

**Payment, clearing and
settlement systems in the
United States**

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List of abbreviations

CFPB	Consumer Financial Protection Bureau
CFTC	US Commodity Futures Trading Commission
CHIPS	Clearing House Interbank Payments System
DCE	designated clearing entity
DCO	derivatives clearing organisation
DFA	Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010
DTC	The Depository Trust Company
DTCC	The Depository Trust and Clearing Corporation
EFAA	Expedited Funds Availability Act of 1987
EFTA	Electronic Fund Transfer Act of 1978
EPN	Electronic Payments Network
ET	eastern time
FCM	futures commission merchant
FICC	Fixed Income Clearing Corporation
FICC/GSD	Government Securities Division of Fixed Income Clearing Corporation
FICC/MBSD	Mortgage-Backed Securities Division of Fixed Income Clearing Corporation
FMU	financial market utility
FSOC	Financial Stability Oversight Council
GSE	government-sponsored enterprise
GTR	global trade repository
MCA	Monetary Control Act of 1980
NOW	negotiable order of withdrawal
NSSC	National Securities Clearing Corporation
NSS	National Settlement Service
NYPC	New York Portfolio Clearing
OC	Federal Reserve Operating Circular
OCC	The Options Clearing Corporation
PSR policy	Federal Reserve Policy on Payment System Risk
S&L	savings and loan association
SEC	US Securities and Exchange Commission
UCC	Uniform Commercial Code

Introduction

Payment systems, clearing houses, central securities depositories and securities settlement systems are key institutions in the US financial market infrastructure. Payment systems in the United States include mechanisms for processing both wholesale and retail funds transfers. At the wholesale level, two large-value electronic funds transfer systems settle the bulk of the dollar value of all payments in the United States. At the retail level, non-cash payments are processed over a number of systems, including cheque clearing systems, automated clearing house systems and credit and debit card networks. While a significant but unknown number of payments continue to be settled in cash, almost all non-cash payment instruments, including cheques, settle electronically. In addition, innovation and competition have facilitated the use of new instruments and payment channels that rely increasingly on electronic payment mechanisms.

Central securities depositories and securities settlement systems facilitate the safekeeping of securities and the guarantee and settlement of different types of securities transactions. Generally in the United States, a single system acts as both a central securities depository and a securities settlement system for a specific set of securities. Central counterparties (CCPs) facilitate the clearing and guarantee of various types of financial transactions, including securities and derivatives transactions, traded either on exchanges or over the counter (OTC). Generally, each CCP clears a specific set of contracts. In recent years, trade repositories have been developed to collect and maintain information on various financial transactions, in particular those involving OTC derivatives. Trade repositories have improved the overall transparency in the OTC derivatives markets.

As the central bank of the United States, the Federal Reserve provides certain payment and settlement services to depository institutions. Private sector operators of payment, clearing and settlement systems also provide such services to financial institutions. Several government agencies play active roles in the oversight and regulation of private sector payment, clearing and settlement systems, most notably the Federal Reserve, the Securities and Exchange Commission (SEC) and the Commodity Futures Trading Commission (CFTC). The Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010 (DFA) provides additional authorities for these or other relevant regulatory agencies over payment, clearing and settlement systems designated by the new Financial Stability Oversight Council (FSOC) as systemically important.

1. Legal and regulatory aspects

1.1 The general legal framework

Payment, clearing and settlement systems in the United States are governed by statutes, regulations and case law at the state and federal levels. The legal principles relevant to a particular system generally depend on the method of payment, the type of transactions cleared and settled, and, in some cases, the status of parties to a payment. Within the relevant governing law, rules and membership agreements of private clearing and settlement arrangements provide a contractual framework for payments activity. For payment services operated by the Federal Reserve, Federal Reserve regulations and operating circulars specify the terms and conditions under which services are provided. In addition, the DFA, enacted on 21 July 2010, was one of the most significant pieces of legislation affecting the US financial regulatory framework in many years. Several parts of the DFA related to payment, clearing and settlement systems are discussed below.

At the state level, the Uniform Commercial Code (UCC) provides a set of model statutes governing certain commercial and financial activities, including some banking and securities

market transactions. The following articles of the UCC pertain to payment and settlement activities: Article 3 (negotiable instruments), Article 4 (bank deposits and collections), Article 4A (funds transfers), Article 8 (investment securities) and Article 9 (secured transactions). These articles, sometimes with local variations, have been incorporated into the laws of all the states.

The Federal Reserve's funds transfer system, the Fedwire Funds Service (Fedwire Funds), is governed by Federal Reserve Regulation J, which defines the rights and responsibilities of financial institutions that use Fedwire Funds as well as the rights and responsibilities of the Federal Reserve. Federal Reserve Operating Circular (OC) 6 covers items such as Fedwire Funds operating hours, security, authentication, fees and certain restrictions. OC 6 also requires each Fedwire Funds participant to enter into a security procedures agreement with its Federal Reserve Bank (Reserve Bank). In addition, OC 1 governs account relationships and OC 5 governs electronic access to Fedwire Funds. A depository institution sending payment orders to a Reserve Bank is also required to have sufficient funds, either in the form of account balances held at the Federal Reserve or daylight overdraft capacity. Funds transfers made through the Clearing House Interbank Payments System (CHIPS) are subject to CHIPS rules and procedures and the laws of the State of New York. Both Fedwire Funds and CHIPS operate under the requirements of UCC Article 4A.¹ Federal Reserve Regulation CC regulates the time in which a depository institution receiving a Fedwire Funds or CHIPS funds transfer on behalf of a customer must make those funds available to its customer.

The Federal Reserve operates its securities transfer system, the Fedwire Securities Service (Fedwire Securities), under OC 7, which covers issues for Fedwire Securities that are similar to those covered in OC 6 for Fedwire Funds. As with Fedwire Funds, OC 1 governs account relationships and OC 5 governs electronic access to Fedwire Securities. Transaction enforceability is governed by state securities and commercial codes, in particular UCC Articles 8 and 9.²

Articles 3 and 4 of the UCC form the legal basis for paper-based cheque transactions in the United States. In addition, the Expedited Funds Availability Act of 1987 (EFAA) and the Check Clearing for the 21st Century Act of 2003 (Check 21 Act) are important federal statutes governing cheque collection. The EFAA grants the Board of Governors of the Federal Reserve System (the Federal Reserve Board, or the Board) authority to improve and accelerate the collection and return of cheques among depository institutions. The Check 21 Act authorised a new negotiable instrument called a "substitute cheque". A substitute cheque is a paper reproduction of an original cheque that contains an image of the front and back of the original cheque. Under the Check 21 Act, a properly prepared substitute cheque is the legal equivalent of the original cheque for all purposes. By authorising banks to create substitute cheques, the Check 21 Act enables banks to truncate original paper cheques, process them electronically, and create substitute cheques for delivery to banks or customers that do not accept cheques electronically. The Federal Reserve implements the EFAA and the Check 21 Act through Regulation CC. In addition to Regulation CC, cheques collected through the Federal Reserve Banks are governed by subpart A of the Federal Reserve Regulation J and OC 3, which provide rules for collecting and returning items through the Federal Reserve.

¹ Article 4A does not address transactions that are governed by the Electronic Fund Transfer Act of 1978 (primarily consumer electronic funds transfers).

² UCC Article 8 sets out rules regarding the rights and obligations of entitlement holders, securities intermediaries, and other parties in both direct and indirect systems for holding securities. UCC Article 9 governs the rights and obligations of parties to a secured transaction.

The rights and liabilities of both consumers and financial institutions involved in consumer electronic payment transactions, including funds transfers through ACH, ATM or POS networks, are governed by the Electronic Fund Transfer Act of 1978 (EFTA) and Regulation E. Regulation E also sets standards for financial disclosure, debit and credit card issuance, access and error-resolution procedures applicable to all financial institutions. Other federal laws and policies affecting consumer use of electronic funds transfers include the Office of the Comptroller of the Currency's Consumer Protection Guidelines and the Truth-in-Lending Act (and Regulation Z issued thereunder), which provide for the disclosure of costs and terms of consumer credit. In addition, the Fair and Accurate Credit Transactions (FACT) Act of 2003 included protections for consumer financial information, such as requiring merchants to truncate the account number of credit and debit card receipts.

Section 1075 of the DFA, which added a new section to the EFTA, directed the Federal Reserve Board to issue rules relating to debit card interchange fees, including a fraud-prevention adjustment, network exclusivity arrangements and transactions routing. Federal Reserve Regulation II implements these rules (see Section 2.2.2).

The Federal Reserve, as supervisor and regulator of certain financial institutions, is the primary federal banking regulator for several payment, clearing and settlement systems.³ In addition, the Federal Reserve Board, by statute, supervises the Federal Reserve Banks and their provision of payment and settlement services such as Fedwire Funds. The Federal Reserve Policy on Payment System Risk (PSR policy) addresses the risks that payment and settlement activities present to the financial system and to the Reserve Banks. Through the PSR policy, the Federal Reserve Board establishes standards for financial system participants to reduce and control settlement and systemic risk arising in payment and settlement systems, consistent with the smooth operation of the financial system.⁴

The Commodity Futures Trading Commission is the primary regulator of derivatives clearing organisations (DCOs), which are clearing houses for futures contracts, options on futures contracts, and swaps. To be registered or maintain registration as a DCO, a clearing house must comply with the CFTC's Core Principles as established in the Commodity Exchange Act (CEA). Recently, the DFA amended the CEA to re-adopt and amend 14 existing core principles and add four new ones.

The Securities and Exchange Commission is the primary regulator of securities clearing agencies (eg central counterparties, securities settlement systems and central securities depositories). The SEC's Standards for the Registration of Clearing Agencies are a set of guidelines that the SEC applies in considering whether to grant or deny registration of a clearing agency. The Standards for the Registration of Clearing Agencies also serve as guidance to assist clearing agencies in assessing whether their organisations, capacities and rules comply with the clearing agency registration provisions of the Securities Exchange Act of 1934 (SEA).

³ See Section 1.2 for the structure of the Federal Reserve System. See Section 1.2.1 for the types of financial institutions for which the Federal Reserve is primary supervisor.

⁴ The PSR policy consists of two parts: Part I sets forth the Board's risk management expectations for payment and settlement systems subject to its authority, including systems operated by the Reserve Banks. The policy also establishes specific expectations for systemically important systems, including compliance with internationally accepted risk management standards for payment systems, securities settlement systems and central counterparties, as adopted in the policy. The Board has incorporated the international standards set out in the CPSS Core Principles for Systemically Important Payment Systems and the CPSS-IOSCO Recommendations for Securities Settlement Systems and Recommendations for Central Counterparties in its PSR policy. Part II of the PSR policy governs the provision of intraday credit (or daylight overdrafts) in accounts at the Reserve Banks and sets out the general methods used by the Reserve Banks to control their intraday credit exposures.

Title VII of the DFA extended the authority of the CFTC and SEC over swaps traded over the counter in a number of ways, including with respect to trading and clearing. Title VII includes a mandate for the central clearing of standardised swaps. Title I of the DFA established the Financial Stability Oversight Council, which is charged with monitoring and identifying emerging risks to financial stability across the entire financial system, identifying potential regulatory gaps and coordinating agencies' responses to potential systemic risks. The FSOC comprises 10 voting members: the Treasury Secretary (who serves as chairperson of the FSOC); the Chairman of the Federal Reserve Board; the heads of the Consumer Financial Protection Bureau (CFPB), Office of the Comptroller of the Currency, SEC, Federal Deposit Insurance Corporation (FDIC), CFTC, Federal Housing Finance Agency (FHFA) and National Credit Union Administration (NCUA); and an independent member with insurance expertise appointed by the President and confirmed by the US Senate. The FSOC also includes five non-voting members who serve in an advisory capacity: the directors of the Treasury Department's Office of Financial Research and the Federal Insurance Office, a state insurance commissioner, a state banking supervisor and a state securities commissioner.

Title VIII of the DFA gives the FSOC the authority to identify and designate a financial market utility (FMU) as systemically important if the FSOC determines that failure of or a disruption to the FMU could create or increase the risk of significant liquidity or credit problems spreading among financial institutions or markets thereby threatening the stability of the US financial system.⁵ In addition, the FSOC may designate certain payment, clearing or settlement activities as systemically important. Designation, among other things, allows the appropriate supervisory agency to impose enhanced risk management standards and supervision on the designated FMU or payment, clearing or settlement activity.

1.2 The role of the Federal Reserve

The Federal Reserve Act of 1913 established the Federal Reserve as the central bank of the United States and prescribed the general banking powers of the Federal Reserve. The Federal Reserve has responsibilities that encompass issuing banknotes, providing payment services, acting as the fiscal agent and depository of the United States government, supervising and regulating certain banking and financial institutions and conducting monetary policy. The Federal Reserve System includes 12 regional Federal Reserve Banks located throughout the United States and the Board of Governors in Washington, DC. The Board of Governors is responsible for the general supervision and oversight of the Reserve Banks, which are separately incorporated entities.

1.2.1 Supervision of payment, settlement and clearing activities and infrastructures

The Federal Reserve supervises and regulates US bank holding companies, financial holding companies and state-chartered commercial banks that are members of the Federal Reserve System.⁶ The Federal Reserve is also responsible for the supervision of Edge Act and agreement corporations as well as the operations of foreign banking organisations in the

⁵ For the purposes of the DFA, FMUs include payment, clearing and settlement systems but do not include trade repositories. On 18 July 2012, the FSOC designated eight FMUs as systemically important under Title VIII of the DFA. These designated FMUs are: (i) The Clearing House Payments Company LLC (PaymentsCo) on the basis of its role as operator of the Clearing House Interbank Payments System (CHIPS); (ii) CLS Bank International (CLS Bank); (iii) Chicago Mercantile Exchange, Inc (CME); (iv) The Depository Trust Company (DTC); (v) Fixed Income Clearing Corporation (FICC); (vi) ICE Clear Credit LLC; (vii) National Securities Clearing Corporation (NSCC); and (8) The Options Clearing Corporation (OCC).

⁶ All federally chartered banks are members of the Federal Reserve System. A state-chartered bank may become a member of the Federal Reserve System by applying to the Federal Reserve. Each member bank is required to subscribe to the capital stock of the Reserve Bank of its District.

United States.⁷ As noted in Sections 3 and 4 of this chapter, several financial market infrastructures are state-chartered banks or Edge Act corporations and are, therefore, supervised by the Federal Reserve.

Title VIII of the DFA strengthens the supervisory and regulatory framework related to payment, clearing and settlement systems in the United States and gives the Federal Reserve Board additional authority to assess systemic risks arising from these systems. Section 805(a) of the DFA authorises the Board to prescribe risk management standards governing the operations of FMUs that have been designated as systemically important by the FSOC, except for designated FMUs that are registered with the CFTC as derivatives clearing organisations or registered with the SEC as clearing agencies. These latter FMUs, known as designated clearing entities (DCEs), are subject to the applicable risk management standards contained in regulations prescribed by the CFTC or SEC, respectively. Section 806(e) of the DFA requires a designated FMU to provide advance notice to its supervisory agency of any proposed change to its rules, procedures or operations that could materially affect the nature or level of risks presented by the designated FMU. The CFTC and the SEC are required to consult with the Board on such notices provided by the DCEs. Under Section 807, the Board, CFTC and SEC must examine and may take enforcement action against designated FMUs for which they are the relevant supervisory agency. In addition, the CFTC and SEC are required to consult annually with the Board regarding the scope and methodology of their examinations of DCEs, and the Board may participate in any examination of a DCE. The Board may also recommend that the CFTC or SEC, as applicable, take enforcement action against the DCE.

Section 809 of the DFA authorises the Board to require a designated FMU to submit reports and data in order to assess the safety and soundness of the utility and the systemic risk that the FMU's operations pose to the financial system.

1.2.2 Provision of payment and settlement services

1.2.2.1 Note issuance

Virtually all US dollar paper currency in circulation is in the form of Federal Reserve notes (FR notes).⁸ Federal Reserve notes are ordered and issued by the Federal Reserve Board and produced by the Department of the Treasury's (US Treasury) Bureau of Engraving and Printing. The Federal Reserve Board compensates the US Treasury for the cost of printing FR notes.

The Board issues FR notes to the 12 Reserve Banks, which distribute FR notes to the public through depository institutions. FR notes are secured by legally authorised collateral, principally US government securities held by the Federal Reserve Banks. The Reserve Banks provide cash services to more than 9,000 of over 15,000 banks, savings and loan associations and credit unions in the United States. The remaining depository institutions obtain FR notes and coins from correspondent banks rather than directly from a Reserve Bank. The Federal Reserve Banks also distribute FR notes and coins internationally, primarily through the Federal Reserve Bank of New York, the Miami Branch of the Federal Reserve Bank of Atlanta and the Los Angeles Branch of the Federal Reserve Bank of San Francisco.

⁷ Edge Act and agreement corporations engage in international banking and investment activities. Edge Act and agreement corporations are chartered by the Federal Reserve Board under Section 25 of the Federal Reserve Act.

⁸ A small number of US notes remain in circulation. US notes were issued from 1862 to 1971 and remain legal tender. Federal Reserve notes were first issued in 1913 and are currently the only form of paper currency printed and issued.

1.2.2.2 Payment services to depository institutions

The Federal Reserve Banks provide a variety of payment and other services to depository institutions. Federal Reserve payment services include the distribution of FR notes and coins; the collection and return of cheques; the electronic transfer of funds via the Fedwire Funds Service, FedACH and the National Settlement Service (NSS); and the electronic transfer of federal government securities via the Fedwire Securities Service.

Individuals and institutions that do not take deposits are generally not permitted direct access to Federal Reserve payment services, though these entities may use these services indirectly as customers of depository institutions. Section 806(a) of the DFA, however, makes designated FMUs eligible for Federal Reserve services. Specifically, the Board may authorise a Reserve Bank to establish and maintain an account and provide deposit and payment services to the designated FMU under terms and conditions that the Board deems appropriate.

The Monetary Control Act of 1980 (MCA) requires the Federal Reserve to charge fees for certain payment services provided to depository institutions, including, for example, cheque collection, FedACH, Fedwire Funds and the NSS. The MCA also specifies that the Federal Reserve is to set fees in such a way that revenues recover the costs of providing payment services over the long term. The Federal Reserve is also required to include in its cost calculations not only its actual operating expenses but also imputed costs, including financing costs and taxes as well as the profit that would have been earned if a private firm provided the services.

1.2.2.3 Fiscal agency and depository services

The Federal Reserve Act provides that the Federal Reserve Banks will act as fiscal agents and depositories of the US government when required to do so by the Treasury Secretary. As fiscal agents and depositories for the federal government, the Reserve Banks auction Treasury securities, process electronic and cheque payments for the Treasury, collect certain funds owed to the federal government, maintain the Treasury's bank account and invest excess Treasury balances. The Reserve Banks also provide certain fiscal agency and depository services to other government agencies, government-sponsored enterprises (GSEs) and certain international organisations.

1.3 The role of other private and public sector bodies

1.3.1 Financial intermediaries

Financial intermediaries that provide payment services in the United States include more than 15,000 depository institutions.⁹ These institutions can be classified as commercial banks or as thrift institutions, such as credit unions and savings and loan associations (S&Ls). These classifications determine what services financial institutions may provide to the public and the regulatory structure to which the institutions are subject.

Commercial banks accept demand and time deposits, make commercial loans and provide the public with other banking services, including payment services. At year-end 2010, there were around 6,500 commercial banks in the United States.

⁹ The term "depository institution", which is defined in Section 19(b)(1)(A) of the Federal Reserve Act, is commonly used in the United States to refer to a deposit-taking financial institution, or one that accepts deposits.

Credit unions (state and federal) are cooperative organisations of individuals sharing a common affiliation, usually through employment with a particular company or organisation or membership in a labour union or church. Credit unions accept deposits of members' savings in the form of share purchases and pay interest, in the form of dividends on the shares, out of earnings. Credit unions also provide loans to members and provide transaction accounts upon which share drafts can be drawn. Federally chartered credit unions may provide and hold residential mortgages and issue credit and debit cards. At year-end 2010, there were nearly 7,500 credit unions in the United States.

S&Ls are federally or state-chartered and are required by law to make a certain percentage of their loans as home mortgages. They may be organised and owned by depositors, in which case they are called mutual associations, or they may be organised as stock-issuing corporations owned by shareholders. S&Ls can make consumer loans, offer negotiable order of withdrawal (NOW) accounts, issue credit and debit cards and offer certain types of commercial loans. Other savings institutions, such as federal savings banks, mutual savings banks and mutual stock banks, accept consumer deposits and invest primarily in residential mortgages and high-grade investment securities. Like S&Ls, these organisations may be owned by their depositors, in which case they are known as mutual savings banks, or they may be stock-issuing corporations owned by shareholders. At year-end 2010, there were almost 1,200 savings institutions (including S&Ls) in the United States.

1.3.2 Other institutions that provide payment services

Other organisations involved in providing payment services include so-called “nonbank banks”, payment card companies and the United States Postal Service. Nonbank banks (or limited-service banks) can make loans or accept deposits but cannot do both. Because of this distinction, a nonbank bank avoids meeting the legal definition of bank under the Bank Holding Company Act of 1956. The Competitive Equality Banking Act of 1987 closed this loophole, but nonbank banks in existence before 1987 were permitted to continue to operate under certain restrictions.

Payment card companies license credit and debit card trademarks to financial institutions, authorise transactions and provide certain clearing and settlement services for transactions between banks. Visa and MasterCard are the two largest payment card networks operating in the United States, but several smaller payment card networks are common throughout the United States. Other card-issuing companies include national “travel and entertainment” card issuers and a number of major retailers that issue cards to their customers.

The United States Postal Service sells postal money orders, which can be used to make payments. The United States Postal Service issued 121 million postal money orders during 2010.

Other entities that play a role in the United States payment system include those that provide specialised payment and settlement services and those that perform standard-setting or rule-writing functions. In 2010, private organisations providing payment and settlement services in the United States included the following: The Clearing House, several cheque clearing houses and specialised financial intermediaries, such as securities clearing corporations and central securities depositories.¹⁰

NACHA, a non-profit association of financial institutions and regional payments associations, formulates and promulgates rules and standards for processing ACH transactions throughout

¹⁰ The Clearing House provides a range of large- and small-value electronic payment services, including the Clearing House Inter-Bank Payments System (CHIPS), a wire-transfer system, the Electronic Payments Network (EPN), an ACH network, and SVPCO, a cheque clearing service.

the United States. In addition, regional ACH associations provide educational and promotional services to ACH participants.

1.3.3 Consumer Financial Protection Bureau (CFPB)

Title X of the DFA created an independent Consumer Financial Protection Bureau within the Federal Reserve to ensure that consumers have access to financial markets and that such markets are fair, transparent and competitive. The CFPB assumed rule-making authority for most federal consumer financial protection statutes, including almost all of the EFTA, in July 2011.¹¹

2. Payment media used by non-financial entities

2.1 Cash payments

Cash (FR notes and coins) is widely used as both a means of payment for many types of transactions and as a store of value in the United States and internationally. FR notes are issued by the Board and are printed in denominations of USD 1, 2, 5, 10, 20, 50 and 100. Coins are issued by the US Treasury's Mint in denominations of 1, 5, 10, 25, 50 cents and USD 1.

At year-end 2010, the value of notes and coins in circulation was USD 983 billion, of which USD 942 billion were notes. The amount of notes in circulation depends on the public's demand for them. Domestic demand largely results from the use of cash in transactions and is influenced primarily by prices for goods and services, income levels and population. US currency is also widely used outside the United States both for transactions and as a store of value. As much as two thirds of the value of US currency in circulation is estimated to be held abroad, primarily in USD 100 notes.

2.2 Non-cash payments

2.2.1 Non-cash payment instruments

In the United States, the money balances used by consumers and non-financial businesses to effect transactions are generally held as transaction deposits at depository institutions. These typically take the form of demand deposits, such as chequing accounts, NOW accounts and credit union share-draft accounts. At year-end 2010, the value of transaction accounts held at depository institutions was USD 1.1 trillion.

Savings accounts, money market deposit accounts, certain small and large time deposits, money market mutual funds and liquid investment assets, such as repurchase agreements and Eurodollar deposits, are less liquid but may nonetheless be used to fund payment activity. Some of these accounts, such as money market deposit accounts and mutual funds, may permit withdrawals of funds by cheque, often in minimum dollar amounts or in limited numbers. Savings deposits (including money market deposit accounts), retail money market mutual funds (general purpose only) and small time deposits totalled approximately USD 7.0 trillion at year-end 2010.¹²

¹¹ The EFTA is explained in Section 1.1.2.

¹² Small time deposits are issued in amounts under USD 100,000. Large time deposits, which do not include Eurodollar deposits, are issued in amounts of USD 100,000 or more.

2.2.1.1 Paper cheques

An estimated 22.8 billion cheques were paid in the United States in 2010, with a value of USD 29.0 trillion.¹³ In 2009, cheques accounted for about 22% of US non-cash payments, compared to 32% of non-cash payments in 2006. From 2006 to 2009, the number of cheques paid declined about 7.1% per year whereas the overall number of non-cash retail payments rose 4.6% per year. Of the approximately 16.2 billion interbank paid cheques in 2010, about 8.0 billion, or 49%, cleared through the Federal Reserve Banks.

In addition, as facilitated by the Check 21 Act, almost all interbank cheques in the United States are now truncated and processed in electronic form. By 2009, an estimated 97% of all interbank cheques in the United States involved the replacement of the original paper cheque with electronic payment information at some point in the collection process. In December 2010, about 99.7% of interbank cheques received by the Federal Reserve Banks were deposited in electronic form and about 98.4% of the interbank cheques delivered by the Reserve Banks were presented electronically to the banks on which they were drawn.

2.2.1.2 ACH credits and debits

ACH transactions are a common form of electronic funds transfer used to make recurring and non-recurring payments. There were about 19.1 billion ACH transactions during 2010, representing USD 38.4 trillion, more than twice as many transactions as there were in 2000 and 30% more than there were in 2006.¹⁴ ACH payments may be either credit or debit transactions. In an ACH credit transaction, funds flow from the originator to receiver and in a debit transaction, as with a cheque, funds flow from the receiver to the originator. ACH credit payments include direct deposit of payrolls, government benefit payments and corporate payments to contractors and vendors. Debit payments include cheques converted to ACH debits, one-time payments authorised via the internet or telephone, recurring mortgage and loan payments, insurance premiums, consumer bill payments and corporate cash concentration transactions.¹⁵ In addition, businesses and individuals may use the ACH to make payments to or receive reimbursement from the federal government related to federal tax obligations. Much of the growth in ACH payments over the last decade has been for non-recurring transactions such as consumer cheques that are converted into ACH payments by merchants and billers and for transactions initiated via the internet or telephone.

2.2.1.3 Credit cards

Credit cards combine a payment instrument with a credit arrangement. Some 21.4 billion credit card transactions were processed during 2010, valued at USD 2.0 trillion. General purpose credit cards are generally issued by a bank under a license from a payment card network, such as Visa or MasterCard, and typically involve a revolving credit agreement. There were 18.9 billion general purpose credit card transactions during 2010 valued at USD 1.7 trillion, along with 2.6 billion private label transactions valued at USD 175 billion.

2.2.1.4 Debit cards

Among non-cash payment types, debit cards grew the most over the past decade and have replaced cheques as the most frequently used non-cash payment instrument in the United States. These cards draw funds from a cardholder's transaction account (for instance, a

¹³ Inferred from the 2010 Federal Reserve Payments Study, www.frb services.org/files/communications/pdf/press/2010_payments_study.pdf.

¹⁴ See the 2010 Federal Reserve Payments Study.

¹⁵ Corporate cash concentration transactions are generally those initiated by an organisation to fund, or to consolidate funds, from its branches, franchises or agents.

transaction account) at an issuing bank. Some 43.8 billion debit card transactions were processed during 2010, valued at USD 1.6 trillion, compared with 26.0 billion processed during 2006, valued at USD 1.0 trillion. Debit cards are processed using either single-message systems or two-message systems. A single-message system is based on ATM/POS network technology that combines authorisation and clearing into one step in which transactions are usually authorised by entering a personal identification number (PIN) into a merchant's online terminal. A two-message system is based on credit card processing systems, in which the authorisation is completed in the first step and clearing is completed in a separate second step. Over 60% of debit card transactions were authorised using a two-message system, virtually all of which were processed over the Visa and MasterCard networks. In 2010, there were 14 single-message networks. The majority of single-message payments were processed over the Visa and MasterCard single-message networks.

Prepaid cards have also grown substantially over the past decade. Prepaid cards facilitate access to non-traditional financial accounts. These cards include general purpose reloadable cards, sometimes used as a substitute for a traditional bank chequing account, and payroll and government benefit transfer (EBT) cards issued to take the place of paycheques and government benefit cheques. Prepaid cards include specific-purpose restricted-use EBT cards provided by governments, private label and general purpose gift cards issued by retail merchants and card networks and rebate cards. In 2009, prepaid cards were used for 6.0 billion transactions valued at USD 142 billion. Of these, there were 2.7 billion private label prepaid card payments, 1.3 billion general purpose card payments and 2.0 billion EBT card payments valued at USD 44.7 billion, USD 42.8 billion and USD 54.5 billion, respectively.

2.2.2 Interchange fee regulation

Section 1075 of the DFA directs the Federal Reserve Board to issue rules relating to debit card interchange fees, network exclusivity arrangements and transactions routing. The Federal Reserve Board's Regulation II, Debit Card Interchange Fees and Routing, implements these provisions.

Interchange fee limitations do not apply to credit cards, issuers that (together with affiliates) have less than USD 10 billion in assets, debit cards issued pursuant to government-administered payment programmes or certain general-use prepaid cards. Covered issuers are permitted to receive an interchange fee up to a cap comprised of 21 cents per transaction plus 5 basis points of the value of the transaction. These issuers may also receive a small upward adjustment to the cap to account for fraud prevention costs.

In addition, the Board has prescribed rules prohibiting network exclusivity arrangements and routing restrictions in connection with electronic debit card transactions. In particular, all debit cards, regardless of the size of the issuer, must have at least two unaffiliated networks associated with them.

3. Payment systems (funds transfer systems)

3.1 General overview

In the United States, funds transfers occur primarily through the Fedwire Funds Service, CHIPS, the National Settlement Service (NSS), cheque clearing, ACH and payment card networks.

3.2 Large-value payment systems

There are two major large-value funds transfer systems in the United States: (i) the Fedwire Funds Service, operated by the Federal Reserve, and (ii) CHIPS, operated by The Clearing House Payments Company LLC. These payment systems are used by depository institutions and their customers to make large-value, time-critical US dollar transfers. In addition to the Fedwire Funds Service, the Federal Reserve also operates the National Settlement Service, which allows for multilateral settlement by clearing houses, financial exchanges and other clearing and settlement groups.

3.2.1 Fedwire Funds Service

3.2.1.1 Institutional framework

The Fedwire Funds Service (Fedwire Funds), owned and operated by the Federal Reserve Banks, is a real-time gross settlement system that enables participants to send and receive final payments in central bank money for their own accounts and on behalf of customers. Under the Federal Reserve Act, the Federal Reserve Board is responsible for general supervision and oversight of the Reserve Banks' provision of Fedwire Funds.

3.2.1.2 Participation

An institution that maintains an account at a Federal Reserve Bank is allowed to be a Fedwire Funds participant. Institutions with accounts at a Reserve Bank may access the Fedwire Funds Service subject to the conditions detailed in Operating Circular 6 and the PSR policy. These institutions include Federal Reserve member banks, non-member depository institutions and certain other institutions, such as US branches and agencies of foreign banks. The US Treasury and other federal agencies also participate in the Fedwire Funds Service as fiscal principals. Some 8,300 participants are able to initiate or receive funds transfers over Fedwire Funds.

3.2.1.3 Types of transactions

Participants use the Fedwire Funds Service to send or receive time-critical payments for their own accounts or on behalf of corporate or individual clients, to settle positions with other financial institutions or clearing arrangements and to submit federal tax payments. The Fedwire Funds Service processed an average of approximately 497,000 payments per day in 2010. The total value of funds transfers originated during 2010 was approximately USD 608 trillion.

3.2.1.4 Operation of the system and settlement procedures

The Fedwire Funds Service is a real-time credit transfer service. Participants originate funds transfers by instructing a Federal Reserve Bank to debit funds from the originator's account at the Reserve Bank and credit funds to the account of another participant. Fedwire Funds processes and settles payment orders individually throughout the operating day. Payment to the receiving participant over Fedwire Funds is final and irrevocable when the amount of the payment order is credited to the receiving participant's account or when notice is sent to the receiving participant, whichever is earlier.

Participants can access Fedwire Funds through computer-to-computer and browser-based electronic access services. Participants conducting large volumes of funds transfers typically use the computer-to-computer service, FedLine Direct. Participants conducting small to moderate volumes of funds transfers typically use the browser-based service, FedLine Advantage. In addition, participants can access the Federal Funds Service by telephone using the Federal Reserve Banks' offline access channel.

The Fedwire Funds operating hours for each business day begin at 21:00 eastern time (ET) on the preceding calendar day and end at 18:30 ET, Monday through Friday, excluding designated holidays. For example, processing on a non-holiday Monday begins at 21:00 ET on Sunday night and ends at 18:30 ET Monday night. The deadline for third-party transfers, those initiated or received by a participant on behalf of a customer, is 18:00 ET. Offline transfers generally cannot be initiated before 09:00 or after 18:00 ET (17:30 for third-party transfers). Under certain circumstances, online and offline operating hours may be extended.¹⁶

3.2.1.5 Risk management

Intraday central bank credit in the form of daylight account overdrafts may be available to holders of accounts at the Federal Reserve Banks, including participants in Fedwire Funds, subject to the terms and conditions set forth in the Federal Reserve Board's PSR policy. Fedwire Funds participants may use daylight overdrafts to facilitate payments throughout the operating day. In 2010, aggregate average daylight overdrafts for funds transfers averaged USD 2.4 billion per day and aggregate peak daylight overdrafts for funds transfers averaged USD 13.2 billion per day, which was about 0.6% of the average gross value of transfers settled each day.

Because funds transfers over Fedwire Funds settle in central bank money with immediate finality, credit risk to the receiving institutions is eliminated. To the extent that the Federal Reserve Banks provide daylight credit to a Fedwire Funds participant, they expose themselves to direct credit risk from participants. The PSR policy sets forth controls and other terms and conditions to mitigate this credit risk while providing sufficient liquidity to account holders for making payments. The PSR policy provides for risk assessments, net debit caps and daylight overdraft fees to control and limit exposures of Federal Reserve Banks to their depository institutions while also incentivising collateralisation to limit credit risk.

To manage operational risk, the Federal Reserve Banks have a number of procedures in place that ensure the resilience of the Fedwire Funds Service, including out-of-region backup facilities for Fedwire Funds applications and all integral support and related functions. The Reserve Banks routinely test the Fedwire Funds business continuity procedures across a variety of contingency situations, including unavailability of facilities, hardware, network or staff, to ensure timely resumption of Fedwire Funds operations in the event of a local, regional or widespread disruption. The Fedwire Funds applications and associated recovery procedures are regularly enhanced and tested to address various emerging risk scenarios.

3.2.2 Clearing House Interbank Payments System (CHIPS)

3.2.2.1 Institutional framework

CHIPS is a real-time computerised system for transmitting and settling US dollar payments among its participating banks. CHIPS is operated by The Clearing House Payment Company LLC (PaymentsCo), which is an affiliate of The Clearing House Association LLC (The Clearing House). CHIPS is subject to supervision and examination by the Federal Reserve and other federal bank supervisory agencies, under the auspices of the Federal Financial Institutions Examination Council. Also, PaymentsCo, on the basis of its role as the operator of CHIPS, has been designated as systemically important by the FSOC, and under Title VIII of the DFA the Federal Reserve is its supervisory agency.

¹⁶ A complete time schedule and list of holidays is available in Appendix B of OC 6. Additionally, guidelines pertaining to the extension of Fedwire hours are available in OC 6.

3.2.2.2 Participation

Participation in CHIPS is available to depository institutions resident in the US that meet the requirements detailed in the CHIPS rules.¹⁷ CHIPS participants must reside in the United States and be subject to supervision by US state or federal banking supervisors. A non-participant wishing to send payments over CHIPS must employ a CHIPS participant to act as its correspondent or agent. There are approximately 50 participants in CHIPS.

3.2.2.3 Types of transactions

Participants use CHIPS to settle a variety of large-value international and domestic payments, including those associated with the adjustment of correspondent balances, commercial transactions, bank loans and securities transactions. CHIPS processed an average of approximately 361,000 payments per day during 2010. The total value of transfers originated during 2010 was approximately USD 365 trillion.

3.2.2.4 Operation of the system and settlement procedures

CHIPS is a real-time final settlement system that continuously matches, nets and settles payment messages. Payment messages are sent to CHIPS through a multiprotocol label switching network or, as a backup, an integrated-services digital network. On a daily basis, the system provides real-time finality for all payment orders released from the CHIPS queue. To achieve real-time finality, payment orders are settled on the books of CHIPS against positive positions, simultaneously offset by incoming payment orders or both.

To facilitate settlement, the CHIPS prefunded balance account (CHIPS account) was established at the Federal Reserve Bank of New York. Under the real-time finality arrangement, each CHIPS participant has a pre-established opening position requirement, which, once funded via a Fedwire Funds transfer to the CHIPS account, is used to settle payment orders throughout the day.¹⁸ A participant cannot send or receive CHIPS payment orders until it transfers its opening position requirement to the CHIPS account. Opening position requirements can be transferred into the CHIPS account any time after the opening of CHIPS and Fedwire Funds at 21:00 ET. All participants must transfer their requirement no later than 09:00 ET. After a participant has paid its opening position requirement, it is permitted to transfer additional funds (known as supplemental funds) to the CHIPS account throughout the day to facilitate the settlement of priority and non-priority payments.¹⁹

During the operating day, participants submit payment orders to a centralised queue maintained by CHIPS. An optimisation algorithm searches the centralised queue for payment orders to settle, subject to restrictions contained in the CHIPS rules. When an opportunity for settlement involving one, two or more payment order(s) is found, the optimisation algorithm releases the relevant payment orders from the central queue and simultaneously marks the CHIPS records to reflect the associated debits and credits to the relevant participants' positions. Submitting participants may remove payment orders from the queue at any time prior to the daily cut-off time for the system (17:00 ET). Debits and credits are only reflected in CHIPS's records and are not recorded on the books of the Federal Reserve Bank of New York. Under New York law and CHIPS rules, payment orders are finally settled at the time of release from the central CHIPS queue.

¹⁷ CHIPS Rules are posted on the CHIPS website at <http://chips.org>.

¹⁸ PaymentsCo establishes the amount of a participant's opening position requirement using a formula that is based on the latest transaction history of each participant.

¹⁹ Priority payments are sent to a receiving participant without regard to certain maximum position limits.

At 17:00 ET, CHIPS attempts to match, net and release as many of the remaining payment orders as possible, although no participant is allowed to incur a negative position. As soon as this process is complete, any unreleased payment orders remaining in the queue are tallied on a multilateral net basis. The resulting net position for each participant is provisionally combined with that participant's current position (which is always zero or positive) to calculate the participant's final net position, and if that position is negative, it is the participant's closing position requirement.

Each participant with a closing position requirement must transfer its requirement to the CHIPS account via Fedwire Funds in order to release its remaining payment orders. These funds, once paid via a Fedwire Funds transfer, are credited to participants' balances in CHIPS. Once all of the Fedwire Funds transfers have been received, CHIPS can release and settle all remaining payment orders in the CHIPS queue. Although each participant with a closing position requirement is expected to send a Fedwire Funds payment order in the amount of that requirement to the CHIPS account, it is possible that a bank may not do so. In that case, unreleased payment orders remaining in the queue are tallied again on a multilateral basis, adjusted by the addition of amounts from the other participants that have paid their closing position requirements. This procedure allows CHIPS to release as many payment orders as possible. Payment orders still remaining in the queue will expire.²⁰ After completion of this process, CHIPS transfers to those participants who have any balances remaining the full amount of those positions, reducing the amount of funds in the CHIPS account at the Federal Reserve to zero by the end of the day.

3.2.2.5 Risk management

CHIPS requires participants to deposit a predetermined amount each day prior to the start of business. During the operating day, CHIPS does not release any payment message from the queue, and therefore does not settle any payment message, unless it can be debited against the participant's current position and no participant's current position is permitted to fall below zero. CHIPS also caps the maximum positive position that any participant can accumulate; this mitigates against the risk of too much liquidity pooling among a few participants, thus affecting the efficiency of the overall settlement process. All payment messages are final upon release to the receiving participant.

Each CHIPS participant is required to have access to sources of credit and liquidity sufficient to pay promptly each day its opening position requirement and its closing position requirement. Participants must be regulated by a US state or a federal bank regulatory authority to ensure that participants are examined on a regular basis and are operating in a sound manner. Each participant is also subject to a credit evaluation by PaymentsCo. CHIPS participants are required to file copies of their annual financial statements and are subject to a periodic review by the PaymentsCo board.

3.2.3 National Settlement Service (NSS)

3.2.3.1 Institutional framework

The National Settlement Service, owned and operated by the Federal Reserve Banks, is a multilateral settlement service used to settle for clearing houses, financial exchanges and other clearing and settlement arrangements. Under the Federal Reserve Act, the Federal Reserve Board is responsible for general supervision and oversight of the Reserve Banks' provision of NSS.

²⁰ Expiration of a payment order is treated as if the payment order was cancelled by the sending participant.

3.2.3.2 *Participation*

An NSS arrangement consists of a designated settlement agent and a group of depository institutions with accounts at a Reserve Bank that settles for the participants in the clearing arrangement. Each arrangement designates a settlement agent to submit settlement files to a Reserve Bank on behalf of the settlers. Settlement agents are not required to be depository institutions or to have accounts at the Federal Reserve. Their responsibilities include determination of settlement amounts by settler and electronic submission of NSS settlement files to the Federal Reserve Banks. At year-end 2010, 1,097 active settlers were part of 19 NSS arrangements established by financial market infrastructures, cheque clearing associations and ACH networks.

3.2.3.3 *Types of transactions*

NSS files multilaterally settle payments among a group of settlers in the private sector cheque clearing houses, the private sector ACH network and the securities settlement systems or other clearing houses that use NSS. In 2010, NSS processed approximately 7,000 settlement files and around 520,000 settlement entries. The total value of settlements during 2010 was approximately USD 14.5 trillion.

3.2.3.4 *Operation of the system and settlement procedures*

NSS provides an automated electronic mechanism for submitting multilateral settlement files to the Federal Reserve Banks. A settlement file contains a listing of the participants, the settlers (either the participant itself or the participant's correspondent) and the dollar amount of the debit or credit to be posted to the settler's account. For each file to be valid, debits must equal credits. If various validity checks are satisfied, the Federal Reserve accepts the file for processing and sends an acknowledgement to the agent. Settlement is final at the point when the settlement file is processed. OC 12 governs settlement over NSS. Each debit on the NSS settlement file is checked against the account balance and intraday credit available to the settlers in their Reserve Bank accounts to determine if it can be posted. In some instances, debits may be rejected if a settler does not have a sufficient balance, or sufficient intraday credit, to cover the debit. When all debit entries on the settlement file have been posted, NSS posts the corresponding credit balances. All postings are final and irrevocable when processed. When all credits have been posted, the settlement for that file is complete and an acknowledgement message is sent to the settlement agent.

The NSS business day begins at 08:30 and ends at 17:00 ET, Monday through Friday, excluding designated holidays. Under certain circumstances, hours can be extended. Files submitted earlier than 08:30 ET are queued for processing beginning at 08:30 ET.

3.2.3.5 *Risk management*

Intraday central bank credit in the form of daylight account overdrafts may be available to NSS settlers to mitigate the liquidity risks they face intraday. In addition, immediate settlement finality and the ability for settlement agents to fund settlement accounts using the Fedwire Funds Service enable NSS settlers to manage their credit and liquidity risks. The Federal Reserve Banks manage operational risk using the tools discussed in Section 3.2.1.5.

The primary source of liquidity risk to participants in an NSS arrangement is the inability of a settler to fund its debit balance. If a settler has insufficient funds to fund its balance, the agent is contacted and must either request that the rejected debit balance be re-processed, arrange for the amount of the rejected balance to be transferred to the settlement account via the Fedwire Funds Service or cancel the settlement file.

3.3 Retail payment systems

3.3.1 Cheque clearing systems

Depository institutions paid an estimated 22.8 billion cheques in the United States during 2010. Approximately 26% of those cheques were deposited in the same institution on which they were drawn (ie “on-us” cheques) and, therefore, were settled via accounting entries on the books of the paying institution. The remaining 74% were cleared and settled through interbank mechanisms. Approximately 52% of the cheques cleared through interbank mechanisms were cleared through direct exchange (presentment), local cheque clearing houses and correspondent bank networks; the rest were cleared through the Federal Reserve Banks.

3.3.1.1 Operation of the cheque collection mechanism

In the wake of the Check 21 Act (see Section 2.2.1.1), the vast preponderance of interbank cheque clearing arrangements are now electronic. Accordingly, much of the infrastructure formerly used to process and deliver paper cheques between banks has ceased to exist. For example, as recently as 2003 the Federal Reserve Banks managed 45 cheque clearing centres. By February 2010, the Reserve Banks had ceased operations at all but one of these paper cheque processing centres. The Reserve Banks have also discontinued their air transportation networks for cheques. In addition, many of the private arrangements for exchanging paper cheques, including local clearing houses and ground courier services, have been discontinued.

Typically the first depository institution to receive a paper cheque “truncates” that cheque, using scanning equipment to capture both an image of the cheque and the information contained in the magnetic ink character recognition (MICR) line printed along the bottom of the cheque. A paper cheque may even be truncated prior to its receipt by the first bank that handles the item. For example, in a process known as “remote deposit capture”, a cheque’s payee, such as a merchant, uses scanning equipment at the point of sale to capture the aforementioned data elements from the paper cheque and, by agreement, deposits the cheque electronically with its bank.

Once a paper cheque has been truncated, banks typically handle the item electronically thereafter. A bank may collect an electronic item by depositing it with a correspondent bank or a Federal Reserve Bank. Correspondent banks that have established relationships with other correspondent banks may present electronic items drawn on each other directly. Smaller institutions generally use the electronic cheque handling services offered by clearing houses, correspondent banks or the Federal Reserve Banks. If necessary, as authorised by the Check 21 Act, a bank handling an electronic item may create a legally equivalent paper substitute cheque for delivery to a subsequent bank or bank customer that does not accept cheques electronically.

While the Check 21 Act has radically transformed the means by which cheques are cleared in the United States, it has not had a substantial effect on the settlement of cheques. Correspondent banks settle the cheques they collect for other institutions through accounts on their books. Paying banks generally settle with correspondent banks using the Federal Reserve’s Fedwire Funds Service. Cheque clearing houses generally net payments. Settlement among cheque clearing house participants generally occurs through direct transactions between members, through designated settlement banks or through the Federal Reserve’s NSS.

The Federal Reserve settles the cheques it collects by posting entries to the accounts that depository institutions maintain with the Federal Reserve. The account of the collecting institution is credited, and the account of the paying institution is debited, for the value of the deposited cheques in accordance with funds availability schedules maintained by the Federal Reserve, which reflect the time normally needed for the Federal Reserve to receive

settlement from the paying institutions. Collecting institutions usually receive credit on the day of deposit or the next business day.

3.3.2 Automated clearinghouse (ACH)

ACH is a nationwide electronic file transfer mechanism that processed 19.2 billion credit and debit transfers initiated by depository institutions through electronically originated batches during 2010. The Federal Reserve is one of the nation's two ACH operators; The Clearing House's Electronic Payments Network (EPN) is the sole private sector ACH operator.

3.3.2.1 Operation of the ACH system

The Federal Reserve maintains centralised application software used to process ACH payments submitted to the Federal Reserve Banks through the FedACH system. Depository institutions electronically deliver files to and receive files from the Federal Reserve Banks through a variety of electronic-access options. EPN and the Federal Reserve Banks rely on each other for the processing of ACH transactions in which either the originating depository institution or the receiving depository institution is not their customer. These inter-operator transactions are settled by the Federal Reserve.

ACH transactions processed by the Federal Reserve are settled through depository institutions' accounts at the Federal Reserve. Settlement for ACH credit transactions processed by the Federal Reserve Banks is final when transactions are posted to the receiving depository institutions' accounts, which is currently at 08:30 ET on the settlement date. Credit for Federal Reserve ACH debit transfers is not final at settlement. Credit for debit items is available to the originating depository institution on the settlement date but is not final until the banking day following the settlement date. FedACH is governed by Operating Circular 4, which, subject to certain exceptions, incorporates the Operating Rules of NACHA (see Section 1.3.2). Transactions processed by EPN are settled on a net basis using the National Settlement Service.

3.3.3 Payment card networks

Credit card and debit card networks provide communications, transaction authorisation and interbank financial settlement for financial institutions. Payment card networks establish uniform operating policies, procedures and controls. Some major networks are publicly traded companies. The largest credit card and signature-based debit card networks in the United States are Visa and MasterCard. American Express and Discover are also major card networks. There were also several smaller debit card networks operating in the United States during 2010.

3.3.3.1 Operation of payment card networks

Credit card and debit card networks sort and route transaction data from acquiring banks to issuing banks over proprietary networks. The networks generally settle on a net basis with the acquiring and issuing banks daily, although typically with a one- or two-day lag between payment initiation and settlement. Generally, the networks use the acquiring and issuing banks' aggregated transaction information to compile each bank's net settlement position. Member banks may be required to maintain collateral with the networks' settlement banks to manage default risks. Acquiring and issuing banks may settle directly with each other, through regional settlement banks or through the Federal Reserve or by other net settlement arrangements. The settlement process can vary significantly, depending upon the banks involved.

4. Systems for post-trade processing, clearing and settlement

4.1 General overview

In the United States, a number of systems facilitate the post-trade processing, clearing and settlement of securities, derivatives and other financial transactions. These currently include trade repositories as well as central counterparties, central securities depositories and securities settlement systems.

4.2 Trade repositories

4.2.1 DTCC Data Repository (US) LLC

4.2.1.1 Institutional framework

DTCC Data Repository (US) LLC (DDRL US) is a wholly owned subsidiary of the Depository Trust & Clearing Corporation (DTCC) that operates a multi-class swaps data repository for the over-the-counter (OTC) equities, credit, interest rate and foreign exchange derivatives markets. DDRL US plans on supporting commodities derivatives in the future. DDRL US maintains an electronic database containing authoritative and timely data on derivatives contracts for the asset classes that it serves.

4.2.1.2 Participation

DDRL US provides open access to all participants in these OTC derivatives markets, including swap execution facilities, designated contract markets, derivatives clearing organisations (DCOs), confirmation providers and middleware providers in an effort to promote processing and regulatory reporting efficiency.

4.2.1.3 Types of transactions

DDRL US is part of DTCC's global trade repository (GTR) service that supports cleared and uncleared OTC equities, credit, interest rate, foreign exchange and commodity derivatives. The GTR service is utilised by two other trade repositories in addition to DDRL US: (i) DTCC Derivatives Repository Limited (DDRL Ltd), a UK company; and (ii) Global Trade Repository for Commodities BV (GTRfC), a Dutch company. GTR is serviced by other DTCC subsidiaries, including the Warehouse Trust Company, a state-chartered, limited-purpose trust company in New York and a member of the Federal Reserve System, that provides post-trade lifecycle event processing to trade repositories servicing the credit default swap market. DDRL US also has links to the DCOs that choose to satisfy CFTC swap transaction reporting requirements under the Commodity Exchange Act.

4.3 Central counterparties (CCPs) and clearing systems

4.3.1 National Securities Clearing Corporation (NSCC)

4.3.1.1 Institutional framework

The National Securities Clearing Corporation provides central counterparty clearing and settlement services for various securities transactions in the United States. NSCC is a wholly owned subsidiary of DTCC and is registered as a clearing agency with, and subject to regulation and supervision by, the SEC. Also, NSCC has been designated as systemically important by the FSOC, and under Title VIII of the DFA the SEC is its supervisory agency.

4.3.1.2 Participation

NSCC participants include brokers/dealers, banks, other clearing agencies, investment companies, insurance companies and other similar entities. NSCC clears transactions for a number of exchanges, electronic communication networks (ECNs) and other trading venues. These trading venues include the New York Stock Exchange (NYSE), the NASDAQ Stock Market and regional US markets, as well as OTC markets in municipal government bonds and other securities.

4.3.1.3 Types of transactions

NSCC provides clearing and settlement services for broker-to-broker trades involving equities, corporate and municipal debt, American depository receipts, exchange-traded funds and unit investment trusts. In 2010, NSCC processed around 20 billion transactions, valued at approximately USD 218 trillion.

4.3.1.4 Operation of the system

NSCC functions as a CCP for the equities and corporate and municipal bond markets. Equities trade over exchanges or ECNs; corporate and municipal bonds trade over the counter. Trading activity, regardless of trade source, enters NSCC on trade date (T) and final settlement occurs three days after (T+3).²¹ In its clearing process, NSCC conducts a multilateral net of its members' trade positions, resulting in a net long (buy) or net short (sell) position in each traded security for each member and a single overall net funds position for each member. NSCC maintains a settlement account at the Depository Trust Company (DTC) to allow settlement of net securities obligations.²²

On settlement date (T+3), NSCC's continuous net settlement (CNS) system instructs DTC to deliver available securities from members with net delivery obligations to NSCC's settlement account and then deliver those securities to members with net receive obligations. These securities deliveries are made free of payment within DTC and are provisional intraday (with respect to the receiver) until end-of-day payment (approximately 16:30 ET) is made over NSS.²³ The DTC and NSCC end-of-day net funds settlement process is executed over a single NSS file. Each DTC and NSCC member must designate a settling bank that participates in the DTC-NSCC NSS arrangement. DTC and NSCC calculate a net-net funds settlement obligation for their common members by netting their separate DTC and NSCC net funds obligations.

4.3.1.5 Risk management

NSCC establishes requirements for participants' financial resources and creditworthiness. Financial requirements are generally based upon the entity type of a participant (eg broker/dealer, bank/trust company etc), types of services that the entity will use (eg full use of continuous net settlement, limited use of non-guaranteed services etc) and whether the entity intends to clear transactions for others. In addition, NSCC maintains sufficient resources, primarily member clearing fund deposits, to cover the failure of the member (including the member's affiliated family) having the largest net debit in extreme but plausible market conditions. NSCC's clearing fund calculation includes daily mark to market charges, which measure the unrealised profit or loss in participants' portfolios using contract prices versus market prices of the securities that NSCC clears.

²¹ Trade information sources include automatic transmission from exchanges and ECNs.

²² Settlement over DTC is described in Section 4.4.2.

²³ Deliveries to members with net funds credit positions (sell obligations greater than buy obligations) will be final intraday once successful delivery of sell obligations has occurred.

NSCC's liquid resources include participant cash contributions to NSCC's clearing fund and the cash that would be obtained from NSCC's committed liquidity facility with a consortium of banks. When drawn upon, the committed liquidity facility would be collateralised with participant securities contributions to NSCC's clearing fund and unpaid CNS long allocations (or collateral supporting those allocations) of the defaulting member. Securities in NSCC's clearing fund consist of US Treasury and agency securities. In the event that a member fails to pay its net funds obligation to NSCC, the CCP is obliged to make payment to its surviving members for the securities they delivered to NSCC to be on-delivered to the failing member. NSCC would need to draw on its liquid resources and/or convert the delivered securities (which the DTC system would make available to NSCC) and/or its other financial resources into cash to make this payment. If losses are incurred in the liquidation of a defaulting member's positions, NSCC would first use that member's clearing fund deposit to cover a loss incurred on the liquidation (and any funds available from any applicable collateral-sharing arrangements with other clearing corporations).

In the event that a defaulting member's clearing fund deposits were insufficient to cover the liquidation of all positions, NSCC would draw from resources available under applicable cross-guaranty agreements and from no less than 25% of the retained earnings attributable to NSCC. If a deficiency still remained, NSCC would satisfy the deficiency by utilising the clearing fund deposits of surviving members and assessing its members as provided in its rules. The assessment process, in general, allocates any remaining losses pro rata among members based upon the member's usage of the service to which the loss relates.²⁴

4.3.1.6 Links to other systems

NSCC maintains a securities settlement account at DTC to allow settlement of net securities obligations. DTC also acts as settlement agent for NSCC to effect net funds settlement over NSS through a single NSS file. Each DTC and NSCC member designates a settling bank that participates in the DTC-NSCC NSS arrangement.

NSCC has entered into a multilateral netting contract and limited cross-guaranty agreement with DTC, the Fixed Income Clearing Corporation (FICC) and The Options Clearing Corporation (OCC), under which these clearing agencies have agreed to make payments to each other for any remaining unsatisfied obligations of a common defaulting participant to the extent that these clearing agencies have excess resources belonging to the defaulting participant.

4.3.2 Fixed Income Clearing Corporation – Government Securities Division (FICC/GSD)

4.3.2.1 Institutional framework

The Government Securities Division of the Fixed Income Clearing Corporation provides central counterparty clearing and settlement services for transactions in US Treasury and agency securities. FICC is a wholly owned subsidiary of DTCC.²⁵ FICC is registered as a clearing agency with and is subject to regulation and supervision by, the SEC. Also, FICC has been designated as systemically important by the FSOC, and under Title VIII of the DFA the SEC is its supervisory agency.

²⁴ Members may cap their exposure to future allocations by electing to withdraw from membership within certain timeframes.

²⁵ FICC also operates its Mortgage-Backed Securities Division (FICC/MBSD) which is described in Section 4.3.3.

4.3.2.2 Participation

FICC/GSD rules allow for the following types of netting members: banks, broker/dealers, futures commission merchants (FCMs), interdealer brokers, government securities issuers, registered clearing agencies, insurance companies and registered investment companies. Foreign entities may become netting members if (i) their home country regulator has entered into a memorandum of understanding with the SEC and (ii) they maintain a US presence. Registered investment companies also may join as sponsored members.

4.3.2.3 Types of transactions

FICC/GSD provides clearing and settlement services for US government securities, including Treasury bills, bonds, notes, zero-coupon securities, government agency securities and inflation-indexed securities. FICC/GSD accepts buy-sell transactions, repurchase and reverse repurchase agreement transactions (repos) and Treasury auction purchases in eligible securities. FICC/GSD also provides General Collateral Finance Repo (GCF Repo) services. The US government securities market is predominantly an over-the-counter market. In 2010, FICC/GSD processed around 34 million transactions with a total value of approximately USD 1.1 quadrillion.

4.3.2.4 Operation of the system

FICC/GSD functions as a CCP for the US government securities market and provides the Real-Time Trade Matching (RTTM) service to its participants. RTTM provides immediate confirmation for submitted trade executions that is legal and binding. FICC/GSD members may submit their trades through interdealer brokers or directly to FICC/GSD.²⁶ Interdealer brokers are specialised securities companies that function as intermediaries to facilitate transactions between broker/dealers.

Through multilateral netting, FICC/GSD establishes a single net long (buy) or net short (sell) position for each member's daily trading activity in a given security. The member's net position is the difference between all purchases (long) and all sales (short) in a specific security. FICC/GSD legally novates each net settlement position and members settle against FICC/GSD as CCP.

US government securities market transactions are generally settled on a T+1 basis. FICC employs the services of two settlement banks, the Bank of New York Mellon (BNYM) and JPMorgan Chase Bank (JPMC) for the purposes of settling transactions. FICC/GSD rules provide that FICC/GSD shall notify each member which settlement bank(s) FICC/GSD will use to deliver eligible securities to members and to receive eligible securities from members, and, by product, the types of securities that each such clearing bank will deliver and receive. In turn, each member must notify FICC/GSD of the bank(s) that the member has designated to act on its behalf in the delivery and receipt of securities to and from FICC/GSD.

4.3.2.5 Risk management

FICC/GSD establishes requirements for participants' financial resources and creditworthiness. FICC/GSD maintains membership standards, including minimum financial requirements. Financial requirements are generally based upon entity type, types of services that the participant will use and whether the participant intends to clear transactions for others. In addition, FICC maintains financial resources, primarily member clearing fund

²⁶ Dealers that are not FICC members or that do not use an interdealer broker to submit trades to FICC may settle their trades on a gross basis either on the books of a depository institution or through the Fedwire Securities Service, described in Section 4.4.1 below, via a depository institution. Non-member dealers may also submit trades to FICC through a dealer member with which they have a correspondent relationship.

deposits, sufficient to cover the failure of its largest member (including the member's affiliated family). The clearing fund consists of deposits posted by members in the form of cash and eligible securities (US Treasury securities, agency securities guaranteed by the US government and pass-through mortgage-backed securities by Ginnie Mae, Fannie Mae and Freddie Mac). FICC/GSD's liquid resources include cash contributions to FICC/GSD's clearing fund.

FICC/GSD marks all open positions, including forward settling and delivery fails, to market twice daily as part of its funds-only settlement process. Among other payments included in FICC/GSD's funds only settlement are repo interest rate marks, delivery differential payments and coupon payments.

FICC/GSD's rules include a loss allocation procedure, which would be invoked if a defaulting member's clearing fund deposit was insufficient to cover losses incurred in the liquidation of the member's positions. If a member becomes insolvent, FICC/GSD would first use that member's clearing fund to cover the loss incurred on the liquidation of the member's positions (and any funds available from any applicable collateral sharing arrangements with other clearing corporations). If those deposits were insufficient to cover the liquidation of all positions, the remaining loss would be allocated against the retained earnings of FICC attributable to the FICC/GSD in the amount of up to 25% of the retained earnings or such higher amount as may be approved by the Board of Directors of FICC. If a further loss remained, FICC/GSD would apply the loss to the clearing fund deposits of its non-defaulting members in accordance with its rules.

4.3.2.6 *Links to other systems*

FICC/GSD uses its two settlement banks, BNYM and JPMC, for the purposes of settling transactions and custody of collateral posted to FICC/GSD's clearing fund. FICC/GSD uses DTC its settlement agent to execute its funds-only settlement over NSS.

FICC has entered into a multilateral netting contract and limited cross-guaranty agreement with DTC, NSCC and OCC, under which these clearing agencies have agreed to make payments to each other for any remaining unsatisfied obligations of a common defaulting participant to the extent that these clearing agencies have excess resources belonging to the defaulting participant.

FICC has also entered into a cross-margining agreement with the Chicago Mercantile Exchange Inc (CME) which provides for coordination between the two clearing corporations in the event of a default of a cross-margining participant. In addition, FICC has a single-pot cross-margining agreement with New York Portfolio Clearing (NYPC).²⁷

²⁷ On 1 March 2011, FICC/GSD received SEC approval to enter into a single-pot cross-margining with New York Portfolio Clearing, a joint-venture between DTCC and NYSE Euronext. On 1 February 2011, NYPC received CFTC approval for registration as a DCO. In March 2011, NYPC went live and currently provides central counterparty clearing and settlement services for various interest rate products, including Treasury and Eurodollar futures. NYPC executes its pass-through payments in conjunction with FICC/GSD's NSS pass-through arrangement, netting the obligations of common members. Futures contracts that cash settle upon expiration settle through this same NSS arrangement. Futures contracts that are physically settled (a Treasury security is delivered against payment upon the expiration of the contract) are converted into FICC/GSD delivery obligations.

4.3.3 Fixed Income Clearing Corporation – Mortgage-Backed Securities Division (FICC/MBSD)

4.3.3.1 Institutional framework

The Mortgage-Backed Securities Division of the Fixed Income Clearing Corporation provides trade guaranty, and central counterparty clearing and settlement services for the mortgage-backed securities (MBS) market.²⁸ These services are provided to FICC/MBSD members that trade in the forward and over-the-counter options markets for MBS issued by Government National Mortgage Association (Ginnie Mae), Federal National Mortgage Association (Fannie Mae) and Federal Home Loan Mortgage Corporation (Freddie Mac).

4.3.3.2 Participation

FICC/MBSD rules allow for the following types of netting members: banks, broker/dealers, interdealer brokers, issuers of eligible securities, registered clearing agencies, insurance companies, registered investment companies and unregistered investment pools.

4.3.3.3 Types of transactions

FICC/MBSD provides clearing and settlement services for Ginnie Mae, Fannie Mae and Freddie Mac pass-through MBS, all of which trade over the counter. In 2010, FICC/MBSD processed around 3 million transactions with a total value of approximately USD 104 trillion.

4.3.3.4 Operation of the system

MBS generally trade on a to-be-announced (TBA) basis, meaning the general terms of the trade are known, but the specific pools of mortgages that the seller will deliver are unknown at the time of trade. FICC/MBSD members may submit their trades through interdealer brokers or directly to FICC/MBSD.²⁹ FICC/MBSD members enter their trade information into FICC/MBSD on the trade date. Settlement of associated obligations typically occurs on one of four monthly settlement dates established by the Securities Industry and Financial Markets Association. Many MBS settle on the next appropriate settlement date, but often market participants choose to settle in a later month.

FICC/MBSD nets TBA trades by TBA CUSIP, creating TBA settlement obligations three days before settlement date (S–3). The netting process also assigns settlement counterparties for each position, which may or may not be original trade counterparties. On S–2, FICC/MBSD members communicate to FICC/MBSD and one another the specific mortgage pools they will deliver to meet their TBA settlement obligations. On S–1, FICC/MBSD nets and novates a subset of the mortgage pools to be delivered based on an optimisation algorithm. On settlement date (S), members whose delivery obligations FICC/MBSD novated settle against FICC/MBSD; otherwise, members settle non-novated obligations bilaterally outside FICC/MBSD and provide FICC/MBSD notification of settlement.

²⁸ FICC, a wholly-owned subsidiary of DTCC, also operates the Government Securities Division (FICC/GSD). As described in Section 4.3.2, FICC is registered as a clearing agency with the SEC and is subject to SEC regulation and supervision. Also, FICC has been designated as systemically important by the FSOC, and under Title VIII of the DFA the SEC is its supervisory agency.

²⁹ Dealers that are not FICC members or that do not use an interdealer broker to submit trades to FICC may settle their trades on a gross basis either on the books of a depository institution or through the Fedwire Securities Service via a depository institution. Non-member dealers may also submit trades to FICC through a dealer member with which they have a correspondent relationship.

4.3.3.5 Risk management

FICC/MBSD provides risk management services to its members to mitigate risks inherent in the settlement process, including the possibility of member default. Among the tools that FICC/MBSD employs to manage risk are participation requirements, clearing fund requirements and daily mark to market of open positions. FICC/MBSD accepts cash and eligible securities (same as FICC/GSD) for deposit in the clearing fund. FICC/MBSD's clearing fund is calculated, collected and held separately from that of FICC/GSD. In addition, FICC/MBSD employs a loss allocation procedure similar to that of FICC/GSD (as described in Section 4.3.2.5).

4.3.3.6 Links to other systems

FICC/MBSD uses DTC as its settlement agent to execute its funds only settlement over the National Settlement Service. FICC has entered into a multilateral netting contract and limited cross-guaranty agreement with DTC, NSCC and OCC under which these clearing agencies have agreed to make payments to each other for any remaining unsatisfied obligations of a common defaulting participant to the extent that these clearing agencies have excess resources belonging to the defaulting participant.

4.3.4 The Options Clearing Corporation (OCC)

4.3.4.1 Institutional framework

The Options Clearing Corporation is an independent clearing house for exchange-traded equity options and commodity futures. OCC currently provides central counterparty clearing and settlement services to nine options exchanges and five futures markets.³⁰ OCC is owned in equal shares by five of its participant exchanges.³¹ OCC is registered as a clearing agency with and is subject to regulation and supervision by the SEC. OCC is also registered as a DCO and regulated by the CFTC. Also, OCC has been designated as systemically important by the FSOC, and under Title VIII of the DFA the SEC is its supervisory agency.

4.3.4.2 Participation

Eligible clearing firms must be broker/dealers registered with the SEC, FCMs registered with the CFTC or non-US securities firms that meet certain financial, operational and regulatory requirements outlined in OCC's rules and bylaws. Non-US securities firms must be incorporated, located and regulated within another country. OCC requires clearing members to maintain minimum net capital levels at all times. OCC has approximately 120 clearing members.

4.3.4.3 Types of transactions

OCC offers clearing and settlement services for transactions in options on several types of underlying assets, including stocks, stock indices, exchange-traded fund (ETF) shares and foreign currencies traded on OCC's participant exchanges and markets. OCC also offers clearing and settlement services for transactions in futures and options on futures on several types underlying assets, including commodities, stocks, stock indices, ETF shares, foreign

³⁰ These exchanges and markets include: BATS; Boston Options Exchange; C2 Options Exchange, Inc; Chicago Board Options Exchange, Incorporated; International Securities Exchange, LLC; NASDAQ OMX PHLX; NASDAQ Options Market; NYSE Amex Options; NYSE Arca Options; CBOE Futures Exchange, LLC; ELX Futures, LP; NASDAQ OMX Futures Exchange; NYSE Liffe US; and OneChicago Exchange.

³¹ OCC is owned by the NYSE Amex Options, the Chicago Board Options Exchange, Inc, the International Securities Exchange, LLC, the NASDAQ OMX PHL and NYSE Arca.

currencies, volatility indices and US Treasury securities. In addition, OCC provides clearing services for securities lending transactions. In 2010, OCC cleared approximately 3.9 billion options contracts and 26.6 million futures contracts.

4.3.4.4 *Operation of the system*

OCC clears and guarantees options and futures contracts. OCC receives matched trade data for trades executed on one of the 14 exchanges or platforms for which it provides clearing services. When a trade is accepted for clearing, OCC is substituted as the counterparty to every buyer and seller through the process of novation and guarantees performance on the contract.

Each morning OCC settles payment obligations incurred on the previous business day. These payments include options premiums passed from buyer to seller and margin deposits.³² OCC requires that all payments due be received by 10:00 ET and is obligated to make all required payments to clearing participants by 11:00 ET.

Settlement occurs through settlement banks designated by OCC. Clearing members must establish a banking relationship with one of the settlement banks designated by OCC, which also has an account at each bank. OCC and its clearing members grant settlement banks the authority to credit or debit their respective accounts based on settlement instructions sent by OCC.

4.3.4.5 *Risk management*

OCC bears counterparty credit risk in the event that clearing members fail to meet their obligations.³³ OCC reduces its exposure through a risk management programme that includes initial and ongoing membership standards, margin requirements, a clearing fund of highly liquid assets and lines of credit to enable OCC to meet clearing member default or suspension obligations, or to cover certain other losses. All trades guaranteed by OCC are matched, which ensures that it has equal and offsetting claims against clearing members. Margin and clearing fund deposits are required to collateralise clearing members' obligations and thus support OCC's guarantee.

OCC sets margin requirements based on a member's overall portfolio risk in options, futures and stock loan/borrow positions. OCC requires the posting of initial margin in order to guarantee a contract. Initial margin deposits must be in the form of cash, government securities, government-sponsored debt, letters of credit, money market fund shares or other acceptable margin securities and may be subject to haircuts. In addition, OCC marks all open contracts to market on a daily basis and requires additional cash payments (known as variation margin) to cover changes in contract value. Margin requirements are calculated using the System for Theoretical Analysis and Numerical Simulations (STANS), a proprietary risk management system that uses Monte Carlo-based simulation techniques.³⁴

OCC also maintains a clearing fund to cover possible losses should a clearing member, bank or a securities or commodities clearing organisation default. The clearing fund is a percentage of the average daily aggregate margin requirement for positions outstanding during the preceding calendar month and mutualises the risk of default among all clearing

³² OCC requires both initial margin deposits and variation margin deposits to cover changes in contract value.

³³ OCC deals only with its clearing members and holds each clearing member accountable for all positions, regardless of whether the positions are for the member itself or customers of the member.

³⁴ The Monte Carlo method is used to build a portfolio profit and loss distribution by repeatedly simulating price movements and their associated results.

members.³⁵ The entire clearing fund is available to cover potential losses in the event that the margin deposit and the clearing fund deposit of a defaulting clearing member are inadequate or not immediately available to fulfil that clearing member's outstanding financial obligations. In the event of a default, OCC is generally required to liquidate the defaulting clearing member's open positions. To the extent that such positions remain open, OCC is required to assume the defaulting clearing member's obligations related to the open positions. The clearing fund is available to cover the cost of liquidating a defaulting clearing member's open positions and performing OCC's obligations with respect to positions not yet liquidated.³⁶

4.3.4.6 Links to other systems

OCC currently maintains cross-margining arrangements with certain US commodities clearing organisations, including the CME and ICE Clear US, as well as offering an internal cross-margin programme for products where OCC clears both securities and futures contracts. In addition, OCC has entered into a multilateral netting contract and limited cross-guaranty agreement with DTC, NSCC and FICC under which these clearing agencies have agreed to make payments to each other for any remaining unsatisfied obligations of a common defaulting participant to the extent that these clearing agencies have excess resources belonging to the defaulting participant.

The OCC also participates in the Disbursement Programme, developed jointly with DTC and NSCC, which facilitates the payment of stock settlement obligations of common OCC clearing members and NSCC participants resulting from exercised and assigned equity options.

4.3.5 CME Clearing

4.3.5.1 Institutional framework

CME Clearing is an unincorporated division of the Chicago Mercantile Exchange, Inc (CME), which is a subsidiary of CME Group Inc and provides central counterparty clearing and settlement services for exchange-traded futures and options contracts traded on CME Group exchanges (as defined in Section 4.3.5.3) and certain OTC derivatives contracts. CME Clearing is a registered DCO regulated by the CFTC. Also, CME has been designated as systemically important by the FSOC, and under Title VIII of the DFA the CFTC is its supervisory agency.

4.3.5.2 Participation

Eligible clearing members are corporations, partnerships or cooperative associations that own shares of CME Group and have sufficient financial capital to support the risks assumed in clearing trades. Clearing members must be registered as futures commission merchants with the CFTC in order to clear customer trading activity. CME Clearing has approximately 64 clearing members.

4.3.5.3 Types of transactions

CME Clearing clears exchange-traded futures and options contracts traded on the CME; the Board of Trade of the City of Chicago, Inc (Chicago Board of Trade, or CBOT); the New York

³⁵ The SEC has approved a proposed change to OCC's method for calculating the size of its clearing fund. OCC will size the clearing fund to cover the larger of the charges that would result from (i) a default by a single clearing member group or (ii) the near simultaneous default of two randomly selected clearing members.

³⁶ Clearing fund deposits must be in the form of cash or government securities (as defined in OCC's bylaws) as the clearing fund is intended to provide OCC with an immediately available pool of liquid assets.

Mercantile Exchange, Inc (NYMEX); and the Commodity Exchange, Inc (COMEX), which are collectively referred to as the “CME Group exchanges”. CME Clearing also clears OTC derivatives contracts submitted for clearing through CME ClearPort. CME Group handled around 3.1 billion contracts in 2010.

4.3.5.4 *Operation of the system*

CME Clearing functions as a CCP for the futures and options contracts it clears. CME Clearing matches trade data submitted for trades executed either through open outcry facilities located in Chicago and New York or the CME Globex electronic trading facility as well as for privately negotiated OTC derivatives transactions. When a trade clears, CME Clearing is substituted as the counterparty to every buyer and seller and guarantees performance on the contract.

CME Clearing marks open contracts to market twice daily and settles payment obligations once in the morning and once in the afternoon of each business day. Morning settlement occurs at 08:30 ET and includes options premiums passed from buyer to seller and initial and variation margin (also known as initial and maintenance performance bonds, respectively) deposits. CME Clearing sends payment instructions to each settlement bank prior to the 08:30 ET deadline and requests a confirmation of payment prior to the deadline. Afternoon settlement includes maintenance performance bond deposits, which are due within one hour of CME Clearing requesting payment from its clearing members.

Settlement occurs through designated settlement banks that act as settlement intermediaries between CME Clearing and its clearing members. Clearing members must establish a banking relationship with one of the settlement banks designated by CME Clearing, which also has an account at each bank.³⁷ CME Clearing and clearing members grant settlement banks the authority to credit or debit their respective accounts for daily market activity based on clearing instructions sent by CME Clearing.

4.3.5.5 *Risk management*

CME Clearing bears counterparty credit risk in the event that future market movements create conditions that could lead to clearing firms failing to meet their obligations to the clearing house.³⁸ CME Clearing reduces its exposure through a risk management programme that includes initial and ongoing financial standards, initial and maintenance performance bond (margin) requirements, mandatory guaranty funds contributions and lines of credit.

CME Clearing sets minimum performance bond requirements based on the product traded and market volatility. Performance bond requirements are calculated for each instrument separately using the CME’s Standard Portfolio Analysis of Risk (SPAN) system for futures and options contracts, a historical value-at-risk (VaR) model for interest rate swaps and a multifactor model for credit default swaps. Performance bond collateral may include cash, gold, US Treasury securities, US government agency securities, foreign sovereign debt, select mortgage-backed securities, specialised collateral programmes, letters of credit and stocks and may be subject to haircuts. CME Clearing also marks to market all open positions at least twice a day, and more often if market volatility warrants, and requires payments from

³⁷ Clearing members must establish separate accounts at settlement banks for customer and house (non-customer and proprietary) activity.

³⁸ CME Clearing is also exposed indirectly to the credit risk of customers of its clearing firms as clearing members are held accountable for all positions, regardless of whether the positions are for the member itself or customers of the member.

clearing firms whose positions have lost value and makes payments to clearing firms whose positions have gained value.

CME Clearing has measures in place intended to enable it to cover any single default and maintain liquidity. In the event of a default by a clearing firm, CME Clearing would first apply assets of that clearing firm to cover its obligations to CME Clearing. These assets include guaranty fund contributions, performance bonds and any other available assets, such as proceeds from the sale of Class A common stock and trading rights (at CME, CBOT, NYMEX and/or COMEX, as applicable) owned by or assigned to the clearing firm.³⁹ Thereafter, if the default remains unsatisfied, CME Clearing would use its surplus funds, guaranty fund contributions of other clearing firms and funds collected through an assessment against all other solvent clearing firms to satisfy the deficit.⁴⁰

4.3.5.6 Links to other systems

CME Clearing offers a cross-margining programme with OCC and FICC. CME Clearing is also involved in the Mutual Offset System Agreement (MOSA) between CME and the Singapore Exchange Ltd (SGX), which enables traders to open a futures position on one exchange and liquidate it on the other.

4.3.6 ICE Clear Credit LLC

4.3.6.1 Institutional framework

ICE Clear Credit LLC (ICE Clear Credit) is a limited liability company and provides central counterparty clearing and settlement services for credit default swaps referencing the CDX North American investment-grade, investment-grade high volatility and high-yield indexes (North American index contracts) and a subset of their single-name constituents (North American single-name contracts). In addition, ICE Clear Credit also provides central counterparty clearing and settlement services for Latin American sovereign credit default swaps. ICE Clear Credit is a subsidiary of IntercontinentalExchange Inc (ICE), a publicly traded company which operates futures exchanges, over-the-counter swaps markets and derivatives clearing houses.

ICE Clear Credit was formerly known as ICE Trust US LLC (ICE Trust), and was regulated by the Federal Reserve and the New York State Department of Financial Services. On 16 July 2011, ICE Trust converted from a New York state trust company to a Delaware limited liability company and changed its name to ICE Clear Credit LLC. On the same day, pursuant to the DFA, ICE Trust began operating under the name ICE Clear Credit, subject to regulation by the CFTC and SEC as a DCO and clearing agency, respectively. Also, ICE Clear Credit has been designated as systemically important by the FSOC, and under Title VIII of the DFA the CFTC is its supervisory agency.

4.3.6.2 Participation

Participants in ICE Clear Credit include broker/dealers registered with the SEC, futures commissions merchants registered with the CFTC and banks. ICE Clear Credit has approximately 27 clearing participants.

³⁹ In addition, CME Clearing would make a demand for payment pursuant to any applicable guarantee provided to the exchange by the parent of a clearing firm.

⁴⁰ CME Clearing separately accounts for and segregates clearing members' positions and monies from its own.

4.3.6.3 *Types of transactions*

Contracts eligible for clearing include certain North American index contracts and North American single-name contracts and Latin American sovereign contracts. Once the contracts are cleared, they are recorded in the trade information warehouse for credit derivatives operated by Warehouse Trust.

4.3.6.4 *Operation of the system*

ICE Clear Credit manages a weekly and daily workflow to clear contracts, requiring the execution of a number of steps by clearing members and the clearing house. The weekly workflow begins with clearing members designating for clearing eligible bilateral contracts registered in Warehouse Trust. Throughout the week, the list of contracts designated for clearing may be modified. The clearing process results in the novation of the bilateral contracts whereby ICE Clear Credit interposes itself between the counterparties to the original CDS contract. Clearing members are provided with margin requirements on cleared positions. The daily workflow allows clearing members to clear new trades on the same day they are executed. The process begins when two clearing members submit the trade for clearing immediately upon trade execution. Once the trade passes a risk management assessment by the clearing house, the trade is accepted for clearing. The trade is then registered in Warehouse Trust, and clearing members are provided with margin requirements on cleared positions. Finally, ICE Clear Credit has developed a workflow for third parties to indirectly clear North American index contracts with ICE Clear Credit via a client relationship with a clearing member.

4.3.6.5 *Risk management*

ICE Clear Credit has a risk management framework to manage the risk associated with clearing CDS contracts. The risk management framework is based on a tiered approach. First, ICE Clear Credit maintains membership criteria, which establish minimum levels of financial resources, operational capabilities and risk management experience for clearing members. Second, ICE Clear Credit requires initial margin on open positions to cover potential clearing member portfolio losses in normal market conditions. Third, ICE Clear Credit requires mark to market margin on open positions, reflecting the market loss or gain on each clearing member's portfolio of cleared positions. Fourth, clearing members must contribute additional financial resources to a guaranty fund. The guaranty fund is sized to cover potential portfolio losses in extreme but plausible market conditions; ICE Clear Credit contributes to this fund. Fifth, ICE Clear Credit has the ability to impose a limited one-time assessment on each of its clearing members in the event the guaranty fund is exhausted.

4.3.6.6 *Links to other systems*

ICE Clear Credit supports the delivery of trades to the clearing house via a number of trade execution and matching systems including ICE Link, MarkitWire and TradeWeb. As explained above, ICE Clear Credit has a link with Warehouse Trust to identify trades eligible for clearing.

4.3.7 *Other clearing systems*

Other domestic and foreign systems also clear transactions in US markets. Domestic clearing systems include MGE Clearing, the Kansas City Board of Trade, ICE Clear US, and New York Portfolio Clearing. Foreign clearing systems for derivatives that do business with US persons are registered as derivatives clearing organisations with the CFTC include LCH.Clearnet Ltd, ICE Clear Europe Ltd and Eurex Clearing AG.

4.4 Securities settlement systems

4.4.1 Fedwire Securities Service

4.4.1.1 Institutional framework

The Fedwire Securities Service (Fedwire Securities), owned and operated by the Federal Reserve Banks, is a real-time delivery versus payment (DVP) securities settlement system that allows for the immediate, final and simultaneous transfer of eligible securities against funds in central bank money. Fedwire Securities provides a system for maintaining and transferring book-entry securities issued by the US Treasury, government agencies, GSEs and certain international organisations.⁴¹ The transfer of securities and associated payment occurs simultaneously and is final when the respective securities and funds accounts are credited and debited. Under the Federal Reserve Act, the Federal Reserve Board is responsible for general supervision and oversight of the Reserve Banks' provision of the Fedwire Securities Service.

4.4.1.2 Participation

Fedwire Securities participants include depository institutions and certain other institutions, including US branches and agencies of foreign banks. Fedwire Securities currently has approximately 2,500 participants.

4.4.1.3 Types of transactions

Fedwire Securities provides issuance, transfer and settlement services for all marketable Treasury securities as well as securities issued by government agencies, GSEs and certain international organisations. The Federal Reserve Banks, in their capacity as fiscal agents for the US Treasury, US federal agencies and GSEs, facilitate the issuance of book-entry securities to participants in the Fedwire Securities Service. Participants may maintain multiple securities accounts and can use the Fedwire Securities Service to transfer securities to settle secondary market trades – including open market operations – to move collateral used to secure obligations and to facilitate repurchase agreement (repo) transactions.

Fedwire Securities processed an average of nearly 78,000 securities transfers per day in 2010. The total value of securities transfers originated during 2010 was approximately USD 320 trillion. At the end of 2010, almost USD 57 trillion in Fedwire-eligible securities were held in custody.

4.4.1.4 Operation of the system

The Fedwire Securities Service is a DVP1 settlement system.⁴² Fedwire Securities processes securities transfers on a gross basis in real time.⁴³ During a typical DVP transaction, the sending participant (sender) initiates the securities transfer by sending a transfer message to the Fedwire Securities Service requesting a transfer of securities to a receiving participant (receiver). Once verified, the securities are automatically withdrawn from the sender's securities account and deposited to the receiver's securities account. Simultaneously, the corresponding funds are withdrawn from the receiver's funds account and deposited to the

⁴¹ In their capacity as fiscal agents, the Federal Reserve Banks act as the central securities depository for securities issued through the Fedwire Securities Service by the US Treasury, government agencies, GSEs and certain international organisations.

⁴² Although most securities transfers are made against a designated payment, securities transfers can be made free of payment.

⁴³ Participants can access the Fedwire Securities Service through computer-to-computer service and browser-based service in the same way that participants can access the Fedwire Funds Service.

sender's funds account. Once the transfer is complete, the Fedwire Securities Service sends both the sender and the receiver notice acknowledging that the message has been processed. The transfers of securities and any related funds over the Fedwire Securities Service are final and irrevocable when a Reserve Bank makes the appropriate debit or credit entries to the respective sending and receiving participants' securities accounts and corresponding funds accounts.

The Fedwire Securities business day begins at 08:30 and ends at 15:15 ET, Monday through Friday, excluding designated holidays. During these hours, participants can originate online securities transfers. Online participants can initiate reversal transactions until 15:30 ET and move (reposition) their securities among their securities accounts until 16:30 ET for payment and until 19:00 free of payment. Offline participants can initiate securities transfers or other requests from 09:00 to 13:30 ET for same-day processing and until 16:00 ET for future-day processing. Under certain circumstances, the Fedwire Securities Service operating hours may be extended by the Federal Reserve Banks.

4.4.1.5 Risk management

Subject to certain conditions, the Federal Reserve Banks extend intraday credit to Fedwire Securities participants lacking sufficient balances to cover Fedwire Securities purchases. The PSR policy describes tools such as debit caps, monitoring, collateralisation and daylight overdraft pricing, that the Federal Reserve Banks use to limit credit risk when extending intraday credit to Fedwire Securities participants. In 2010, aggregate average daily daylight overdrafts for Fedwire Securities was USD 3.8 billion and aggregate daily peak daylight overdrafts was USD 57.2 billion per day. The Federal Reserve Banks manage operational risk using the tools discussed in Section 3.2.1.5.

4.4.2 The Depository Trust Company (DTC)

4.4.2.1 Institutional framework

The Depository Trust Company is a central securities depository and securities settlement system. DTC is a wholly owned subsidiary of DTCC. DTC is registered as a clearing agency with the SEC and is subject to SEC regulation and supervision. DTC is also chartered as limited-purpose trust company under New York State banking law and is a member of the Federal Reserve System and is thus supervised by the New York State Department of Financial Services and the Federal Reserve. Also, DTC has been designated as systemically important by the FSOC, and under Title VIII of the DFA the SEC is its supervisory agency.

4.4.2.2 Participation

DTC's participants include brokers/dealers, banks, investment companies and similar entities. A number of DTC's participants are also participants in NSCC given DTC's provision of settlement services to securities transactions cleared and risk-managed through NSCC.

4.4.2.3 Types of transactions

DTC provides clearing, settlement and central securities depository services for trades in eligible securities including equities, corporate bonds, municipal bonds and money market instruments (MMI), such as commercial paper. The total value of securities on deposit at DTC amounted to approximately USD 36.5 trillion in 2010.

4.4.2.4 Operation of the system

DTC operates a DVP2 settlement system. Securities settle on a gross basis at DTC intraday and associated funds settle on a net basis through NSS at the end of the day (approximately 16:30 ET). To facilitate the settlement of securities transactions intraday, DTC allows receiving participants to incur a net money debit during the day up to a net debit cap

established by DTC. In addition to its net debit caps (which DTC applies to individual participants and to affiliated families of participants), all net debits are fully collateralised (with haircuts) and DTC's risk management builds in an added layer of protection against an MMI issuer failure on the same day as a participant default.

4.4.2.5 Risk management

Risk management controls play a major role in the design of DTC's settlement system.

DTC's risk management controls are based on guidelines established by the Federal Reserve for book-entry securities systems that settle over Fedwire Funds. DTC currently employs three primary risk management controls for securities processing: (i) collateralisation, (ii) net debit caps and (iii) Largest Provisional Net Credit (LPNC) control (exclusive for MMIs).

Collateralisation is meant to ensure that a participant that fails to pay for its settlement obligation will have collateral in its account sufficient to cover that obligation and available to be liquidated in the event it were insolvent. DTC's collateralisation monitoring procedures prevent the completion of transactions that would cause a participant's net debit to exceed the total available collateral in its account. Similarly, the application of net debit cap controls helps assure that DTC has sufficient liquidity to cover the failure of any single participant or of a financial family of affiliated DTC participants. DTC's system prevents the completion of transactions that would cause a participant's net debit to rise above a specific amount – its net debit cap. Participants' net debit caps are limited by DTC's established maximum net debit cap, the value of which is always set lower than DTC's total available liquidity.⁴⁴

In addition to collateralisation and participation requirements, DTC maintains a Participants Fund. In addition to being a liquidity resource, the Participants Fund is available to satisfy any uninsured loss incurred by DTC, including a loss resulting from a participant's failure to settle. In the event of such loss, DTC would first charge the loss to that participant's deposit to the Participants Fund (including its voluntary deposit, if any). If the loss exceeds the failing participant's deposit, DTC can charge the excess to its retained earnings or pro rata to the required Participants Fund deposits of all other participants. Should DTC make a charge against a participant's required deposit to the Participants Fund (pro rata or otherwise), the participant must make an additional deposit to the Participants Fund in an amount equal to the charge.

4.4.2.6 Links to other systems

DTC provides book-entry securities settlement services to NSCC's Continuous Net Settlement. DTC also acts as settlement agent to FICC/GSD and FICC/MBSD to make certain funds-only pass through payments on behalf of NYPC.

DTC has entered into a multilateral netting contract and limited cross-guaranty agreement with FICC, NSCC and OCC, under which these clearing agencies have agreed to make payments to each other for any remaining unsatisfied obligations of a common defaulting participant to the extent that these clearing agencies have excess resources belonging to the defaulting participant.

⁴⁴ In addition to requiring participants to have sufficient collateral to support their net debits and ensuring that their net debits do not exceed their net debit caps, an additional procedure, LPNC, has been established to ensure that the occurrence of a combined MMI issuer's default and a participant's failure to settle does not expose DTC to loss and liquidity risks.