The Right Way to Price Federal Reserve Services

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Electronic funds transfer systems may be making payroll depositing and bill paying easier for you, but they're raising difficult policy questions for the Federal Reserve System. The Fed now runs most of the nation's automated clearinghouses, which let banks exchange funds via electronic impulses on magnetic tape ("electrons") instead of cumbersome paper checks. Should the Fed continue to run these new facilities as it does traditional check clearinghouses—mainly for member banks and free of charge? Or should other financial firms be allowed to use them too? If so, which firms? And should they have to pay to use them? How much?

The Fed proposed some general answers to these questions last year: broaden indirect access to clearinghouses somewhat, charge prices which encourage use of electronic clearing, and give Federal Reserve member banks a discount in return for the reserve funds they must keep. In making these proposals the Fed solicited comments from the financial community, but the U.S. Department of Justice responded with some very definite answers of its own.

All financial firms should have equal access to clearing facilities, it said, and they should face equal prices for equal services, without regard to irrelevant factors like Federal Reserve membership. The Fed definitely should charge for its clearing services and enough to cover all operating costs; that is, the Fed should run its clearinghouses like private businesses. In fact, the Justice Department said, the best thing the Fed could do for the clearing industry would be to get out of it and let private businesses take over.

At the core of the Justice Department's argument is the principle which should guide not only the Fed's access and pricing policies but also its decisions to offer any good or service at all: economic efficiency. In most situations, competition working in the private marketplace does a reasonably good job of allocating resources for the economy as efficiency prescribes—producing goods and services at lowest cost and in the amounts society wants. So if the Fed wants to achieve efficiency generally, it can only justify getting involved in an industry by showing that competition among private firms cannot operate properly and the Fed can help. When the Fed decides on these grounds that it must actually provide a good or service such as clearing, then its proper access and pricing policies are whatever is needed to achieve economic efficiency in that particular situation.

Efficiency should be the Fed's objective*

Few would argue with the suggestion that the Fed, as a public body, should ultimately try to achieve the greatest level of well-being for society as a whole. In economic terms, the Fed should try to maximize social welfare.

This concept, when used in an economic

*Some believe the Fed must also consider the effects of its access and pricing policies on membership in the Federal Reserve System. But encouraging membership shouldn't overrule the primary goal of efficient pricing. Membership could be maintained through other means, for example, paying banks interest on their reserves.

context, can be separated into two components: the efficiency of producing and distributing goods and services and the distribution of income. Since the Fed has only indirect influence on income distribution, it should leave that to government tax and transfer policies. And in matters where the Fed has authority or direct interest, it should concentrate on achieving economic efficiency.

"Economic efficiency" itself has two main aspects: technological efficiency and allocative efficiency. An outcome of a production or distribution process is technologically efficient if the quantity available of any particular good or service cannot be increased without decreasing the quantity available of at least one other good or service. An outcome is allocatively efficient if either the composition of total output by product or the distribution of goods among individuals cannot be changed without making at least one individual worse off. In a competitive economy, technological efficiency requires that given levels of goods and services be produced at least cost; allocative efficiency requires they be produced in the right proportions. This means for each good and service the cost of producing the last unit (marginal cost) must just equal what society is willing to pay for it.

In summary, then, the Fed should pursue the objective of economic efficiency in order to best serve society. This means the Fed should strive to ensure that the economy's goods and services are being produced in the cheapest possible way and in the right proportions.

Usually, leave the market alone

For most goods and services the Fed need do nothing at all to reach its objective; just leave the market alone. For one of the most significant results in theoretical economics is that perfect competition operating under a wide variety of conditions leads to economic efficiency. Each firm is motivated to achieve technological efficiency in order to maximize its own profits; industries move to technological efficiency as more efficient firms drive out less efficient ones. The price system operating in the competitive economy responds to people's tastes and costs of production and leads to allocative efficiency. The price of a good reflects what society is willing to pay for the last unit demanded, and this turns out to be exactly what it costs firms to produce that last unit.

Competition, of course, does not always lead to economic efficiency. In certain situations efficiency requires either that private firms cooperate in providing and pricing goods or that the government—possibly the Fed—impose a solution. It is only in these special situations, when neither competition nor private cooperative ventures can be expected to work well, that the Fed should consider intervening in the private marketplace.

But just to show that the private marketplace isn't efficient in providing a certain good is not enough reason to intervene. The outcome must be shown to be better with intervention than without it. Even when the private marketplace clearly can't do the job properly, public authorities need a tremendous amount of information, knowledge, and skill before their intervention can help. (Has our energy situation, for instance, been improved by federal government intervention?)

Two situations in which competition does not work properly and the Fed could possibly help are public goods and decreasing cost industries.

A *public good* is something that once it is provided, no member of society can be excluded from sharing it. If a private firm tried to provide a public good and charge a price for it, too little of the good would be produced. That is because the price the firm could charge for the last unit sold is no greater than the benefit an individual buyer would get from it. But the benefit to society of this last unit would be greater than the benefit to an individual since all members of society would share the increased output whether they paid for it or not. If a public good is to be provided in sufficient quantity, therefore, society must do it collectively and tax itself to cover the cost. National defense is the

standard example of a public good; monetary policy might also fit into this category.

Goods and services produced in a *decreasing cost industry* (sometimes called a "natural monopoly") cannot be provided or priced properly without some guidance from their customers or the government either. A decreasing cost industry is one in which the average cost of production declines as output increases. To be technologically efficient, such an industry must consist of only one firm. That is, a single firm can produce all the goods in the industry at a lower cost than two or more firms could.

If the single firm sought to maximize its own profits, it would restrict its output and charge a higher price than efficiency requires. But if the firm had to charge the allocatively efficient price equal to the cost of the last unit produced, it would lose money. So the firm's customers or the government must step in to ensure that the firm can price its goods or services as efficiently as possible and still survive. In addition to charging a unit price, this usually means imposing some extra lump-sum charge or nondistorting tax to cover the firm's operating loss. Developing an efficient pricing scheme in these cases is usually a difficult, if not insoluble, problem. Public utilities are the standard examples of decreasing cost industries, but check and automated clearinghouses may also fit this description.

Some (including people in the Fed) have argued that the Fed should also intervene in the private sector when in carrying out its legitimate or assigned tasks it has developed special expertise and technological capabilities which allow it to produce certain goods and services more cheaply than can the private sector. This does not seem to be a valid argument for intervention, however, because it does not assert that the price system cannot work properly.

The argument maintains that technological efficiency would increase if the Fed entered a normal industry on the same basis as a private firm, pricing to maximize its profits, subject to the same taxes, laws, and other constraints faced by all other private firms in the industry. But why should the Fed do all that work when it could more simply provide its special knowledge, experience, or equipment to the private sector and achieve the same economic result?

In summary, until proven otherwise the Fed should assume that the private sector left unfettered can provide any good or service efficiently. The Fed should intervene only when it can argue persuasively that because of special circumstances competition cannot operate to price goods and services properly, the private sector cannot solve this problem cooperatively, and Fed involvement will increase economic efficiency.

How to intervene?

After deciding that private industry cannot properly provide a certain good or service without help, the Fed must then determine how it should intervene—should it regulate or operate? "Regulating" would mean letting private industry produce the good or service while the Fed influenced its demand or supply. "Operating" would mean producing the good or service itself.

While the question of which method to use is in most cases hard to answer, the Fed's guideline should still be economic efficiency: Which method will get it where it wants to go at the cheapest cost?

Private industry, motivated by profits and disciplined by competition, can probably produce most products cheaper than can government. And if private industry is allowed to capture some of the rewards from research and development, it likely will be more innovative and dynamic than government enterprise.

But regulation requires costly information gathering and monitoring. And it may unavoidably interfere with the incentive of private industry to minimize production costs.

If regulation can be devised, therefore, which preserves the efficiency incentive of private industry and is relatively cheap to administer, that method should be used. Other-

wise, government operation may be necessary. In order to choose to operate the Fed must argue that the probable loss in technological efficiency when it produces will be less than the probable cost of regulation when private industry produces.

Access and Pricing Policies

Once the Fed identifies a good the private sector cannot provide efficiently, it has in a sense identified an area where the price system cannot operate properly. And to intervene it is acting as if it knows how the price system ought to operate. Thus, the Fed's access and pricing policies should be just what is required for economic efficiency in these special circumstances.

The access question really need not be discussed separately. A restrictive access policy is just a special kind of pricing policy, one that charges an infinite price to some group of potential customers. Thus, the access question is part of the pricing question of whether to charge a different price per unit of service to different groups of potential customers.

While the policy of charging different prices to different customers can be consistent with economic efficiency, the criteria for price discrimination must be related to demand characteristics of the customers. Two customers equally willing and able to pay for a good or service should face the same price schedule. The Fed has no defense on economic efficiency grounds for charging different prices—or offering different access—to financial institutions based on the criterion of Federal Reserve System membership, for example.

If the Fed intervenes because of a public good, it faces a severe problem in determining how much to provide and how to cover costs of production. It must seek a level of output for which the value to society of the last unit produced is just equal to its cost. Learning of the benefits society gets from public goods is tricky and usually requires some information about individual preferences. Once that is known, however, various tax schemes can be used to pay the costs of production.

If the Fed intervenes in a decreasing cost industry, it does not have to worry about whether its prices will encourage or discourage competition from the private sector. A decreasing cost industry must have only one producer to achieve technological efficiency. The Fed need only be concerned with setting the price of the last unit sold equal to the cost of producing it and then determining some way to raise revenue to cover the operating loss. But, as mentioned earlier, this usually turns out to be a difficult problem.

To illustrate, let's look at a hypothetical decreasing cost industry. In the accompanying table, columns 1 and 2 taken together represent an assumed standard downward-sloping demand curve: the demand for the industry's good increases as its price falls. Column 3 is the total revenue earned in the industry if the units of output in column 1 are sold at the price in column 2.

Total cost as shown in column 4 assumes a start-up production cost of $4 and then a constant production cost of $2 per unit. The cost of each additional unit produced is displayed in column 5. The cost of producing the first unit is $6, the start-up cost plus the cost per unit. Each additional unit can be produced at a cost of $2. A start-up cost coupled with a constant cost per unit implies decreasing average costs as shown in column 6.

Column 7 computes the total profit of the industry at each output level by subtracting the total cost in column 4 from total revenue in column 3.

The total cost schedule in column 4 is assumed to be faced by any firm which wants to enter the industry. The calculations in columns 5-7 implicitly assume that the industry has only one firm, but this is obviously the most efficient number. With only one firm in the industry, the start-up cost need be incurred only once. One firm, for example, can produce two units of the good at a total cost of $8. Two firms, each producing one unit of the good, would do so at a total cost of $6 + $6 = $12. Total costs are therefore minimized in a decreasing cost in-

A Hypothetical Decreasing Cost Industry

1 Quantity Demanded	2 Price per Unit (assumed)	3 Total Revenue (1) x (2)	4 Total Cost ($4 startup + $2 per unit)	5 Marginal Cost (change in total cost)	6 Average Cost (4) ÷ (1)	7 Total Profit (3) - (4)
0	6	0	0	0	—	0
1	5	5	6	6	6	-1
2	4	8	8	2	4	0
3	3	9	10	2	$3\frac{1}{3}$	-1
4	2	8	12	2	3	-4
5	1	5	14	2	$2\frac{4}{5}$	-9

dustry by having a single firm produce all the goods.

So how should the goods and services be priced in this industry to achieve allocative efficiency?

Full-cost pricing won't work. At $4 per unit, two units of the good would be demanded, and total revenue and total cost would exactly balance. But at that level the value to consumers of the last unit produced would be $4 and the cost of producing it only $2. Since consumers would be better off to pay, say, $3 to get an extra unit produced and since the firm would receive more for that extra unit than its production cost, full-cost pricing is not allocatively efficient in this case; it results in too few goods being produced.

Marginal-cost pricing alone won't work either. At a price of $2 per unit, four units of the good would be demanded, and the value to consumers of the last unit produced ($2) would equal the cost of producing that unit ($2). This seems allocatively efficient, but at a price of $2 the firm would lose $4. And so the problem: How can the firm make up the loss while not upsetting the efficiency of marginal-cost pricing?

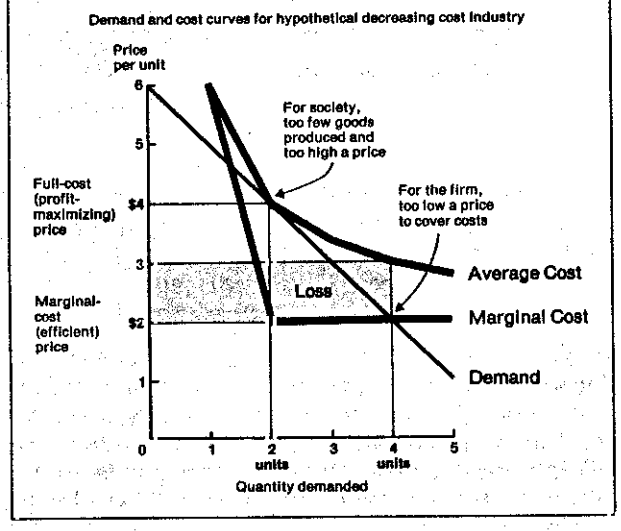
Suppose now that at a price of $2 per unit customer A demands two units and customers B and C each demand one unit. One possible pricing scheme would be to charge $2 per unit and also a $1.33 flat fee for entry. This scheme doesn't seem to work, however. Customers faced with it would probably form a "correspondent" relationship to avoid the entry fee; that is, one customer would pay the entry fee, buy all four units, and distribute the goods to the other customers, and the firm still would not make up its loss.

In order to combat this incentive, the size of the entry fee might be based on the quantity of goods a customer demands. Thus, the firm would charge $2 per unit, and charge entry fees of $2 to customer A and $1 to customers B and C. The customers, not being complete ignoramuses, however, would quickly recognize that they were effectively being charged $3 a unit and demand less than the efficient amount.

In this example, a perfectly efficient pricing scheme seems difficult to construct with a constant price per unit, but it does seem possible with price discrimination based on willingness to pay. The firm could sell the goods one unit at a time in an auction.

Given the hypothetical demand schedule, the firm would be able to get $5 for the first unit sold, $4 for the second, $3 for the third, and $2 for the fourth. This pricing scheme would be allocatively efficient since the price for the last unit sold would equal the cost of producing it, and the total revenue from the sales ($5 + $4 + $3 + $2 = $14) would cover the total cost of production ($12). If the total revenue received

Efficient pricing in a decreasing cost industry requires an extra charge to make up the firm's loss.



through this type of perfect price discrimination did not cover total production costs, the value of production would be less than the cost, and no goods should have been produced.

Although an auction seems to result in efficient pricing in this example, it seems ill-suited as a method of handling frequent, high-quantity sales, such as clearing services. In decreasing cost industries such as that, therefore, some other scheme must be used.

In summary, the Fed's pricing policy for any good or service it provides must be defensible in terms of the Fed's objective of economic efficiency. Different access or pricing policies based on criteria unrelated to demand characteristics, such as Federal Reserve membership, cannot be defended on economic efficiency grounds. For a public good the Fed should concentrate on determining the level of output which best meets society's needs. It should set a zero unit price for that good and finance the cost of production from taxes. For a good produced in a decreasing cost industry, the Fed should set the price of the last unit sold equal to marginal cost and somehow assess an auxiliary, nondistorting charge or tax to cover the operating loss.

Pricing Clearing Services

As an example of how the Federal Reserve System could apply these general principles of access and pricing, let's return to the clearing industry. The Fed first must determine whether it has a legitimate role to play in the provision of clearinghouse services (checks and electrons). To justify a role it must show that the private sector cannot provide these services efficiently alone and that Fed involvement can help. Its proper policies would then be to do whatever is required to achieve efficiency.

A fairly strong case can be made that clearing is a decreasing cost industry.

On one level it can be argued that the production costs of clearing resemble the cost schedule for the hypothetical industry discussed above. Clearing seems to have large setup costs (for computers, sorters, and communication networks, for example) and a low, rather constant cost per item cleared. The validity of this argument depends on empirical evidence, of course, but even if it is valid, the argument seems to apply about as well to private industries such as autos or steel as it does to clearing.

On a deeper level, though, it can be argued that the clearing industry is unique. Imagine an economy with banks and other financial firms scattered about as in our economy and with one payments technology (checks), but where a clearing industry has not yet been developed. Given this clean slate, what would be the most efficient organization for the clearing industry?

What would be best?

While we can only speculate about the answer, the nature of transportation, production, and accounting costs suggests that the most efficient organization would be a hierarchy of clearing networks: local clearinghouses feeding into regional clearinghouses feeding into a national clearinghouse. And any market—local, regional, or national—would have only one clearing-

house. This last point is crucial.

In any given market, banks and other financial firms which must devise a scheme for clearing checks could enter into bilateral trading arrangements. That is, firm A could settle with firm B and then with firm C and then with firm D and so on, and other firms could similarly settle their accounts.

But a central check clearinghouse seems much more efficient. All checks could be cleared there, and debits and credits could be netted out and posted to accounts with the clearinghouse. Each firm would have to keep an account only with the clearinghouse; it would not need accounts with other financial firms. And each firm would have to spend much less on transportation with a central clearinghouse than under bilateral trading arrangements.

So each financial market would have at most one clearinghouse; it is hard to imagine two clearinghouses located next door to each other efficiently serving the same market and operating independently. Since this seems true no matter what the volume of checks cleared, it indicates that check clearing is a decreasing cost industry. If this were not true, at larger and larger volumes two, three, or even more clearinghouses could easily compete in the same market.

There do, then, seem to be valid reasons for viewing clearing as a decreasing cost industry. In each market in each level of a hierarchy of clearing networks, a single clearinghouse seems most efficient. Who should operate it?

Without intervention by the Fed or some other public body, financial firms in each market would probably enter into cooperative clearing associations since competing clearinghouses would be inefficient. Such associations would conceivably make it easy for members to collude and deny equal entry to other firms in the market. The associations might also make it possible for firms to restrict payment services at the clearinghouse level in order to restrict supply at the retail level. A restriction in supply would result in higher retail prices, and if the demand for payment services was sufficiently insensitive to price, it would raise the profits of the financial firms. So some government involvement in the clearing industry might be necessary for economic efficiency. Does that justify Fed operation or regulation?

I do not believe so.

Private associations probably would be more efficient than the Fed in clearing payments and would better solve the difficult pricing problem faced in this industry. The associations would most likely contract out the operation of the clearinghouses, and each established operator would face competition from other potential private operators. Although only one clearinghouse would operate at a time at any level of the hierarchy, private concerns would compete for the rights to operate that clearinghouse. A firm which developed a new and better way to clear checks, for example, would win the rights to manage a clearinghouse and thus drive out the established operator. This process of innovation through competition for operation would be lost with Fed operation.

With private associations operating the clearing industry, Fed regulation may also be unnecessary. The Justice Department could assume responsibility for providing an environment free of collusion and restrictive trade practices, as it does for other trade associations.

What is realistic?

Ideally, then, I argue that the Federal Reserve System should not be involved in the clearing industry at all. Realistically, however, the Fed already operates check clearinghouses and will probably become entrenched in automated clearinghouses. Given this involvement, the Fed's access and pricing policies should be made to achieve the greatest efficiency possible under the circumstances.

The argument that the most efficient organization of the clearing industry would have only one clearinghouse serving each market implies that all financial firms in the industry have

equal access to that clearinghouse. Otherwise those firms being discriminated against would find it profitable to form their own clearing associations or choose circuitous routes to clear their payment items. Either practice would clearly be inefficient from the economy's viewpoint.

Efficient pricing in the clearing industry is more complicated than efficient access. The industry really has two payments technologies—checks and electrons—both of which are characterized by decreasing costs. At low volumes, clearing paper checks is relatively more efficient than clearing electronic impulses on magnetic tapes, while the reverse is true at high volumes. If the Fed decides to operate clearinghouses for both types of payments at the national and regional levels and to allow cooperative associations locally (as is probable, though not necessarily appropriate), how should the Fed price its services to promote technological and allocative efficiency?

In order to achieve technological efficiency, any given level of demand for clearing services must be provided in the cheapest way possible. This implies that if checks and electrons are perfect substitutes as means of payments, only one technology should be used at a time; that is, the least-cost way would be to use only checks at low volumes of transactions and only electrons at high volumes. It would not be desirable, as some have suggested, to price automated clearing services below marginal cost in order to encourage electronic payments at low volumes.

The two forms of payments are probably not perfect substitutes, however. Technological efficiency thus requires only that each type of clearing service be provided as cheaply as possible. There is still no reason to price in order to encourage the use of one type of payment at the expense of the other. Each type should be considered separately, and the Fed should simply price clearing of each type based on costs.

As we have seen, though, allocatively efficient pricing in a decreasing cost industry is not simple. And the clearing industry presents an additional new twist. Prices must not only be set so that the price of the last unit sold equals its production cost. Prices at each clearinghouse must also be set to ensure that the entire clearing network is used efficiently.

This means the Fed should not price clearing services at marginal cost and cover its operating losses out of general tax revenues. Local private clearinghouses would then be at a disadvantage because they must charge a price that fully covers their costs. And financial firms would be encouraged to try to clear through the Fed some payments which could more efficiently be cleared through local private clearinghouses. So it is important that the Fed somehow charge enough to cover costs.

The Fed should develop and implement a two-pronged pricing schedule for its clearing services: unit prices set equal to marginal costs and lump-sum user fees set at levels for which total revenues just cover total costs. The charges should be imposed in such a way that financial firms have neither the incentive nor the opportunity to use inefficient means to avoid them.

Conclusion

Pricing to achieve economic efficiency presents problems in a decreasing cost industry. But the Fed must try to solve them if it decides to continue operating clearinghouses.

That decision would not be easy to justify, however. As the Justice Department recognizes, the Fed should only be involved in an industry when it can argue conclusively that private competition or cooperation will not work well. This has not yet been done for clearing—and many other Fed services.

The views expressed herein are those of the author and not necessarily those of the Federal Reserve Bank of Minneapolis or the Federal Reserve System.