

The Federal Reserve's Role in Retail Payments: Adapting to a New Environment

By Stuart E. Weiner

The U.S. retail payments system is in the midst of a transformation. The shift from paper to electronics, the emergence of new instruments and payments channels, the rise in nonbank participation, the change in risk profiles—all are elements of this new landscape. The Federal Reserve takes as one of its mandates fostering a payments system that is safe, efficient, and accessible. How does the Federal Reserve fulfill this mandate in this new environment?

Since its beginning, the Federal Reserve has played a crucial role in the U.S. retail payments system. From time to time, that role has been reevaluated, for example, in the 1980s with the publication of the White Paper and in the 1990s with the report of the Rivlin Committee.¹ The current environment suggests the time may be right for another examination.

Other central banks are facing similar issues. The Bank for International Settlements (BIS), for example, has published two important studies in recent years analyzing the role of central banks in retail payments and payments oversight. The European Central Bank (ECB) also

Stuart E. Weiner is vice president and director of Payments System Research at the Federal Reserve Bank of Kansas City. The author thanks his colleagues at the Federal Reserve Bank of Kansas City and Marc Andries, Ron Berndsen, Robert Lindley, Ben Norman, Simonetta Rosati, Jeff Stehm, Larry Taft, and Maria Iride Vangelisti for valuable discussions and information. This article is on the bank's website at www.KansasCityFed.org.

has examined such issues and has recently proposed a framework for the oversight of card payment schemes and standards. The Reserve Bank of Australia has just completed a review of its policies with respect to retail payments, and the Bank of England would be granted explicit payments oversight authority under a bill recently sent to Parliament. Experience in these and other countries may be helpful in thinking about the Federal Reserve's future involvement in payments.

This article reexamines the Federal Reserve's role in retail payments in light of the evolving payments system. The first section reviews the changing U.S. payments landscape. The second section explores conceptual issues inherent in central bank involvement in retail payments, covering objectives, roles, and economic rationales. The third section examines perspectives from other countries that may prove useful. The fourth section assesses current Federal Reserve involvement in retail payments, while the fifth section looks to the future, offering a framework for thinking about key issues. The article closes with a brief summary. The principal message of the article is the Federal Reserve will likely continue to play an important role in retail payments. However, given the evolution of the payments system, the role the Federal Reserve plays and the rationale for this role may be different than they have been in the past.

I. THE EVOLVING U.S. PAYMENTS LANDSCAPE

It has become commonplace to describe the U.S. retail payments system as currently undergoing a fundamental transformation. But in fact this is true—unprecedented changes are occurring along many dimensions. Payments methods are shifting dramatically from paper to electronics. Payments processing is taking place amidst relentless technological change. Risk profiles are shifting. Market structures are changing, with rising concentration and controversial pricing increasingly reaching the public spotlight. And nonbanks are becoming more prominent throughout the payments chain.

The shift toward electronic payments has been striking. The most recent Federal Reserve study indicates that electronic payments now exceed two-thirds of all noncash payments. As recently as eight years ago, electronic payments' share was only 42 percent, and at the beginning of the 1980s, it was only 14 percent. According to 2006 data, 16

percent of all noncash transactions are now ACH payments, 23 percent are credit card payments, and 27 percent are debit card payments. ACH and debit card transactions are growing at particularly rapid rates—19 percent and 18 percent, respectively, over the past three years.²

This shift toward electronic payments is both organic and reflective of new payments methods. Traditional ACH transactions—for example, payroll deposits and government disbursements—and traditional credit and debit card transactions at point-of-sale (POS) continue to grow solidly. But Internet transactions; lockbox, POS, and backroom check conversion; and stored value, decoupled debit, and contactless payments also underlie the surge in electronics. And mobile phone payments may be on the horizon as well.³

A breakdown of ACH statistics is particularly revealing. In 2003, traditional ACH payments numbered 6.6 billion and accounted for 87 percent of all ACH transactions. New, nontraditional ACH payment types—such as check conversions and ACH Internet payments—numbered 1.0 billion and accounted for the remaining 13 percent. In 2006, just three years later, nontraditional payments numbered 4.1 billion, and their associated share had risen to 33 percent.

Accompanying, and in large part driving, these developments have been dramatic technological advances in computing power and telecommunications. One result has been large and growing economies of scale in payments processing. Another has been growing complexity and interrelatedness in technical and business relationships, potentially implying higher vulnerability to “single points of failure.”⁴ Risk profiles have accordingly shifted, with new sources of system-wide risk, operational risk, and fraud risk likely present in this new environment.

Central banks have long been concerned with systemic risk. Systemic risk is the risk that the failure of one party in a payments system will lead to the failure of other parties in the system, having a domino effect that may eventually be transmitted to other parts of the financial system or economy. But system-wide risk is nearly as problematic. System-wide risk, a term coined by the Bank of England (2000), refers to situations in which a disruption to a particular payment system could have a significant impact on that system, although not necessarily have repercussions in other parts of the financial system.⁵ Disruptions in retail payment systems, in particular, could have such system-wide impacts.

System-wide risk can arise from several sources, including operational failures and security breaches. In today's highly complex, interrelated payments environment, an operations malfunction at one key firm can quickly be transmitted to other firms. Similarly, security breaches, identity theft, and other types of payments fraud can rapidly impact multiple participants.⁶

Industry structures in retail payments are evolving as well. One example is the increased concentration of credit, debit, and ATM markets. The top three issuers of credit cards, for example, now account for over 60 percent of the total value of Visa and MasterCard transactions, almost double that of a decade ago. In the debit card market, Visa's combined market share of signature and PIN debit has increased some ten percentage points over the same period, to over 60 percent. And in the ATM market, concentration ratios for ATM ownership, drivers, and independent sales organizations (ISOs) all continue to drift higher.⁷

A second structural change is the increased prominence of nonbanks in the payments system. Nonbanks have always been present, but today they are more visible and more prevalent than ever before. A typical transaction may involve more than 50 distinct payment activities, ranging from back-office processing, to routing of transactions, to the provision of new instruments and payment channels. Recent research reveals that nonbanks play an important role in virtually all of these activities and, in some cases, a dominant role. And this holds true for traditional payment types as well as emerging payment types. Nonbank presence is being felt throughout the industry.⁸

In short, the payments industry has become remarkably dynamic and quick-moving, affecting all participants, including the Federal Reserve.

II. CENTRAL BANK INVOLVEMENT IN RETAIL PAYMENTS: CONCEPTUAL ISSUES

Central banks throughout the world seek strong economies and stable financial markets. These goals, in turn, rest to a considerable degree on well-functioning payment systems. Central banks rely on a number of objectives, roles, and economic rationales in formulating and implementing payments policies.

Central bank objectives and roles

Safety and efficiency are the principal objectives of central bank retail payments policy. Virtually all central banks stress safety, and most stress efficiency. Some central banks also highlight accessibility—for example, the Federal Reserve.⁹ Others add competitive conditions as an explicit objective—for example, the Reserve Bank of Australia.

Fostering safety in retail payments is typically interpreted broadly as seeking an environment in which economic agents are able to undertake transactions smoothly and securely. In some cases, central banks use the alternative term, integrity, to describe this objective. Integrity arguably is a richer, more informative term in that it draws attention not only to the safety and soundness of individual payments entities but also to the safety and soundness of a payments system operating as a whole. A retail payments system must have integrity—it must be reliable, and it cannot be vulnerable to disruption or failure at any point along the payments chain.

Fostering efficiency in retail payments is similarly broadly interpreted. While rarely formally defined, most central banks appear to regard an efficient payment system as one that uses a minimum of economic resources for a given level of economic activity. Efficiency, of course, is influenced by such factors as technology, innovation, market structure, and competitive conditions, all of which are taken into consideration to some degree by central banks.

Central banks serve three principal roles in retail payment systems: operator, facilitator (catalyst), and regulator (overseer). The level and type of involvement in these three roles vary widely across central banks, reflecting different histories, institutional structures, and legislative authorities. As noted by the BIS, virtually all central banks play at least a minimal operational role by providing settlement services, and a majority also act in some capacity as facilitators or catalysts (2003, 2005).¹⁰ A number of central banks also have explicit oversight responsibilities.

The operator role of central banks falls along a spectrum. In almost all countries, central banks offer final settlement on their books for some retail payment systems. Some central banks also provide direct clearing services for some retail systems—the Federal Reserve, for instance, provides check collection and ACH services in the United States. In addition, many central banks provide retail payment services

to government agencies, and some maintain databases for security and fraud-mitigation purposes.

The facilitator or catalyst role of central banks also falls along a spectrum. Activities range from maintaining contacts with private sector firms, to conducting research on important payments topics, to encouraging and initiating various market outcomes. Central banks sometimes work with other public authorities in their catalyst role and also often draw on their strong relationships with their country's financial institutions and banking and payment associations.

It is in their role as regulators or overseers that central banks' involvement in payment systems has evolved the most in recent years. As the BIS reports:

The concept of central bank oversight of payment and settlement systems has become more distinct and formal in recent years as part of growing public policy concern with financial stability in general. (...) It is only relatively recently that oversight has become a function that is more formal and systematic—namely a function whereby the objectives of safety and efficiency are promoted by monitoring existing and planned systems, assessing them against these objectives and, where necessary, inducing change. However, although recent, this development in the nature of oversight has been rapid and the function has now come to be generally recognized as a core responsibility of central banks. (2005)

As in the case of operator and facilitator involvement, the level and type of oversight activity vary considerably from central bank to central bank. Some central banks have explicit legal authority and powers for retail payments oversight. Others have less well-defined authority and powers. Oversight activities can range from general monitoring of payment market developments, to establishing industry rules and standards, to onsite supervision of specific firms and networks.

Specific information on the operator, facilitator, and overseer roles performed by many of the world's major central banks is provided in Section III below.

Central bank economic rationales

Central bank involvement in retail payments is almost always undertaken in furtherance of one or more of the overriding objectives dis-

cussed above. So, at its most general level, a central bank's involvement is almost always grounded in broad public policy considerations. But often underlying these broad public policy rationales are more distinct economic rationales. Sometimes these economic rationales are made explicit, sometimes they are not.

Comparative advantage and economies of scope. One economic rationale underlying payments policy is comparative advantage and economies of scope. Virtually all central banks maintain reserve or settlement accounts on behalf of major financial institutions. Because of this, it is sometimes argued that central banks have a comparative advantage in performing intrabank funds transfer services—there may be economies of scope between maintaining these accounts and providing funds transfers among these accounts.¹¹ This comparative advantage/economies of scope consideration, along with a near-universal concern over systemic risk (see below), is the reason why most central banks in fact operate large-value (wholesale) payment systems. While economies of scope are typically not offered as a rationale for retail payments involvement, the possibility has been raised.¹²

Market failures. A second economic rationale underlying payments policy is market failures. A market failure is generally defined as a situation in which market forces lead to an inefficient allocation of resources. This can mean that a given service or product is being produced at a higher cost than necessary, or that a service or product that is being produced is not fully consistent with the preferences of consumers. Assessing whether a market failure is present can be a difficult task, however, and gray areas abound. In payments markets, market failures can potentially arise for a number of reasons.¹³ It is convenient to group these into three categories: externalities, noncontestable monopolies, and asymmetric information.

An *externality* exists when the benefits or costs accruing to an individual agent taking an action do not coincide with the benefits or costs accruing to society as a whole as a result of that action. Externalities can be either negative or positive.

One example of a negative externality is that associated with *systemic risk* in payments systems. Systemic risk can arise from externalities because individual agents conducting transactions in a given payment system will not take into account the effect that a late payment

or insufficient funds on their part could have on the system as whole. Central banks throughout the world devote considerable resources to monitoring and evaluating large-value payments systems and any associated systemic risk.

Another, related, example of a negative externality arises in the context of *underprovision of safety measures* in a payments system. Payment systems typically involve a large number of entities, including networks, banks, processors, merchants, security firms, Internet service providers, and so on. Schreft (2007) has noted that a data breach at any one of these entities could have a major impact on all of the others, but individually, none of the entities has an incentive to take this interdependence into account when making security investments. As a result, safety measures could well be inadequate for the system as a whole.

A third example of an externality, this time a positive externality, arises in the context of so-called *network effects*. Payments products and services often involve networks that require a critical mass of participants on two sides of a market. For example, enough merchants must be willing to accept a specific form of payment for consumers to use that form of payment, and enough consumers must use that form of payment for merchants to install the necessary hardware and software to accept that form of payment. But because individual incentives do not take into account such “network effects,” such products and networks may not develop, even though consumers and merchants, once the product or network was in place, would benefit.

Closely related to this are *coordination difficulties*. Situations may arise in payments markets where coordination among participants would be beneficial to all concerned—for example, adoption of uniform standards, adoption of a common technology, or use of a single shared resource. But agreement on a specific standard, technology, or business practice may be difficult to achieve since participants will typically vary in size and preferences, and some may be tempted to “free-ride”—that is, bear little or no cost—on any agreement that might be made. Such coordination difficulties are another example of an externality, in which the benefits to participants in sum are greater than the benefits to individual participants. The result is an underprovision of services or products.

A second type of market failure potentially impacting retail payments is *noncontestable monopolies*. Because there are large economies of scale in processing electronic payments, it may be cost-efficient for just a small number of firms to operate. But this, in turn, may give these firms significant market power, which can lead to monopoly or near-monopoly pricing and provide insufficient incentive for innovation. If such firms believe they have potential competitors who could enter their market—that is, if their market is “contestable”—competitive conditions could still prevail. But in the absence of credible contestable threats, economies of scale can lead to a monopolistic or near-monopolistic market structure.

A third type of market failure potentially impacting retail payments is *asymmetric information*. An example is when a seller of a payments service knows more about the security features of that service than a potential buyer (Schreft 2007). Naturally, the seller wants to highlight the positive features of the product but has little incentive to reveal any negative features, for example, poor fraud protection. If the buyer is able to find another seller selling the same service but with better fraud protection, there is no problem. But if such information is difficult to verify, sellers with strong fraud protection are unable to differentiate their product and hence have little incentive to provide this protection. As a result, this asymmetric information can lead to lower average fraud protection than some buyers would be willing to pay for.

Public goods. A final economic rationale potentially underlying payments policy is so-called public goods. A public good, once supplied, can be consumed by all without limiting the consumption of others. Because a public good is available to everyone, individuals have little incentive to pay for additional increments of the good since they will be able to enjoy any additional increments paid for by others—this is the so-called “free-rider” effect. The result is an underprovision of the good.

Some have argued that payment system safety and efficiency are examples of public goods and have used this line of reasoning to suggest a role for central bank involvement. At its core, however, is the more fundamental rationale of externalities. As noted above, externalities can lead to an underprovision of safety measures. And network effects and coordination difficulties can lead to an underprovision of efficient payments products and services.

III. PERSPECTIVES FROM OTHER COUNTRIES

As noted in the previous section, the extent to which central banks engage in the three principal roles of operator, facilitator, and overseer in retail payments varies considerably across countries. This section provides specifics for a number of central banks, drawing on two important studies by the BIS (2003, 2005) as well as country-specific documents.¹⁴ While every country is different and generalizations are difficult to make, retail payment considerations—and oversight of retail payment systems in particular—is increasingly becoming a priority of central banks.

Operator role

The central banks of all G10 countries and Australia provide settlement services for some, although typically not all, retail payment systems. This settlement takes place on the books of the respective central banks. Depending on the particular country, payment systems making use of this service include paper-based systems, usually checks; direct debit and credit transfer systems; some debit card and ATM systems; and some e-money systems. Credit card systems, in contrast, typically do not make direct use of central bank settlement services, nor do postal and other giro systems.

Although much less common, some central banks also offer direct clearing services to various retail payment systems. In the United States, as noted, the Federal Reserve provides both check collection and ACH services. The central banks of Germany, Italy, and Belgium are similarly involved, providing assorted check, direct debit, credit transfer, ATM, and payment card clearing services. The Reserve Bank of Australia also is involved as an operator but in a limited way, calculating the net settlement obligations for a number of retail systems.¹⁵

In addition to clearing services, many central banks offer various retail payment services to other branches of government. And, at least two central banks operate databases for payment security purposes. The Bank of France maintains two national databases focusing on check-related matters, while the Bank of Italy manages a database directed at both check and payment card incidents.¹⁶

Facilitator role

The facilitator or catalyst role is an important one for central banks. Most central banks have established close relationships with private sector participants in order to maintain an active dialog over payment system developments and, at times, to promote specific initiatives. In some countries, these relationships are formal—in Australia, Canada, France, Switzerland, and the U.K., for example, the central bank is represented on the board of the country's payments association (BIS 2003). In other countries, the relationships may be less formal but no less influential. The Federal Reserve's role in promoting Check 21, a law that facilitates check truncation, is an example.¹⁷

Several central banks have been at the forefront of promoting industry change. The Bank of Canada, for example, was an important supporter of the public key infrastructure (PKI) initiative. The Bank of Japan has played an important role in establishing standards for payments infrastructures. In Switzerland, the central bank is represented on all relevant committees that propose and implement changes to existing clearing and settlement systems, and in the Netherlands, the central bank has been instrumental in establishing a more integrated retail payments infrastructure. BIS (2003) lists several additional initiatives.¹⁸

In addition to promoting and sometimes initiating important changes in retail payments systems, central banks also serve as catalysts by undertaking important research projects. Central banks, because of their public policy orientation, may be able to study important trends and developments in an impartial way, furthering understanding of the payments environment. They may be able to draw on a range of otherwise unavailable proprietary data and information, undertaking studies that otherwise could not be completed. Several important studies, such as the Federal Reserve's retail payments usage studies, provide examples of this important catalyst activity.¹⁹

Overseer role

As noted earlier, it is in the area of oversight that central bank involvement in retail payments has evolved the most in recent years. A number of central banks—including the ECB and the Eurosystem national central banks, the Bank of England, the Swiss National Bank, the

Bank of Canada, the Monetary Authority of Singapore, and the Reserve Bank of Australia—have reevaluated or altered their oversight stance.

Central bank oversight encompasses a range of systems, participants, and instruments, as well as a mix of different activities. Moreover, it is conducted under varying levels of authority and power.

Oversight scope. The scope of payments oversight varies widely among central banks. Virtually all central banks oversee the large-value (wholesale) payment systems operating in their countries since these systems are viewed as systemically important payment systems (SIPS).²⁰ But several central banks—for example, the Bank of Japan, the Bank of Sweden, and some Eurosystem central banks—also have designated one or more retail payment systems as systemically important, and hence, they too are subject to oversight (BIS 2005, ECB 2008c).²¹

In addition, some Eurosystem central banks oversee retail payment systems that are judged not to reach a level of systemic importance but rather are judged to be payment systems of prominent importance, or “PIPS.” PIPS are defined as “systems that play a prominent role in the processing and settlement of retail payments and whose failure could have major economic effects and undermine the confidence of the public in payment systems” (BIS 2005).²² This “prominently important” notion appears similar to the “system-wide risk” concept developed by the Bank of England, which was discussed earlier. Outside of Europe, other central banks—for example, the Bank of Canada and the Reserve Bank of Australia—have adopted comparable, broader approaches to assessing which retail payment systems, if any, to oversee.²³

The scope of retail payments oversight extends beyond payment “systems” to potentially include payment participants and payment instruments as well. Some central banks include select industry participants in formal oversight programs—for example, network operators or payments processors.²⁴ Other central banks directly oversee specific payment instruments.²⁵ In some cases, a central bank’s oversight program includes all three components.

Oversight activities. Retail payments oversight activities can be grouped into three broad areas: monitoring, assessment, and inducing change (BIS 2005). Monitoring activities can take many forms, including evaluating publicly available information, requiring specific information and compliance self-assessments, and conducting onsite

inspections. The BIS reports that a majority of surveyed central banks can require the systems they oversee to provide information and to submit to onsite inspections. It also notes that cooperation among central bank overseers and other banking or securities regulators is desirable in order to avoid duplication and to share information.

Assessment activities are straightforward. In light of a central bank's stated objectives, typically safety and efficiency, how is a given payment system, participant, or instrument performing? Central banks use different benchmarks and criteria to make such assessments. Three recent examples are found in comprehensive reports from the Bank of England (2008), the Dutch Central Bank (De Nederlandsche Bank 2008), and the Reserve Bank of Australia (2008a).

Finally, inducing change can be effected through a variety of means. Moral suasion, public release of assessments, voluntary agreements, and outright mandated changes can all be employed. Regarding the last, the BIS reports that a large number of central banks have direct statutory powers to require change (BIS 2005). This topic of oversight authority is taken up next.

Oversight authority. The sources of authority that central banks have for payments system oversight vary a great deal. A number of central banks have their oversight responsibility set out explicitly, but in general terms, in broad laws or treaties. Examples include the ECB, the Bundesbank, the Bank of Japan, and the Swedish central bank. Other central banks have their responsibilities explicitly set out in considerable detail in specific oversight legislation. Examples in this category include the Bank of Canada, the Dutch Central Bank, the Reserve Bank of Australia, the Hong Kong Monetary Authority, and the Monetary Authority of Singapore. A third set of central banks has been characterized as lying somewhere between these first two groups in that "they have an explicit reference to oversight responsibilities in the law or treaty setting out their functions that is more detailed than that of the first group although not as comprehensive as that of the second group" (BIS 2005). These banks include the central banks of Belgium, France, Italy, Luxembourg, and Switzerland.

The Bank of England and the Federal Reserve fit into none of these groups. At present, the Bank of England's payments oversight responsibility is nonstatutory and is set out in a memorandum of understanding

between it, the finance ministry, and the financial services supervisor. However, a bill has recently been presented to Parliament that would give the Bank explicit statutory authority and broad responsibilities.²⁶ The Federal Reserve's authority rests on an assortment of statutes and agreements, described by the BIS as derived "from a range of statutory responsibilities for monetary policy, banking supervision, lender of last resort, and provision of payment and settlement services" (BIS 2005).²⁷

For those central banks that have explicit, detailed authority, the scope and range of their oversight activities are frequently spelled out in the relevant legislation or law. For those central banks that have less explicit or less detailed authority, the policies they pursue are more often self-defined or self-determined. But it is difficult to make generalizations because, in addition to different legal frameworks, countries, of course, have different payment infrastructures, institutions, and customs.

One general trend that can be identified, however, is the move in recent years toward clarifying, evaluating, and frequently expanding the role of central banks in payments oversight. The ECB, the Reserve Bank of Australia, the Monetary Authority of Singapore, the Bank of Canada, the Swiss National Bank, and the Bank of England are cases in point.

The European Central Bank has broad payments oversight authority and responsibility. Its mandate stems from the original 1992 EU treaty, which states that one of the main tasks of the European System of Central Banks is to "promote the smooth operation of payment systems" and, in doing so, "the ECB and the national central banks may provide facilities, and the ECB may make regulations, to ensure efficient and sound clearing and payment systems within the Community and with other countries" (ECB 2008a). Over time, the ECB has clarified and expanded its role as payments overseer—always in the context of working with the various Eurosystem national central banks—by issuing such documents as *Oversight Standards for Euro Retail Payment Systems* (2003), *Business Continuity Oversight Expectations for Systemically Important Payment Systems (SIPS)* (2006), and *Oversight Framework for Card Payment Schemes—Standards* (2008b). Recent initiatives include studying the implications of the Single Euro Payments Area (SEPA) and the Payments Services Directive (PSD), and the ECB

also plans on publishing an updated, comprehensive oversight policy statement in the near future (ECB 2008a).

The Reserve Bank of Australia derives its wide-ranging oversight responsibilities and powers largely from the Payment Systems (Regulation) Act of 1998. It may “designate a particular payment system as being subject to its regulation, determine rules for participation in that system, set standards for the safety and efficiency for that system, direct participants in a designated system to comply with a standard or access regime, and arbitrate on disputes in that system... (RBA 2008c).” Moreover, the RBA also has the power to gather information from a payment system or from individual participants. The Bank has been very active in retail payment issues, especially regarding credit and debit card markets. In September 2008 it published a review of the many reforms it has put in place in recent years (RBA 2008a).

The Bank of Canada, the Swiss National Bank, and the Monetary Authority of Singapore have also seen changes in their oversight frameworks. In 1996, the Canadian Parliament passed the Payment Clearing and Settlement Act, which gave the Bank of Canada responsibility for the oversight of payments and other clearing and settlement systems for the purpose of controlling systemic risk. Notably, the Canadian ACH system is one of the payment systems eligible for review under the Act, although to date it has not been so designated (Bank of Canada 2008). In 2004, the National Bank Act in Switzerland gave the Swiss National Bank the power to set requirements for payment systems that could potentially destabilize the financial system (Swiss National Bank 2008, BIS 2005). And in 2006, the Singapore Parliament passed the Payment Systems (Oversight) Act, which gave the Monetary Authority broad powers to gather information from operators and participants in any payment system as well as designate payment systems subject to the Monetary Authority’s regulations (Monetary Authority of Singapore 2006). The central banks of Belgium, France, Germany, Hong Kong, Italy, Japan, Luxembourg, the Netherlands, and Sweden are also operating under oversight regimes less than 15 years old.²⁸

The Bank of England is another interesting case. As noted above, historically, its oversight authority has been nonstatutory and shared with HM Treasury and the Financial Services Authority (FSA) through a memorandum of understanding. However, under the provisions of

a bill presented to Parliament in October 2008, the Bank would be granted statutory authority to oversee “recognized” payment systems, which in turn would be so designated by the Treasury in consultation with the Bank of England and/or the FSA.²⁹ In a background paper authored by the Bank, the Treasury, and the FSA, it is noted that recognized payment systems would be of systemic or system-wide importance, and that some key retail systems, such as Bacs, would possibly be included.³⁰ Under the provisions of the bill, the Bank of England could potentially engage in a broad range of oversight activities, including establishing rules and standards for the operation of recognized systems, conducting onsite inspections, and assessing penalties for noncompliance with requirements.

IV. FEDERAL RESERVE INVOLVEMENT IN RETAIL PAYMENTS: PAST AND PRESENT

Like many other central banks, the Federal Reserve has historically played a key role in the U.S. retail payments system. The legal foundation for the Federal Reserve’s involvement in retail payments is found in a number of statutes, including the Federal Reserve Act of 1913, the Electronic Funds Transfer Act of 1978, the Monetary Control Act of 1980, the Expedited Funds Availability Act of 1987, and the Check Clearing for the 21st Century Act of 2003. The Federal Reserve has emphasized three overriding objectives for payments policy: safety, efficiency, and accessibility. In recent years, the term integrity has sometimes been used in place of safety to underscore the attributes of reliability, security, and resilience in addition to safety and soundness.

The Federal Reserve acts in all three roles in retail payments: as operator, facilitator, and overseer. Its involvement as an operator is based on guidelines developed in the White Paper of 1984.³¹ The White Paper lists three criteria that must be met for the Federal Reserve to consider introducing new services: the Federal Reserve must expect to achieve full cost recovery; the Federal Reserve service must expect to provide a clear public benefit; and the service should be one that other providers alone cannot be expected to provide with reasonable efficiency, scope, and equity. The Federal Reserve’s involvement as a facilitator is usually self-initiated. The Federal Reserve’s involvement as an overseer is based on an assortment of statutes, arrangements, and agreements.

The roles and rationales for Federal Reserve involvement in retail payments have evolved over the years, as discussed next.

Operator role

Role in checks. The Federal Reserve has been an active operator in the nation's check collection process since its founding. Its early involvement can be seen as a response to the fragmented nature of the industry. Nonpar clearing was the norm, and remote locations were inadequately served. It took a few years for the Federal Reserve to have a significant impact, but by the mid-1920s, the value of checks collected by Reserve Banks had reached roughly 50 percent of the value cleared through clearing houses.³² By entering the market and ultimately becoming a prominent participant, the Federal Reserve was in effect addressing what now would be termed coordination difficulties and network effects.

This rationale for a presence in the check collection business appears similarly valid in the 1950s and 1960s, when the Federal Reserve was instrumental in working with other entities to establish the MICR standard and to develop high-speed sorting equipment. In 1956, a subcommittee of the American Bankers Association, with input from a number of industry parties, including the Federal Reserve, chose the MICR technology for encoding routing numbers and account numbers on checks. Subsequently, the Federal Reserve took a lead role in providing operational and financial support for developing high-speed sorting equipment that could process these checks. By 1965, high-speed check sorting equipment was being used extensively by the Federal Reserve and throughout the banking system.³³ The Federal Reserve's influence and direct operator role helped overcome coordination hurdles.

More recently, the Federal Reserve has been active in promoting truncation and check-imaging technologies and practices. Its goal is to make the U.S. payments system more efficient by moving from paper-based to electronic-based systems. As an operator, the Federal Reserve has encouraged check electronification through its various product offerings and pricing incentives. As a facilitator, it has encouraged check electronification by playing a seminal role in initiating the Check 21 legislation (discussed below). In both instances, the Federal Reserve has adopted policies that are consistent with addressing coordination

problems as well as promoting greater efficiency in the payments system more generally. Looking to the future, the ongoing reduction in the Federal Reserve's check collection infrastructure and its continued encouragement of electronic alternatives appear well-grounded in economic policy principles.

It is important to note that not taking an active role in a particular payment system or a particular initiative can also be effective, depending on the circumstances. An example is the Federal Reserve's decision at the early stages of credit card development not to clear credit card slips through its check clearing operations. This decision helped spur the private sector to ultimately create an advanced electronic solution for the clearing of credit card transactions, a positive outcome in terms of efficiency.

Role in ACH. In addition to its involvement in checks, the Federal Reserve has been a prominent participant in the ACH industry. In the 1970s it assumed a leadership role in promoting the ACH, and it became one of the key ACH operators. Initially, ACH volumes were low, and for a few years following the implementation of the Monetary Control Act, the Federal Reserve subsidized the ACH network. Its reason for promoting the ACH was to provide an electronic alternative to checks for bank-to-bank small-dollar payments. But to establish such a system, significant network effects had to be overcome, which Federal Reserve participation helped address. High startup costs and the initial limited volume understandably made private-sector banks reluctant to invest in and use this new network. Over time, however, a critical mass was achieved, and today the ACH is one of the nation's most heavily used retail payments systems.³⁴

On network-effect grounds, it is difficult to argue that today's ACH requires the Federal Reserve to be an operator. It is now a mature network. However, a case might be made that the Federal Reserve should remain an operator for two other reasons. One, the ACH industry has become highly concentrated, with only the Federal Reserve and the Electronics Payments Network (EPN) currently acting as operators.³⁵ Two, the volume and nature of ACH transactions have evolved to the point where, if not systemically important, the ACH network is clearly of system-wide or prominent importance. On non-contestable monopoly

and systemic risk grounds, respectively, a continued Federal Reserve presence might therefore be warranted.

With respect to market concentration, were the Federal Reserve to exit the ACH industry, it is difficult to imagine an equal or more competitive environment emerging, at least in the near term. The Federal Reserve's presence in the ACH market clearly provides competition for EPN. And because large economies of scale exist in the ACH network, entry of new competitors is difficult. Future entry cannot be ruled out—a recent joint processing venture announced by Bank of America and Wells Fargo, for example, has led some analysts to speculate that a third ACH operator could emerge at some point in the future.³⁶ But, for now, it is the Federal Reserve that provides the sole nationwide competition for EPN.

The Federal Reserve's presence, along with EPN's, also provides indirect competition for the payments card industry, which some would argue suffers from a lack of competitive pressures. Recent developments have shown that a number of debit-type payments can be processed using the ACH, regardless of the front-end payment instrument used—for example, checks, cards, and Internet payments. Thus, indirectly as well as directly, Federal Reserve participation as an ACH operator can help encourage retail payments competition and efficiency.

With respect to risk considerations, the ACH network now handles over 18 billion transactions a year with a total value of \$36 trillion.³⁷ Having two operators instead of one arguably enhances the resilience of the system, particularly if the two operators have backup capabilities not just internally but with each other.³⁸ Moreover, by directly participating as an operator, the Federal Reserve is able to get a “hands-on” view of potential security and fraud issues impacting the ACH industry. Both points appear consistent with the Federal Reserve's integrity objective.

Facilitator role

The Federal Reserve historically also has been active as a facilitator, or catalyst, in retail payments. As noted above, it played important roles in automating the check process in the 1950s and 1960s and in advancing the ACH network in the 1970s. In both instances, it accomplished this not just by being an operator but by working with a broad cross-section of industry and governmental entities to foster discussion and

agreement. In so doing, it helped bring about a more efficient, more accessible payments system.

More recently, the Federal Reserve has been active in initiating and promoting the electrification of checks through the Check Clearing for the 21st Century Act, or Check 21 for short. This act, which was signed into law in October 2003, is designed to reduce some of the legal impediments to check truncation and thereby encourage the move from paper to electronics. The law “facilitates check truncation by creating a new negotiable instrument called a substitute check, which permits banks to truncate original checks, to process check information electronically, and to deliver substitute checks to banks that want to continue receiving paper checks” (Federal Reserve System 2008). Most of the early work on the Check 21 concept was undertaken by the Federal Reserve, and the Federal Reserve played an important role in guiding it to fruition. And in a short period of time, it has been embraced by the banking system and its customers—as of September 2007, more checks were being presented electronically than by paper.³⁹

Finally, like other central banks, the Federal Reserve engages in a number of other facilitator activities that are rooted in efficiency, integrity, and accessibility considerations. These include participating in standards discussions, sponsoring industry forums, and conducting research on payments system issues.

Overseer role

Federal Reserve involvement in payments oversight reflects a mix of responsibilities and activities. The Federal Reserve’s “Policy on Payments System Risk” (2007b) provides guidance on principles and minimum standards for managing risk in systemically important payments, based on the BIS Core Principles and other international guidelines for securities settlement systems and central counterparties. The policy applies to public and private-sector payments and settlement systems that expect to settle a daily aggregate gross value of transactions exceeding \$5 billion on any given day. Where the Federal Reserve has authority over an applicable system, it is guided by this policy in its oversight; where it does not have such authority, the Federal Reserve offers to work with the domestic and foreign authorities that do.⁴⁰

In addition, the Federal Reserve has oversight responsibilities under the Electronic Funds Transfer Act of 1978 and the Expedited Funds Availability Act of 1987. Under the former, the Federal Reserve is authorized to establish regulations regarding the rights and responsibilities of consumers using various electronic payments; these regulations are issued in Regulation E. Under the latter, the Federal Reserve is authorized to establish regulations for the collection of all checks; these regulations are issued in Regulation CC.⁴¹

As part of its prudential supervision programs, which are aimed at monitoring the health and operation of individual banks and bank holding companies, the Federal Reserve can examine various payments activities of banks, including those associated with ACH, wire service, and payment cards. And under the Bank Service Company Act of 1962, the Federal Reserve and other supervisory agencies can examine nonbank service companies to whom banks outsource specified financial services, including payments services. The TSP (technology service providers) program is operated under the auspices of this act, enabling the Federal Reserve, in cooperation with other agencies, to monitor some of the nation's largest nonbank payments providers.⁴²

V. FEDERAL RESERVE INVOLVEMENT IN RETAIL PAYMENTS: FUTURE

The evolving retail payments system suggests that this may be an opportune time to rethink the Federal Reserve's retail payments policy. As noted in Section III, many other central banks are pursuing similar reexaminations. The Federal Reserve could elect to maintain its current policies, preserving the scope and level of activity in its three roles of operator, facilitator, and overseer. Or the Federal Reserve could elect to alter its policies, scaling back or expanding its scope or level of activity where conditions warrant. In either case, it would be useful for the Federal Reserve to have a systematic framework for assessing whether, and to what extent, to alter its retail payments policies. Such a framework would give the Federal Reserve a consistent, analytically rigorous way of making decisions on potential policy changes.

This section outlines a possible framework. The framework contains two basic elements: criteria for involvement and type of involvement.

Criteria for involvement

The first question to ask is, Under what circumstances should the Federal Reserve consider altering its payments policy, either expanding or contracting activities? One can envision two core criteria, one or both of which would be expected to be met, for the Federal Reserve to revise its policy: 1) Does the change in policy address a market failure? 2) Does the change in policy advance one or more of the overriding objectives of efficiency, integrity, and accessibility?

One point to make is that these two criteria will sometimes overlap: for example, market failure and efficiency considerations will sometimes be one and the same. A second point to make is that, while in some instances both criteria would be expected to be met, one can also envision cases in which market failure was not at issue but one or more of the general objectives was. Situations could arise in which a proposed policy change was judged to enhance efficiency, integrity, or accessibility, even though there was no obvious market failure. So meeting one, but not necessarily both, of the core criteria (and more often than not, it being the second criterion) might be an approach for the Federal Reserve to consider adopting.

A third point to make is there also may be cases in which there are tradeoffs among the three general objectives of efficiency, integrity, and accessibility. For example, a proposed policy might advance accessibility but at the expense of some efficiency. In such cases, policymakers would need to assess net costs and benefits.

Type of involvement

The second question to ask is, If the criteria are met for the Federal Reserve to alter its retail payments policy, how exactly should Federal Reserve involvement be changed? This, in turn, involves two subsidiary questions: 1) What role (operator, facilitator, or overseer) should the Federal Reserve adopt? 2) To what extent, that is, at what level of activism, should the Federal Reserve respond?

The choice of operator, facilitator, or overseer, of course, will depend critically on the specific market failure or general objective being addressed. And, of course, some policy changes would presumably involve all three roles simultaneously.

Tied to the choice of role is the choice of level of activism within a role. In all three of its roles, the Federal Reserve would typically face a continuum of activism. The point it would choose on that continuum would depend on several factors, including the assessed degree of market failure, the anticipated private sector response, the reversibility or irreversibility of planned investments, and potential financial risks for the Federal Reserve. Cost considerations would also be key. Cost recovery presumably would be required for services and activities for which the Federal Reserve had private sector competition, while cost effectiveness would be required for services and activities that were public in nature.

VI. SUMMARY

The U.S. retail payments system is evolving rapidly. Electronic payments have become the norm. New technologies, new participants, and new market structures have become the norm as well. It is not far-fetched to suggest that the payments landscape has changed more in the last decade than in the entire half-century preceding it.

Around the world, central banks' payments policies are evolving equally rapidly. Recognizing the significant changes underway, many central banks have been reevaluating their roles in their respective payment systems. Their experience should prove helpful to the Federal Reserve as it reexamines its role in this new environment.

ENDNOTES

¹The White Paper, entitled “The Federal Reserve in the Payment System,” was issued by the Board of Governors in 1984 and revised in 1990. It describes the Federal Reserve’s “general policy regarding its role in the payments system” (Federal Reserve System 1984). The Rivlin Committee was appointed by Chairman Greenspan in 1996 to examine payment services provided by the Federal Reserve to depository institutions. The Committee’s report, entitled “The Federal Reserve in the Payments Mechanism,” was issued in 1998 and recommended that the Federal Reserve remain a provider of both check collection and ACH services (Federal Reserve System 1998). The report, however, was never officially adopted by the Board of Governors.

²See Federal Reserve System (2007a) and Gerdes and Walton (2002).

³The outlook for mobile payments is discussed by Bradford and Hayashi (2007).

⁴An example is a common reliance on a particular technology; for discussion, see Bank of England (2000).

⁵The impact of the September 2001 terrorist attack on the U.S. check-clearing system might be considered an example.

⁶See Schreft (2007) and Sullivan (2007) for discussions of payments security issues.

⁷Concentration in credit and debit card markets and the recent controversies over interchange pricing are discussed by Hayashi, Sullivan, and Weiner (2006).

⁸For a full discussion of nonbanks in the payments system, see European Central Bank and Federal Reserve Bank of Kansas City (2007a, 2007b).

⁹Regarding accessibility, the White Paper states that the Federal Reserve seeks “to ensure the provision of payments services to all depository institutions on an equitable basis, and to do so in an atmosphere of competitive fairness” (Federal Reserve System 1984).

¹⁰The remainder of this subsection draws in part on BIS (2003, 2005).

¹¹See Green and Todd (2001) for discussion.

¹²See Stern (2005).

¹³Lacker (2005) provides a contrary view, arguing that market failures are largely absent from payments markets.

¹⁴Recent publications from central banks on retail payments involvement include Bank of Canada (2008), Bank of England (2008, 2000), De Nederlandsche Bank (2008, 2007), European Central Bank (2008a, 2008b, 2006, 2005, 2003), Monetary Authority of Singapore (2006), Reserve Bank of Australia (2008a, 2008b, 2008c), and Swiss National Bank (2008).

¹⁵Table 1 in BIS (2003) provides a list of settlement and clearing activities of the G10 and Australian central banks.

¹⁶See Banque de France (2008) and Banca d’Italia (2008).

¹⁷Check 21 is discussed further in Section IV.

¹⁸See Box 2 in BIS (2003).

¹⁹The most recent usage study is Federal Reserve (2007a). Another research project example is the joint ECB/Federal Reserve Bank of Kansas City study on nonbanks in the payments system, in which the ECB and participating Eurosystem national central banks were able to gather important industry data for various European payment systems. See European Central Bank and Federal Reserve Bank of Kansas City (2007).

²⁰In cases of systemically important payment systems, the BIS core principles typically form the basis for oversight evaluations (BIS 2005). In some countries—for example, the UK and Switzerland—so-called risk-based oversight is also being applied to some extent (see, for example, Bank of England (2008)).

²¹Six retail payment systems in the Eurosystem—in France, Ireland (2), Luxembourg, the Netherlands, and Finland—are currently classified as SIPS (ECB 2008c). The alternative term “SIRP” (Systemically Important Retail Payment System) is sometimes used in Eurosystem publications, e.g. ECB (2005).

²²Seven retail payments systems in the Eurosystem—in Belgium, Greece (2), Spain, Italy, Portugal, and STEP 2—are currently classified as PIPS (ECB 2008c). The alternative term “PIRP” (Prominently Important Retail Payment System) is sometimes used in Eurosystem publications, e.g. ECB (2005).

²³The Bank of Canada, for example, has identified the Canadian ACH system as potentially subject to oversight, although its most recent assessment is not to do so (Bank of Canada 2008). In Australia, the Reserve Bank of Australia oversees a large part of the retail payments system (Reserve Bank of Australia 2008a, 2008b, 2008c).

²⁴An example is the Federal Reserve’s participation in the TSP (technology service providers) program covering a limited number of nonbank payments firms, conducted in cooperation with other federal supervisory agencies. See European Central Bank and Federal Reserve Bank of Kansas City (2007).

²⁵BIS (2005) reports that “nine central banks regard themselves as directly overseeing payment instruments in some way that is distinct from their oversight of systems per se (Belgium, the ECB, France, Germany, Italy, the Netherlands, Singapore, Sweden, and the United States).”

²⁶Specifics of the proposed bill are discussed later in this section.

²⁷The Federal Reserve’s involvement in oversight is discussed in more detail in Section IV.

²⁸For a summary of the sources of other central banks’ oversight responsibilities and powers, see Annex 1 in BIS (2005).

²⁹The bill is formally known as Banking Bill 2007-2008; see United Kingdom Parliament (2008).

³⁰See Bank of England, HM Treasury, and FSA (2008).

³¹See Federal Reserve System (1984).

³²See Connolly and Eisenmenger (2000) for further discussion.

³³See Connolly and Eisenmenger (2000) for further discussion.

³⁴See Connolly and Eisenmenger (2000) and National Commission (1977) for a history of the Federal Reserve's involvement in ACH.

³⁵EPN is part of The Clearing House Payments Company.

³⁶See Bills (2008).

³⁷Figures are taken from NACHA (2008a). It is worth noting that the ACH network is no longer just a "small-dollar" network—some very large transactions pass over the ACH network, blurring the distinction between wholesale and retail payment systems.

³⁸Thus, the argument here is that the Federal Reserve's operator presence in ACH likely helps the ACH system be more resilient and robust in situations where backup provisions become necessary. Extending this line of reasoning, it may be useful to explore whether the Federal Reserve's ACH network could be used as a "switch of last resort" in the event of major disruption to another retail payments system, for example, a credit or debit card network. Hoenig raises this possibility in Hoenig (2000, 2007).

³⁹The GAO has recently reviewed the Check 21 Act in U.S. Government Accountability Office (2008).

⁴⁰For further discussion, see European Central Bank and Federal Reserve Bank of Kansas City (2007a, 2007b) and Stehm (2006).

⁴¹For further discussion, see Connolly and Eisenmenger (2000).

⁴²For further discussion, see European Central Bank and Federal Reserve Bank of Kansas City (2007a, 2007b) and Sullivan (2007).

REFERENCES

- Banca d'Italia. 2008. "Interbank Register of Bad Cheques and Payment Cards," www.bancaditalia.it/sispaga_tesor/servpag/cai.
- Bank for International Settlements, Committee on Payment and Settlement Systems. 2005. "Central Bank Oversight of Payment and Settlement Systems," May, www.bis.org/publ/cps68.pdf?noframes=1.
- _____. 2003. "Policy Issues for Central Banks in Retail Payments," May, www.bis.org/publ/cps52.pdf?noframes=1.
- _____. 2001. "Core Principles for Systemically Important Payment Systems," January, www.bis.org/publ/cps43.pdf?noframes=1.
- Bank of Canada. 2008. "Payments and Other Clearing and Settlement Systems," www.bankofcanada.ca/en/financial/financial_gen.html.
- Bank of England. 2008. *Payment Systems Oversight Report 2007*, February, www.bankofengland.co.uk/publications/psor/psor2007.pdf.
- _____. 2000. *Oversight of Payments Systems*, November, www.bankofengland.co.uk/publications/fsr/ops.pdf.
- _____, HM Treasury, and FSA. 2008. *Financial Stability and Depositor Protection: Further Consultation*, July, www.bankofengland.co.uk/publications/other/financialstability/financialstabilitydepositorprotection080701.pdf.
- Banque de France. 2008. "The National Register of Irregular Cheques (FNCI)," www.banque-france.fr/gb/instit/services/page1b.htm.
- Bills, Steve. 2008. "Wells—B of A ACH Venture Spurs Debate," *American Banker*, May 22.
- Bradford, Terri, and Fumiko Hayashi. 2007. "Complex Landscapes: Mobile Payments in Japan, South Korea, and the United States," Federal Reserve Bank of Kansas City, *Briefing*, September, www.kc.frb.org/Publicat/PSR/Briefings/PSR-BriefingSept07.pdf.
- Bradford, Terri, Matt Davies, and Stuart E. Weiner. 2003. *Nonbanks in the Payments System*, Federal Reserve Bank of Kansas City, www.kansascityfed.org/publicat/psr/BksJournArticles/NonBankPaper.pdf.
- Connolly, Paul M., and Robert W. Eisenmenger. 2000. "The Role of the Federal Reserve in the Payments System," paper presented at Federal Reserve Bank of Boston Conference, October, www.bos.frb.org/economic/conf/conf45/conf45f.pdf.
- De Nederlandsche Bank. 2008. "Oversight," www.dnb.nl/en/payments/oversight/index.jsp.
- _____. 2007. *Annual Report*, www.dnb.nl/en/binaries/ar07_tcm47-176707.pdf.
- European Central Bank. 2008a. *Payment Systems and Market Infrastructure Oversight Report 2007*, July, www.ecb.int/pub/pdf/other/paymentsystemsandmarketinfrastructureoversightreport2007en.pdf.
- _____. 2008b. *Oversight Framework for Card Payment Schemes-Standards*, January, <https://www.ecb.europa.eu/pub/pdf/other/oversightfwcardpaymentss200801en.pdf>.
- _____. 2008c. "Retail Payment Systems," www.ecb.int/paym/pollpayover/retail/html/index.en.html.
- _____. 2006. *Business Continuity Oversight Expectations for Systemically Important Payment Systems (SIPS)*, September, www.ecb.int/pub/pdf/other/businesscontinuitysips2006en.pdf.

- _____. 2005. *Assessment of Euro Retail Payment Systems Against the Applicable Core Principles*, August, www.ecb.int/pub/pdf/other/assessmenteuroretailpaymentsystems200508en.pdf.
- _____. 2003. *Oversight Standards for Euro Retail Payment Systems*, June, www.ecb.int/pub/pdf/other/retailpoversightstandardsen.pdf.
- European Central Bank and Federal Reserve Bank of Kansas City. 2007a. "Nonbanks and Risk in Retail Payments," paper presented at joint ECB-Bank of England Conference on Payment Systems and Financial Stability, Frankfurt, November, www.kc.frb.org/Publicat/PSR/RWP/NonbanksRWP07-02.pdf.
- _____. 2007b. "Nonbanks in the Payments System: European and U.S. Perspectives," paper presented at Federal Reserve Bank of Kansas City conference, *Nonbanks in the Payments System: Innovation, Competition, and Risk*, Santa Fe, New Mexico, May, working paper 07-01, www.kc.frb.org/Publicat/PSR/RWP/NonbanksRWP07-01.pdf.
- Federal Reserve System. 2008. "Check Clearing for the 21st Century Act," www.federalreserve.gov/paymentsystems/truncation/default.htm.
- _____. 2007a. *The 2007 Federal Reserve Payments Study*, December, [www.frbervices.org/files/communications/pdf/research/2007_payments_study.pdf](http://frbervices.org/files/communications/pdf/research/2007_payments_study.pdf).
- _____. 2007b. *Federal Reserve Policy on Payments System Risk*, January, www.federalreserve.gov/paymentsystems/psr/policy.pdf.
- _____. 1998. *The Federal Reserve in the Payments Mechanism*, January, www.federalreserve.gov/boarddocs/press/general/1998/19980105/19980105.pdf.
- _____. 1984. *The Federal Reserve in the Payments System*, www.federalreserve.gov/paymentsystems/pricing/frpaysys.htm#ques1.
- Gerdes, Geoffrey R., and Jack K. Walton II. 2002. "The Use of Checks and Other Noncash Payment Instruments in the United States," *Federal Reserve Bulletin*, August, www.federalreserve.gov/pubs/bulletin/2002/0802_2nd.pdf.
- Green, Edward J., and Richard M. Todd. 2001. "Thoughts on the Fed's Role in the Payments System," *The Region*, Federal Reserve Bank of Minneapolis, April, www.minneapolisfed.org/pubs/region/01-04/2000ar.cfn.
- Hayashi, Fumiko, Richard J. Sullivan, and Stuart E. Weiner. 2006. *A Guide to the ATM and Debit Card Industry: 2006 Update*, Federal Reserve Bank of Kansas City, www.kc.frb.org/PUBLICAT/PSR/BksJournArticles/ATMDebitUpdate.pdf.
- Hoenig, Thomas M. 2007. "Central Bank Perspectives," remarks at Federal Reserve Bank of Kansas City, *International Payments Conference on Nonbanks in the Payments System*, Santa Fe, May, www.kc.frb.org/EconRes/psr/PSRConferences/2007/PDF/HoenigRemarks.pdf.
- _____. 2000. "Payments and Settlement Systems: Future Players and Issues," remarks at *BAI Money Transfer 2000 Conference*, November 9, www.kc.frb.org/SpeechBio/chicago.htm.
- Lacker, Jeff. 2005. "Payment Economics and the Role of Central Banks," Bank of England, *Payments Conference*, May 20, www.bankofengland.co.uk/financial-stability/futureofpayments/lacker.pdf.
- Monetary Authority of Singapore. 2006. "Implementation of the Payment Systems (Oversight) Act 2006," June, www.mas.gov.sg/news_room/press_releases/2006/Implementation_of_the_Payment_Systems_Oversight.html.

- NACHA. 2008. "NACHA Reports More than 18 Billion ACH Payments in 2007", May 19, www.nacha.org/news/news/pressreleases/2008/Volume_Final.pdf.
- National Commission on Electronic Fund Transfers. 1977. *EFT in the United States: Policy Recommendations and the Public Interest*, Washington, D.C.
- Reserve Bank of Australia. 2008a. *Reform of Australia's Payments System—Conclusions of the 2007/2008 Review*, September, www.rba.gov.au/PaymentsSystem/Reforms/RevCardPaySys/Pdf/conclusions_2007_2008_review.pdf.
- _____. 2008b. *Reform of Australia's Payments System—Preliminary Conclusions of the 2007/2008 Review*, April, www.rba.gov.au/PaymentsSystem/Reforms/RevCardPaySys/Pdf/preliminary_conclusions_2007_2008_review.pdf.
- _____. 2008c. Payments System Board, www.rba.gov.au/paymentsystem/payments_system_board.html.
- Schreft, Stacey. 2007. "Risks of Identity Theft: Can the Market Protect the Payment System?" Federal Reserve Bank of Kansas City, *Economic Review*, Fourth Quarter, www.kc.frb.org/PUBLICAT/ECONREV/PDF/4q07Schreft.pdf.
- Stehm, Jeff. 2006. "Payment Systems and the Safety Net: The Role of Central Bank Money and Oversight," in Gerard Caprio Jr., Douglas D. Evanoff, and George G. Kaufman, eds., *Cross Border-Banking: Regulatory Challenges*, World Scientific Publishing Co.
- Stern, Gary H. 2005. "Economic Research and the Role of the Federal Reserve in Payments," Federal Reserve Bank of Minneapolis, *The Region*, December, www.minneapolisfed.org/pubs/region/05-12/top9.cfm?js=0.
- Sullivan, Richard J. 2007. "Risk Management and Nonbank Participation in the U.S. Retail Payments System," Federal Reserve Bank of Kansas City, *Economic Review*, Second Quarter, www.kc.frb.org/PUBLICAT/ECONREV/PDF/2q07sull.pdf.
- Swiss National Bank. 2008. "Oversight of Payment and Securities Settlement Systems," www.snb.ch/en/system/print/en/i/about/finstab/id/finstab_oversight.
- United Kingdom Parliament. 2008. "Banking Bill 2007-2208," www.publications.parliament.uk/pa/cm/200708/cmbills/147/2008147.pdf.
- U.S. Government Accounting Office. 2008. *Check 21 Act*, Report to Congressional Committees GAO-09-8, October, www.gao.gov/new.items/d098.pdf.

