# Payment, clearing and settlement systems in the United Kingdom

# Contents

# List of abbreviations

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| APACS | Association for Payment Clearing Services |
| APS | Assured Payment System |
| BPSL | Bacs Payment Schemes Ltd |
| CBM | Central Bank Money |
| C&CC | Cheque and Credit Clearings |
| C&CCC | Cheque and Credit Clearings Company Ltd |
| CDI | CREST Depository Interest |
| CFTC | Commodity Futures Trading Commission |
| CHAPS Co | CHAPS Clearing Company Ltd |
| DCO | Derivatives Clearing Organisation |
| DTCC | Depository Trust & Clearing Corporation |
| EuroCCP | European Central Counterparty |
| FCA | Financial Conduct Authority |
| FPS | Faster Payments Service |
| FMIRs | Financial Markets and Insolvency (Settlement Finality) Regulations 1999 |
| FSA | Financial Services Authority |
| FSMA | Financial Services and Markets Act 2000 |
| IADS | Independent ATM Deployer |
| IBDE | Interbank Data Exchange |
| ICE | ICE Clear Europe Ltd |
| LCH | LCH.Clearnet Ltd |
| LFCA | Liquidity Funding and Collateralisation Agreement |
| LIFFE | London International Financial Futures Exchange |
| LLSA | Liquidity and Loss-Sharing Agreement |
| LME | London Metal Exchange |
| NCS | Note Circulation Scheme |
| PPS | Protected Payment System |
| RCH | Recognised Clearing House |
| SFD | Settlement Finality Directive |
| TDBV | Term Delivery by Value |
| USRs | Uncertificated Securities Regulations |

# Introduction

There have been significant changes to the United Kingdom's payments, trading, clearing and settlement landscape in recent years, resulting from reform of the institutional framework, consolidation and enhancement of infrastructures, and payment innovations.

## The payment systems

The four main interbank payment systems, previously operating under the umbrella of the Association for Payment Clearing Services (APACS), are now managed and operated by independent companies. These are:

- CHAPS, the United Kingdom's real-time gross settlement system operated by CHAPS Clearing Company (CHAPS Co). The infrastructure is provided by the Bank of England (the Bank).
- Bacs, a high-volume, retail deferred net settlement system operated by Bacs Payment Schemes Ltd (BPSL). It has a three-day clearing cycle and infrastructure is outsourced to a third-party service provider.
- Faster Payments Service (FPS), a retail deferred net settlement system operated by Faster Payments Schemes Limited. Launched in 2008, it runs three settlement cycles per day. The infrastructure is outsourced to a third-party service provider.
- Cheque & Credit Clearings (C&CC). Operated by the Cheque & Credit Clearings Company (C&CCC), this is a clearing for paper-based payment instructions. The volumes of this system have been in long-term decline.

Other retail payment systems include LINK, which connects the ATMs of different providers throughout the United Kingdom to enable withdrawal of cash and support a range of payment card schemes, and Visa and MasterCard (the main issuers of debit and credit cards). Electronic money (e-money) activities remain small-scale, but the number of e-money providers is increasing, offering a range of both internet-based and prepaid card schemes.

Sterling is a member currency of CLS, the global foreign exchange settlement system.

## Settlement and clearing systems

CREST is the United Kingdom's securities settlement system for the holding and transfer of securities. An embedded payment system supports a delivery–versus-payment (DVP) settlement service for transactions in UK, Irish, Manx and Channel Islands securities. CREST has been operated since 2002 by Euroclear UK & Ireland (EUI), a fully-owned subsidiary of Euroclear SA. CREST also has links to settlement systems outside the United Kingdom to allow transactions in foreign securities to be settled in CREST.

The United Kingdom has four recognised clearing houses (RCH). These are:

- LCH.Clearnet Ltd: the main UK central clearing counterparty (CCP), which clears for a range of equities, fixed income, derivative and commodity markets. LCH is part of the LCH.Clearnet Group, based in Paris.
- ICE Clear Europe Ltd: acts as a CCP providing clearing services for all trades on ICE Futures Europe, all cleared OTC contracts executed in ICE's global OTC markets and a range of European credit default swap (CDS) products. These contracts include oil, gas, coal and electricity futures and options.
- EuroCCP: a wholly owned subsidiary of the Depository Trust & Clearing Corporation (DTCC). EuroCCP clears equity trades in 19 European markets. EuroCCP began

operations in August 2008 and clears trades for a number of multilateral trading facilities.

- CME Clearing Europe: newly established, this is a wholly owned subsidiary of CME Group Inc that will provide clearing services for OTC trading of energy derivatives, interest rate swaps, CDS and foreign exchange.

# 1. Institutional aspects

## 1.1 The general institutional framework

Financial regulation in the United Kingdom is carried out by the Bank of England and the Financial Services Authority (FSA), the UK supervisory agency. Both these authorities also work closely with the Treasury, as the United Kingdom's finance ministry is known. Their respective responsibilities relating to financial stability are set out in a memorandum of understanding. The roles and responsibilities of the central bank are set out in the Bank of England Act 1988 and the Banking Act 2009. The roles and responsibilities of the FSA are set out in the Financial Services and Markets Act 2000 (FSMA).

### *The Banking Act 2009*

The regulatory framework relating to large-value payments systems in the United Kingdom is governed by the Banking Act 2009. Part 5 of the Banking Act establishes a statutory framework for the oversight of recognised interbank payment systems. The Act confers powers on the Treasury to designate, by order, a system as a "recognised inter-bank payment system" if the Treasury is satisfied that "any deficiencies in the design of the system or disruption of its operation, would be likely to threaten the stability of, or confidence in, the UK financial system, or to have serious consequences for business or other interests throughout the United Kingdom".

The Act also confers powers on the Bank of England in respect of such recognised systems. The Act allows the Bank to issue principles to which recognised systems must have regard; these broadly follow the CPSS Core Principles. The Act also provides the Bank with a set of tools to support its oversight function. These include powers to gather information, set principles, issue directions, require changes to system rules, appoint inspectors, and require the commissioning of an independent report. There are also powers of sanction for compliance failures as specified in the Act, including publishing the fact of a compliance failure, financial penalties and closure of a system. There is also a power of management disqualification.

### *Financial Services and Markets Act (FSMA) 2000*

Under FSMA 2000, responsibility is given to the Financial Service Authority for the supervision of clearing houses and settlement systems. The regulatory status of these entities is that of recognised bodies. These entities may have payment systems embedded within them. As a consequence, the Bank of England and the FSA cooperate in the oversight of recognised payment systems that are operated by FSA-regulated entities. A memorandum of understanding facilitates effective communication and cooperation between the Bank and FSA in respect of the oversight of payment systems.

The FSA is also the prudential regulator of many participants in recognised interbank payment systems, including UK banks and the UK subsidiaries of foreign banks, and is therefore responsible for the regulation of credit, liquidity and operational risks they may incur by using such systems.

### The Financial Markets and Insolvency (Settlement Finality) Regulations 1999

The Financial Markets and Insolvency (Settlement Finality) Regulations (FMIRs) 1999, which implement the EU Settlement Finality Directive in the United Kingdom, allow payment and settlement systems to apply for certain protections against the operation of normal insolvency law, ensuring that transactions that have been entered into the system are final and irrevocable, and to ensure the enforceability of collateral security. In order to receive these protections, systems must meet the criteria set out in the Settlement Finality Regulations and be designated by the relevant authority.

The Bank of England is the relevant authority for systems processing only payment transfer orders. The Bank assesses applications for designation from such systems and decides whether to designate a system on the basis of whether it meets the requirements set out in the schedule of requirements.

The FSA is the relevant authority for systems processing securities transfer orders, but consults the Bank when it receives an application for designation of a system that processes both securities transfer orders and payment transfer orders.

## 1.2 The role of the central bank

The Bank of England's responsibilities are set out in a statement of its two core purposes and a memorandum of understanding between the Bank, the FSA and HM Treasury, issued following the transfer of banking supervision responsibilities to the FSA in 1998. An updated memorandum was issued in March 2006.

At the Mansion House on 16 June 2010, the Chancellor announced plans to change the system of UK financial regulation. This was followed up by consultations published by HM Treasury. The proposals include the establishment of a new Prudential Regulation Authority under the Bank, a Financial Policy Committee of the Bank with responsibilities for macroprudential regulation, and a separate Financial Conduct Authority (FCA). Some of the proposals relate to wholesale financial markets and the infrastructures that support those markets. HM Government has proposed that the regulation and supervision of settlement systems and central counterparty clearing houses (CCPs) be transferred to the Bank to sit alongside its existing role in the oversight of recognised payment systems. The FCA will be responsible for regulating exchanges and other trading platform providers. The Bank will coordinate with the FCA and other relevant authorities as appropriate.

### *1.2.1 Provision of services*

#### *1.2.1.1 Provision of cash settlement facilities*

The Bank of England acts as settlement agent for a number of domestic payment and settlement systems (CHAPS, CREST, Bacs, FPS, C&CC, and LINK) and in consequence provides settlement accounts for members of those clearings. There is, however, no general requirement for banks to hold operational accounts with the Bank. The main UK clearing companies require their members to hold settlement accounts at the Bank in order to participate directly in their clearing processes. The Bank's policy on granting settlement accounts is set out in its Settlement Accounts Policy Paper.

Institutions that belong to more than one clearing company generally maintain a single account through which their clearing obligations are settled. Since May 2006, the sterling accounts have also functioned as reserve accounts. Settlement of obligations arising between CHAPS members takes place on a gross basis and in real time across settlement accounts. Settlement between CREST banks also occurs on a real-time gross basis, although their accounts at the Bank are updated every few minutes upon receipt of end-of-cycle earmarks from the CREST system.

Settlement of other clearings takes place on a multilateral net basis, with a single net amount posted to each clearing member's account for each clearing at a specific time during the day. Regardless of the clearing to which it relates, each credit and debit applied to a settlement account is final and irrevocable from the time it is posted.

#### *1.2.1.2 Provision of credit facilities*

To facilitate efficient settlement within the high-value clearings, the Bank of England provides members of CHAPS and CREST settlement banks with intraday credit against eligible collateral via intraday repos (some of which are generated automatically within the CREST system to finance the settlement of purchases of eligible securities by settlement banks (self-collateralising repos)).

#### *1.2.1.3 Banking activities*

The Bank of England's banking operations cover a range of other activities in addition to the operation of settlement accounts on behalf of UK payment and clearing systems:

- the issuance of banknotes;
- the settlement of official operations, the management of collateral and provision of sterling reserve accounts; and
- provision of a range of wholesale banking and custody services to the UK government, national central banks, some supranational organisations.

#### *1.2.1.4 Provision of securities settlement facilities*

The Bank of England has no statutory responsibility for the establishment or operation of settlement and/or clearing systems. Since 2003 the Bank of England has not provided facilities for British government stock and money market instruments. The Bank does, however, provide settlement accounts for CREST settlement banks and effects the settlement of obligations arising between CREST settlement banks at the end of each CREST settlement cycle. The Bank also acts as a settlement bank in CREST, settling on behalf of a number of customers.

### *1.2.2 Pricing policies*

The Bank's charging policy in respect of its general banking operations is based on the principle of fully recovering the costs of the banking services it provides.

### *1.2.3 Oversight*

The Bank of England oversees seven recognised interbank payment systems (CHAPS, BACS, FPS, CLS, and the embedded arrangements in CREST, LCH.Clearnet Ltd and ICE Clear Europe). These systems have been recognised by HM Treasury as meeting the criteria set out in Section 185 of the Banking Act 2009.

The Bank works closely with the FSA on the oversight of CREST, LCH.Clearnet Ltd, and ICE Clear Europe, coordinating its responsibilities for oversight of the embedded payment arrangements in these systems with the FSA's responsibilities as supervisor of EUI, LCH.Clearnet Ltd and ICE Clear Europe. The Bank also participates in the international cooperative oversight arrangements for Euroclear and LCH.Clearnet Groups, the CLS system (which settles foreign exchange transactions in 17 currencies, including sterling) and SWIFT.

Further details of the Bank's oversight, as well as descriptions of developments in UK payment systems, can be found in the Bank's Payment Systems Oversight Report.

Additional information on the oversight of recognised payment systems under the Banking Act 2009 can be found on the Bank's website.

### 1.2.4 Participation in other forums

The Bank of England works closely with HM Treasury and the FSA to discharge its statutory responsibility for contributing to, and enhancing, the stability of the United Kingdom's financial systems. The Bank is also represented on a number of international committees and working groups organised by the ECB and the BIS, and participates in the cooperative oversight arrangements described above. Domestically, the Bank is an observer on the Board of the Payments Council and of CHAPS Co; it is a board member of Bacs and the Cheque and Credit Clearings.

## 1.3 The role of other private and public sector bodies

### 1.3.1 The Financial Services Authority (FSA)

The FSA was established in 1998 to take over regulation of the UK's financial services sector. Under FSMA 2000, the FSA was made the single statutory regulator for all regulated financial markets in the United Kingdom. The FSA's objectives are: maintaining confidence in the financial system; the protection of consumers; the promotion of public understanding of the financial system; and the reduction of financial crime. Within the scope of FSMA, the FSA is responsible for: the authorisation and prudential supervision of banks, building societies, investment firms, insurance companies and brokers, credit unions and friendly societies; the supervision of financial markets, securities listings and clearing and settlement systems; and the conduct of operations in response to problem cases affecting firms, markets and clearing and settlement systems within its responsibilities.

### 1.3.2 The Payments Council

The Payments Council, set up by the payments industry in 2007, is the organisation that sets the strategy for UK payments and ensures that UK payment systems and services meet the needs of payment service providers, users and the wider economy. The Payments Council has three main objectives: to develop a strategic vision for payments and lead the future development of cooperative payment services in the United Kingdom; to ensure that payment systems are open, accountable and transparent; and to ensure the operational efficiency, effectiveness and integrity of payment services in the United Kingdom.

In May 2008, the Payments Council published the National Payments Plan (NPP) setting out its agenda for the next five to 10 years. Developed after extensive consultation with the industry and users, the plan is a strategic document that outlines a vision for UK payments, explains how the needs of stakeholders will be met, and identifies the areas where the Payments Council believes that collaboration and cooperative activity can deliver benefits to all users.

The Payments Council is a voluntary membership organisation and is governed by a set of published rules and a board of directors. Organisations that are payment service providers with qualifying payment volumes can join the Payments Council as full members.

The Payments Council works closely with a number of contracted schemes. These include: BACS Payment Schemes Limited; CHAPS Clearing Company Limited; Faster Payments Schemes Limited; Cheque & Credit Clearing Company Limited; The UK Domestic Cheque Guarantee Card Scheme; LINK ATM Scheme; and The Belfast Bankers' Clearing Company Ltd.

Each scheme has entered into a contract or other formal arrangement with the Payments Council that sets out their respective rights and duties. Under the contract, schemes are required to report to the Board. The Board can make decisions that are binding on scheme members in order to implement its strategy. This is, however, subject to a right for both the schemes and their members to apply for a formal waiver.

## 2. Payment media used by non-banks

### 2.1 Cash payments

The Bank of England has the sole right to issue banknotes in England and Wales. The Bank currently issues banknotes in four denominations – GBP 5, 10, 20 and 50 – that circulate freely throughout the United Kingdom. Three banks in Scotland and four banks in Northern Ireland retain the right to issue their own sterling banknotes. These notes must be fully backed at all times, partly by Bank of England notes or UK coin (or a combination of the two) and partly by balances in interest-bearing accounts held at the Bank.[1]

The wholesale distribution and circulation of Bank of England banknotes is managed under the Note Circulation Scheme (NCS), which promotes the processing and distribution of notes by the commercial sector. To make this arrangement economically viable, the NCS allows its members (commercial banks, cash-in-transit companies and the Post Office) to hold notes in custody for the Bank within their network of cash centres. Members thus avoid much of the funding cost of the notes handled, which could otherwise make it prohibitively expensive to undertake the wholesale processing of notes. In effect, members receive off-balance sheet treatment for a significant quantity of the notes in their possession. The rules of the NCS are framed to mitigate the risks to the Bank that arise from allowing commercial organisations to hold its notes in this way, and to promote efficiency in the distribution and processing of notes so as to meet the demands of cash users.

The Bank seeks to limit the volume of notes in the wholesale distribution network to the minimum required to support the demand for notes in the economy and to sustain an acceptable quality of notes in circulation. Thus the NCS both limits the volume of notes that may receive off-balance sheet treatment, and gives members incentives to reduce the total volume of notes in the wholesale distribution system by improving the efficiency of their operations. The Bank's direct involvement in wholesale processing and distribution is limited to the issue of new notes, the withdrawal of notes superseded by new designs, and the authentication and destruction of notes that are no longer fit for circulation.

The Royal Mint meets demand by issuing coins (paid for in advance) to wholesale coin centres. Discussions between organisations involved in the wholesale processing and distribution of cash (including the NCS members, commercial banks, building societies and cash-in-transit companies) and the Bank and the Royal Mint are held under the auspices of the Payments Council Cash Services Group. This group acts as a focal point for the provision of strategic direction on cooperative (non-commercial) issues relating to cash as a component of the UK money transmission/payments industry.

At the end of 2010, the value of banknotes in circulation totalled GBP 51.1 billion.[2] Figures produced by the Payments Council show that, in 2010, GBP 266 billion of consumer payments was in cash (compared to GBP 264 billion in 2006). Cash accounted for 61% of all consumer payments by volume in 2010 (down from 68% in 2006).

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[1] The Bank has statutory responsibility for regulating the issue of Scottish and Northern Ireland notes under Part 6 of the Banking Act 2009.

[2] Excluding higher-value notes used as cover for the note issuers of banks in Scotland and Northern Ireland.

## 2.2 Non-cash payments

### *2.2.1 Non-cash payment instruments*

#### *2.2.1.1 Credit transfers*

The volume of paper-based credit transfers continues to decline. The total volume of interbank paper credits cleared in the United Kingdom declined from 108 million in 2006 to 61.7 million in 2010. Similarly, the total value of these transactions fell from GBP 60 billion in 2006 to GBP 32.3 billion in 2010. Paper-based credits are accompanied by cheques and/or cash and are often used for making payments to large organisations such as utility or mail order companies. Payments to individuals rarely pass through the clearings as they are usually paid into the beneficiary's own bank.

CHAPS is the main system for transferring high-value automated credits that need to be settled on a real-time basis. In 2010, CHAPS handled a daily average of 127,071 payments, with a total value of GBP 224 billion.

The vast majority of interbank electronic credits, apart from standing orders and remote banking transactions which are now processed by Faster Payments Service (FPS), are processed by Bacs; these are mainly small- and medium-value items. In 2006, Bacs processed 2.5 billion credits totalling GBP 2,584 billion. By 2010, this volume had fallen slightly to 2.44 billion credit payments totalling GBP 3,114 billion.

FPS processes only credit transactions comprising single immediate payments, forward-dated payments and standing orders. Since its inception in 2008, FPS volumes have risen from 82.7 million in 2008 to 428 million in 2010.

#### *2.2.1.2 Direct debits*

A direct debit is an instruction to a customer's bank or building society authorising the payment originator to collect varying amounts from the customer's account, provided the customer has been given prior notification of the collection amount and date. Direct debits allow the originators of payments (such as utilities and insurance companies) to collect payments automatically from bank and building society accounts. The direct debit scheme is operated by BPSL.

Under the rules of the direct debit scheme, the customer's bank or building society must (on request) make an immediate refund to the customer's account should any money be taken in error. This guarantee protects customers when the originator has not notified the customer of an amount or date change. It also protects the customer if an incorrect amount is debited or the debit occurs earlier than specified.

The volume of direct debits has been growing steadily since 2006. During 2006, there were 2,858 million direct debit payments with a value of GBP 845 billion. By 2010, volumes and values had risen to 3,229 million and GBP 948 billion respectively.

#### *2.2.1.3 Cheques*

As with paper-based credit transfers, the volume of payments cleared by cheque has been in steady decline. The use of cheques at the point of sale has fallen dramatically since the widespread introduction of credit and debit cards, but cheques are still used relatively frequently for the remote payment of bills, person-to-person payments and by businesses for business-to-business as well as business-to-person payments. Some 1.2 billion cheques were cleared in 2006 (totalling GBP 1,171 billion); by 2010 this number had fallen to 0.78 billion (with a value of GBP 761 billion).

Cheques are cleared by Cheque and Credit Clearing Company (C&CCC), which operates the Cheque and Credit Clearings (C&CC). In addition to sterling clearing, the C&CCC operates a bulk paper clearing facility for euro- and US dollar-denominated cheques presented at UK banks. The number of payments cleared through the euro and US dollar systems is small.

### *2.2.1.4 Payment cards*

Use of electronic funds transfer at point of sale (EFTPOS) technology has grown steadily in recent years. At the end of 2010, there were 1,252,696 EFTPOS terminals in the United Kingdom (compared with 1,023,215 in 2006) that accepted, credit, debit and prepaid cards.

Chip and PIN technology was introduced to debit and credit cards in the United Kingdom in 2004. All cards are now issued with chip and PIN technology. Since 14 February 2006, all chip and PIN cardholders must use their PIN to pay for goods (unless the retailer does not have a chip and PIN terminal). Contactless card payments were launched in the United Kingdom in 2007 enabling card payments of GBP 15 or below to be made without entering a PIN.

#### *2.2.1.4.1 Debit cards*

Visa and MasterCard are the two main debit card schemes in the United Kingdom. Visa has been issuing debit cards under different brand names since 1987; its cards are currently issued under the Visa Electron and Visa Debit brands. The SWITCH scheme was launched in October 1988, and was rebranded as Maestro by MasterCard in July 2004. The Solo brand was launched by SWITCH in 1997.

Visa Electron and Solo cards work in the same way as conventional debit cards, except that they require every transaction to be authorised online, regardless of value. This has widened the range of users, particularly to younger customers and holders of investment and savings products. Maestro, Solo and Visa branded cards can be used at EFTPOS terminals and remotely (by phone, mail or internet). Solo and Visa Electron are primarily domestic schemes.

At the end of 2010, 79.9 million Visa Debit and Electron cards were in use, up from 43.7 million in 2006. Some 4.8 million Maestro cards were issued by UK banks and building societies, down from 24.9 million in 2006.

The total volume of debit card purchases has risen markedly in recent years, reaching 6.4 billion payments in 2010. The number of debit card transactions is now approximately three times the number of credit card transactions. The value of the average domestic debit card purchase in 2010, at GBP 46, is lower than that of the average credit card payment, at GBP 59.

#### *2.2.1.4.2 Credit and charge cards*

Although MasterCard and Visa are the main credit card schemes operating in the United Kingdom, American Express and Diners Club International also operate in the country. Credit cards typically fall into three categories: standard cards, issued to anyone over 18 (subject to acceptance); premium cards (which carry extra benefits and rewards and generally have stricter requirements); and charity/affinity cards (which are issued on behalf of charities or other organisations and generate a donation to the charity/organisation when the card is issued and/or each time the card is used). Cardholders may pay off the full amount of the balance, or they may choose to pay a portion of the total amount outstanding (usually subject to a monthly minimum).

The two largest charge card companies in the United Kingdom are American Express and Diners Club International; some banks also issue Visa and MasterCard branded charge cards. Charge cards require the balance to be paid off in full each month. Most charge card companies also offer reward schemes; in return for providing these an annual fee is usually levied.

At the end of 2010, some 55.6 million credit and 6.6 million charge cards were in issue, compared to 69.5 million and 5 million respectively in 2006. Total spending on charge and credit cards amounted to GBP 136.3 billion during 2010.

*2.2.1.4.3 Prepaid cards*

Prepaid cards are a small but growing segment of the UK card market. The majority of prepaid cards are closed-loop gift cards, which can only be used at certain retailers. Visa and MasterCard are increasing their presence in the open-loop market; these cards provide access to funds at multiple points of sale and include ATM functionality. The prepaid card market is being led by banks not historically associated with the issuance of mainstream credit and debit cards.

*2.2.1.4.4 Retailer cards*

Some retailers issue their own in-store cards. These typically only serve one store group and some operate on the basis of a monthly subscription and a revolving credit facility. Other retailer cards operate in the same way as prepaid or bank charge cards.

*2.2.1.4.5 Postal instruments*

Cashless payments can also be made through the Post Office. Small-value payments can be made using postal orders, which are particularly convenient for those who do not have access to a bank account.

### *2.2.2 Non-cash payment terminals (ATMs)*

At the end of 2010, more than 63,000 ATMs were in operation in the United Kingdom, compared with around 60,500 machines at the end of 2006. Ownership of ATMs is split between banks and building societies and non-financial organisations known collectively as independent ATM deployers (IADs). Of the ATMs in the United Kingdom, 57% are operated by banks and building societies, and 43% are operated by IADs. All ATMs are connected via the LINK network.

In addition to cash withdrawals, LINK transactions include balance enquiries and in most cases customers can also change their PIN. ATMs operated by banks and building societies may also allow their own cardholders to produce mini-statements, make bill payments, transfer money between accounts, and request statements or new cheque books.

Around 20,000 ATMs are located at bank or building society branches. There has been a trend towards the installation of ATMs in so-called remote locations such as supermarkets and convenience stores, social and leisure centres, motorway service stations, railway stations and post offices.

## 3. Payment systems (funds transfer systems)

### 3.1 General overview

This section provides a detailed description of the recognised interbank payment systems: CHAPS, Bacs and FPS. Also included are descriptions of Cheque & Credit Clearings and LINK.

CHAPS is an RTGS system designed primarily for high-value payments, although there is no lower (or upper) limit on the value of payments. Of the more retail-orientated systems (Bacs and the C&CC) deal with high volumes of relatively small-value payments, although they can also accommodate large-value transfers. Both these clearings operate on a three-day processing cycle and are unsuited for use by wholesale financial markets that settle higher values. As a result, the average value of transactions in these clearings is much smaller than those processed in CHAPS. FPS is a near real-time system used primarily for low-value immediate payments (internet and telephone banking); volumes are significantly lower than in Bacs and C&CC. The average value of payments passing through these systems in 2010 ranged from GBP 385 in FPS to GBP 1.7 million for a CHAPS payment.

The rules governing the operations of each interbank payment system are determined by the scheme. Any institution wishing to apply for membership of the system must meet the scheme's technical and operational requirements and agree to pay the costs associated with their membership. An applicant must also obtain explicit agreement from the Bank of England to provide settlement account facilities for the purpose of settling obligations resulting from these systems.

## 3.2 Large-value payment systems – CHAPS

CHAPS started operating in 1984 as a nationwide electronic interbank system for sending irrevocable, guaranteed and unconditional sterling credit transfers from one settlement member to another for same-day value. It originally operated on the basis of end-of-day multilateral net settlement between members across accounts at the Bank of England. In April 1996, it was developed into an RTGS system. It now handles nearly all large-value same-day sterling payments between banks.

Prior to 2008, CHAPS Euro provided settlement for euro-denominated payments. Following the Bank's decision not to join TARGET2, CHAPS Euro closed on 16 May 2008. Former CHAPS Euro members and their customers now effect their TARGET payments in euro via another country's system.

### *3.2.1 Institutional framework*

CHAPS is the United Kingdom's large-value sterling payments system, settling GBP 234 billion between January and September 2010. The scheme is run by the CHAPS Clearing Company (CHAPS Co) and payments are processed by the RTGS system run and owned by the Bank of England. The CHAPS Company is member-owned, each member holding one share in the company. A memorandum of understanding between the Bank of England and CHAPS Co sets out the services which RTGS will provide as well as the service levels expected. In 2000, CHAPS was designated under the Financial Markets and Insolvency Regulations 1999 (FMIRs). CHAPS is a recognised interbank payment system under Part 5 of the Banking Act 2009.

### *3.2.2 Participation*

CHAPS is a highly tiered payment system. There are 17 direct members of CHAPS (as well as the Bank of England and CLS Bank). Direct members operate as correspondent banks for other banks, processing payments on their behalf. Membership criteria for CHAPS are set out in the CHAPS Rules and are also available on the CHAPS Co website.

### *3.2.3 Types of transaction*

CHAPS processes clean sterling payments in real time. There are no restrictions on the type or value of transactions in CHAPS. The payer (ie the settlement bank) must have sufficient liquidity in its settlement account in RTGS before the payment can be made. The majority of CHAPS transactions (by value) relates to large financial transactions, either between banks or between banks and corporates. Some retail transactions such as house purchases also go through CHAPS. CHAPS is also used for sterling pay-ins and pay-outs related to CLS transactions and for transfers to and from the concentration bank in relation to LCH margin payments.

### *3.2.4 Operation of the system and settlement procedures*

CHAPS is open for business on each day from 06:00 to 16:00 for customer payments, and then for a further 20 minutes for interbank (funding management) payments.

CHAPS payment instructions are routed via SWIFT to the RTGS system and settled individually across settlement accounts at the Bank of England. All messages are subject to authentication and encryption as provided by SWIFT. Once the payment is settled in RTGS (sending bank debited, receiving bank credited), a confirmation message is returned to SWIFT and the entire payment message is then forwarded to the receiving bank. Finality of the funds transfer between sending and receiving banks is achieved at the moment the payment is settled across the books of the Bank of England.

The Bank provides the Enquiry Link, which allows members to interact with the RTGS system so that they can monitor payments progress and manage payments in the centralised queue.

If a member submits a payment but has insufficient funds for it to settle, the message is queued within the RTGS processor until liquidity becomes available. If payments queues build up, “circles” processing can be used, whereby offsetting payments are settled on a “simultaneous gross” basis as distinct from netting. This is a useful mechanism to address situations where there may be insufficient liquidity to allow each payment in a given set to settle sequentially, but where the available funds would permit these to be settled collectively. While this facility may help to prevent blockages (gridlock), it is not used routinely during a typical day, as CHAPS members have access to additional intraday liquidity to ensure that all payments can be made.

If RTGS were to become inoperable at both its primary and recovery site for a substantial period of time, a bypass mode offers the main contingency option. In bypass mode, the settlement of payment messages does not take place in real time. Messages are delivered directly between sending and receiving members without copying any details to the RTGS system. Members provide CHAPS with agreed bilateral positions and CHAPS then calculates multilateral net settlement positions. These positions are then forwarded to the Bank for settlement.

### *3.2.5 Risk management*

The design of CHAPS means that credit risks do not arise during the course of normal operations. Payments are made in real time and are both irrevocable and final at the point at which the relevant member’s settlement account is debited. A member cannot make a CHAPS payment unless it has sufficient funds available on its RTGS settlement account with the Bank of England. Members can use balances held with the Bank on their reserve accounts to fund payments. If members require further liquidity, the Bank provides collateralised intraday liquidity.

The main form of financial risk associated with CHAPS is liquidity risk. To aid liquidity management, all members have real-time information on their balances and the status of payment messages via the Enquiry Link with the Bank. Both centralised and individual members’ schedulers enable members to manage the order in which payments settle; the majority of members use their internal schedulers. Throughput guidelines are used to help prevent liquidity hoarding.

### 3.2.6 Pricing

Settlement members pay an annual charge to CHAPS Co to cover their share of the system's operating costs. The charges are kept to a minimum consistent with the adequate provision of services and the recovery of all operating costs. The Bank of England charges a per-item tariff in respect of each CHAPS transfer settled using the RTGS processor. The Bank also charges a yearly account management fee.

### 3.2.7 Major ongoing and future projects

CHAPS Co and the Bank of England have undertaken extensive analysis on possible liquidity-saving mechanisms to implement within CHAPS that would reduce liquidity costs. CHAPS Co and the Bank are considering whether to proceed with the development of a generic RTGS system that would be offered by SWIFT. This would be used instead of the RTGS bypass mode in the event that both of the Bank's RTGS sites failed.

## 3.3 Retail payment systems

### 3.3.1 Bacs

#### 3.3.1.1 Institutional framework

Bacs is the United Kingdom's largest retail payment system by volume, providing automated clearing house (ACH) services for bulk clearing of electronic transfers in both debit and credit form. Bacs Payment Schemes Ltd (Bacs) is responsible for the Bacs Direct Credit and Direct Debit payment instruments. Processing of these payment instruments is outsourced to VocaLink Ltd, a member-owned third party. Bacs has been recognised by HM Treasury for oversight by the Bank of England in accordance with Section 185 of the Banking Act 2009. In 2005, the scheme was designated under the FMIRs.

#### 3.3.1.2 Participation

Sixteen financial institutions are members of Bacs, including the Bank of England and one building society. These credit institutions are responsible for settling all settlement obligations arising from the Bacs clearing process. Direct members must meet the criteria set out by Bacs.

Direct members are able to sponsor other organisations as indirect users of the Bacs payment system. Indirect users are allocated a user number by their sponsor and can submit payment instructions directly to the central infrastructure. The indirect users of the system include a wide range of commercial and public sector bodies. There are also 743 Bacs-approved bureaux that submit transactions through Bacs on behalf of third-party users.

In 2005, Bacs introduced a class of membership known as affiliate status. Affiliate status allows stakeholders to contribute views to the Bacs board on issues without taking on operational and settlement responsibilities. There are currently 40 affiliate members.

#### 3.3.1.3 Types of transaction

Bacs processes sterling-denominated direct debits and Bacs direct credits. Bacs previously processed standing orders; however, these instruments recently migrated to the Faster Payments Service. Although there is a limit of GBP 20 million on the value of individual payment instructions submitted via Bacs, in practice the vast majority of payments processed are of much lower value.

A high proportion of the transfers handled represent regular disbursements such as wages, pensions, utility bill payments, insurance premiums or subscriptions. Various payment types can be accommodated, and there is no general restriction on the purpose of the underlying transaction.

#### *3.3.1.4 Operation of the system and settlement procedures*

Users submit payment instructions through Bacstel-IP, a bespoke submission channel. Some of the major users of Bacs (primarily direct recipients of transactions) use direct high-speed links (ETS or STS). Bacs has established common standards for the format in which payment information is supplied to the central infrastructure. Users can submit payment instructions between two and 71 days ahead of the payment date.

Payments submitted to Bacs are subject to a three-day clearing and processing cycle. The deadline for the receipt of payment instructions from users is 22:30 on Day 1 of the cycle. Data submitted throughout the day is validated and sorted into bank order by the central infrastructure to be transmitted onwards to the destination. The destination bank may be either a receiving bank or paying bank, depending on whether the transaction is a direct debit or direct credit. Processing of input transactions should be completed by 06:00 on Day 2. On Day 3, transfers are debited/ credited to the respective payer/payee accounts, usually at the beginning of the operating day.

The interbank obligations that arise in Bacs are settled at the Bank of England on a multilateral net basis on Day 3 of the clearing cycle. Settlement occurs at 09:30 daily through the posting of multilateral net settlement positions directly to the settlement accounts using the RTGS processor.

#### *3.3.1.5 Risk management*

Each direct member is responsible for settling payments generated by itself and the users it sponsors. There is no system of limits or other controls enforced by the central infrastructure to inhibit the volume and value of payments for which a particular settlement member is responsible. Each member may, however, set individual item and account limits. Depending on the type of payment, these may generate actionable referrals. An actionable referral requires a positive action from the user before the payment will be processed. The ability of a user to initiate Bacs transfers, and the arrangements for funding the resultant position, are matters to be decided bilaterally with the user's settlement bank.

In 2005, Bacs and its members introduced a legally binding loss-sharing agreement, the Liquidity Funding and Collateralisation Agreement (LFCA), to ensure that settlement can be completed in the event of a member defaulting on its obligation to other members of the payment system.

Currently, separate LFCAs cover both Bacs and the C&CC and they are designed to cover the position of the largest direct member in default. All direct members are obliged collectively to provide liquidity to fund the shortfall created by any default up to a limit determined by reference to average net debit positions of the direct members over the previous 12 months.

Each member also pledges collateral; the amount of collateral pledged by the direct members has a limit determined by reference to the highest net debt positions of the direct members over the previous 12 months. In the event of a default, collateral pledged by the defaulter is used to reimburse the survivors in full or in part for the liquidity provided.

#### *3.3.1.6 Pricing*

Bacs levies an item charge on its members to recover processing and other service costs. Sponsoring banks negotiate independently with users and other customers the charges these counterparties will incur as a result of generating transfers or receiving credits through the payment system. Bacs' rules require the direct members to meet the system's operating expenses through payment of an annual fee.

### *3.3.2 Faster Payments Service (FPS)*

#### *3.3.2.1 Institutional framework*

FPS is an automated retail clearing and settlement system for credit transactions to households and corporates in the United Kingdom. It is managed by Faster Payments Schemes Limited with processing of payment instructions outsourced to a third-party service provider, VocaLink Ltd. FPS has been recognised by HM Treasury for oversight by the Bank of Engand in accordance with Section 185 of the Banking Act 2009. In 2010, FPS was designated under the FMIRs.

#### *3.3.2.2 Participation*

The direct members of FPS (settlement banks) are also shareholders in CHAPS Co. At present 10 financial institutions are direct members, and they are responsible for settling payment obligations arising in FPS.

FPS has the functionality to allow other participants, sponsored by a direct member, to input transactions directly into the central processing infrastructure; the direct member remains responsible for end-of-cycle settlement with other members. There is only limited participation in FPS via such functionality.

#### *3.3.2.3 Types of transaction*

FPS processes sterling credit transactions in the form of single immediate payments, forward-dated payments, or standing orders. All individual payments are subject to a limit of GBP 100,000, although this may rise over time. Approximately half of transactions are standing orders, being regular disbursements for payment of wages, utility bills, donations to charities etc, or future dated payments. Other transactions are generated via telephone or internet instructions, covering a broad range of retail transaction types. Payments can also be transmitted in bulk by banks or corporates, and are split for settlement by the central infrastructure.

#### *3.3.2.4 Operation of the system and settlement procedures*

FPS operates on a 24 hours a day, seven days a week basis. Payments are submitted to the central infrastructure (operated by VocaLink) in either single payment or bulk form. All payment messages conform to the ISO 8583 standard, except those bulk payments submitted via the “direct corporate access” channel, which utilises the bespoke format used for Bacs payment messages.

FPS is a multilateral deferred net settlement system. There are three interbank clearing cycles each working day, settling at 07:15, 13:00 and 15:45. Settlement occurs across accounts held by direct members in the RTGS system at the Bank of England.

#### *3.3.2.5 Risk management*

Individual transactions are subject to a limit, currently GBP 100,000, and each member’s net debit settlement position is also subject to a cap (the “Net Sender Cap”). The cap for each member is determined by formula; once a cap is reached a member can no longer send payments until its net position recedes (ie until it receives payments) or settlement occurs.

All member banks are party to a liquidity and loss-sharing agreement (LLSA), a binding contract to ensure that settlement can be completed in the event of a member defaulting with unsettled obligations to other members of FPS. It is designed to cover the largest single Net Sender Cap, and members commit liquidity up to this level to ensure settlement can take place. Each member also pledges collateral (held in trust by the Bank of England), with the total amount of collateral pledged equal to the largest Net Sender Cap. In the event of a member’s default, that member’s collateral would be realised to repay liquidity provided by surviving members in part or in full.

#### *3.3.2.6 Pricing*

FPS operates on a cost recovery basis. Members pay a fee to CHAPS Co to join FPS and an annual charge to cover their share of the scheme's operating costs. VocaLink charges members a connection fee as well as monthly fees to maintain the connection to the central infrastructure. Processing costs are recovered by VocaLink from members through a per-item charge.

Sponsoring banks negotiate independently with users and other customers the charges these counterparties will incur as a result of generating transfers or receiving credits through the payment system.

### ***3.3.3 Cheque and Credit Clearings (C&CC)***

#### *3.3.3.1 Institutional framework*

The Cheque and Credit Clearing Company is the non-profit industry body that has managed the cheque clearing system in England and Wales since 1985 and in all of the United Kingdom since 1996. The clearing of sterling and euro cheques in Northern Ireland is managed by the Belfast Bankers' Clearing Company. C&CCC is not a recognised interbank payment system under the Banking Act 2009. Both the cheque clearing and the credit clearing are designated under the FMIRs.

#### *3.3.3.2 Participation*

C&CCC has 10 direct members. There is no requirement to participate in all four of the clearings operated; the euro debit clearing has 10 members and the US dollar clearing only five. Other banks and building societies can access the clearings through agency arrangements with direct members; 400 banks and building societies currently participate indirectly.

#### *3.3.3.3 Types of transaction*

The C&CCC system processes paper debit items (ie cheques) and credit items (ie bank giro transfers). C&CCC processes sterling and euro, as well as US dollar debits, for which it took over responsibility in January 2010. Cheques processed through the cheque clearing and paper credits passed through the credit clearing must meet the physical specifications (relating to layout and paper specifications) laid out in the standards of the relevant clearing. There are, however, no restrictions on the value of individual transfers or on the economic nature of the transaction.

#### *3.3.3.4 Operation of the system and settlement procedures*

The cheque and credit clearings both operate on a three-day payment and settlement cycle. In the case of the cheque clearing, a cheque presented to a member bank during banking hours will be sent to that bank's clearing centre at the end of the working day (T+0), and will arrive late that night or early on T+1. Cheques are evaluated and processed at the clearing centre and the codeline of the cheque and amount are transmitted over the Interbank Data Exchange (IBDE) network to the relevant paying bank by 11:00 on T+1. In parallel, cheques are parcelled up and sent to a clearing exchange centre, where they are passed to the paying bank later in the morning on T+1. The majority of banks have chosen to outsource their processing to third-party service providers. Where the collecting and paying banks use the same processor, the cheque need not pass through a clearing exchange – provided that this arrangement (between two members) is registered with C&CCC as a direct exchange.

On T+2, C&CCC calculates the multilateral net amounts for each of the direct members. Settlement of the sterling clearings takes place at the Bank of England across settlement accounts using RTGS. Settlement of the euro clearing takes place across an account at a commercial bank. US dollar cheques (drawn on a UK bank) are settled using one of the five members of the clearing as a settlement service provider on a rotational basis.

Paper credits follow a reverse process to cheques, in which the collecting bank is generally the payer's bank. The processing procedures for the credit clearing are very similar to those employed in the cheque clearing. However, pre-printed codeline details on credits are not transmitted over the IBDE network.

Changes known as 2-4-6 came into force at the end of November 2007. These changes set a maximum time line of two, four and six working days for each of the stages after paying in a cheque to a current or basic bank account. Interest is received from T+2, the amount can be withdrawn from T+4, and certainty that the money cannot be reclaimed without consent is provided at the end of T+6.

#### *3.3.3.5 Risk management*

No system of limits or other controls is imposed by the C&CCC to restrict the volume or value of payments for which a particular member is responsible. In May 2005, the C&CCC and its members implemented a legally binding loss-sharing agreement to ensure that settlement can be completed in the event of a member defaulting on its obligations to other members of the payment system. This LFCA covers both Bacs and C&CC. A description of the LFCA arrangements can be found in Section 3.3.1.5.

#### *3.3.3.6 Pricing*

The C&CCC does not impose a per-item charge on cheques or credits handled; its costs are met through direct contributions by shareholders (the settlement members). Banks negotiate charges with their business customers for processing debits and credits arising from paper instruments; most banks do not impose such direct fees on their personal customers.

### ***3.3.4 LINK***

#### *3.3.4.1 Institutional framework*

The LINK Scheme is an unincorporated association of members. The Scheme sets the rules and is responsible for the day-to-day management of the ATM network. Provision of the central infrastructure and processing services has been outsourced to a third-party service provider, VocaLink Ltd.

#### *3.3.4.2 Participation*

The LINK Scheme currently has 38 members; most of these are banks and building societies, although there are also currently 11 non-financial institution members who operate ATMs but do not issue cards.

#### *3.3.4.3 Types of transaction*

LINK is the United Kingdom's largest ATM network, enabling its members' customers to withdraw cash from almost all of the United Kingdom's ATMs, irrespective of the bank at which they hold their account. The primary use of the LINK network is to withdraw cash, but the system also supports other services such as balance enquiries and mobile phone top-ups.

#### *3.3.4.4 Operation of the system and settlement procedures*

LINK is a deferred multilateral net settlement system, with a two-day clearing cycle. The LINK infrastructure retains a record of transactions conducted on T+0 and calculates net settlement obligations. These are passed to the Bank of England for settlement across settlement accounts using RTGS.

#### *3.3.4.5 Pricing*

VocaLink Ltd applies an annual tariff to the direct members of LINK to recover processing and other service costs. The LINK network allows both free and "pay-to-use" cash machines, but sets rules on charging and transparency of charging that apply to all cash machine and card issuers.

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

## 4.1 General overview

This section provides a detailed description of the central counterparties LCH, ICE Clear Europe and Euro CCP, and the securities settlement system, CREST.

LCH clears a broad range of asset classes comprising securities, equities, derivatives, financials and commodities contracts traded on major exchanges such as LIFFE, LME and LSE and on various MTFs. LCH also clears a number of OTC contracts, most notably interest rate swaps and sovereign bonds and repos. ICE Clear Europe acts as central counterparty for trades on the ICE Futures Europe energy exchange, OTC energy contracts and corporate single-name and index credit default swaps. Euro CCP clears cash equity products for a number of MTFs.

As the securities settlement system, CREST settles the purchase, sale, loan and repo of UK and Irish equities and UK government and corporate debt.

## 4.2 Central counterparties and clearing systems

### *4.2.1 LCH*

#### *4.2.1.1 Institutional framework*

LCH.Clearnet Ltd is part of the LCH.Clearnet Group. The Group was formed in December 2003 at the time of the merger between the LCH and the French-based CCP, Clearnet. LCH.Clearnet Ltd is a UK-incorporated company. It aligned its ownership in 2009 so that it is now 83% owned by users and 17% by the exchanges for which it clears.

LCH.Clearnet Ltd is regulated in the United Kingdom by the Financial Service Authority as a recognised clearing house under FSMA 2000. In addition, LCH.Clearnet Ltd is designated under the Settlement Finality Regulations (SFD). On 5 January 2010, HM Treasury recognised the embedded payment arrangements within LCH.Clearnet Ltd as an "inter-bank payment system" under Part 5 of the Banking Act 2009, giving the Bank of England statutory responsibility for overseeing it. The Bank and the FSA have a memorandum of understanding regarding the oversight of payment systems that covers LCH.Clearnet Ltd's embedded payment arrangements.[3]

#### *4.2.1.2 Participation*

LCH.Clearnet Ltd provides clearing services for a variety of members, comprising financial institutions, brokers and corporations. To transfer payments from member accounts to its

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[3] LCH.Clearnet Ltd is also a "Derivatives Clearing Organization (DCO)" in the United States and subject to Commodity Futures Trading Commission (CFTC) rules and the US Commodity Exchange Act.

own accounts, LCH.Clearnet Ltd uses the Protected Payment System (PPS), which is a network of commercial payment banks (PPS banks) that provide accounts to LCH.Clearnet Ltd and its members, as well as concentration banks where LCH.Clearnet Ltd holds funds intraday. LCH.Clearnet Ltd's concentration banks are the Bank of England for sterling and euro transactions, Citibank and Bank of New York Mellon for US dollar transactions and HSBC for transactions in minor currencies.

#### *4.2.1.3 Types of transaction*

LCH.Clearnet Ltd acts as a central counterparty for: OTC cash and repo trades in European government bonds ("RepoClear"); OTC interest rate swaps ("SwapClear"); non-deliverable forwards ("ForexClear"); equities-based trades and contracts for difference, eg LSE, SIX Swiss Exchange, BATS Europe, Equiduct and Plus Markets Group ("EquityClear"); financial, equity and commodity derivatives traded on LIFFE, EDX, LME and OTC; and freight, energy and emissions contracts traded on Nodal and OTC..

#### *4.2.1.4 Operation of the system (embedded payment arrangements)*

LCH.Clearnet Ltd transfers cash (margin and cash settlement sums) to and from its members through the PPS banks. In each currency, there is a concentration bank with which LCH.Clearnet Ltd holds an account. The concentration bank is used to collect surplus funds from each of the other PPS banks and to send these funds to PPS banks where LCH.Clearnet Ltd has a net debit position. The concentration bank account is also used to send and receive funds to/from LCH. Clearnet Ltd's investment counterparties.

LCH.Clearnet Ltd calculates initial and variation margin overnight and calls/pays margin due from and to its members every day early in the morning. LCH.Clearnet Ltd routinely calls intraday margin in response to movements in the prices and positions traded. SWIFT messages are used to transmit details of margin requirements between LCH.Clearnet Ltd and members' PPS banks. The transfer of funds is made in two stages; first, PPS banks confirm to LCH.Clearnet Ltd that they are willing to make a payment, and make a book entry debiting the member's account and crediting that of LCH.Clearnet Ltd. Secondly, the PPS banks transfer funds to the concentration bank within two hours for early morning calls and within one hour intraday.

LCH.Clearnet Ltd does not play a role in the matching of trades. LCH.Clearnet Ltd accepts trades directly from organised trading platforms, via a settlement system or through OTC trade registration facilities provided by the clearing house. Depending on the source of the trade registered for clearing, LCH.Clearnet Ltd accepts trades through open offer (as with cash equity trades executed on the London Stock Exchange) or through novation (as with OTC trades registered for clearing).

#### *4.2.1.5 Risk management*

To limit the risk LCH.Clearnet Ltd accepts by acting as a central counterparty, namely the losses it could potentially incur if one of its members were to default, LCH.Clearnet Ltd applies membership requirements, collects initial and variation margin and maintains a default fund.

To reduce the probability of a member default, LCH.Clearnet Ltd sets and monitors requirements for its members. These requirements may vary depending on the type of membership and the markets (products) the member wishes to clear. The requirements include minimum levels of financial resources and creditworthiness, and adequate operational capacity.

As mentioned above, LCH.Clearnet Ltd calculates initial margin and variation margin on all positions it clears using a number of different margin methodologies. Initial margin requirements are calculated using margin models that are tailored to the risk characteristics of the market cleared, and include both industry-standard methodologies (such as SPAN for exchange-traded derivatives) and proprietary methodologies (such as PAIRs for interest rate swap products). All cleared positions are subject to a mark to market variation margin on at least a daily basis. LCH.Clearnet Ltd can and does make both routine and ad hoc intraday margin calls, subject to a minimum transfer threshold. LCH.Clearnet Ltd regularly backtests the intended coverage.

LCH.Clearnet Ltd holds a single default fund, which can be applied to default losses arising from any of the markets it clears. The default fund is sized to be adequate to cover, at a minimum, the greater of the simultaneous default of the member that presents the largest credit risk to LCH.Clearnet Ltd and the five members with the lowest credit rating or the second and third members presenting the largest credit risk and the five members with the lowest credit rating, in extreme but plausible market conditions. The adequacy of the default fund is tested daily against end-of-day positions using historical and theoretical scenarios.

Under the provisions of its default rules, LCH.Clearnet Ltd has broad discretion to determine when a member is in default. Should a member be placed in default, LCH has the authority to close out or transfer the defaulter's contracts, realise the defaulter's collateral or perform any other action required to manage the default. LCH has an internal default management framework as well as a detailed operational procedures manual to assist in the process of managing default-related issues.

On a daily basis LCH.Clearnet Ltd forecasts its likely liquidity needs, both on an ongoing "business as usual" basis and in the event of the default of the member that presents the largest liquidity risk to LCH.Clearnet Ltd. This possible liquidity requirement is compared to the level of the liquidity LCH.Clearnet Ltd could make available if required.

LCH.Clearnet Ltd has a treasury investment policy to determine how members' collateral is managed and any resulting risks mitigated. The vast majority of cash is secured, and the policy outlines minimum credit rating criteria for LCH.Clearnet Ltd's counterparties, concentration limits at the counterparty group level, diversification of assets, and criteria to mitigate interest rate risk. Non-cash collateral is held mainly at two European CSDs, and one custodian bank in the United States.

Risks in the embedded payment arrangements are managed by setting minimum criteria for PPS banks and by defining procedures to ensure that payment deadlines are met. Concentration in a central bank account reduces exposure to intraday credit risk.

#### *4.2.1.6 Pricing*

LCH.Clearnet Ltd is a user-owned, constrained-for-profit organisation. It does not pay out dividends but uses excess profits for future fee reductions.

### ***4.2.2 ICE Clear Europe***

#### *4.2.2.1 Institutional framework*

ICE Clear Europe is owned by IntercontinentalExchange (ICE), a US company founded in 2000. ICE is a publicly traded company listed on the New York Stock Exchange. In June 2001, ICE acquired the International Petroleum Exchange (IPE), which is now ICE Futures Europe. ICE Clear Europe was launched in 2008 to clear trades for ICE Futures and the ICE OTC Energy market operated by ICE. ICE Clear Europe began clearing euro-denominated CDS in July 2009.

ICE Clear Europe is regulated in the United Kingdom by the FSA as a recognised clearing house under FSMA 2000. In addition, ICE Clear Europe received Settlement Finality Designation from the FSA under the Financial Markets and Insolvency (Settlement Finality) Regulations 1999. On 24 February 2010, HM Treasury recognised the embedded payment arrangements within ICE Clear Europe as an "'inter-bank payment system" under Part 5 of the Banking Act 2009, giving the Bank statutory responsibility for overseeing it. In the United

States, ICE Clear Europe has also been granted an order as a "Derivatives Clearing Organization" by the US Commodity Futures Trading Commission. Subject to compliance with certain conditions, ICE Clear Europe has been granted an exemption from the US Securities and Exchange Commission in respect of its CDS clearing service.

#### 4.2.2.2 Participation

In December 2010, ICE Clear Europe had 57 members, mainly financial institutions and energy companies. Payment arrangements are provided by six APS banks. ICE Clearing Europe's concentration bank is JP Morgan.

#### 4.2.2.3 Types of transaction

ICE Clear Europe acts as central counterparty for trades made on the ICE Futures Europe energy exchange, OTC energy contracts, and corporate single-name and index credit default swaps. The energy and CDS clearing operations have separate membership criteria, rules and risk models.

#### 4.2.2.4 Operation of the system

(Embedded payment arrangements)

ICE Clear Europe transfers cash (margin) to and from its members through a mechanism known as the Assured Payments System (APS). The APS consists of a network of six commercial banks that provide accounts to both ICE Clear Europe and its members in one or more of the currencies in which liabilities are incurred. ICE Clear Europe members must open accounts in two of the following currencies: sterling, euros and US dollars. JP Morgan, with which ICE Clear Europe also holds an account, acts as a concentration bank for each currency. The concentration bank accounts are used to collect funds from each of the APS banks and send funds that are surplus to ICE Clear Europe margin requirements directly to clearing members.

ICE Clear Europe calculates initial and variation margin overnight and calls/pays margin due from and to its members every day early in the morning. ICE Clear Europe calculates initial and variation margin requirements every five minutes during the day and can call intraday margin in response to movements in the prices and positions traded. SWIFT messages are used to transmit details of margin requirements between ICE Clear and members' APS banks. Settlement of cash and some physically settled contracts is also made across the APS. Early morning calls have to be met by 09:00 London Time and intraday calls within one hour. CDS coupon and credit event payments are made in CLS.

Energy contracts clear on an open offer basis, whereby contracts with the clearing house automatically form upon trade matching on the respective market (eg at ICE Futures Europe).

For CDS clearing, confirmed, eligible transactions that are submitted to the DTCC's Markit/SERV Transaction Information Warehouse can be submitted for clearing to ICE Clear Europe. On clearing, the bilateral contract is replaced by two contracts with the clearing house.

#### 4.2.2.5 Risk management

As detailed in its rulebook, ICE Clear Europe sets membership criteria for all clearing members, including additional requirements for CDS clearing members. This includes a minimum capital requirement of USD 10 million for energy clearing members and a capital requirement of USD 5 billion for CDS clearing members. In addition to the financial resource requirements for members, the membership rules cover operational capability, risk management experience and regulatory oversight.

The clearing house calculates margin using the SPAN4 algorithm for energy clearing. For CDS, the clearing house uses a proprietary risk assessment methodology which is shared with ICE Trust and developed by the group subsidiary, The Clearing Corporation (TCC).

Intraday margin calls can be made between 09:00 and 22:00 London Time and must be met within 60 minutes of notification by the clearing house. Margin calls are made in accordance with the intraday margin calling policy.

Clearing members must pay the end-of-day variation margin by 09:00 London Time on the following business day. Margin payments are met in accordance with the clearing house's list of permitted cover, which includes cash and acceptable non-cash collateral.

In addition, ICE Clear Europe may execute a special margin call in response to its risk monitoring of members. For example, a concentration risk margin multiplier is applied to large positions.

ICE Clear Europe invests cash margin in accordance with its investment policy.

Clearing members are obliged to make minimum contributions to the guarantee fund. ICE Clear Europe maintains a separate energy and CDS guarantee fund, which aims to mutualise losses under extreme market scenarios. In addition, the clearing house may call additional funds from non-defaulting members. ICE Clear Europe has contributed USD 100 million to its energy guarantee fund. Additionally, ICE has contributed USD 10 million to the CDS guarantee fund and has committed a further USD 40 million over a two-year period.

In the event of a member default, the clearing house will close out the defaulting member's positions in accordance with its rulebook. The order in which the clearing house utilises assets to meet the obligations and liabilities of the defaulter is also specified in the rulebook.

Risks in the embedded payment arrangements are managed by setting minimum criteria for APS banks and establishing payment deadlines.

#### *4.2.2.6 Links to other systems*

ICE Trust and TCC provide services to ICE Clear Europe under an outsourcing agreement. The services are provided through a common infrastructure, ICE Clear Europe does not have links to any other central counterparty.

ICE Clear Europe also has links with large-value payment systems to make cash payments (CHAPS, TARGET2, Fedwire and CHIPS). It uses the SWIFT network to communicate with its APS banks and accesses CLS via JP Morgan.

#### *4.2.2.7 Pricing*

ICE Clear Europe is a wholly owned subsidiary of ICE, a publicly listed company on the New York Stock Exchange. It charges members clearing fees on a per-lot basis.

#### *4.2.2.8 Major ongoing and future projects*

ICE Clear Europe has recently undertaken a post-trade and clearing systems migration programme, in which the clearing house has replaced the TRS/CPS platform with an in-house clearing system.

### ***4.2.3 Central counterparty EuroCCP***

#### *4.2.3.1 Institutional framework*

The London-based European Central Counterparty Ltd (EuroCCP) is a wholly owned subsidiary of the US-based Depository Trust and Clearing Corporation (DTCC). DTCC is owned and governed by its users. EuroCCP has its own board and board committees, including audit and risk committees.

EuroCCP is regulated in the United Kingdom by the FSA as a recognised clearing house under FSMA 2000. In addition, EuroCCP is designated under the Settlement Finality Regulations.

#### *4.2.3.2 Participation*

Firms wishing to directly use the services of EuroCCP are required to become participants. There are two types of participant: general clearing participants (who can clear for themselves and non-clearing participants of the MTF platforms that EuroCCP clears for), and individual clearing participants (who can clear for themselves only). Firms that are not participants of EuroCCP can access the firm's services through the establishment of a clearing arrangement with a general clearing participant (for non-clearing participants of the MTF platforms and individual clients who are not participants of the MTF) or individual clearing participants (for individual clients who are not participants of the MTF only). As of February 2011, EuroCCP had 15 active general clearing participants and 12 individual clearing participants.

#### *4.2.3.3 Types of transaction*

EuroCCP clears cash equity products for a number of European multilateral trading facilities, most importantly for Turquoise. It clears for a total of 19 markets throughout Europe.

#### *4.2.3.4 Operation of the system*

EuroCCP uses Citibank as its concentration bank and participants pay margin and default fund contributions either directly into EuroCCP's account with Citibank or via a payment bank of their choice. EuroCCP calculates margin requirements overnight and calls outstanding margin from its participants every day early in the morning. To this end, EuroCCP has powers of attorney in place with the settlement banks its participants use. This allows it to send direct instructions to these banks on behalf of its participants.

EuroCCP uses SWIFT messages to communicate margin requirements to participants and with its settlement agent.

#### *4.2.3.5 Risk management*

EuroCCP requires margin payments to cover the default risk posed by its participants when it accepts trades into clearing. EuroCCP's margin fund is made up of a number of components, the most important of which are charges equivalent to the concepts of initial and variation margin. EuroCCP also reviews its risk exposure regularly throughout the day and has the ability to call intraday margin.

Margin may be provided in either cash or acceptable non-cash collateral. EuroCCP accepts a number of government bonds, cash and letters of credit as eligible collateral (subject to a minimum 40% cash requirement). EuroCCP also has minimum capital requirements for its participants and can add special charges to margin calls should it identify a concern with the creditworthiness of a participant.

If the default of a participant exhausts the margin funds provided by that participant, EuroCCP can access the collateral paid by the defaulting participant into the guarantee fund and, if necessary, the guarantee fund contributions of all its other participants. Should the guarantee fund also be exhausted, EuroCCP requires its participants to indemnify it against any excess loss. Participants can limit their liability for any excess loss in accordance with EuroCCP's rules. EuroCCP's rules also give it the discretion to use its capital to meet losses after a defaulting participant's funds have been exhausted, before invoking loss-sharing agreements with all its other participants.

#### *4.2.3.6 Links to other systems*

As at April 2011, EuroCCP has no links with other clearing houses. It uses Citibank as the settlement agent for the 19 European markets it serves. Where it is a direct member of the local CSD, its accounts are operated by Citibank. EuroCCP has connections to all platforms it clears for.

#### *4.2.3.7 Pricing*

EuroCCP is a wholly owned subsidiary of DTCC, which is a user-owned entity operating an at-cost model. In DTCC's model, excess profits are typically rebated back to its users.

#### *4.2.3.8 Major ongoing and future projects*

As of April 2011, EuroCCP's key future project is the launch of interoperability with other clearing houses for a number of trade platforms.

## 4.3 Securities settlement system

### *4.3.1 CREST*

Inaugurated on 15 July 1996, the CREST system was originally owned and operated by a private sector company, CRESTCo Ltd, which itself was owned by a range of CREST users. In September 2002, CRESTCo merged with Euroclear. On 1 January 2005, a corporate restructuring of Euroclear created a new parent company called Euroclear SA/NV with CRESTCo, Euroclear France, Euroclear Nederland, Euroclear Belgium and Euroclear Bank as its subsidiaries. On 1 July 2007, CRESTCo Ltd changed its name to Euroclear UK & Ireland Ltd (EUI) and on 1 September 2010, EUI merged with EMX Company Limited (the operator of an electronic router for funds orders and settlement messages), which had been part of the Euroclear Group since 1 January 2007. Euroclear Plc, which owns Euroclear SA/NV is a UK-registered private company owned by around 200 user-shareholders, mainly major banks and brokers (see also the descriptive Red Book chapter on the euro area).

#### *4.3.1.1 Institutional framework*

The CREST system is operated by EUI. CREST supports securities settlement for UK and Irish equities as well as corporate bonds, government debt, money market instruments and exchange traded funds. EUI's International Service enables CREST members to hold and settle transactions in foreign securities through links with other CSDs.

EUI is authorised as an operator of a relevant system under the Uncertificated Securities Regulations 2001 (USRs). The USRs provide the legal basis for the dematerialisation of UK securities and the transfer of dematerialised securities in the CREST system by way of electronic transfer of title. EUI is regulated in the United Kingdom by the FSA as a recognised clearing house under FSMA 2000. EUI is also authorised as an operator of systems in Ireland, Jersey, and the Isle of Man. The CREST system is also a designated system in the United Kingdom and Ireland under the Settlement Finality Directive.

On 5 January 2010, HM Treasury recognised the embedded payment arrangements within the CREST system as an interbank payment system under Part 5 of the Banking Act 2009, giving the Bank of England statutory responsibility for overseeing it.

CREST's embedded payment arrangements are covered by a memorandum of understanding between the Bank and the FSA regarding the oversight of payment systems. The Bank, the FSA, and the Central Bank of Ireland have a memorandum of understanding for cooperation on the regulation of services provided by EUI relating to the settlement of Irish securities.

### *4.3.1.2 Participation*

EUI offers membership for corporate entities and individuals regardless of domicile or location (except as mentioned below). CREST membership ranges from banks and broker-dealers to private clients. These are mainly firms that are active in the UK and Irish equity markets and the gilt market (or their custodians). The CREST Terms and Conditions and Rules set out the requirements for participating in the CREST system.

In CREST terminology, there is a distinction between “participants” and “users”. Participants are those who hold securities in the CREST system (“members”) or who provide payment services (“settlement banks”) or registration services (“registrars”). Users are those who communicate with the CREST system for themselves and/or behalf of participants. EUI requires users to locate their gateway computers (the secure equipment used for sending/receiving electronic messages to/from the CREST system) in the United Kingdom, Ireland, or another jurisdiction approved by EUI.

Most corporate members maintain and operate their own securities accounts in the CREST system (“direct members”). “Personal members” (mainly individuals) maintain accounts in their own name, but use the facilities of a user (a “sponsor”) to communicate with CREST. Sponsors are required to be authorised under FSMA. Non-members of CREST who are active participants in the equity or gilt markets typically hold their accounts with custodians or brokers who are direct members of the system, although individuals may choose to hold their securities outside the system altogether, in paper form.

Applicants must enter into a contractual agreement with EUI to participate in the CREST system. They also must enter into a contractual arrangement with an approved CREST settlement bank in order to receive credit in the CREST system to settle their transactions. EUI may require participants and users incorporated or resident outside the United Kingdom to provide a legal opinion confirming the participant’s or user’s ability to be bound by the terms of the agreement executed by EUI and the participant or user.

EUI serves over 35,000 members of which approximately 2,850 are corporate participants. There are 14 CREST settlement banks including the Bank of England. The access criteria for CREST settlement banks are set out in the CREST Rules.

### *4.3.1.3 Types of transaction*

The CREST system settles the purchase, sale, loan and repo of UK and Irish equities and UK government and corporate debt. The UK regulations governing the CREST system (ie the USRs) permit only the admission of securities constituted under English, Scottish or Northern Irish laws. But under a multi-jurisdictional model, securities governed by Irish, Jersey, Guernsey and Isle of Man laws are admitted pursuant to the laws of those jurisdictions (see Section 4.4.1.6 below). Moreover, through the system’s links to other settlement systems in Europe and the United States, members are able to hold foreign securities. Some lines of foreign securities are held under depository arrangements established for settlement purposes by the registrar (an agent appointed by the issuer).

### *4.3.1.4 Operation of the system*

In general, CREST executes only transfer instructions that it receives via an accredited communications network either from the member whose account is to be debited or credited, or its sponsor. The terms of the transfer must be confirmed by both the transferor and the transferee, who input independent instructions into CREST that are matched before proceeding to settlement. In relation to transactions on certain trading venues, EUI provides central sponsor services enabling members or their settlement agents to opt to allow settlement instructions to be created automatically on their behalf and to be input by another CREST user acting as a central sponsor.

The settlement process is continuous between 06:00 and 16:40, with settlement against payment ceasing at 16:10. The system remains open for input and matching of forward-dated transactions until 20:00.

CREST has two accredited network service providers for communications between the CREST system and users – SWIFT and BT Syntegra. Different arrangements apply to communications with participants that are CSDs, exchanges or CCPs.

The CREST system provides DVP1 settlement in central bank money with simultaneous and irrevocable transfer of cash and securities for all sterling and euro payments. The USRs establish that the CREST record is the register for dematerialised UK securities (the operator register) such that, at the point of settlement in the CREST system, the transferee/buyer receives immediate and irrevocable direct legal title to the dematerialised securities. Finality of stock and cash is therefore simultaneous. The USRs require the issuer's registrars to keep a duplicate record that must be reconciled with the operator register and is referred to for the purposes of general meetings and corporate actions. For Irish, Jersey, Guernsey and Isle of Man securities, the register of legal title is maintained by the issuer's registrar.

Also at the point of settlement, the CREST payment that discharges the buyer's obligation to the seller is accompanied by a irrevocable undertaking by the Bank of England (for sterling) and the Central Bank of Ireland (for euro) to debit the buyer's settlement bank and credit the seller's settlement bank accounts. The Bank applies such credit and debit postings across the settlement banks' RTGS CREST accounts at the end of each cycle. The Central Bank of Ireland applies such postings at the end of the day. As a result, the buyer is solely exposed to the risk on its chosen settlement bank, and intraday risks between the settlement banks are eliminated. Settlement banks maintain separate RTGS accounts at the Bank of England for CREST and for "clean" payments (ie those arising for activities other than securities settlement in the CREST system). Settlement banks balance (by means of liquidity transfers) their available funds between these RTGS accounts throughout the day according to the demands arising in CREST or from clean payments. At the start of each CREST settlement cycle, the liquidity balance on each settlement bank's RTGS CREST settlement account is irrevocably earmarked for CREST settlement.

Once the CREST system has identified a set of transactions for which sellers have stock, buyers have cash or credit, and buyers' settlement banks have sufficient earmarked RTGS liquidity, these transactions will be settled with finality. Only transactions where both stock and cash/credit are known to be available will be queued against the liquidity that the settlement banks have earmarked for CREST settlement. Where available liquidity is insufficient, uncovered transactions will be queued against liquidity provided by the settlement bank in the next CREST settlement cycle. Once stock has been transferred with legal title, and members' cash/credit positions are updated within the CREST system, the Bank of England and the Central Bank of Ireland are notified of settlement banks' usage of earmarked liquidity and the transfers between them, and they implement the relevant postings across settlement banks' accounts. Remaining earmarked liquidity is then released and any queued liquidity transfers effected. For CREST Sterling, the earmarking process can then begin again for the next settlement cycle.

The CREST system provides DVP2 settlement in commercial bank money for US dollar payments. CREST US dollar transactions are settled in the CREST system during the settlement day. However, CREST settlement banks discharge their net bilateral US dollar payment obligations at the end of the day outside the CREST system.

EUI provides support to several central clearing counterparties (CCPs) for the services they offer to various trading platforms. EUI offers two types of clearing-related service: the CREST Clearing Support Arrangement, which is more limited (includes the direct input service) and the CREST Central Counterparty Services (which include direct input, the netting service, and maintenance of databases containing various data such as open position data and margin data calculated by the CCPs). The direct input service enables the automated creation of transactions on behalf of CREST members by a CREST central sponsor without the need for those participants to input or match such transactions themselves.

In July 2002, the CCP service for trades made through the London Stock Exchange's electronic orderbook was expanded to include the option of settlement netting. As a result of this enhancement, CREST users who opt for the service have only one settlement instruction to settle in each line of stock as a result of a day's trading. Netting only applies to sufficiently similar contracts; and the settlement (with LCH and SIX x-clear as CCPs) takes place on T+3, as for non-netted electronic orderbook trades. Other CCPs have joined the EUI system in 2010 under the CREST clearing support arrangements.

#### *4.3.1.5 Risk management*

CREST settlement banks are contractually bound to settle debts incurred in the CREST system by their customers. The settlement banks provide their customers with intraday credit in the CREST system, limiting their own exposure by setting up debit caps within the system; the CREST system itself provides no credit facilities. The debit cap represents the maximum debit position that a settlement bank is willing to assume for a given customer and is a combination of unsecured credit and secured credit advanced in return for a charge over securities held by their customer in the CREST system.

To increase the supply of intraday sterling liquidity available to the settlement banks, EUI and the Bank of England support a demand-driven auto-collateralisation repo arrangement~~s~~ whereby a purchasing CREST member may use eligible securities (mainly UK government securities) in the course of settlement to generate intraday sterling liquidity for its settlement bank.

The CREST system is supported by two data centres that are updated synchronously in real time.

#### *4.3.1.6 Links to other systems*

The CREST system has cross-border links with Euroclear Bank SA/NV, Euroclear Nederland, Depository Trust and Clearing Corporation (DTCC), and SIX SIS Ltd. A wholly owned subsidiary of EUI (CREST Depository Limited), through a nominee, holds the underlying international securities in an account with the relevant CSD (either directly or through a custodian).

A holder of a foreign security in the CREST system receives a CREST Depository Interest (CDI), an English law instrument representing the holder's proprietary interest in the underlying international security, which is held on his behalf in the foreign CSD by the CREST nominee. A deed poll executed by CREST Depository Limited (CDL) sets out the holder's right against CDL to the underlying security. The CDI holder has legal title to the CDI and beneficially owns the underlying foreign security.

#### *4.3.1.7 Pricing*

EUI regularly reviews its tariff arrangements in consultation with CREST participants and users to ensure that CREST services provide a consistent income stream for EUI, that different market sectors are not disadvantaged, and that economies of scale are returned to the market via tariff reductions or rebates.

#### *4.3.1.8 Use of securities infrastructure by the central bank*

The Bank of England uses CREST to receive collateral to support its monetary policy operations and to receive collateral to provide intraday liquidity to its RTGS CHAPS sterling settlement banks. The Bank also provides intraday liquidity to CREST sterling settlement banks in CREST through CREST self-collateralising repo transactions. The Bank also uses CREST to support its proprietary and customer custody business. This includes acting as the UK Debt Management Office's settlement agent for the issuance and management of UK gilts and Treasury bills in CREST. The Bank uses CREST for UK securities and uses other (I)CSDs and central banks for non-UK securities.