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Thoughts on the Fed's Role in the Payments System

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Abstract

This essay concerns how the Federal Reserve's role as a payment services provider can best be aligned with its broad mission to foster the integrity, efficiency, and accessibility of the U.S. payments system. A recommended strategy involves specialization in providing services where the central bank has a comparative advantage—notably, services directly related to providing a comprehensive, secure system of accounts for interbank settlement and potentially some additional services justified by economies of scope. If markets for other payment services evolve as expected, the recommended strategy would have the Fed generally rely on means other than direct service provision to help ensure that services are provided effectively and equitably. Several specific implications of this strategy are suggested. This essay also appeared in the "Federal Reserve Bank of Minneapolis 2000 Annual Report," which was published in the April 2001 issue of the Bank's magazine *The Region*.

Technological and institutional innovations, including the growth of the Internet and of interstate banking, have enhanced the prospect for rapid evolution of the U.S. payments system. The Federal Reserve is collaborating with other payments system participants to facilitate this change. The Fed has undertaken to foster the integrity, efficiency, and accessibility of the payments system, and that commitment will remain as timely when the change is complete as it is today. However, as in every significant transformation of the economic environment, all institutions must monitor, and if necessary realign, their strategies to ensure that they continue to support their respective goals under the emerging conditions. Although forethought cannot frame an all-embracing plan that will be sound regardless of what the future brings, it can identify a general strategic direction that supports the institution's enduring goal and provides the agility needed to take best advantage of emerging circumstances. Thus, while no one knows whether the U.S. payments system will evolve rapidly or slowly, responsible institutions will already be considering how they can best serve the public if and when current policy achieves the transition to a new generation of payment instruments.

In that spirit, we suggest an approach to keeping the Reserve Banks' role as payment services providers well aligned with the Fed's mission. We draw on both general economic and business principles and also on the specific principles that Congress and the Federal Reserve have adopted over time to ensure that the Reserve Banks' service-provider role embodies good public policy.[1] These considerations lead us to recommend a strategy for Reserve Bank payment services provision that gives top priority to services closely related to interbank settlement. For most other payment services under our strategy, the transition to the next generation of payment instruments would prompt the Reserve Banks to make a transition as well, toward promoting integrity, efficiency, and accessibility primarily by means other than direct service provision—such as participation in the setting of standards, the drafting of model legislation, and the regulation of payment services markets.

Our reasoning about the Federal Reserve's strategy toward the emerging payments system starts from the idea that specialization is beneficial to most organizations and has specific additional benefits for the Federal Reserve System. That specialization promotes efficiency is one of the most basic and firmly established principles of economics and is a widespread working assumption in management theory as well. It implies that agents in the economy—institutions, as well as individuals—tend to serve the public best by focusing their resources and efforts on their respective areas of special strength, rather than by each attempting to do the broadest range of tasks that it can manage at a merely competent level.[2] Since we regard economic analysis corroborated by historical evidence as indicating that a central bank's most critical functions in the payments system revolve around settlement of interbank payments, we view these functions as a central bank's area of primary payment services strength.[3] Applying the specialization principle to the Fed, we thus recommend that specific services comprising, or closely related to, the Reserve Banks' core interbank settlement functions have the highest strategic priority among the Reserve Banks' payment services activities.

This recommendation is strengthened by some considerations specific to the Federal Reserve System. The Fed is, preeminently, the U.S. central bank, responsible for monetary policy, aspects of financial supervision and regulation, and oversight of the functioning of the payments system. Direct provision of payment services may support these functions in some respects, but it also creates potential difficulties with them in others. Governance structure is an example. A regionally oriented structure of 12 distinct, independent corporations has contributed to central bank independence and public accountability by providing a coherent institutional basis for the Reserve Bank presidents' role in making and implementing monetary policy. However, as the U.S. banking industry has become more integrated nationwide, an integrated governance structure for the provision of Federal Reserve payment services has become practically indispensable. Because the central bank functions and payment services within each Reserve Bank share some common support and overhead, such as information technology staff and facilities, the governance arrangements for the two types of functions cannot be kept completely distinct. As a matter of logic, even if moving de facto to joint governance of the 12 Reserve Banks in a broad sphere of decision making would prove to be key to enabling Federal Reserve financial services to recover their costs in a competitive market, such a market test would not conclusively show such consolidation to be desirable. A cost-recovery test for priced financial services is not designed to reflect the burden (or, conceivably, the benefit) that consolidation might entail for monetary policy and other such central-bank functions.

A further consideration in favor of the Reserve Banks playing a specialized role in the payments system concerns maintaining an overall relationship of mutual deference between the Fed and the private sector. The Fed's reputation as a trustworthy and neutral organization focused on broad public objectives is an indispensable asset in meeting its public responsibilities. That asset can be put at some risk if banks, other commercial firms, or the general public perceive the Reserve Banks to be encroaching on activities that the private sector can perform efficiently and equitably.[4]

These various considerations do not have the stark consequence that the Reserve Banks should never participate in markets beyond what is required to discharge the Fed's core central-bank responsibilities. They do suggest, however, that such participation be undertaken cautiously, when careful consideration shows that the several alternative means of attaining the Fed's payments system objectives are clearly inferior.

Near the end of this article, we apply the ideas introduced here by developing a list of specific observations and recommendations concerning the Fed's role in the payments system. If the payments environment evolves as we anticipate, these recommendations would focus the Reserve Banks' payment services provider role more tightly. The more focused role we envision is consistent, we believe, with current Federal Reserve legislative authority and policy.[5] Some current activities would be phased out if their policy rationales became less salient.[6]

By recommending that the Federal Reserve specialize in some activities in which we think it has a comparative advantage, we are by no means advocating that those ac-

tivities be reserved to the Fed alone. Nor do we advocate that other activities, otherwise appropriate for the Reserve Banks, be proscribed by law or regulation solely on this account. To the contrary, institutions' spheres of comparative advantage are best identified, and the institutions' respective activities accordingly shaped, through a continuous process of open and vigorous competition.

The Fed's Payments System Objectives and Tools for Achieving Them

The integrity, efficiency, and accessibility of payment services are the well-established goals of the Federal Reserve with regard to the payments system. (See Appendix A, which surveys the Fed's authoritative statements and interpretations of these goals.) Direct provision of payment services is one means to attain these goals, but it is not the only means that the Fed can and does use. To facilitate a balanced view on the role of service provision in the Fed's pursuit of payments system objectives, we outline in this section a variety of methods available to, and largely in use by, the Fed. This survey sets the stage to consider which options the Fed should use in a particular situation and, in particular, when it should take on the role of payment services provider.

The Federal Reserve has pursued its payments system goals in part through direct provision of payment services. As a nationwide complex of institutions, the Reserve Banks can address payments system access issues directly, by providing interbank payment services to all banks on equivalent terms. They can also address integrity issues by making their services very reliable as well as accessible and by offering them to failing institutions as well as healthy ones. The hard part is to meet the access and integrity objectives through direct service provision without falling short on the efficiency objective. However, the Monetary Control Act of 1980 (MCA) requires the Reserve Banks to be cost-effective enough to recover the costs of their directly provided services, including adjustments for taxes, the cost of capital, and other private-sector expenses, from the fees they charge their customers. According to a priced-services accounting system that has been in place for almost 20 years and has survived significant internal and external scrutiny, the Reserve Banks have met the MCA's requirements. In that sense, the Fed has successfully provided wide access to a set of reliable and efficient services for many years, in furtherance of its general goals for the payments system.

Provision of payments system services by the Reserve Banks continues to be guided by the White Paper (FR Board 1990). This guidance was reaffirmed and amplified during the 1990s, when Federal Reserve Chairman Alan Greenspan asked then Vice Chair Alice Rivlin to head a committee reviewing the Reserve Banks' role in providing payment services, especially automated clearinghouse (ACH) and check clearing. On the basis of internal analysis as well as extensive public testimony, the Rivlin committee reported in early 1998 that the Reserve Banks should continue to provide ACH and check clearing services. (See Committee on the Federal Reserve in the Payments Mechanism 1998.)[7]

Besides direct provision of services by the Reserve Banks, there are other ways to pursue the Fed's goal of maintaining a U.S. payments system that serves the public well. Perhaps the simplest alternative is to rely on private market institutions to provide reliable, efficient, and accessible payment services. Economic theory implies that, in an ideal environment, private competition will lead to efficient arrangements for producing and distributing services that are of optimal quality and available to all at prices appropriately reflecting marginal cost. Experience suggests that this actually occurs, at least approximately and sufficiently, for many goods and services in the U.S. economy. Competition is also generally accepted to be especially successful in promoting long-term innovation and efficiency in many markets. In the payments system, private competition is already the primary mechanism for ensuring access to low-cost, reliable services for consumers and nonfinancial businesses. Deferring to private market provision of interbank clearing and settling services is also an option the Fed can consider in pursuing its payments system objectives. For some services, such as the clearing of interbank credit card, debit card, and automated teller machine (ATM) payments, the Fed has largely done so.[8]

Economic theory also acknowledges conditions under which private markets alone will not ensure reliable, efficient, and equitably accessible service provision, and there are concerns that these conditions may prevail in some payment markets. For example, if a provider's average cost of providing a service declines continuously as its level of production increases, efficient production requires that there be only one provider, in order to capture these economies of scale. This is not necessarily a problem per se, because potential entrants can provide competitive discipline to the incumbent provider without actually having to enter the market themselves. Markets subject to such potential competition are called *contestable*. However, there can be a problem for contestability if irretrievable *sunk* costs associated with entering or exiting the industry constitute a barrier to entry by a potential competitor. Under these uncontestable-market conditions, the single private seller could restrict output below the efficiently produced level in order to raise prices and increase profits. Alternatively, the monopoly producer might be free to increase profits by reducing the integrity of the product below the efficient level of product quality. Because of higher prices and lower quality, some potential consumers who would have been willing to purchase the service at the efficient price and quality will, in effect, have lost access to service.

This general description of a monopolized market is thought by some to capture the situation that would prevail if the provision of check clearing services to small, remote markets were left to the private market. It is assumed, that is, that these markets have only enough volume to support a single physical shipment of checks per day and that there are irretrievable sunk costs to entering or exiting the clearing business. Such conditions could result in a single for-profit shipper with monopoly power over check clearing services in that area. At best, the banks in that area would pay high prices for poor service. Fears of just this outcome were frequently cited in the testimony of rural bankers before the Rivlin committee, and it is a traditional rationale for the nonprofit Reserve Banks to provide check clearing services at cost in rural areas.

Private competitors may also fail to achieve socially optimal outcomes if efficient service provision requires using a single shared resource and the individual providers

are unable to agree on how to organize and manage the shared resource. On the one hand, critical shared resources do not necessarily pose an insurmountable problem to industry participants, as illustrated by the generally successful operation of mutually owned and operated clearing institutions in credit card, debit card, and ATM networks. On the other hand, neither can the viability of such institutions be taken for granted, as suggested by the history of litigation and member politics experienced by mutually owned clearing organizations such as Visa and MasterCard. When unable to agree among themselves on how to provide critical shared resources, industry participants may invite a neutral (generally nonprofit) third party, including perhaps a government or government-sponsored entity, to assist in arranging for the needed services. Alternatively, public policymakers may step in themselves if the industry appears unable to arrange the provision of shared services in a way that promotes integrity, efficiency, and accessibility. For example, historically, the Reserve Banks' entry into payment services provision partly reflected the private market's inability to arrange for a single set of accounts to effect interbank settlement. (For further details, see Appendix A.)

Private market failures of these and other kinds can be addressed in several ways. At least three broad alternatives to direct Reserve Bank service provision can be identified: changing the environment that gave rise to market failure so that private competition can again be relied on, regulating the private providers, and arranging for public or nonprofit service provision by an entity other than the Federal Reserve.

The factors that give rise to a market failure may be inherent in the industry's technology (as in the example above, with declining cost and barriers to entry) or may reflect financial and institutional circumstances (such as a price-fixing conspiracy supported by a successful strategy of eliminating competitors by predatory pricing). The former requires a fundamental technological solution, if competitive forces alone are to be trusted. Through the passage of time, and perhaps in response to initiatives promoted by the Fed and other nonprivate entities, new technologies less likely to lead to market failure may be devised. The same forces—time and sometimes promotion by the Fed and others—may also be required to develop new institutional arrangements that support the introduction and usage of the new technologies. When successful, the new technologies transform the competitive environment, eliminating the market failures and permitting private competition to lead to the desired outcomes. For example, several new technologies designed to use electronic images instead of paper originals to clear checks could eliminate the natural monopoly problem said to plague rural check clearing markets today. The Fed is among the institutions promoting and piloting these technologies. To the extent that the Fed and others successfully convert the check clearing business to electronics, the markets for both rural and urban check clearing may be perfectly well served by private competition in the future.

Market failure deriving from persistent financial or institutional power is amenable to correction by legal intervention under antitrust laws. If the market failure arose solely from historical or strategic circumstances unrelated to the underlying technology, interventions such as repealing legal obstacles to emerging competitors can permanently correct the problem and again allow reliance on private service provision. Sometimes the market failure involves a combination of technological factors and historical circumstances. In these cases, new technology and legal intervention may both be required for private service provision to again lead to desired outcomes. The Fed does not have direct authority or responsibility for antitrust enforcement (except for limited authority related to bank mergers), so it cannot directly pursue its payments system objectives through this means. However, when warranted it can contribute significant relevant information on the basis of its knowledge of payments industry conditions and its economic research capabilities.

When the technology in an industry appears to be enduringly inconsistent with good public policy outcomes under unfettered competition, ongoing intervention by government or government-sponsored regulators may be an effective alternative. In the context of the payments system, specifically, the Federal Reserve System currently acts as a consumer-protection regulator in consumer payment and credit markets, under legislative authority. If it wished, Congress could expand the Federal Reserve System's regulatory powers over interbank payment markets as an alternative to direct provision of services by the Reserve Banks.[9]

Although effective in principle, regulation can be difficult to implement well over the long haul. In practice, it may sometimes be more effective to charter a government body or nonprofit agency to provide or subsidize certain services, rather than attempting to regulate private providers. The historical origins of the Federal Reserve System, discussed below, partly reflect these concerns, as do the origins of other government-sponsored service providers, such as public postal services. A somewhat different example is the provision of scheduled air service to small cities under the Essential Air Service program initiated in the Airline Deregulation Act of 1978. In this case, the federal government has not established a nonprofit provider, but instead subsidizes private airlines to provide the desired service (U.S. Congress 2000). And in Switzerland, the Swiss Interbank Clearing (SIC) system, which settles interbank payments via irrevocable transfers of funds held at the Swiss central bank, was developed by a private joint venture, Telekurs AG, in collaboration with the central bank. Check clearing also takes place at Telekurs, under central bank supervision (Bank for International Settlements 1993, pp. 361–63). The Fed could use similar arrangements for services such as check clearing, including in remote rural areas.

Specialization and the Core Functions of the Reserve Banks in the Payments System

The central question of this article is, Which options should the Fed use to advance its public policy goals for the payments system, and, in particular, when should it take on the role of payment services provider? Our answer, developed more fully in subsequent sections of this article, is tied to our view that the unique strength of the Federal Reserve in the payments system derives from its status as the U.S. central bank. We will infer from this premise, and from the premise that specialization is generally beneficial, that the way in which the Fed pursues its payments system goals should be determined in large measure by its core

central-bank function. Before pursuing that line of reasoning further, in this section we defend the general specialization principle and characterize the core function of a central bank in the payments system.

The benefits of specialization among nations were elucidated early in the history of economics, most clearly by Ricardo (1817). His key idea is that all countries benefit when goods are freely traded and each country focuses its finite resources on producing those goods in which it has a comparative advantage. As long as countries have finite but different endowments of resources (natural resources, human resources, and capital), then specialization in production, combined with international trade, tends to make available the greatest amount of goods for consumers in each country. This is one of the most widely accepted principles of economics.

The idea that specialization is beneficial is also widely assumed to apply to firms and other organizations. At first glance, this assumption may seem suspect. If Firm *A* has efficiently specialized in producing good *X* and firm *B* has efficiently specialized in producing good *Y,* why couldn't a merged firm *A* + *B* remain equally efficient at producing *X* and *Y?* After all, individual firms appear to be free to expand not only their efforts, but also the resources they employ, whereas nations can only slowly expand their total resource base. So why can't firms (and other organizations) avoid the need to specialize by simply adding enough resources to perform multiple diverse activities efficiently?

There is no hard and fast reason why organizations cannot expand to perform a range of tasks well, but experience suggests that the results are often disappointing. Perhaps the most familiar evidence for the benefits of organizational specialization stems from the demise of many of the conglomerates formed in the 1960s. These were firms that combined, through mergers and acquisitions, numerous diverse activities under a single management and ownership structure. Over time, many of these entities underperformed their less diversified, more focused competitors (Ravenscraft and Scherer 1987), and by the 1980s, many were broken up in what Bhagat, Shleifer, and Vishny (1990, p. 2) refer to as the "deconglomeratization of American business and a return to corporate specialization."[10]

Although the frequently disappointing performance of large, diversified organizations is not fully understood, experience and theory suggest that there may be limits on how many different activities can be managed effectively in a single organization. No one manager can be truly expert on a wide range of products and activities, so multiple management lines are required to maintain an adequate knowledge base. It seems, however, that the effectiveness of multiple management lines is often less than would be expected by summing the results of their independent operation, perhaps because of internal rivalries or because of disputes and ambiguities related to ex ante incentives and ex post rewards.

Although we recognize that the intellectual foundations of the specialization principle for organizations are less complete than those underlying Ricardo's (1817) comparative advantage concept for nations, we believe that the principle is fairly strongly supported by the weight of practical experience and by elements of financial economics and of organizational studies.[11]

How would the general principle of specialization be applied to the Reserve Banks' role in the payments system? One implication, we will argue, is that as service providers, the Reserve Banks should place high strategic priority on services that the central bank has special advantages in providing. Specifically, this strategic core of payment services consists of maintaining deposit accounts for private banks and providing short-term credit to, and effecting transfers of balances among, those accounts as a means of settling interbank obligations efficiently.[12] Our characterization of this core function relies on consideration of both economic history and economic theory.

We define a *central bank* to be an institution that

- Has both the government and the commercial banks as account holders.
- Can influence overall interbank credit market conditions through its credit policies toward account-holding banks and its intermediation on behalf of the government.
- Has been given lead public policy responsibility for achieving credit market conditions that foster prosperity and economic stability—price stability in particular.

This definition reflects the fact that, historically, central banks have been chartered to perform two functions. One is to be an intermediary between the government and its lenders, enabling the government to obtain credit by ensuring that implicit default through inflation will occur only in genuine national emergencies.[13] The other is to serve broad public interests as the trustworthy and neutral apex of a hierarchy of banks that, in turn, provide the nonbank public with accounts used to settle financial, business, and personal payments by transfer of balances.[14] Indeed, there is an economy of scope between these two functions that gives the central bank a comparative advantage in serving the latter. That is, since almost all banks need to transfer funds from their customers to the government to pay taxes, the government's bank is in a natural position to serve as the apex.[15]

The role as the apex of the banking hierarchy puts the central bank in a unique and distinguished position in the payments business. As explained in more detail in Appendix B, this role evolved out of market interactions, as correspondent banking grew from provision of a passive service—simply maintaining an account for respondents—to a role with respect to banks that is closely analogous to the role that banks play with respect to their nonbank customers—including netting, extension of credit, and concomitant monitoring of creditworthiness. Moreover, just as private banks are often structured to avoid conflicts of interest with their own nonbank customers, central banks evolved in part to avoid conflicts of interest with banks. A foundry, for example, would be loath to have its bank also be in the foundry business. As lender to the foundry, the bank would have a legitimate need for information regarding the foundry's customers. If the bank also owned a foundry itself, the bank could abuse the information obtained from the borrowing foundry to compete unfairly in their shared business by stealing the foundry's most profitable customers. For similar reasons, banks were reluctant to have a correspondent bank that also did general banking business in the same market.

Market demand thus arose for a special-purpose intermediary (that is, one that does not do business with nonbank traders) that is able to play this role without the incentive conflicts that a bank would have. Both private-sector and public-sector intermediaries of this type exist, typically as nonprofit organizations in order to further mitigate incentive conflicts. And both the private- and public-sector special intermediaries are subject to government oversight as well.[16] Examples within the private sector include mutually owned clearinghouses for checks, credit card receivables (such as Visa), and electronic funds and securities transfers as well as the bank-owned, government-regulated, special correspondent institutions known as *bankers' banks*.[17]

Examples within the government or government-sponsored sector include specialized intermediaries, such as central banks and certain industry lenders (such as the Federal Home Loan Banks in the United States, especially vis-à-vis thrift institutions before 1980). The *Reserve Banks*—nonprofit entities created by an act of Congress and supervised by a government agency, the Board of Governors of the Federal Reserve System—are a case in point. The potential for activities of a Reserve Bank to create conflict of interest with commercial banks is controlled in three ways: by its nonprofit status, by restrictions in its corporate charter (specified in the Federal Reserve Act), and by the oversight of a federal government agency, the Board of Governors of the Federal Reserve System. The most blatant source of potential conflict of interest with the banks that the Fed serves—lending by Reserve Banks to nonbank borrowers—is ruled out (except in emergency conditions) explicitly by charter restriction. And a combination of Reserve Banks' nonprofit status and Board oversight is designed to control conflicts of interest that might arise through the Reserve Banks' discharge of their payments system functions.

This historically oriented description of the function of a central bank in the payments system is consonant with a fast-developing—albeit not yet mature—body of economic theory regarding the function of central banks. (See Freeman 1996 and Green 1997.) Together, history and theory suggest that there are two payments system functions that a central bank is better able than other institutions (except, perhaps, a clearinghouse) to perform for banks. These core central-bank payment functions, which we explain in Appendix B, are analogous to the core functions that banks provide to their customers.

- A central bank can manage in the broad public interest a system of accounts that all banks are eligible to own and that they can use to settle interbank transactions.
- By extending credit to banks, a central bank can provide the benefits of interbank payments netting and immediate finality of payments.

Its ability to perform these functions and, in particular, its position of neutrality and trust among the public and the institutions that it serves are the unique strengths of a central bank as a provider of payment services. From this finding, together with the general principle that the public is best served when each institution in the economy focuses its resources in its area of unique strength, we conclude that these two functions form the core of the services that should continue to be provided directly by the Reserve Banks and that they should receive the highest strategic priority among the Reserve Banks' activities as providers of payment services.

The Reserve Banks' Role in Providing Other Services

The Reserve Banks' provision of accounts to banks and of final interaccount settlement supported by central-bank credit only partially fulfills the Fed's payments system goal. The Fed has also accepted the role of promoting the integrity, efficiency, and accessibility of a broad range of payment services, notably numerous interbank clearing functions, the good performance of which depends on more than just access to the Reserve Banks' core payment services. What tools should the Fed use to help assure good outcomes across this full spectrum of payment services?

For some—probably very limited—range of services, efficiency considerations alone may imply that direct service provision by Reserve Banks is the right solution. The provision of these services may be so technologically or institutionally related to the Reserve Banks' core services that it would clearly be much cheaper for the Reserve Banks to provide them in conjunction with their core services than for them to be provided in any other way. In economic terms, provision of these services is said to be *complementary* to the provision of core services, resulting in positive economies of scope. (See Appendix C for a more detailed explanation of these concepts and of how they might suggest that the Reserve Banks should provide certain services outside the core.) The range of payment services with high core complementarity is unclear and can be determined only with detailed analysis that is beyond the scope of this essay, but our a priori expectation is that it is narrow.

Beyond the Reserve Banks' core services, plus possibly some clearly complementary activities, provision of payment services by the Reserve Banks should be considered as merely one option among many for pursuing the Fed's goal. We see no reason to presume that payments service provision is the best option. At a minimum, the full range of options discussed above should be analyzed and considered.

In analyzing these options, we would apply both the general and Fed-specific versions of our specialization principle. The general version was elaborated in the preceding section. The Fed-specific version involves a general sense of caution about complicating Reserve Bank governance structures or putting the Federal Reserve in the position of encroaching significantly on private-market institutions, as discussed in the introduction. We now apply each specialization principle to the question at hand.

As noted above, the general specialization principle provides a rationale for the Reserve Banks to provide core interbank settlement, accounting, and credit functions. However, because we take as given the Fed's goal of promoting the integrity, efficiency, and accessibility of the payments system more broadly, the general specialization principle does not imply that the Reserve Banks should always strictly limit their role as a payment services provider to only those core functions. Nevertheless, the general specialization principle does suggest that core functions have the highest claim to be performed directly by the Reserve

Banks. The more remotely related to the core a payments system objective is, the stronger are the considerations in favor of using other policy tools to accomplish it.

The Fed-specific benefit of specialization has to do with the Fed's relationship with the general public and the banking industry. We would argue that the Fed was deliberately designed to decentralize central-bank policymaking and to minimize the extent of its head-on competition with other financial intermediaries in order to promote its effectiveness in its core monetary policy and payments system roles. Our argument—that activities that tend to burden Reserve Bank independence or significantly aggravate the problem of direct competition or conflict between the central bank and other financial intermediaries have indirect costs that the Fed should not ignore—applies to core as well as noncore functions to some degree. However, in the case of core functions, there are few competitors and few good alternatives. So the real force of this consideration applies to noncore functions. There we see this consideration tending to rank options such as Reserve Bank service provision or extensive Federal Reserve System regulation lower than less intrusive options.

Perhaps the most attractive means of meeting the Fed's goal, when it is available, is to help ensure that private payment markets are contestable. Recall that a *contestable market* is one in which existing participants always face numerous actual or potential rivals. When a large number of rivals are present in the market, it can be termed *competitive* in the usual sense. However, even markets with one or just a few actual participants can still be contestable, provided potential rivals can enter and exit the market without incurring large irretrievable costs in the process. In the absence of sunk costs of entry or exit, existing participants are always competing not only against each other, but also against any number of nonparticipants who can enter the market if profits appear abnormally high.

This potential competition promotes socially desirable results in line with the Fed's payments system goal. Even when only a single firm is actively providing a service, potential competition prevents that provider from setting prices significantly above competitive norms. More generally, potential competition spurs existing participants to innovate and adopt efficient new technologies, so as not to be overtaken by a more progressive entrant to the market. For the same reasons, existing participants cannot skimp on the quality and reliability of their services or discriminate among customers to a greater extent than is required for economic efficiency. In other words, contestability disciplines market participants to pursue integrity, efficiency, and accessibility of services.

The Fed can, and already does, promote contestability in payment markets. First of all, the Reserve Banks should ensure that when they provide payment services, they do so in a way that does not impede entry into or exit out of those markets or related payment markets. As was mentioned earlier, the Reserve Banks make their core payment services available to both incumbent providers and potential entrants in various payment services, including some in which the Reserve Banks do not participate directly. As a regulator, the Fed can try to ensure that its regulations do not inadvertently create unnecessary barriers to entry into or exit out of payment services markets. Through its oversight of the payments system and its research capabilities, the Fed can also seek to highlight regulatory or institutional entry and exit barriers that are the responsibility of other agencies, institutions, or lawmakers. Finally, the Fed can work with the payments industry to facilitate the adoption of new technologies and institutions that ease entry and exit barriers. Possibly the clearest current example would be to facilitate the adoption of technologies and institutional arrangements for electronic check clearing in order to trivialize the effects that small volumes and long distances can have on check clearing markets for small and remotely located banks. By facilitating the adoption of new electronic clearing methods, the Fed could help ensure contestability and consider an orderly withdrawal from its current role as a provider of check clearing services.

Another potentially effective option for achieving the Fed's payments system goals is to shift some regulatory or service provision activities to other governmental, nonprofit, or cooperative entities that have core functions which better suit them for these tasks. For example, the Reserve Banks already utilize the U.S. Postal Service to perform some routine transportation and delivery functions in remote areas, and the Reserve Banks do not directly compete with the mutually owned organizations (such as Visa and MasterCard) that serve as trusted third parties in the credit card payments clearing market. A related option would be for the Reserve Banks to contract with other organizations to provide certain payment functions, using an open bid process and imposing restrictions if necessary to ensure integrity and accessibility. Either way, the Fed would retain its oversight role, as well as the option to enter into direct service provision or impose more extensive regulation if needed (up to the limits of its statutory authority). However, as long as these other entities meet the Fed's objectives in these markets, the Fed would be free to better focus its resources on its core activities.

The examples above illustrate that the Fed has at least some alternatives to direct service provision for assuring the integrity, efficiency, and accessibility of the payments system. Based on the advantages to the Fed of specializing its payments system role, we conclude that the Reserve Banks should provide core interbank settlement services, plus any closely complementary services. Beyond that, the Fed should consider its full range of tools but exercise caution regarding intrusive options such as direct service provision or extensive regulation.

Some Specific Implications

Here we apply the general conclusions derived in the previous sections to specific choices confronting the Fed at the beginning of the 21st century.

The Fed should continue to provide an interbank funds transfer system of unquestionable strength, quality, and efficiency.

There is fairly strong international consensus that central-bank operation of an interbank settlement system directly based on transfers of balances among banks' reserve accounts is an effective way to ensure the security and integrity of that system of interbank settlement.[18] That is, given the limitations of current technology and that which is likely to be available in the near future, there is thought to be an economy of scope between maintaining reserve accounts and providing funds transfers among those accounts. An interbank settlement system should provide

ease of use and fast throughput with impeccable data security, reliability, and risk controls. The very high standards for these attributes that are appropriate in the large-value context imply a stronger economy of scope than exists in the retail-payments case.

The Reserve Banks currently meet those standards with their internal network of computers and their specialized hardware and software that allow depository institutions to directly initiate funds transfers, subject to Fed risk controls. Continuing to meet these standards in today's rapidly evolving technological environment will require an ongoing and well-targeted effort to upgrade hardware and software and retain critical staff. The Fed will need to stay abreast of numerous developments in communications, security and encryption, and software and hardware to ensure that its core systems retain their strength and integrity as they evolve to support the emerging products, standards, and access channels that the financial sector will demand to achieve efficiency and boost productivity. An uncompromising commitment to ensure both efficiency and strength (security, reliability, and so on) in core interbank settlement services should be the Reserve Banks' highest payment services priority.

Payment services whose value added stems primarily from payments clearing rather than interbank settlement will generally not be core payment functions of the Reserve Banks.

The Reserve Banks' involvement in payment services is sometimes held to contribute to the Federal Reserve System's core central-bank functions, such as monetary policy, banking supervision, and financial stabilization. To the extent these arguments are limited to what we have termed *core payment services*, chiefly interbank settlement services (including provision of short-term credit to facilitate net settlement), they are consistent with our own suggestion here. However, some commentators appear to argue that the Reserve Banks' provision of a broader array of services, including check clearing and ACH, significantly enhances the Fed's ability to carry out its central-bank functions. (See Corrigan 1983, pp. 352, 357.)

We are not convinced. Other central banks, such as the Bank of England, appear to have performed their central-bank responsibilities well with no such broad involvement in payment services. While this may in part reflect historical differences in the payment and banking industries in these other countries, even in the United States the relevance to central banking of the Reserve Banks' role in activities such as check clearing has diminished sharply over time. When the Fed was founded, checks constituted the principal means of interbank payment, so check clearing then constituted essentially a core service according to our characterization. Even later, when wire transfers had supplanted checks as the primary tool for direct interbank settlement, checks remained almost the sole form of consumer and small business noncash payment. Through its involvement in check clearing along with wire transfers, the Fed could provide services to almost the entire payments system during periods of banking instability and may also have derived a broad understanding of commercial bank payments activity and an ability to manage failing institutions. These advantages are now diminishing considerably, as payment services organized without direct Reserve Bank participation, such as credit and debit cards, take an increasing share of the payments market and commercial banks' payments activity. No one suggests that the Reserve Banks need to provide these emerging and maturing payment services in order to conduct monetary policy, stabilize markets, or supervise banks, and we believe the same is true for the comparable payment markets the Reserve Banks are in already. In light of the great diversity and rapid evolution of modern means of making retail payments, we do not see provision of a handful of those means as an effective way for a central bank to monitor and understand the payments industry. The Fed has, and must have, other ways to do that.

The advantages of having commercial payment intermediaries serve the public in the Reserve Banks' traditional noncore market niches are likely to increase as electronic payment options expand.

The Reserve Banks historically had a prima facie advantage over commercial banks as a nationwide payment services provider, because banks faced legal and regulatory obstacles to providing a full spectrum of customer services nationwide. Those obstacles no longer exist. The Federal Reserve Banks also specialized historically in providing interbank payment services to banks that were only marginally profitable to serve on a commercial basis because of factors such as location in a sparsely populated area.[19] We anticipate that such factors will be of little or no relevance in the electronic payments environment of the future and that this is a significant reason the Fed should promote migration to electronic payments.

If these two traditional Reserve Bank market niches diminish as we expect, so will the need for the Reserve Banks to provide nonsettlement payment services that commercial firms are unable or unwilling to replicate. Then the costs that a central bank incurs by competing broadly with commercial banks (including correspondent banks) in various other service lines are likely to become salient.

The Federal Reserve's policy on its role in the payments system should explicitly recognize promotion of contestable payment markets as a key tactic in the Fed's pursuit of its payments system goal. At the same time, pursuit of electronic payment technologies should be considered primarily as a means for promoting contestability, rather than as an end in itself or as a direct means of pursuing the Fed's goals.

As stressed by Board of Governors Vice Chairman Roger Ferguson (1998), promotion of contestable payment markets has become a key Fed tactic. Its status should be formally recognized. Then the Fed would promote a transition to an electronic payments environment that enhances the contestability of payment markets. This would allow the Fed to achieve its payments system goal through greater reliance on private competition, with a reduced role by the Reserve Banks as direct providers of noncore payment services.

The Fed should give high priority to supporting the Multilateral Settlement System.

As we reflect on emerging payment trends and the Fed's payments system priorities, we have come to view the Reserve Banks' Multilateral Settlement Service as a good example of how a Reserve Bank service can promote contestable markets and improve the payments system

overall. The Multilateral Settlement Service, introduced in 1999, makes it simple for a group of any two or more banks to submit a settlement file listing debits and credits to be applied to their accounts at the Fed.[20] The Reserve Banks first process the debits, applying Fedwire-equivalent risk controls to ensure that each paying bank has the funds or authorization to cover the amount debited. Assuming this is the case, the Reserve Banks then process the credits as irrevocable final payments to the receiving institutions, all on the same day that the settlement file was submitted. This service provides low-cost, direct access to same-day interbank settlement for groups (of banks) of any size, without regard to the underlying transactions that generate their mutual debits/credits or any requirement that the underlying transactions be processed or handled by the Reserve Banks.[21] It has the potential to provide a safe, convenient, reliable, and efficient means of settling the interbank obligations generated by all forms of emerging commercial payment vehicles. Barriers to entry in the payments clearing market are thereby reduced, because groups of banks can enter a wide range of payment clearing activities in the knowledge that they will not have to also establish their own safe and reliable settlement mechanism. We would make the continued enhancement of the Multilateral Settlement Service a priority for the Fed.

Federal Reserve market share is not a public policy goal per se.

Effective competition from private firms may result in a declining payments market share for the Reserve Banks. As long as the Reserve Banks are conducting their business capably, such loss of market share should not be a cause for concern about the integrity, efficiency, or accessibility of the payments system. It is often simply a sign that a private firm is currently the more effective form of organization to achieve those results. In the absence of evidence that the Reserve Banks are being supplanted by monopoly or oligopoly providers in a noncontestable market, a decrease in market share should normally be viewed as neutral or positive.

Conclusion

We have noted that the Fed can pursue its payments system goals by several means, and not just by providing payment services directly. We have argued that the Fed should prioritize its activities in the payments system in a way that makes best use of its character as a specialized institution—a central bank—and that most effectively supports its overall mission by de-emphasizing noncore activities that intrude significantly on the private sector. We have drawn several more specific implications from this approach.

Our suggested principles thus countenance a configuration of Reserve Bank payment services that would differ from what exists today. We emphasize that this is a long-term vision. If it were to be adopted, then the transition to it would have to be managed with care and foresight.

This essay has focused on the Reserve Banks' involvement in the payments system as providers of payment services. In closing, we would draw attention to the numerous other forms of involvement in the payments system that the Fed maintains, apart from its role as a service provider. In fact, when the public thinks about the Fed's leadership in the payments system, it is largely—and justly—those other forms of leadership that come to mind.

We therefore think the Fed should continue to pursue payments system monitoring and leadership by other means as well. The Fed has traditionally participated with industry, government, and academic representatives on initiatives such as the setting of technical standards and the drafting of model payments legislation. It can play a critical role in those efforts by promoting new institutions and technologies that support a safe, reliable, and efficient payments system. The Fed's banking supervision and market stabilization missions require it to understand the functioning of the payments system. To this end, maintaining an ongoing dialogue with payment providers will continue to be essential. Finally, the Fed has contributed to its own understanding and to the making of good public policy toward the payments system through its contributions to basic research in monetary theory, the industrial organization of payment mechanisms, and related areas. Maintaining or strengthening this tradition is also likely to become increasingly important.

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[1]In compliance with the provisions of the Monetary Control Act of 1980, the Reserve Banks price their services to cover costs, including estimates of the taxes and capital costs that their private sector competitors pay. In addition to this fundamental cost recovery discipline, the Federal Reserve System has promulgated policy principles to guide its participation in payment services markets, published in what is known as the *White Paper* (FR Board 1990) among those familiar with the Fed's payments system.

[2]This rough characterization will suffice for the purposes of this essay. To the reader who wishes to recast our argument in the most explicit and careful form, we recommend the discussion of comparative advantage in any standard text on the economics of international trade.

[3]The term *bank* refers broadly in this essay to depository institutions and other financial institutions that, for reasons of public policy, are permitted to hold accounts at the central bank.

[4]Evidence is provided by the role of friction with the state banks, and their consequent opposition, in defeating renewal of the charter of the Second Bank of the United States. The actions of the Second Bank of the United States were lawful, in conformity with sound banking practices, and inspired by defensible considerations of public policy. Nevertheless those actions were bitterly resented because they forestalled some private-sector banks from doing legitimate business. See Catterall 1902, pp. 166, 451.

[5]In particular, we regard it as being consistent with the White Paper on the role of the Federal Reserve in the payments system.

[6]One such rationale would be fostering the transition to an electronic-based retail payments system, which would already be well under way in the environment that we contemplate. Another rationale would be coping with market failures. We suggest that an electronic system would correct such a market failure or make it addressable by general competition policy, such as antitrust law.

[7]In addition, the Rivlin committee recommended that the Federal Reserve System play an active role, in conjunction with other payment services providers and users, in enhancing the efficiency of ACH and check clearing services and in framing strategies for moving to the next generation of payment instruments. In 1999, the Payments System Development Committee was established by the Board of Governors to help follow up on recommendations of the Rivlin committee and actively to foster innovation in the payments system, where this is in the public interest.

[8]It is true that a number of such commercial networks ultimately rely on Reserve Bank payment services (for example, the Fed ACH) to transfer funds between their members' reserve accounts for final settlement. When the Reserve Banks play such a limited, specialized role in support of payment services in which they do not directly compete, they contribute to the integrity of those services and provide a means to transfer funds among a more inclusive group of participants than might otherwise be cost-effective. By playing this role, the Reserve Banks also enhance competition, because both incumbent service providers and potential entrants have the option to settle on the Reserve Banks' books. In other words, this is an example of the Reserve Banks promoting the Fed's payments system goal by offering an interbank settlement service that supports private payments initiation and clearing.

[9]It might be suggested that, in contrast to the way that we treat them here, regulation and direct provision of services are not completely distinct, unrelated alternatives. Indeed, some would emphasize that the Reserve Banks' fairly broad participation in markets for payment services makes the Federal Reserve a better informed, and thus more skillful, regulator than it might otherwise be. We agree that there is such a complementarity in principle, but we are not convinced that it is important in practice. It

has not been recognized as important in other industries, such as broadcasting, transportation, and power generation and distribution, where issues of regulation have been studied more intensively than in the payments industry. A strong and complete case for complementarity in the payments industry would therefore have to identify a special feature of the industry that makes it exceptional in this respect. Furthermore, the Fed already serves as an effective regulator of banks that issue credit and debit cards without participating in those markets, and no one regards regulation in this area as deficient on this account.

[10]See Montgomery 1994 for a review of much of the relevant literature.

[11]Financial economics implies that, absent specific technological complementarities among the activities of several firms, the firms' investors cannot benefit from a merger on the basis of diversification per se. From the investors' perspective, the merger has no advantage over holding a portfolio of the separate firms' securities. (See Myers 1968, 1976.) The organizational studies of which we are aware suggest that specialization is typically advantageous, but also document some instances that are presumed to be exceptions to the general rule—situations in which diversification has seemed to produce efficiencies.

[12]The Federal Reserve, like almost all central banks, has the exclusive authority to issue and destroy currency. However, this authority is exercised in coordination with the Treasury and primarily to accommodate the preferences of banks and the public regarding the proportion of total central-bank liabilities that should be outstanding in the form of currency as opposed to banks' balances at the Reserve Banks. For these reasons, we do not consider currency provision in this essay. However, the strategic core might alternatively be defined to include currency provision.

[13]The leading example is the founding of the Bank of England. North and Weingast (1989) study this history and show that the establishment of a central bank greatly benefited England. Sargent and Velde (1995) show the subsequent value of the Bank of England to British public finance during the 18th century. Sargent (1986) provides a set of historical studies of the role of an independent central bank in controlling inflations and hyperinflations in various countries during the 20th century, as well as a theoretical study (Sargent and Wallace 1981) that provides an analytic framework for understanding the historical episodes.

The central bank's function as intermediary between the government and its creditors does imply that the central bank will be a major user of the payments system, but we think that this function should not be a principal ground for it to play a role of strategic leadership in the payments system. Part of the government-finance intermediary role can be for the central bank to manage the making and receiving of payments for the government. This is the fiscal agency responsibility that the Federal Reserve Act assigns to the Reserve Banks. Given the volume of Treasury payments today, this responsibility implies that the Federal Reserve will be among the most intensive users of the payments system. However, the fiscal agency mandate properly involves conservative, cost-effective satisfaction of the government's direct payment needs. It should not be regarded as authorizing the central bank to provide what would be, in effect, off-budget financing for a broad program of government-sponsored investment in the payments system per se without appropriate budgetary oversight by Congress. (Broaddus and Goodfriend (1996) explain, in the context of the issue of foreign-exchange-market intervention, why central-bank funding of broad Treasury initiatives risks disturbing the institutional balance between the central bank and the government on which control of inflation depends in the long run.) Recent legislation requiring the Treasury to report the value of services it receives from the Federal Reserve helps to address the potential problem of circumventing congressional oversight, but this development does not release the Federal Reserve from responsibility to be circumspect in its role as the government's fiscal agent.

[14]Goodhart (1988) emphasizes this function.

[15]On this understanding, the central bank occupies a position of comparative advantage regardless of whether account balances there are intrinsically less subject to default than balances held at other banks—a question regarding which there has been long-running debate in monetary history and economics.

[16]Goodhart (1988) examines in detail the concurrent evolution of clearinghouses and central banks. Regarding government oversight, while this may be less prominent in the case of clearinghouses than of central banks, clearinghouses are typically subject to antitrust law and also to prudential supervision (often by the central bank) in cases where issues of systemic risk are judged to exist.

[17]Analogously, many credit unions are members of special jointly owned, government-regulated intermediaries called *corporate credit unions.*

[18]However, central-bank operation of interbank settlement is not universal. We note above that Switzerland's SIC system is operated by a private joint venture under central-bank oversight. In addition, the Bank of Canada is a regulator and guarantor of the Large Value Transfer System and the Bank of England is a co-owner of the CHAPS Clearing Company, but neither system is operated directly by the central bank.

[19]Incidentally, to the credit of the Fed's financial services staff, the Reserve Banks have consistently recovered costs and generally earned the acclaim of their customers in these difficult-to-serve markets.

[20]A bank that does not have an account of its own at a Reserve Bank can also participate in the Multilateral Settlement Service, provided a bank with a Reserve Bank account agrees to act as its settler by accepting the non–account-holding bank's debits and credits in its Reserve Bank account.

[21]It also significantly facilitates the provision of same-day settlement finality for net settlement arrangements, a longstanding goal of the Fed's interbank settlement function.

Appendix A
The Federal Reserve's Objectives Regarding the Payments System and Payment Services Provision

Here we survey the Fed's payments system objectives as articulated in the White Paper.

The White Paper (FR Board 1990, pp. 293–4) states that "the Federal Reserve will continue to bring to payments markets an overall concern for safety and soundness, promotion of operating efficiency, and equitable access. Indeed, those considerations relating to integrity, efficiency, and access to the payments system will remain at the core of the Federal Reserve's role and responsibilities regarding the operation of the payments system." The three key words that signify the Fed's broad payments system objectives—integrity, efficiency, and accessibility—have been repeatedly reaffirmed.

The White Paper and other Federal Reserve documents interpret more specifically what those three objectives mean. With regard to integrity, the White Paper not only offers "safety and soundness" as a synonym, but also goes on to explain (FR Board 1990, p. 294) that "a reliable payments system is crucial to the economic growth and stability of the nation. The smooth functioning of markets for virtually every good and service is dependent on the smooth functioning of banking and financial markets, which, in turn, is dependent on the integrity of the nation's payments system." It cites payment breakdowns during the Panic of 1907 and in the wake of the 1974 failure of Bankhaus Herstatt in Germany as examples of financial disruptions that the Fed seeks to minimize. It suggests that the Fed's roles in providing a reliable interbank settlement mechanism and payments system access to failing institutions help prevent such breakdowns.

The White Paper does not explicitly define efficiency, but by implication and context it seems clear that a standard notion of economic efficiency is intended. Loosely speaking, this notion implies that the social cost of the resources used to provide the prevailing level of payment services cannot be reduced and that it is not possible to make everyone better off by least-cost provision of more or less of some payment services. In a dynamic economy, this notion also encompasses efficiency over time, including appropriate investment in new technologies and development of new services.

The Fed's goal of promoting access to payment services primarily refers to access by *banks* (defined to include thrifts, mutual savings banks, and credit unions). As indicated in the White Paper and elsewhere, the Fed does not necessarily aim directly at promoting payments system access by consumers and nonfinancial businesses.* Instead it seeks to ensure that banks have equitable access to interbank payment services in order that the banks in turn can make a broad range of payment services available on competitive market terms to U.S. consumers and nonfinancial businesses.

The White Paper explicitly ties the Reserve Banks' role as payment services provider to the Fed's general payments system objectives. It (FR Board 1990, p. 293) states that "the role of the Federal Reserve in providing payment services is to promote the integrity and efficiency of the payments mechanism and to ensure the provision of payment services to all depository institutions on an equitable basis, and to do so in an atmosphere of competitive fairness." That is, the Reserve Banks engage in payment services provision as a means of pursuing the Fed's overall payments system objectives.

Appendix B
Interbank Settlement and the Emergence of Central Banks

Here we examine in more detail the development of corresponding banking arrangements that paved the way for the emergence of central banks as hubs in national payment networks. (See Goodhart 1988 for a detailed analysis.)

We cast our discussion in terms of check transactions, which were the principal form of transactions (for both large- and small-value payments) from the mid-19th century until the Federal Reserve introduced the precursor to Fedwire, its wire transfer service for large-value payments, in 1918. The points that we make here are as valid for electronic payments as for checks, however.

To begin, consider how transfers of bank balances are used to make payments in an economy with only one bank. A person (household or firm) holds wealth in a demand account with zero or very low return, primarily in order to make payments. Payment by transfer of a bank balance is acceptable to a payee because it is secure against both theft and loss of market value and because it is verifiable. Payment by transfer of bank balances is mutually advantageous to the payor and payee because it is fairly inexpensive, so that the cost of making a payment does not eat up the gain to trade.

Now consider what happens when there are several banks. It would probably be infeasible, and would certainly be inefficient, for each person to have an account at every bank. Unless two traders happen to have accounts at the same bank, no individual banker can make payments for them in the way that has just been envisioned. Payment requires a way to get funds from one bank to another. Now, if there are relatively few banks (as in Canada, until recently), a solution to this problem is for every bank to have an account with every other bank. Suppose that, with this arrangement in effect, person *A* writes a check for $1,000 to person *B*, who has a different bank from *A*. Person *B* takes the check to his or her bank, which in turn presents it to *A*'s bank. Person *A*'s bank debits $1,000 from *A*'s account and credits $1,000 to the account of *B*'s bank at *A*'s bank. Person *B*'s bank then credits $1,000 to *B*'s account. Over time, there will be payment flows from account holders at *A*'s bank to account holders at *B*'s bank and vice versa. Then—say, when the balance in each bank's account at the other is above $1 million—the banks can agree to reduce those balances by offsetting amounts of up to $1 million without any funds actually having to be transferred. Banks' ability to make such reductions of offsetting payments, known as *bilateral netting*, can keep the cost of making payments by interbank transfer almost as low as by transfer of balances within a single bank. Only where there is persistent asymmetry in the payment flows between the two banks does it become necessary to make an actual money transfer, which typically does involve significant cost.*

During the period 1837–1913, the United States did not have a central bank. The regime of interbank payments just described was, in principle, how the U.S. payments system operated. However, since there were too many banks for it to be advantageous for every bank to have an account at every other one, a system of correspondent banking arose. Actually, there was a hierarchy of correspondent banks. Each small city had one or more correspondents that served the local banks, each major city had several correspondents that served the correspondent banks of the smaller cities of that region, and New York City had a number of banks that were correspondents for the regional correspondent banks across the country. If *B*'s bank did not have an account at *A*'s bank, then it presented *A*'s check to a third bank—the correspondent bank—at which both it and *A*'s bank had accounts, and the correspondent bank transferred the amount of the check from the account of *A*'s bank to the account of *B*'s bank. Moreover, if there was a cycle of offsetting payments—$1,000 from *A* to *B,* $1,000 from *B* to *C,* and $1,000 from *C* to *A*—then the payments that were induced between these payors' banks canceled. Correspondent banking thus provided the possibility of economizing in the payments process by *multilateral netting,* which reduced the need to make actual money transfers even below the level that would have been required under bilateral netting.

Offsetting interbank payments such as we have just discussed typically are not simultaneous. If a correspondent bank waits until receipt of an offsetting payment in order to do netting, rather than debiting the bank on which the first check is drawn, then either the bank that presents the first check or the correspondent bank is extending credit to the paying bank of that first check. For example, if *A*'s bank deposits a check to *A* from *B* in the morning and the correspondent bank promptly credits the amount of the check to the account of *A*'s bank, while *B*'s bank does not deposit a check for an equal amount to *B* from *A* (or payable to and from any two customers of the respective banks of *B* and *A*) until the afternoon, then the correspondent bank is making a loan to *B*'s bank over the midday period. However, if the correspondent bank waits until an offsetting check is deposited with it to credit the account of *A*'s bank while not debiting the account of *B*'s bank (which would constitute gross payment rather than net payment), then *A*'s bank is extending credit to *B*'s bank over midday, in effect. Because the correspondent bank has an ongoing relationship with each of its respondents, its credit is typically more acceptable to the presenting bank than the credit of a payor bank that the presenting bank may not know well. When the correspondent bank provides credit in this way, it has the option, in effect, to insure the value of the payment to the presenting bank.** That is, the correspondent irrevocably credits the account of the paying bank at the time of presentment. Such an arrangement is said to provide *immediate finality.* Particularly in the case of large-value payments, interbank payments are made more efficient by the provision of legal and practical immediate finality in this way.

The roles that large correspondent banks played in netting interbank obligations and extending credit to facilitate interbank settlement were, in our view, the core payments system roles assumed by the Reserve Banks and other central banks.

Appendix C
Functions Complementary to the Core

Here we explain the possible economy of scope between the core and complementary functions of a central bank.

An economy of scope exists when there is a technological reason to produce several goods or services jointly rather than separately. For example, since jet fuel, gasoline, heating oil, lubricating oil, and so forth are all constituents of petroleum that are gotten by cracking the petroleum into the separate constituents of its mixture, there is an economy of scope in operating a refinery. It is obviously better to produce all of these products jointly than to try to produce them separately.

In central banking, there could be an economy of scope between a core function and a payments function outside the core. In such a case, if the central bank performs the core function, the public is well served (other things being equal) by having it perform the additional function as well.

As an example, we are inclined to think that the Fed's Multilateral Settlement Service enables depository institutions to take advantage of an economy of scope between settlement services

and risk management services utilizing the Fed's Account Balance Monitoring System (ABMS). The ABMS is a computer system that provides the option to monitor, in real time, the reserve account of a depository institution. This system is used for risk management of Fedwire, the Reserve Banks' real-time gross settlement system for large-value payments. Recently, the Federal Reserve established the Multilateral Settlement Service, which enables check clearinghouses, credit card networks, and other entities to use the ABMS for risk management of their private (usually net settlement) payment arrangements. Given that the Fed has already built the ABMS and is operating it for internal use and that the incremental cost of granting access to these other entities is small, there is an economy of scope here.

The economy of scope in this central-bank example is much subtler than the one in petroleum refining. In fact, it is typically true that careful statistical analysis is required to document an economy of scope convincingly. When and if such an economy of scope does exist, it provides a prima facie reason for a central bank to expand its payments system activities in a particular, targeted way beyond its core functions.

Even where an economy of scope may demonstrably exist, one must weigh several questions before deciding that central-bank participation in a payments market is the best form of policy. For example, if the economy of scope were an artifact of regulation, then would revising or removing the regulation be preferable to expanding the role of the central bank? Does adoption of new technology (such as movement from paper-based check collection to electronic payments) remove an old economy of scope or create a new one, and, if so, should the range of central-bank activities be adjusted? We emphasize that an economy of scope is a threshold condition for the central bank to examine judiciously whether it ought to undertake an activity outside its core function, and does not alone constitute an open-and-shut case for such activity.

Appendix A

*The Federal Reserve is responsible for administering certain laws and regulations that deal directly with consumer and small business payment matters. However, the Fed does not have general responsibility or authority for ensuring consumer and nonfinancial business access to the payments system.

Appendix B

*Before the Reserve Banks provided a streamlined interbank settlement service, there was a large, direct cost in the form of expensive shipment of currency or gold. Today there remains a cost, albeit a much smaller one, associated with the opportunity cost of holding wealth as balances to effect settlement rather than investing it in productive projects.

**That is, the correspondent bank has the option to offer its respondents a contract to this effect. In some cases, the correspondent may be required by law to do so.

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The Fed staff has also speculated on the possibility. Earlier this month my good friend David Kotok sent around links to several academic and central bank negative-rate studies. One was a 2012 article by Kenneth Garbade and Jamie McAndrews of the Federal Reserve Bank of New York. Their title tells you what they thought at the time: â€œIf Interest Rates Go Negativeâ€¦Â Having decided to put NIRP on the list, the Fed has to make sure the banking system can handle it. Whether it can is far from clear right now. The technology issues alone could unleash chaos if the Fed went negative without warning.Â I didnâ€™t even mention the Fedâ€™s stock market scenario in the right column above. It shows the Dow dropping almost to 10,000 by the end of this year and recovering very slowly. Green EJ, Todd RM (2001) Thoughts on the Fedâ€™s role in the payments system. Fed Reserve Bank Minneapolis Q Rev 25(1):12â€“27Google Scholar. Griliches Z, Ringstad V (1971) Economies of scale and the form of the production function. North-Holland, AmsterdamGoogle Scholar. Hancock D, Humphrey DB, Wilcox JA (1999) Cost reductions in electronic payments: the roles of consolidation. Economies of scale, and technical change. J Bank Finance 23:391â€“421CrossRefGoogle Scholar. Actually, the Fed carries out open market operations only with the nation's largest securities dealers and banks, not with the general public. In the case of an open market purchase of securities by the Fed, it is more realistic for the seller of the securities to receive a check drawn on the Fed itself. When the seller deposits this in their bank, the bank is automatically granted an increased reserve balance with the Fed. Thus, the new reserves can be used to support additional loans. Through this process, the money supply increases.