

Clearing, settlement and depository issues¹

Francis Braeckevelt²

1. Executive summary

Once neglected as a boring but necessary element of dealing in the capital markets, the settlement process has caught the attention of both the public and the private sector.

The rise of emerging markets, the growth of financial markets, the increased focus on cross-border activity and financial market deregulation in different parts of the world made the settlement process considerably more complex but also made investors fully aware that operational support systems form a critical part of an effective and efficient capital market.

Today, the creation of a robust clearing and settlement environment has become the topic of many discussions and the recent technological innovation allowed for important rationalisation, integration and consolidation trends to emerge. The current fragmented infrastructure is increasingly perceived as a source of cost inefficiencies and significant risk. As a result, new models are being developed that aim at mitigating risks and containing or reducing costs.

In Section I, we highlight some of the current thoughts in today's clearing and settlement debate, the generally accepted roles and responsibilities of financial intermediaries, as well as recommendations made by various national, supranational or private organisations on how to develop robust and efficient clearing and settlement systems.

In Section II, we assess some selected central securities depositories in Asia. The most noteworthy observations we have made with regards to the settlement environment in Asia can, in our opinion, best be summarised as follows:

- The main barriers to developing an efficient bond market in Asia are mainly related to the trading environment (ie liquidity constraints and foreign investor restrictions) rather than to infrastructure issues.
- Today's clearing and settlement infrastructure in Asia is very fragmented. Even though the current setup operates well and conforms with the criteria outlined in the US Investor Act of 1940, the infrastructure is not cost efficient and does not mitigate risks in the settlement process in a comprehensive manner.
- Because of the central role central securities depositories play, it is important that the intermediaries be structurally, financially and operationally sound. This entails proper supervision by the public sector, an adequate capital base, stringent risk management tools (audits, insurance, etc) and business recovery plans.
- Central securities depositories should continue to develop and implement true delivery versus payment (DVP) systems and provide intraday settlement finality.

¹ The information provided is derived from data received from various sources and from the respective depositories and is believed to be reliable and accurate.

² Francis Braeckevelt is responsible for Investor Services Product Management in Asia Pacific.

- The future Asian infrastructure will probably evolve gradually, based on the current setup. We anticipate further consolidation within the respective markets, with a gradual expansion of cross-border links.
- Alternatively, a “central utility” concept could be reviewed. This utility could act as a central access point to various markets, providing multicurrency, DVP settlement, ideally complemented by an automated securities lending and borrowing facility.

2. Introduction

Asia's domestic markets continue to recover from the fallout of the severe 1997 financial crisis and are, today, characterised by more stability and an expectation of growth. GDP in Asian countries is expected to expand considerably over the coming years and to outpace the growth in other regions, creating important funding and financing requirements. With the 1997 events fresh in mind, governments and private sector participants are acutely aware of the dangers of relying on short-term capital, bank financing and capital inflows denominated in foreign currency and subject to foreign exchange fluctuations.

Asian economies are therefore expected to limit their exposure to these traditional funding sources by supplementing them with domestic currency financing alternatives.

A key feature in creating an investor-friendly environment is the development of an efficient capital market, and more specifically a strong and liquid domestic debt market, allowing market participants (both borrowers and investors) to attract and invest in longer-term financial products.

Therefore, critical elements required for organising a sound capital market are:

1. the creation of a liquid government bond market, providing basic investment and funding possibilities and a credible benchmark yield curve to price corporate debt;
2. adequate credit rating coverage, by either global (S&P, Moody's, Fitch) or local credit rating agencies;
3. the implementation of a harmonised taxation and regulatory environment;
4. the establishment of operational infrastructure based on efficient and sound clearing and settlement mechanisms, central depositories and derivatives markets, as well as securities borrowing and lending and repurchase agreement facilities.

The main drivers of an effective capital market are pricing and demand and supply considerations. Increasingly, however, market participants appreciate the importance of an adequate support infrastructure. In other words, where capital markets provide the fundamental infrastructure to bring investors together, the clearing and settlement infrastructure ensures the effectiveness and efficiency of the system.

The clearing and settlement process is a series of complex tasks that start with trade confirmation and continue through the clearing process up to the actual settlement of a trade. The successful functioning of this system or series of systems is largely dependent on the close interaction of a number of intermediaries, each responsible for a distinct part of the process.

3. Definitions

The following list presents some of the definitions commonly used in discussion on clearing and settlement topics.

Clearing. Generally, clearing refers to the process of comparing trades before settlement date or the determination of the net obligations of the broker participants (for both securities and cash). In certain publications, clearing may be used synonymously with settlement.

Settlement. The settlement process refers to the exchange of cash and securities on the contractual settlement date. The settlement date can be agreed upon at trade execution or can be prescribed by local trading conventions. Settlement may be processed on a provisional or a final basis.

Settlement finality. The exchange of cash and securities is final when a settlement can no longer be unwound. Finality eliminates the main legal risks of payment and settlement systems, reduces systemic risk and ensures the smooth operation of a system.

Provisional settlement. Provisional settlement allows for onward delivery of securities which were not received on a final and irrevocable basis. Systemic risk is introduced in the system if the unwinding of a specific settlement has a cascading effect on other previously settled transactions.

Gross settlement. Gross settlement systems settle transactions on an instruction by instruction and real-time (RTGS) basis throughout the day. RTGS systems are costly due to the need for collateral or available cash balances to cover payment obligations during the day or for securities lending programmes to cover short securities positions. RTGS systems, however, typically reduce systemic risk.

Net settlement. In net settlement systems, obligations are settled at the end of the business day on a net basis. The net process is subject to potential systemic risk, due to the contagion effect where incoming funds are relied upon to make onward payments when a participant cannot meet his obligations. As there is no requirement to post collateral or keep cash balances readily available during the day, net systems tend to be less costly.

Central securities depository (CSD). A CSD is either the physical entity or the system that facilitates the settlement and safekeeping of securities and ensures the reconciliation of participant accounts. Securities can be safekept in immobilised or dematerialised form. Settlement generally occurs in book entry form.

International central securities depository (ICSD). An ICSD is a depository settling trades in international and various domestic securities, usually through direct and indirect links with agents in the domestic markets. The best known ICSDs are Euroclear Bank and Clearstream International. The eurobond market developed in part in response to operational and regulatory inefficiencies in domestic bond markets.

Central counterparty (CCP). A CCP acts as counterparty to every buy and sell trade, a process known as “novation”. This process concentrates counterparty risk and provides multilateral netting.

Vertical integration. Vertical integration refers to the merger of institutions providing different services in the value chain (eg trading, clearing, CSD). Vertical integration offers advantages of scope.

Horizontal integration. Horizontal integration refers to the merger of institutions providing similar services (eg clearing services for equities, derivatives and fixed income instruments). Horizontal integration offers advantages of scale.

Continuous Linked Settlement (CLS™). CLS is a unique process that enables cross-border currency transactions to be settled intraday. CLS enables settlement to be final with payout from central bank funds. As it is a real-time, global settlement system, it will significantly reduce the settlement risk caused by delays arising from differences in time zones, legal jurisdictions and operating procedures.

Delivery versus payment. Delivery versus payment (DVP) is the simultaneous, final, irrevocable and immediately available exchange of securities and cash on a continuous basis throughout the day.

Straight through processing. Straight through processing (STP) is defined in many different ways by different segments in the financial industry. In general, it is considered to be a process that improves the efficiency of the securities industry by eliminating trade and settlement failures, reducing manual processing, decreasing settlement time, etc.

Section I: Current trends in clearing and settlement

1. Clearing and settlement infrastructure

1.1 Introduction

It is difficult to unambiguously define the scope or the roles and responsibilities of a clearing and settlement intermediary by analysing the current operating models. Market practices, CSDs, clearing houses, CCPs and other parts of the clearing and settlement infrastructure have developed at different rates, resulting in distinct regulatory, tax and technical environments.

In the infrastructure section, we will cover:

- basic clearing and settlement services;
- the central counterparty concept;
- the clearing and settlement service model;
- rationalisation/integration/consolidation: public or private initiatives?

1.2 Basic clearing and settlement services

The analysis of various domestic market systems does identify some common and basic roles and responsibilities of clearing and settlement providers.

These services include but are not necessarily limited to:

- trade matching;
- trade confirmation;
- clearing activities (ie netting of obligations);
- cash flow distribution;
- trade settlement (either on a final irrevocable or provisional basis);
- registration (beneficial owner's name or in a nominee name);
- safekeeping of assets and holdings;
- messaging/reporting;
- other services, such as account reconciliation, which are often provided in conjunction with local or global custodians.

1.3 Central counterparty

The use of a central counterparty is most prevalent in clearing activities, where, through novation, counterparty risk is effectively mitigated on a centralised and cost-efficient basis. It

is commonly recommended that clearing houses be organised as separate legal entities from the securities depositories. Even though the CCP can be closely related to a CSD, each fulfils different functions and has a distinct role and responsibilities in the clearing and settlement process.

A central counterparty should maintain an adequate capital base and strong risk management tools to mitigate its own risks and deal with adverse situations. These tools may include, but are not limited to, margin call procedures, settlement of margin calls in central bank money, exposure limits, guarantee funds, securities lending and buy-in procedures or the use of collateral or daylight overdraft arrangements.

Introducing a central counterparty has the most tangible effect where trading anonymity is required. In market segments where trading occurs over the counter or through market-makers, traders can effectively mitigate the exposure and risk through a careful selection and due diligence of their counterparties.

The concept has gained importance worldwide and central counterparties have been introduced in a number of Asian markets. As illustrated in Annex 4, countries like China (all bonds), Indonesia (corporate bonds), Malaysia (corporate bonds) and Thailand (all bonds) have integrated a central counterparty into the clearing and settlement infrastructure.

1.4 The clearing and settlement service model

Traditionally, clearing and settlement systems have been geared towards the domestic market, organised around instrument types (equities, derivatives, fixed income, etc) and primarily focused on overcoming imperfections and providing tailor-made solutions to market-specific issues.

However, this resulted in a highly fragmented infrastructure, typically exposed to significant operating inefficiencies, technical inconsistencies, high cost structures or disparate regulatory environments.

Today, market participants recognise the need for a rationalised or integrated infrastructure allowing for an efficient exchange of securities and payments, while at the same time ensuring that risks are mitigated and costs are reduced or contained.

In a fragmented model, several intermediaries each provide part of the clearing and settlement services. The challenge, therefore, is to effectively integrate this infrastructure by introducing expensive but required regulatory and operational changes.

In a cross-border trading and settlement context, integration also involves creating full interoperability between different domestic systems and providing access to systems outside the domestic market.

Recent technological innovation has made this integration process a more realistic exercise as countries continue to adopt international standards and conventions (International Securities Identification Number (ISIN) standards or Bank Identification Codes (BIC)), and have considerably increased investments in straight through processing (STP) solutions (SWIFT or FIX (Financial Information eXchange) protocols).

1.5 Rationalisation/integration/consolidation: public or private initiatives?

With all the challenges and expenses to overcome, it is important to identify and assign responsibilities to the various participants driving the rationalisation process forward.

Looking at the various initiatives that have been or are being introduced, the success of the clearing and settlement infrastructure rationalisation process is highly dependent on the interaction between the private and public sectors. This close cooperation will help achieve risk reductions, cost controls and infrastructure efficiencies, as well as system stability and robustness.

In general, the private sector focuses primarily on:

- analysing and improving market practices and technical requirements;
- the consolidation process itself.

The public sector, in contrast, tends to be predominantly involved in issues pertaining to:

- the harmonisation of tax legislation;
- the reconciliation and harmonisation of national laws in a cross-border environment;
- the creation of an integrated regulatory and oversight framework;
- the implementation of the most cost-efficient, competitive and sound infrastructure;
- the oversight of the private sector (intervening if required) to ensure the process is resulting in increased efficiencies;
- the creation of regulations that provide incentives for providers to innovate.

As a result, capital markets have evolved significantly over time. In a traditional infrastructure, intermediaries are closely related to the government or the main capital market participants and operate as a natural or a de facto monopoly. In the government bond market, for example, central banks generally provide the central securities depository functions. In the more recent models, intermediaries are operating in a market-based environment characterised by rationalisation, integration and consolidation.

2. Clearing and settlement infrastructure

2.1 Introduction

Seeing the importance of the clearing and settlement process in maintaining the systemic soundness of the global financial markets, the operating environment has been analysed by many international committees and working groups from both the public and private sectors.

As a result, a range of projects have been initiated to develop and promote securities clearing and settlement systems that can operate in a stable and robust environment while at the same time reducing risks and costs for their participants.

The operating, monetary, regulatory and infrastructure observations of individual markets are also relevant in a regional context. The barriers encountered in the rationalisation or integration process have not halted the progress, but have in some instances slowed it down, resulting in regional clearing and settlement systems that are currently at varying stages of development, sophistication and integration.

We will review the clearing and settlement infrastructure and recent developments in:

- the United States;
- Europe;
- Asia.

2.2 United States

In the United States, a relatively homogeneous clearing and settlement infrastructure has been created thanks to the single currency and harmonised regulatory and tax environment.

US Treasuries are generally settled on an RTGS basis through the Federal Reserve book entry systems and are held in dematerialised form. Settlement occurs on a rolling TD+1 basis, unless otherwise negotiated at the time of trading. The transfer of securities and cash occurs immediately upon settlement, on a final and irrevocable basis.

To maintain confidence in the US financial markets, the Federal Reserve Bank continues to participate in private sector initiatives and to explore ways of streamlining the design and operation of the clearing and settlement process.

The most recent initiatives are related to CLS procedures and the introduction of Fedwire-like services in the settlement procedures of additional instrument types.

2.3 Europe

In Europe, the introduction of the euro provided important momentum to the rationalisation process of stock exchanges, payment systems and securities clearing and settlement structures. Apart from the single currency, the following developments also accelerated the process:

- the creation of a single integrated and efficient European capital market;
- an increase in international capital movements;
- technological progress;
- financial deregulation.

The European public institutions involved in this rationalisation effort are the European Commission, the European Parliament (as the European legislator) and the European System of Central Banks/Committee of European Securities Regulators (ESCB/CESR), which combines both central banks and securities regulators. The main requirements that have been identified for successfully constructing an integrated clearing and settlement model are:

- the removal of technical, legal and fiscal barriers, to lower the costs and reduce inefficiencies of cross-border settlement;
- the removal of competitive distortions/unequal treatment of entities performing similar clearing and settlement activities;
- the creation of clearing and settlement industry standards to ensure a sound system in which risks can be mitigated, reduced or controlled;
- a market-led rationalisation process with oversight from the public sector, which covers:
 - following through on changes in local laws and regulations, if required;
 - remaining vigilant to a particular intermediary emerging as a monopolistic entity and ensuring that a system for balancing stakeholders' interests is provided for;
 - paying special attention to the soundness of the clearing and settlement system and to the low-probability catastrophic risks that can introduce systemic risks.

The diagrams in Annex 1 represent the current and future state of the European clearing and settlement system, illustrating the complex nature and the extent of the consolidation and integration.

2.4 Asia

Unlike the United States or Europe, Asia does not have a single currency or a unified market. This lack of a homogeneous regulatory and operational environment results in a wide range of different market practices and allows "domestic" systems to exist side by side. Where the clearing and settlement systems supporting equity trading in Asia have evolved, the fixed

income markets remain significantly less sophisticated, from both an execution and a support perspective.

Despite the many differences, however, Asia is subject to the same general trends as the United States and Europe. Technological advances, deregulation and globalisation increase the need to introduce or develop sound capital market and operating systems. The current highly fragmented infrastructure, however, is prone to adverse risk factors and high costs.

Considering the current constraints, it may not be possible or necessary for Asia to introduce a fully integrated US- or European-type clearing and settlement model. It would be beneficial for Asia, however, to move towards a gradual rationalisation of the domestic and regional infrastructure, introducing interoperability between domestic and cross-border systems as well as leveraging the various global and private sector initiatives like CLS.

In the interim, the predominantly domestic infrastructure should focus on increasing transparency and implementing optimal execution and operational mechanisms. This will allow the current system to increase cost efficiency, provide investors with fast and robust execution and processing mechanisms and align the local market with international standards.

Certain countries have started to integrate parts of the clearing and settlement infrastructure, achieving economies of scale (horizontal integration) or scope (vertical integration). Examples of horizontal integration can be found in Korea, where the Korea Securities Depository (KSD) acts as the central depository for all instruments in the market, or in Australia, where government bonds were transferred to Austraclear in 2002. The benefits of vertical integration are clearly illustrated in Indonesia where, since the introduction of the Bank Indonesia - Scripless Securities Settlement System (BI-SSSS), securities are cleared and settled in scripless form at Bank Indonesia (BI) and payments occur through the central bank's RTGS system. This is an encouraging trend provided the market remains vigilant in assessing the associated risks, related to the creation of a de facto monopolistic situation (higher costs) or to the introduction of contagion risk through increased system concentration.

We therefore conclude that due to the specific developments in the Asian markets, domestic systems will probably prevail, but that some form of integration can optimise the services offered to both local and foreign investors. Another option that could possibly be introduced in an Asian context is the utility-type approach, where a central, preferably user-owned, entity provides multicurrency central depository services.

3. Regulations concerning clearing and settlement structures

3.1 Introduction

The challenges that regulators and market participants face in building a robust and efficient infrastructure are numerous and complex. Many working groups and regulators have contributed extensively to the creation of an operational and regulatory framework in which this process can be conducted.

In the next section, some recommendations and research papers published on the subject have been brought together. The main reports that will be briefly discussed are:

- Global publications:
 - G30 recommendations;
 - CPSS/IOSCO report.
- European publications:
 - Giovannini report(s);

- ESCB/CESR report;
- the Lamfalussy process (“Committee of Wise Men”).
- US rules and regulations:
 - Rule 17f-7 of the Investment Company Act of 1940.

3.2 Global recommendations

3.2.1 G30 recommendations (Annex 2)

The Group of Thirty (G30) is a private, not-for-profit, international institute composed of senior representatives from the private and public sectors and the academic world. The G30 has been instrumental in creating a common understanding about the structure of a secure and efficient clearing and settlement infrastructure.

The G30 issued a first report on clearing and settlement in 1989, with the principal objective of improving local market practices. A second report (Plan for Action) issued in January 2003 contains 20 recommendations designed to create a robust interoperable global network, mitigate risk and improve governance.

3.2.2 CPSS/IOSCO recommendations (Annex 3)

In December 1999, a task force launched by the Bank for International Settlements (BIS) reviewed and consolidated the work performed by the International Organization of Securities Commissions (IOSCO) and the Committee on Payment and Settlement Systems (CPSS).

As a result, in 2002, the task force issued 18 recommendations to enhance the safety of, and reduce the system risk inherent in, central securities depositories.

3.3 European initiatives

3.3.1 Giovannini report(s)

The first Giovannini report was issued in November 2001 and identified 15 technical, market practice, legal and fiscal barriers to creating a low-cost cross-border settlement system. Out of these 15 barriers, 10 were deemed to be of a legal and regulatory nature (and not due to technical constraints or market practice), emphasising the importance of close interaction between the public and private sectors.

A second Giovannini report, issued in April 2003, presented a road map for removing the barriers identified in the first report, and assigned action and follow-up responsibilities. Finally, the report contained a detailed description of possible consolidation models and policy responses.

3.3.2 ESCB/CESR report (European System of Central Banks/Committee of European Securities Regulators)

In early 2002, the ESCB/CESR consulted the financial industry on how the global CPSS/IOSCO recommendations for securities settlement systems should be adapted and strengthened to apply to the European marketplace.

An extra standard has been added to the existing 18 CPSS/IOSCO recommendations covering the “custodians operating systematically important systems” notion.

3.3.3 The Lamfalussy process (“Committee of Wise Men”)

The Committee of Wise Men was appointed in July 2000 by the European Council of Finance Ministers (ECOFIN) out of concern that the existing regulatory and legislative framework

hampered the growth and competitiveness of European securities markets. The committee was mandated to identify all obstacles in the securities markets that impede cross-border transactions and to suggest remedial actions.

The final report, issued in 2001, found that important gaps persist in European legislation and that the conventional legislative process of the EU is too slow, complex and cumbersome.

3.4 US rules and regulations

3.4.1 Rule 17f-7 of the Investment Company Act of 1940

In 2000, the US Securities and Exchange Commission (SEC) adopted Rule 17f-7, which governs the circumstances under which US investment companies may hold securities through the facilities of non-US central securities depositories.

The key requirement of Rule 17f-7, by reference to Rule 17f-4, is that an investment company must receive from its “primary custodian” an analysis of the custody risks associated with maintaining assets with each depository it uses.

Rule 17f-7 does not provide specific guidance concerning the content of these analyses of depository custody risk, but in the release announcing the adoption of the rule, the SEC stated:

“As a general matter, we expect that an analysis will cover a depository’s expertise and market reputation, the quality of its services, its financial strength, any insurance or indemnification arrangements, the extent and quality of regulation and independent examination of the depository, its standing in published ratings, its internal controls and other procedures for safeguarding investments, and any related legal protections.”

The Bank of New York, as a primary custodian, reviews all depositories in its global custody network on their eligibility under Rule 17f-7 of the Investment Company Act of 1940. The eligibility requirements as detailed in the rule are that depositories must:

- act or operate a system for the central handling of securities or equivalent book entries in the country;
- be regulated by a foreign financial regulatory authority;
- hold assets for the custodian that participates in the system under safekeeping conditions no less favourable than the conditions that apply to other participants;
- maintain records that identify the assets of each participant and segregate the system’s own assets from the assets of participants;
- provide periodic reports to its participants with respect to its safekeeping of assets, including notices of transfers to or from any participant’s accounts;
- be subject to periodic examination by regulatory authorities or independent accountants.

Section II: Analysis of Asian settlement infrastructure

1. Asian infrastructure review: methodology

1.1 Introduction

In Section II, we shift our attention and assess the situation in Asia, identifying areas of strength or potential improvement.

Similar to the other regions, the clearing and settlement infrastructure in Asia has been developed and is being continuously refined to reduce the inherent clearing and settlement risks and to contain or lower the cost structure.

When reviewing the specific Asian situation, we focus on risk management aspects, as this constitutes a critical component of the investment decision process. In addition, investors' awareness of market infrastructure risk continues to grow.

1.2 Framework and scope of the Asia review and analysis

- As a global custodian, the Bank of New York (BNY) is most intimately involved with the settlement and safekeeping functions in the domestic custody markets. As such, our analysis will focus on central securities depositories and not on the clearing infrastructure.
- The review pertains to the fixed income market (government and corporate bonds) only.
- The analysis is based on BNY's research on the central depositories' compliance with Rule 17f-7 of the US Securities Investment Act of 1940. Generally, the information provided is derived from data received from the respective depositories and is believed to be reliable and accurate.
- The decision to use the 17f-7 rule criteria in our analysis does not imply any opinion on the value and usefulness of the other recommendations as described in the first section, but is made primarily based on BNY's expertise in this area.

1.3 Risks associated with central securities depository infrastructure

In general, we believe investors should review and be aware of five broad risk categories when assessing whether a central securities depository meets their infrastructure risk tolerance. Even though each risk category is reviewed separately, it should be noted that risks are typically cumulative and should therefore be looked at on an aggregate basis.

Risk is only one, albeit critical, part of every due diligence. In addition, it is important to remain vigilant to other factors that may impact the depository activity, like scalability and remaining excess capacity. This becomes especially important if a depository is considering expanding its responsibilities and activities, either by accepting new instruments, through the consolidation of depository functions within a given market, or if cross-border activity is expected to add substantial volumes to the domestic activity.

The five broad risk criteria to be reviewed are:

1.3.1 Market risk

Market risk is probably the broadest category and covers generic elements related to the market as a whole. In the context of the Asian depositories review, this section will focus on:

- the organisational structure of the depository;
- immobilisation/dematerialisation of securities.

1.3.2 Legal risk

The regulatory environment and the legal structures covering central securities depositories are critical to ensure the safety of the assets and contract enforceability. Features of the legal risk review include:

- regulations and governance rules covering the depository activity;
- enforcement history in case of non-compliance;

- compulsory use of the depository;
- the liabilities assumed by the central securities depositories;
- the asset segregation policies of the depository system;
- recourse options when accounts are blocked and assets frozen;
- central depository asset lien provisions.

1.3.3 Credit risk

Credit risk is a third important aspect of the risk framework and is considered as a combination of:

- *principal risk*: counterparty default.
- *replacement risk*: in case of failed settlement, counterparties may be compelled to acquire securities in the marketplace, where prices may have fluctuated.
- *liquidity risk*: required funding is not available to fulfil the payment obligations.

When looking at credit risk in an infrastructure context, we will focus on:

- the membership criteria established by the depository;
- the compliance monitoring process;
- the disciplinary action available to the depositories when rules are breached;
- the existence of guarantee funds and insurance policies;
- the credit facilities extended by the depositories to their participants.

1.3.4 Operational/custody risk

This section describes how depositories handle operations risks, and reviews:

- the depositories' performance and functionality;
- guarantee funds and insurance policies;
- the availability of delivery versus payment (DVP) settlement.

Table 1

The BIS settlement models

Model 1	Systems that settle transfer instructions for both securities and funds on a trade by trade (gross) basis, with final (unconditional) transfer of securities from the seller to the buyer (delivery) occurring at the same time as final transfer of funds from the buyer to the seller (payment).
Model 2	Systems that settle securities transfer instructions on a gross basis, with final transfer of securities from the seller to the buyer (delivery) occurring throughout the processing cycle, but settle funds transfer on a net basis, with final transfer of funds from the buyer to the seller (payment) occurring at the end of the processing cycle.
Model 3	Systems that settle transfer instructions for both securities and funds on a net basis, with final transfers of both securities and funds occurring at the end of the processing cycle.

1.3.5 Systemic risk

Eliminating systemic risk allows depositories to ensure the soundness and robustness of their systems, especially to cope with adversities or business interruptions. The question of whether a contagion effect can occur through the unwinding of settled transactions is addressed in the operational/custody risk section, where we review the settlement methods. In this section, we will focus on the central securities depositories' business recovery plans.

2. Asian infrastructure depository analysis

2.1 Introduction

We reviewed the risk management tools and processes adopted by selected central securities depositories in a country by country analysis. We believe the group of selected central securities depositories, although not exhaustive, is representative for the Asian region and includes a mixture of entities serving both the government and corporate bond market segments.

Table 2

Country by country assessment: markets and depositories

Country	Central securities depository
Australia	Austraclear
China	CSDCC Shanghai and Shenzhen ¹
Hong Kong SAR	Central Monetary Unit (CMU)
India	Reserve Bank of India (RBI) National Securities Depository Limited (NSDL)
Indonesia	Bank Indonesia (BI)
Japan	The Bank of Japan (BOJ)
Korea	Korea Securities Depository (KSD)
Malaysia	Bank Negara Malaysia (BNM)
Philippines	The Bureau of Treasury (BTR) The Philippine Central Depository Inc (PCD) ²
Singapore	The Monetary Authority of Singapore (MAS)
Taiwan, China	Central Bank of China (CBC) Taiwan Securities Central Depository (TSCD)
Thailand	The Bank of Thailand (BOT) The Thailand Securities Depository Co Limited (TSD)

¹ The current QFII scheme in China may be subject to further changes by the regulators and may affect the risk assessment of the China Securities Depository and Clearing Corporation Ltd (CSDCC). ² The PCD received a temporary operating licence for debt securities in March 2002 and is expected to become a subsidiary of the Fixed Income Exchange, when established (due date 2004). Even though part of the initial analysis, all observations concerning the PCD have been excluded from the results, as the PCD is currently not used for the safekeeping or settlement of fixed income instruments.

2.2 Government bond trading mechanisms

Even though trading falls outside the scope of this analysis, we found that in certain cases the trading and settlement environments are highly correlated and that trading restrictions may largely affect the mechanics of the settlement process and the attractiveness of a given market.

When appraising the trading process in the government and corporate bond market, we found that fixed income markets are generally less developed compared to the more active domestic equity markets.

Some of the major limitations to foreign investor participation in the markets reviewed are:

Liquidity constraints

Bond issues are, for a variety of reasons, taken up by local investors and held to maturity. In addition, because of the countries' budgetary surpluses, Asian governments have traditionally not issued large quantities of government paper. Both of these trends have affected the development of the market infrastructure considerably and have negatively impacted market liquidity.

- *Australia:* Commonwealth Government Securities are popular amongst banks/local institutions and form a large part of their statutory liquidity requirements.
- *Korea:* Government bonds are acquired by large investment trust companies, banks and life insurance companies to satisfy reserve requirements. The same investors also acquire corporate bonds.
- *Malaysia:* Both Malaysian Government Securities (MGS longer tenures) and private debt securities (PDS) are typically held till maturity. The local Employees Provident Fund (EPF) is a big investor in the fixed income market.
- *Singapore:* About 80-90% of all corporate bonds are acquired by banks and insurance companies and are typically held as proprietary positions until maturity.
- *Thailand:* The Bank of Thailand (BOT) generally issues BOT bonds only to financial institutions, which use them to satisfy reserve and liquidity requirements.

Foreign investor restrictions

In selected countries, foreign investor regulations, restricting foreign participation in the market, still apply. Most of these require foreign investors to obtain prior approvals from the central bank (mainly foreign exchange-related) or from the regulators (investor status).

- *China:* Foreign participation is only allowed through the QFII (qualified foreign institutional investor) scheme and is restricted to exchange-listed Treasury and convertible bonds. Stringent capital controls are still in place.
- *India:* Foreign institutional investors (FIIs) must be registered with the Securities and Exchange Board of India (SEBI) and the Reserve Bank of India (RBI). Approved investors are allowed to invest up to 30% of the total portfolio in debt instruments. Separate approval is required to start a 100% debt fund.
- *Indonesia:* Foreign participation is subject to prior approval from Bank Indonesia (BI) and/or Bapepam, the capital markets supervisory agency. Foreign exchange transactions must be approved and supported by underlying trade evidence.
- *Japan:* No direct restrictions apply but foreign investors are subject to stringent foreign indirect participant and qualified foreign intermediary rules.

- *Korea*: Investors must obtain an investment registration certificate from the Financial Supervisory Service (FSS). Korean won can only be purchased to meet exact payment obligations.
- *Philippines*: Inward/outward remittances of funds are subject to central bank approval.
- *Taiwan, China (hereinafter Taiwan)*: Until the new FINI rules replaced the existing QFII/non-QFII regulations, foreign investors were only allowed to hold a single cash account. As this account was generally used for equity-related transactions, access to the fixed income market was effectively barred. Foreign participation in the repo market is capped and foreign exchange transactions must be reported to the central bank.
- *Thailand*: Same day and next day foreign exchange transactions are prohibited.

2.3 Current clearing and settlement infrastructure in Asia

Before taking the analysis to an individual country level, let's look at the clearing and settlement infrastructure in the region as a whole.

Annex 4 presents a summary of the clearing and settlement infrastructure in selected Asian countries for government and corporate bonds. For each country, the central securities depositories, the payment system operator, the central clearing counterparty (if applicable) and the clearing houses (if applicable) for government and corporate bonds have been tabulated.

Without focusing on specific roles or responsibilities, some interesting trends and observations about the organisation of the Asian domestic market infrastructure appear.

- A positive trend that has developed in most countries is the creation of formal central securities depositories to settle and safekeep all types of securities. In some countries, physical scrip still exists, but these instances are generally exceptional, and physical securities are being gradually phased out.
- Payments are processed either electronically or by cheque. Cheques are used in China (partly), Taiwan (partly) and India (across instruments). A further move towards the implementation of electronic payment systems, in our view, should be encouraged.
- Central clearing counterparties are not common. In countries where the concept has been introduced, CCPs remain closely linked to either the exchange or the clearing house. The feasibility and implications of introducing a central counterparty need to be explored in further detail, taking into account specific market mechanics and conditions.
- Securities clearing generally occurs through separate entities (India, Hong Kong SAR, Philippines, Malaysia), licensed clearing banks (Taiwan), depositories (Taiwan - selected corporate bonds; Thailand, corporate bonds) or the exchange (Korea).
- Usually, different institutions assume the role of CSD, payment system operator, CCP and clearing house, depending on the underlying instrument, resulting in a highly fragmented environment, which may lead to significant market inefficiencies. Exceptions are Australia, China and Korea, where infrastructure is consistent across segments.
- Within a specific asset class, infrastructure may differ based on the trading methods (on exchange or OTC), eg government bonds in Hong Kong or corporate bonds in Malaysia, further contributing to the market fragmentation and potential inefficiencies.

- Even though payment systems may also differ across segments, the cash infrastructure is less fragmented due to central banks' involvement in the payment side. In Malaysia and Thailand, for example, although instruments are held in different depositories, payments are processed through the central bank's RTGS system (RENTAS and BAHTNET respectively).
- Government bonds are commonly deposited at central banks or their affiliates (Hong Kong, India, Indonesia, Malaysia, Philippines, Thailand), providing the market participants with an additional level of comfort with the depository infrastructure.
- In the other markets, fixed income instruments are held at depository and clearing corporations (China, Hong Kong (selected issues) and Korea), limited liability companies (Australia) or licensed clearing banks (Taiwan).
- Due to the similar trading conventions, the corporate bond intermediaries are generally more closely aligned with the equity than with the government bond infrastructure.

In summary, the domestic clearing and settlement infrastructure in Asia is very fragmented and differs significantly across markets and instruments. Central banks play an important role as depositories for government bonds, while the corporate bond market infrastructure follows the equity market practices and infrastructure setup more closely.

2.4 Risk reviews of the selected Asian central depositories

In our assessment, the organisation and structure of the central securities depositories have been tested against the various risk categories discussed in Section II.1.3:

- market risk;
- legal risk;
- credit risk;
- operational/custody risk;
- systemic risk.

Before going into the specifics of each risk component, it is important to highlight a unique aspect of the relationship between the CSD, the local custodian (domestic settlement and safekeeping agent) and the global custodian.

Even though the assets of a particular beneficial owner are held at a CSD, this investor has not necessarily entered into a direct contractual relationship with the market provider. If a beneficial owner uses a global custodian for its back office operations, these services are governed by a specific global custody agreement.

Generally, to complete the chain through to the CSD, two more contractual/service relationships have been set up to service the assets. First, there is the link between the local and global custodian, based on a legal contract, and secondly, the relationship between the CSD and the local custodian, generally covered by a participant agreement.

Considering the breadth and width of these cascading relationships, it is critical to adopt a strict and continued due diligence process. This review and due diligence practice is important not only with regard to the entities with which a direct contractual relationship has been established, but also, and probably even more so, with regard to the other intermediaries (such as CSDs, payment systems, etc) with which no legal link exists. To do this effectively, market specific features must be reviewed carefully and local legal opinions may be required in certain cases to validate generally accepted practices in a local market context.

2.4.1 Market risk

As part of the investment decision, investors participating in cross-border trading have to be aware of the market risks that investing in foreign markets and jurisdictions may entail. As elements related to the organisation and governance of the securities depository may contribute to the overall market risk, this section will focus on some of those specific elements.

The organisational structure of the depository

Understanding the ownership structure of a central securities depository is important for assessing its financial strength and support structure. Central banks or government-owned entities usually receive the implicit or explicit backing of the government, whereas it is important to analyse the financial statements for private entities to fully assess the financial soundness of these providers and their ability to deal with default or other adverse event risk.

From the selected central securities depositories:

- three are organised as for-profit private limited liability companies (Austraclear (Australia), NSDL (India), TSD (Thailand));
- three are non-profit organisations partly or wholly owned by the exchange (CSDCC (China), KSD (Korea), TSCD (Taiwan); the KSD has the widest ownership structure);
- nine central banks, units of a central bank or entities fully owned by the government provide government bond depository services and operate on a non-profit basis (CMU (Hong Kong; cost recovery basis), RBI (India), BI (Indonesia), BOJ (Japan), BNM (Malaysia), BTR (Philippines), MAS (Singapore), CBC (Taiwan), BOT (Thailand)).

Immobilisation/dematerialisation of securities

Physical securities are almost non-existent in today's markets. In general, fixed income paper deposited at the CSDs is either held in dematerialised or immobilised form, or a combination of the two (depending on the issuer or instrument):

- Securities are held in dematerialised form at the CSDCC (China), NSDL and RBI (India), BI (Indonesia; for current issues), BOJ (Japan), BNM (Malaysia), BTR (Philippines), MAS (Singapore; insignificant portion of physical shares still exists), CBC (Taiwan), TSD and BOT (Thailand).
- Securities are held in immobilised form at the TSCD (Taiwan).
- Instruments deposited at the following depositories are held in either immobilised or dematerialised form, depending on the issuer or the instrument: Austraclear (Australia), CMU (Hong Kong; EFBs and EFNs are dematerialised, other instruments are held in immobilised form at two external settlement banks), KSD (93% is dematerialised, the remainder is held in immobilised form).

2.4.2 Legal risk

Regulations and governance rules covering central depository activity

Considering that the rules under which the depositories are governed may affect the outcome of legal disputes or other adverse situations, it is important to gain a fair understanding of the depositories' legal foundation and oversight structure.

- Central banks and other government-owned institutions, which are widely represented in our selection, are generally self-regulated entities, incorporated under the central bank laws of their respective countries and subject to oversight

and supervision of government-linked commissions or ministries. Examples are CMU (Hong Kong), RBI (India), BI (Indonesia), BOJ (Japan), BNM (Malaysia), BTR (Philippines), MAS (Singapore), CBC (Taiwan) and BOT (Thailand).

- Supervision of the non-central bank entities (Austraclear (Australia), CSDCC (China), NSDL (India), KSD (Korea), TSCD (Taiwan), TSD (Thailand)) generally falls under the purview of the financial market regulators or government entities (ministries or government departments). A common regulator is the Securities and Exchange Commission (SEC) or its local equivalent.

Even though the financial regulators in each market keep close oversight over the depositories, it remains prudent to ensure that specific contracts entered into by investors or their representatives are enforceable under the local laws and regulations.

Enforcement actions in case of non-compliance

If central securities depositories fail to comply with the statutory or regulatory requirements, the supervisory authorities may resort to remedial or enforcement actions such as imposing fines or restricting, suspending or terminating the activities of the depository. All depositories in the review stated that no such action had been brought against them in the past three years.

Compulsory use of the depository

The use of central securities depositories for safekeeping and settlement is required either by law or by local market practice. This improves transparency and reduces the risks of settlement fails due to timing issues related to the withdrawal or lodgment process.

The use of the central depository for *safekeeping* is:

- not compulsory: none;
- compulsory by law: CSDCC (China); CMU (Hong Kong; EFB/EFN); BI (Indonesia; verbal confirmation); BNM (Malaysia); BTR (Philippines); KSD (Korea); CBC (Taiwan; government bonds issued after September 1997);
- consistent with prevailing market practice: Austraclear (Australia); CMU (HK; other); RBI and NSDL (India); MAS (Singapore); TSCD (Taiwan); TSD and BOT (Thailand).

The use of the central depository for *settlement* is:

- not compulsory: none;
- compulsory by law: CSDCC; CMU (EFB/EFN); RBI; NSDL; BI (verbal confirmation); BOJ; BNM; BTR; PCD; KSD; TSCD; TSD; CBC (government bonds issued after September 1997);
- consistent with prevailing market practice: Austraclear; CMU (other); MAS; BOT.

The liabilities assumed by central securities depositories

The liability question is important in view of the compulsory nature of safekeeping and settlement through most depositories. Apart from the fact that none of the depositories assume liability for force majeure, political risks or acts of God, liability language may differ substantially across central depositories:

- The CSDCC (China), RBI and NSDL (India), BI (Indonesia), BOJ (Japan) and KSD (Korea) assume liability for their own performance.
- The TSCD (Taiwan) assumes liability for its own performance to the extent that the loss is covered by insurance, and MAS in Singapore assumes liability for its own

performance, limited to an amount not exceeding the value of the non-recoverable amount plus interest.

- Other depositories do not assume liability for their own performance: Austraclear (Australia), CMU (Hong Kong: “unless the error is caused by wilful default or gross negligence of the HKMA or its servants or agents”), BNM (except for loss of participant’s securities) and BTR (Philippines).
- In addition, the CMU (Hong Kong), which safekeeps physical certificates for bonds and money market instruments at two subcustodians, states that, in the event of a loss, the CMU will in the first instance recover its own damages from the payment received from the subcustodian, and subsequently distribute compensation to affected CMU members.
- The Bank of Thailand (BOT) states that it is liable for direct losses related to reconciliation errors with registrars and theft of securities, but that it does not assume liability for its errors and omissions or failure of its systems, and that it is immune from legal action in its own jurisdiction.

The asset segregation policies of the depository system

In countries where nominee registration is very common, it is important to understand the account setup and asset segregation policies adopted by the depositories, as this may have important consequences in cases of default or insolvency.

- In all countries reviewed, the depository’s proprietary assets (if any) are separated from the participant’s assets. Austraclear, the BOJ and the KSD, explicitly state that they do not hold any proprietary assets in the depository system.
- In most countries, participants are required to segregate their proprietary and client assets. Exceptions are Australia (Austraclear), where segregation at the participant level is optional, and Indonesia (BI), where segregation is not allowed.
- In general, setting up omnibus accounts is a common market practice. Assets in omnibus accounts are usually held on a fully fungible basis and are not identified as resident/non-resident holdings, or are not linked to a specific individual investor.
- In China (CSDCC), India (NSDL) and Korea (KSD), where foreign investors are subject to prior investment approval from the authorities or regulators, assets are unambiguously linked to the accounts of an approved underlying foreign investor.
- In Japan, the account structures at the BOJ allow for the identification of non-resident holdings and the beneficial owner’s tax status and liabilities.
- In Malaysia (BNM), assets are identified as either resident or non-resident holdings.
- In Thailand (BOT), proprietary assets are segregated from client assets. Client assets must be segregated per underlying client.

Recourse options when accounts are blocked or assets are frozen

Accounts may be blocked or assets frozen when disciplinary action (default/rule violations) is brought against a depository participant. It is important for the underlying investors to understand how this affects the protection of and access to assets:

- In Australia (Austraclear), Hong Kong (CMU) and the Philippines (BTR), access to the account by the underlying client is subject to the approval of an administrator/liquidator.
- In China (CSDCC), India (RBI) and Japan (BOJ), prior approval from the securities depository is required.

- In Korea (KSD), approval is granted by the securities regulators (FSS).
- In Indonesia (BI), Malaysia (BNM) and Thailand (TSD), access is subject to the relevant (bankruptcy) legislation.
- In India (NSDL), Taiwan (TSCD) and Thailand (BOT), assets are unambiguously linked to the underlying investor through the segregated account setup. Client accounts, therefore, remain fully accessible at all times.

Central depository asset lien provisions

Generally, a depository does not hold liens on assets, except in cases like:

- the payment of fees/expenses;
- securities encumbrance issues (Austraclear);
- settlement defaults (Thailand).
- Bank Indonesia stipulates that it has the authority to exercise a lien on a participant's proprietary assets (if required).

2.4.3 Credit risk

The membership criteria established by the depository

Participant eligibility criteria may vary from market to market. In all the countries analysed, however, applicants are subject to stringent rules and regulations outlined in the depository membership rules and/or imposed by the applicant's specific regulator (eg banks must be approved by the central bank). In addition, in certain markets, the depository's parent company (Austraclear), the exchange or the securities market regulator (CSDCC) must also approve all new membership applications.

In general, the legal framework governing the relationship between the depository and a participant comprises:

- a standard participation contract;
- terms and conditions of participation;
- rules and by-laws of the depository;
- relevant domestic laws and regulations.

The compliance monitoring process

- Usually, the depository monitors its participants' adherence to the membership criteria.
- In China (CSDCC), India (NSDL), Korea (KSD) and Taiwan (TSCD), the securities regulators assist the depository in the monitoring process.

Disciplinary actions available to the depositories when rules are breached

It is relatively rare that central securities depositories have to resort to disciplinary action to address non-compliance with the rules and regulations governing the CSD/participant relationship. However, in cases where action was deemed necessary, appropriate action was taken. No details about the specific cases have been disclosed. In cases of non-compliance, the central depositories can:

- impose fines;
- restrict, suspend or terminate the participant's membership.

In addition, the depositories in Japan (BOJ), India (RBI and NSDL), Korea (KSD) and Taiwan have also issued rules that specifically address disciplinary or remedial action in case of participant defaults or insolvency.

During the past three years:

- CSDCC Shanghai has taken action to address payment defaults;
- RBI (India) took action against participants that did not meet their settlement obligations;
- the NSDL (India) terminated or suspended seven participants that no longer met the net worth criteria or were disbarred from the exchange;
- BNM (Malaysia) resorted to disciplinary action and fines (no further details have been disclosed);
- all other depositories confirmed that no disciplinary or remedial actions have been taken against any of their participants.

The credit facilities extended by the depositories to their participants

Credit facilities and overdraft lines are important tools in mitigating liquidity and counterparty risk as they prevent the settlement activity from being disrupted even if there are not sufficient funds available. In most cases, the CSD does not directly extend credit facilities to its participants, who must enter into overdraft and credit arrangements with the local commercial banks.

- Austraclear (Australia), CSDCC (China), CMU (Hong Kong), BOJ (Japan), BTR (Philippines), MAS (Singapore), KSD (Korea) and TSCD (Taiwan) specifically indicated that they do not extend any credit or overdraft facilities to their participants.
- Only BNM (Malaysia) stipulated that it does extend intraday credit to its participants, provided sufficient collateral has been posted.

2.4.4 Operational/custody risk

Establishment of guarantee funds and insurance policies

Guarantee funds

Most central depositories do not guarantee settlement (as a central counterparty or otherwise), but act as agents in the settlement and safekeeping process. As such, they have not created any guarantee funds, but mitigate settlement risks through the adoption of true delivery versus payment settlement methods.

- Austraclear (Australia), CMU (Hong Kong), RBI and NSDL (India), BI (Indonesia), BNM (Malaysia), BTR (Philippines - even though settlement of matched transactions confirmed by both parties is guaranteed), MAS (Singapore) and the KSD (Korea) have not established guarantee funds to cover their daily activities.
- CSDCC (China) has set up both a settlement risk (systemic failure) and a settlement guarantee fund (participant default).
- BOJ (Japan) maintains an investor protection trust (participant default).
- TSCD (Taiwan) contributes 5% of its operating income to a “default damaged reserve fund” to cover losses of or damage to share certificates under custody.
- TSD (Thailand) acts as a central counterparty to trades between clearing members of the exchange only, and has established a credit line with the settlement banks to cover settlement default. Settlement between custodian banks and their counterparties is not covered.

Guarantee funds are more common in a trading and clearing environment. If a guarantee fund has been created, it is important to evaluate the fund's size, payout criteria and replenishment schedules to ensure the available resources are adequate to mitigate the risks they cover.

- In India, CCIL (Clearing Corporation of India Ltd) and the respective clearing houses related to the respective stock exchange assist the depositories in the settlement process and maintain guarantee funds to mitigate associated risks.
- In Korea, Taiwan and Thailand, the stock exchanges maintain guarantee funds to compensate losses resulting from a member's default.

Insurance policies

If guarantee funds are not available, it is important to review the insurance policies a CSD has arranged to protect itself and its participants against adverse events. When analysing the available policies, it is important to focus on the policy coverage and carrier, the amounts insured and the applicable deductible amounts to assess the risk-mitigating capacity of the specific policies.

- The central banks or linked depositories in our review (CMU (Hong Kong), RBI (India), BI (Indonesia), BOJ (Japan), BNM (Malaysia), BTR (Philippines) and MAS (Singapore)) typically do not maintain third-party insurance policies.
- Of the non-central banks, only CSDCC (China) does not maintain insurance.
- NSDL (India), KSD (Korea), TSCD (Taiwan) and TSD (Thailand) maintain insurance policies to meet claims arising from their depository services and performance.

Performance and functionality

Functionality

For participants and underlying investors, it is important to understand how a CSD is organised from a functional point of view, and whether risk is concentrated within the CSD or is further disseminated to third-party providers through outside vendor/contractor relationships.

- Austraclear (Australia), CSDCC (China), NSDL (India), BNM (Malaysia), BTR (Philippines), MAS (Singapore), KSD (Korea), TSCD (Taiwan) and the TSD (Thailand) handle all functions related to depository responsibilities in-house and do not outsource any activities to third party providers.
- CMU (Hong Kong) provides all depository functions in-house except for the safekeeping of physical certificates (private subcustodians) and computer processing (HK Interbank Clearing Limited).
- RBI (India) provides services internally except for netting services and the computing of participant obligations of certain trades, which is outsourced to the clearing house CCIL.
- BOJ (Japan) performs all functions internally except for communications, for which it employs NTT, the national telephone carrier.

Communication procedures

Most depositories communicate with their participants through either:

- proprietary technology;
- secure dial-up or leased connections;
- a combination thereof.

Control procedures and performance history

All depositories have implemented stringent internal control procedures, mitigating operational risk. During the past three years, no adverse performance has been reported that resulted in system disruptions of significant proportions.

Audits

When reviewing the performance, functionality and overall stability of market intermediaries and providers, it is important to complement proprietary due diligence results with feedback provided in both internal and external (independent) audit reviews:

- Central banks, as self-regulated entities, are generally subject to statutory audit reviews by the government and to internal audit reviews.
- Some central banks (eg RBI - India) reported only a statutory audit requirement.
- Austraclear (Australia), CSDCC (China) and CMU (Hong Kong) are subject to both internal and external audits.
- The NSDL (India) is subject to regular external and ad hoc regulatory (SEBI) audits.
- The KSD (Korea) is subject to annual internal/external and regulatory (FSS) audits.
- The TSCD (Taiwan) is subject to four levels of audit (internal, external and regulatory (SFC), as well as an operational audit on its computer systems).
- The TSD (Thailand) is audited annually by the SET internal auditor (operational), twice a year by external auditors (financial), and is subject to an occasional audit by the SEC.

In addition, risk management policies of the CSDCC (China), CMU (Hong Kong), NSDL and RBI (India) and the BOJ (Japan) are reviewed separately by specifically appointed risk review committees.

Even though audit reports were not always made available for review, the depositories stated that during the last audit no material exceptions were found. Only the NSDL (India) reported that minor exceptions were found (no further details are available).

Data security

All depositories have implemented rigorous safeguards to ensure data security and protection, such as unique passwords and user IDs (subject to regular change) and lockout facilities, and depositories holding physical certificates employ guards to protect the vaults.

Availability of delivery versus payment settlement

The settlement process is the source of a variety of important risks and should therefore be carefully analysed when assessing the soundness and safety of a central securities depository. In view of the importance of this section, a detailed description of the settlement process and some of the risk mitigators addressing certain aspects of the operational processes for each country/depository in the analysis has been included in Annex 5.

2.4.5 Systemic risk

The establishment of business recovery plans

All depositories have detailed business recovery plans in place covering physical equipment, software and data security as well as organisational structure. Most depositories also have backup locations where business can be resumed if normal activity has been disrupted. Exceptions to this rule are the KSD (Korea; planned for 2004) and the RBI (India), where both the main and the backup centre are located at the same premises. Generally, the full

details of the business continuity and recovery plans are not divulged to the public for security reasons.

In most instances, data are backed up electronically and stored off-site. Most depositories have a documentation retention policy ranging between five (one case) and 20 years (one case). The most common retention periods are either seven or 10 years. RBI (India) and BI (Indonesia) did not disclose their retention policy guidelines.

Operational procedures are generally tested on a regular basis (at least once a year). Results are usually not disclosed, or disclosed only in broad terms or in local language (CSDCC (China), BOJ (Japan)). In some cases, testing frequencies are not divulged (CSDCC Shanghai). MAS (Singapore) publishes full test results.

In case of a failure, the depositories have comprehensive communication policies to inform the public and the authorities as well as the regulators.

The backup facility can generally be activated within one to four hours. KSD (Korea) confirmed backup facilities can be made operational within three hours, NSDL (India) reported a 24-hour required lead time and the TSCD (Taiwan) a four-to eight-hour required lead time.

None of the depositories has had to activate the emergency plans during the past three years, except for the TSCD (Taiwan; no details have been provided).

2.4.6 Conclusion

The analysis of Asian central securities depositories reveals, in our opinion, that the depositories reviewed comply with the criteria outlined in Rule 17f-7 of the US Investment Act of 1940. The structural and operational framework appears to be on a level consistent with that of other central securities depositories serving comparable securities markets.

As outlined, the broad criteria that depositories must comply with to be considered an eligible central securities depository under rule 17f-7 are:

- acting as a system of central handling of securities;
- being regulated by a financial regulatory authority;
- holding assets of all participants on equivalent terms;
- identifying and segregating participant assets;
- reporting periodically to participants;
- being examined at regular intervals by a regulator or independent accountant.

Some of the most noteworthy criteria we should retain from the above analysis are that depositories should:

- consolidate the depository functions to service all securities in a domestic market;
- create real-time RTGS processing models, as these effectively mitigate risks, even though they tend to be more costly due to the liquidity requirements;
- set up effective support systems, such as securities lending and access to credit facilities, to ensure the system's efficiency and effectiveness;
- confirm trade details early on in the process and harmonise settlement cycles to allow further efficiencies;
- establish integrated and real-time links with the payment systems;
- remove physical certificates from the financial system and keep securities in immobilised or dematerialised form (where legally possible);

- safeguard the soundness of the system by segregating proprietary and client assets and by adopting enhanced risk management tools, such as insurance or guarantee funds;
- subject the infrastructure and its external links to periodic independent reviews.

Payment systems should:

- be centralised, with a single payment system responsible for settlement-related payments;
- be fully integrated with the securities depository;
- still be owned, operated or closely linked with the central bank to allow payments to be made in central bank funds;
- be structured as RTGS or continuous net settlement systems;
- allow for electronic transfers using secure systems achieving same day value and finality.

Other important observations we made relate to:

- *Validation of a depository's financial strength:* This validation is made either through the review of financial statements, ownership structure or risk management tools. Asia's government bond settlement infrastructure is still largely concentrated with central banks or affiliates, for which this information may not be readily available.

Central banks remain fundamental to the servicing of government bonds and for the operation of the payment systems because they:

- act as neutral participants at the centre of the system;
- receive a seal of confidence from the market;
- retain important oversight functions in order to:
 - maintain the safety of payments and the payment system;
 - maintain the safety of the clearing and settlement system;
 - promote the clearing and settlement system's efficiency.

The corporate bond market has evolved towards the use of non-central bank intermediaries, in line with the practices identified in the equity markets, for which financial statements and ownership information can be more easily obtained.

- *Mitigation of systemic risk:* A critical element in an environment where CSDs become more widespread and the technology advances rapidly. Default in one part of the payment, clearing, settlement and safekeeping system may cause a contagion effect and affect the entire clearing and settlement infrastructure.

The soundness of the overall operating and regulatory framework and the depositories' business recovery plans are important elements in all due diligence reviews. We have not found any major shortcomings with regard to regulatory or business recovery issues in our analysis. Only the fact that the KSD (Korea) and RBI (India) have their main and backup centres on the same premises is perceived as a potential source of risk.

- *Internal and external audit reviews:* these reviews are important in assessing the depositories' operating processes. Traditionally, central banks have not been subject to the same rigorous audit requirements as privately operated intermediaries. However, the assumption that they enjoy the backing of their respective governments in case of adverse events alleviates some of these concerns.

Possible general areas for improvement on the audit requirement are to:

- include audit reviews of the interlinked operating systems, such as payment systems or clearing houses;
- publish the audit results to make them freely available for external review.
- *Asset exposure risk:* These risks are mainly contained through the implementation of true DVP and RTGS systems. Austraclear (Australia), CMU (Hong Kong; real-time settlement), BOJ (Japan; DVP settlement), BNM (Malaysia), MAS (Singapore) and TSD (Thailand) have implemented real-time gross settlement systems.

In countries where no true DVP systems are available, additional measures have been put in place to address the liquidity and asset exposure risk.

- In Hong Kong (CMU), under the batch settlement mode, securities are put on hold until payments have been confirmed.
- In the Philippines (BTR) and Thailand (BOT), investors face intraday exposure due to the timing differences of the cash and securities settlement process.
- In China (CSDCC) and Taiwan (TSCD), securities, transferred on settlement date, become available to the investor the next day, when the payment has been confirmed.
- In India at the NSDL, an intraday exposure exists due to the timing differences between the pay-in and payout schedules.
- At the Reserve Bank of India, if settlement occurs through RBI accounts, no exposure exists. However, if cash settlement occurs outside the RBI, timing lags and exposures exist.
- *The applicable settlement cycles:* Most countries have adopted a TD+3 (at the latest) rolling settlement cycle for fixed income instruments, which corresponds to the generally accepted G30 time frame.

Some authorities are considering shortening the settlement cycle to limit the market and foreign exchange risks created by possible price fluctuations. Even though this risk reduction effect is highly desirable, in order to attract foreign investors, it is important to keep settlement cycles aligned with the foreign exchange contract timing to allow timely and proper funding of the cash accounts.

- *Liquidity risk:* Gross and net settlement systems are subject to different risks. The mechanics of a gross RTGS settlement system, for example, create larger liquidity exposures, which call for proper risk management tools.
 - In most countries, credit facilities are not available through the central depositories directly, but through the domestic commercial banks.
 - In Malaysia, lending facilities are not available to foreign investors.
 - In India (NSDL), there is only limited securities lending activity (not allowed for foreign investors) and the access to credit is uncertain.
 - In China (CSDCC), liquidity risk is mitigated through securities lending programmes and the existence of guarantee funds.
 - In Japan (BOJ), liquidity risk may arise under the non-DVP settlement method. These risks are addressed by making intraday credit limits available.
 - Both in Thailand (BOT), for BAHTNET users, and Malaysia (BNM), the depositories themselves extend credit to their participants.
 - In Indonesia, access to credit facilities is restricted, even through commercial banks.

- In Taiwan (TSCD), some risk elements are present, as participants only have limited access to securities lending facilities.
- In Korea (KSD), the fail-related lending programmes maintain stability in the market.
- In the Philippines and India, the use of cheques to make settlement-related payments introduces a risk element in the settlement process.
- The introduction of a repo market in China is considered as a positive development.
- *Counterparty risk:*
 - Through their design, RTGS settlement systems eliminate counterparty risk.
 - Central depositories typically mitigate counterparty risk by implementing rigorous participant membership criteria and adopting stringent membership monitoring tools.
 - If settlement is postponed due to insufficient balances of securities or cash, principal risk is taken out of the system but is replaced by market risk.
 - Failed settlements may attract market risk and expose counterparties to consequential losses. In Hong Kong (CMU), for example, failed trades are automatically cancelled from the system at the end of the day and must be re-entered.
 - Central depositories generally do not act as a central counterparty, except for TSCD (Taiwan), CSDCC (China) and BOT (Thailand; payments only). As such, counterparty exposure is reduced and guarantee funds have generally not been put in place.
 - Where guarantee funds have been implemented to safeguard financial stability, it is important to analyse the size, payout criteria and loss-sharing provisions of the fund.
 - Central banks typically do not enter into settlement assurance provisions or guarantee fund arrangements.
 - In both India and the Philippines, cheque use creates counterparty risk on payment banks.

In summary, we believe it is fair to conclude from the analysis that most countries are continuously looking at enhancing the clearing and settlement infrastructure to mitigate risks and reduce or contain costs. An illustration of this trend can be found in the implementation of the BI-SSSS in Indonesia. With the introduction of this scripless settlement system, the DVP, liquidity and operational risks inherent in the previous manual processes have been effectively mitigated.

2.5 Possible future central securities depository models for Asia

2.5.1 Introduction

After reviewing a selected number of central depositories in the region and the conclusions we have drawn, it is important to look at how the infrastructure could evolve over time.

Based on the observations about the current Asian models and taking into account trends around the world, we would like to review the following three options:

- interlinked depositories supported by open access to different domestic systems;

- a full integration/consolidation model;
- a private, central institution linked to the domestic market infrastructure.

2.5.2 *Interlinked depositories with open access*

In this model, links are established between the different providers, allowing for partial consolidation and a high degree of interoperability. This model can be seen as a first step towards full integration (please refer to the next paragraph).

Advantages

- Compared to a highly fragmented infrastructure, this model allows for partial risk mitigation (systemic, market, operational and liquidity risks) and potential cost efficiencies.
- Competitive element is retained through the coexistence of several providers.
- Implementation of increased transparency.

Disadvantages

- Investors/participants are required to establish memberships at various systems.
- Investment in interoperability is required - interoperability refers to technical compatibility of systems but also includes standardised communication/messaging, fees, contracts and procedures.
- Each component of the system must be efficient to ensure stability and robustness of the entire system.
- The ongoing costs of existing separate entities (maintenance and innovation) remain - there are few economies of scale.
- The costs associated with linking multiple back office systems are important.
- The integration of the component systems may be complex.

2.5.3 *Full consolidation*

A fully consolidated model, either within a given market or regionally (United States/Europe) requires close oversight by the authorities and the regulators to ensure a smooth functioning of the system. The integrated entity must be sound, backed with the necessary financial strength, and have stringent risk management tools and a strong and wide acceptance from participants. Generally, standardised and integrated processes reduce some of the major risks created in a fragmented environment.

Advantages

- Full integration provides important economies of scale.
- Economies of scale promote cost efficiencies. The absence of duplication of processes and investment reduce the required fixed and ongoing maintenance costs.
- Largest incentive to innovate and provide wider range of services (eg portfolio services).

Disadvantages

- Most expensive/complex structure to develop (system and processing re-engineering).

- Political/regulatory support required. Need for complex regulatory/taxation change.
- Important trade-off between full integration and increased systemic risk due to over-reliance on a single system and increased risks related to a lack of competition.
- Oversight is required to promote and ensure continued improvements to the system. The monopolistic situation may result in a lack or absence of incentives to innovate.
- On a pan-Asian basis, harmonised or streamlined processes within a given asset class (eg settlement cycles) are preferred as this facilitates the consolidation process and achieves the highest savings for the investors.

2.5.4 *Private, central institution linked to domestic market infrastructure*

The option of a central institution linked to the local market infrastructure (CSD, CCP, clearing house) is most valuable in a multicurrency environment (cross-border), and mimics the setup of an international central depository.

The utility should establish links through its local agents and its users, should be industry-owned and should either provide all services in-house or contract with various third-party entities to provide selected services. In order to provide all services in-house, this utility has to be organised as a bank to offer cash and credit-related services.

Where traditionally domestic central depositories do not have a banking licence and settle cash through central bank accounts, the central banks' involvement in a multicurrency environment becomes impractical, due to differences in time zone, timing and cutoff time. The utility could address this by offering settlement services using commercial bank money, through the recently launched Continuous Linked Settlement (CLS) infrastructure.

The utility model requires complex regulatory arrangements, stringent and multiple risk/concentration/ business recovery measures and acceptance from the participant and user communities.

2.5.5 *Conclusion*

When reviewing the outlook for Asia, it is important to evaluate risks in an integrated environment and in the current context. Today, Asia is a very fragmented region with large differences between the infrastructures servicing specific instrument types.

The domestic markets are continuing to evolve, as witnessed by the introduction of certain functionality or initiatives in various markets:

- establishment of rating agencies for corporate bonds (India and Indonesia);
- implementation of the BI-SSSS (Indonesia).

Future enhancements are being prepared to further enhance the development of the bond markets:

- STP processing (Australia);
- the expansion of international links and cooperation agreements (Hong Kong);
- introduction of the central counterparty concept for bond clearing (Japan, Thailand);
- a proposal to develop a long-term bond market and benchmark yield curve (Korea);
- introduction of a local fixed income exchange (Philippines);
- launch of 10-year government bond futures contract in January 2004 (Taiwan);
- a plan to move the TSD towards a T+2 settlement cycle (Thailand);
- TSD's development of a Post Trade Integration Project, aimed at integrating all system functions and centralising systems linked to market participants (Thailand);

- TSD's plan to extend its service offering to include bonds and to focus on STP processing initiatives (Thailand).

These initiatives streamline the domestic markets and offer a more robust and efficient infrastructure, focused on risk reduction and cost efficiencies.

The choice of the future path for the clearing and settlement infrastructure will be based on a trade-off between risk management, efficiency and costs, while at the same time implementing a system best suited for potential growth of the market.

Where domestic markets become more sophisticated, depositories could start playing a bigger role in the servicing of foreign investors' portfolios.

To be successful, Asian markets must overcome certain barriers, such as:

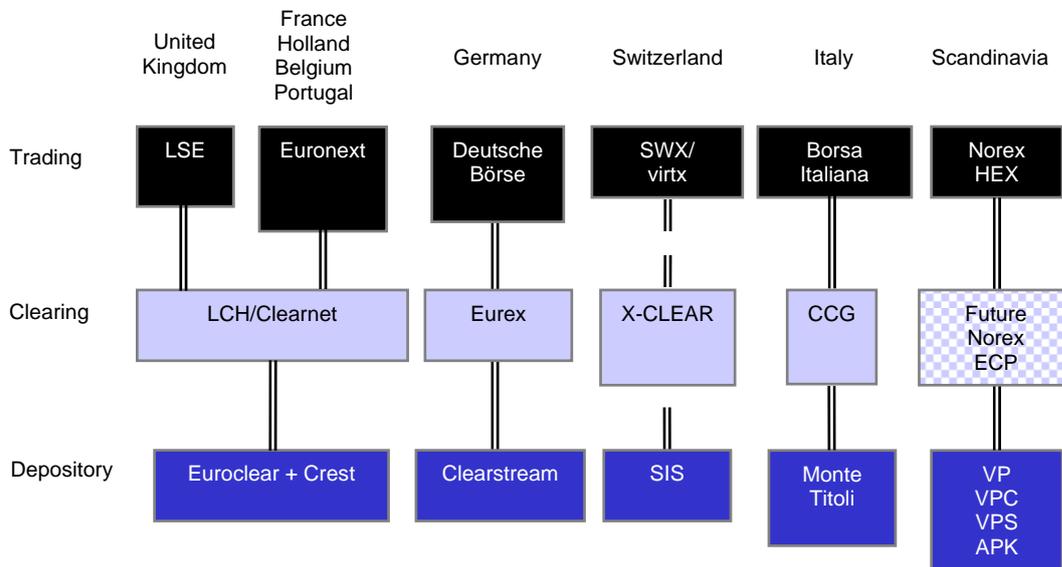
- *technology interfaces*: standardised communication and automation are critical in the development process and proprietary systems should be phased out.
- *need for intraday finality*: this will eliminate the need for expensive collateral or maintaining idle cash balances, reducing both funding cost and liquidity risks.
- *systems linkage*: links must be established allowing information transfers on a risk-free and efficient basis.
- *differences in market mechanics*: eliminate differences in settlement periods between instruments and adopt common market practices.
- *regulatory divergence*: harmonise the legislation applicable to all relevant market segments and encourage cooperation between the public and private sectors.

Rationalising the depository functionality may lead to integration or consolidation, but could potentially give rise to monopolistic issues, especially if the remaining entity is organised as a private, for-profit entity. Authorities must therefore implement appropriate oversight procedures to prevent upward cost pressures and to encourage continued innovation.

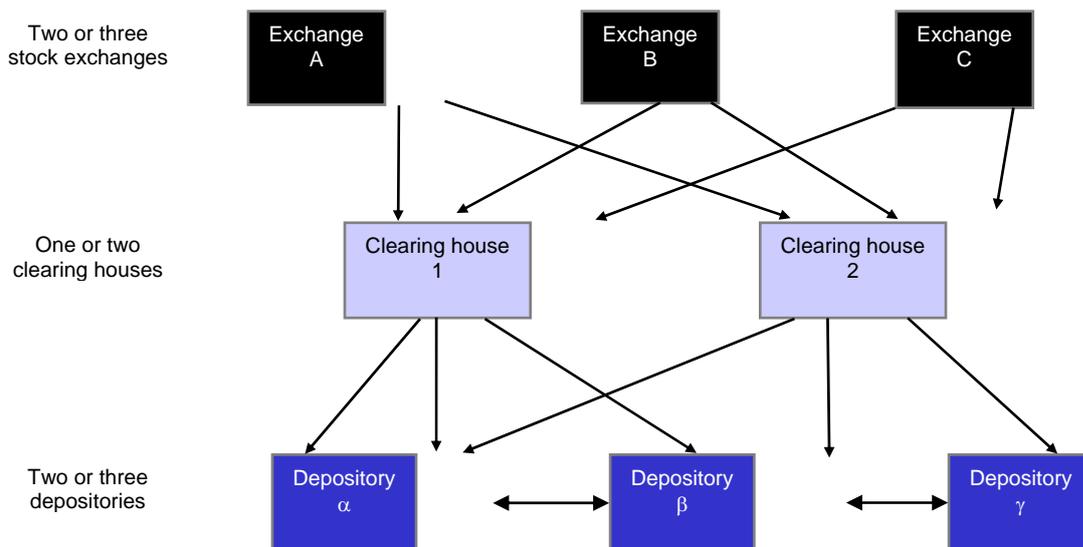
Taking into account the highly fragmented environment, we believe it is fair to say that the clearing and settlement environment is most likely to develop gradually, either by linking the local infrastructures or by introducing a "central utility". A steady move towards closer consolidation may be a next logical next step, but based on the important differences between the regulatory, operational and taxation laws in the respective markets, it is unlikely that a full regional consolidation/integration is possible.

Annex 1: European clearing and settlement environment

Current situation in Europe



Future outlook of the European marketplace



Annex 2: G30 recommendations

Table 3

G30 recommendations (1)

Recommendation 1a	Trade comparisons between direct market participants by T+0
Recommendation 1b	Matched trade details should be linked to the settlement system
Recommendation 2	Indirect market participants to achieve affirmation by T+1
Recommendation 3a	Central depository, broadest possible participation
Recommendation 3b	Widest possible range of depository eligible instruments
Recommendation 3c	Immobilisation/dematerialisation to the utmost extent possible
Recommendation 3d	Compatible rules and practices in case of multiple CSDs
Recommendation 4a	Real-time gross settlement system
Recommendation 4b	Trade netting system as per “Lamfalussy recommendations”
Recommendation 5	Delivery versus payment as defined by ISSA
Recommendation 6a	Same day funds for securities settlement
Recommendation 6b	Same day funds for the servicing of securities portfolios
Recommendation 7a	A rolling settlement system should be adopted by all markets
Recommendation 7b	Final settlement for all trades by T+3
Recommendation 8a	Securities lending and borrowing should be encouraged
Recommendation 8b	Existing regulatory and taxation barriers should be removed
Recommendation 9a	ISO Standard 7775 (securities messages)
Recommendation 9b	ISO Standard 6166 (ISIN numbering system)

Table 4

G30 recommendations (2)

Recommendation 1	Eliminate paper and automate communication, data capture and enrichment
Recommendation 2	Harmonise messaging standards and communication protocols
Recommendation 3	Develop and implement reference data standards (SWIFT, ISIN, BIC)
Recommendation 4	Synchronise timing between different clearing and settlement systems and associated payment and foreign exchange systems
Recommendation 5	Automate and standardise institutional trade matching
Recommendation 6	Expand the use of central counterparties
Recommendation 7	Permit securities lending and borrowing to expedite settlement
Recommendation 8	Automate and standardise asset servicing processes, including corporate actions, tax relief arrangements and restrictions on foreign ownership
Recommendation 9	Ensure financial integrity of providers of clearing and settlement services
Recommendation 10	Reinforce the risk management practices of users of clearing and settlement service providers
Recommendation 11	Ensure final, simultaneous transfer and availability of assets
Recommendation 12	Ensure effective business continuity and disaster recovery planning
Recommendation 13	Address the possibility of failure of a systematically important institution
Recommendation 14	Strengthen assessment of the enforceability of contracts
Recommendation 15	Advance legal certainty over rights to securities, cash or collateral
Recommendation 16	Recognise and support improved valuation and closeout netting arrangements
Recommendation 17	Ensure appointment of appropriately experienced and senior board members
Recommendation 18	Promote fair access to securities clearing and settlement networks
Recommendation 19	Ensure equitable and effective attention to stakeholder interest
Recommendation 20	Encourage consistent regulation and oversight of clearing and settlement service providers

Annex 3: CPSS/IOSCO recommendations

Table 5

CPSS/IOSCO recommendations

Standard 1	<p><i>Legal framework</i></p> <p>Securities settlement systems should have a well founded, clear and transparent legal basis in the relevant jurisdictions.</p>
Standard 2	<p><i>Trade confirmations and settlement matching</i></p> <p>Confirmation of trades between direct market participants should occur as soon as possible after trade execution, but no later than trade date (T+0). Where confirmation of trades by indirect market participants (such as institutional investors) is required, it should occur as soon as possible after trade execution, preferably on T+0, but no later than T+1.</p>
Standard 3	<p><i>Settlement cycles</i></p> <p>Rolling settlement should be adopted in all securities markets. Final settlement should occur no later than T+3. The benefits and costs of a settlement cycle shorter than T+3 should be evaluated.</p>
Standard 4	<p><i>Central counterparties</i></p> <p>The benefits and costs of a CCP should be evaluated. Where such a mechanism is introduced, the CCP should rigorously control the risks it assumes.</p>
Standard 5	<p><i>Securities lending</i></p> <p>Securities lending and borrowing (or repurchase agreements and other economically equivalent transactions) should be encouraged as a method for expediting the settlement of securities transactions. Barriers that inhibit the practice of lending securities for this purpose should be removed.</p>
Standard 6	<p><i>Central securities depositories</i></p> <p>Securities should be immobilised or dematerialised and transferred by book entry in CSDs to the greatest extent possible.</p>
Standard 7	<p><i>Delivery versus payment</i></p> <p>CSDs should eliminate principal risk by linking securities transfers to funds transfers in a way that achieves delivery versus payment.</p>
Standard 8	<p><i>Timing of settlement finality</i></p> <p>Final settlement should occur no later than the end of the settlement day. Intraday or real-time finality should be provided where necessary to reduce risks.</p>
Standard 9	<p><i>CSD risk controls to address participant defaults</i></p> <p>CSDs that extend intraday credit to participants, including CSDs that operate net settlement systems, should institute risk controls that, at a minimum, ensure timely settlement in the event that the participant with the largest payment obligation is unable to settle. The most reliable set of controls is a combination of collateral requirements and limits.</p>

Table 5 (cont)

CPSS/IOSCO recommendations

Standard 10	<p><i>Cash settlement assets</i></p> <p>Assets used to settle the ultimate payment obligations arising from securities transactions should carry little or no credit or liquidity risk. If central bank money is not used, steps must be taken to protect CSD members from potential losses and liquidity pressures arising from the failure of the cash settlement agent whose assets are used for that purpose.</p>
Standard 11	<p><i>Operational reliability</i></p> <p>Sources of operational risk arising in the clearing and settlement process should be identified and minimised through the development of appropriate systems, controls and procedures. Systems should be reliable and secure, and have adequate, scalable capacity. Contingency plans and backup facilities should be established to allow for timely recovery of operations and completion of the settlement process.</p>
Standard 12	<p><i>Protection of customer's securities</i></p> <p>Entities holding securities in custody should employ accounting practices and safekeeping procedures that fully protect customers' securities. It is essential that customers' securities be protected against the claims of a custodian's creditors.</p>
Standard 13	<p><i>Governance</i></p> <p>Governance arrangements for CSDs and CCPs should be designed to fulfil public interest requirements and to promote the objectives of owners and users.</p>
Standard 14	<p><i>Access</i></p> <p>CSDs and CCPs should have objective and publicly disclosed criteria for participation that permit fair and open access.</p>
Standard 15	<p><i>Efficiency</i></p> <p>While maintaining safe and secure operations, securities settlement systems should be cost-effective in meeting the requirements of users.</p>
Standard 16	<p><i>Communication procedures</i></p> <p>Securities settlement systems should use or accommodate the relevant international communication procedures and standards in order to facilitate efficient settlement of cross-border transactions.</p>
Standard 17	<p><i>Transparency</i></p> <p>CSDs and CCPs should provide market participants with sufficient information for them to identify and evaluate accurately the risks and costs associated with using the CSD or CCP services.</p>
Standard 18	<p><i>Regulation, supervision and oversight</i></p> <p>Securities settlement systems should be subject to transparent and effective regulation and oversight. Central banks and securities regulators should cooperate with each other and with other relevant authorities.</p>
Standard 19	<p><i>Risks in cross-border links</i></p> <p>CSDs that establish links to settle cross-border trades should design and operate such links to effectively reduce the risks associated with cross-border settlements.</p>

Annex 4: CSDs/CCPs and payment systems in Asia

Table 6
CSDs/CCPs and payment systems in Asia

	Government bonds				Corporate bonds			
	CSD	Payment system	Central clearing counterparty	Clearing house	CSD	Payment system	Central clearing counterparty	Clearing house
Australia	Austraclear	RTGS	n/a	Austraclear	Austraclear	RTGS	n/a	Austraclear
China	The China Securities Depository and Clearing Corp (CSDCC), Shanghai and Shenzhen branches	Two payment systems are used to settle cash: a paper-based credit advice collected by the central bank (PBOC), and an electronic real-time payment system, China National Advance Payment System (CNAPS)	CSDCC Shanghai/ Shenzhen	CSDCC Shanghai/ Shenzhen	Same as government bonds	Same as government bonds	Same as government bonds	Same as government bonds

Table 6 (cont)
CSDs/CCPs and payment systems in Asia

	Government bonds				Corporate bonds			
	CSD	Payment system	Central clearing counterparty	Clearing house	CSD	Payment system	Central clearing counterparty	Clearing house
Hong Kong SAR	Central Moneymarkets Unit (CMU)/ Central Clearing and Settlement System (CCASS) (selected Exchange Fund Notes are traded on CCASS)	Clearing House Automatic Transfer System (CHATS), operated by Hong Kong Interbank Clearing Limited (HKICL)	None for those settled via CMU Settlement via CCASS: under continuous net settlement system, HKSCC settlement counterparty to both buying and selling broker through novation	n/a HKSCC clearing house for securities traded on the Stock Exchange of Hong Kong	CMU	Clearing House Automatic Transfer System (CHATS), operated by Hong Kong Interbank Clearing Limited (HKICL)	n/a	n/a
India	Reserve Bank of India - Public Debt Office	Cheque, pay-order, banker's cheque or Reserve Bank of India cheque Interbank clearing - RTGS (expected 2004)	n/a	Clearing Corporation of India Limited (CCIL)	National Securities Depository Ltd (NSDL) and Central Depository Services (India) Ltd (CDSL)	Cheque, pay-order, banker's cheque or Reserve Bank of India cheque Interbank clearing - RTGS (expected 2004)	n/a	BOI Shareholding Ltd (BOISL) is clearing house for trades on the Stock Exchange, Mumbai (BSE), National Securities Clearing Corporation Limited (NSCCL) is clearing corporation for trades on National Stock Exchange (NSE)

Table 6 (cont)
CSDs/CCPs and payment systems in Asia

	Government bonds				Corporate bonds			
	CSD	Payment system	Central clearing counterparty	Clearing house	CSD	Payment system	Central clearing counterparty	Clearing house
Indonesia	Bank Indonesia	Bank Indonesia through interbank clearing - real-time gross settlement (RTGS) system	n/a	Bank Indonesia	KSEI (scripless)	C-BEST (scripless)	KPEI (scripless)	KSEI (scripless)
Japan	Bank of Japan	(a) BOJNet (b) FXYCS (Foreign Exchange Yen Clearing System) (c) Zengin System (online domestic yen fund transfer and remittance system)	n/a Future 2005: JGBCC (JGB Clearing Corporation)	n/a Future 2005: JGBCC (JGB Clearing Corporation)	CBs: JASDEC (Japan Securities Depository Center, Inc) Others: n/a	(a) FXYCS (Foreign Exchange Yen Clearing System) (b) BOJNet (c) Zengin System (online domestic yen fund transfer and remittance system)	On-market: JSCC (Japan Securities Clearing Corporation) Off-market: n/a	On-market: JSCC (Japan Securities Clearing Corporation) Off-market: n/a

Table 6 (cont)
CSDs/CCPs and payment systems in Asia

	Government bonds				Corporate bonds			
	CSD	Payment system	Central clearing counterparty	Clearing house	CSD	Payment system	Central clearing counterparty	Clearing house
Korea	KSD (Korea Securities Depository)	BOK-Wire (Bank of Korea-Wire)	KSE (Korea Stock Exchange)	KSE	KSD	BOK-Wire	KSE	KSE
Malaysia	Bank Negara Malaysia (BNM)	RENTAS (real-time gross settlement system managed by BNM)	n/a	n/a	(a) KLSE eligible bonds - Malaysian Central Depository Sdn Bhd (MCD) (b) SSTS eligible bonds - Bank Negara Malaysia (BNM)	(a) RENTAS (b) RENTAS	(a-i) Securities Clearing Automated Network Sdn Bhd (SCANS) only for trades settling via Institutional Settlement Services (ISS). (a-ii) n/a for trades settling via MCD transfer mechanism (b) n/a	(a) Securities Clearing Automated Network Sdn Bhd (SCANS) (b) n/a

Table 6 (cont)
CSDs/CCPs and payment systems in Asia

	Government bonds				Corporate bonds			
	CSD	Payment system	Central clearing counterparty	Clearing house	CSD	Payment system	Central clearing counterparty	Clearing house
Philippines	Registry of Scripless Securities (RoSS)	Payment settled between counterparties via cheques Optional: Bangko Sentral ng Pilipinas (BSP - central bank) RTGS (Q1 2004)	n/a	n/a	n/a	Over the counter	n/a	n/a
Singapore	MAS	MEPS	n/a	MAS	CDP (scripless)	MEPS (scripless)	n/a	CDP (scripless)
Thailand	Bank of Thailand *(1)	BAHTNET (RTGS)	Bank of Thailand	Bank of Thailand	Thailand Securities Depository *(2)	BAHTNET (RTGS) *(2)	Thailand Securities Depository	Thailand Securities Depository

Annex 5: Settlement process in Asian countries

BIS settlement models:

Model 1: Securities and funds are transferred on a simultaneous, irrevocable and real-time gross settlement (RTGS) basis.

Model 2: Securities are settled on a gross basis and cash is settled on a net basis.

Model 3: Both securities and cash are exchanged simultaneously on a net basis once a day.

Australia: Austraclear

Settlement process: BIS Model 1

- Settlement cycle: negotiable but generally on a rolling TD+3 basis.
- Availability of securities is checked in seller's account and position earmarked.
- If sufficient funds are available, settlement occurs in Austraclear.
- Transactions which would create a securities shortfall are rejected.
- Payment: via a feeder system to the central bank's RTGS system.

Risk mitigators

- Matching: required but not legally binding. Matched but unsettled trades are automatically deleted at the end of the settlement day.
- Securities lending: allowed in the market but not offered by Austraclear.
- Buy-in: there are no established buy-in procedures for debt instruments.

China: China Securities Depository and Clearing Corporation Ltd (CSDCC)

Settlement process: similar to BIS Model 2. Note: net fund movement occurs on the day after the final movement of securities.

- Settlement cycle: securities are settled on TD on a gross trade-by-trade basis; cash is paid on a net basis on TD+1.
- On the evening of TD, CSDCC transfers shares on a final and irrevocable basis.
- On TD+1, funds are transferred to and from the clearing bank designated by the CSDCC.

Risk mitigators

- Matching: unclear whether a prematching or affirmation process is active.
- Brokers check the availability of securities/cash with the QFII's appointed custodian bank before executing trades. Trades are rejected in the event of insufficient holding.
- Once executed, the trades are binding on the brokers.
- Securities lending: short-selling, securities lending and borrowing are not allowed.
- Buy-in: no buy-in/sell-out rules. In case of overdraft, CSDCC imposes interest penalties based on the amount of the overdraft and holds securities as collateral.

- The depository acts as the central counterparty for all participants and guarantees both securities and cash settlements.

Hong Kong: Central Monetary Unit (CMU)

Settlement process

- Settlement cycle: negotiable. Generally, trades executed in the morning are settled on the same day, while those executed in the afternoon are usually settled the next day.
- Settlement can be effected using the real-time or the batch settlement method. Under both methods, cash and securities move simultaneously. Transfers are final and irrevocable.
- Payment happens through CMU interface with the real-time interbank payment system, known as the Clearing House Automatic Transfer System (CHATS).

Settlement process: real-time settlement - BIS Model 1

- Instructions are automatically matched by CMU and securities are put on hold.
- Once payment is confirmed to the CMU, the securities are released.
- In the event of insufficient securities, trades are transferred to the end-of-day batch settlement process.
- If insufficient funds are available, transactions remain pending until funds are available.

Settlement process: batch settlement - BIS Model 3

- At 3.30 pm, the end-of-day batch run starts.
- Net settlement obligations (securities and cash) calculated and available balances checked.
- Settlement occurs if sufficient funds and securities are available.
- Failed transactions are cancelled at the end of each day.

Risk mitigators

- Matching: automatically upon receipt of settlement instruction.
- The CMU monitors participants' cash and securities accounts on a continuous basis.
- Securities lending: in December 1997, HKMA introduced a securities lending programme for eligible private debt instruments held through the CMU.
- Buy-in: no established buy-in procedures. Generally, counterparties renegotiate the settlement of any failed trades.

India: National Securities Depository Limited (NSDL)

Settlement process

- The inter-broker settlement model is similar to BIS Model 3, whereas the broker-custodian settlement process resembles BIS Model 2.
- Settlement does not occur on a simultaneous basis.

Settlement process: clearing house trades

- Settlement cycle: TD + 2 rolling settlement basis.

- Custodian banks advise the clearing house on TD+1 of its intent to settle on TD+2.
- Once a custodian confirms the trade to the clearing house, settlement is binding.
- To effect settlement, the custodian delivers cash or securities to the clearing house during pay-in and receives securities or cash from the clearing house during payout.
- The period between pay-in and completion of payout is four to eight hours.
- On pay-in date, securities are transferred to a “pool” account at the NSDL for further credit to the clearing house’s account during the day.
- The net cash amount is paid by cheque to the clearing house on TD+2 (at 10.30 am).
- On TD+2, the clearing house transfers securities through the NSDL (at 2 pm).

Settlement process: hand delivery trades

- Settlement occurs outside of the clearing house.
- To settle a trade, both delivery and receipt instruction have to be put in NSDL system.
- On settlement date, brokers initiate payment either by account transfer or by cheque.
- Cheques (over INR 100,000 (about USD 2,050)) submitted prior to 10.30 am on SD or cheques (under INR 100,000), presented on SD–1 before noon receive same day value.
- As soon as the investor receives cleared funds or securities, delivery of securities or payment to the broker is initiated (no fixed cutoff time).
- Transfer of securities is final and irrevocable.

Risk mitigators

- Matching: not mandatory and outside the depository. Generally, only matched instructions are entered in the depository system for settlement.
- Securities lending: While securities lending exists, foreign investors cannot borrow securities in accordance with local regulations.
- Buy-in: Short positions between brokers are resolved through auctions on SD+1 for settlement on SD+2. If securities cannot be bought in the auction, the trade is closed out as per SEBI guidelines. Special rules apply for failed trades near ex-date.

India: Reserve Bank of India (RBI)

Settlement process

- For larger trades (above NIR 200 million), the counterparties must indicate whether settlement will occur through the clearing house, CCIL or directly with RBI.
- As all participants maintain cash accounts with the RBI, payments are settled through the central bank accounts.

Settlement process: settlement via CCIL - BIS Model 2

- The CCIL generates a securities and cash obligations report for each participant.
- CCIL sends details of the participants’ gross securities and net cash obligations to RBI.

- Upon verification that the securities and cash are available, the RBI debits and credits securities on a gross basis and subsequently processes the net cash settlement.
- CCIL receives settlement confirmation from RBI and informs its members.

Settlement process: settlement with RBI directly - BIS Model 1

- On SD (no specific time), RBI initiates simultaneous transfer of securities and cash if sufficient positions are available.

Risk mitigators

- Matching: between counterparties. The matching is binding and the trade is designated “ready for settlement” on the system, viewable by both the RBI and the CCIL.
- Securities lending: Repos exist, foreign investors are not permitted to borrow securities.
- Buy-in: under both methods, if sufficient balances are not available, settlement is postponed until the counterparties resolve the discrepancies and/or shortages (this eliminates principal risk, but not market risk).
- RBI levies strict penalties on participants for settlement failures.

Indonesia: Bank Indonesia (BI)

Settlement process: in February 2004, BI introduced its BI-SSSS (Bank Indonesia - Scripless Securities Settlement System). Even though it is still too early to assess the performance of this new system accurately, a few general observations can be made:

- The scripless system is a big step forwards from the previous manual process.
- The new scripless settlement model conforms with BIS Model 1.
- With the implementation of SSSS, government bonds and SBIs are settled on a DVP basis, through the securities and payment systems, SSSS and RTGS.
- The scripless system is expected to reduce operational risk and improve the efficiency of the government bond settlement infrastructure.
- Paper forms are eliminated and securities module linked to the RTGS payment system.

Japan: Bank of Japan (BOJ)

- Settlement at the BOJ occurs in book entry form either on DVP or non-DVP basis.

Settlement process: DVP basis - BIS Model 1

- Settlement cycle: rolling TD + 3 settlement basis via the new JGB book entry system.
- Settlement occurs on a real-time gross DVP basis between 9 am and 3 pm.
- Due to the real-time nature of the process, sufficient securities/cash balances are required.
- Pending securities receipts, pending receipts of funds or pre-advised funds are not considered good securities or funds until received.

- Prearranged credit line can be arranged to cover cash obligations, restricted to JGB settlement only. The use of the credit facility must be fully collateralised and will incur an intraday funding costs.

Settlement process: non-DVP basis - no BIS model applies - cash settled on a net basis on SD by 2.30 pm and securities on an RTGS basis by 12 pm.

- Securities are settled on an RTGS basis at the BOJ. Cash settlement usually occurs on a net basis via the Foreign Exchange Yen Clearing System (FXYCS).
- If the cash account is not properly funded, an intraday overdraft limit will be used.
- Cash is settled during a batch run at the end of the day, therefore, no intraday funding cost or intraday line usage charges apply.

Risk mitigators

- Matching: either by phone or through the NTT matching system on TD+1. Not binding.
- Securities lending: lending is allowed in the Japan market, subject to stringent conditions with regards to tenure and collateral requirements.
- Buy-in: no formal buy-in practices. JGB fails are generally resolved directly by the counterparties through mutually negotiated interest claims. If a trade fails and remains outstanding for more than 10 business days, a buy-in may be initiated.

Korea: Korea Securities Depository (KSD)

Settlement process: BIS Model 3

- Settlement cycle: negotiable but generally on a rolling TD+2 basis.
- Securities are settled on a gross basis through the KSD whilst the cash transfers occur through BOKWire (amounts above KRW 1 billion) or manager's cheque (amounts less than KRW 1 billion).
- Under the Institutional Affirmation & Settlement System (INAS), KSD acts as an intermediary to all payment obligations through its account with the Bank of Korea, but does not assume participants' default risk.
- Brokers use proprietary holdings to settle if investors hold insufficient positions.

Risk mitigators

- Matching: indirect participants prematch trades against the electronic trade report received from KSD. If discrepancies occur, amended details are sent to the KSD and new trade reports are generated.
- Unmatched transactions which were not rectified are not included in the net position report and can only be settled directly between the broker and the underlying investor.
- Buy-in: as per local regulations, buy-in/sell-out on SD+2.
- If an investor continues to fail his obligations, the regulator may impose sanctions, including the suspension of the Investment Registration Card (IRC).
- Securities lending/borrowing: KSD established detailed procedures/acts as intermediary.

Malaysia: Bank Negara Malaysia (BNM)

Settlement process: BIS Model 1

- Settlement cycle: negotiable but generally occurs on TD + 1.
- Once a trade is completed, details are uploaded and validated in SSTS.
- SSTS transmits an unconfirmed sale/delivery advice to the receiving party.
- On SD, the receiving party confirms the transaction in SSTS.
- SSTS initiates the transfer in book entry form in the accounts with BNM.
- Securities are transferred within SSTS; cash is transferred via BNM's RTGS payment system, RENTAS, by debiting or crediting the participants' cash accounts held at BNM.

Risk mitigators

- Matching: no matching procedures.
- Buy-in: in the event a settlement fails, BNM initiates a buy-in. If the securities cannot be bought in by 6 pm on settlement date, BNM may reverse the original transaction.
- Trades not confirmed by the receiving party remain in the system until cancelled.
- Securities lending: lending and borrowing have currently been suspended.

Philippines: Bureau of Treasury (BTR)

- Settlement cycle: same day settlement, ie on trade date (TD).
- Cash payments are generally made outside the Registry of Scripless Securities (RoSS) and are settled directly between the counterparties. Cash can be settled by the BTR but this is very uncommon.

Settlement process: cash settlement outside RoSS

- Upon trade execution, cash is paid on a gross basis by manager's cheque or cashier order.
- Cheque or cashier orders deposited before 12 noon are given same day value.
- Once payment is made, settlement details are uploaded and confirmed into RoSS and transactions are matched by the BTR.
- Matched trades are settled on a gross basis before the end of the day (no specified time).

Settlement process: cash settlement through the central bank - BIS Model 2

- For matched trades, the BTR prepares payment obligations and instructs the central bank to make the appropriate cash transfers.
- The BTR transfers securities on a gross settlement basis in RoSS.
- Although lines of credit are available to cover insufficient cash balances, generally, instructions are not uploaded into RoSS if funds are not available.

Risk mitigators

- Matching: through RoSS on trade date. Unmatched trades are considered as failed and are automatically deleted from the RoSS system.
- Buy-in: no established procedures.

- Securities lending/borrowing: no established procedures.

Singapore: Monetary Authority of Singapore (MAS)

Settlement process: BIS Model 1

- Settlement cycle: (TD + 1) for regular trades and on trade date (TD) for cash trades.
- Regular trades, affirmed on TD, settle at 9 am on TD+1 on a true DVP basis. In the event of disagreement, buyer can resolve issues with seller up to 4.30 pm on TD+1.
- Cash trades, once confirmed, settle on a true DVP basis.
- Settlement (securities and cash) occurs on a gross basis.
- Settlement occurs through MAS Electronic Payment System (MEPS), an RTGS system for high value interbank fund transfers (IFT) and scripless Singapore Government Securities (SGS).

Risk mitigators

- Matching: trade affirmation/confirmation via MEPS. Amendments subject to mutual agreement, provided settlement has not occurred. If a dispute is not resolved, the matter is referred to the SGS Market committee for a final decision.
- Buy-in: no established buy-in procedures.
- Securities lending: a repo facility is available for primary dealers, allowing them to borrow benchmark issues.

Taiwan: Taiwan Securities Central Depository (TSCD)

Settlement process: BIS Model 3

- Settlement cycle: TD+1.
- Matched transaction reports are sent to the TSCD, the direct and the indirect participants.
- TSCD prepares summary reports with matched trades and net securities/cash obligations for every broker. Discrepancies must be reported to TSE/TSCD before the end of TD+1.
- On SD (TD+1), participants verify and confirm settlement details. If verification is not possible before the settlement cutoff time, brokers may cancel the trade, or settle it with an undertaking to resolve any disputes with the investor at a later date.
- Securities are automatically transferred into the buyer's account at the TSCD during the overnight batch-run, unless a failed trade is reported by the broker to the TSE.
- The securities are available only if payment has been confirmed on SD+1. Any delivery failure should be reported to the TSE in the evening of SD.
- Cash is settled via an electronic interbank wire transfer system on SD+1 based on the net cash obligations indicated on the summary report for on-exchange trades.
- The TSE reports any payment defaults to the TSCD, which puts a hold on the securities in the defaulting broker/ investor's account at the TSCD.

Risk mitigators

- Matching: automated and binding between brokers through FAST trading system. Indirect participants prematch trades based on the brokers' trade execution report.

- Buy-in: failed trades are prohibited and may cause the investor's investment license to be revoked for three years.
- Securities lending: TSCD does not have any securities lending and borrowing programme. However, foreign investors are allowed to lend stocks to local borrowers (ie brokers) who need to cover settlement shortfalls due to failed trades or transaction errors.

Thailand: Bank of Thailand (BOT)

Settlement process: BIS Model 1

- Settlement cycle: rolling TD + 2 settlement basis.
- On SD, for matched instructions, BAHTNET/2 checks the availability of securities and cash and settles securities only upon receipt of funds.
- Government securities are cleared and settled electronically on a gross delivery versus payment (DVP) basis through BOT's BAHTNET/2 system, the country's RTGS system.
- Matched instructions that were not settled due to insufficient cash or securities are automatically deleted at the end of the day.

Risk mitigators

- Matching: via phone. Matched instructions can be deleted only upon mutual agreement.
- Buy-in: no established procedures.

Thailand: Thailand Securities Depository Co Limited (TSCD)

Settlement process: BIS Model 3

- Settlement cycle: rolling TD + 3 settlement basis.
- On SD, the TSD nets securities and cash obligations. The TSD effects net cash transfers from the TSD BAHTNET account at BOT about 45 minutes after the transfer of securities and only upon ascertaining the availability of the securities.
- If the event shares or funds are not available, the TSD must be informed and a new net report is generated before settlement.
- If there are insufficient funds, the TSD uses the Equity Clearing Fund to settle the trade. On SD + 1, the TSD will sell the securities to reimburse the Clearing Fund and related costs and impose a fine on the defaulting broker.

Risk mitigators

- Matching: through the TSD Net Clearing system. The matching process is not binding for custodian banks.
- Buy-in: initiated on TD + 5 for settlement on TD + 8.
- Securities lending: mandatory borrowing programme. TSD acts as a principal, for the account of the broker. This programme is subject to stringent rules and penalties.

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