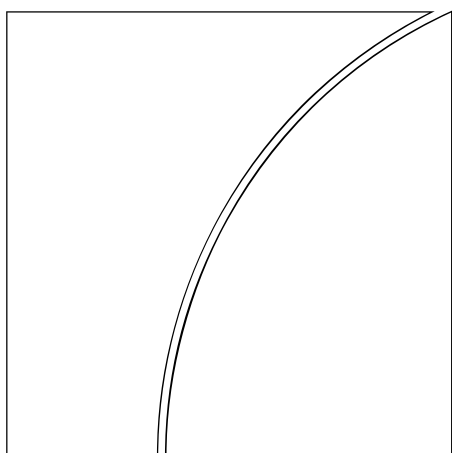


# Committee on Payment and Settlement Systems



## Payment systems in Singapore

Prepared by the Monetary Authority of Singapore and the Committee on Payment and Settlement Systems of the central banks of the Group of Ten countries

November 2001



BANK FOR INTERNATIONAL SETTLEMENTS

Copies of publications are available from:

Bank for International Settlements  
Information, Press & Library Services  
CH-4002 Basel, Switzerland

E-mail: [publications@bis.org](mailto:publications@bis.org)

Fax: (+41 61) 280 9100 and (+41 61) 280 8100

This publication is available on the BIS website ([www.bis.org](http://www.bis.org)).

© *Bank for International Settlements 2001. All rights reserved. Brief excerpts may be reproduced or translated provided the source is cited.*

ISBN 92-9131-628-8

## Foreword

The Committee on Payment and Settlement Systems (CPSS) periodically publishes - under the aegis of the Bank for International Settlements (BIS) - reference works on payment systems in various countries, widely known as Red Books. In December 1993, it published the fourth edition of the Red Book covering the G10 countries, and has since produced yearly statistical updates. The CPSS has also invited the central banks of a number of countries where important developments in payment systems are under way to publish - in collaboration with its Secretariat at the BIS - separate volumes on their respective payment systems. The present volume, the first edition of the Red Book for Singapore, is a further step towards increasing our understanding of the way payment systems work in different countries.

Properly functioning payment systems enhance the stability of the financial system, reduce transaction costs in the economy, promote the efficient use of financial resources, improve financial market liquidity and facilitate the conduct of monetary policy. In recent years, issues relating to the economic efficiency and financial risks of all types of payment systems have come to the fore.

Central banks have a strong interest in promoting safety and improving efficiency in payment systems as part of their overall concern with financial stability. They play a key role in domestic payment system development and, in many cases, operate large-value payment systems. A number of central banks have been influential in improving public understanding of the payment and settlement arrangements in their countries.

We hope this volume will contribute to the general understanding and awareness of payment systems in Singapore, both domestically and internationally.

Tommaso Padoa-Schioppa  
Chairman, Committee on  
Payment and Settlement Systems  
Member of the Board of the  
European Central Bank

Koh Yong Guan  
Managing Director  
Monetary Authority of Singapore  
Republic of Singapore



## Table of contents

1.	Introduction .....	1
1.1	General legal aspects .....	1
1.2	The role of financial intermediaries .....	2
1.2.1	Banks .....	2
1.2.2	Automated Clearing House (ACH) .....	3
1.2.3	Credit/charge card operators .....	3
1.2.4	Network for Electronic Transfers (Singapore) Pte Ltd (NETS) .....	3
1.2.5	SWIFT .....	4
1.3	The role of the central bank .....	4
1.3.1	MAS role in the development and regulation of payment systems .....	4
1.3.2	Role in real-time gross settlement system .....	5
1.3.3	Role in the settlement of securities transactions .....	5
1.4	The role of other private and public sector bodies .....	5
1.4.1	Singapore Clearing House Association (SCHA) .....	5
1.4.2	Association of Banks in Singapore (ABS) .....	5
1.4.3	Electronic Payments Committee (EPC) .....	5
1.4.4	Electronic Payments Technical Committee (EPTC) .....	5
1.4.5	Controller of Certification Authorities (CCA) .....	6
2.	Summary information on payment media used by non-banks .....	6
2.1	Cash .....	6
2.2	Non-cash payments .....	6
2.2.1	Cheques .....	6
2.2.2	GIRO .....	6
2.2.3	Payment cards .....	7
2.2.4	Automated Teller Machines (ATM) .....	8
2.2.5	Electronic Funds Transfer at Point of Sale (EFTPOS) .....	8
2.2.6	Other access channels for banking and payments .....	8
3.	Interbank exchange and settlement circuits .....	9
3.1	General overview .....	9
3.2	Interbank systems for retail transactions .....	9
3.2.1	Singapore Dollar Cheque Clearing System .....	9
3.2.2	USD cheques .....	10
3.2.3	Interbank GIRO (IBG) .....	11
3.2.4	ATM networks .....	11
3.2.5	EFTPOS .....	12
3.3	Real-time gross settlement system - MAS Electronic Payment System (MEPS) .....	13
3.3.1	Participants .....	13

3.3.2	MEPS-Interbank Funds Transfer (MEPS-IFT) .....	13
3.3.3	Intra-day and end-of-day credit extension .....	13
3.3.4	Management and pricing .....	14
3.3.5	Operations of MEPS .....	14
3.4	Main projects and policies being implemented .....	14
3.4.1	Cheque truncation .....	14
4.	Special use of interbank transfer systems for international payments and securities transactions .....	15
4.1	Exchange and settlement systems for retail transactions payments .....	15
4.1.1	Traveller's cheques and personal cheques .....	15
4.1.2	International ATM network .....	15
4.2	Exchange and settlement systems for securities transactions .....	15
4.2.1	Securities settlement systems .....	15
4.2.2	Central Depository (Pte) Limited (CDP) .....	15
4.2.3	MEPS- Singapore Government Securities System (MEPS-SGS) .....	16
5.	Role of Central Bank in interbank settlement system .....	17
5.1	General responsibilities .....	17
5.2	Provision of settlement facilities .....	18
5.3	Monetary policy and payments system .....	18
	Glossary .....	19
	Statistical tables .....	23
	Comparative tables .....	33

## 1. Introduction

A payment system comprises the cultural, political, legal, economic and business practices and arrangements used within a market economy to determine, store and exchange value or ownership of goods and services. In its simplest form, a payment stems either from a trade between buyers and sellers in a market or from a financial obligation.

Modern payment systems in a market economy can be modelled in three major segments: first, the instruments used to deliver payments; second, the clearing and settlement process involved in a payment transaction; and finally, the actual transfer of funds between institutions.

Singapore's payment system has evolved over the years, driven by technological progress, changing consumer needs and development of new financial activities. It has changed from one that was based essentially on paper and cash transactions to one today that has a diverse range of cashless payment instruments, as well as efficient and reliable clearing and settlement systems.

In Singapore, the common methods of making retail payments besides using currency comprise cheques and interbank GIRO debit and credit transfers as well as payment cards (stored value, debit and credit cards). Banks' customers can also use their debit cards to make third-party account funds transfers and to make bill payments to selected commercial and government entities via the ATMs. More recently, banks' customers have been able to make bill payments and third-party funds transfers through their telephone, mobile and internet banking services.

The Monetary Authority of Singapore (MAS) operates a real-time gross settlement system, MAS Electronic Payment System, for large-value local currency interbank fund transfers and the settlement of scripless Singapore Government Securities.

### 1.1 General legal aspects

A number of laws and bye-laws have a bearing on payment instruments and institutions in Singapore.

Cheques and GIRO transactions cleared through the Automated Clearing House are regulated by the following laws and bye-laws:

- *Section 59 of the Banking Act* allows MAS, in conjunction with banks and other financial institutions, to establish a Clearing House to facilitate the clearing of cheques and other credit instruments, and ensure its smooth operation.
- *Banking (Clearing House) Regulations, Cap. 19, Regulation 1*, subsidiary legislation administered by MAS, sets the framework with respect to clearing with the Automated Clearing House.
- The *Bills of Exchange Act* governs how cheques are drawn, accepted and paid.
- The *Bye-laws of the Singapore Clearing House Association (SCHA)* state the rules and regulations for participation in the clearing of cheques and GIRO.

*Section 77A of the Banking Act* states that only banks authorised by MAS can issue stored value instruments that have multiple payment capabilities.

*Section 59A of the Banking Act* makes provision for MAS to establish and operate one or more real-time gross settlement (RTGS) systems. MAS is responsible for the smooth operation of the RTGS system and ensures that participants comply with the rules and regulations.

The *Currency Act (Chapter 69)* established the Board of Commissioners of Currency, Singapore (BCCS) in 1967. The Act conferred on the BCCS the sole right to issue currency in Singapore. A notable provision of the Act is that the Singapore dollar must be 100% backed by external assets. This is achieved through the maintenance of a currency fund consisting of foreign currencies, demand and time deposits, treasury bills and securities, and gold.

With the increasing trend towards electronic transactions, digital signatures are becoming more important, both for identification purposes and to serve as an alternative to hand-written signatures. Digital signatures are also useful in preventing unauthorised alteration of the contents of electronic documents. On 10 July 1998, the *Electronic Transactions Act* was enacted to provide for the legal recognition of digital signatures and establish the framework to facilitate electronic commerce transactions in Singapore.

## 1.2 The role of financial intermediaries

### 1.2.1 Banks

Singapore's payment landscape is predominantly the domain of banks.

Commercial banks in Singapore are allowed to engage in a wide range of financial services. These include traditional banking services such as loans and deposits, and investment banking business such as underwriting and distribution of equity and debt securities, corporate finance, funds management and unit trust management. As at end-December 2000, there were 134 commercial banks in Singapore, eight of which were locally incorporated.

Commercial banks are licensed under the *Banking Act* (Chapter 19). Their activities are also governed by MAS Notices to Banks and guidelines issued from time to time. There are three categories of commercial banks in Singapore: full banks, wholesale banks and offshore banks.

Banks are currently the only institutions able to process across all segments of the payment process chain (acquisition, processing, clearing and settlement). However, new payment service providers are expected to play a greater role in the coming years.

#### *Full banks*

Full banks are authorised to transact the whole range of banking business, both personal and corporate. These include the operation of current, savings and fixed deposit accounts, financing of exports and imports, transfer of funds, commercial letters of credit, trust receipts, traveller's cheques and currencies. Full banks may also provide advice on trade and investment and foreign exchange regulations, and may furnish credit reports and trade information.

Most full banks provide the entire range of retail payment services such as cheque services, funds transfers, issuance of credit and debit cards, and ATM services. As at end-December 2000, there were 31 full banks, eight of which were locally incorporated banks and the remainder branches of foreign banks. Foreign full banks face some restrictions on the setting-up of branches and offsite ATMs. Currently only local banks can provide EFTPOS services.

#### *Wholesale banks*

Formerly known as restricted banks, wholesale banks may engage in the whole range of banking activities open to a full bank except that they may not:

- (1) accept Singapore dollar fixed deposits of less than SGD 250,000 per deposit from non-bank customers;
- (2) pay interest on Singapore dollar current accounts operated by resident individuals.

As at end-December 2000, there were 20 restricted banks in Singapore, all of which were branches of foreign banks.

#### *Offshore banks*

The category of offshore banks was introduced in 1973 with the aim of improving the scope of activity in the Asian dollar market. Offshore banks enjoy similar opportunities to full and wholesale banks for business in the offshore market, but their scope of business in the Singapore dollar retail market is limited.

In addition to the conditions imposed on wholesale banks, offshore banks also cannot:

- (1) accept interest-bearing Singapore dollar deposits from resident non-bank customers other than approved financial institutions;
- (2) extend total credit facilities in Singapore dollars exceeding SGD 500 million to non-bank customers who are residents of Singapore. Qualifying offshore banks can offer credit facilities of up to SGD 1 billion.

As at end-December 2000, there were 83 offshore banks in Singapore, all of which were branches of foreign banks.



### *Banking liberalisation programme*

In May 1999, MAS announced a five-year programme to liberalise commercial banking in Singapore. This was aimed at promoting a more open and competitive environment and spurring the development and upgrading of local banks.

MAS has granted qualifying full bank (QFB) privileges to four foreign banks, wholesale banking licences to eight offshore banks and qualifying offshore bank (QOB) status to eight offshore banks. In addition to the normal privileges accorded to a foreign full bank, the QFB privileges allow the banks, inter alia, additional branches and ATMs.

In June 2001, MAS further announced that it would award another two banks QFB status and grant all QFBs enhanced privileges in branching and establishing off-site ATMs.<sup>1</sup> In addition, from 1 July 2002, QFBs will be allowed to provide debit services for EFTPOS transactions. Restricted and offshore banking licences (including QOB) will be consolidated into a new wholesale banking licence. Wholesale banks will be able to engage in all activities open to the restricted banks. For a start, all current restricted banks will be renamed wholesale banks and MAS will issue another 20 wholesale banking licences within the next two years, with priority accorded to existing QOBs.

*(More information on the banking liberalisation programme, including how new licences are granted, can be found on the MAS website at [www.mas.gov.sg](http://www.mas.gov.sg).)*

### *Internet-only banks (IOBs)*

MAS issued a policy statement on internet banking in July 2000. MAS is prepared to grant new banking licences for Singapore-incorporated banking groups to set up separate banking subsidiaries (including joint venture entities) to pursue new business models, including internet-only banking, outside their existing banking entities. There is currently one bank operating under the IOB business model.

#### **1.2.2 Automated Clearing House (ACH)**

The Singapore ACH operates the Singapore Dollar Cheque Clearing System, the US Dollar Cheque Clearing System and the Interbank GIRO System. The operation of the ACH is contracted to Banking Computer Services Pte Ltd (BCS).

#### **1.2.3 Credit/charge card operators**

The main credit card operators in Singapore are VISA and MasterCard, while American Express and Diners Club are the main charge card operators. These operators provide the international network linkages between the merchant and the card-issuing banks and clear their cards' transactions among participating banks. The card operators switch the transaction to the card issuers, who check the credit limit and verify the authenticity of the transaction.

#### **1.2.4 Network for Electronic Transfers (Singapore) Pte Ltd (NETS)**

NETS is a nationwide electronic payment platform, formed in 1985 by a consortium of local banks - Development Bank of Singapore, POSBank,<sup>2</sup> Oversea-Chinese Banking Corporation, Overseas Union Bank and United Overseas Bank. Tat Lee Bank and Keppel Bank joined NETS in 1990 and 1992 respectively.<sup>3</sup> NETS aims to establish infrastructure, systems and services to facilitate electronic banking services and financial payments. The company commenced operations by offering a nationwide EFTPOS network, an online debit payment service.

---

<sup>1</sup> With the second phase of banking liberalisation, each QFB is permitted to establish up to 15 locations, of which up to 10 can be branches. The 15 locations can include both branches and off-site ATMs. The sub-limit of 10 branches can include branches and limited purpose branches.

<sup>2</sup> POSBank was acquired by DBS in 1998.

<sup>3</sup> The two banks merged in 1999.

Over the years, NETS has evolved to a multi-service organisation, providing a comprehensive range of electronic payment services such as EFTPOS, CashBack, Shared ATM service, CashCard, SET Payment Gateway, NETSCash and Trade Finance service.

NETS was recently restructured with a new consortium, comprising DBS and Singapore Telecommunications Limited (SingTel<sup>4</sup>), holding a 45% stake. DBS will transfer its existing stake to the consortium. The remaining 55% will be owned by NETS' existing shareholder banks, namely Keppel TatLee Bank, Oversea-Chinese Banking Corporation, Overseas Union Bank and United Overseas Bank.<sup>5</sup>

### **1.2.5 SWIFT**

The Society for Worldwide Interbank Financial Telecommunication (SWIFT) was founded by 239 banks from 15 countries in 1973, with the purpose of providing technology-based communication services across all financial markets through member banks. Today, SWIFT provides secure global communication to more than 7,200 financial institutions in 192 countries. The services provided include interfaces, store-and-forward messaging, interactive messaging, file transfers and message routing.

SWIFT was introduced in Singapore in 1979, and by 1983 there were 50 banks connected to the network. As at end-December 2000, there were 179 domestic institutional users, of which nine were locally incorporated institutions participating as full members. The remaining domestic institutional users were sub-members and participants, consisting of foreign commercial banks, investment advisers, securities houses and other financial institutions.

## **1.3 The role of the central bank**

The Monetary Authority of Singapore (MAS) was established as a statutory board under the Monetary Authority of Singapore Act in 1970. Its mission is to promote sustained non-inflationary economic growth and a sound and progressive financial services sector. Except for the issuance of currency, which is entrusted to the BCCS, MAS performs all the functions normally associated with a central bank.

MAS acts as a settlement agent for the banking institutions in Singapore, by allowing funds transfers to take place across the banks' settlement accounts held with MAS. MAS is also the operator of the MAS Electronic Payment System (MEPS), Singapore's high-value RTGS system. Besides cash settlement accounts, banking institutions also hold Singapore Government Securities (SGS) settlement accounts with MAS in the MEPS.

MAS also handles government-related payments and receivables that usually take the form of funds transfers between the government's accounts with MAS and with banks.

### **1.3.1 Development and regulation of payment systems**

As part of its mission to promote a sound and progressive financial services sector, MAS oversees the payment system to ensure its overall safety, efficiency and development. MAS thus puts in place or facilitates relevant policies, practices and principles used throughout payment, clearing and settlement systems in Singapore.

MAS has explicit legislative powers to establish and operate RTGS systems, oversee the management of the cheque and Interbank GIRO systems and regulate the issuance of multipurpose stored value cards. These powers are spelt out under the various Acts and Regulations as highlighted in Section 1.1. In addition, MAS exercises oversight in other payment areas indirectly through banks. MAS has a good working relationship with payment system participants and stakeholders which

---

<sup>4</sup> SingTel is one of the major telecommunication operators in Singapore.

<sup>5</sup> OCBC merged with Keppel TatLee bank and UOB merged with OUB in 2001.

complements its legislative role in the respective systems. MAS often relies on extensive industry consultation to ensure its objectives for the payment system are achieved.

### **1.3.2 Real-time gross settlement system**

MAS launched the real-time gross settlement system MEPS on 13 July 1998 to replace the end-of-day net settlement system for large-value interbank funds transfers in Singapore. MEPS employs cryptography and smartcard technology to protect payment transactions and achieve end-to-end security between the front-end system at the banks and the host settlement system at MAS. As MEPS effects final settlement of interbank funds transfers on a continuous, transaction-by-transaction basis throughout the processing day, settlement risks inherent in the end-of-day net settlement system are greatly reduced. (See Section 3.3 for more details on the RTGS system.)

### **1.3.3 Settlement of securities transactions**

MEPS is also designed to handle the settlement of scrippless Singapore Government Securities (SGS). Participating banks hold SGS accounts with MAS, which are debited or credited with SGS when transactions are executed. Payment obligations that arise from trading in SGS and other Singapore dollar-denominated corporate debt may be settled on a delivery versus payment (DVP) basis via interfaces to the interbank funds transfer system in MEPS (see Section 4.2).

## **1.4 The role of other private and public sector bodies**

### **1.4.1 Singapore Clearing House Association (SCHA)**

The SCHA is an association formed in December 1980 to establish, manage and administer clearing services and facilities for cheques and debit and credit items of its members. It comprises MAS and the commercial banks in Singapore that wish to become members. As at end-December 2000, the SCHA had 48 ordinary members and 87 associate members. The SCHA establishes the rules on the rights and responsibilities of participating banks as well as the service providers for the various clearing systems; it is also responsible for the Singapore ACH (see Section 1.2.2).

### **1.4.2 Association of Banks in Singapore (ABS)**

The ABS is made up of member banks drawn from a wide spectrum of banking entities licensed by MAS. It represents the interests of its members, sets minimum standards of good practice for these members and supports projects that are mutually beneficial.

The ABS also holds regular discussions with MAS regarding industry issues and the promotion of a sound financial system in Singapore. The ABS provides input for legislation and guidelines relating to the industry, including on payment and settlement systems.

### **1.4.3 Electronic Payments Committee (EPC)**

Chaired by the Ministry of Finance, the EPC has been tasked by the Cabinet with promoting a cashless society. The Committee has been directed to encourage the banking sector to provide a wider and better range of services for electronic transactions and to make the cost of each transaction type transparent to the user.

The EPC comprises representatives of various government agencies and statutory bodies, including MAS, as well as the ABS.

### **1.4.4 Electronic Payments Technical Committee (EPTC)**

The EPTC is an industry-based group established by the Information Technology Standards Committee (ITSC) under the auspices of the Singapore Productivity and Standards Board and the Infocomm Development Authority of Singapore.

Its mission is to identify, review and propose standards for adoption in Singapore in the following areas:

- Electronic bill presentment and payment systems/services
- e-payment infrastructure, systems and services
- Electronic commerce
- Mobile commerce
- Public key identification/certification authority infrastructure, interoperability and connectivity.

Member organisations participate in various projects to recommend standards. When standards are established, EPTC will also hold roadshows and workshops to promote the standards to the industry.

As at December 2000, EPTC had over 35 member organisations from the financial sector, including MAS, most major banks, credit card companies, e-commerce systems vendors and payment services firms.

#### **1.4.5 Controller of Certification Authorities (CCA)**

As specified under the *Electronic Transactions Act*, the CCA oversees the activities of certification authorities (CAs), by licensing, certifying, monitoring developments and using other controls.

The licensing scheme for CAs is voluntary. It promotes high-integrity CAs that can be trusted. A licensed CA enjoys the benefits of evidentiary presumption for its digital signatures. A CA wishing to obtain a licence must meet stringent licensing criteria in various aspects, including financial soundness, personnel integrity, strict security controls and procedures. The licensing criteria are stipulated in the Electronic Transactions Act 1998, Electronic Transactions (Certification Authorities) Regulations 1999 and the Security Guidelines for Certification Authorities.

The CCA is subsumed under the Infocomm Development Authority of Singapore.

## **2. Summary information on payment media used by non-banks**

### **2.1 Cash**

As in most countries, currency remains the most accepted payment medium for small-value transactions in Singapore.

The BCCS has the sole right to issue currency and coins. Notes are in circulation in denominations of SGD 1, 2, 5, 10, 20, 50, 100, 500, 1,000, 5,000 and 10,000. Coins are issued in denominations of SGD 0.01, 0.05, 0.10, 0.20, 0.50 and 1.00.

Singapore dollars in circulation are fully backed by a basket of external assets that includes gold and other foreign currencies.

### **2.2 Non-cash payments**

#### **2.2.1 Cheques**

Cheques are commonly used in Singapore by consumers for bills and small-value payments and among businesses for regular payments such as purchases of goods and services.

The number of cheques cleared by the ACH increased by more than 70% from 1989 to 1999. This can be attributed to the increased economic activity in Singapore in that period.

In 2000, 91 million cheques for a total value of SGD 453 billion were processed by the ACH.

#### **2.2.2 GIRO**

The Interbank GIRO (IBG) system was launched in April 1984. It is an offline interbank payment system catering mainly for low-value bulk payments. IBG allows a customer of a participating bank to transfer funds, through direct debits or credits, to or from the accounts of customers of any other

participating bank. The IBG can be broadly separated into two classes according to the type of transfers: direct debit transfers and direct credit transfers.

#### *Direct debit transfers*

In debit transfers, the payee instructs his bank to collect payment from the paying party, often on a recurring basis. Direct debit payments are preauthorised by the paying customer, who gives permission to his bank to debit his account upon receipt of instructions initiated by the specified originator. Examples of such preauthorised recurring payments include utility bill payments or payments for telecommunications services.

#### *Direct credit transfers*

In credit transfers, the payer instructs his bank to debit his account and transfer the funds to the payee. In Singapore, most credit transfers are standing order arrangements made by the originators with their bank. The bank then carries out the necessary transfers on a regular specific date, to a specific receiver and for a specific amount. Payroll crediting is the most common direct credit transfer.

Some banks have recently offered direct crediting services to their individual customers, mainly through Internet banking and ATMs. These individual instructions are processed together with the bulk credit instructions for that day.

The number of IBG transactions processed in 2000 was 30 million, for a value of SGD 72 billion.

### **2.2.3 Payment cards**

#### *2.2.3.1 Credit cards*

All major credit cards are offered in Singapore. The issuance of credit cards is subject to MAS guidelines and regulations, for example on eligibility criteria for card applicants and the marketing of credit cards.

Total credit card transactions amounted to SGD 10.5 billion in 2000.

#### *2.2.3.2 Debit cards*

Debit cards can be broadly categorised into two groups: PIN-based debit cards and signature-based debit cards.

PIN-based debit cards allow cardholders to make payments or withdraw cash from their deposit accounts at ATMs and EFTPOS terminals. The payment or cash withdrawal is effected through an online transfer of funds from the cardholder's account. (See Sections 2.2.4 and 2.2.5.)

VISA Electron card and the Debit MasterCard are examples of signature-based debit cards in Singapore.

#### *2.2.3.3 Stored value cards*

Stored value cards (also known as e-money) in Singapore can be categorised into single purpose stored value cards (SPSVCs) and multi-purpose stored value cards (MPSVCs). SPSVCs can only be used to pay for goods and services offered by the issuer (eg prepaid phone cards). In contrast, a MPSVC also allows cardholders to pay for goods and services offered by other merchants or organisations.

CashCard, launched in November 1996, is a MPSVC jointly issued by the five local banks.<sup>6</sup> It offers consumers a cashless payment option at a variety of retail outlets, car parks and vending machines, as well as payment of toll charges at Electronic Road Pricing gantries and the checkpoints between Singapore and Malaysia. In addition, the CashCard can be used for online purchases with the use of a card reader. The CashCard can be reused by topping up its value to a maximum of SGD 500 at ATMs,

---

<sup>6</sup> Development Bank of Singapore, Keppel TatLee Bank, Oversea-Chinese Banking Corporation, Overseas Union Bank and United Overseas Bank.

selected EFTPOS terminals and automated kiosks<sup>7</sup> provided by NETS as well as some mobile phones and over the internet.

Over the years, CashCard has gained increasing acceptance in Singapore. In 2000, the number of CashCard transactions was 100 million for a total value of SGD 174 million.

With the incorporation of VISA's stored value mark, VISA Cash, and the adoption of the open Common Electronic Purse Specifications (CEPS), CashCard holders will also be able to transact overseas in the near future.

#### **2.2.4 Automated teller machines (ATMs)**

ATMs are one of the channels that allow banks' customers to perform routine banking transactions without having to visit a bank branch. The first ATM in Singapore was installed in 1979 by Chartered Bank. Since then, many banks have followed suit, installing their own models of ATMs. Some of the local banks share a common ATM network. MAS limits the number of ATMs owned by foreign banks.

Since their introduction, ATMs have played a major role in promoting a cashless society and in bringing greater convenience to customers. ATMs offer consumers greater ease in making deposits to and withdrawals from their bank accounts. In addition, they provide other services such as shares applications, third-party funds transfers and bill payments.

As at December 2000, there were 1,787 ATMs in Singapore, representing a penetration rate of about 445 ATMs per million inhabitants.

#### **2.2.5 Electronic funds transfer at point of sale (EFTPOS)**

The development of Singapore as a cashless society was boosted by the introduction of the EFTPOS service by NETS in 1986. EFTPOS is a debit card system allowing ATM cardholders to use their ATM cards to pay merchants for the purchase of goods and services through an online transfer of funds from their accounts.

As at December 2000, 20,000 EFTPOS terminals were available island-wide at over 12,000 retail outlets including major supermarkets, department stores, petrol stations, government departments and a large number of smaller merchants. In 2000, there were 77 million transactions worth SGD 4.8 billion.

The CashBack service was introduced in March 2001 to allow consumers to withdraw cash at selected retail stores through EFTPOS terminals. This service is currently provided free to the ATM cardholders of the five local banks.

#### **2.2.6 Other access channels for banking and payments**

##### *2.2.6.1 Telephone banking*

Since the introduction of phone banking in 1982, the range of phone banking services offered has increased. Besides being able to transfer funds and conduct account balance enquiries over the telephone, bank customers can also make bill payments, trade in stocks and bid for Certificates of Entitlement (COEs).<sup>8</sup>

##### *2.2.6.2 Mobile banking*

More recently, bank customers have been able to conduct banking transactions through the display screen features of mobile phones. In addition, they can also pay for some online purchases using their mobile phone instead of providing their credit card details over the internet. One payment method involves payers pre-registering their credit card account details with their mobile payment service provider. Payers can then make payments using an ID and PIN as authentication and the payment is

---

<sup>7</sup> These automated kiosks include CashCard Automated Machines, NETS Kiosks and CashCard Service Terminals.

<sup>8</sup> To own a motor vehicle in Singapore, a COE is required. COEs are awarded based on monthly bidding.

processed as a traditional credit card transaction. Another method allows the mobile payment to be reflected as another item in the payer's phone bill.

### 2.2.6.3 *Internet banking*

Internet banking allows consumers to conduct account balance enquiries, fixed deposit placements, demand draft applications and loan applications. In addition, payment services such as funds transfers (including transfers to third parties' accounts with other banks) and bill payments are increasingly available via the internet.

A number of banks have also launched internet payment services that enable consumers to pay for their internet purchases by directly debiting their bank accounts using their normal internet banking systems.

## **3. Interbank exchange and settlement circuits**

### **3.1 Overview**

The major payment and clearing functions in Singapore are provided by three main organisations.

- (a) The Singapore Clearing House Association (SCHA) provides three payment clearing and settlement systems for its member banks:
  - Singapore Dollar Cheque Clearing System;
  - US Dollar Cheque Clearing System; and
  - Interbank GIRO System.
- (b) NETS manages the clearing process for the local retail payment systems such as the local banks' ATM networks, EFTPOS and CashCard networks.
- (c) MAS operates the settlement system for large-value interbank fund transfers, ie the MAS Electronic Payment System (MEPS).

The clearing systems provided by SCHA are operated by the ACH. Obligations arising out of the Singapore Dollar Cheque Clearing System and the Interbank GIRO System are settled across banks' current accounts held at MAS. There is a direct interface between the ACH and MEPS to facilitate daily multilateral net settlement of these payment obligations on a deferred same day basis.

Obligations arising out of the US Dollar Cheque Clearing System are settled across participants' accounts held with Citibank, the settlement agent. At a stipulated time each working day, the settlement obligations for each participant are sent to Citibank.

Obligations arising out of the systems managed by NETS are settled across participants' accounts held with Development Bank of Singapore Ltd (DBS), the settlement bank. NETS advises the multilateral net obligations to DBS for settlement on a deferred basis; for ATM and EFTPOS transactions this will be on a same day basis, but for Cashcard transactions settlement may occur the next day.

Large-value electronic payments are settled within MEPS. Payment obligations that arise from trading in Singapore Government Securities and in other SGD-denominated corporate debt are settled on a DVP basis via interfaces to the interbank funds transfer system in MEPS (see Section 4.2).

### **3.2 Interbank systems for retail transactions**

#### **3.2.1 *Singapore Dollar Cheque Clearing System (SGDCCS)***

The current operator of the SGDCCS is Banking Computer Services Pte Ltd (BCS). Direct participation in the SGDCCS is available only to ordinary SCHA members. Other SCHA members can participate indirectly in the SGDCCS using another participating bank as an agent bank. As at December 2000, there were 41 direct participants and 71 indirect participants in the SGDCCS.

The SGDCCS is a national cheque clearing system. It was first automated in 1982 with magnetic ink character recognition (MICR) technology. In 1992, it was further enhanced with the establishment of the Electronic Clearing System (ECS). ECS facilitates the electronic transfer of cheque MICR data from banks to the ACH for processing.

The clearing system was further improved in 1997 when BCS launched the image clearing system. This system allows the image of the inward cheques to be captured on a CD-ROM and sent to the paying banks for verification. This process improves the efficiency of the inward cheque clearing operation. It currently takes one working day for a Singapore dollar cheque to be cleared and funds to be released to the payee.

The clearing and settlement process of a SGD cheque is as follows:

1. The payer sends a cheque to the payee.
2. The payee deposits the cheque at the presenting bank, which credits the payee's account provisionally ("on hold" cheques).
3. The presenting bank sends MICR information (ECS data) of cheques to the ACH. For banks sending ECS data, the corresponding physical cheques can be sent to the ACH later in the day.
4. After clearing the cheques determining the net settlement amount for each participating bank, the ACH sends the net clearing figures to MEPS for broadcast and settlement.
5. The ACH processes and sorts the ECS data and physical cheques and these are available for collection by the relevant paying banks that evening.
6. If the paying bank rejects a cheque, it will return the unpaid cheques to the presenting bank through the ACH by 12:00 the next day.
7. The ACH will process the returned cheques and forward them to the respective presenting banks. The settlement amount for both paying and presenting banks will be adjusted accordingly by the ACH in the figure sent to MEPS that day.
8. If the cheque is cleared successfully, the payee can withdraw the "on hold" funds after 14:00 on the second business day.

The ACH will transmit the multilateral net positions of all direct and indirect participants to MEPS twice a day on weekdays and once on Saturdays. The cut-off time for transmission of ECS data to the ACH for midday clearing is 14:30 on weekdays (there is no midday clearing on Saturdays). Midday multilateral net settlement positions are broadcast across MEPS at 15:05 and banks have until 15:45 to fund any net debit positions, whereupon final settlement is effected. For end-of-day cheque clearing, there are two cut-off times for transmission of data to the ACH: one for non-ECS physical cheques at 16:00 and one for ECS data at 16:45 on weekdays (12:30 and 13:15, respectively, on Saturdays). End-of-day multilateral net settlement positions are broadcast across MEPS at 17:45 (14:05 on Saturdays) and banks have until 18:15 (14:30 on Saturdays) to fund any net debit positions, whereupon final settlement is effected.

A deposited cheque will accrue interest from the day it is deposited. However, the funds are not "cleared funds" until the next business day at 14:00 in order to provide the collecting bank with sufficient time to be reasonably sure that the cheque will be paid. Cheques are not considered paid until the paying bank has had time to validate the cheque and the drawer's capacity to cover it. Paying banks will only notify presenting banks on an exception basis, ie only if the cheque has been dishonoured (see *points 6 and 7 above*).

### **3.2.2 US Dollar Cheque Clearing System (USDCCS)**

The USDCCS was launched in 1996 to clear and settle US dollar-denominated cheques drawn on banks in Singapore. The system significantly reduced the time needed to clear a USD cheque from the previous two to four weeks to only three days. BCS and Citibank are the appointed clearing operator and settlement bank, respectively, for the USDCCS.

For the settlement of USD cheques, participating banks must maintain USD accounts with Citibank with minimum balances of USD 10,000.

The clearing and settlement process for USD cheques is as follows:



1. USD cheques are delivered to the ACH by presenting banks.
2. At the end of the first day, the ACH will generate a settlement statement to the settlement bank setting out the total credits and total debits of each of the participating banks.
3. The settlement bank then advises participating banks if there will be insufficient funds in their accounts with the settlement bank, based on a comparison of the total debit position against available funds in each participating bank's account. Participating banks are required to meet any projected shortfall.
4. The ACH processes and sorts the USD cheques and these are available for collection by the relevant paying banks on the second business day. Settlement occurs on the second business day across participating banks' accounts with Citibank, but the funds are not considered "cleared funds" until the end of day three.
5. All returned unpaid USD cheques are delivered to the ACH at the latest by the morning of the third business day.
6. The ACH processes the returned cheques and the relevant presenting banks collect them by noon on the third business day.
7. The customers can withdraw the proceeds after 14:00 on the third business day.

### **3.2.3 Interbank GIRO (IBG)**

IBG is a paperless system that allows a customer of a participating bank to transfer funds, through direct debits and credits, to the accounts of customers of any participating bank. In July 2001, the ACH introduced the eGIRO system, which removes the manual delivery of magnetic tapes between the banks and the ACH by using secured electronic transmission of payment data. Under eGIRO, the entire process of clearing and settlement, including processing of returned and rejected items, can be straight through and automated.

The clearing and settlement process for IBG is as follows:

1. The first party sends the payment instructions to the originating bank.
2. The originating bank checks the credit limit of the first party (if it is a direct credit instruction) and sends the payment instructions to the ACH for clearing.
3. After determining the net settlement amount for each participating bank, the ACH sends the net clearing figures to MEPS for broadcast and settlement.
4. The ACH forwards the payment instructions to receiving banks for the credit/debit of the second party's account.
5. If the payment instruction is rejected, receiving banks will return the rejected instruction to the originating bank through the ACH the next day. The ACH will adjust the settlement amount for both banks before forwarding the rejected instruction to the originating bank.
6. If the collection (payment) is successful, a credit (debit) statement is generated for the first party and a debit (credit) statement for the second party.

There is one clearing and settlement session for IBG payment instructions on weekdays and one on Saturdays. Participants are required to send payment instructions to the ACH by 12 noon on weekdays and 9:00 on Saturdays. The ACH will send multilateral net settlement positions to MEPS for broadcast to all banks by 15:30 on weekdays and 12:15 on Saturdays; broadcasts at these times are for information only. The figures are broadcast again at 17:45 (14:05 on Saturdays) and banks have until 18:15 (14:30 on Saturdays) to fund any net debit positions, whereupon final settlement is effected.

### **3.2.4 ATM networks**

Most banks in Singapore have proprietary ATM networks, but there are linkages between these networks providing consumers with wider access. There are currently two major ATM networks in Singapore:

- the POSB-DBS ATM network, which was established following the merger of POSB and DBS in 1998. This network is a proprietary-based network; and
- the ATMNETS network, a shared ATM service among the other four local banks (United Overseas Bank, Oversea-Chinese Banking Corporation, Overseas Union Bank, Keppel-Tat Lee Bank). In November 2000, these four banks announced plans to consolidate their off-site ATMs under a new entity called ACENET. ACENET will market and manage ATM services for an integrated off-site ATM network. Its implementation is expected to lead to cost savings through economies of scale for the participating banks. It will provide operational and technical services such as ATM cash replenishment, machine maintenance, upgrading of the network as well as the development of infrastructure and other ATM-related services.

For transactions using the ATMNETS network, the switching is done by NETS. When a cardholder performs a transaction at an ATM of another bank, NETS switches the transaction to the issuing bank for authorisation, which involves verification of the PIN, checking that sufficient funds are available and authentication of the transaction. The issuing bank then sends its response back via NETS, which switches it to the ATM being used, and the transaction is completed.

If cardholders perform transactions at their own bank's ATMs, these do not require any switching, as the issuing bank is able to directly approve them.

ATMNETS transactions are cleared by NETS. NETS calculates the multilateral net settlement positions for each member bank. The net amount is then provided to DBS for direct debiting/crediting of the member banks' accounts with DBS.

Member banks then manage their nostro accounts at DBS through MEPS.

Cirrus and Plus transactions are cleared by Mastercard and VISA respectively on a similar principle to NETS. When currency conversions are necessary, the London interbank rate is used. Settlement for these transactions is conducted through the respective card schemes' bankers.

### **3.2.5 EFTPOS**

NETS' EFTPOS service was publicly launched in 1986. Currently, NETS owns more than 20,000 EFTPOS terminals, with approximately 9,200 merchants in over 12,000 outlets.

EFTPOS transactions acquired on NETS terminals are routed to NETS for processing. The routing arrangements vary depending on the card type used in the transaction:

- For debit cards issued in Singapore, NETS dispatches the transaction for authorisation to the issuing bank. The issuing bank verifies the PIN, checks that sufficient funds are available, verifies that the transaction is not fraudulent, debits the cardholder's account and informs the merchant of the successful transaction, who in turn delivers the goods/services to the cardholder.
- For Maestro cards and Amex and Diners charge cards, NETS routes the transaction to the card processor according to the branding. The card processor, on behalf of the issuing bank, checks the payment limit, verifies that the transaction is not fraudulent and authorises the merchant to deliver the goods/services.

Point of sale transactions are settled across accounts held with NETS' settlement bank, DBS. NETS clears local debit cards and stored value card transactions and settlement occurs via debiting/crediting of the banks' accounts with DBS:

1. NETS first performs multilateral netting to determine a net settlement amount for each member bank.
2. The net amount is then submitted to DBS for debiting/crediting of the member banks' accounts.
3. Member banks then manage their nostro accounts at DBS through MEPS.

### **3.3 Real-time gross settlement system - MAS Electronic Payment System (MEPS)**

The MAS Electronic Payment System (MEPS) is a real-time gross settlement (RTGS) system developed for large-value Singapore dollar interbank funds transfers and the settlement of scripless Singapore Government Securities (SGS). The main feature of MEPS is the real-time and irrevocable transfer of funds and SGS. The settlement of the cash leg of SGD-denominated corporate and other government debt instruments can also be made through MEPS.

Banks' current accounts held with MAS are structured to facilitate RTGS payments. Within each current account, there are two sub-accounts: the reserve account and the RTGS account. The banks' intraday Minimum Cash Balances (MCB)<sup>9</sup> requirement is maintained in the reserve account. Funds exceeding the intraday MCB requirement in the reserve account are transferred at the start of the day to the RTGS account, where they may be used for the settlement of MEPS payments. On an intraday basis, banks may also draw down the full MCB amount in their reserve account to make payments.

#### **3.3.1 Participants**

All banks in Singapore are eligible to participate directly in MEPS.

However, banks with a small volume of SGD payments may choose not to participate in the system. Instead, such non-participating banks may appoint participating banks as their agents to make SGD interbank payments on their behalf by entering into private agency agreements with any of the participating banks. The terms of such agreements are bilaterally negotiated between the banks, and are outside the ambit of the MEPS. MAS, however, provides some services for these non-participating banks to transfer funds and SGS out from their MAS current accounts and SGS-Minimum Liquid Assets<sup>10</sup> (MLA) accounts respectively.

There were 90 participating banks in MEPS as at December 2000. The daily turnover value for MEPS averages around SGD 35 billion and the average daily volume of transactions is around 7,000.

#### **3.3.2 MEPS - Interbank Funds Transfer (MEPS-IFT)**

MEPS consists of two subsystems, namely MEPS Interbank Funds Transfer (MEPS-IFT) and MEPS Singapore Government Securities (MEPS-SGS). MEPS-SGS is described in more detail in Section 4.2.3.

Under the MEPS-IFT subsystem, interbank funds transfers are made using MEPS messages, derived from SWIFT standards. As long as the paying bank has sufficient funds in its RTGS account, its same day payment instructions will be settled instantaneously and irrevocably.

MEPS-IFT processes only same day value transactions. However, the system also accepts forward-dated transactions up to two working days forward. Such forward-dated transactions are stored in the host database and processed on the actual value date.

#### **3.3.3 Intraday and end-of-day credit extension**

To ensure the smooth functioning of the RTGS system and to avoid possible gridlock, MAS extends short-term intraday credit to banks.

MAS will extend intraday funds where necessary to resolve any systemic payments gridlock. Such funds are extended through primary dealer banks. Intraday credit facilities must be collateralised with SGS; there is currently no charge for their use.

An end-of-day facility is also provided to allow banks to borrow SGD funds from MAS via overnight SGS repurchase transactions (repos). The interest rate charged on the repo is 2% above the

---

<sup>9</sup> Under Section 40 of the Banking Act, all banks in Singapore are required to maintain MCB with MAS of not less than 3% of total liabilities.

<sup>10</sup> Under Chapter 19 of the Banking Act, as part of the MLA requirements, all banks in Singapore must hold Singapore Government Securities equal to at least 10% of total liabilities (10% SGS includes both outright holdings of SGS and those held under reverse repo transactions).

reference rate, ie the one-month SGD Sibor fixed by the Association of Banks in Singapore (ABS) at 11:00 Singapore time on the same working day. SGS are valued based on the average closing prices submitted by primary dealers. Only SGS in excess of the MLA prudential requirement are considered eligible collateral for both the short-term intraday credit and end-of-day facilities.

### **3.3.4 Management and pricing**

MEPS is owned and operated by MAS. All participating banks are contractually bound to operate in compliance with the MEPS operating rules and regulations as stipulated by MAS.

Participating banks are charged on a cost recovery basis. A flat fee is charged for each MEPS message, payable by the bank initiating the message. There is no annual subscription fee or joining fee to participate in MEPS, and no additional charge for real-time current account balance enquiries.

### **3.3.5 Operation of MEPS**

Each participating bank has a front-end system linked to the central host computer at MAS. The front-end system allows a bank to perform data entry, submit payment instructions and make online account enquiries. Submitted payment instructions that are not able to settle due to insufficient funds in a bank's account are queued with priority assigned by the participating bank. All queued instructions are settled in accordance to their assigned priority levels on a first-in-first-out (FIFO) basis. The queuing mechanism has the following levels of priority:

- 1 MAS transactions
- 2 Cheque/Interbank GIRO (IBG) transactions
- 3 Banks' urgent transactions
- 4 SGS transactions
- 5 Banks' normal transactions
- 9 Banks' payments on hold

Participants are only able to reprioritise payments at priority levels 3, 5 or 9. By moving these payments from one of these priority levels to another, banks can effectively determine the settlement sequence of their payments. To illustrate, a bank may not have sufficient balance to settle a priority 3 payment, but has enough to settle its other priority 5 payments. In this case, all priority 5 payments will not settle until the priority 3 payment is settled. Alternatively, the bank may place the priority 3 payment on hold with a priority 9, and then its priority 5 payments can be settled first.

The operating hours of the MEPS-IFT subsystem are 09:00 and 18:30 on Mondays to Fridays, and 09:00 and 14:45 on Saturdays.

## **3.4 Main projects and policies being implemented**

### **3.4.1 Cheque truncation**

The Singapore Clearing House Association and the Association of Banks in Singapore are jointly developing a Cheque Truncation System (CTS) targeted for implementation in September 2002. The CTS is a cheque clearing system where electronic images of the cheques are captured at the point of deposit and transmitted throughout the entire clearing process. Physical movement of paper cheques will be reduced, resulting in a more efficient cheque clearing cycle.

## **4. Special use of interbank transfer systems for international payments and securities transactions**

### **4.1 Exchange and settlement systems for retail transactions payments**

#### **4.1.1 Traveller's cheques and personal cheques**

Full banks both offer and accept for negotiation traveller's cheques denominated in major currencies. This service is also available to foreign visitors.

Cheques other than personal and cashier cheques drawn on participating banks of the ACH are settled via correspondent banking.

#### **4.1.2 International ATM network**

Many ATM terminals are part of the Cirrus and Plus networks operated by MasterCard and VISA respectively. Overseas credit and debit cardholders whose cards have such affiliations are able to withdraw local currency via these ATM terminals. Similarly, the credit and debit cards issued by Singapore financial institutions carrying these signs can also be used abroad.

### **4.2 Exchange and settlement systems for securities transactions**

#### **4.2.1 Securities settlement systems**

Securities traded in Singapore consist mainly of SGS, corporate and statutory board bonds, and equities. These transactions are cleared and settled through two different systems:

- The Clearing and Settlement system at the Central Depository (Pte), which acts as the centralised securities depository for corporate bonds and equities.
- The MEPS-SGS subsystem at MAS, which clears and settles SGS on an RTGS basis via an interface with the MEPS-IFT system.

#### **4.2.2 Central Depository (Pte) Limited (CDP)**

CDP is a wholly owned subsidiary of the Singapore Exchange (SGX), which is a self-regulatory organisation. SGX was established on 1 December 1999, from the merger and demutualisation of the Stock Exchange of Singapore and the Singapore International Monetary Exchange Limited.

The clearing and settlement system at CDP is a computerised book-entry system that settles trades on a delivery versus payment (DVP) basis. It has the capability of settling transactions on a T+3 basis. The system also supports settlements in USD. It provides integrated clearing, settlement and depository facilities for market participants and investors.

##### *Participants in the settlement framework*

- *SGX member companies.* SGX member companies' participation in the system is compulsory.
- *Principals.* Principals are companies approved by CDP to settle trades on a DVP basis for their clients. Participation is optional and is by application to CDP. Eligible companies are essentially the custodian banks.
- *Settlement banks.* Settlement banks are selected by CDP to facilitate funds settlement between CDP and the principals.
- *Clearing bank.* The clearing bank is appointed by CDP to settle money payment between principals' settlement banks and CDP. Trade settlement consists of two processes: trade affirmation followed by money settlement. To settle trades on a DVP basis, the custodian bank must have access to the clearing and settlement system to affirm trades on a DVP basis, and a settlement bank to settle payment with CDP.

- *International clearing agents.* International clearing agents such as Euroclear and Clearstream can participate through their depository agents in Singapore.

#### *Clearing and settlement systems*

CDP has the following systems for settlement of equities and fixed income securities:

- Institutional Delivery Affirmation System (IDAS) is used for custody and settlement of equities traded by institutional clients; and
- Debt Securities Clearing and Settlement System (DCSS) is an electronic book-entry system for the custody and settlement of Singapore dollar statutory board and corporate bonds.

IDAS settles equities trades on a DVP basis while bonds can be settled on a DVP or FOP (free of payment) basis via DCSS. On a FOP settlement basis, the transacting parties use CDP only for securities transfer and arrange for funds transfer separately.

For non-debt securities, CDP acts as the counterparty to each affirmed trade and ensures the delivery of securities against payment, and funds against the delivery of securities. Under IDAS DVP rules, custodian banks must ensure that there are shares to meet delivery obligations before affirming the sale transaction. Once a trade is affirmed, the custodian bank must deliver the securities to CDP. The system earmarks the securities to be delivered. CDP is authorised to effect final and irrevocable transfer of any securities so earmarked.

To ensure payment upon delivery of securities, CDP is supported by undertakings from the settlement banks and the clearing bank. The clearing bank of CDP undertakes to pay on behalf of settlement banks while the settlement banks undertake to pay on behalf of custodian banks. On the other hand, CDP also has an undertaking from the clearing bank to make a payment on behalf of the settlement banks if any settlement bank fails in its payment obligation.

Cash settlement in the IDAS arrangement is on a net basis of all the affirmed purchase and sale transactions for a settlement day. The net paying settlement banks would pay to the clearing bank and the clearing bank would in turn pay the net receiving settlement banks on behalf of CDP with cash settlement finality at the end of T+3.

For listed debt securities, CDP is not involved in the cash settlement. Instead, funds are simultaneously transferred via MEPS-IFT while securities are transferred in the DCSS book-entry system on a gross trade-for-trade basis. A real time DVP arrangement is achieved through a live leased line linkage between CDP (DCSS) and MAS (MEPS-IFT).

#### **4.2.3 MEPS - Singapore Government Securities System (MEPS-SGS)**

The MEPS-SGS system facilitates the instantaneous and irrevocable transfer of SGS. The users of the system can choose either a DVP-based system or a FOP-based system to settle securities transactions in the MEPS-SGS system. DVP settlement of SGS occurs on an electronic basis over the MEPS and MAS-SGS book-entry clearing system. On the other hand, FOP settlement of SGS involves a transfer of SGS without a corresponding funds transfer instruction.

The MEPS-SGS system provides the following facilities:

- a tender allocation process that automates the processing of tender bids;
- a front-end system that allows users to enter trade details and provides various levels of confirmation;
- a confirmation system where trade details entered by sellers are passed to buyers for affirmation;
- a trade settlement system through a link with the RTGS system (MEPS-IFT);
- a repurchase agreement and processing system;
- a safe custody service for the stock that separates stock held as part of the MLA requirement, principal stock and stock held for customers;
- the processing of interest payments and redemption through a link with the RTGS payment system.

### *Participants and non-participants in MEPS*

Participating banks need to maintain two accounts in the MEPS-SGS subsystem:

- *SGS-MLA account*: to maintain SGS for compliance with the MLA requirements.<sup>11</sup>
- *SGS-Free account*: to maintain any excess SGS holdings over the minimum MLA requirements.

### *Trade settlement procedures*

Banks can only sell SGS in the SGS-Free account. Transfers of SGS from the MLA account to the SGS-Free account can only be effected if the value of the remaining SGS in the SGS-MLA account is equal to or exceeds the prudential requirement of 10% of liabilities. Otherwise, such transfers will be rejected by the system.

If the seller of SGS has insufficient SGS for delivery, the transaction is queued until there are sufficient SGS in the seller's SGS-Free account. The SGS would be earmarked for transfer to the buying bank and an IFT payment message would be sent to MEPS.

If the buying bank has insufficient funds to pay for the SGS purchase, the payment is queued. When the funds become available, the amount is debited from the buyer's RTGS account and credited to the seller's RTGS account. The MEPS-IFT subsystem will then simultaneously notify the MEPS-SGS subsystem to transfer the securities irrevocably to the purchasing bank.

Non-MEPS participating banks can also receive funds and SGS in their MAS current accounts and SGS-MLA accounts, respectively, to facilitate adjustment of their balances for prudential (MCB or MLA) purposes. Funds transfers from participating banks to non-participating banks are credited directly to the non-participating banks' MAS current accounts, while SGS issues are credited into such banks' SGS-MLA accounts. However, participating banks may only make SGS transfers to non-participating banks on a FOP basis.

## **5. Role of the central bank in the interbank settlement system**

### **5.1 General responsibilities**

MAS aims to promote sustained non-inflationary economic growth, and a sound and progressive financial services sector. The principal functions of MAS are as follows:

- *Monetary and exchange rate policy*: to formulate and execute monetary and exchange rate policies in order to promote sustained and non-inflationary growth of the economy;
- *Banker and financial agent of the government*: to manage the country's official foreign reserves and facilitate the issuance of Singapore Government Securities;
- *Financial sector supervision*: to foster a sound financial services sector, which includes supervising and regulating the banking, insurance, securities and futures industries;
- *Banker to the financial sector*: to provide banking facilities for commercial banks and finance companies;
- *Financial sector development*: to develop and promote Singapore as an international financial centre.

The consolidation of functions at MAS stands in marked contrast to the growing trend elsewhere of separating the financial supervision function from the monetary policy function. Its operation is also different from the widespread practice of maintaining specialist regulators for different asset classes.

---

<sup>11</sup> See footnote 10.

The legislative basis for MAS' role in the payment system was outlined in Section 1.1. In general, however, the *MAS Act* gives MAS the authority to regulate all elements of the monetary, banking and financial system of Singapore. MAS administers various statutes pertaining to money, banking, insurance, securities and the financial sector in general.

## **5.2 Provision of settlement facilities**

MEPS is owned and operated by MAS and it is the centre of Singapore's payment and settlement system for interbank transactions. MEPS provides for the real-time and irrevocable transfer of funds.

The final settlement of transactions occurs by passing entries to banks' current accounts with MAS. All banks are eligible to hold accounts with MAS.

Further details on MEPS are provided in Section 3.3.

## **5.3 Monetary policy and the payment system**

Singapore's monetary policy aims to promote sustained and non-inflationary growth for the Singapore economy and is centred on the exchange rate.

MAS manages the Singapore dollar against a basket of currencies of Singapore's main trading partners and competitors. The trade-weighted Singapore dollar is allowed to float within an undisclosed target band. MAS reviews the level and width of the band periodically to ensure that it is consistent with economic fundamentals and market conditions. MAS also intervenes in the foreign exchange market from time to time to ensure that movements of the Singapore dollar exchange rate are orderly and consistent with the exchange rate policy. MAS manages the bulk of Singapore's official foreign reserves, except for foreign assets held by BCCS to back the currency in circulation.

Other monetary policy instruments include the discount rate, open market operations and reserve requirements for deposit-taking institutions as provided by the *Banking Act*.

The ability of MAS to implement monetary policy and effectively regulate the supply of SGD liquidity in the banking system relies on the availability of a robust and efficient technological and institutional framework, or transmission mechanism. Singapore's RTGS system, MEPS, is the interbank payment system through which MAS carries out its monetary operations, and to this extent, it is important that the system is designed and operated in such a way as not to create unanticipated or unnecessary delays or difficulties for MAS in achieving its monetary policy objectives.

Changes in specific design aspects of the payment system can have implications for the conduct of monetary policy. To this extent, MAS ensures that any changes to the payment system are pursued in a coordinated and complementary manner with monetary policy implementation processes.



## Glossary

<b>ABS</b>	Association of Banks in Singapore. Refer to Section 1.4.2
<b>ACENET</b>	Refer to Section 3.2.4
<b>BCCS</b>	Board of Commissioners of Currency, Singapore. Refer to Section 1.1
<b>BCS</b>	Banking Computer Services Pte Ltd. Refer to Section 1.2.2
<b>CashCard</b>	Refer to Section 2.2.3.3
<b>CCA</b>	Controller of Certification Authorities. Refer to Section 1.4.5
<b>CDP</b>	Central Depository (Pte) Limited. Refer to Section 4.2.2
<b>CTS</b>	Cheque Truncation System. Refer to Section 3.4.1
<b>DCSS</b>	Debt Securities Clearing and Settlement System. Refer to Section 4.2.2
<b>ECS</b>	Electronic Clearing System. Refer to Section 3.2.1
<b>eGIRO</b>	Refer to Section 3.2.3
<b>EPC</b>	Electronic Payments Committee. Refer to Section 1.4.3
<b>EPTC</b>	Electronic Payments Technical Committee. Refer to Section 1.4.4
<b>FOP</b>	Free of payment. Refer to Section 4.2.2
<b>IBG</b>	Interbank GIRO. Refer to Section 3.2.3
<b>IDAS</b>	Institutional Delivery Affirmation System. Refer to Section 4.2.2
<b>IFT</b>	Interbank Funds Transfer. Refer to Section 3.3.2
<b>IOB</b>	Internet-only bank. Refer to Section 1.2.1
<b>MAS</b>	Monetary Authority of Singapore. Refer to Section 1.3
<b>MCB</b>	Minimum Cash Balances. Refer to Section 3.3
<b>MEPS</b>	MAS Electronic Payment System. Refer to Section 1.3.2
<b>MLA</b>	Minimum Liquid Assets. Refer to Section 3.3.1
<b>NETS</b>	Network for Electronic Transfers (Singapore) Pte Ltd. Refer to Section 1.2.4
<b>QFB</b>	Qualifying full bank. Refer to Section 1.2.1
<b>QOB</b>	Qualifying offshore bank. Refer to Section 1.2.1
<b>SCHA</b>	Singapore Clearing House Association. Refer to Sections 1.1 and 1.4.1
<b>SGDCCS</b>	Singapore Dollar Cheque Clearing System. Refer to Section 3.2.1
<b>SGS</b>	Singapore Government Securities. Refer to Section 1.3.3
<b>SGX</b>	Singapore Exchange. Refer to Section 4.2.2
<b>USDCCS</b>	US Dollar Cheque Clearing System. Refer to Section 3.2.2



## **Statistical tables**



Table 1  
**Basic statistical data**

	1996	1997	1998	1999	2000
Population (mid-year)	3,670,400	3,793,700	3,922,000	3,950,900	4,017,700
GDP (SGD millions)	128,201	140,228	137,464	142,111	159,042
GDP per capita (SGD)	34,928	36,963	35,050	35,969	39,585
Exchange rate (domestic vis-à-vis USD):					
<i>year-end</i>	1.3998	1.6755	1.6605	1.6660	1.7315
<i>average</i>	1.4089	1.4973	1.6730	1.6975	1.7288

Table 2  
**Settlement media used by non-banks**  
(at year-end, in SGD millions)

	1996	1997	1998	1999	2000
Notes and coin <sup>1</sup>	10,293	10,704	10,146	11,315	11,289
Transferable deposits <sup>2</sup>	18,863	18,297	18,427 <sup>3</sup>	21,676	23,650
<i>of which held by:</i>					
<i>Households</i> <sup>4</sup>	13,718	13,930	13,570	15,747	18,095
<i>Corporate sector</i> <sup>5</sup>	1,991	1,920	1,821	2,673	2,393
<i>Others</i> <sup>6</sup>	3,154	2,447	3,037	3,256	3,163
Narrow money supply (M <sub>1</sub> ) <sup>7</sup>	27,040	27,511	27,239	31,109	33,262
<i>Memorandum item:</i>					
Broad money supply (M <sub>3</sub> ) <sup>8</sup>	148,495	160,766	173,581	186,184	182,913

<sup>1</sup> Currency in active circulation. <sup>2</sup> Demand deposits of non-bank customers. <sup>3</sup> Due to rounding, figure does not tally with its breakdown components. <sup>4</sup> Demand deposits of other residents in Singapore. <sup>5</sup> Demand deposits of non-bank financial institutions. <sup>6</sup> Demand deposits of residents outside Singapore and demand deposits of Singapore government and statutory boards. <sup>7</sup> Notes and coin in active circulation and transferable deposits. <sup>8</sup> Summation of M<sub>1</sub>, finance companies' and Post Office Savings Bank's (POSB) net deposits with non-bank financial institutions as well as total quasi-money. POSB merged with the Development Bank of Singapore Limited in 1998.

Table 3  
**Settlement media used by credit/deposit-taking institutions**  
(at year-end, in SGD millions)

	1996	1997	1998	1999	2000
Reserve balances held at central bank	7,095	7,702	5,431	7,524	5,691
of which:					
<i>Required reserve</i>	<i>na</i>	<i>na</i>	<i>na</i>	<i>na</i>	<i>na</i>
<i>Free reserve</i>	<i>na</i>	<i>na</i>	<i>na</i>	<i>na</i>	<i>na</i>
Transferable deposits at other banks	na	na	na	na	na
<i>Memorandum item:</i>					
Institutions' borrowings from central banks	na	na	na	na	na

Table 4  
**Banknotes and coin**  
(at year-end, in SGD millions)

	1996	1997	1998	1999	2000
Total banknotes and coin issued	11,276	11,733	11,338	14,209	13,017
Total value of banknotes	10,512	10,919	10,496	13,194	12,078
Denomination of banknotes:					
<i>10,000 dollars</i>	<i>1,301</i>	<i>1,347</i>	<i>1,084</i>	<i>1,288</i>	<i>1,140</i>
<i>1,000 dollars</i>	<i>2,839</i>	<i>3,058</i>	<i>2,947</i>	<i>3,618</i>	<i>3,339</i>
<i>500 dollars</i>	<i>631</i>	<i>617</i>	<i>585</i>	<i>521</i>	<i>415</i>
<i>100 dollars</i>	<i>685</i>	<i>684</i>	<i>667</i>	<i>787</i>	<i>807</i>
<i>50 dollars</i>	<i>3,568</i>	<i>3,673</i>	<i>3,661</i>	<i>5,169</i>	<i>4,565</i>
<i>25 dollars</i>	<i>10</i>	<i>10</i>	<i>10</i>	<i>10</i>	<i>10</i>
<i>20 dollars</i>	<i>160</i>	<i>141</i>	<i>132</i>	<i>129</i>	<i>127</i>
<i>10 dollars</i>	<i>728</i>	<i>776</i>	<i>786</i>	<i>987</i>	<i>949</i>
<i>5 dollars</i>	<i>141</i>	<i>148</i>	<i>152</i>	<i>171</i>	<i>180</i>
<i>2 dollars</i>	<i>288</i>	<i>307</i>	<i>316</i>	<i>362</i>	<i>392</i>
<i>1 dollar</i>	<i>161</i>	<i>158</i>	<i>156</i>	<i>155</i>	<i>154</i>
Total value of coin	588	630	643	673	694
Denomination of coin:					
<i>5 dollars</i>	<i>7</i>	<i>7</i>	<i>7</i>	<i>7</i>	<i>7</i>
<i>1 dollar</i>	<i>245</i>	<i>270</i>	<i>278</i>	<i>300</i>	<i>316</i>
<i>50 cents</i>	<i>125</i>	<i>133</i>	<i>135</i>	<i>137</i>	<i>138</i>
<i>20 cents</i>	<i>100</i>	<i>104</i>	<i>105</i>	<i>107</i>	<i>108</i>
<i>10 cents</i>	<i>86</i>	<i>89</i>	<i>89</i>	<i>91</i>	<i>92</i>
<i>5 cents</i>	<i>20</i>	<i>22</i>	<i>23</i>	<i>24</i>	<i>26</i>
<i>1 cent</i>	<i>5</i>	<i>5</i>	<i>6</i>	<i>6</i>	<i>7</i>
Banknotes held by banks <sup>1</sup>	811	802	998	2,557	1,489
Total banknotes held outside credit institutions <sup>2</sup>	10,293	10,704	10,146	11,315	11,289

<sup>1</sup> Cash at banks. <sup>2</sup> Currency in active circulation.

Table 5  
**Institutional framework**  
(as at 31 December 2000)

Categories	Number of institutions	Banking offices including HQ and main office	Number of accounts	Value of accounts (in SGD millions)
Central bank	1	3 <sup>1</sup>	137	5,691
Commercial banks:				
Local banks	8		na	
Foreign banks	126	494	na	171,316 <sup>2</sup>
Merchant banks	58	58	na	na
Finance companies	12	88	na	13,646
<b>Total</b>	<b>205</b>	<b>643</b>	<b>137</b>	<b>190,653</b>

<sup>1</sup> MAS has a representative office in both New York and London. <sup>2</sup> Non-bank customer deposits.

Table 6  
**Cash dispensers, ATMs and EFTPOS terminals**

	1996	1997	1998	1999	2000
Cash dispensers and ATMs:					
Number of networks <sup>1</sup>	2	2	2	2	2
Number of terminals	1735 <sup>2</sup>	1,894	1,893	1,855	1,794
Volume of transactions <sup>3</sup> (thousands)	13,800	15,200	15,500	10,100	8,540
Value of transactions <sup>3</sup> (SGD millions)	3,000	3,400	3,500	2,400	2,040
EFTPOS terminals:					
Number of networks	1	1	1	1	1
Number of machines	13,083	15,002	16,034	17,804	19,490
Volume of transactions (thousands)	42,388	50,855	57,897	65,740	76,932
Value of transactions (SGD millions)	2,786	3,444	3,531	4,100	4,746

<sup>1</sup> Does not include proprietary networks of individual foreign banks. <sup>2</sup> As at March 1996. <sup>3</sup> Interbank transactions only. The interbank transaction figures dropped drastically in 1999 when DBS pulled out of the ATM network following its merger with POSBank.

Table 7  
**Number of payment cards in circulation**  
 (at year-end, in thousands)

	1996	1997	1998	1999	2000
Cards with e-money function <sup>1</sup>	151	683	2,193	3,464	4,697
Cards with debit/credit function					
<i>cards with debit/cash function<sup>2</sup></i>	<i>2,824</i>	<i>2,956</i>	<i>3,014</i>	<i>3,177</i>	<i>2,982</i>
<i>cards with a credit function<sup>3</sup></i>	<i>6,595</i>	<i>7,212</i>	<i>7,880</i>	<i>8,587</i>	<i>9,410</i>

<sup>1</sup> CashCard. <sup>2</sup> Based on survey data from eight banks (DBS, UOB, OUB, OCBC, KTL, HSBC, Standard Chartered and BNP). <sup>3</sup> Includes both main and supplementary cards.

Table 8  
**Payment instructions handled by selected payment systems:  
 volume of transactions**  
 (in thousands)

	1996	1997	1998	1999	2000
SHIFT/MEPS <sup>1</sup>	1,544	1,804	1,876	1,866	1,908

<sup>1</sup> MEPS replaced SHIFT in July 1998.

Table 9  
**Payment instructions handled by selected payment systems:  
 value of transactions**  
 (in SGD billions)

	1996	1997	1998	1999	2000
SHIFT/MEPS <sup>1</sup>	7,613	9,729	9,043	9,237	9,581

<sup>1</sup> MEPS replaced SHIFT in July 1998.



Table 10  
**Transfer instructions handled by securities settlement systems:  
 volume of transactions**  
 (in thousands)

	1996	1997	1998	1999	2000
CDP <sup>1</sup>	na	na	11,733	20,827	13,599
SGS (SHIFT/MEPS) <sup>2</sup>	24	24	19	18	21

<sup>1</sup> Includes transactions of equity and debt based instruments. <sup>2</sup> MEPS replaced SHIFT in July 1998.

Table 11  
**Transfer instructions handled by securities settlement systems:  
 value of transactions**  
 (in SGD billions)

	1996	1997	1998	1999	2000
CDP <sup>1</sup>	na	na	99	196	171
SGS (SHIFT/MEPS) <sup>2</sup>	na	na	62 <sup>3</sup>	144	173

<sup>1</sup> Includes transactions of equity and debt instruments. <sup>2</sup> MEPS replaced SHIFT in July 1998. <sup>3</sup> July-December.

Table 12  
**Indicators of use of various cashless payment instruments:  
 volume of transactions**  
 (in thousands)

	1996	1997	1998	1999	2000
Cheques: <sup>1</sup>					
<i>SGD cheques</i>	82,504	87,524	87,343	92,180	91,259
<i>USD cheques</i>	106	185	275	375	390
Payments by card:					
<i>Debit cards</i> <sup>2</sup>	56,188	66,055	73,397	75,840	85,472
<i>Credit cards</i>	na	na	na	na	na
Paperless credit transfers: <sup>1</sup>					
<i>SHIFT/MEPS (large-value)</i>	1,544	1,804	1,876	1,866	1,908
<i>GIRO (low-value)</i>	12,010	13,278	13,772	12,020	12,692
Direct debits <sup>1</sup> (GIRO)	20,099	23,202	20,665	17,360	17,288
<b>Total</b>	<b>172,451</b>	<b>192,048</b>	<b>197,328</b>	<b>199,641</b>	<b>209,009</b>

<sup>1</sup> Interbank transactions only. <sup>2</sup> Summation of EFTPOS transactions and interbank transactions initiated at ATMs.

Table 13  
**Indicators of use of various cashless payment instruments:  
 value of transactions**  
 (in SGD billions)

	1996	1997	1998	1999	2000
Cheques: <sup>1</sup>					
<i>SGD cheques</i>	581	608	459	489	453
<i>USD cheques</i> <sup>2</sup>	5	11	12	15	21
Payments by card:					
<i>Debit cards</i> <sup>3</sup>	6	7	7	7	7
<i>Credit cards</i>	7	8	8	9	11
Paperless credit transfers: <sup>1</sup>					
<i>SHIFT/MEPS (large-value)</i>	7,613	9,729	9,043	9,237	9,581
<i>GIRO (low-value)</i>	45	55	54	51	53
Direct debits <sup>1</sup> (GIRO)	15	19	16	15	19
<b>Total</b>	<b>8,272</b>	<b>10,437</b>	<b>9,599</b>	<b>9,823</b>	<b>10,145</b>

<sup>1</sup> Interbank transactions only. <sup>2</sup> Aggregated figures converted at end-of-year exchange rates. <sup>3</sup> Summation of EFTPOS transactions and interbank transactions initiated at ATMs.

Table 14  
**Participation in SWIFT by domestic institutions**

	1996	1997	1998	1999	2000
Total domestic SWIFT users	167	191	186	177	179
<i>of which:</i>					
<i>members</i>	11	11	11	9	9
<i>sub-members</i>	138	150	147	142	153
<i>participants</i>	18	30	28	26	17
<i>Memorandum item:</i>					
Total SWIFT users	5,632	6,176	6,557	6,797	7,125
<i>of which:</i>					
<i>members</i>	2,874	2,985	2,980	2,214	2,288
<i>sub-members</i>	2,404	2,585	2,720	2,763	2,978
<i>participants</i>	354	606	857	1,820	1,859

Table 15  
**SWIFT message flows to/from domestic users**  
(millions)

	1996	1997	1998	1999	2000
Total messages sent	16.54	20.18	20.50	19.61	19.70
<i>of which:</i>					
<i>Category I</i>	2.08	2.47	2.70	2.85	3.08
<i>Category II</i>	5.61	6.65	6.33	5.41	5.06
Total messages received	13.52	16.88	17.37	17.08	17.29
<i>of which:</i>					
<i>Category I</i>	2.00	2.35	2.56	2.77	3.00
<i>Category II</i>	0.83	1.07	1.22	1.29	1.34
Domestic traffic	2.32	3.02	3.23	2.82	2.77
<i>Memorandum item:</i>					
Global SWIFT traffic	687.79	812.12	937.04	1,058.84	1,273.91



## **Comparative tables**



Table 1  
Notes and coin in circulation<sup>1</sup>

	1995	1996	1997	1998	1999
	<b>USD per inhabitant<sup>2</sup></b>				
Singapore	1,987	2,003	1,684	1,558	1,719
Belgium	1,391	1,340	1,174	1,244	1,177
Canada	677	687	688	683	834
France	892	841	742	800	767
Germany	2,025	1,936	1,679	1,682	1,592
Italy	1,082	1,138	1,062	1,210	1,135
Japan	3,578	3,363	3,217	3,727	4,594
Netherlands	1,537	1,411	1,227	1,268	1,098
Sweden	1,312	1,327	1,183	1,207	1,303
Switzerland	3,394	3,127	2,828	3,117	2,771
United Kingdom	531	606	627	655	695
United States	1,430	1,499	1,600	1,715	1,908
	<b>As a percentage of GDP</b>				
Singapore	8.4	8.0	7.6	7.4	8.0
Belgium	5.3	5.2	5.1	4.8	5.1
Canada	3.4	3.4	3.4	3.5	3.8
France	3.3	3.3	3.2	3.1	3.3
Germany	6.9	7.0	6.8	6.4	6.6
Italy	5.5	5.3	5.5	5.6	6.0
Japan	9.6	9.8	10.4	10.9	12.0
Netherlands	na	5.5	5.2	4.8	4.6
Sweden	4.7	4.8	4.7	4.6	4.9
Switzerland	7.7	8.0	7.8	7.9	8.1
United Kingdom	2.8	2.8	2.8	2.7	2.9
United States	5.1	5.1	5.2	5.3	5.6
	<b>As a percentage of narrow money<sup>3</sup></b>				
Singapore	39.1	38.1	38.9	37.3	36.4
Belgium	27.2	27.5	26.5	23.8	20.4
Canada	17.1	15.6	15.3	15.7	16.6
France	14.2	14.2	13.5	13.2	13.2
Germany	29.1	26.9	26.3	23.3	23.4
Italy	16.3	16.1	16.1	16.1	15.2
Japan	26.9	26.1	25.8	25.3	24.8
Netherlands	22.1	19.7	18.5	14.7	13.2
Sweden	10.5	9.9	10.0	10.2	10.6
Switzerland	18.0	17.3	15.6	15.5	15.1
United Kingdom	4.6	4.5	4.6	4.5	4.6
United States	32.6	36.0	39.1	41.4	45.4

<sup>1</sup> For an explanation of the figures, see the relevant country tables. <sup>2</sup> Year-end figures converted at end-of-year exchange rates. <sup>3</sup> Narrow money: M1, except for Sweden (M3) and the United Kingdom (M2).

Table 2  
Transferable deposits held by non-banks<sup>1</sup>

	1995	1996	1997	1998	1999
	<b>USD per inhabitant<sup>2</sup></b>				
Singapore	3,517	3,671	2,879	2,829	3,293
Belgium	3,715	3,536	3,261	3,984	4,598
Canada	3,279	3,702	3,812	3,675	4,204
France	5,381	5,082	4,761	5,242	4,968
Germany	4,953	5,309	4,697	5,551	5,138
Italy	5,399	5,784	5,386	6,199	6,321
Japan	9,697	9,526	9,245	10,987	13,929
Netherlands	5,421	5,763	5,397	7,342	7,213
Sweden	11,351	11,991	10,476	10,570	10,666
Switzerland	8,359	8,282	8,673	9,824	8,902
United Kingdom	11,073	12,797	12,895	13,809	14,474
United States	2,918	2,632	2,465	2,398	2,262
	<b>As a percentage of GDP</b>				
Singapore	14.9	14.7	13.0	13.4	15.3
Belgium	14.0	13.8	14.1	15.5	20.1
Canada	16.0	18.0	19.0	19.0	19.0
France	20.1	19.8	20.6	20.3	21.7
Germany	16.8	19.1	19.1	21.2	21.2
Italy	27.4	26.8	27.9	28.7	33.3
Japan	25.9	27.8	29.7	32.1	36.4
Netherlands	na	22.5	23.1	28.0	30.4
Sweden	40.6	44.3	42.0	40.4	40.4
Switzerland	18.9	21.3	23.8	25.0	25.9
United Kingdom	58.4	58.1	57.4	57.7	59.8
United States	10.4	8.9	7.9	7.4	6.6
	<b>As a percentage of narrow money<sup>3</sup></b>				
Singapore	69.2	69.8	66.5	67.6	69.7
Belgium	72.8	72.5	73.5	76.2	79.6
Canada	83.0	84.0	85.0	84.0	83.0
France	85.8	85.8	86.5	86.8	85.6
Germany	71.2	73.8	73.7	76.8	75.5
Italy	81.1	81.8	81.8	82.4	84.8
Japan	73.1	73.9	74.2	74.7	75.2
Netherlands	77.9	80.3	81.5	85.3	86.8
Sweden	90.6	91.1	88.7	89.6	86.9
Switzerland	44.2	45.8	47.9	48.9	48.4
United Kingdom	95.4	95.5	95.4	95.5	95.4
United States	66.6	63.2	60.2	57.9	53.8

<sup>1</sup> For an explanation of the figures, see the relevant country tables. <sup>2</sup> Year-end figures converted at end-of-year exchange rates. <sup>3</sup> Narrow money: M1, except for Sweden (M3) and the United Kingdom (M2).



Table 3  
**Settlement media used by banks<sup>1</sup>**  
(1999)

	<b>Banks' reserves at central bank (USD billions)<sup>2</sup></b>	<b>Banks' reserves at central bank as a percentage of narrow money<sup>3</sup></b>	<b>Transferable deposits at other banks (USD billions)<sup>2</sup></b>	<b>Transferable deposits at other banks as a percentage of narrow money<sup>4</sup></b>
Singapore	4.5	24.2	na	na
Belgium	7.3	12.4	6.5	11.0
Canada	0.9	0.6	2.7	1.7
France	18.4	5.4	na	na
Germany	33.4	6.0	115.0	20.6
Italy	11.7	2.7	58.2	13.5
Japan	94.9	4.0	73.0 <sup>4</sup>	3.2 <sup>5</sup>
Netherlands	15.7	11.9	na	na
Sweden	3.6	3.3	11.1	10.2
Switzerland	5.3	4.0	23.9	18.2
United Kingdom	3.4	0.4	342.3	37.9
United States	11.1	1.0	31.1	2.7

<sup>1</sup> For an explanation of the figures, see the relevant country tables. <sup>2</sup> Year-end figures converted at end-of-year exchange rates. <sup>3</sup> Narrow money: M1, except for Sweden (M3) and the United Kingdom (M2). <sup>4</sup> End-March figure converted at end-March exchange rate. <sup>5</sup> End-March figure.

Table 4  
**Institutional framework<sup>1</sup>**  
(1999)

	<b>Number of institutions</b>	<b>Number of inhabitants per institution</b>	<b>Number of branches</b>	<b>Number of inhabitants per branch</b>	<b>Number of accounts per inhabitant</b>
Singapore	205	19,599	643	6,248	na
Belgium	121	84,479	8,372	1,221	1.3
Canada <sup>2</sup>	2,108	14,507	13,696	2,233	na
France	1,672	35,345	25,144	2,350	0.9
Germany	2,995	27,446	55,492	1,481 <sup>3</sup>	1.0
Italy	878	65,718	41,209	1,400	0.5 <sup>4</sup>
Japan	3,169	39,977	64,614	1,961	na
Netherlands	123	128,848	6,282	2,523	1.3
Sweden	123	72,049	3,940	2,249	na
Switzerland	336	21,323	6,528	1,097	na
United Kingdom	506	117,589	34,146	1,743	2.6
United States <sup>5</sup>	21,070	12,841	77,983	3,469	na

<sup>1</sup> For an explanation of the figures, see the relevant country tables. <sup>2</sup> Deposit-taking institutions only. <sup>3</sup> Including post office branches which are entrusted with the execution of semi-cashless payments for Deutsche Postbank AG. <sup>4</sup> Refers to bank accounts only. <sup>5</sup> Number of branches does not include head offices of any type of institution or branches of credit unions.

Table 5  
Cash dispensers and ATMs<sup>1</sup>

	1995	1996	1997	1998	1999
<b>Number of machines per 1,000,000 inhabitants</b>					
Singapore	482	473	499	483	470
Belgium	360	414	492	562	608
Canada	600	624	652	775	874
France	395	419	461	499	549
Germany	436	459	504	556	562
Italy	378	421	444	487	523
Japan	1,013	1,051	1,115	1,127	1,143
Netherlands	378	395	409	417	423
Sweden	267	269	268	281	291
Switzerland	532	587	678	643	655
United Kingdom	358	376	393	416	476
United States	466	524	616	692	831
<b>Number of transactions per inhabitant</b>					
Singapore <sup>2</sup>	3.4	3.8	4.0	4.0	2.6
Belgium	14.3	15.1	15.7	15.6	17.4
Canada	43.7	45.6	48.3	52.0	53.4
France	15.8	18.1	19.9	20.5	na
Germany	13.4	15.3	na	17.1	18.4
Italy	5.8	6.4	7.2	8.4	8.6
Japan	3.8	4.1	5.0	5.8	6.0
Netherlands	23.2	25.7	25.8	27.0	33.4
Sweden	31.8	33.6	35.3	37.6	35.0
Switzerland	10.0	10.6	11.4	11.3	12.2
United Kingdom	25.2	27.2	29.6	31.3	33.1
United States	36.9	40.3	41.0	41.4	39.9
<b>Average value of transactions (USD)<sup>3</sup></b>					
Singapore <sup>2</sup>	146.0	154.3	149.4	135.0	140.0
Belgium	138.1	129.5	114.3	124.0	104.8
Canada <sup>4</sup>	51.0	52.0	50.6	62.2	65.4
France	81.3	77.4	68.5	70.7	na
Germany	196.6	179.0	na	169.5	156.0
Italy	198.3	202.7	184.7	178.9	150.9
Japan	450.6	383.4	288.8	235.0	258.3
Netherlands	119.3	109.8	97.6	96.1	78.4
Sweden	112.6	104.4	104.5	108.4	100.0
Switzerland	246.9	209.5	186.6	180.4	172.9
United Kingdom	77.3	78.1	84.5	87.8	88.8
United States	67.7	68.0	67.7	68.0	68.0

<sup>1</sup> For an explanation of the figures, see the relevant country tables. <sup>2</sup> Shared ATM transactions only. <sup>3</sup> Converted at yearly average exchange rates. <sup>4</sup> Average value of a cash withdrawal only.

Table 6  
EFTPOS terminals<sup>1</sup>

	1995	1996	1997	1998	1999
<b>Number of terminals per 1,000,000 inhabitants</b>					
Singapore	3,251	3,564	3,954	4,088	4,506
Belgium	7,174	7,997	8,421	9,124	9,767
Canada	6,448	8,501	10,988	12,986	13,278
France	9,394	9,333	9,540	9,949	13,529
Germany <sup>2</sup>	856	1,402	1,983	2,816	3,658
Italy	2,683	3,734	4,887	6,000	7,542
Japan	200	183	155	127	na
Netherlands	4,736	6,170	7,692	8,533	9,186
Sweden	6,160	6,946	7,774	8,405	9,155
Switzerland	3,499	4,747	5,803	7,167	8,602
United Kingdom	8,647	9,354	8,983	10,304	11,765
United States	2,010	3,298	4,851	6,283	8,604
<b>Number of transactions per inhabitant</b>					
Singapore	9.8	11.5	13.4	14.8	16.6
Belgium	20.8	23.9	27.2	32.7	38.6
Canada	13.4	22.7	34.6	44.7	54.3
France	32.3	32.4	32.7	36.8	41.3
Germany <sup>2</sup>	1.8	2.6	2.8	4.4	5.2
Italy	2.1	2.9	4.4	6.0	8.1
Japan	0.007	0.004	0.004	0.004	0.003
Netherlands	16.5	23.8	31.0	37.8	44.2
Sweden	10.4	12.6	15.9	19.0	26.0
Switzerland	8.0	10.8	13.6	14.9	19.1
United Kingdom	na	na	na	na	na
United States	6.1	9.3	14.6	21.2	27.5
<b>Average value of transactions (USD)<sup>3</sup></b>					
Singapore	43.5	46.7	45.2	36.5	36.7
Belgium	77.6	72.6	63.3	66.2	55.7
Canada	34.8	32.7	30.8	29.1	29.5
France	63.3	60.4	51.5	54.2	48.7
Germany <sup>2</sup>	95.7	98.2	71.7	88.5	84.4
Italy	118.6	118.2	106.8	96.1	79.3
Japan	na	32.4	56.6	62.4	246.7
Netherlands	59.1	56.5	48.7	48.2	48.6
Sweden	80.7	80.7	78.0	68.0	68.0
Switzerland	96.4	96.3	73.5	63.6	76.2
United Kingdom	na	na	na	na	na
United States	37.0	40.4	41.5	41.6	43.0

<sup>1</sup> For an explanation of the figures, see the relevant country tables. <sup>2</sup> In 1997 electronic cash only. <sup>3</sup> Converted at yearly average exchange rates.

Table 7  
**Number of cards<sup>1</sup>**  
(1999, per 1,000 inhabitants)

	<b>Cards with a cash function</b>	<b>Cards with a debit/credit function</b>	<b>Cards with a cheque guarantee function</b>	<b>Retailers' cards</b>
Singapore	804 <sup>3</sup>	2,978 <sup>2,3</sup>	.	na
Belgium	1,308	1,308	436	156
Canada	2,027	2,482	.	na
France	636	567	.	.
Germany	1,200	1,297	552	97
Italy	369	565	5.5	na
Japan	2,388	na	.	503
Netherlands	1,527	1,527	na	na
Sweden	830	799	na	na
Switzerland	1,106	1,142	729	na
United Kingdom	1,881	1,529	911	na
United States	2,658	2,793	na	2,177

<sup>1</sup> For an explanation of the figures, see the relevant country tables. <sup>2</sup> Sum of cards with debit and credit functions.  
<sup>3</sup> Includes cards with a debit function. Based on survey data from eight banks.

Table 8  
**Relative importance of cashless payment instruments<sup>1</sup>**  
 (percentage of total volume of cashless transactions)

	1995	1996	1997	1998	1999
	<b>Cheques</b>				
Singapore <sup>2</sup>	50.9	47.9	45.7	44.4	46.4
Belgium	10.6	9.4	8.0	7.0	5.8
Canada	52.1	45.4	39.4	34.6	31.5
France	45.6	43.6	43.0	40.7	na
Germany	7.0	6.4	5.7	4.8	4.0
Italy <sup>3</sup>	33.7	31.4	28.8	27.2	25.6
Japan	na	na	na	na	na
Netherlands	5.8	4.0	2.8	1.9	1.0
Sweden	.	.	2.0	0.3	0.3
Switzerland <sup>4</sup>	2.0	1.6	1.3	1.0	0.8
United Kingdom <sup>5</sup>	41.3	37.8	34.7	32.0	29.0
United States	76.3	74.5	72.9	70.8	68.6
	<b>Payments by cards</b>				
Singapore <sup>2,6</sup>	30.3	32.6	34.4	37.2	38.0
Belgium	19.7	21.4	23.4	27.4	28.9
Canada <sup>7</sup>	33.3	38.8	44.5	48.4	51.7
France	17.6	18.3	16.9	18.2	na
Germany	3.6	4.2	4.1	5.1	5.2
Italy <sup>3</sup>	6.6	8.6	11.2	14.2	17.6
Japan	na	na	na	na	na
Netherlands	13.4	19.5	23.2	26.2	28.6
Sweden	14.2	14.8	18.9	23.0	24.1
Switzerland	18.4	20.7	22.8	23.4	27.3
United Kingdom	24.1	27.1	29.6	31.7	34.6
United States	20.0	21.4	22.9	24.6	26.6

<sup>1</sup> For an explanation of the figures, see the relevant country tables. In some cases the total may not sum to 100% because of other items. <sup>2</sup> Interbank transactions only. <sup>3</sup> The figures for the year 1995 differ from those provided in the statistical annex of the Italian chapter as they are estimated for the whole system. <sup>4</sup> Postal cheques are not included because detailed figures are not published by Postfinance. <sup>5</sup> Includes Town cheques. <sup>6</sup> Excludes cards with a credit function. <sup>7</sup> Figures for 1995-97 are estimated.

Table 8 (cont)

	1995	1996	1997	1998	1999
	<b>Credit transfers</b>				
Singapore <sup>2,8</sup>	7.6	7.9	7.9	7.9	7.0
Belgium	60.2	59.5	58.0	54.0	51.9
Canada	8.2	8.9	8.9	9.5	9.4
France	15.6	15.7	16.3	16.4	na
Germany	48.8	49.2	48.2	50.6	50.6
Italy <sup>3</sup>	45.0	41.7	40.8	39.0	37.2
Japan	na	na	na	na	na
Netherlands	52.7	48.8	46.3	43.8	41.6
Sweden	79.4	78.5	72.1	68.6	67.5
Switzerland <sup>9</sup>	76.3	74.4	72.3	72.1	68.4
United Kingdom <sup>10</sup>	18.2	18.0	18.0	17.8	17.6
United States	2.4	2.6	2.7	3.1	3.2
	<b>Direct debits</b>				
Singapore <sup>2</sup>	11.2	11.7	12.1	10.5	8.7
Belgium	9.5	9.7	9.8	9.4	9.4
Canada	6.4	6.8	7.2	7.4	7.5
France	11.3	11.8	12.5	13.3	na
Germany	40.6	40.2	42.0	39.5	40.2
Italy <sup>3</sup>	5.4	7.3	8.5	9.2	10.4
Japan	na	na	na	na	na
Netherlands	28.1	27.7	27.7	28.2	28.9
Sweden	6.4	6.7	7.1	8.0	8.1
Switzerland <sup>11</sup>	3.3	3.3	3.6	3.5	3.6
United Kingdom	16.4	17.0	17.8	18.6	18.9
United States	1.3	1.4	1.5	1.6	1.7

<sup>8</sup> Includes large-value transactions: MEPS. <sup>9</sup> All transfers at Postfinance included. <sup>10</sup> Paper-based and paperless (includes large-value: CHAPS). <sup>11</sup> Without Postfinance direct debits; see footnote 9.

Table 9  
**Relative importance of cashless payment instruments<sup>1</sup>**  
 (percentage of total value of cashless transactions)

	1995	1996	1997	1998	1999
	<b>Cheques</b>				
Singapore <sup>2</sup>	7.5	7.1	5.9	4.9	5.1
Belgium	3.3	3.0	2.9	3.2	0.6
Canada	98.2	97.3	97.0	96.5	21.5
France	4.7	4.8	4.4	2.6	na
Germany	2.1	1.8	1.6	1.4	1.7
Italy <sup>3</sup>	4.5	3.7	3.3	2.8	3.7
Japan	na	na	na	na	na
Netherlands	0.1	0.0	0.0	0.0	0.0
Sweden	na	na	na	0.5	0.4
Switzerland <sup>4</sup>	0.1	0.1	neg	neg	neg
United Kingdom <sup>5</sup>	6.3	5.9	5.0	4.4	2.8
United States	11.9	11.2	10.5	10.3	11.2
	<b>Cards</b>				
Singapore <sup>2</sup>	0.2	0.2	0.1	0.2	0.2
Belgium	0.1	0.2	0.2	0.2	0.1
Canada <sup>6</sup>	0.4	0.7	0.7	0.8	0.5
France	0.2	0.2	0.2	0.1	na
Germany	neg	neg	neg	neg	0.1
Italy <sup>3</sup>	0.1	0.1	0.1	0.1	0.1
Japan	na	na	na	na	na
Netherlands	0.1	0.2	0.2	0.2	0.2
Sweden	1.4	1.5	1.7	1.9	2.3
Switzerland	neg	neg	0.1	0.1	0.1
United Kingdom	0.2	0.3	0.3	0.3	0.2
United States	0.2	0.2	0.2	0.2	0.2

<sup>1</sup> For an explanation of the figures, see the relevant country tables. In some cases the total may not sum to 100% because of other items. <sup>2</sup> Interbank transactions only. <sup>3</sup> The figures for the year 1995 differ from those provided in the statistical annex of the Italian chapter as they are estimated for the whole system. <sup>4</sup> Postal cheques are not included because detailed figures are not published by Postfinance. <sup>5</sup> Includes Town cheques. <sup>6</sup> Figures for 1995-97 are estimated.



Table 9 (cont)

	1995	1996	1997	1998	1999
	<b>Credit transfers</b>				
Singapore <sup>2,7</sup>	92.1	92.6	93.7	94.8	94.6
Belgium	96.3	96.6	96.7	96.3	98.9
Canada	1.0	1.5	1.8	2.1	77.5
France	93.0	92.7	93.4	96.0	na
Germany	95.8	95.7	95.9	95.8	91.4
Italy <sup>3</sup>	94.1	95.0	95.4	95.7	94.5
Japan	na	na	na	na	na
Netherlands	98.9	99.0	99.1	99.2	99.1
Sweden	95.7	95.6	95.8	94.9	94.3
Switzerland <sup>8</sup>	99.8	99.8	99.8	99.8	99.8
United Kingdom <sup>9</sup>	92.4	92.7	93.8	94.4	96.3
United States	87.0	87.6	88.4	88.4	87.5
	<b>Direct debits</b>				
Singapore <sup>2</sup>	0.2	0.2	0.2	0.2	0.2
Belgium	0.3	0.3	0.3	0.3	0.3
Canada	0.3	0.5	0.6	0.7	0.5
France	0.9	1.0	1.0	0.6	na
Germany	2.1	2.5	2.5	2.7	6.9
Italy <sup>3</sup>	0.2	0.2	0.3	0.3	0.5
Japan	na	na	na	na	na
Netherlands	0.9	0.8	0.7	0.7	0.7
Sweden	2.9	2.9	2.5	2.7	3.0
Switzerland <sup>10</sup>	0.1	0.1	0.1	0.1	0.1
United Kingdom	1.0	1.1	1.0	1.0	0.7
United States	1.0	1.0	1.0	1.0	1.1

<sup>7</sup> Includes large-value transactions: MEPS. <sup>8</sup> All transfers at Postfinance included. <sup>9</sup> Paper-based and paperless (includes large-value: CHAPS). <sup>10</sup> Without Postfinance direct debits; see footnote 8.

Table 10a  
**Features of selected interbank funds transfer systems**<sup>1,7</sup>  
 (figures relate to 1999)

	Type <sup>2</sup>	Owner/ manager <sup>3</sup>	No of participants		Processing <sup>4</sup>	Settlement <sup>5</sup>	Membership <sup>6</sup>
				of which direct			
<b>Singapore</b> (figures relate to 2000)							
SGDCCS	R	AS	112	41	ACH	GS	O
Interbank GIRO	R	AS	49	38	ACH	GS	O
USDCCS	R	AS	53	30	ACH	N	O
MEPS	L	CB	136	92	RTT	RTGS	O
<b>Belgium</b> <sup>7</sup>							
Clearing House	L+R	B+CB	101	44	M	N	O
CEC	R	B+CB	104	46	ACH	N	O
<b>Canada</b>							
LVTS	L	AS	14	14	RTT	N	RM
<b>France</b> <sup>7</sup>							
CH Paris <sup>8</sup>	L+R	AS	357	29	M	N	RM
CH Provinces <sup>9</sup>	R	CB	267	219	M	N	O
SIT	R	CB+B/AS	311	22	RTT	N	RM
CREIC	R	CB	16	16	ACH	N	O
PNS <sup>10</sup>	L	CB+B/AS	25	25	RTT	N/BN/RTGS	RM
<b>Germany</b> <sup>7</sup>							
EMZ (former DTA)	R	CB	2,662	2,662	ACH	GS	O
EAF (former EAF 2)	L	CB	68	68	RTT	N/BN	RM
<b>Italy</b> <sup>7</sup>							
Local clearing	R	CB	na	135	RTT <sup>11</sup>	N	O
Retail	R	CB <sup>12</sup>	942	211	ACH	N	O

<sup>1</sup> For additional information, see the relevant country chapters. <sup>2</sup> L = large-value system, R = retail system.  
<sup>3</sup> Owner/manager: B = banks, CB = central banks, AS = payment association. <sup>4</sup> Processing method: M = manual, ACH = automated clearing house (offline), RTT = real-time transmission. <sup>5</sup> N = multilateral netting, BN = bilateral netting, RTGS = real-time gross settlement, GS = other gross settlement. <sup>6</sup> O = open membership (any bank can apply) or RM = restricted membership (subject to criteria). <sup>7</sup> For information on the national components of the EU-wide TARGET system (namely, ELLIPS in Belgium, TBF in France, ELS in Germany and BI-REL in Italy), see the relevant country tables. Data on TARGET as a whole are shown in Table 10b under European Union. <sup>8</sup> Clearing house in Paris. <sup>9</sup> Clearing houses in the provinces. <sup>10</sup> Previous SNP system changed to PNS (Paris Net Settlement) during 1999. <sup>11</sup> Transactions can also be submitted on floppy disk. <sup>12</sup> System managed by the Interbank Company for Automation in the name and on behalf of the Bank of Italy.

Table 10a (cont)

	Degree of centralisation <sup>13</sup>	Pricing <sup>14</sup>	Closing time for same day transactions <sup>15</sup>	Number of transactions (thousands)	Value of transactions (USD billions) <sup>16</sup>	Ratio of transactions value to GDP (at annual rate)
<b>Singapore<sup>19</sup></b>						
SGDCCS	C	V	1645 <sup>17</sup> /1315 <sup>18</sup>	92,180	294	3.5
Interbank GIRO	C	V	1200 <sup>17</sup> /0900 <sup>18</sup>	29,380	40	0.5
USDCCS	C	V	15:30	375	9	0.1
MEPS	C	V	1830 <sup>17</sup> /1425 <sup>18</sup>	1,866	5,544	65.1
<b>Belgium<sup>7</sup></b>						
Clearing House	D	V	15:00	4,950	113	0.5
CEC	C	F	15:00	937,160	477	2.0
<b>Canada</b>						
LVTS	C	F	18:30	3,040	15,035	23.1
<b>France<sup>7</sup></b>						
CH Paris <sup>8</sup>	C	F	15:00	683,689	903	0.7
CH Provinces <sup>9</sup>	D	N	11:00	2,700,494	1,163	0.9
SIT	D	F	13:30	5,913,372	2,505	1.9
CREIC	D	V	12:00	304,530	30	0.02
PNS <sup>10</sup>	C	F	16:00	5,197	25,647	18.9
<b>Germany<sup>7</sup></b>						
EMZ (former DTA)	C	V	NO	2,176,200	2,388	1.1
EAF (former EAF 2)	C	F	16:00	12,100	41,610	19.7
<b>Italy<sup>7</sup></b>						
Local clearing	D	V	12:00	103,942	666	0.6
Retail	C	F	NO <sup>20</sup>	959,750	1,279	1.2

<sup>13</sup> Geographical access to the system: C = centralised (one processing centre only) or D = decentralised. <sup>14</sup> Prices charged to participants: F = full costs (including investment), V = variable costs, S = symbolic costs (below variable costs), N = no costs. <sup>15</sup> Closing time for same day transactions (NO = no same day transactions). <sup>16</sup> Converted at yearly average exchange rates. <sup>17</sup> Weekdays. <sup>18</sup> Saturdays and eve of public holidays. <sup>19</sup> Interbank transactions only. <sup>20</sup> Except for credit transfers entered before 10:00, which are settled on the same day.

Table 10b  
**Features of selected interbank funds transfer systems<sup>1</sup>**  
 (figures relate to 1999)

	Type <sup>2</sup>	Owner/ manager <sup>3</sup>	No of participants		Processing <sup>4</sup>	Settlement <sup>5</sup>	Membership <sup>6</sup>
				of which direct			
<b>Japan</b>							
FEYCS	L	B	259	47	RTT	N/RTGS	RM
BOJ-NET	L	CB	409	409	RTT	RTGS <sup>7</sup>	RM
<b>Netherlands<sup>8</sup></b>							
Interpay	R	B	71	71	ACH	N	O
<b>Sweden<sup>8</sup></b>							
K-RIX	L	CB	23	23	RTT	RTGS	RM
Bank Giro System	R	B	18	18	ACH	N	O
<b>Switzerland</b>							
SIC	L+R	CB+B	291	291	RTT	RTGS	RM
DTA/LSV	R	B	161	161	ACH	GS	RM
<b>United Kingdom<sup>8</sup></b>							
CHAPS Sterling	L	B	404	14	RTT	RTGS	RM
BACS	R	B	50,000 <sup>9</sup>	15	ACH	N	RM
Cheque/credit	R	B	471	12	M	N	RM
<b>United States</b>							
Fedwire	L	CB	9,994 <sup>10</sup>	9,994 <sup>10</sup>	RTT	RTGS	O
CHIPS	L	B	77	77	RTT	N	RM
<b>European Union</b>							
TARGET	L	CB	5,144	4,261	RTT	RTGS	O
Euro 1	L	B	72	72	RTT	na <sup>11</sup>	RM

<sup>1</sup> For additional information, see the relevant country chapters. <sup>2</sup> L = large-value system, R = retail system.  
<sup>3</sup> Owner/manager: B = banks, CB = central banks. <sup>4</sup> Processing method: M = manual, ACH = automated clearing house (offline), RTT = real-time transmission. <sup>5</sup> N = multilateral netting, BN = bilateral netting, RTGS = real-time gross settlement, GS = other gross settlement. <sup>6</sup> O = open membership (any bank can apply) or RM = restricted membership (subject to criteria). <sup>7</sup> The system has been designed to allow participants to enter funds transfer instructions continuously, in which case settlement takes place on the central bank's books immediately. It is, however, also used to settle on a net basis. <sup>8</sup> For information on the national components of the EU-wide TARGET system (namely, TOP in the Netherlands, E-RIX in Sweden and CHAPS Euro in the United Kingdom), see the relevant country tables. Data on TARGET as a whole are shown under European Union. <sup>9</sup> Estimated. <sup>10</sup> Fedwire participants as of 30 June 2000. <sup>11</sup> The legal structure of Euro 1 is based on the Single Obligation Structure (SOS), whereby on each settlement day, at any given time, each participant will have only one single payment obligation or claim with respect to the community of the other participants as joint creditors/debtors, which will be settled at the end of the day. In accordance with the SOS, no bilateral payments, claims or obligations between participants will be created by the processing of payments in the system. Nor will there be any form of setoff, novation or netting resulting from the continuous adjustment of the participants' single claim or obligation.

Table 10b (cont)

	Degree of centralisation <sup>12</sup>	Pricing <sup>13</sup>	Closing time for same day transactions <sup>14</sup>	Number of transactions (thousands)	Value of transactions (USD billions)	Ratio of transactions value to GDP (at annual rate)
<b>Japan</b>						
FEYCS	D	V <sup>15</sup>	13:45	9,995	62,389	14.4
BOJ-NET	D	V <sup>15</sup>	17:00	4,810	302,792	69.7
<b>Netherlands<sup>8</sup></b>						
Interpay	C	F	11:30	2,152,500	1,431	3.6
<b>Sweden<sup>8</sup></b>						
K-RIX	C	F	17:00	343	12,208	50.6
Bank Giro System	C	F	NO	338,000	395	1.6
<b>Switzerland</b>						
SIC	C	F	16:15	141,700	28,805	111.2
DTA/LSV	C	F	09:00	104,600	245	0.9
<b>United Kingdom<sup>8,16</sup></b>						
CHAPS Sterling	D	F	17:00	19,786	72,336	50.1
BACS	C	F	NO	3,095,405	2,850	2.0
Cheque/credit	D	F	NO	2,103,569	2,322	1.6 <sup>17</sup>
<b>United States</b>						
Fedwire	C	F	18:30	102,800	343,382	36.9
CHIPS	C	F	16:30	57,300	297,934	32.0
<b>European Union</b>						
TARGET	D	F	18:00	42,258	240,574	
Euro 1	C	F	16:00	17,646	44,418	

<sup>12</sup> Geographical access to the system: C = centralised (one processing centre only) or D = decentralised. <sup>13</sup> Prices charged to participants: F = full costs (including investments), V = variable costs, S = symbolic costs (below variable costs), N = no costs. <sup>14</sup> Closing time for same day transactions (NO = no same day transactions). <sup>15</sup> Prices are set on the principle that institutions which are to benefit from online processing should pay the relevant charges. <sup>16</sup> Interbank figures only. <sup>17</sup> Excludes Northern Ireland.

Table 11  
**Operating hours of selected large-value interbank funds transfer systems<sup>1</sup>**  
 (as of December 1999)

System	Gross (G) or net (N)	Opening- closing time for same day value (local time) <sup>2</sup>	Settlement finality (local time) <sup>3</sup>	Cutoff for all third-party payment orders	Cutoff for international correspondents' payment orders	<i>Memo item: Standard money market hours<sup>4</sup> (local time)</i>
<b>Singapore</b> MEPS	G	06:00-20:00 <sup>5</sup> / 06:00-15:00 <sup>8</sup>	09:00-18:30 <sup>5</sup> / 09:00-14:30 <sup>8</sup>	18:30 <sup>5,6</sup> / 14:45 <sup>6,8</sup>	(7)	<i>(09:00-18:30<sup>5</sup>/ 09:00-15:00<sup>8</sup>)</i>
<b>Belgium<sup>9</sup></b> CEC	N	15:01-15:00	15:15	15:00	15:00	<i>(9:00-16:15)</i>
Clearing House	N	8:00-15:00	15:00	.	.	<i>(9:00-16:15)</i>
<b>Canada<sup>10</sup></b> LVTS	N	7:00-18:30	19:30	18:00	18:00	<i>(11)</i>
<b>France<sup>9</sup></b> PNS <sup>12</sup>	N	8:00-16:15	8:00-16:15	16:00	16:00	<i>(9:00-17:00)</i>
<b>Germany<sup>9</sup></b> EAF	G/N	7:00-16:00	.	(13)	8:00 <sup>14</sup>	<i>(8:30-18:00)<sup>15</sup></i>
<b>Italy<sup>9</sup></b>						
<b>Japan</b> FEYCS	G/N	9:00-13:45	15:00	10:30 <sup>14</sup>	10:30 <sup>14</sup>	<i>(9:00-17:00)</i>
BOJ-NET	G <sup>16</sup>	9:00-17:00	.	14:00	na	
<b>Netherlands<sup>9</sup></b>						
<b>Sweden<sup>9</sup></b> K-RIX	G	7:00-17:00	7:00-17:00	(17)	8:00 <sup>14</sup>	<i>(9:00-16:15)</i>
<b>Switzerland</b> SIC	G	18:00-16:15 <sup>18</sup>	18:00-16:15	15:00	8:00	<i>(9:00-16:00)</i>
<b>United Kingdom<sup>9</sup></b> CHAPS Sterling	G	6:00-17:00	.	16:00	16:00	<i>(7:00-16:00)<sup>19</sup></i>
<b>United States<sup>10</sup></b> Fedwire	G	00:30-18:30	00:30-18:30	18:00	17:00	<i>(8:30-18:30)<sup>20</sup></i>
CHIPS	N	00:30-16:30	18:00 <sup>21</sup>	16:30	16:30	
<b>European Union</b> TARGET	G	7:00-18:00		17:00	na	<i>(7:00-18:00)</i>
Euro 1	G/N	7:30-16:00	16:30-16:45	16:00	na	<i>(7:00-18:00)</i>

## Footnotes to Table 11

- <sup>1</sup> Some systems make no explicit distinction between large-value and retail transactions and may be used to settle interbank transfers relating to a variety of underlying transactions. Some systems may also accept payment orders for a number of value days.
- <sup>2</sup> The initialisation period for collateral pledging/valuation, setting of bilateral limits etc begins at 07:00. The payment message exchange period begins at 08:00.
- <sup>3</sup> For net settlement systems.
- <sup>4</sup> Money market hours indicated refer to the time period in which domestic interbank transactions are normally carried out. They therefore do not relate to particular interbank funds transfer systems.
- <sup>5</sup> Weekdays.
- <sup>6</sup> For same day clearing.
- <sup>7</sup> MEPS is used for domestic payment orders only.
- <sup>8</sup> Saturdays and eve of public holidays.
- <sup>9</sup> Information on the EU-wide TARGET system (including its national components, namely, ELLIPS in Belgium, TBF in France, ELS in Germany, BI-REL in Italy, TOP in the Netherlands, E-RIX in Sweden and CHAPS Euro in the United Kingdom) is shown under European Union.
- <sup>10</sup> Eastern time.
- <sup>11</sup> No standard hours.
- <sup>12</sup> Previous SNP system changed to PNS (Paris Net Settlement) during 1999.
- <sup>13</sup> This is subject to arrangements between the correspondent banks.
- <sup>14</sup> SWIFT guideline; in practice it may be later.
- <sup>15</sup> For settlement purposes it can be later.
- <sup>16</sup> The system has been designed to allow participants to enter funds transfer instructions continuously, in which case settlement takes place on the central bank's books immediately. BOJ-NET, however, is also used to settle on a net basis.
- <sup>17</sup> Participants decide among themselves which cutoff times they will use for different types of third-party orders. Large-value payments can be made at any time of the day.
- <sup>18</sup> The system is open for input 24 hours a day. Settlement services are limited by the indicated opening and closing times. A value day starts at 18:00 local time on the previous business day and ends at 16:15 on the value day. Third-party payments may be entered for same day settlement until 15:00. Between 15:00 (cutoff 1) and 16:00 (cutoff 2) only cover (bank-to-bank) payments are accepted for same day settlement. From 16:00 to 16:15 transactions are restricted to the processing of lombard credits (collateralised loans from the Swiss National Bank at a penalty rate).
- <sup>19</sup> The Bank of England intervenes in the market as necessary at 09:45, 14:30 and 15:30, and may conduct a final round of operations with the settlement banks at 16:20.
- <sup>20</sup> Trading occurs among dealers for funds on deposit at Federal Reserve Banks (ie federal funds) as early as 06:30.
- <sup>21</sup> Payments over CHIPS become final on completion of settlement, which normally occurs between 16:30 and 17:00. Rules are designed to ensure that settlement takes place no later than 18:00.

Table 12  
**Features of selected securities systems**  
 (figures relate to 1999)

	Type <sup>1</sup>	Owner/manager <sup>2</sup>	No of participants		Settlement of cash leg <sup>3</sup>	Delivery <sup>3</sup>
				of which direct		
<b>Singapore</b> (figures relate to 2000)						
MEPS - SGS	G	CB	136	92	G	G
CDP	E,O	SE	na	na	G	G
<b>Belgium</b>						
NBB clearing	G,O	CB	166	166	G	G
CIK	E,O	B	57	57	G	N
<b>Canada</b>						
SSS <sup>4</sup>	G,E,O	B,SE,O	78	78	N	G/N
DCS <sup>5</sup>	G	B,SE,O	61	61	N	G
<b>France</b>						
RGV	G,O	B,SE	167	na	G	G
RELIT	G,E,O	B,SE	339	na	N	G
<b>Germany</b>						
Clearstream Banking AG	G,E,O	B,SE,O	322	322	N/G	G
<b>Italy</b>						
Securities settlement procedures:						
LDT	G,E,O	CB	279	279	N	N
CAT	G	CB	435	435	( <sup>6</sup> )	G
Monte Titoli	E,O	Monte Titoli	519	.	( <sup>6</sup> )	G
<b>Japan</b>						
JGB registration	G	CB	440	440	G/N	G/N
JGB book-entry	G	CB	377	377	G/N	G/N
<b>Netherlands</b>						
NECIGEF	G,E,O	SE	69	69	G	G
<b>Sweden</b>						
VPC	G,E,O	B+O	51	51	G/N	G
OM	O	O	57	57	N	N
<b>Switzerland</b>						
SECOM	G,E,O,	B	359	359	G	G
<b>United Kingdom</b>						
CGO <sup>7</sup>	G,O	CB/SE	378	378	N	G
CMO	O	B,SE,O	60	60	N	G
CREST	G,E,O	B,SE,O	22,949	22,949	N	G
<b>United States</b>						
Fedwire	G	CB	9,936	9,936	G	G
DTC (SDFS) <sup>8</sup>	E,O	B,SE,O	527	527	N	G

<sup>1</sup> G = government securities, E = equity, O = other. <sup>2</sup> B = banks, CB = central banks, SE = stock exchange, O = other.  
<sup>3</sup> G = gross, N = net. <sup>4</sup> The book-based system of The Canadian Depository for Securities Limited (CDS). <sup>5</sup> The real-time, online debt clearing service of CDS, which commenced operation during August 1994. <sup>6</sup> Deliveries free of payments. <sup>7</sup> Gilt settlement migrated from CGO to CREST in July 2000. <sup>8</sup> Same day funds settlement.



Table 12 (cont)

	Delivery	Central securities depository	Cash settlement agent <sup>9</sup>	Number of transactions (thousands)	Value of transactions (USD billions) <sup>10</sup>	Ratio of transactions value to GDP (at annual rate)
<b>Singapore</b>						
MEPS - SGS	T+0	MAS	CB	17	86	1.0
CDP	T+3	CDP	B	20,827	118	1.4
<b>Belgium</b>						
NBB Clearing	T+2+3 <sup>11</sup>	NBB	NBB	121	2,270	9.7
CIK	T+3 <sup>12</sup>	CIK	NBB	242	76	0.3
<b>Canada</b>						
SSS <sup>4</sup>	up to T+3	CDS	B <sup>13</sup>	{ 24,400	{ 17,376 <sup>14</sup>	{ 26.7
DCS <sup>5</sup>	up to T+3	CDS	B <sup>15</sup>			
<b>France</b>						
RGV	T to T+100	Euroclear France	CB	2,249	30,965	22.9
RELIT	T to T+30 <sup>16</sup>	Euroclear France	CB	25,503	5,491	4.1
<b>Germany</b>						
Clearstream Banking AG	T+ 0-40	Clearstream Banking AG	CB	73,158	15,348	7.3
<b>Italy</b>						
Securities settlement procedures:						
LDT	T+2/T+3 T+5 <sup>17</sup>	CAT + Monte Titoli	CB	38,553.3 <sup>18</sup>	29,162 <sup>18</sup>	28.3
CAT	T	CAT	( <sup>6</sup> )	501.4	3,111	3.0
Monte Titoli	T	Monte Titoli	( <sup>6</sup> )	na <sup>19</sup>	na <sup>19</sup>	na
<b>Japan</b>						
JGB registration	T+3	CB	CB	956.0	25,281	5.8
JGB book-entry	T+3	CB	CB	1,048.8	54,234	12.5
<b>Netherlands</b>						
NECIGEF	T+3	NECIGEF	CB	2,357	688	1.7
<b>Sweden</b>						
VPC	T+2, T+3 <sup>20</sup>	VPC	CB	8,914	10,690	44.3
OM	T+3		CB	58,040	.	.
<b>Switzerland</b>						
SECOM	T+3	SIS	CB	11,676	2,571	10.4
<b>United Kingdom</b>						
CGO	T, T+1	CB	CB	2,062	55,634	37.2
CMO	T	CB	B, CB	334	3,782	2.6
CREST	T+1, T+5	na	B, CB	43,237	15,328	10.6
<b>United States</b>						
Fedwire	T	CB	CB	13,400	179,500	19.3
DTC (SDFS) <sup>8</sup>	T+3	DTC	DTC	189,000	94,000	10.1

<sup>9</sup> Multiple settlement banks with interbank settlement taking place across the books of the central bank. <sup>10</sup> Converted at yearly average exchange rate. <sup>11</sup> T+2 for treasury bills; T+3 for bonds. <sup>12</sup> The seller retains the responsibility for delivering securities. <sup>13</sup> A single chartered bank. <sup>14</sup> Figures are for the 12 months ended 31 October 1998. <sup>15</sup> A single chartered bank, though not the same bank as for the SSS. <sup>16</sup> When processed by the "SLAB" system (special delivery service by bilateral agreements), the delivery occurs same day. <sup>17</sup> T+2 for government bills; T+3 for government and corporate bonds; T+5 for equities, warrants and convertible bonds. <sup>18</sup> Bilateral balances. <sup>19</sup> Data refer to bonds only. <sup>20</sup> Same day delivery and settlement is also possible under specific conditions.

Table 13  
**SWIFT traffic: intra-G10 message flows in 1999**  
(number of messages, in thousands)

From/to	SG	BE	CA	CH	DE	FR	GB	IT
SG	2,817	229	162	366	569	294	2,147	126
BE	303	9,273	264	2,168	2,992	2,830	8,245	1,360
CA	168	274	4,854	500	398	313	1,660	217
CH	350	1,381	427	10,203	5,111	2,668	5,910	1,851
DE	544	2,745	385	4,491	6,989	4,130	11,200	4,198
FR	223	2,409	334	2,037	4,561	16,805	8,400	3,265
GB	1,578	3,853	1,553	5,239	10,101	6,086	39,077	5,015
IT	99	1,190	181	1,702	3,721	3,656	6,347	2,524
JP	1,326	743	276	956	1,254	750	6,350	470
NL	133	3,197	144	1,555	4,038	1,455	6,139	776
SE	96	681	62	404	1,330	424	3,549	351
US	3,803	3,537	3,939	7,681	7,448	5,174	20,774	3,739
<b>Total G10</b>	<b>8,622</b>	<b>29,284</b>	<b>12,420</b>	<b>36,938</b>	<b>47,944</b>	<b>44,291</b>	<b>117,652</b>	<b>23,766</b>
<b>Total non-G10</b>	<b>5,622</b>	<b>8,151</b>	<b>2,451</b>	<b>9,780</b>	<b>26,264</b>	<b>14,349</b>	<b>39,976</b>	<b>10,100</b>
<b>Total all countries</b>	<b>17,061</b>	<b>37,435</b>	<b>14,872</b>	<b>46,718</b>	<b>74,208</b>	<b>58,640</b>	<b>157,628</b>	<b>33,866</b>

From/to	JP	NL	SE	US	Total G10	Non-G10	All countries
SG	2,200	167	82	5,050	11,392	5,396	19,605
BE	836	3,409	333	5,081	36,792	9,017	45,809
CA	336	127	58	4,932	13,668	2,861	16,530
CH	940	1,171	290	8,476	38,426	9,833	48,259
DE	1,338	3,262	900	9,767	49,407	24,272	73,679
FR	925	1,488	339	7,388	47,952	10,811	58,763
GB	6,988	3,983	2,274	24,528	108,698	30,067	138,764
IT	529	722	206	5,035	25,815	7,648	33,463
JP	5,967	257	109	9,775	26,908	10,216	37,124
NL	336	7,062	293	5,375	30,370	5,970	36,341
SE	134	405	3,048	2,582	12,971	4,695	17,666
US	8,704	3,941	1,628	41,716	108,283	73,701	181,984
<b>Total G10</b>	<b>27,032</b>	<b>25,828</b>	<b>9,478</b>	<b>124,656</b>	<b>499,290</b>	<b>189,092</b>	<b>688,382</b>
<b>Total non-G10</b>	<b>11,752</b>	<b>7,161</b>	<b>4,472</b>	<b>75,319</b>	<b>209,776</b>	<b>160,678</b>	<b>370,455</b>
<b>Total all countries</b>	<b>38,784</b>	<b>32,989</b>	<b>13,950</b>	<b>199,975</b>	<b>709,066</b>	<b>349,770</b>	<b>1,058,836</b>

Source: SWIFT.