1975:IV, with the sample averages used in the computations. Wealth elasticities were computed in a similar manner. In the case of wealth elasticities, however, the 1 percent increase in wealth was allocated to the various categories of investors in the model according to their respective percentage holdings of the total amount of financial assets in the economy.

For debt-financed deficits, the qualitative impacts in Table 3 indicate that portfolio crowding in occurs even though both short-term and long-term interest rates on Treasury securities increase. In each case the rise in short-term and long-term interest rates is sufficient to reduce the demand for money more than the increase in wealth increases the demand for money. The net effect is that the LM curve in Figure 2 shifts to the right causing the equilibrium in both commodity and money markets to occur at a higher level of income and a lower interest rate than indicated by r_1 and Y_1. Thus, the empirical results indicate that the total crowding-out effect is reduced from that represented by $Y_2 - Y_1$ in Figure 2—that is, in the short run the magnitude of transactions crowding out overstates the actual amount of total crowding out.[21] As discussed above, this result further indicates that either an increase in federal spending or a reduction in federal taxes will increase aggregate demand in the economy.

Table 2
EMPIRICAL ESTIMATES OF THE LINEARIZED DEMAND EQUATIONS
(Sample Period: 1960:I—1975:IV)

Asset	Coefficient Estimates			
	r_S	r_B	r_E	W
M^D	−1.986	−0.988	−1.955	0.847
S^D	2.392	−0.451	−0.676	−0.013
B^D	−0.406	1.439	0.111	0.015
E^D	0	0	2.520	0.151

r_S = yield on 3- to 5-year Treasury securities
r_B = yield on 10-year and over Treasury securities
r_E = Standard and Poor's dividend/price ratio
S = short-term Treasury securities
B = long-term Treasury securities
E = equities
M = money
W = M + S + B + E

Table 3
THE QUALITATIVE IMPACTS OF MONEY AND DEBT FINANCING OF DEFICITS

Increase in the Supply of:	Increase (+) or Decrease (−) in the Level of Interest Rate:			Portfolio Crowding Out (+) or Crowding In (−)
	r_S	r_B	r_E	
M	−	−	−	−
S	+	+	−	−
B	+	+	−	−

CONCLUSIONS

During recessionary periods, federal deficits often occur as economic stimulus is provided to a sagging economy. Because of the reliance often placed on debt-financed deficits during these periods, it is important to assess the associated economic effects of debt financing. For example, it is possible that a significant portion of debt-financed deficits simply crowd out private spending, which would negate some of the expansionary impact of the deficit.

A theoretical model often used to analyze the economy, the IS-LM model, implies that debt financing could have substantial offsetting effects on the amount of economic stimulus provided by increased deficits. However, by expanding the basic two-asset (money-bond) version of this model to include four

21 Similar qualitative results have been discussed as possibilities based on explicit assumptions concerning asset substitutability. See, for example, James Tobin, "Money, Capital, and Other Stores of Value," *American Economic Review*, May 1961, pp. 26-37; and James Tobin, "An Essay on the Principles of Debt Management," in *Fiscal and Debt Management Policies*, Commission on Money and Credit, Prentice-Hall, 1963, pp. 143-218.

assets—money, short-term Treasury securities, long-term Treasury securities, and equities—the economic consequences of debt-financed deficits become much more uncertain. In the context of this four-asset model, empirical estimates indicate that the total crowding-out effect may in fact be relatively small, implying that stimulative fiscal policy actions will increase aggregate demand in the economy. The empirical results should only be interpreted as being suggestive, however, because the inclusion of four assets in the model still only accounts for a fraction of the total financial assets existing in the economy. The crowding-out question should be analyzed by including as many assets as possible and by also explicitly taking into account the distinct channels of financial intermediation that may further affect the overall level of economic activity.

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