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System of Payments – Transfer of Great Values

The Contribution of the American Experience

INTRODUCTION

This paper was written as part of the Fall 1999 Minerva Program, conducted by the Institute of Brazilian Issues of the George Washington University.

The objective of the paper is to present an overview of the instruments for large funds transfers within the payments system of the United States, namely the Federal Reserve wire transfer network (**Fedwire**) and the New York Clearing House Interbank Payments System (**CHIPS**).

The first section exposes the instruments available by the system of payments in the United States, the providers of each service and their institutional framework.

The second section describes the Federal Reserve System, its structure and role in regulating and supervising the system of payments, as well as the reserve account of member institutions, through which the funds transfers are settled.

The third and fourth sections present each instrument's institutional and operational characteristics, such as, among others, property and control of the system; access and pricing policies and criteria of participation of agents; processing and liquidation of transfers; risk management policy.

The paper concludes with a brief evaluation of the contribution both of **Fedwire** and **CHIPS** to the soundness and reliability of the system of payments in the United States.

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THE SYSTEM OF PAYMENTS IN THE UNITED STATES

1 – Instruments and providers

By definition, a system of payments is the agreed upon structure by means of what two agents, a buyer and a seller of any good or service, are able to perform a payment transaction, i.e., a movement of funds from the payor to the payee, using a variety of instruments, either physical or virtual. Each instrument's characteristics like cost, availability of funds, convenience of use, technology incorporated and orientation to consumer under considerations such as size or business will determine their relative participation in terms of value and volume of transactions.

The use of any instrument other than cash to perform a payment transaction will necessarily mean an alteration in balances held in each agent's account at a deposit-taking institution. In the United States these instruments include checks; automated clearing house (ACH) automated teller machine (ATM) and point-of-sale (POS) networks; **Fedwire** network; and **CHIPS** network.

Paper checks issued by deposit-taking banks are the most common instrument of retail payment, used primarily by individuals to pay for consumer purchases of goods and services. The settlement of checks may occur through approximately 140 local check clearing houses throughout the United States, or a national check clearing house or the Federal Reserve System, in whose reserve accounts the net positions of participants are settled.

ACH electronic payments services are provided by one national, two regional and several local networks. They process value-dated batch payments, less costly and with a greater certainty of payment to the receiver than checks, used primarily for recurring payments initiated by businesses and governments, like corporate payments to contractors and vendors, payrolls, government benefit payments, mortgage and loan payments, insurance premiums, among others. Rules and standards for processing ACH transactions are formulated and promulgated by the National Automated Clearing House Association (NACHA) and settlement is made through institutions' accounts at their Federal Reserve Bank.

ATM and POS networks provide electronic communication, authorization of transactions and settlement between member financial institutions, under uniform operating policies, procedures and controls. Their typical clients are bank-issued card-holding customers.

3 – Legal framework

The payment system in the United States is governed by federal and state legislation, provisions issued by financial regulation agencies and case law. At state level, the Uniform Commercial Code is the legal basis with relation to payment and settlement activities. The Expedited Funds Availability Act of 1987 and the Electronic Funds Transfer Act of 1978 are examples of federal legislation governing payment systems issues. The Comptroller of the Currency's Consumer Protection Guidelines and Federal Reserve's Regulations E (Electronic Funds Transfers), J (Collection of Checks

and Other Items by Federal Reserve Banks and Funds Transfers through **Fedwire**) and CC (Availability of Funds and Collection of Checks) are examples of federal agencies' provisions that deal with rules for the system of payments. Operating Circulars issued by the Federal Reserve Banks cover operational and technical aspects of services provided by the Federal Reserve System.

Rules and agreements govern the arrangements among participants of providers of private clearing and settlement of payment transactions, in a contractual framework that operates under applicable law.

THE FEDERAL RESERVE SYSTEM

1 – Structure and role in the payment system

The Federal Reserve System is the central bank of the United States and its responsibilities include the conduction of monetary policy, the supervision and regulation of banking institutions, the maintenance of stability of the financial system and the provision of certain services to its participants. Among these services are the maintenance of reserve accounts, the collection and clearing of checks, the electronic transfer of funds and the distribution of currency and coin, thus playing a major role in nation's payment system. The Federal Reserve System also performs the activities of fiscal agent of the federal government, such as the maintenance of the Department of Treasury's transaction account, the payment of Treasury checks and the issuance, transfer and redemption of federal government securities.

The system is composed of a Board of Governors, which has a governmental role and is located in Washington, D.C., and twelve regional Federal Reserve Banks that act as operating arms of the central banking system and are located respectively in Boston, New York City, Philadelphia, Cleveland, Richmond, Atlanta, Chicago, St. Louis, Minneapolis, Kansas City, Dallas and San Francisco. All Federal Reserve Banks except Boston and Philadelphia have a Branch or Branches that share the performance of central banking system functions within their own Reserve District.

The Board of Governors is composed of seven members (including a Chairman and a Vice Chairman), who serve a fourteen-year term and are appointed by the President of the United States and confirmed by the U.S. Senate. The Board's responsibilities comprehend the supervision and regulation of the operations and activities of the Federal Reserve Banks and their Branches; the exercise of broad authority over the national system of payments; the issuance of regulations applicable to the banking system a whole and, in some cases, only to Federal Reserve member banks; the performance as a representative of the United States in certain multilateral financial organizations; and the publication of detailed statistics and other information concerning the System's activities.

Each Reserve Bank is composed of nine Directors (including a President and Vice Presidents), of whom three are appointed by the Board of Governors and six are elected by District member banks. Besides being the operating arm for the System's banking and credit policies, each Reserve Bank acts as a depository for the banks in its jurisdiction. Each Branch has its own board of directors, appointed both by its Reserve Bank and by the Board of Governors.

The Board of Governors, the president of the Federal Reserve Bank of New York and presidents of four other Reserve Banks, serving on a rotating basis, constitute the Federal Open Market Committee (FOMC), which is responsible for the oversight of open market operations as the principal tool of monetary policy.

2 –The reserve account

As already noted, the use of any instrument other than cash to perform a payment transaction will necessarily mean an alteration in balances held by each agent at a deposit-taking institution. If deposit-taking institutions of agents are different, the payment transaction will be settled through an alteration of balances held by each institution at its respective accounts at a Federal Reserve Bank.

The Federal Reserve System provides each eligible institution with a single master account at a designated Federal Reserve Bank, usually in the District where the institution is chartered, where all the debits and credits that result from financial transactions with the Federal Reserve settle, such as reserve balance administration, overnight and daylight overdraft monitoring, discount window access and financial services. An institution's opening, intraday and closing balances are determined at its master account.

Under its master account, each institution may operate a subaccount or subaccounts that reflect information records of a specific subset of settling transactions, either for reconciliation or for other account management purposes. A subaccount does not reflect the institution's balances, but contains totals of debit and credit activity according to criteria such as type of service, geographic region or respondent/correspondent relationship. All Federal Reserve services can be processed in a subaccount, with the exception of **Fedwire** book-entry securities transfers, in order to facilitate collateral administration in an interstate bank branching environment.

The structure and operation of a master account and its subaccounts are governed by Operating Circular no. 1, issued in identical terms by all Federal Reserve Banks.

FEDWIRE

1 – Definition and technical aspects

Fedwire can be defined as a nationwide operating system owned and operated by the Federal Reserve, consisting of two components:

- a) an electronic support of two separate services –the transfer of funds only and the transfer of book-entry U.S. government securities;
- b) a high-speed communications network (FEDNET) which links all Federal Reserve Banks and Branches with more than 14,000 depository institutions.

For the purposes of this paper, just the funds-only transfer service will be presented, although it is worth mentioning that the securities transfer service provides the settlement of transactions on a delivery-versus-payment basis, which allows the transfer of securities against immediate, simultaneous transfer of funds.

The service provided by **Fedwire** consists of an automated, same-day, real-time, gross settlement transfer of funds. The real-time feature ensures that each transaction is processed by the system as it is initiated rather than stored for batch processing. The gross settlement feature determines the individual settlement of each transfer rather than the net sum of transactions along a determined period.

Although there is no minimum dollar size required for transfers, **Fedwire** is generally considered a large-value, time-critical payment instrument, primarily related to domestic transactions such as the disbursement and collection of funds by the Treasury and other federal agencies, interbank overnight loans, interbank settlement transactions, payments between corporations and settlement of securities transactions.

Transfers are always initiated by the institution sending funds and are offered immediate finality, that is, they are irrevocable and unconditional once processed and completed, normally within seconds of the transfer being initiated.

Depository institutions may enter their instructions “on-line”, directly into the **Fedwire** system through either a FedLine connection or a Computer Interface connection provided by the Federal Reserve System, or “off-line”, by telephone, letter or fax to a Federal Reserve Bank. In the former case, instructions go directly from the sender’s terminal to the Federal Reserve’s computer for processing and execution. In the latter case, only after authentication of the request the transfer instruction is entered into Federal Reserve Bank’s computer and executed.

2 – Property and control of the system

Fedwire is owned and operated by the Federal Reserve Banks. Payment transactions over the funds transfer system are governed by the Subpart B of Federal Reserve's Regulation J, which incorporates certain provisions of Article 4A of the Uniform Commercial Code (UCC) that concern wholesale funds transfers. These provisions, which gain the force of a uniform federal law, define the rights and responsibilities of the various participants in a funds transfer, including the originator, the intermediaries and the beneficiary.

Regulation J also grants each Federal Reserve Bank the power to issue operating circulars governing details of its funds-transfer operations and other matters considered appropriate, such as, among other things, cutoff hours and business days, security procedures, specifications of format and media requirements for payment orders, fees and certain restrictions. These circulars, issued in identical terms by all Federal Reserve Banks, are referred to as Operating Circular No. 6.

The Federal Reserve's Financial Services Policy Committee (FSPC), whose components are six presidents and first vice presidents from the Reserve Banks, is responsible for overall leadership of the twelve Federal Reserve Banks' financial services activities and related support functions. Reporting to the FSPC are the directors of five national Product/Function offices, with system-wide responsibility for the following areas: retail payments, wholesale payments, cash/fiscal services, support services and business development. In addition, the FSPC, Product Directors, and Product Managers work in close partnership with the Federal Reserve's Information

Technology leadership. The Product Directors and Product Managers direct system-wide initiatives that support overall business strategies; develop and price products and services; and ensure that the Federal Reserve's services meet the needs of depository institutions, the U.S. Treasury, and the public.

The Wholesale Payments Product Office (WPPO), located at the Federal Reserve of New York, has product management responsibility for the wholesale payments services offered by the Federal Reserve. WPPO fosters the integrity, efficiency, and accessibility of U.S. wholesale payments and settlement systems in support of domestic financial stability and economic growth in a global context.

3 – Access policy and criteria of participation of agents

Access to participate in the **Fedwire** funds transfer system is extended to all entities eligible to maintain deposit accounts at Reserve Banks, including:

- a) member banks of the Federal Reserve System;
- b) most nonmember commercial banks, savings and loan associations, savings banks and credit unions, which are subject to reserve requirements set by the Federal Reserve, as determined by the Monetary Control Act (MCA) of 1980;
- c) agreement and Edge Act corporations, which are specially chartered corporations, typically subsidiaries of U.S. banks, engaged in international banking and investment activities;

- d) the U.S. Treasury, federal agencies and government-sponsored enterprises;
- e) U.S. branches and agencies of foreign banks, as a result of the International Banking Act of 1978;
- f) official international financial organizations, such as, among others, the International Monetary Fund, the World Bank and the Inter American Development Bank;
- g) foreign central banks and governments, whose access to **Fedwire** services is limited and has to be requested through the Federal Reserve Bank of New York.

The Support Function Office (SFO), located at the Federal Reserve Bank of San Francisco, provides tactical and strategic management support to the Federal Reserve System's accounting service policies, practices and applications, and oversees and supports high quality electronic access to Federal Reserve services. Among SFO's tasks are the evaluation and recommendation of new technologies relative to emerging business needs and customer access requirements, the provision of strategic planning in the development and evaluation of new electronic access vehicles, and the overall management of the electronic access and customer support environment.

The SFO also conducts marketing research to assess customer response to current products and future requirements for services and support systems, and provides marketing communications support for system-wide financial service products.

Depository institutions are provided with electronic access to Federal Reserve services either through FedLine platforms, available for DOS-based operation system, or through Computer Interface connections.

Computer Interface is an electronic access option for a large volume depository institution that wishes to develop a direct connection between its mainframe computer and a Federal Reserve Bank host mainframe, provided that it adheres to the published Federal Reserve protocol standards, known as Computer Interface Protocol Specifications (CIPS).

A Computer Interface customer has two connection options, determined by the institution's hardware and software configuration. One option, FRISC, is intended primarily for those customers that utilize large-scale IBM or compatible systems. The other option, FLASH can be implemented on a variety of current vendor-offered hardware systems ranging from microcomputers to large computer systems. Each Computer Interface customer develops its own application software based on detailed specifications issued by the Federal Reserve.

4 – Hours of operation

Until December 5, 1997, the **Fedwire** funds transfer service operated from 8:30 a.m. to 6:30 p.m. Eastern Time (ET) Monday through Friday. From December 8, 1997 on, the service began operating from 12:30 a.m. to 6:30 p.m. ET Monday through Friday, expanding hours of operation to 18 per day, according to the following schedule:

Operation	On-line Transfers	Off-line transfers
Opening	12:30 a.m.	9:00 a.m.
Cutoff hour for foreign payment orders	5:00 a.m.	4:30 a.m.
Cutoff hour (other than settlement payment orders)	6:00 a.m.	5:30 a.m.
Cutoff hour for settlement payment orders	6:30 a.m.	6:30 a.m.

This expansion was determined by the Board of Governors under the assumption that it could be a useful component of private-sector initiatives to reduce settlement risk in the foreign exchange markets and to eliminate an operational barrier to innovation in privately-provided payment and settlement services. The 12:30 a.m. ET **Fedwire** opening time overlaps the entire European banking day and about two and one-half hours of the banking day in Tokyo. The overlap of operating hours among major financial centers will contribute to strengthened interbank settlement for cross-border markets.

Participation in the earlier **Fedwire** operating hours is voluntary for depository institutions. An Expanded Funds Transfer Hours List is elaborated weekly, although institutions appearing on the participant list are not under obligation to send transfers at any specific time or on any particular day. All participants can originate funds transfers anytime during the expanded funds transfer business day, regardless of their inclusion on the participant list. Currently, if a participant receives a funds transfer at a time when

Fedwire is open but the participant is closed, the amount of the funds transfer will be credited to the receiver's account when received over **Fedwire**.

The business day or the cutoff hours may be extended or reduced by the Federal Reserve Banks, in their discretion, to meet special market needs. A participant, however, may request an extension of the operating hours that may be granted by its Federal Reserve Bank conditioned to:

- a) a failure of the funds transfer network equipment in either party; or
- b) a significant operating problem at a bank or major dealer; and
- c) the extension is considered necessary to prevent a significant market disruption, e.g. the amount of the transfer exceeds \$ 1 billion.

5 – Processing and liquidation of transfers

An on-line funds transfer is initiated by the sending institution posting through its automated connection a payment order to **Fedwire**, that is, a message whose designated type code identifies it as an authorization to the Federal Reserve Bank holding its master account and subaccounts to debit one of these accounts for the amount of funds to be transferred to the receiving institution. For the purposes of identification of parties in the transfer, a nine-digit routing numbers is assigned to each institution, according to the system administered by the American Bankers Association (ABA). The authenticity of the message is verified according to the security procedure

incorporated in the hardware and software associated with the computer, which includes an identification code and a confidential password that allow access to the system and the encryption of the message during the transmission process.

As a result of the real-time monitoring of each individual institution, its Federal Reserve Bank may take some actions “ex post”, i.e., once a debit position exceeds the debit cap of the institution, which range from imposing collateralization or supplementary clearing balances, holding or rejecting transfers until balances are collected in the Federal Reserve account, to terminating the access of the institution to Fedwire.

The sending institution receives an acknowledgement of receipt of the payment order issued, as the system executes the transfer, that is, funds are debited to the sender’s Federal Reserve Bank master account or a subaccount and credited to the receiver’s Federal Reserve Bank master account or a subaccount, upon acknowledgement of the payment order to the receiving institution. If a transfer is received on behalf of a customer, Regulation CC of the Federal Reserve requires that the funds are made available to the customer by the opening of the next business day, although in practice **Fedwire** transfers are available on the day they are received.

6 – Risk management policy

The operation of **Fedwire** poses a series of risks to the Federal Reserve Banks, to the banking system and to other sectors of the economy, in the forms of credit risk –should a participant be unable or unwilling to settle its obligations deriving from a

payment transaction; liquidity risk –the possibility that participants or the system do not have sufficient funds available to meet settlement obligations as and when expected; or operational risk –associated to the failure of electronic data infrastructure used in the settlement process.

To address the risks deriving from the possibility of a daylight overdraft, i.e., the occurrence of a negative balance during the business day in Federal Reserve accounts as a result of funds-only transfers or securities transfers, a risk reduction policy was developed by the Federal Reserve. This policy comprehends the procedures used to measure the daylight overdrafts; fees for average daily overdrafts; institution of net debit caps to be incurred by participants; collateralization of some securities transactions; and a limit on the size of individual securities transfers.

The measurement of daylight overdrafts benefits from the quasi-real-time schedule for posting debits and credits related to non-**Fedwire** transactions, thus eliminating both the uncertainty as to when these transactions would be posted and the practice of posting certain credits earlier than their corresponding debits. The posting schedule is as follows:

a) at 8:30 a.m. Eastern Time (ET): government and commercial ACH credit transactions; Treasury Electronic Federal Tax Payment System (EFTPS) investments form ACH credit transactions; advance-notice Treasury investments; interest and redemption payments on Treasury state and local series; Treasury checks, postal money orders, local Federal Reserve Bank checks; and EZ-Clear savings bond redemptions;

- b) throughout business day: **Fedwire** funds-only transfers and securities transfers; and net settlement entries;
- c) by 9:15 a.m. ET: interest and redemption payments on U.S. Treasury and government agency securities; matured coupons payments and reception before maturity date of U.S. Treasury and government agency securities;
- d) beginning at 9:15 a.m. ET: original issues of Treasury securities;
- e) at 11:00 a.m. ET: ACH debit transactions; EFTPS investments from ACH debit transactions;
- f) at 11:00 a.m. ET and hourly thereafter: commercial check transactions, including return items; check correction equal to or above \$1 million; currency and coin deposits; and credit adjustments equal to or above \$1 million;
- g) by 1:00 p.m. ET: same-day Treasury investments;
- h) at 2:00 p.m. ET: processed manual letters of credit;
- i) at 5:00 p.m. ET: Treasury checks, postal money orders and EZ-Clear savings bonds redemptions presented by 4:00 p.m. ET; local Federal Reserve Bank checks presented before 3:00 p.m. ET; processed manual letters of credit; same-day ACH transactions, including return items, check truncation items and flexible settlement items;

j) after the close of **Fedwire** funds transfer system: all other non-**Fedwire** transactions, including discount window loans and repayments.

Reserve Banks charge a fee for average daylight overdraft in deposits account of participants, corresponding to 36 basis points multiplied by the fraction of a 24-hour day during which **Fedwire** is scheduled to operate (currently, 18/24). The average daylight overdraft is calculated by dividing the sum of negative balances at the end of each minute of the scheduled operating day by the total number of operational minutes in that day. A deductible equal to 10 percent of the participant's qualifying capital (i.e., capital used to meet risk-based standards, as defined by financial regulatory agencies) is subtracted and the fee is applied to the excess. Fees of \$25 or less in any two-week interval are waived.

A net debit cap is the maximum level of overdraft that a participant may incur in its Federal Reserve account, in a daily peak as well as in a two-week period basis. To each net debit cap category is associated to a multiple of the qualifying capital that the Federal Reserve Bank will allow as an overdraft, above which a funds transfer will be held or rejected.

Cap Category	Two-week average multiples of qualifying capital	Single day average multiples of qualifying capital
High	1.500	2.250
Above average	1.125	1.875
Average	0.750	1.125
“De minimis”	0.400	0.400
Exempt-from filing	Lesser than 0.200 or \$10 million	Lesser than 0.200 or \$10 million
Zero	0.000	0.000

The Account Balance Monitoring System (ABMS) application grants the Federal Reserve Banks and the participants the ability to monitor in a real-time, on-line basis their intraday master account and subaccount balances and therefore the observance of overdrafts limits. The Integrated Account System (IAS) provides participants with a variety of statements, reports, notifications and inquiry capabilities to help manage accounts balances.

An institution may either adopt a zero cap as a result of its own management policy prohibiting overdrafts or as an assignment by its Reserve Bank. Qualification for a debit cap category greater than zero is open to financially healthy institutions and to

those eligible to borrow from the discount window, that is, subject to reserve requirements, to Edge and agreement corporations, bankers' banks and limited-purpose trust companies.. Participants that incur in an overdraft up to 0.20 of their qualifying capital or \$10 million, whichever is smaller, are granted the category of "exempt-from-filing" and do not need to provide additional documentation. The "de minimis" category is granted to institutions that annually file a resolution from their board of directors approving the use of intraday credit up to 0.40 of their qualifying capital.

Participants may be granted the three other categories based on a self-assessment performance rating, carried out at least once in a twelve month period, considering four aspects: creditworthiness; intraday funds management and control; customer credit policies and control; and operating control and contingency procedures. The results of the self-assessment are then submitted to the Federal Reserve Bank for approval. Federal Reserve Banks have the authority to reduce a cap unilaterally, establish collateralization or balance requirements, or end access to the service.

A collateralization of overdrafts is required of institutions that frequently (more than three times in a two rolling two-week period) exceed their caps in more than 10 percent, due solely to securities transfer operations. An institution may also voluntarily collateralize all or part of its securities overdraft, which will then not be included with the overdrafts measured against their caps.

The limit of \$50 million on the size of individual securities transfers is intended to reduce the risk posed by position-building of securities dealers, i.e., the accumulation of securities for delivery to the client against payment only when the order

is complete. The limit is not applied to original issue deliveries of securities from a Reserve Bank to a depository institution or to transactions of a Reserve Bank in its condition of fiscal agent of the U.S. government or international organizations.

Operational risk is addressed through the establishment of two layers of back-up automation facilities, at the Federal Reserve Bank of Richmond and the Federal Reserve Bank of Dallas.

7 – Pricing policy

Fedwire funds transfer service is priced by the Federal Reserve so as to cover its full cost of production, considering fixed and variable costs and also the Private-Sector Adjustment Factor, which is based on an estimate of the taxes and cost of capital the Federal Reserve would incur were it a private firm. This methodology was established in the Monetary Control Act of 1980 as a means of ensuring equal terms of competition to private providers of payment systems.

The Federal Reserve adopts a volume-based pricing for the service, under the assumption that it will lead to more efficient use of the system, resulting in lower average costs to be passed on to the benefit of all customers. Monthly prices are based on each customer's message volume by summing all messages, including funds transfers as well as non-value service messages (i.e. messages that do not generate an accounting entry) sent and received by the master account and any related subaccounts. The price is then calculated at \$0.34 each for the first 2,500 on-line messages; \$0.27 each for on-line messages beyond 2,500 up to 80,000; and \$0.21

each for on-line messages beyond 80,000. Off-line messages and telephone notifications are charged \$13.00 each when originated or received.

The following table exemplifies prices per month charged on three hypothetical patterns of use of the system:

Institution	Messages Sent	Messages Received	Total Messages	Calculation	Total Billed
A	1,000	1,000	2,000	2,000*\$0.34 0*\$0.27 0*\$0.21	\$680.00
B	10,000	10,000	20,000	2,500*\$0.34 17,500*\$0.27 0*\$0.21	\$5,575.00
C	50,000	50,000	100,000	2,500*\$0.34 77,500*\$0.27 20,000*\$0.21	\$29,975.00

Billing is carried out through an accounts receivable system that captures billing data, computes service charges and accrues transaction data for each depository institution based on services performed by the Federal Reserve System. The system produces monthly detail and summary Statements of Service Charges for the services rendered, on the third and fifth business days of the month, respectively, and notifies customers of charges to their accounts. Settlement of these charges occurs on the

fifteenth of the month for the previous month's services. For institutions that hold Clearing Balances, earnings credits also are calculated and used to offset service charges.

8 – Operational control and backup system

The Federal Reserve Information Technology organization (FRIT) provides technology support to the 12 Federal Reserve Banks and Board of Governors in carrying out the System's mission. FRIT is accountable to the Information Technology Oversight Committee and is a part of the Federal Reserve Bank of Richmond. The organization has two principal parts: a services unit, Federal Reserve Automation Services (FRAS); and a consulting, planning and standards unit, Information Technology Planning and Standards (ITPS). FRAS provides mainframe computer and national network services. The network, FEDNET, connects over 14,000 depository institutions to central bank, payment, and other financial services. ITPS is responsible for developing the system-wide information technology vision, development and promotion of technology standards, and provision of consulting support to Federal Reserve businesses.

9 – Future developments

In 2000, the Federal Reserve will begin transitioning current FedLine customers to the new FedLine software designed for the Microsoft Windows NT Workstation operating system and to FedLine for the Web, under a new connection alternative – TCP/IP File Transfer Protocol (FTP).

The message format for **Fedwire** funds transfers is being modified to make it similar to both the **CHIPS** and the SWIFT message formats. SWIFT is the acronym for Society for Worldwide Interbank Financial Telecommunications, a private electronic message exchange system. This change should provide significant efficiencies for customers by reducing the need for manual intervention when transactions are processed and by eliminating the truncation of payment-related information when payment orders received via **CHIPS** or SWIFT are forwarded to **Fedwire**.

CHIPS

1 – Definition and technical aspects

CHIPS (Clearing House Interbank Payments System) can be defined as a private operating system for the transfer of funds among participants of the Clearing House Interbank Payments System Company (CHIPCo), consisting of an automated, end-of-the-day, net settlement of transactions. The net settlement feature determines that transactions are stored for batch processing, with participants paying or receiving the net sum of their daily operations at the end of the business day.

Although, like **Fedwire**, there is no minimum dollar size required for transfers, **CHIPS** is considered a large-value payment instrument, primarily related to foreign transactions such as foreign exchange sales and purchases; foreign trade; eurodollar placements; international loans; and eurosecurities settlement.

Transfers are always initiated by the sending funds institution and intraday payments are final, that is, irrevocable and unconditional, when end-of-the-day net debits and credits are covered through the accounts of the settling participants at the Federal Reserve Bank of New York.

CHIPS primary automation facility is located Midtown New York City and a secondary facility in New Jersey operates as its back-up site.

2 – Property and control of the system and access policy

CHIPS is managed and governed by the Clearing House Interbank Payments System Company (CHIPCo), a company owned by the New York Clearing House Association, which is composed of nine member banks: The Bank of New York, N.A.; The Chase Manhattan Bank, N.A.; Citibank, N.A.; Morgan Guaranty Trust Company; Bankers Trust Company; HSBC Bank USA; Fleet Bank National Association; European American Bank; and Republic National Bank of New York.

CHIPCo participants may be commercial banks, Edge Act corporations, U.S. agencies and branches of foreign banks, investment companies as defined by New York State banking law or a banking affiliate of a commercial bank with an office in New York City. Each participant has ownership interest in the company and shares in its governance through a ten-member governing board.

3 – Hours of operation

CHIPS transfer operations are posted from 7:00 a.m. to 4:30 p.m. Eastern Time (ET), Monday through Friday. Soon after 4:30 a.m. each participant is informed of its net position, including the position of the participant for which it settles. By 5:30 p.m., all participants with a net debit position are required to transfer the corresponding funds to the **CHIPS** settlement account at the Federal Reserve Bank of New York by means of a **Fedwire** payment message. Once all payments have been made, funds are transferred by the system to all participants with a net credit position, typically before

5:45 p.m., also by means of a **Fedwire** message and the settlement is complete. After a holiday, closing time is extended to 6:00 p.m. ET.

Participants may adjust bilateral limits credit limits extended to each other participant at any point during the operating day. However, the daily net debit cap assigned to each participant is calculated upon information entered by participants by 20 minutes before the opening of business on the applicable day. If other participants adjust a participant's bilateral limits upward or downward during a day, that participant's debit cap will remain at what was fixed at the opening of business.

4 – Processing and liquidation of transfers

CHIPS settlement of transactions is tiered, with 20 settling participants, of which 10 are member of the New York Clearing House and 10 are non-members, both groups acting for themselves and for non-settling participants. Participants, either settling or non-settling, which act as correspondents of CHIPCo non-participants, both domestic and abroad, usually receive instructions concerning payment operations through the SWIFT (Society for Worldwide Interbank Financial Telecommunications) system, a private electronic message exchange system.

A **CHIPS** payment message indicates the value date of the transaction, as messages can be entered for same-day or future-day value; the sending and receiving participants; the debit and credit parties; and the dollar amount. As the message is entered by the participant into the system, the central computer edits and authenticates

the message, stores the transaction and acknowledges the sender with a “store” message.

As the sender approves the stored transaction and releases it, the system screens the payment against risk controls, i.e., verifies whether the message is within the sender’s net debit cap and does not exceed its bilateral limit established by the receiver. If neither limit is exceeded a “receive” message is sent to the receiver, otherwise the message is rejected. Upon transmission of a credit message to the receiver, the **CHIPS** computer also makes a permanent record of the transaction and the appropriate debits and credits for its balance records. Each participant begins the business day with a starting balance of zero and its net position is calculated continuously during the day based on payment messages sent and received.

Following the closing of transfer operations at 4:30 p.m. ET, the system produces settlement reports for settling and non-settling participants. Settling banks with a net debit position have then one hour to transfer the corresponding fund via **Fedwire** to the **CHIPS** settlement account on the Federal Reserve Bank of New York. Once this procedure is completed, corresponding funds are transferred, also by **Fedwire** from this settlement account at the Federal Reserve to the Federal Reserve accounts of settling participants with net credit positions, usually by 5:45 p.m. ET. The settlement account is brought to zero balance and is closed daily.

5 – Risk management policy

As a private funds transfer network with no central bank support, **CHIPS** has implemented safeguards to address legal, credit and liquidity risk and, as a consequence, systemic risk, thus meeting the standards established for multilateral netting systems by the Lamfalussy Report, issued in 1990. The report's principles are:

- a) netting schemes should have a well-founded legal basis under all relevant jurisdictions;
- b) participants should have a clear understanding of the impact of the particular scheme on the financial risks affected by the netting process;
- c) procedures should be clearly defined for the management of credit and liquidity risks, specifying the responsibilities of the system provider and the participants;
- d) the system should be available to ensure the completion of the settling process in the event of an inability to settle by participant with the largest single net debit position;
- e) the system should have objective and publicly-disclosed criteria for fair and open access;
- f) operational reliability of the system should be ensured with the availability of back-up facilities.

Legal risk is addressed by the establishment of rules and agreements under federal legislation, New York State legislation and the Uniform Commercial Code, to which all participants, including foreign participants must adhere, providing the legal certainty for the multilateral netting arrangements even in the event of a failure of a participant.

As each participant begins the business day with a zero balance at **CHIPS** records, credit must be extended in order to allow payments to be made. To address credit risk, a daily bilateral credit limit ranging from zero to \$1 trillion is extended by each participant to every other participant, thus limiting the maximum net dollar amount of payment it is willing to receive from that participant. Besides that, a binding net debit cap is imposed by **CHIPS** on each participant, corresponding to 3% of all the bilateral limits set for the participant by each other participant as of the opening of business on the applicable day.

The president of the CHIPCo has the discretion to increase or decrease the debit cap of any participant or all of them at any time, as well as to fix a debit cap of zero for one or more participants, or to remove the debit caps altogether, allowing the system to operate without this control. The combined features of bilateral credit limits and net debit caps will allow **CHIPS** to settle even if the two largest participants simultaneously fail at their maximum debit position, therefore attaining a “Lamfalussy standard + 1” status. The system is also able to cover the simultaneous failure of the 25 smaller participants.

To ensure the finality of settlement, **CHIPS** loss-sharing rules impose to each participant an allocation referred to as “additional settlement obligation” or “ASO”, equal to 5.1% of the highest bilateral limit that it has granted to any other participant or \$10 million, whichever is greater, and collateralized with a pledge of U.S. Treasury securities that are held in collateral accounts at the Federal Reserve Bank of New York, under the exclusive control of the CHIPCo. This allocation will allow the settlement of a failed participant’s obligation on a “pro rata” basis by those remaining participants who had established bilateral limits for the failed participant.

Besides the imposition of caps on participants’ net debit position, liquidity risk is addressed by the level of liquid assets each participant is required to maintain, which can be determined to be improved if any liquidity problem is perceived. Furthermore, the real-time, on-line inquiry system permits a participant to monitor its net position and potential need for liquidity.

6 – Pricing policy

CHIPS monthly operating costs are recovered in a cooperative way, by CHIPCo allocating total costs for operations among participants according to usage of the service, measured by the number of messages sent and received during the previous month. Each sending message is charged \$0.25 and each receiving message is charged \$0.18, although there is a minimum charge of \$1,500.00 per month. High volume users, i.e., those whose messages sent or received amount to more than 80,000, are charged \$0.13 for each message.

7 – Operational control and backup system

CHIPS participants are linked by dedicated high speed diversified data communication lines to the central computer and emergency dial-up lines are available to participants in case of a failure of regular communications links. Dual computers are present at its primary site and an identical system at a secondary facility, with high-speed lines linking both sites. Backup batteries, generator systems, and a water supply protects the computers in case of a failure in New York City power and water systems. A triple database, further protected by advanced recoverable auditing techniques, provides continuous availability of information.

CONCLUSION

The development of an instrument for large funds transfers with characteristics such as incorporated by **Fedwire** seems almost a natural consequence of the size and complexity of the United States economy. They can be summarized in timeliness, as ensured by the real-time feature; reliability, resulting from the fact that each transfer is irrevocable and unconditional once completed; and safety, as provided by a risk management policy that addresses credit, liquidity and operational risks. The role played by **Fedwire** in the soundness and efficiency of the U.S. system of payments is crucial for the interdependent operation of the banking system, the money and capital markets and the associated derivative markets.

The U.S. system of payments benefits in the same degree from the reliability and safety provided by **CHIPS** in the settlement of transactions of an international nature, as a result of the safeguards implemented to meet credit, operational and legal risks. In exceeding the standards established by the Lamfalussy report, **CHIPS** stands as a model for a private operator of a funds transfer system.

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