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Federal Reserve Bank of Cleveland

Currency: Time for Change?

by Paul W. Bauer

Despite the increasing usage of credit and debit cards and the emergence of various electronic payment instruments, currency remains king—at least if that title is based on volume of transactions.[1] Maintaining the quality of Federal Reserve notes in circulation represents the single largest expenditure by Reserve Banks: Roughly $700 million a year is spent to buy new notes from the Bureau of Engraving and Printing and to process, store, and distribute notes.

While these costs are high, the value to users and holders of currency is much greater, indicated by the roughly $20 billion yearly in interest payments that consumers willingly forego by holding $460 billion of their wealth in the form of Federal Reserve notes.[2]

But, given some analysts' optimistic predictions that new forms of payment instruments, generically called *e-money*, will soon acquire a significant share of transactions, why should any effort be expended worrying about how paper currency is supplied? After all, why rearrange the deck chairs on the Titanic? Past experience suggests that the public is very conservative in its selection of payment instruments, and new instruments gain acceptance very slowly. More than 20 years ago, many people were predicting that electronic funds transfers would be the demise of the paper check. Only now, however, are electronic check presentment and automated clearinghouse payments significantly impacting paper check volumes. As this case illustrates, predicting the future course of a payment instrument's usage is an uncertain endeavor.

In addressing the challenges to paper currency posed by both existing and emerging payment instruments, the Federal Reserve must have clear goals for the provision of currency. Consistent with that objective, the Federal Reserve also must provide currency in the most cost-effective manner possible. After examining the Federal Reserve's current role in the provision of currency, this *Economic Commentary* explores the challenges and opportunities in developing forward-looking currency policies.[3]

Currency Provision Today

The role of the Federal Reserve in maintaining the quality of currency circulating in the economy parallels that of the kidneys in maintaining the quality of blood circulating in the body. Toxins (counterfeit notes) and damaged blood cells (unfit notes) must be culled. This happens somewhat haphazardly, because blood cells (like currency) do not pass through the kidneys (a Federal Reserve site) on a predictable schedule.

The Federal Reserve maintains 37 sites throughout the United States for currency processing and distribution.[4] Expenses for these services exceed $280 million a year, while the cost of purchasing new notes from the Bureau of Engraving and Printing totals more than $400 million a year. In return, the nation's stock of more than 18 billion outstanding Federal Reserve notes—a total value of $400 billion—is maintained at a high level of fitness and integrity, the two components of note quality. Reserve Banks receive new notes from the Bureau of Engraving and Printing, and used notes from banks depositing their excess currency holdings.[5] Deposits are received as bundles made up of 10 straps, each strap containing 100 notes. The bundles are counted manually in the receiving area and the entire batch is cataloged and stored in the vault until it can be processed.

Despite the increasing usage of credit and debit cards and the emergence of various electronic payment instruments, currency remains king—at least for small-dollar-value transactions. Maintaining the quality of Federal Reserve notes in circulation represents the single largest expenditure by Reserve Banks. This *Economic Commentary* examines the Federal Reserve's current role in the provision of currency and explores the challenges and opportunities in developing forward-looking currency policies.

Soon after it is deposited at a processing site, each note is counted, verified on high-speed sorting equipment, and examined by sensors which judge its fitness for circulation. The high-speed equipment then repackages fit currency into straps and blocks that are stored in the vault until they are needed.

Unfit notes are destroyed by shredders attached to the high-speed equipment. A note is deemed unfit for circulation if it is torn or has holes, if it is too soiled, or if it no longer has a sufficiently crisp texture. Notes that are judged to be counterfeit or that cannot be read by the high-speed equipment are classified as rejects. Rejects are sent through a cancellation procedure in which operators manually examine each note and then pass it through a low-speed machine which, in conjunction with the high-speed

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machine, reconciles the account of the depositing bank. When a counterfeit is detected, the amount of the note is deducted from the depositing bank's reserve-account balance and the note is turned over to the Secret Service.

Currency enters circulation when a bank places an order for it; orders are filled using new currency or existing fit currency, depending on availability. Banks cannot specifically request new currency from the Federal Reserve.

The Depository Institutions Deregulation and Monetary Control Act (1980) does not require Reserve Banks to recover the costs of providing currency, unlike other Federal Reserve payment services (check, ACH, Fedwire, and Book Entry Securities). Generally, the only cost to banks for depositing or obtaining currency is that of transporting it to and from the Federal Reserve. Currency services are rationed according to the recently implemented Uniform Cash Access Policy (UCAP),[6] designed to achieve a uniform and consistent level of cash access across Federal Reserve districts. Formerly, each district had its own set of policies governing the distribution of currency.

UCAP limits the number of bank offices that can obtain free currency services from the Federal Reserve. A bank may designate up to 10 offices to receive one free order each week from the local Reserve Bank facility. Offices seeking to deposit (order) currency more frequently than once a week must have orders (deposits) which exceed a 20-bundle aggregate threshold and which meet the local facility's minimum threshold for each denomination ordered (deposited). A bank may obtain free access for more than its 10 designated offices under certain conditions: All of them (including the designated 10) must deposit and order currency in volumes exceeding the Federal Reserve facility's high-volume threshold (generally 50 to 100 bundles), and all must meet the facility's minimum threshold for each denomination deposited or ordered. Banks that cannot meet these requirements, but still wish to obtain service more frequently or for more offices than the policy allows, may do so by paying an access fee.

The Federal Reserve's Goal in Currency Provision

As a public entity, the Federal Reserve attempts to maximize net social welfare. Generally, this involves setting marginal social benefits equal to marginal social costs. If the Reserve Banks were private firms operating in competitive markets with no market failures, they could behave as profit-maximizing firms and set their prices equal to their marginal costs. However, profit maximization is not the most appropriate goal for the Federal Reserve, for two reasons. First, the Federal Reserve is a monopoly supplier of currency, without the possibility of competition. Of course, there are alternatives to paper currency, but legal restrictions effectively prohibit direct competition. Second, as a public entity, the Federal Reserve may pursue social objectives that conflict with profit maximization, such as equitable access for all banks.

While the cost of providing currency to the public can be accurately measured, the *value* that the public places on using currency is very difficult to estimate. In particular, how much do people value currency circulating at a given level of fitness? Would they prefer a higher or lower level of fitness (given the expense of increasing the average level of note quality)? The problem is that, in the absence of a competitive market, it is hard to find the optimal price–quality combination.[7]

The Federal Reserve's goal of maximizing social welfare implies that currency usage should *not* be promoted at all costs. To the extent possible, the resources expended in providing currency services should, on the margin, match the benefits of holding currency. Determining the most appropriate level of service to provide to banks is tricky because the Federal Reserve provides most of its currency services free of charge. Consequently, the value to banks, and ultimately consumers, is not revealed by any market price. Several authors have advocated greater reliance on pricing to allocate access to Federal Reserve currency services.[8]

The other implication is that the chosen level of service for currency provision must be delivered in the most cost-effective manner possible. While the Federal Reserve has made a number of cost-saving innovations over the years, the next section considers a possible shift in the way currency is provided that could significantly reduce costs.

A "Derivative" Approach

Recent innovations by the Federal Reserve in setting up extended custodial inventory arrangements (ECIs), and by the Bank of Canada in their formation of regional processing centers, point the way for a fundamental reengineering of currency operations, holding out the possibility of significantly lower costs. The key is to recognize that central banks are actually providing three services (asset conversion, denomination intermediation, and quality assurance) that traditionally could be acquired only as a bundle.[9] Only quality assurance, however, requires the physical delivery of a note to a Reserve Bank; the other two services may be provided with appropriate entries on the central bank's books. Setting up arrangements by which these services can be obtained separately could result in lower social costs by allowing banks to acquire only the currency services they actually *need*.

First, consider the ECI framework. To facilitate the distribution of the new $100 bills, the Federal Reserve Bank of New York set up four ECI sites in European banks. U.S. currency in the vaults of ECI banks is held on the books of the Federal Reserve until paid out. This reduces the cost of holding currency, because the funds converted into reserve-account balances could be sold in the Fed funds market if the bank has excess reserves. ECI banks pay for transporting the currency, sort the circulated currency that they take in, and return to the Federal Reserve only the old-design and unfit new-design notes.

Of course, security concerns are never far from the attention of the Federal Reserve. ECI banks must keep their ECI holdings and operations completely separate from their other currencies and operations; meet Federal Reserve standards for their vault and operations; maintain adequate insurance payable to the Federal Reserve; certify that any net savings from the ECI are passed on to their customers; and remain in sound financial condition.

While the Federal Reserve's designated ECIs operate only overseas, the Bank of Canada's innovation has dramatically altered its domestic operations. Like ECIs, regional distribution centers were set up across the country by private financial institutions, following controls similar in intent to those placed on ECIs by the Federal Reserve. Under the new system, the Bank of Canada has been able to close seven of its nine regional sites because it now focuses on managing *information* instead of the physical notes. The Bank of Canada monitors the stock of currency at the regional distribution centers to ensure that stocks are adequate, and it formally holds these stocks on its own books until the notes are paid out. Canadian banks now pay the full cost of handling and processing fit notes and, consequently, have an incentive to optimize their internal currency operations, given the explicit prices. Whether banks get a particular supply of cash from one of the two Bank of Canada sites, a regional currency processing center, or from its own operations depends on the relative costs of the various sources.

The social costs of maintaining the currency stock could be significantly lower under a domestic ECI arrangement. Such a reengineering holds out the prospect of both lower processing and transportation costs. Processing costs could decrease because only the services actually required by a bank would be provided. Transportation costs could decrease because there would be many more sites where currency could be obtained, shortening the distance currency must travel. Domestic ECIs are likely a less costly way of providing additional sites than opening new Federal Reserve sites, because banks may already have excess vault capacity; even if they have none, it may be less costly for them to build additions than for the Federal Reserve to establish entirely new presences.

For example, an ECI bank with excess currency could transfer these funds into its reserve-account balance at almost no cost. The only cost would be the resources required to move the currency from the bank's partition in the vault to the ECI's and to signal this transaction to the central bank.[10] Note that no resources would be expended sorting and verifying the currency. Also, because there likely would be more sites where currency could be obtained, even non-ECI banks could save on their transportation costs, in addition to the societal cost savings of foregoing the currency processing.

In addition, such ECIs would have a for-profit incentive structure and would be able to operate in ways that the Reserve Banks are not free to do. For example, Federal Reserve sites account for items down to the dollar. If a discrepancy appears, the Reserve Bank will spend as much as it takes to reconcile the books, whereas a private provider would likely write off small discrepancies. Secondly, every note that enters a Federal Reserve site is counted, whereas private banks generally weigh bundles of one-dollar bills rather than counting them individually. Implementing prices that reflect the resource cost of services would give banks an incentive to optimize their activities and lower the total cost of supplying and maintaining the currency stock.

There is concern that under an ECI arrangement, the quality of the notes in circulation may decline over time. Currently, the Federal Reserve's overseas ECIs do not invest in expensive sorting equipment because they primarily separate the new-design notes from the old-design ones. But purchasing high-speed sorters similar to those used by Reserve Banks would enable them to maintain a high level of note fitness.

While this would enable ECIs to provide currency of the same level of *physical* fitness, counterfeit notes could circulate longer, as not every anticounterfeit feature is made public by the Federal Reserve and the Treasury. Random sampling of currency in ECI vaults, in conjunction with the regular audit of these facilities, could be one way of improving the detection of counterfeits. Other actions would be to make notes more difficult to counterfeit or to make public more of the anticounterfeit features.

Conclusion

Currency provision remains one of the primary tasks of the Federal Reserve System. It is also a task that absorbs a great deal of resources. In furnishing this service, the Federal Reserve must look beyond its own interests to ensure the greatest possible net social benefits. In part, this means supplying the chosen level of service through the least costly means available—but it also means choosing this level of service appropriately.

New modes of operation such as domestic use of private currency depots, similar to the Federal Reserve's European ECI efforts and the Bank of Canada's regional distribution centers, could allow currency to be provided at a lower overall cost. The key to implementing such a strategy is that only one of the three currently bundled currency services provided by the Federal Reserve requires the physical presence of the paper note. The other two services could be provided through information management and by economizing on shipping and sorting costs.

Before such a radical reengineering could take place, the issue of note quality, particularly the question of counterfeits, must be carefully considered. Policies such as statistical sampling of ECI stocks could be implemented to combat such problems.

Footnotes

1. When measured as a percent of the value exchanged in trade, currency's share shrinks dramatically but remains significant. Based on value, electronic forms of payment such as Fedwire and CHIPS surpassed currency long ago. See David B. Humphrey and Allen N. Berger, "Market Failure and Resource Use: Economic Incentives to Use Different Payment Instruments," in David B. Humphrey, ed., *The U.S. Payment System: Efficiency, Risk and the Role of the Federal Reserve.* Boston: Kluwer Academic Publishers, 1987.

2. Most of this currency requires little expenditure by the Federal Reserve, because a significant quantity of notes outstanding circulates overseas. Estimates range from 50% to 70% (see Richard D. Porter and Ruth A. Judson, "The Location of U.S. Currency: How Much Is Abroad?" Board of Governors of the Federal Reserve System, *Federal Reserve Bulletin,* October 1996, pp. 883–903.).

3. The Federal Reserve and the Treasury share responsibility for policymaking related to the provision of currency. While the Treasury designs and prints the notes and lays out the conditions under which unfit notes are destroyed, and the Federal Reserve administers the distribution of fit notes and the receipt of used notes, both organizations frequently consult one another. No major changes to the way the currency services are managed are likely to occur without the Treasury's support.

4. One site, Pittsburgh, processes no currency but does operate as a cash depot for banks.

5. By "bank," I follow the common practice of meaning all depository financial institutions, such as banks, savings and loans, and credit unions.

6. See the *Federal Register* notice dated April 30, 1996, for a detailed discussion of the UCAP policy, which became effective May 1, 1998.

7. This problem can be seen in other industries where markets are regulated. For example, prior to 1978 interstate airfares were set by the Civil Aeronautics Board at a higher level than those for similar intrastate routes. Airlines generally competed away the potential economic rents by trying to attract passengers with better service than rival carriers provided. As a result, the regulated market delivered a higher price–quality bundle than would have been optimal.

8. The first to advocate such a policy were Thomas M. Supel and Richard M. Todd in "Should Currency Be Priced Like Cars?" Federal Reserve Bank of Minneapolis, *Quarterly Review,* Spring 1984, pp. 3–14. The idea was developed more fully in Jeffrey M. Lacker, "Should We Subsidize the Use of Currency?" Federal Reserve Bank of Richmond, *Economic Quarterly*, vol. 79, no.1 (Winter 1993), pp. 47–73.

9. Asset conversion is the converting of one type of base money into another (either currency into reserve-account balances or vice versa). Denomination intermediation is the exchanging of one denomination for another. Quality assurance refers to filtering out unfit notes and counterfeits from the currency stock.

10. Of course, there would be the sunk cost of implementing the Federal Reserve's security and control standards for the ECI portion of the vault.

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