

Public Prices - Private Costs; The Federal Reserve Bank  
Competes With Itself

By  
Betsy Hannah Gordon

B.A., Clark University, Worcester, Massachusetts  
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Signature of Author:.....  
Department of Urban Studies and Planning,  
May 15, 1982

Certified by:.....  
Thesis Supervisor

Accepted by:.....  
Chairman, Departmental Graduate Committee

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Course Concentration: Public Policy and Management

ABSTRACT

This thesis analyzes the Monetary Credit and Control Act of 1980 provision that the Federal Reserve Bank set explicit fees for its services. The Federal Reserve Bank must begin to actively compete as a public agency in a private market for payment services. The act has required the Federal Reserve Bank to reorient management focus and institutional priorities as a service provider.

A discussion of the pricing strategy adopted by the Federal Reserve Bank reveals both how efficiently costs were allocated among different services in order to determine a fee schedule, and the implication of cross-subsidization of services. In addition, particular attention is given to the question of how a public agency meets a mandate to set fees that include a proxy for "non-market" costs of capital. The issue of what is a "fair" market price with respect to public interest concerns is an overriding theme of this thesis.

The specifics of this analysis include an evaluation of an average cost versus marginal cost pricing scheme, the determination of a "fair" rate of return, and the way the existing Federal Reserve Management and Budgeting System was used to assist in the implementation of a fee schedule.

Thesis Supervisors:

Dr. Leonard G. Buckle, Professor of Urban Studies, M.I.T.  
Dr. Suzann R. Buckle, Professor of Urban Studies, M.I.T.  
Dr. Herman B. Leonard, Professor of Public Policy, John F.  
Kennedy School Of Government

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Mr. James Love, Master in Public Administration, John F. Kennedy School of Government, Harvard University.

Professor Stewart C. Myers, Sloan School of Management, Massachusetts Institute of Technology.

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## I Introduction

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The Depository Institution Deregulation and Monetary Control Act (MCA) was signed into law by President Carter on March 27, 1980. This act marks a new era in the banking and finance industry. One of the provisions of this law requires that the Federal Reserve System (The Fed) discontinue its traditional practice of offering payment services at zero cost to member banks, and offer priced services to all depository institutions. A fundamental consequence of the MCA is that there will no longer be any distinction between member and non-member banks. By requiring the Fed to price its services the Congress intended that competitive forces shape the national banking payments service market and enhance the efficiency with which banking services are delivered.

The task of pricing the Federal Reserve's services places enormous pressure on the Fed. It must now redefine and in fact prove the very role it should play as a public sector service provider. This means the Fed must not only articulate, but also cope with a different organizational

philosophy. The way the Fed manipulates its entire management system in setting prices for services, will in part, shape this philosophy. The Fed must reorient its operation towards a market sensitive approach as it sells its services, and confront the existing forces in the competitive market. The Fed must be deliberate about strategies of maintaining volume and increasing market share. Any trade-off existing between these two strategies will depend upon the flexibility implied by the Fed's pricing policy. In addition to its traditional role as regulator, the Fed will now take on a more overt role as competitor.

To the extent that the Fed is ultimately forced to cut back some of its service capacity because of the market response to its fee structure, it must also face the potential role as service provider of last resort. Although somewhat beyond the scope of this analysis, it is important to recognize the substantial impact the mandate of Fed pricing will have on the Fed's mode of operation as provider of financial payment services, and on its status as a service provider relative to its private sector competitors.

This paper first will set out the historical context

that led to the formulation of the MCA and the specific requirement of Fed pricing. Next, it will analyze the existing management and budgeting system, and explain how costs were allocated to priced services. Third, it will consider how the Fed went about determining a rate of return on its services given the MCA mandate to include in the fees a mark-up representing the costs of taxes and financing that the Fed would incur as a private entity. Finally, it considers the pricing theory applicable to the Fed's approach towards setting a fee structure for services. This will include a discussion of the merits of average cost and marginal cost pricing under different conditions of supply and demand. Consideration of these four aspects allow judgements to be made about how effective the Fed has been in its effort to price services "so as to enhance the efficiency of the nation's payments system." <sup>1</sup> In turn, some of the fundamental changes which will improve the Fed's pricing scheme become evident.

An analysis of how the Fed determines its pricing strategy tells an interesting story about an agency which at once must grapple with internal constraints of its own management and budgeting system, a requirement that it price



its services at full cost, the shift in demand for its own services in response to setting explicit fees, and the overriding concern of the private sector that the Fed price its services "fairly".

## II A Transition From Free to Priced Services: Historical Trends

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The formulation of the MCA was motivated by a combination of economic, political, and technological forces, which together called into question the role the Federal Reserve should play as the central bank, responsible both as a regulator of monetary policy and a "competitor", providing payment services to member banks. It was the converging of these forces that accelerated the trend of member bank bail-out, intensified the focus on the costs rather than the benefits of Fed membership that made increasingly apparent the issues of inter-bank equity, and spurred on the movement towards the mandate of Fed pricing. The MCA was ultimately a compromise law incorporating the at times conflicting agendas of Congress, the Federal Reserve, the Treasury, and the banking community in general.

### Issues of Fed Membership and Monetary Pricing Considerations

Over the past decade, the Congress has considered a variety of approaches to financial reform. A primary focus was on the problem of member bank attrition from the Federal

Reserve System and its impact on the ability of the Fed to carry out monetary policy objectives. Both the number of member banks leaving the system and the percentage of total bank deposits accounted for by member banks had steadily decreased. Over the past ten years 435 member banks had withdrawn from the system, and only 103 had joined.<sup>2</sup>

Initially it was mostly smaller banks, with assets under fifty million, that were leaving the system. During the 1970's, larger banks with assets over one-hundred million were leaving the system at increasing rates.<sup>3</sup> The underlying cause of this trend was the cost associated with the reserve requirements imposed on member banks. Reserves are non-interest bearing accounts held with the Fed in exchange for free services and access to the discount window. These reserves are an opportunity cost of alternative interest bearing investments and are something that banks naturally wish to avoid.

Monetary policy makes the reserve requirement issue an important concern of the Federal Reserve System and the Congress. There is a direct link between the amount of reserves in the banking system and the Fed's ability to

control the money supply and credit. Through the Fed's open market operations, the buying and selling of U.S. securities, the Fed influences the level of reserves in the system. Buying government securities increases the volume of reserves with which banks can lend. Selling Government securities will tighten the money supply and decrease the volume of funds available for credit. A predictable reserve base is necessary in order for the Fed to carry out its open market operations. With fewer banks and a lower amount of nationwide deposits as part of the Federal Reserve System, the Fed therefore, has less ability to control money and credit.

The role of reserve requirements in carrying out monetary policy is an issue around which there is continual debate. In 1980, 70% of all commercial bank deposits were held by member banks.<sup>4</sup> This would seem to imply a substantial ability by the Fed to control monetary aggregates. However, the Congress was more concerned with the rate of attrition and its potential consequences. Therefore, proposals were called for which would stop the trend of avoiding reserve requirements through attrition.

One proposal would have required interest to be paid on

reserves and another called for a graduated set of reserve requirements within a statutory range. A proposal introduced by the House Banking Committee Chairman Henry S. Reuss as H.R. 13847 called for "universal reserve requirements".<sup>5</sup> Both Senators Reuss and Proxmire introduced subsequent modifications which resulted in the MCA provision of uniform, universal requirements. With the universal reserves requirement, the total amount of reserves would be spread across a broader base of depository institutions. There was also a proposal for reduction in the reserve ratio, such that the total amount of reserves held with the Fed would be lower.

## Reduction in the Reserve Base and the Concerns of the Treasury

The banking community received this specific provision favorably. However, the Treasury, another party intimately involved in the formulation of the MCA, was concerned about any decrease in the absolute level of reserves held nationwide. Both the Treasury and the Congress recognized that a lower level of absolute reserves might translate into a revenue loss to the Treasury. The Treasury's support for Fed pricing in part was because the revenues generated from service fees would offset the potential loss in earnings caused by a lower revenue base.

The basis of the Treasury's viewpoint is best understood by considering the not so obvious link between the level of aggregate reserves and the cost of borrowing to the Treasury, and the flow of net earnings each year from the Fed to the Treasury. Through the Fed's buying and selling of Government securities it manipulates the level of reserves and the money supply. The Fed draws down the reserve base through the purchase of a government security. If a lower total reserve base exists, the Fed will hold proportionately fewer government securities. In turn, the

public will hold more. To the extent that more publicly held debt bids down the price of bonds, their corresponding yields will increase. In turn, the Treasury will be forced to finance proportionately more of its debt by borrowing from the public--at the higher rate of interest. Therefore, fewer total reserves cause a by-product of increased borrowing costs to the Treasury. It is in this way that net earnings to the Treasury may decline. It should be pointed out that the actual change in the ratio of government held securities at the Fed because of the induced change in the reserve base, is unlikely to be very substantial, and the increased costs to the Treasury - if any - quite small. (A more obvious relationship is between the net Treasury revenues earned from the Fed, and the Fed's own earnings from its entire operation as regulator of monetary policy and as a provider of priced services.)

The reason the mandate of Fed pricing was assumed to help offset the potential loss of revenues to the Treasury becomes relatively straightforward. The Fed returns the majority of its interest earnings each year to the Treasury. Prior to the MCA, the revenues the Fed funneled back to the Treasury did not include the fees (cost recovery) from its

service operation. With the mandate of Fed pricing and full cost recovery, the Fed in effect will generate an additional source of income to contribute towards its cost of operations. Any savings in operating costs that result from the service fees, will become an additional source of revenue to the Treasury. That is, the Fed will need to keep less interest income to cover its operating costs because it will be supporting a lower cost of operation. The Congressional records indicate that the initiation of Fed pricing was, in part, intended to offset any loss in earnings to the Treasury.



## Recent Trends Shaping the Provision for Fed Pricing

There have also been various trends which essentially forced the issue of Fed pricing into the forefront of Congressional deliberations. First, foregone investment opportunities because of the sterile reserve requirement are exacerbated when interest rates rise and the cost of federal funds and Treasury Bills increase. For example, during the period between 1971 and 1981, the prime rate rose from 5.72% to 18.87%, and six month T-Bills from 4.5% to 13.8%.<sup>6</sup>

Second, member banks were placed at a competitive disadvantage with recent financial innovations in the form of transaction related interest bearing deposits such as NOW'S, POW'S, and telephone transfers from savings deposits. This development fostered enormous competitive pressure on the banking community for deposit funds. Member banks, being financially squeezed from membership burdens, were less able to offer interest bearing accounts as an inducement to customers.

Third, the increased competition in the banking industry and the pressure to control operating costs made

the burden of reserve requirements more onerous. Reserve requirements are considered a significant cause of the historic earnings difference between member and non-member banks.

Fourth, the cost of membership was increased by the enhanced quality and greater efficiency of correspondent bank service provision. In turn, some of the services provided free by the Fed seemed of less value. Correspondents began to offer check collection services requiring less pre-sorting, less stringent cutoff times for check processing, and more immediate availability of funds than did the Fed. Respondent banks could therefore obtain better service from their correspondent banks. Some respondent banks were precluded from using the Fed because of their remoteness from a Federal Reserve office. Member banks as well have increasingly relied upon correspondent banks for the provision of certain services. The Fed did improve the efficiency in its check collection service through the establishment of Regional Check Processing Centers (RCPC's). However, this service was available to non-members as well as members, and therefore, added to the relative costs associated with membership. 7

Finally, one of the more significant factors which increasingly called attention to the costs and inequities associated with Fed membership was that any non-member bank had access to to the Fed services simply by operating through a member bank correspondent. The correspondent bank would access services free of charge from the Fed, (i.e., check collection services, wire transfer services, cash services). A non-member bank, typically a respondent bank, could then receive these services from their correspondent either free of charge or at a subsidized rate. In this way, larger correspondent banks could somewhat offset the cost of reserves and respondent banks could take advantage of cheaper services which at times reflected a higher level of quality than would have been provided through the Fed. In light of all of these factors it is no real surprise that the mandate of uniform, universal reserve requirements and Fed pricing received a very mixed reaction; The degree of acceptance depended upon the relative burdens of holding reserves in the pre- and post- MCA environment, balanced against the additional costs incurred because of Fed pricing.

### Free Services and Efficiency Concerns

When the Federal Reserve System was created in 1914, it was charged with the responsibility of "furnishing an elastic currency, to afford a means of rediscounting commercial papers, and establishing a more efficient supervision of banking".<sup>8</sup> In order to assure the efficient functioning of the national payments system the Federal Reserve was authorized to provide services free of charge or at a subsidized rate. The very first services to be provided were check collection and discount services. Since that time the number and volume of Fed services has steadily increased.

Prior to the MCA the services provided free of charge to all member banks and a few non-member banks were:

- 1) Operation of payments system, including check processing, and transportation,
- 2) Automated clearing house services,
- 3) Purchase, sale, safekeeping, and clearing of federal securities,

- 4) Wire transfers,
- 5) Bank examinations for state member banks and holding company inspections,
- 6) Pick up and delivery of coins and currency,
- 7) Operation of the discount window,
- 8) Operation of the Regional Check Processing Centers,
- 9) Provision of certain bank advisory services,
- 10) Provision of a variety of business, financial, and general information on current economic events. 9

The availability of these services is the primary advantage for maintaining membership in the Federal Reserve System.

The trends since the Fed was created in 1914 leading to member bank attrition were not foreseen by Congress. Although the problems which were increasingly associated with the reserve requirements became causally linked to the mandate for Fed pricing, arguments focusing on efficiency grounds alone were increasingly heard during the past decade. In 1974, three Fed employees wrote an article entitled "Pricing and the role of Fed in an electronic funds transfer system." This article stated that:

"The Federal Reserve must charge full cost for all

services provided if private organizations are to have real options of developing lower cost alternatives. If the Federal Reserve provided services free of charge, it would undermine private initiative which is so vital for increased innovation and efficiency....Full cost pricing will insure that the financial community will always have the option of developing alternative ways of handling transfers. Preservation of public and private options should provide insurance against the almost inevitable sluggishness which tends to develop in large service organizations." 10

Just how inefficient the Fed is as a service provider because of the inherent characteristics of the public sector is debatable. It may be that the more important variable influencing efficiency is the pervasiveness of competition. Nonetheless, the point is that offering free services results in the overuse of some services and inhibits the likely effort towards lower cost provision of services, innovation, and more efficient ways of using society's scarce resources.

William G. Miller, then Secretary of the Treasury and

later Chairman of the Board, used this very argument when he was actively involved in developing the terms of the MCA. Paul Volker also supported the notion of the efficiency of Fed pricing. This became crucial in the deliberations with the Treasury because of their concern with the potential loss in Treasury revenues resulting from the universal reserve requirements.<sup>11</sup> Moreover, the banks themselves began to raise the efficiency issue.

Consider for example the comments of the President of the Philadelphia First National Bank:

"In 1976, Philadelphia National, as part of its competitive effort to obtain new correspondent banking business, worked out an arrangement with four banks in the Johnstown, PA, area to provide certain check clearing and check transportation services that were then unavailable from the Federal Reserve System and which other private institutions had chosen to offer competitively. After the agreement had been worked out in detail, the Philadelphia Federal Reserve Bank, notified of it, intervened and offered the identical service to the four banks at no direct cost to them. Naturally, the four banks chose the Federal Reserve's offer over ours. In order to provide the service, the

Federal Reserve had to incur costs that I am convinced we could have met - had the Federal Reserve been required to charge a fair price for the service. In this instance, the Federal Reserve directly undercut a private initiative, presumably to engender the good will of four banks, and in so doing provided a de facto subsidy to those institutions funded by the local Federal Reserve's profits on the interest free reserve balance required to be maintained with it by district members, including ourselves." 12

Although the Fed did not typically engage in such unscrupulous business practices, the fact that it could potentially "undermine such private sector initiatives" alluded to the realization that such practices could become more common as the Fed continued to experience a decline in both membership, and demand for some of its services. Moreover, this experience made obvious the unfair competitive advantage being granted to the Fed as a public sector regulator of monetary policy.

It slowly became clear that the Fed's role as the central bank could be detached from its role as a depository



institution. That is, the Fed's responsibilities as a regulator of monetary policy need not descriptively impose restrictions and costs on depository institutions through the reserve requirements so that these institutions may in turn benefit from the provision of free Fed services. At the same time, it was clear that the Fed could not adopt a policy of simultaneously imposing costs of reserve requirements and charging for its services. This would create obvious interbank inequity. Given the desire to reduce the inefficiencies imposed by the provision of services at zero cost, and the need for stability in the reserve base, a dual policy was required which would provide open access to Fed services and mandatory reserve requirements for all depository institutions.

This line of thinking was formalized in a 1976 report by the Ad Hoc Task Force on Access to Services, which stated that the most effective way of granting access to all financial institutions was to charge explicit fees for services and require all depository institutions to hold reserves with the Fed. This was intended to solve the membership problem, improve the efficiency of the national payments system, and assist in preventing what were

considered unfair pricing practices. Five years later Congress passed the landmark MCA, which, among other things, provided that the Fed must price its services and compete "to enhance the efficiency and effectiveness of the national financial service mechanism and better monitor aggregates."

The provisions of the act which will directly facilitate the implementation of these objectives are:

- 1) The abolition of Regulation Q through an orderly phase-out and ultimate elimination of all limitations on deposit interest rates.
- 2) Mandatory reserve requirements for all depository institutions.
- 3) Universal access to Fed services and the requirement that they be explicitly priced.<sup>13</sup>

The Fed's present task is the implementation of the mandate of Fed pricing. We will now consider how the Fed manipulated its existing management and budgeting system in order to determine the explicit fees for priced services.

### III. The Federal Reserve System's Management and Budget System

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#### The Planning and Control System (PACS): Structure/Purpose

The purpose of a cost accounting system is to measure, in monetary terms, the quantity of resources utilized to carry out a specific objective or purpose. Cost accounting is, therefore, a management tool which can be used in budgeting, performance evaluation, or price setting.

In 1977 the Fed adopted the Planning and Control System (PACS) method of cost accounting. PACS is a full cost system, which means that both direct costs and a fair share of indirect costs are allocated to specific activity centers. Direct costs are those expenses which are incurred solely to accomplish a specific objective. Indirect costs are those expenses which are shared by more than one activity-- such as support services and other overhead items. These are commonly referred to as joint costs.

Any cost accounting system must approximate the proper allocation of the indirect costs because of the difficulty

in distinguishing between the share of overhead items spent on particular activities. A rule-of-thumb method of allocation may be used, such as square-foot of floor space, sales, or direct costs. Sometimes space and direct costs together, or some other combination or proxies maybe used. Sometimes more sophisticated studies are undertaken to make more precise allocations of indirect costs. There are, of course, costs associated with gaining better information on the true allocation of indirect costs, and the management problem is to weigh the expense of implementing a more sophisticated and complex system against the benefits of having better cost data.

The Fed's PACS system was adopted prior to the inception of the MCA, and thus was tailored to a set of internal data needs that were somewhat different than those that exist today. In general, PACS is better at providing broad budgeting data and cost control information than it is at identifying the full costs of specific services. In part, this is a problem of levels of aggregation--because PACS provides information on whole categories of services whereas for pricing purposes it is necessary to unbundle

these categories into more discrete items.

#### PACS Cost Allocation and Allocation to Priced Services

PACS itself has three essential levels of disaggregation of cost data. First, the Fed breaks out its costs into seven Output System Service lines, which are the broad categories of responsibility of the Fed. They include: Monetary and Fiscal Policy, Services to the United States Treasury and Government Agencies, Services to Financial Institutions and the Public, Supervision and Regulation, Support Services, and Overhead Services.

Among the responsibilities of the Fed, only one System Line is to be priced--namely, Financial Services. PACS breaks down Financial Services into six service lines, which are the programs to carry out the Fed's responsibilities. They include: Commercial Check Processing, Coin and Currency, Electronic Payments Mechanism.

Each of these service lines are finally broken down into activities which are the specific operations required to carry out the particular programs. For example, under the Commercial Check Processing Service Line there are four

activities, including: check processing, fine sort, returns, and adjustments. (See Figure 1, page 31).

After the MCA was passed in 1980, the Fed appointed a "Pricing Policy Task Force", (PPTF) to assist the Fed in meeting the mandates of the Act. Among other things, the PPTF reviewed the PACS and designed a series of Pricing Worksheets which are used to step-down the PACS data so that it is useful in determining full costs for services to be priced under the MCA.

In essence, the pricing worksheets add an additional level of disaggregation within the activities so that they can be broken down into smaller categories which reflect different costs. For example, the pricing worksheet for commercial check processing creates six smaller service categories that will be separately priced. This is shown schematically in Figure 2 on page 32. It is worth noting that the lowest level of cost disaggregation is still the "activity", although the relevant level for pricing is just one below the "activity". That is, the bank buying the services from the Fed does not pay four separate fees to have checks processed, adjusted, returned, and fine sorted,

FIGURE 1

Step-Down of Fed Cost Data Under PACS

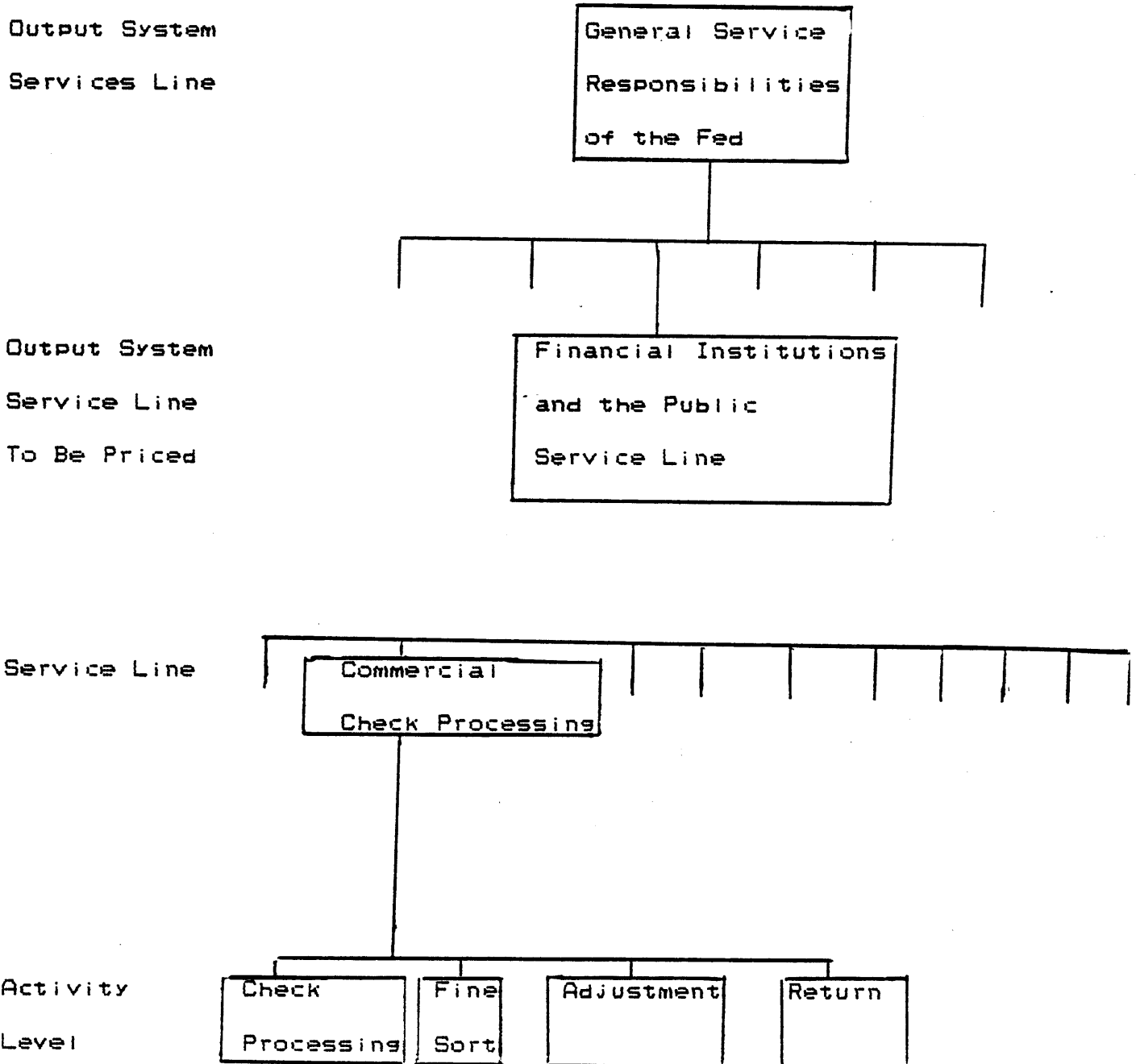
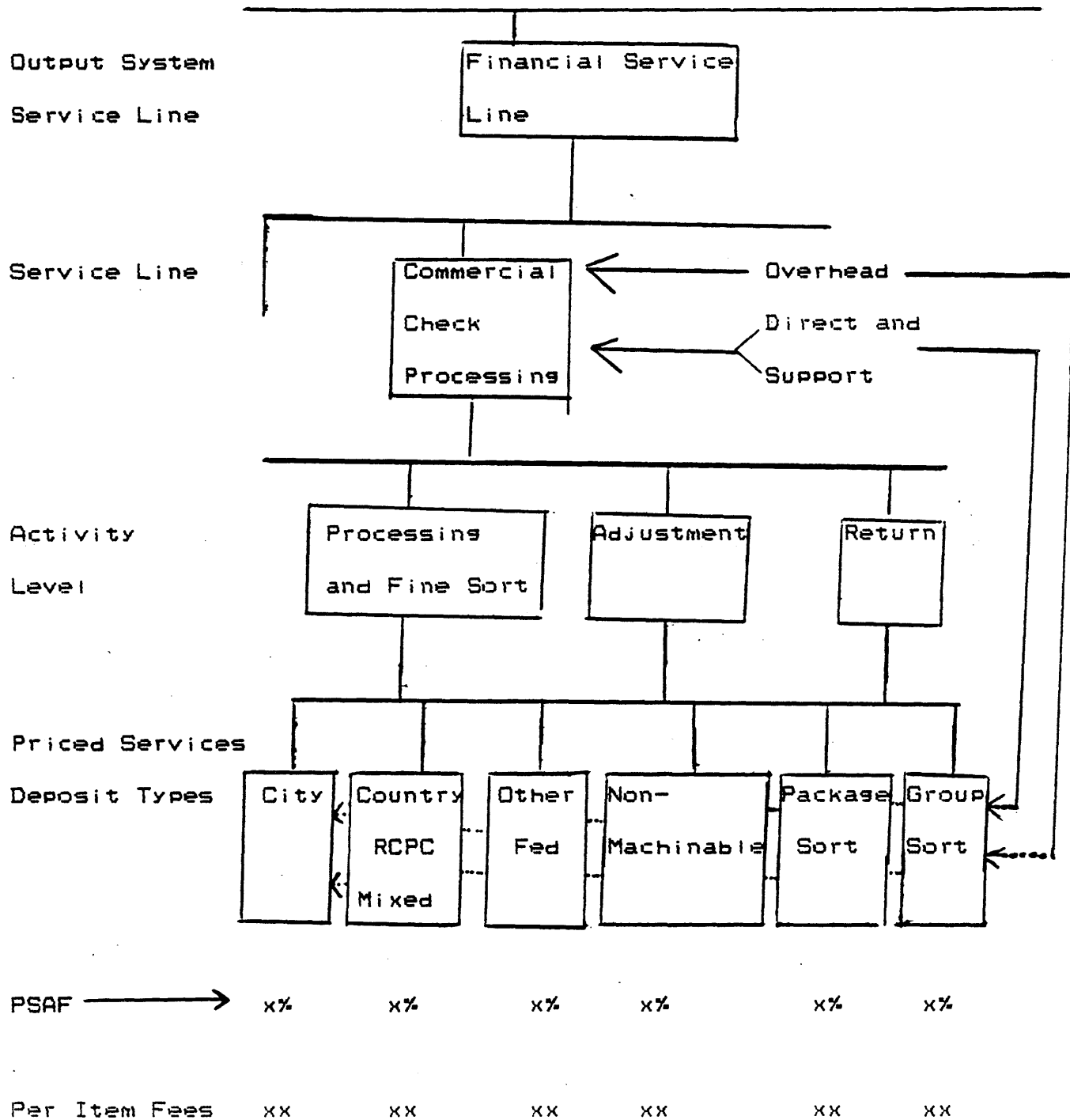


FIGURE 2

Step-Down Cost Allocation To Priced Services





but rather one fee for everything. The activities are simply the various things that the Fed does to provide a given type of service. The Fed charges for City checks rather than four separate charges for the different things it does to process City checks.

This new level of disaggregation which has been developed with the pricing worksheets provides the best cost data for pricing. A service which is going to be priced is identified and broken out unbundled from the larger "service line" provided by the PACS. The costs of the various activities are allocated downwards to the new service category. This is the full cost of providing a particular service. The Fed then takes the full cost and marks it up by the Private Sector Adjustment Factor, (PSAF), to impute private sector capital costs. This is the unit price or fee which is charged.

#### Evaluation of the Pricing Worksheet

Whether or not this procedure will provide the Fed with a price that reflects the true economic cost of providing the service depends on the method used to allocate activity

costs to the priced services, plus the appropriateness of the PSAF mark-up.

An initial review of the procedures used by the Fed in allocating the activity costs among services reveals that in some cases simple rule-of-thumb allocation methods have been used, whereas in other cases the Fed has used more detailed studies to determine the cost allocation. For example, in commercial check processing, four out of the six sub-categories have activity costs allocated on the basis of volume, while two categories have costs allocated on the basis of time-motion studies. (Refer to Appendix I on the Pricing Worksheet for further detail.) A closer look at check processing costs raises a number of questions about the cost accounting procedures used.

First, at times, a charge may reflect the costs of an activity not associated with its processing. A particular example of this is the allocation of the activity costs for returns and adjustments. These costs were allocated across all deposit types. However, not all items require returns or adjustments. Therefore, all users of the Fed's check processing services must bear the costs for returns and

adjustments even though all users do not impose such costs on the processing operation.

Second, there are some instances where the same fees are charged for an item, but there are significant differences in the respective processing costs. The most glaring example is that three deposit types, Mixed, Country, and RCPC, were all lumped together for pricing purposes. (See glossary for definition of deposit types.)

Third, the process employed for the allocation of overhead adheres strictly to the assumption that each deposit type requires the same level of overhead related resources. But, just as there are variations in the resource requirements for processing different deposit types, there are also differences in the amount of overhead that should be reflected in the separate charges for deposit types. Given that the PACS initially aggregates overhead at the output service line level, the step-down of costs, first to the check activity and then across to the priced services, adds to an already somewhat arbitrary process of overhead allocation.<sup>14</sup> To the extent possible, an overhead allocation scheme should recognize different resource

requirements for providing services. For example, both non-machinable cash letters and mixed cash letters require that more resources be devoted to their processing than the other deposit types. The present method of assigning overhead costs to priced services ends up not allocating enough costs to these items and too many costs to other deposit types.

Appendix 1 provides a detailed discussion of the Pricing Worksheet and exactly how costs were allocated to priced services. The different kinds of ratios used to allocate the costs of various activities and the overhead allocation methods are explained. Much of the problem in deriving efficient prices through the Pricing Worksheet is related to the way that the PACS initially categorized costs for the Fed's management purposes in the "pre-MCA" environment. As the Fed's management objectives changed, its accounting and budgeting system must be reoriented as well-- away from a one-sided focus on cost minimization towards matching revenues and costs.

Some of the initial restructuring of the Pricing Worksheet itself could improve some of the allocation of

costs to priced services. The Fed could also define certain of the deposit types as "activities" or shift to a more uniform standard cost approach.<sup>15</sup> In general, it is recommended that all deposit types be priced separately because there are sufficient differences in their processing requirements to justify different charges for each deposit type.

Having observed the problems of using the PACS to allocate actual Fed costs to priced services, and the resulting pitfalls, it is now appropriate to turn to another question--namely, how accurately does the Fed allocate imputed costs to priced services? That is, how are capital costs imputed by the Fed?

#### IV The Private Sector Adjustment Factor (PSAF)

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##### Why the PSAF?

According to the Monetary Control Act, the Fed must price its services so as "to give due regard to competitive factors."<sup>16</sup> This has been construed to mean that the Fed should not price its services strictly according to its costs, but should make certain adjustments to account for its non-market costs of capital. That is, since the Fed does not have to raise capital in the private debt and equity markets, and since it does not pay taxes, the cost of its invested capital is much lower than its competition in the private sector. In order to address this concern, the Fed has proposed a Private Sector Adjustment Factor, known as the PSAF, which imputes the cost of financing and taxes that would have been incurred, if it were a private sector entity.

#### Derivation of the PSAF

Once the decision was made to impute the costs of financing for the Fed in determining a fair price to charge for its services, the task of picking a proper cost of capital remained. The Fed decided to use the weighted average of the costs of debt and equity of a sample of twelve large bank service corporations, which provide a variety of services, including some of those that the Fed must price under the new regulatory laws. Based on a 1979 survey, the Fed estimated that the cost of short term debt was 10.44%, long term debt cost was 8.66% and equity return, gross of income taxes, was 22.7%.<sup>17</sup>

Next, the Fed estimated its total assets which should be allocated to the priced services. The Fed's asset accounts were divided into short-lived and long-lived asset categories which were all valued at historic cost. Excluded from the asset base were the value of all assets used by the Fed to carry out its function as the central bank, its supervisory and regulatory responsibilities, and its role as

a fiscal agent of the Treasury.

The asset accounts chosen to represent assets used in the production of priced services were the following:

SHORT-LIVED

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Difference and Suspense, Net - All cash items in the process of collection, including the float.

Adjustments, Net - What in 1981 were categorized as Difference and Suspense accounts.

Accrued service revenue - A new post-MCA account representing an accounts receivable for all priced services. The account was not included in the 1981 PSAF calculation.

Materials and Supplies - Operating inventory for all priced services. This account was left out of the 1981 the PSAF calculations due to error.

LONG-LIVED ASSETS

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Bank premises, net

Furniture and equipment, net

Other real estate



The next step was to calculate the share of the total asset base which should be allocated to the priced services. The Fed accomplished this by allocating its assets to services on the basis of the projected operating expenses. That is, the ratio of the operating expenses for priced services to the Fed's total operating expenses is assumed to be a fair proxy for the percent of the Fed's total asset base devoted to use for the priced services. Using this method the Fed estimated that 43% of its total asset accounts would be allocated to priced services.

The Fed's total asset accounts are \$660 million. Of this, \$137.5 million are short-lived and \$522 million were long-lived assets. Next, the Fed assumed that the proper debt to equity ratio for the long-lived assets would be 30:70. Thus, the short-lived assets allocated to priced services are  $\$137.5 \times .43 = 59$ ; the imputed equity is  $\$522 \times .43 \times .30 = 67$ ; and the imputed long term debt is  $\$522 \times .43 \times .70 = 158$ .<sup>18</sup>

Based on these parameters the Fed estimated the total costs of capital for the priced services as follows:

Table I: Weighted Cost of Imputed Capital

ASSET		Annual cost of capital as a %	Annual cost of capital
Short-Lived Assets			
Imputed short term debt	\$59.5	10.44%	\$6.2
Longer-Lived Assets			
Imputed long-term debt	67.5	8.66	5.8
Imputed equity	158.0	22.7	35.9
	285.0		47.9

Weighted Cost of Imputed Capital =  $47.9 / 284 = 16.8\%$

The PSAF, however, is not the annual cost of capital allocated to the priced services (16.8%), but rather a number which estimates the financing costs as a mark-up over operating costs. That is, the figure derived for the annual cost of capital (\$47.9) is divided by the annual operating costs--rather than the asset base. Based on cost estimates

from the Fed's accounting Division, operating costs for the priced services are pegged at \$310.7. This results in a PSAF of 15.4%, (i.e.,  $\$47.9 / 310.7$ ).

#### Evaluating the PSAF

"Pre-MCA" the Fed's role was unique among financial service operations. It provided services free of charge. It did not have any need to calculate an asset base measured by the value of priced services, to determine an appropriate rate of return on its capital assets, or to decide whether to value assets at historic or current cost for purposes of pricing. The use of the PSAF brings all these issues to the forefront. There are problems associated with defining the asset base; and a plethora of approaches to setting a return considered adequate and reasonable with respect to the asset base.

Now that the Fed has embarked on a new strategy for pricing its services, including its imputed capital costs, the question remains, just how suitable is the Fed's approach? To evaluate this question, three crucial issues need examination. First, has the Fed imputed the correct capital structure? Second, is it proper to use the pre-tax return on equity of the twelve bank sample as the cost of capital for the priced services? And thirdly, should the

PSAF be a mark-up on operating costs rather than invested capital?

#### The Capital Structure

As noted above, the Fed has constructed a hypothetical debt equity structure for the priced services. From Table 1, it can be seen that the capital structure consists of 55% equity, 24% long term debt, and 21% short term debt. The Fed used the 12 bank sample to derive its capital structure, but it did not simply adopt the actual capital structure of the banks.

Banks finance assets through demand and savings deposits as well as debt and equity. When debt, equity and deposits are taken into account, the share of equity in the asset base of the twelve bank sample is only 2% to 5%.<sup>19</sup>

When the PSAF was first proposed, the Fed wanted to use a much larger share of debt in its hypothetical asset base, due to the small amount of equity in the banks' actual capital structure. This was a controversial issue because the price of equity is based on pre-tax returns to shareholders, and typically runs from two to three times the cost of debt. A small share of equity thus tended to lower the PSAF mark-up.

A better approach for the Fed would be to estimate the debt-equity ratio for the portion of a bank's balance sheet which is related to the sale of correspondence services. Koot and Walker suggest that this "would probably show about 60% debt and 40% equity."<sup>20</sup> To illustrate how a difference of this magnitude would change the PSAF mark-up, the Fed's capital costs are reconstructed using the same debt and equity prices, but with the equity share reduced from 55% to 40%.

TABLE 2: Cost of Capital With 60:40 Debt:Equity Ratio

Asset		Annual cost of capital as a %	Annual Cost of capital
Short term debt			
(Table 1, line 1)	59.5	10.44	\$6.2
Long term debt			
(225.5 - (285).4)	111.5	8.66	\$9.7
Equity			
(285 X .4)	114.0	22.7	\$25.9
	285.0		41.8

Weighted cost of capital =  $41.8 / 285 = 14.67\%$

PSAF =  $41.8 / 310.7 = 13.45\%$

Thus, it can be seen that a reduction in the imputed

equity share from 55% to 40% reduces the PSAF from 15.5% to 13.45%, holding interest rates and return to equity constant.

The banking community successfully lobbied against this proposal, however, and ultimately the Fed adopted a different approach. First, it assumed a matched capital structure. All of the Fed's short term assets were assumed to be financed by short term debt and all the long term debts were assumed to be financed by equity and long term debt. The rationale for this change was that the Fed's imputed capital structure should be related to the actual assets devoted to the provision of the priced services.

As noted, short term assets were assumed to be financed by short term debt. The long term assets, however, were financed by both equity and debt, and the Fed has to decide how much would be hypothetically financed by each item. In the end, the Fed simply took the 12 bank sample, eliminated the entire deposit base, and then used the ratio of long term debt to equity. This was as noted, 30:70. <sup>21</sup>

Thus, the Fed started with the 12 bank sample to determine the proper asset base, <sup>22</sup> then abandoned the sample

to adopt the "matching" capital structure, and finally, returned to the 12 bank sample to determine the proper ratio of long term debt to equity. The result is a system which is neither typical of the actual capital structure of banks, nor truly "matched" to the services provided.

## The Return to Capital

The question of the proper return to capital invested in the provision of the priced services is central. The Fed has simply taken the average debt and equity returns for the twelve bank sample and assumed that this is the cost of capital for the priced services. But, as noted earlier, the twelve bank sample has an unusual capital structure which is highly leveraged with deposits. In addition, a price for debt or equity under one capital structure will not necessarily be appropriate for another one. This is particularly relevant here where the banks in the sample are typically financed by less than 5% equity.

Moreover, the banks in the sample offer a broad range of services which are not being offered by the Fed; individual and business demand and savings deposits, CD's, commercial and consumer loans, housing mortgages, credit cards, money orders and the like. The data from the sample are averaged across different services. If it is more risky to provide some services than others, the return to capital will also vary.

One method of evaluating the proper rate of return is



the Capital Asset Pricing Model (CAPM). CAPM is a theoretical approach to measuring the expected return on a given asset based on the relationship between the variance of returns on a particular investment and the variance of returns to the market as a whole. Simply put, CAPM assumes that investors can reduce risk through diversification. By holding several stocks, the fluctuations of a particular stock is offset by the variance of other stocks. Risk, however, is not completely diversifiable, as the entire market has ups and downs, and the portfolio might thus be subject to fluctuations in the business cycle. CAPM divides risk into two categories: systematic and non-systematic. Systematic risk is the risk associated with the market as a whole, while non-systematic risk is the unique risk associated with a particular business enterprise. Investors are assumed to be rewarded for bearing systematic risk, but not unsystematic risk which can be diversified away. The actual reward or risk premium for a given investment is a function of the degree to which the stock variance is correlated with the market as a whole. The greater the tendency for the investment to move with the market, the greater the non-diversifiable risk. The more independent the variance - the less risky is the investment.

More specifically, CAPM is used to derive a market cost of capital ( $r_m$ ), which is a function of the risk free rate ( $r_f$ ), earned simply by purchasing a U.S. Treasury Bill, the risk premium ( $r_m - r_f$ ), and beta, the degree of fluctuation of a particular portfolio with respect to the market as a whole. The premium represents the extra return the investor obtains by holding some portion of the market portfolio, or in other words, by bearing systematic risk. The lower the beta of the portfolio, the lower will be the premium earned above the risk-free rate.

Investments which tend to be sensitive to the business cycle contain a greater degree of systematic risk, and hence require a greater risk premium. Examples of such industries include the computer industry, real estate, automobiles, or primary metals, all of which are dependent upon the economy as a whole. Industries where risks are entirely random, and are not related at all to the rest of the economy, would in theory, require a risk premium of zero, and a rate of return about the same as the T-Bill rate.

A number of factors will determine how much systematic

risk the Fed's services would face if they were provided in the private sector. For example, just how volatile is the demand for check processing services, and how much are changes in demand correlated with changes in economic activity? What are the characteristics of the technology used to process checks, and what is the relationship between the Fed's fixed and variable costs?

Perhaps more to the point, do the services to be priced by the Fed contain more or less systematic risk than the average systematic risk of the twelve bank sample or the economy in general?<sup>23</sup> For example, is check processing more or less sensitive to the business cycle than credit related services such as consumer and business loans? If it is possible to determine the level of risk inherent in the processing of checks with respect to the general economy, it would be feasible to impute a value for beta which would reflect the fluctuation of check volume over time with general economic activity. If it can be speculated that check processing is a low risk activity, then a low estimate of beta would be appropriate.

To get a first approximation for this question, we

compare the volume of check processing, one of the major services offered by the Fed, to the volume of commercial bank loans, over the seven year period of 1973 to 1979. In table 3, the percentage changes in check processing and commercial bank loans are compared to the percentage changes in the GNP. Both the GNP and the commercial bank loans are expressed in constant dollars.

An initial inspection of Table 3 suggests that the volume of checks processed by the Fed has grown at a steady rate, while both the GNP and the volume of commercial bank loans took a severe dip during the recession of 1974-75. To get a better look at the relationship between the changes in the GNP and check volume and loan volume, a regression model was constructed for both check volume and loan volume, where change in the GNP was the independent variable. The results are shown in Table 4.

The results of the regression are striking. Check processing is a very poor fit, with a GNP coefficient of .6 and an R-squared value of .192. Less than 20% of the variance of changes in the volume of check processing can be explained by changes in the GNP. On the other hand, the volume of commercial bank loans is shown to be much more

TABLE 3

Percent changes in the volume of check processing,  
commercial bank loans, and GNP 1973-1979.

	% real change GNP	% change check volume	% real change commercial loans
1973	5.8	17.6	12.9
1974	-.6	8.0	0.0
1975	-1.1	5.6	-5.5
1976	5.4	7.9	5.0
1977	5.5	8.1	10.3
1978	4.8	6.0	11.2
1979	3.2	7.1	14.09

Sources:

Economic Report of the President, January, 1981.

U.S Government Printing Office, Washington, D.C.

Statistical Abstract of the U.S., 1980. U.S. Department of  
Commerce, Bureau of the Census. p.539

Federal Reserve Bank of Atlanta, "A Quantitative Description  
of the Check Collection System", Volume I, p. 97-99.

TABLE 4

Changes in the volume of check processing and commercial bank loans as a function of changes in the GNP:

1) % change in volume of Fed check processing  
=  $6.6 + .6 (\% \text{ change in GNP})$   
R-Squared = .192

2) % change in volume of commercial bank loans  
=  $.224 + 2.04 (\% \text{ change in GNP})$   
R-Squared = .67

Commercial bank loans and GNP are in constant dollars

Data from the years 1973-79. When the years 1970 to 1972 were added to the check processing model, the GNP coefficient fell to .4 and variance value dropped to .1.

dependent upon changes in the GNP. The GNP coefficient for the commercial loan equation is 2.04, and the r-squared value is .67. About two thirds of the variance in the volume of bank loans is related to changes in the GNP.

Although this is hardly the final word in evaluating the relative systematic risk for the two lines of services, one can speculate that the check processing services are indeed less risky than commercial loans, given the assumptions of the CAPM model. It also appears that less volatility is associated with check processing than the economy in general. There is little correlation between changes in check volume over time and changes in the economy in general. This all implies that the likely range of values for a "fair" rate of return on check services, that the Fed might require, should approach the risk-free rate. It may be that the Fed should monitor the risk-free rate and adjust the PSAF accordingly--that is, with respect to the check processing service line.

In general, it would be a rather simple task for the Fed to undertake a more thorough review of the various services offered by the Fed, to assess the degree of systematic risk they carry, and to compare that to the credit related services offered by commercial banks. If

further analysis supports the hypothesis that the priced services embody less systematic risk than the average services offered by the commercial bank sample, the rate of return should be adjusted downward.

#### Mark-up Pricing

One of the more interesting features of the Fed's pricing policy is the decision to make the PSAF a mark-up of operating costs, rather than invested capital. The Fed has constructed a complicated system for determining its imputed capital structure, and the price of debt and equity. But rather than use this data to explicitly allocate capital costs to the various services, the Fed simply takes the total capital costs for all services and divides this number by the total operating costs for all services. The result, the PSAF, is a number used to gross up average operating costs so that the margin of price over operating costs will cover the Fed's imputed capital costs.

Operating costs are likely to be easier to allocate among services than capital, and this alone probably



explains the PSAF system. But there is precious little else to recommend the method. It is highly unlikely that all the services, or for that matter, any two, have the same ratio of operating to capital costs. This means that some services are being priced too high, while others are priced too low. Moreover, as the new prices induce changes for demand for services, the PSAF rate will have to be revised. If the services which are priced too high are effectively priced out of the market, the total capital costs will have to be allocated among a narrower base of services, and to the degree that disparities in the ratio of operating to capital expenses persist, yet another group of services may be priced out of the market.

We have now considered the allocation of actual and imputed costs to priced services. Next we turn to another aspect of the analysis. Specifically, we ask, even if the Fed did allocate its costs both actual and imputed, just how should it price its services? That is, what economic principles guide the Fed in its overall pricing scheme, and would a change in pricing structure result in welfare efficiency gains for society?

## V The Economics Of Public Pricing

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### Average Cost Pricing and Intertemporal Adjustment

So far we have examined the historical developments leading up to the MCA, the changes the Fed has implemented in its cost accounting system to accommodate the new data needs created by the Act, and the method used to impute private sector capital costs. We have seen that the Congress wants the Fed to phase in a fee for service system that will promote efficiency and to encourage private sector provision of some or all of the services now provided by the Fed. In this section we evaluate the Fed's use of a total average cost pricing strategy to achieve these objectives.

The easiest way to understand the rationale for average cost pricing by the Federal Reserve, is to observe that little or no consideration was given to any alternatives. The record suggests that the Fed was primarily concerned with the fundamental question of whether or not to charge any fees at all, and once a decision was made on that front,

the fact that fees should equal average total costs was taken as given. Indeed, much of the initial debate over the fee setting mechanism concerned the proper definition of total costs.

For example, the PSAF discussed earlier, was created to impute a cost that was incurred by the private sector. A system which ignored the special tax advantages of the Fed tended to result in allocative inefficiencies, as the Fed could underprice its competition unfairly. A number of other total cost issues were also discussed. The Fed wanted to price its services in such a way that it would cover its long-run total costs. That is, the Fed proposed that prices need not cover total costs in the short-run so long as the pricing strategy was designed to cover total costs over some longer and unspecified time frame. The large private sector correspondent banks have opposed this. They argued that such an open ended restriction would allow the Fed to engage in predatory pricing practices as prices would be dropped in the short run in order to eliminate competition, and then raised.

There were however, at least two counter arguments for

allowing the Fed intertemporal flexibility in setting prices. First, it was pointed out that once the Fed introduced fees, the demand for its present services would decline. For example, once fees were introduced, the volume of checks processed by the Fed actually declined by about 20%.<sup>24</sup> This sharp decline in demand left the Fed with excess capacity for check processing. A policy of strict total cost pricing would have required the Fed to increase its check processing fees in order to pay for the idle capacity. This in turn would have led to yet another reduction in demand, and even more idle capacity. Thus, the Fed was faced with the prospect of a vicious spiral of price increases and newly idled capacity, while both average and marginal variable costs remained below the price. Only a policy of pricing to meet the long-run total cost would allow the Fed to undertake an orderly adjustment to the new environment created by its own pricing policies.

The second counter argument concerned new services and new technologies which enjoyed economies of scale over a relevant range of output. The Fed needed the flexibility to set prices below their initial total costs, so that enough

volume could be built up to allow the Fed to realize those lower unit costs, and thus to establish the new service.

The debate over the PSAF and the time-frame for cost recovery was important, but begged the question of whether or not total cost pricing was ever justified in the first place. The Congress was interested in phasing out the Fed's role as a supplier of free services, and introducing more private sector competition. Unless one assumes the Congress was interested in increasing the income of the shareholders of private commercial banks, the policy objective can be interpreted as increased efficiency.

First, overuse of Fed services is discouraged. That is, the fees give a signal to users of the system that some costs are incurred, thus forcing users to economize on their use of the services. Secondly, the fees will create an environment where private sector firms can compete with the Fed. To the degree that private firms can provide the services at a lower cost, society will benefit by the expansion of the private sector role.

Average total cost (ATC) pricing can thus be shown as

an improvement over no prices. A number of other pricing options exist, however, some of which are clearly superior to ATC pricing on efficiency grounds. The most obvious alternative is strict marginal cost (MC) pricing. Since the most efficient allocation of resources occurs when output is expanded to the point where the cost of producing the last unit is just equal to its price, it is widely recognized by economists that a first best pricing strategy sets price equal to marginal cost.

When the long run cost curve for a service is flat, exhibiting constant returns to scale, the long-run marginal cost curve is equal to the long-run ATC curve, and it makes little difference which pricing rule is used. But where the marginal cost of production is either increasing or decreasing, there will be a divergence between the ATC and the MC curve.

Where the supply curve is sloping upward, and experiencing diseconomies of scale, the ATC price will be lower than the MC price. If the supply curve is downward sloping over the relevant range, and enjoying economies of scale, the MC price will be less than the ATC price. Thus,

an ATC pricing rule will lead to prices which are either too high or too low, as judged by efficiency criteria.

An illustration of this point is offered by using a translog production function to derive supply curves for three services offered by the fed: Check Processing, Automatic Clearing House (ACH), and Wire Transfers. Check processing is seen to have diseconomies of scale, and an ATC pricing scheme would tend to underprice the service. The ACH has economies of scale, and an ATC scheme would overprice the service. Finally, wire transfers are roughly a constant cost service, and here ATC would be fine.<sup>25</sup>

### Average Cost Pricing Versus Marginal Cost Pricing

In recent years there has been a renewed interest in the applications of marginal cost pricing to the public sector, and the circumstances when modifications of this simple rule are in order. The most important problem is the case where marginal cost prices do not cover total costs. Here it is necessary to find a subsidy for the service, or to raise prices in excess of marginal costs. Unless one unrealistically assumes that subsidies can be financed by lump sum taxes on persons it is inevitable that society will suffer some welfare losses regardless of the approach taken. The efficiency question then is to minimize the welfare costs.

When the subsidy can come from any source, including tax revenues, a number of financing strategies can be proposed, most of which also raise equity questions, as money is taken from others to subsidize the users of bank services. The common and relevant response is to impose a constraint upon the service provider, such that total revenues must equal total costs. The average cost pricing approach would, of course, meet this test.



There are also other ways of meeting the revenue constraint, while setting prices in ways to minimize welfare losses. One such approach, Ramsey Pricing, requires that prices diverge from marginal costs in inverse proportion to the elasticity of demand for the service.<sup>26</sup>

Ramsey Pricing or Inverse Elasticity Pricing, not only provides a systematic framework for setting Fed prices that minimizes welfare losses, but it also provides a number of insights into how different pricing strategies will affect the total revenue and service and the absolute prices charged. For example, where the Fed provides two services which share joint overhead fixed costs, in some circumstances it could lower prices for both services by scrapping the present pricing system, and allocate those overhead costs among the two services in inverse proportion to the demand elasticities. This is simply because a service which has a highly elastic demand might provide greater total contribution to the overhead costs if its price was lower than would be the case if the overhead was allocated on the basis of sales as is presently done.

An example of this principle can be found in the

current pricing practices of the commercial banks. According to one source, "even casual conversations with correspondent bankers make it clear that these effects of own and cost-price elasticities of demand are implicitly considered at large, aggressive, money center correspondent banks in determining a marketing strategy for correspondent services." Where demand is inelastic, prices are set higher. Where demand is highly elastic, banks are acutely aware of the penalty of raising prices too high. Thus, even in a world where "it is doubtful (explicitly formulas) are used to determine ...prices" managers intuitively sense the advantages of demand sensitive pricing.

Ramsey Pricing is an important alternative to both the Fed's current average cost pricing policy, and strict marginal cost pricing. Under the Ramsey pricing option, the Fed would begin with marginal costs, and then allocate any overall revenue shortfall among services in inverse proportion to demand elasticities. The Fed would still be able to meet the mandate for total cost recovery, while pricing each service at no less than its marginal cost, and thus discouraging excess use of service lines which have

diseconomies of scale. Revenue shortfalls, if any, which resulted from the marginal cost prices, would be allocated among services in a such a way as to minimize welfare losses. That such a pricing strategy was not even considered during the recent rulemaking suggests that we are only beginning our journey toward a more rational and efficient pricing strategy for the Fed.

## VI Conclusion

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We have observed the implementation of the Congressional mandate that the Federal Reserve System set explicit fees for its services. Three key aspects were identified. The first was that the Fed relied on data from the Planning and Control System (PACS) to allocate its own costs of service operations to priced services. Because the PACS represents a management and budgeting system designed for the Fed's management objectives prior to the inception of the MCA, it was not readily equipped to properly cost out priced services. It is recommended therefore, that the Fed re-examine the way it categorizes costs. It would make sense that the Fed define some of the priced services as activities. More importantly, the Fed must begin to unbundle its costs in order to provide information necessary to identify the capital to operating ratios for discrete services. This would mean that the Fed adopt a standard cost approach to its accounting system, which could be oriented towards the objective of breaking out fixed and variable costs across service lines. The need to unbundle costs in this way becomes obvious when a system must

simultaneously apply a fair rate of return to each of the services being priced.

This brings us to the second element of the Fed's pricing scheme; the mark-up of its service fees by a factor measuring the costs of taxes and financing that it would incur if it were a private sector firm. Although this mark-up, called the private sector adjustment factor, makes sense conceptually, the entire approach to deriving it was fundamentally wrong. This resulted in an inaccurate and therefore inefficient distribution of the costs of providing particular services. It was determined that the PSAF was an incorrect proxy for the Fed's cost of capital.

The capital structure from which the PSAF derives is neither the Fed's capital structure, or the capital structure of a sample of banks assumed to represent the service mix of the Fed's operation. Rather, through the Fed's effort to create a capital structure it became mired in its attempt to match sources and uses of funds. The cost of funds the Fed used was based on an assumption about the debt to equity ratio of the twelve bank sample. Then the Fed applied this cost to its own operating rather than

capital costs. The rate of return that the Fed came up with was then applied equally to all service lines regardless of differentials in the capital-to-operating-cost ratios of these services. As an alternative it is recommended that the Fed consider some of the applications of the Capital Asset Pricing Model to determine a fair rate of return on its invested capital. The CAPM approach would permit the Fed to distinguish between the levels of risk and return unique to the provision of the discrete services, rather than continuing its current practice of overcharging for some services and undercharging for others - ignoring different levels of risk between services.

Finally, we reviewed the uncritical acceptance by the Fed of an average cost pricing scheme. We considered the well accepted notion of marginal cost pricing, and then considered a departure from marginal cost pricing called Ramsey pricing, which may be an even better second best solution for the Fed to try. If the Fed adhered to Ramsey pricing, it could distribute costs that would diverge from the marginal costs of services in inverse proportion to the respective elasticities of demand. The services that the Fed, and banks in general offer, have varying levels of

demand elasticities. With the revenue constraint, imposed by Congress, that total costs equal total revenue, the most efficient way to allocate costs, justify cross-subsidies, and minimize welfare losses, may be to vary prices the most from marginal cost where service demand is less elastic and vary prices the least from marginal cost where service demand is more elastic .

We have come down hard on the Fed's ways of implementing its pricing policy. But although the Fed has erred, two considerations deserve mention. First, the Fed was responding to a Congressional mandate that not only required full cost recovery, and asked that the Fed match revenues and expenses, but also imposed an extremely stringent time-frame within which the Fed had to meet these requirements. This did not allow the Fed the time to make certain adjustments in its operations that may have earlier reconciled some of the pitfalls we have uncovered.

Second, the MCA has fostered change and innovation in the way that the Fed approaches its service operations, both internally and with respect to the entire banking community. The Fed is asking more questions about efficient ways to

price services, ways to unbundle its costs, and about the very role it should play so as to enhance the efficiency of the national payments service system and better serve the public interest. Moreover, the MCA has led the banking community in general to confront these issues more aggressively than they have in the past. So, what on the one hand can be viewed justifiably as an outcome somewhat lacking in efficiency, can on the other hand be considered as a major step forward. Change is an incremental process, including making and undoing mistakes. The stage has surely been set for an improved payments mechanism. We eagerly await the development of the next round of pricing reform debates.



Glossary  
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Availability:

The amount of time it takes for the Fed to credit the account of the depository institution which is collecting money on the checks it sent to the Fed for processing.

Automated Clearing House (ACH):

The national electronic payment services including direct deposits and pre-authorized transfers among customers' demand deposit accounts to all regions of the United States. There are 36 AHC facilities.

Adjustment Activity:

This is one of the cost categories for check processing which is included in the Fed's Planning and Control System (PACS). Adjustments are required any time there is an error in the crediting of accounts during the check collection process. There are controlled adjustments which result from misrouting or error by the Fed and there are uncontrolled adjustments which result from processing errors made by other financial institutions.

Adjustments, Net:

This is a balance sheet account of the Federal Reserve System and was included as one of the asset accounts comprising the asset base used in the derivation of the Private Sector Adjustment Factor.

Bank of First Deposit:

This is the bank which has accepted deposits from its customers either drawn on itself (on-us) or on other banks. All checks drawn on other banks (on other) are channeled through the check collection system, eventually, to the payor bank.

Cash Letter:

A bundle of checks wrapped in a letter stating the face value of all the items enclosed. Cash letters are typically differentiated by the types of checks inside (checks drawn on local banks only). These cash letters are commonly referred to as deposit types. It is the deposit types that are subject to fees under the MCA mandate of Fed pricing.

**Collecting Institution:**

Also referred to as the depositing institution, this bank is seeking payment of the checks it has on deposit. This bank may also be the bank of first deposit, acting as the entry point for checks into the collection system.

**Commercial Bank:**

This term will be used to refer to a state or federally chartered bank and would include a bank of first deposit, depositing institution, payor bank, payee bank, and correspondent bank.

**Correspondent:**

This term refers to a particular functional relationship between two banks - one which provided the check services to the other (respondent) bank. The correspondent is typically a larger bank within a metropolitan area. The trend towards regional correspondents means that financial institutions are merging in order to provide a wider range of services to a larger geographic area.

**Credit:**

This term will refer to the Fed's crediting of an account. The account is increased by the amount of the borrowed funds.

**Debit:**

This term will refer to the Fed's debiting an account. The account is decreased by the appropriate amount.

**Depositing Institution:**

The bank which brings its business to the Fed. In the context of this paper, a depositing institution will always refer to the bank which is purchasing the check collection services from the Fed.

**Deposit Types:**

Also referred to as cash letters. These are the categories of the services which are subject to fees under the MCA mandate of Fed pricing. The specific deposit types are City, Country, Mixed, Non-Machinable, Package Sort, Group Sort.

**Deferred Availability:**

When availability is not "immediate"(same-day) it is referred to as "deferred". Usually this means a delay of

1.5 days.

**Deferred Credit:**

This is a balance sheet account which represents the face value of the checks that are in process of collection and have been granted availability within an agreed upon time. This account is not part of the Float.

**Depositing Institution:**

This is the institution that is depositing the check for collection. This check is drawn on the payor bank (Drawee banks).

**Difference Account:**

This is a balance sheet account which refers to the uncollectable/ unpayable amounts because of an out-of-balance situation arising primarily from:

- 1) Mistakes made by the commercial bank in reporting the exact amount of the checks deposited for collection.
- 2) Any difference reported during the shipment between federal reserve banks.
- 3) Internal settlement operations including balancing paid savings bonds, cafeteria receipts, and postmaster's deposits.

**Drawee Bank:**

The entity responsible for payment of the amount designated on the check.

**Drawer Bank:**

The entity presenting the check.

**Electronic Fund Transfer (EFT)**

A communications network which facilitates the electronic flow of funds; this flow may be via wire transfers, ACH, or Automated Teller Machines.

**End-Point**

Refers to an individual bank. Usually this is the bank which will be responsible for payment of the check which the depositing institution submitted to the Fed for processing.

**End-Point Sorting**

This aspect of check processing refers to the task performed by a high speed reader sorter which sorts all the checks "down" to payor banks. A Fed facility will end-point sort

certain types of deposits. The Fed will not end-point sort checks for payor banks in other Fed districts; In this case the local Fed will send checks to the second Fed for end-point sorting.

**Equivalent items:**

Equivalent items represent the number of items processed during their first time through a reader-sorter plus .25 times the number of items that must be processed a second or more times through a reader-sorter. Ordinarily items in various deposit types must be processed more than once because they could not be sorted to their final destination on their first run (first run through the machine). This situation usually arises because the number of destinations in the deposit types exceed the number of sorting pockets in a reader/sorter. Consequently, high volume destinations are sorted on the first run through a machine, and several pockets, which were used to collect lower volume destinations, are run again and sorted to final destination.

Equivalent items are used to allocate processing expenses among deposit types. Its calculation incorporates the processing characteristics of how many extra times an item is processed on a reader-sorter times 24%. The reason a factor of 100% was not used is because check processing is not all machine related and this method of cost allocation more accurately reflects the resources used in check processing. For example, non-machine activities include receiving checks from couriers, manually segregating cash letters into deposit types, pre-reader/sorter preparation, pre-settlement preparation, actual settlement, check wrapping, and presentation to courier or local clearing house. Since non-machine activities are done only once for a check, Fed officials believe it inappropriate to use the absolute number of items processed when checks must be run through a machine two or more times when allocating costs across deposit types. The 25% factor, therefore, gives weight to the non-machine activities in allocating expenses.

**Fed Facility:**

Any Federal Reserve Bank site which provides check processing services.

**Fed, FR Bank, FR Facility, FRB.**

All these abbreviations are used interchangeably to refer to a Federal Reserve Bank. The term Federal Reserve would include all banks in the Federal Reserve System. Reference will be made to a Fed facility in the context of the check processing service only.

**Float:**

In the most narrow sense, the Fed float refers to the dollar value of all items which have been credited to the appropriate account based upon the agreed upon availability schedule, but which are not actually received by the Fed from the payor bank by the time availability has been granted. The value of the Fed float can be calculated from two balance sheet accounts by subtracting the deferred availability account from the Items in the Process of Collection account.

Under the MCA the Fed is required to either price or eliminate the Float. It has chosen the latter course. The Fed categorizes float according to positive and negative float. It is seeking to eliminate negative float. Negative float or debit float occurs when the Fed can not collect funds on the same day on which credit was passed; the Fed is owed money. Positive float is created when the Fed collects funds sooner than the funds have been granted to the deposit bank.

**Handling:**

Any operation required in the processing of the checks. This term is used interchangeably with "processing".

**Immediate Availability:**

Also referred to as same day availability. When credit is granted on the same day as the item is deposited with the Fed facility.

**Item-Pass Ratio:**

A ratio of the number of extra times a check must pass through a high-speed reader-sorter relative to the fixed number of individual items received by the Fed facility.

**Items:**

Refers to an individual check.

**Local Clearing House:**

A clearing house which is located in an area which includes the paying and collecting banks. Checks drawn on the respective institutions are exchanged daily at the clearing house.

**National / Nations Payments Mechanism:**

Refers to the network/system of institutions/individuals facilitating essentially all types of payment system transactions (flow of funds) between and among institutions and individuals.

**Non-Par Banking Practices:**

Non-par banking occurs when a percentage deduction is taken from the face value of the checks prior to the delivery of the funds.

**NOW:**

A NOW Draft Account or Negotiable Order Withdrawal is a demand deposit account which earns interest.

**On-Others:**

Checks drawn on a bank other than the one processing the checks.

**On-Us:**

Checks drawn on the bank which also does the processing of the check.

**Payee bank:**

The entity which is owed the face value of the check.

**Payor Bank:**

The bank responsible for making the payment. Same as the drawee. This is the institution which has the funds upon which its customers have drawn the checks. Once the check is presented by the depositing bank, or its agent (i.e., the Fed), the check must be paid by the payor bank.

**Presentment:**

The process of a depositing bank or its agent presenting a check to the payor bank for payment.

**Return:**

Refers to the expenses in the handling of checks which are returned unpaid. These items may have been processed by an RCPC branch or Fed office.

**Settlement:**

Refers to any activity related to the balancing of work coming in and going out of the Fed.

Exhibit I: Check Deposit Types and Characteristics

Deposit Type	Characteristics
City:	<p>Location &amp; Transportation: Payor banks located within Fed city. No transportation since checks are picked up at clearing house.</p> <p>Processing Characteristics: Low machine use since often the number of city banks is similar to the number of pockets (24) in a machine. Many points can be end-point sorted on a first pass.</p> <p>Availability: Immediate since checks can be presented soon after processing.</p> <p>Price: Price is relatively low reflecting low machine use and no transportation costs.</p>
RCPC:	<p>Location &amp; Transportation: Payor banks located in RCPC zone, beyond perimeter of city area. Distance therefore requires that transportation be used to present checks.</p> <p>Processing Characteristics: More machine use because there are usually a greater number of end points relative to pockets on a machine (24), thereby requiring many checks to go through a machine before being end-point sorted.</p> <p>Availability: Immediate, distance is not that great to prevent presentation of the checks on the same day as received by the Fed.</p> <p>Price: Price is moderate reflecting higher machine use and transportation costs.</p>
Country:	<p>Location &amp; Transportation: Payor banks located beyond perimeter of city and RCPC areas. Distance, therefore, requires transportation for presentment.</p> <p>Processing Characteristics: Same as for RCPC.</p> <p>Availability: Next day. Distance prevents presentation of checks the same day as received by the Fed.</p>
Other Fed:	<p>Location &amp; Transportation: Payor bank located in another Fed district, therefore requiring extensive transportation to send checks to receiving Fed district office.</p>

Processing Characteristics: Machine use is moderate since there can be as many as 49 points to sort down to (i.e. Various Fed offices located throughout the U.s.) Also, processing is required to end point sort at receiving Fed.

Availability: Next day. Distance prevents presentation of checks the same day as received by the Fed.

Price: Price is high reflecting processing costs at big Fed offices and transportation between initial receiving Fed and second Fed that makes presentation.

Mixed:

Location & Transportation: Location and transportation vary because this deposit type is comprised of city, RCPC, country, and other Fed checks.

Processing Characteristics: Machine use is high since cash letter must first be sorted down to deposit type before they are end point sorted to payor bank.

Availability: Typically next day after deposit.

Price: Reflects the high machine use and also possible extensive transportation to present checks.

Non-machinable:

Location & Transportation: These characteristics vary because payor banks are in city, RCPC, country or other Fed areas.

Processing Characteristics: Very labor intensive since most items must be hand fed into low speed proof machines.

Availability: Next day or two days. Labor intensive aspect prevents quick processing. Two day applies to country and other Fed endpoints.

Price: Is highest of all prices due to labor intensive characteristics.

Package Sort:

Location & Transportation: Payor bank located in city, country, RCPC, and other Fed areas. Transportation, therefore, also varies according to location.

Processing Characteristics: No Fed processing



since depositing bank as endpoint sorted checks to payor banks. Also, later deposit deadline because of pre-processing.

Availability: Credit passed according to same availability schedule for city, RCPC, country, and other Fed schedules listed above.

Price: Lowest price, which reflects non-machine processing by Fed.

Group Sort: Location & Transportation: Payor banks located in city, RCPC, country, and other Fed areas. Transportation, therefore, varies according to location.

Processing Characteristics: Limited Fed processing since depositing bank has sorted checks down to banks represented in the designated group. Also, later deposit deadline because of pre-processing.

Availability: Credit passed according to availability schedule for city, country, RCPC, and other Fed schedules listed above.

Price: A little higher than package sort, since items were sorted to a number of institutions rather than one end-point. However, lower to reflect some pre-processing.

APPENDIX 1

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The Pricing Worksheet: How data from the Planning and Control System is used to derive unit fees.

The pricing of commercial check processing services involves the establishment of explicit fees for different deposit types on a per item basis. These deposit types are fully explained in Exhibit 1. They include city items, RCPC's, country items, mixed cash letters, other Fed, and package sort.

Basic Steps Involved in Calculating Unit Prices

All data are based on PACS budgeted/projected 1981 expenses and volume counts.

Step I: Aggregating total expenses to be allocated to priced services.

A) The total expenses are recorded for the commercial check processing service line which includes direct, support, and overhead expenses for all activities; processing and fine sort/ adjustments/ returns.

B) Subtracting Out of Shipping Related Expenses

- 1) Expenses for shipments between Fed offices in the same district and between Fed offices in different districts are subtracted out from total expenses calculated in Step 1, A. These expenses are added back after the PSAF has been applied to the subtotal of costs/ expenses per deposit type. Since shipping services are contracted out to a private service provider, the tax and financing costs are assumed to already be reflected in the shipping charges to the Fed. It would therefore be double counting to include the shipping costs for each deposit type, and, at the same time, apply the PSAF to these costs.
- 2) The reimbursement expenses which had been granted to depository institutions (pre-MCA) for making use of direct sends, are also subtracted out. These expenses will not be added back, because they are not incurred in the pricing environment.
- 3) In-house mail expenses are subtracted out. These expenses relate to the cost of handling consolidated

shipments only. Because these costs vary across districts it is suggested that each Fed Office estimate the in-house mail expenses which would include overhead, equipment, personnel, etc.

Step II: Step Down Allocation of Commercial Check

Processing Service Line Expenses to the Activity Level.

The expense figure for the commercial check processing service line less shipping determined in Step I represents the total expenses which will be allocated to each check activity and ultimately to each deposit type.

A) All direct, support, and District Project expenses are first allocated to each check activity. Processing and fine sort are combined for the purposes of the pricing exercise. The other activities are returns and adjustments.

Step III: Estimate of Check Volume/Number of Items Processed

A) A total volume amount is determined. This includes

all items processed by a Federal Reserve Office, either shipped to another office in the same district, or to an office outside the district which includes the payor bank. 1) In order to estimate the number of items received by consolidated shipment it is suggested that the Fed assume that there are 352 items per pound.

B) The total volume of items processed is recorded. This is an estimate of the next year's volume. Then, based on the current year's actual volume, a percent break-out by deposit type is calculated. This is applied to the projected volume total in order to arrive at the projected number of items by deposit type. (Defined as number of items processed.)

C) A total for the number of equivalent items is also determined. This is equal to the total number of items actually processed, plus a percentage mark-up which accounts for the additional amount of times an item must be resorted in order to separate out all items by individual account.

D) The total number of equivalent items is allocated to deposit types according to the same ratio used in Step II, B.

Step IV: Allocation of Activity Expenses to Deposit Types/Priced Services

- A) The totals for returns and adjustments activity recorded in Step II,A are allocated across all deposit types based on the volume ratio of the number of items in each deposit type to the total projected number of items processed. The equivalent item ratio is not used here because the amount of adjustment and return activity is proportional to the number of individual checks received for processing.
- B) For the allocation of check processing and fine sort expenses, all expenses for activities are first allocated only to the non-machinable and package sort deposit types. This allocation is based on actual "internal records", for each Fed Office. i.e. number hours/personnel costs, etc. In this way, the actual resources required for processing this deposit type are more accurately reflected in the cost allocation. Non-machinables are the most expensive of all processing activities.
- C) The expenses which remain after the subtraction of expenses associated with non-machinable and package sort, are then allocated to the group sort deposit

type. This allocation is based on the volume ratio of equivalent items for group sort to the total equivalent items.

D) All remaining expenses after subtracting out expenses associated with non-machinable, package sort, and group sort, are then allocated according to the volume ratio of the equivalent number of items per deposit type to the total number of equivalent items.

#### Step V: Allocation of Overhead Expense

A) The total overhead expense for the commercial check processing line is allocated to each deposit type according to an expense ratio. This ratio is based on the total expense for each activity less shipping by deposit type to the total expense for all activities. (i.e. The subtotal of expenses which has been calculated for each deposit type based on the particular volume ratio and expenses segregated by activity, is the numerator. The denominator is the summation of expenses for all activities in the commercial check processing service line.

#### Step VI: Application of the Private Sector Adjustment Factor

A) The subtotal of the total expenses is calculated for

each deposit type. These expenses include direct and support costs, for processing, fine-sort, adjustments, and returns, and the adjustment for overhead which were all determined in Steps I-VI.

B) This subtotal is then increased by the PSAF.

#### Step VII: Adding Back Shipping Costs

A) The total shipping costs determined in Step I are allocated across each deposit type according to the appropriate volume ratio. Shipping expenses are not allocated to the city deposit type. These items do not require shipment. Shipping expenses for country, RCPC, mixed, non-machinable, package and group sort are allocated according to a volume ratio of the number of items per deposit type to the total number of items processed.

#### Step VIII: Calculation of Per Unit Cost

A) The total expenses for each deposit type, inclusive of the PSAF, plus shipping costs, are divided by the number of individual items processed per deposit type.



FOOTNOTES:  
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- 1) Federal Reserve Press Release, Board of Governors of the Federal System. (Washington, D.C) December 31, 1980.
- 2) Statement of G. William Miller, Chairman, Board of Governors, Federal Reserve Board, U.S. Congress, Senate Committee on Banking, Housing and Urban Affairs, Hearings on S.3304, "The Federal Reserve Requirements Act of 1978", 95th Congress, 2nd Session, August 14, 1978 (Washington, D.C., U.S. Government Printing Office, 1978) p.7-9
- 3) Ibid. p. 27
- 4) Peter Merrill Associates, Inc., "The Federal Reserve Membership Problem, Impact on Banks", Boston, 1979. p. 13
- 5) Ibid. p. 15
- 6) "Economic Report of the President", January, 1981. U.S. Government Printing Office. Washington, D.C.
- 7) Interviews: Mr. Robert McPherson, Public Relations, Federal Reserve Bank of Boston, March 15, 1982.  
Mr. Bruce Craig, Assistant Vice President, Marketing Division, Federal Reserve Bank of Boston, February, 1982.
- 8) "The Federal Reserve System, Purposes and Functions." Washington, D.C., 1974.
- 9) Koot, Ronald S. and Walker, David H.; "The Mark-up in pricing of Federal Reserve Services". Issues in Bank Regulation, Published by the Bank Administration Institute. Summer, 1980.
- 10) Eisenmenger, Robert W., Murrell, Alicia and Weiss, Steven. "Pricing and the Role of the Federal Reserve in an Electronic Funds Transfer System," Conference Series # 13. Federal Reserve Bank.
- 11) Conference Speech Given by Mr. Robert W. Eisenmenger, Director of Research and Senior Vice President, Federal Reserve Bank of Boston. "Pricing of Federal Reserve Bank Services,"

- 12) Koot, Ronald S. and Walker, David H.; "The Mark-up in Pricing of Federal Reserve Services", Issues in Bank Regulation. Published by the Bank Administration Institute. Summer, 1980.
- 13) Public Law, 96-221, March 31, 1980. Sec. 102.
- 14) Although the nature of overhead allocation schemes precludes a direct and exact distribution of costs, certain of the overhead allocation by the PACS results in a disproportionate amount of costs being allocated to the commercial check processing line. To the extent that this is true, the allocation of overhead expenses from the service line level to the priced deposit items will reflect this misallocation. For example, telephone and telegraph overhead expenses are distributed across all output service lines under the dollar ratio basis. This allocation scheme computes a percentage ratio for each output service line which is based on the expense per output service (commercial check processing) divided by the total expenses for all output services (cash, wire, ACH, etc.). This ratio is then used to allocate overhead costs to each individual output service. Because the commercial check processing service line includes approximately 40% of the total expenses for all services, usage of the dollar ratio method forces the check service line to bear the majority of overhead expenses. However, wire transfer service uses a greater percentage of the telephone and telegraph expenses. It would make sense, therefore, to allocate more of the telephone and telegraph overhead expense to wire transfer services. (A time motion study could be conducted to determine the proportion of this expense used by activity.) A similar situation exists with regard to protection overhead. The Fed has recognized that most of this expense is associated with guarding the money stored at the Fed. The check processing activity requires far less protection service and should not bear a disproportionate cost of protection overhead.
- 15) Through time motion studies a standard cost allocation system could be developed. Costs regularly associated with a particular deposit type could be identified with the same deposit type. Such a system would essentially rely on: A) Internal information (number of personnel,

- labor costs, machine usage), B) Surveys conducted to identify the unique costs of a given deposit type and, C) Surveys conducted to identify the variability of one cost (i.e. personnel) with respect to all deposit types: This would provide information on how labor intensive are deposit types. Because costs are fixed only within a relevant time period, it will be necessary to resurvey particular activities on a continued basis.
- 16) Federal Reserve Press Release, Board of Governors of the Federal Reserve System. (Washington, D.C.) December 31, 1980.
  - 17) Federal Reserve System Docket No. R-0324, Fee Schedules and Pricing Principles.
  - 18) Office Correspondence, The 1982 Private Sector Adjustment Factor, December 21, 1981.
  - 19) Statistical Abstract of the U.S., 1979. U.S. Department of Commerce, Bureau of Census.
  - 20) Koot, Ronald S. and Walker, David H.; "The Mark-up in Pricing of Federal Reserve Services", Issues in Bank Regulation, Published by Bank Administration Institute, Summer, 1980.
  - 21) Appendix I, Federal Reserve Docket No. R-0324
  - 22) Ibid.
  - 23) The CAPM typically looks at the risk associated with a given portfolio with respect to the market return as measured by the Standard and Poors 500 composite index. This index is based on expected returns, not actual returns. In order to use a comparable base to compare the volatility of check volume to the economy, a contemporaneous measure of the economy should be used. Rather than derive a lagged measure for the S. & P. index, percent change in real GNP was chosen as an approximate measure of fluctuation in the economy.
  - 24) Humphrey, David B.; "Cost scale economies, competition and Product mix in the U.S. Payments System." 1977, Financial Studies Section, Division of Research and Statistics, Board of Governors, Federal Reserve System, Washington. D.C.

- 25) Ibid.
- 26) Baumol, William J., and Bradford, David F., "Optimal Departures from Marginal Cost Pricing", Volume 60, December, 1970. pp. 265-283.
- 27) One overall objection to Ramsey Pricing is that it results in uncompensated transfers of costs to the users of services with the more inelastic demand. However, this criticism is somewhat misguided when considering the application of Ramsey Pricing to the pricing of Fed services. A Ramsey allocation scheme can in fact improve the allocation of costs with respect to all parties by leading to a reduction in prices. As a result of initial price discrimination, given the condition of declining marginal costs or constant costs, demand may increase for services priced closer to marginal cost, and therefore induce lower unit costs and hence, prices. Moreover, bank services are typically viewed as packages of services sold to a particular customer. As such, the policy of cross-subsidization resulting from Ramsey Pricing need not necessarily create direct subsidies to only certain users, and in turn greater burden for others. Rather, Ramsey pricing may permit cross-subsidies between services, that are offset with respect to the total cost/price of these services.

BIBLIOGRAPHY  
-----

Books, Published Reports, and Pamphlets:

- Brealey, Richard and Meyers, Stewart. Principles of Corporate Finance, McGraw-Hill Book Company, 1981
- Economic Report of the President; January 1981. U.S. Government Printing Office, Washington, D.C.
- Federal Reserve Bank of Atlanta. "A Quantitative Description of the Check Collection System", Volume I, Co-sponsored by the American Bankers Association, Bank Administration Institute; Federal Reserve System.
- Federal Reserve Bank of New York, Paul Meek, "Open Market Operations", 1978.
- Statistical Abstract of the United States, 1980, U.S. Department of Commerce, Bureau of the Census. p.539
- U.S. Department of Housing and Urban Development, The Supply of Mortgage Credit, 1970-1979
- Kahn, Alfred E., The Economics of Regulation: Principles and Institutions.
- Lipsey, R.G., and Lancaster, Kelvin, "The General Theory of Second Best", Review of Economic Studies (1956) XXIV:11-32
- Musgrave, Richard A., and Musgrave, Peggy B., Public Finance in Theory and Practice, McGraw-Hill Book Company, 1980.
- Nelson, James R.; "Marginal Cost Pricing In Practice", Prentice Hall, Inc., Englewood Cliffs, N.J., 1964.
- Peter Merrill Associates, Inc., The Federal Reserve Membership Problem, Impact on Banks, Boston, 1979.
- Scott, John Troy; "Price and Non-price Competition in Banking Markets", Federal Reserve Bank of Boston, Research Report 62.

Periodicals

- Anthony, Robert N., "Recognizing the Cost of Equity", Harvard Business Review, January-February 1982, pp. 91-94
- Baumol, William J., "Optimal Departures From Marginal Cost Pricing", American Economic Review. Volume 60, December, 1970. pp. 265-283.
- Bankier, Gordon B., and Rademacher, Hollis W.; "Evaluating How to Deal With the Fed's New Role", ABA
- Burger, Albert E., "Does the Federal Reserve Invest Member Bank Reserves?", Federal Reserve Bank Review, St Louis, July 1978.
- Cocheo, Syeve, "What DIDC Decided and How?" ABA, April, 1981.
- Furboton, Eirik and Pejovich, Svetozar; "Property Rights and Economic Theory: A Survey of Recent Literature. Journal of Economic Literature. December 1972, Volume X, No. 4, pp. 1137-1162.
- Kinzer, Donald; "Economic Consequences of Deregulation of Interest Rates", American Banking Magazine, October, pp.149-151
- Mathur, Ike and Loy, David; "The Pricing and Quality of Commercial Bank Services", The Bankers Magazine, July-August 1981. pp.32-38.
- Sullivan, Michael P., "Bank Marketing Strategy, Past, Present and Future" The Bankers Magazine, July-August 1982, pp.28-32.
- Wallace, Donald A.; "Joint and Overhead Cost and Railway Policy" Quarterly Journal of Economics (August, 1934) XLVIII: 583-619.
- Wentworth, Howard B.; "The Monetary Control Act and Account Analysis", The Magazine of Bank Administration, January 1982. pp.24-29.

Speeches:

Eisenmenger, Robert W., Director of Research and Senior Vice President, Federal Reserve Bank of Boston. "Pricing of Federal Reserve Bank Services"

Correspondence:

The 1982 Private Sector Adjustment Factor, December 21, 1981.

Statutes:

Public Law (1980) 96-221

Government Documents:

Report to the Ad Hoc Task Force on Access to Federal Reserve Services. Washington, D.C.: Board of Governors of the Federal Reserve System, January, 1976.

Unpublished Reports:

Humphrey, David B., Brundy, James M., and Kwast, Myron C.; "Check Processing at Federal Reserve Offices", Financial Studies Section. Division of Research and Statistics.

Verified Statement of Alfred E. Kahn on behalf of the National Coal Association. Ex parte #34. Interstate Commerce Commission. Sept. 16, 1981.

Interviews conducted at the Federal Reserve Bank of Boston, during the months of February through April, 1982.

Mr. Bruce Crais; Assistant Vice President, Marketing Division.

Mr. Ronald Currie; Vice President, Accounting and Control Division.

Mr. Robert Eisenmenger; Director of Research and Senior Vice President.

Ms. Jane Gebeaux; Assistant Vice President, Accounting and Control Division.

Ms. Kathrine Gibson; Economist, Research Division.

Mr. Robert Listfield, Vice President, Marketing Division.

Mr. Robert McPherson; Public Relations.

Mr. Edward Smith; Operations Analyst, Payments Mechanism Support.