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金管局資料簡介(4) HKMA Background Brief No. 4

香港的金融基建

FINANCIAL
INFRASTRUCTURE
IN HONG KONG

《香港的金融基建》是「金管局資料簡介」系列的第四份小冊子。金管局推出資料簡介系列，是為了闡明香港貨幣與銀行體系的運作。日後我們會繼續推出有關貨幣、銀行，以及其他金融基礎設施的小冊子。

本小冊子亦備有網上版本，讀者可於金管局網站查閱，網址為 www.hkma.gov.hk。

Financial Infrastructure in Hong Kong is the fourth of a series of HKMA Background Briefs designed to explain the workings of Hong Kong's monetary and banking systems. Forthcoming background briefs will cover monetary, banking, and other financial-infrastructure issues.

This booklet is also available on the HKMA website at www.hkma.gov.hk.



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Foreword

We all appreciate the importance of physical infrastructure to our daily lives. Extensive road and rail networks make commuting convenient and efficient. Modern ports and airports make possible the speedy international movement of goods and people. What is less noticeable, however, is the existence of another form of infrastructure just as important as roads, bridges and tunnels to the economy – financial infrastructure. Financial infrastructure means the systems for payment and settlement of transactions among financial institutions and the links between these systems. Money flows through the financial infrastructure just as people and goods move around transport networks. For funds to flow smoothly, the infrastructure must be safe, robust and efficient.

Developing a safe and efficient financial infrastructure is especially important to an international financial centre like Hong Kong. In the first ten months of 2006, an average of HK\$557 billion in fund transfers was settled by the Hong Kong dollar real time gross settlement (RTGS) payment system every day. Handling daily volumes equivalent to over one third of Hong Kong's annual gross domestic product requires efficient financial infrastructure. On days influenced by some special events such as initial public offerings, the turnover in the RTGS system can be multiple times that of the average level. For instance, the Hong Kong dollar RTGS system had a record high turnover of HK\$1.37 trillion on 27 October 2006, roughly the same value of Hong Kong's gross domestic product for a year. Even for the US dollar RTGS system, the record high turnover on 31 October 2006 was at a very respectable level of US\$22.4 billion.

Readers will appreciate that the ability of the payment systems to handle large fund flows in an efficient manner does not come automatically. Over the years, the Hong Kong Monetary Authority (HKMA) has devoted much effort and resources to building a safe, efficient and reliable financial infrastructure that can meet the clearing and settlement needs of the financial industry. In 2005, for example, the HKMA reviewed the financial infrastructure in Hong Kong and developed a blueprint for further developing our payment and settlement systems into a multi-currency, multi-dimensional platform. This will help to consolidate Hong Kong's position as an international financial centre and maintain the stability and integrity of our monetary and financial systems, which are both important responsibilities of the HKMA.

Although it is fundamental to the financial sector and the economy, Hong Kong's financial infrastructure is probably not well understood by the general public. This booklet, *HKMA Background Brief No.4: Financial Infrastructure in Hong Kong*, is designed to improve readers' understanding of the financial infrastructure in Hong Kong, and the HKMA's role in developing the infrastructure. It is one of a series of HKMA background briefs that set out clearly and concisely the key areas of responsibility of the HKMA for both specialists and the wider community. Readers who are interested in the subject may wish to visit our website (www.hkma.gov.hk) to look at the online version of this and other HKMA publications.

Joseph Yam

Chief Executive

Hong Kong Monetary Authority

December 2006

Introduction

Money flows through an economy like vehicles travelling on a highway: it must move smoothly, swiftly and without obstruction for the economy to work properly. A robust financial infrastructure is indispensable to the smooth circulation of money through the economy. The components of a financial infrastructure include payment systems, settlement systems for securities transactions, and links among these systems and with similar systems in other places.

An important part of the HKMA's job is to develop Hong Kong's financial infrastructure, particularly the clearing and settlement systems that facilitate domestic and cross-border transfers of funds and securities. In 2005, the HKMA, in response to technological advances and new market trends, conducted a review of the financial infrastructure to work out a development strategy and implementation plan.

This background brief highlights the importance of financial infrastructure; sets out the objectives of developing the systems in Hong Kong; illustrates how the different components of the financial infrastructure work; and explains how a robust multi-currency, multi-dimensional platform contributes to monetary and financial stability and the development of Hong Kong as an international financial centre.

Importance of financial infrastructure

Financial infrastructure allows money to flow through the economy by serving as a platform for financial transactions. The following examples illustrate some of the financial processes that an efficient financial infrastructure makes possible:

- Funds can be transferred within Hong Kong from Bank A to Bank B as soon as Bank A enters the payment instruction in the interbank payment system.
- In a foreign exchange transaction, a party can be credited with the currency it is buying instantaneously when it delivers the currency it is selling.
- A member of the debt securities clearing and settlement system can be credited with securities as soon as the corresponding payment is debited from its bank account in a paperless transaction with no time lag.
- A bank in Hong Kong can settle debt securities lodged with an overseas debt securities settlement system through its account with Hong Kong's debt securities settlement system.

All these processes involve the flow of money in one way or another. While these flows can be achieved without elaborate financial infrastructure (for example, by the physical exchange of cash for paper certificates of debt securities in the third example), the modern business world now demands a much higher level of safety and efficiency. To stay competitive, an economy must have a robust financial infrastructure to support increasingly sophisticated financial activities.

Strategic objective

The HKMA plays a key role in developing Hong Kong's financial infrastructure. The objective is to have a safe and efficient system based on a multi-currency, multi-dimensional platform. Such a platform helps maintain the stability and integrity of the monetary and financial systems, and consolidate Hong Kong's position as an international financial centre. The benefits of the platform will become more apparent as Hong Kong's financial activities become more sophisticated and new financial products are offered in the market.

A **multi-currency platform** is one that handles real-time transactions in Hong Kong of the major foreign currencies and the Hong Kong dollar. This multi-currency capability is important in several ways. First, it may help maintain currency stability by allowing fund raisers the chance to denominate shares or bonds in the foreign currencies that they intend to use, without the need to convert to the Hong Kong dollar. This helps reduce large capital flows into and out of the Hong Kong dollar which might lead to pressure on the exchange rate. Secondly, the platform can meet the needs of fund raisers and investors to raise or invest funds anywhere and in whatever currency. This enables them to maximise benefits, either by lowering funding costs or improving returns. Thirdly, it allows Asian investors to use Hong Kong as a regional centre for multi-currency fund transfers and as a regional settlement hub for clearing and settling US dollar and euro financial instruments traded during Asian hours, thus reducing the settlement risk. Hong Kong is one of the few economies in the world that offers a multi-currency payment and settlement platform.

A **multi-dimensional platform** is one that covers diverse financial intermediation channels including banking, equity and debt. The balanced development of these channels helps to reduce the dependence on any one of them and lower the risk of systemic problems that could seriously disrupt normal economic activities during a crisis in a particular channel. The platform provides convenient access by domestic, Mainland and overseas participants, at both wholesale and retail levels, to facilitate international financial transactions. The platform also assists in the development of the primary and secondary markets, which need to be highly efficient and liquid.

Payment systems

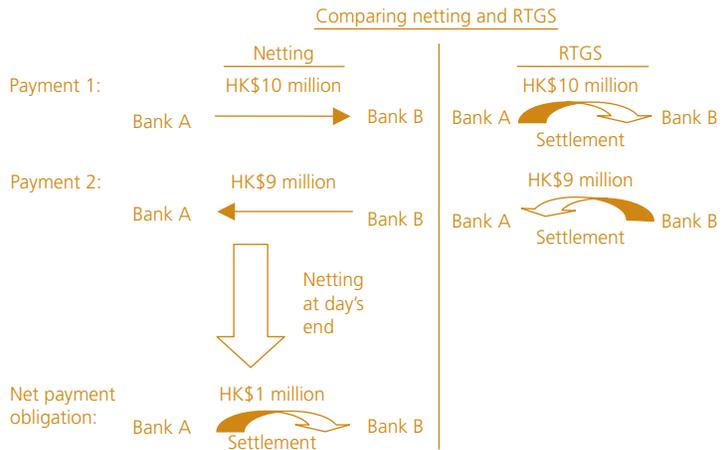
Interbank fund transfers are made through payment systems that are essential components of the financial infrastructure. Hong Kong's payment systems allow fund transfers in the Hong Kong dollar, US dollar, euro, and renminbi. Hong Kong Interbank Clearing Limited is the operator of the payment systems, providing banks with various interbank clearing and settlement services.

Hong Kong dollar clearing system

Introduced in 1996, the Hong Kong dollar RTGS system provides safe and efficient settlement of interbank payments denominated in the Hong Kong dollar. Through the RTGS, interbank payments are settled continuously on a deal-by-deal basis across the book of the HKMA without netting. All banks in Hong Kong maintain settlement accounts with the HKMA.

Netting and RTGS

Prior to the establishment of the Hong Kong dollar RTGS system, banks settled payments among themselves by way of netting. Through this process, every bank paid (or received) only the net difference of the payments payable to (or receivable from) all the other banks participating in the system at the end of each business day. Netting exposed banks to systemic risk because the failure of one bank to pay the amount due at the end of the day might expose other banks to unexpected payment obligations and trigger a chain of defaults.

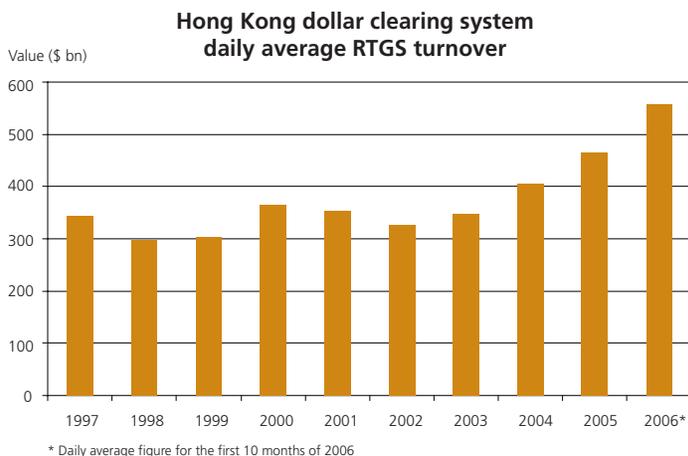


After the introduction of the Hong Kong dollar RTGS system, large-value interbank payments were no longer settled by end-of-day netting, but on a continuous, deal-by-deal basis through the banks' settlement accounts with the HKMA – the settlement institution of the system. As these payments are settled one by one during the day, systemic settlement risks arising from end-of-day netting are eliminated.

Compared with netting, RTGS requires banks to have more intraday liquidity to settle payments during the day. Under the current arrangement, banks in Hong Kong can obtain interest-free intraday liquidity through intraday repurchase agreements with the HKMA using Exchange Fund Bills and Notes. Other liquidity-saving devices have also been implemented to improve efficiency.

Apart from processing large transactions between banks, the Hong Kong dollar clearing system also processes smaller retail payment items, including cheques, autopay transactions, low-value bulk electronic payment items (EPS and auto-credit), and low-value automatic teller machine transfers.

In the first 10 months of 2006, an average of HK\$557 billion in transactions were settled each day through the Hong Kong dollar RTGS system. The annual turnover of the system in 2005 was HK\$116 trillion, more than 80 times Hong Kong's gross domestic product.



Clearing systems of foreign currencies

In addition to running the Hong Kong dollar clearing system, the HKMA introduced the US dollar clearing system in 2000 and the euro clearing system in 2003 to facilitate the efficient settlement of US dollar and euro transactions in Hong Kong during Asian business hours. The Renminbi Settlement System was launched in March 2006 to cater for the settlement needs arising from expanded renminbi business. The participation of banks in these clearing systems is voluntary.

| | Launch date | Functions | Settlement Institution (Clearing Bank for Renminbi Settlement System) | Average daily turnover in the first 10 months of 2006 |
|-----------------------------------|-------------|--|---|---|
| US dollar clearing system | August 2000 | RTGS payment facilities for US dollar and US dollar paper cheque clearing | The Hongkong and Shanghai Banking Corporation Limited | US\$ 6.2 billion |
| Euro clearing system | April 2003 | RTGS payment facilities for euro | Standard Chartered Bank (Hong Kong) Limited | €1.1 billion |
| Renminbi Settlement System | March 2006 | Automated systems for renminbi cheque clearing and settlement, remittance processing, renminbi bank card payments, and renminbi position-squaring; real-time account enquiry service for participating banks | Bank of China (Hong Kong) Limited | RMB33 million yuan* |

* Daily average figure from 6 March 2006 to 31 October 2006

Features of the payment systems

Payment-versus-payment (PvP)

PvP is a mechanism for settling a foreign exchange transaction to ensure that payments in the two currencies involved are settled simultaneously. The Hong Kong dollar, US dollar and euro clearing systems in Hong Kong are interlinked to enable banks to settle US dollar/Hong Kong dollar, euro/US dollar, and euro/Hong Kong dollar foreign exchange transactions on a PvP basis. PvP greatly improves settlement efficiency, and eliminates settlement risk arising from time lags in transactions and from time-zone differences (known as Herstatt risk).

The Renminbi Settlement System is linked with the Hong Kong dollar RTGS system to enable banks to square their renminbi positions on a PvP basis.

What is Herstatt risk?

Herstatt risk is the risk that arises when the two legs of a foreign exchange transaction are settled in different time zones. If there were no US dollar clearing system in Hong Kong, and Bank A in Hong Kong wanted to sell Hong Kong dollars to Bank B in Hong Kong for US dollars, the Hong Kong dollar payment from Bank A to Bank B could be settled immediately through the Hong Kong dollar clearing system in Hong Kong. However, while it is daytime in Hong Kong, it is night-time in the US and the US dollar payment from Bank B to Bank A can only be settled when the US settlement system opens hours later. Because of the time lag between the transfers of the two payments, there is a risk that Bank A, having parted with its Hong Kong dollars, might not be able to get the US dollars back from Bank B for one reason or another, thereby incurring a loss. This is commonly known as Herstatt risk after the failure of Germany's Herstatt Bank in 1974.

The PvP mechanism, in which a final transfer of one currency occurs only if a final transfer of the other currency also takes place, effectively eliminates Herstatt risk associated with foreign exchange transactions.

Settlement finality

The settlement of transactions made through the Hong Kong dollar, US dollar and euro clearing systems is final and irrevocable. This finality is protected from insolvency laws and other laws by the Clearing and Settlement Systems Ordinance.

Debt securities settlement system

The Central Moneymarkets Unit (CMU) is the debt securities clearing and settlement system in Hong Kong operated by the HKMA. Established in 1990, the CMU provides an efficient clearing, settlement and custodian service for debt securities denominated in Hong Kong dollars and other major currencies. These debt securities include Exchange Fund Bills and Notes, Hong Kong Special Administrative Region Government bonds, and debt securities issued by both public and private sector entities. In the first 10 months of 2006, the CMU processed on average HK\$37 billion (152 items in volume) each day in CMU secondary-market transactions.

Delivery-versus-payment (DvP)

The CMU interfaces seamlessly with the Hong Kong dollar, US dollar and euro clearing systems to enable CMU participants to enjoy the advantages of DvP when settling debt securities. DvP is a securities delivery arrangement which eliminates settlement risk by ensuring that the securities and funds involved are settled simultaneously. With securities and payment exchanging hands at the same time, settlement risk is reduced and efficiency improved. The multi-currency platform in Hong Kong makes DvP possible for any debt securities denominated in Hong Kong dollars, US dollars or euros.

The settlement of securities listed on the Hong Kong Stock Exchange can also be settled by DvP due to the links between the Central Clearing and Settlement System of the Hong Kong Stock Exchange and the Hong Kong dollar and US dollar clearing systems.

System links

Hong Kong's financial infrastructure has been developed to cater for both domestic and cross-border economic activities. Links with payment systems and debt securities systems in other economies have been developed to provide an easily accessible payment and settlement platform for cross-border economic transactions and financial intermediation.

Payment links

Links with Mainland China – Current links cover cross-border RTGS payments in Hong Kong dollars and US dollars, and cheque clearing in Hong Kong dollars, US dollars and renminbi, with Guangdong Province including Shenzhen¹. The use of these links, which helps expedite payments and remittances between Hong Kong and Guangdong, has been rising gradually with the increasing economic integration between Hong Kong and the Mainland. The average daily turnover in the first 10 months of 2006 was the equivalent of some HK\$919 million.

Link with Malaysia – A link between the ringgit clearing system in Malaysia (the RENTAS system) and the US dollar clearing system in Hong Kong came into operation in November 2006. The link permits the PvP settlement of foreign exchange transactions in ringgit and US dollars during Malaysian and Hong Kong business hours, thereby eliminating the Herstatt risk. This is the first cross-border PvP link between two RTGS systems in the region.

Link with the Continuous Linked Settlement (CLS) system – The CLS system, operated by CLS Bank International, is a global clearing and settlement system for cross-border foreign exchange transactions. It removes settlement risk in these transactions by settling them on a PvP basis. The CLS system covers 15 currencies, with the Hong Kong dollar joining in 2004.

¹ Joint clearing for US dollar cheques is currently with Shenzhen only.

CMU links with other regional and international systems

Over the years, the CMU has developed external links with regional and international debt securities settlement systems to assume a more global reach. These links allow overseas investors to hold and settle debt securities lodged with the CMU, and local investors to hold and settle debt securities lodged with overseas systems. The CMU has developed links with debt securities settlement systems in Australia (AustraClear, 1997), New Zealand (AustraClear New Zealand System, 1998), South Korea (Korea Securities Depository, 1999), Mainland China (China Government Securities Depository Trust & Clearing Co. Ltd., 2004), and international debt securities settlement systems (Euroclear (1994), Clearstream (1994)).

Financial infrastructure: stability of monetary and financial systems

As illustrated earlier, Hong Kong has developed a comprehensive financial infrastructure to support the city's economic activities. How does this network help maintain the stability and integrity of Hong Kong's monetary and financial systems?

A major failure in financial infrastructure can have serious consequences ranging from payment gridlock, posing liquidity problems to the banks involved, to suspension of interbank payments, resulting in banking operations grinding to a halt. An efficient payment infrastructure is also essential for the smooth recycling of funds when there are very large fund flows, such as during major initial public offerings (IPOs). Without such a system, the liquidity pressures on banks could squeeze interest rates to exceptionally high levels.

Because of the importance of a safe and efficient financial infrastructure to the stability and integrity of the monetary and financial systems in Hong Kong, the HKMA has introduced a number of improvements to smooth payment flows and enable banks to use liquidity more efficiently.

The robustness of Hong Kong's financial infrastructure has been well demonstrated by the smooth and efficient payment operations during large IPOs, such as the Industrial and Commercial Bank of China IPO in October 2006. This IPO was more than 70 times over-subscribed, attracting over HK\$410 billion in application monies. On the IPO's refund date, the turnover of the Hong Kong dollar RTGS system reached a record HK\$1.37 trillion, more than doubling the turnover of a normal business day. Despite this unprecedented activity, the financial infrastructure in Hong Kong proved resilient and operated smoothly.

System improvements

The HKMA has introduced a number of improvements over the years, such as the CHATS² Optimiser and the RTGS Liquidity Optimiser, to smooth payment flows and enable banks to use liquidity more efficiently.

The CHATS Optimiser, introduced in 2004, is a mechanism that settles paper cheques and large-value CHATS payments simultaneously and by offsetting. Paper cheques are settled daily in a bulk run at a specific time by multilateral netting. When the gross amounts required to settle paper cheque payments are substantial, banks, knowing their net cheque settlement positions, can make use of the CHATS Optimiser to make offsetting CHATS payments to their counterparties during the bulk settlement run. This makes the funding management of the banks more efficient by reducing the need for them to sit on substantial amounts to settle the payment obligations at the time of the bulk settlement run.

To further reduce the risk of payment gridlock and to help banks economise on the need for intraday liquidity, the HKMA introduced the RTGS Liquidity Optimiser in January 2006. This allows users to manage their liquidity more efficiently through periodic multilateral offsetting of payment instructions queued in the RTGS system at 30-minute intervals. Special runs can also be arranged to clear payment queues. This liquidity-saving device has proved particularly useful in dealing with heavy fund flows during IPOs by clearing large offsetting payments and reducing the risk of payment gridlock.

² The RTGS system in Hong Kong is known as Clearing House Automated Transfer System or CHATS.

Financial infrastructure and Hong Kong's status as an international financial centre

An international financial centre is a place where financial institutions from around the world come together to carry out international financial intermediation, for example, channeling US savings into investments in China, or vice versa. Many factors define the competitiveness of an international financial centre, including its legal framework, human resources, clustering of demand, a robust regulatory system, an effective and clean government, and efficient accounting and other support services.

However, these alone are not sufficient in today's global environment. The nature of international finance has changed rapidly in recent years. Globalisation and advances in information technology have made decision making and trading in financial instruments possible anywhere. The main processes of financial transactions that must converge at a centre are clearing and settlement. The choice of where to "land" a deal for clearing and settlement depends largely on the robustness and efficiency of the financial infrastructure. Hence, an additional, and perhaps defining, factor required by a centre to capture international financial transactions is a safe, efficient and sophisticated financial infrastructure.

Another major factor emerging in recent years is the expanding funding and investment needs of Mainland China, together with its rapid economic development and gradual financial liberalisation. At the end of October 2006, there were 224 Mainland enterprises listed on the Hong Kong Stock Exchange. The market capitalisation of these Mainland companies (H shares) and Mainland-related companies (red-chips) represented 43% of Hong Kong's total stock market. In the first ten months of 2006, these companies raised HK\$274 billion or around 70% of the equities funds raised in the

market. In addition, the investment needs of the Mainland are huge, with its foreign currency reserves increasing to US\$988 billion at the end of September 2006 and with new policy initiatives, such as the relaxation of overseas investment by insurance funds and the Social Security Funds. The Mainland's financial intermediation requirements are also expected to expand rapidly as strong economic growth continues and financial liberalisation deepens.

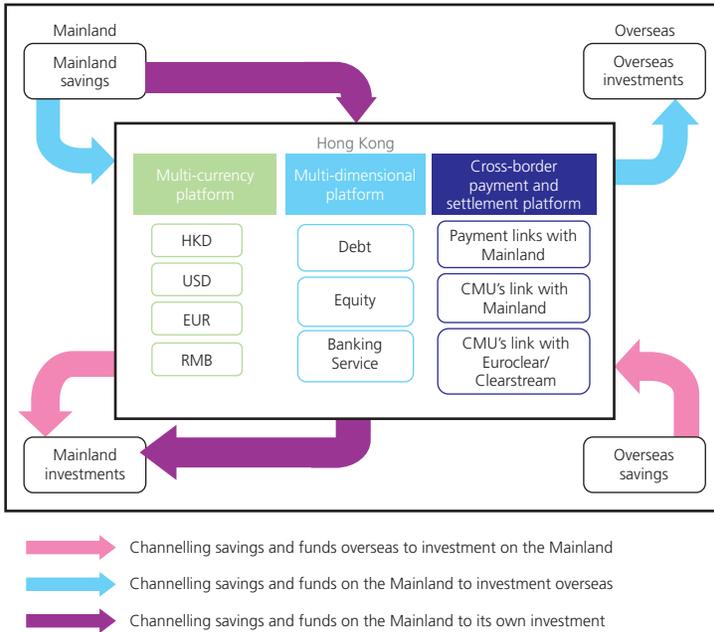
The development of a safe and efficient multi-currency, multi-dimensional platform puts Hong Kong in an ideal position to satisfy the growing needs for financial intermediation of the Mainland and the payment and settlement needs in the Asia-Pacific region.

Financial intermediation for Mainland China

The fundamental objective of financial intermediation is to mobilise idle savings to meet investment needs. To serve as a centre of financial intermediation for the Mainland, Hong Kong needs to develop its capability in three areas:

- (a) channelling savings and funds overseas to investment on the Mainland;
- (b) channelling savings and funds on the Mainland to investment overseas; and
- (c) channelling savings and funds on the Mainland to its own investment.

Hong Kong's role in financial intermediation for the Mainland



A multi-currency, multi-dimensional platform is an essential element for Hong Kong to develop these capabilities. For example, the established equity and bond markets in Hong Kong and the financial infrastructure capable of processing Hong Kong dollars, US dollars, and euros, provide easily accessible facilities for Mainland entities to raise funds in these currencies. Hong Kong, being in the same time zone as Mainland China, also provides a multi-currency platform that is ideal for Mainland entities to manage their investment risks when they engage in overseas investment.

A payment and settlement hub for the Asia-Pacific region

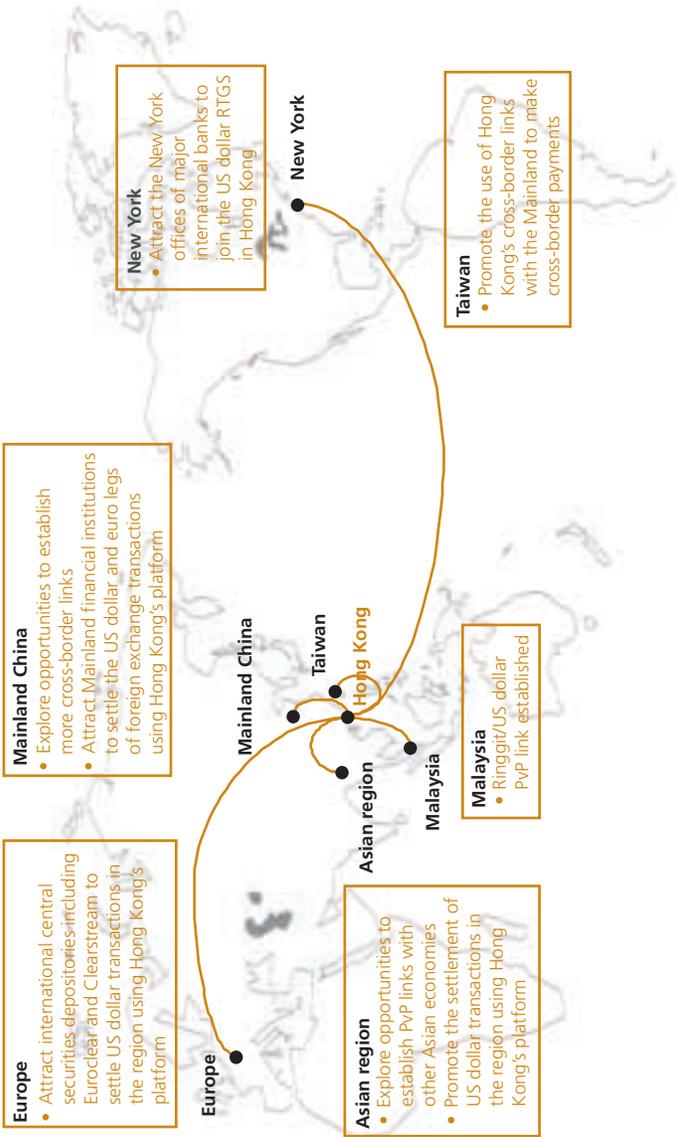
Hong Kong's capacity to settle transactions in major world currencies including the US dollar and the euro constitutes a unique competitive advantage for Hong Kong to become a payment and settlement hub for the Asia-Pacific region. This potential is further strengthened by Hong Kong's role as a window to China through our cross-border payment links with the Mainland.

Two examples illustrate how financial institutions in the region can benefit from using Hong Kong's financial infrastructure:

- If a financial institution in the Asia-Pacific region wishes to carry out a foreign exchange transaction involving its local currency and the US dollar, the local currency leg can be settled in the home country and the US dollar leg in Hong Kong. Settling the two legs of the transaction in the same time zone effectively reduces Herstatt risk.
- A bank wishing to make a US dollar payment to its counterpart in Shenzhen can make use of Hong Kong's US dollar payment link with Shenzhen to transfer the funds through a bank in Hong Kong.

The HKMA has been exploring opportunities to establish more payment links with other economies, and encouraging overseas financial institutions to use Hong Kong's multi-currency platform. This is part of the vision of developing Hong Kong as a payment and settlement hub for the region. Major initiatives are summarised in the diagram.

Developing Hong Kong into a regional payment and settlement hub



Conclusion

Over the years, Hong Kong has developed a sound financial infrastructure expediting economic transactions and financial intermediation in the region. However, to maintain Hong Kong's monetary and financial stability and its competitiveness as an international financial centre, the present financial infrastructure must be further developed into a robust and comprehensive multi-currency, multi-dimensional platform covering the major currencies transacted in the region, and with diversified channels for financial intermediation. The Renminbi Settlement System and the payment link with Malaysia are recent examples of the HKMA's efforts in this area.

Further reading

Guide to Hong Kong Monetary and Banking Terms (Third Edition). Hong Kong Monetary Authority, November 2006

Articles in *Hong Kong Monetary Authority Quarterly Bulletins*:

'The oversight of payment and securities settlement systems in Hong Kong', *June 2006*

'Review of financial infrastructure development', *December 2005*

'Development of financial infrastructure in Hong Kong', *March 2003*

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'Financial technology infrastructure for Hong Kong', *February 1998*

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'Hong Kong's payment system', *August 1995*

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