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**Managing Payment and Settlement System Reform:  
A Thai Perspective**

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**ABSTRACT**

**This paper deals with Thailand's recent experience in managing payment and settlement system reform. It discusses the major types of the payments and settlement system reforms in Thailand and the rationales behind the implementation of such reform measures. Particular emphasis is given to the discussion of the contribution of the system reform for large-value transactions under the BAHTNET, along with a number of supporting policy measures, in reducing risks involved in the payment system. The results suggest that the shift to the BAHTNET system is a significant reform in the domestic payment and settlement system that has contributed greatly to the reduction of various types of risks, particularly those of systemic risk. The paper also explores possible options in managing risks in foreign exchange settlement. It concludes with comments regarding future developments and challenges related to the payments and settlement system reforms in Thailand.**

***Keywords:*** managing payment system reform, RTGS, risk reduction, Thailand

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# Managing Payment and Settlement System Reform: A Thai Perspective\*

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## I. Introduction

It has become increasingly recognized that central banks need to play a more active role in payment and settlement systems. This is partly due to rapid growth in both the volumes and value of payment transactions, the growing integration or globalization of financial markets, and the dramatic changes in technologies. As a consequence, the risks involved in payment and settlement systems tend to have increased significantly for central banks, commercial banks, and other participants in payment systems. Reducing payment *system risk* has been a policy priority of many central banks since the mid to late 1980s. This is reflected in part by the move towards the adoption of real time gross settlement or RTGS systems as the preferred system for large-value transfers by the majority of industrial countries since the mid 1980s. As pointed out elsewhere, an increasing number of countries have currently operated under the RTGS systems, including in particular the Netherlands (1985), Sweden (1986), Switzerland (1987), Germany (1987), Japan (1988), Italy (1989).<sup>1</sup>

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\* This is a revised version of the paper prepared for 2<sup>nd</sup> SEACEN-CPSS Course on the PSS for Emerging Economies in Manila, Philippines, 21-27 September 2003. The authors are respectively Senior Director and Team Executive of Payment Systems Group. The views expressed in this short paper are those of the authors and should not reflect those of the Central Bank of Thailand.

<sup>1</sup> For more details, see Maxwell *et.al* (1999), among others.

Similar to the experience of central banks in many countries, the Bank of Thailand (BOT) has over the past decade initiated a series of reform measures aiming at removing a host of risks involved in the payment and settlement system, and at the same time, improving a more efficient payment system. Examples of payment system reform include: (i) the adoption of Real-Time Gross Settlement (RTGS) system of the so-called BAHTNET (Bank of Thailand Automated High-value Transfer Network) for high-value payments in May 1995, (ii) the introduction of the electronic cheque-clearing system (ECS) by the BOT in July 1996, (iii) the implementation of image signature technology in February 2003. As pointed out in an earlier study by Pariwat and Hataiseree (2002), the implementation of the system reform for large-value transactions, along with the introduction of a number of supporting policy measures, have been found to jointly contribute to a significant reduction in systemic risk and other risks involved in the large-value payments and fund transfers.

This paper is aimed to shed some light on a number of issues related to managing payment and settlement system reform in Thailand. The rest of the paper is structured as follows:

➤ *Section II* provides the brief overview of the nature and salient features of payment and settlement systems in Thailand;

➤ *Section III* provides a brief description of the risks involved in the payment and settlement systems and the Bank's involvements. It also discusses the major coverage of the payment system reforms in Thailand and the payment system reform objectives;

➤ *Section IV* deals with reform option for wholesale payments and system reform for large-value transactions. Special reference is given to the implementation of RTGS under the BAHTNET;

➤ *Section V* provides a detailed discussion of important policy measures for reducing risks in large-fund transfers, especially those of *systemic risk*. Particular attention is given to the discussion of the contribution and the success factors of the BAHNET system in reducing risk;

➤ *Section VI* discusses possible options in managing risks in foreign exchange settlement in a more efficient manner; and

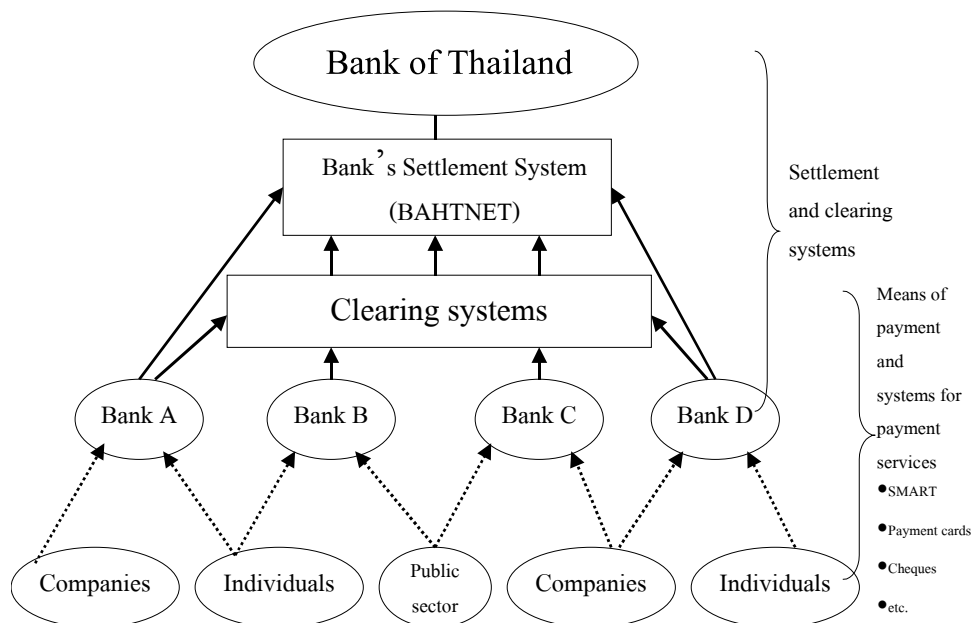
➤ *Section VII* concludes with comments regarding future developments and challenges of the payment and settlement system of Thailand.

## II. Overview of the payment and settlement systems in Thailand

The payment system in Thailand, as characterized in Chart 1, can be broadly classified into 2 levels according to the type of service provider: (i) “systems for payment services” (retail-bank system) and (ii) “systems for clearing and settlement of payments between banks” (inter-bank system). The former involves the use and provision of cheques, card services, and cash. The latter are systems for calculating positions and transferring funds between financial institutions in the inter-bank market. The systems include:

- (i) *BAHTNET* which is a payment system supporting the transfer of large-value payment;
- (ii) *ECS* (Electronic Cheque Clearing System) which is a payment system supporting inter-bank cheque payment;
- (iii) *PCS* (Provincial Cheque Clearing System) which is one-day clearing at the provincial and district levels; and
- (iv) *Media Clearing* which is a payment system supporting the transfer of small-value payment. However, the Media Clearing system has been later replaced with SMART (System for Managing Automated Retail Funds Transfer).

**Chart 1 : The Payment System in Thailand**



Inter-bank payments are usually large value and derived from both bank customers' transactions and banks' own businesses. They are large-value customers' inter-bank payments, payments for the settlement of an inter-bank cheque clearing, payments for the settlement of an ATM clearing arising from the withdrawal of cash from another bank's ATM, the settlement of a credit card clearing for payment with credit card issued by another bank, inter-bank lending and securities investment, foreign exchange trading, and transactions instructed by non-resident investors. For more detailed account of this, see for example EMEAP (2001).

Financial transactions processed through the BOT accounts can be broadly classified into 7 categories: (i) fund transfer for non-resident Baht account, (ii) Baht settlement for FX trading, (iii) inter-bank lending, (iv) securities and equity trading, (v) funds transfer (vi) internal funds transfer, and (vii) others. Of these, as portrayed in Pariwat and Hataiseree (2002), fund transfer for non-resident Baht account appears to have gained the largest share, accounting for nearly 36 percent of the total value of the domestic inter-bank fund transfer via BAHTNET. The second important item in this regard is fund transfer in the form of FX transaction, accounting for about 29 percent of the total value of fund transfer. This is followed by the transfer of funds in the form of internal funds transfer, inter-bank borrowing and lending and securities trading with having the respective shares of around 13 percent, 10 percent, and 3 percent.<sup>2</sup>

It is important to note that financial fund transfers among banks have been increased importance as implied from a continuous rise in the value of wholesale financial market transactions. As pointed out in Pariwat and Hataiseree (2002), the daily average value of financial transactions settled through BOT accounts was on average about B262.7 billion in the years 2000-2002, compared with the mere amount of B26.9 billion in 1999. In addition, as shown in Chart 2, the ratio of the large-value payment relative to GDP for Thailand is reasonably high, equivalent to 13 percent of Thailand's annual GDP. The ratio for Thailand is much higher

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<sup>2</sup> It is worth noting that the total value of the first four-types of domestic fund transfers mentioned above is reasonably high, accounting for an approximate share of 80 percent of the total value of cheque clearing transaction in Bangkok and its vicinities, which is about B300,000 million on a daily average basis.

than those of some countries in the Southeast-Asian region. This is particularly so when compared with Philippines, Malaysia, and Indonesia with having the reported ratio of 0.1, 4, and 5, respectively.<sup>3</sup>

Such the relatively high level of turnover relative to GDP for Thailand tends to indicate that the systemic risks inherent in deferred net settlements are potentially huge. The exposure of such a magnitude, albeit being much lower when compared with those in most industrialized countries, is seen as one of the important motivations in the move towards the launching of the system reform for large-value transaction. The reform is also driven by the recognition that a central bank would be obliged to intervene to avoid systemic disruption should a serious failure occur.

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<sup>3</sup> However, the levels of turnover relative to GDP for Thailand are much lower than those found in G10 payment systems. This is not totally surprising, as it may be attributed to differences in a number of factors. For one thing, it reflects differences in the stage of financial development between G10 countries and emerging countries like Thailand. For another, it is because the large-value payment system via BAHTNET has just gained an increasing popularity by the financial institutions in recent years.

<p style="text-align: center;"><b>Chart 2</b></p> <p style="text-align: center;"><b>Large-value payment systems in relation to GDP:</b></p> <p style="text-align: center;"><b>G10 countries and selected ASIAN countries</b></p>		
Country	System	Annual payments turnover /GDP
Belgium	ELLIPS	83
Canada	LVTS	23
France	TBF and PNS	56
Germany	EAF and ELS	31
Italy	BI-REL	28
Japan	BOJ-NET	70
Netherlands	TOP	42
Sweden	K-RIX	51
Switzerland	SIC	111
United Kingdom	CHAPS Sterling and Euro	75
United States	CHIPS and Fed-wire	69
Singapore	MEPS	60
Indonesia	BI-RTGS	5
Malaysia	RENAS	4
Philippines	MIPS2	0.1
Thailand	BAHTNET	13

*Notes:* (i) Figures for other countries, except Thailand, were calculated using 1999.

(ii) For Thailand, the calculation is based on the year 2000.

*Source:* Figures for G10 countries are from BIS and IFS, while those of Asian countries are authors' own calculation based on the data contained in *Payment Systems in EMEAP Economies (2002)*.

### **III. Risk in the payment and settlement system and major payment system reforms**

Like many other central banks, the BOT has been particularly concerned with the risk in large-value transfer systems, or systems for clearing and settlement of payments between banks, as are located at the top of the payment system in Chart 1. The concern seems to reflect a substantially high degree of “systemic risk” involved in the financial transactions in the inter-bank system. As is commonly agreed, disruptions in this segment of the payment system can lead to tremendously adverse consequences, partly through the banks’ exposure to each other and partly through the banks’ processing of payments to and from their customers—i.e. retail payments.

#### **3.1 Risk in the payment and settlement system and the Bank’s involvement**

As financial transactions among banks in the domestic inter-bank fund transfer markets have showed sign of a continuous increase in values over the past many years, this implies that failure of one big bank in fulfilling its obligation could be a source of financial instability. In this respect, it may contribute to spreading liquidity and solvency problem. The problem of this kind tends to have become more pronounced, as it becomes apparent that the values of financial transactions in the interbank markets have increased significantly in recent years.

The BOT, like many central banks, has over the past many years placed an increasing emphasis on the development and design of an appropriate infrastructure for large value funds transfers aimed at reducing and/or eliminating various classes of risks in the payment system. Examples in this regard, as portrayed in more details in Chart 3, are:

- (i) credit risk,
- (ii) liquidity risk,
- (iii) systemic risk,
- (iv) foreign exchange risk,
- (v) operational risk, and
- (vi) legal risk.

**Chart 3****Risks in payment and settlement systems**

*Legal risk:* the risk that is related to uncertainty about agreements and the distribution of responsibility in the payment system. Experiences in many countries point to the need to put in place a necessary legal framework on Payment Systems, as it can contribute to a reduction or elimination of legal risk. In Australia's case, for example, the Reserve Bank of Australia has found it more comfortable about the legal underpinnings of the payment system, after The Payment Systems and Netting Act came into force in 1998. In the case of Thailand, there is currently no explicit legislation on payment systems to oversee and discipline some policies, such as pricing and electronic funds transfer, of payment services providers and participants. However, the BOT has considered the introduction and amendments of involving acts, which are Amendment to the Bank of Thailand Act, Payment Systems Act, Financial Institutions Act, Electronic Funds Transfer Act and Royal Decree, Rules and Regulations, derived from Electronic Transaction Act.

*Credit risk:* the risk that is often referred as the risk of losses due to the failure of another bank to meet obligations on time or at the later point in time.

*Liquidity risk:* the risk that is tied to the costs involved in liquidate shortfall due to delays in settlement. This may be due, for instance, to insufficient liquidity occurring at one of the banks or the failure of computer systems or telecommunication services.

*Systemic risk:* the risk that the settlement failure in any given transaction can spread quickly beyond the original counter parties to affect other parties the interrelation of trade and settlement, ultimately disrupting the nation's entire payment and settlement system. As commonly practiced elsewhere, central banks in many countries have placed a relatively greater emphasis on the containment of systemic risk in the evaluations of risk in the nation's settlement systems. In view of this, possible measures, particularly the BAHTNET arrangements, giving rise to a reduction of systemic and other risks are discussed in greater details in this section.

*Foreign exchange settlement risk:* the risk that one party to a foreign exchange transaction will pay the currency it sold but not receive the currency it bought.

*Operational risk:* the risk that deficiency in systems or internal controls could result in unexpected losses and cause or exacerbate credit and liquidity risks.

As implied above, systemic risk has increased in recent years because of the increased volume of wholesale financial transactions, accounting for around 13% of GDP in 2002. In view of this, the BOT is most concerned about the systemic risk and has continued to launch a number of initiatives and/or reforms to help minimize the risks involved in the case of large-value payments. This risk arises when the inability of one bank to meet its obligations vis-à-vis another participant at due time may cause similar failure on the part of other participants. In extreme case, such inability could trigger a chain reaction endangering the stability of the entire payment system.

As financial transactions among financial institutions in the inter-bank fund transfer markets have showed sign of a continuous increase in values over the past many years, this implies that failure of one big bank in fulfilling its obligation could be a source of financial instability. In this respect, it may contribute to spreading liquidity and solvency problem. The problem of this kind tends to have become more pronounced, as it becomes apparent that the values of such financial transactions have increased significantly in recent years. As mentioned in Pariwat and Hataiseree (2002), the daily average of funds transfers among financial institutions in the inter-bank markets is reported to be in the range of B247,320 to B275,260 million in the period of 2000-2002 compared with the mere value of B26,900 in 1999.

### **3.2 Payment system reforms objectives**

As is commonly agreed, the key to reform of the payment system needs to be to develop payment arrangements that are aimed at removing systemic risk and other risks by ensuring that a payment disruption or crisis cannot undermine the stability of banks in general. In order to reach this goal, it is necessary to identify the risks that can cause a disruption, and then establish appropriate procedures or measures to help reduce these risks.

In focusing on the management of the payment system reform, the BOT has been pursuing a number of specific objectives. Chief among these are:

- to ensure that payment system risks are reduced to acceptable levels, and are managed appropriately by system participants;
- to maintain the smooth operation of payment and settlement system, and ensure that the public confidence in payment and settlement system remains high at all times;
- to encourage banks and other payment service providers to offer efficient and reliable payments services to their customers;
- to foster the move towards delivery versus payment arrangements in all financial markets—especially with respect to high-value transactions;
- to ensure that payment system arrangements provide good support for the effective implementation of monetary policy.

However, reflecting the initial conditions and difference in institutional factors of different countries, the reform process in Thailand has been carried out using a *step-by-step approach*. As will be discussed in more details in subsequent sections, the reform on wholesale payments has been given more emphasis compared with those of reforms on small-value payments due in part to the different nature of risks and the associated impact on the financial stability.

Apart from these, more attention needs to be given to the proper mix of payment system reform measures between the use of “standard” policy measures, e.g. pricing-incentive measures, the use of ILF and queuing mechanism, and measures based on the so-called “moral suasion technique”. For example, the reliance on the use of moral suasion technique needs to be adopted from time to time to seek more cooperation from market participants. Examples in this regard include the use of informal agreement among market participants in the cheque-clearing process to shift to the use of the BAHTNET system for fund transfers instead of the traditional mode of cheque-clearing system for high-value cheque.

### 3.3 Major payment system reforms in Thailand

There have been important changes and reforms to the Thai payments system over the past many years. The major coverage of the reform include:

➤ The introduction of *Real-Time Gross Settlement (RTGS) of the so-called BAHTNET* system for high-value payments in May 1995. The shift to the BAHTNET system has caused several important changes with respect to the funds transfer among financial institutions.

First, the value of inter-bank transaction settled through the BAHTNET system increased significantly, particularly following the introduction of the enforcement by the Bank since March 10, 2000. As is evident from Chart 4, the value of cheque payment declined sharply from around B267,390 million in 1999 to B102,980 in 2000, a reduction of more than 61 percent, while the value of fund transfer via the BAHTNET system increased nearly tenfold from an approximate amount of B26,900 million in 1999 to B247,320 million in 2000.

Second, the introduction of the BAHTNET system has caused changes in the behavior of the settlement process. As pointed out in Pariwat and Hataiseree (2002), payments instructions have entered into the system earlier, as market participants' heightened awareness of the risks and costs associated with settlement. Such a move toward an early settlement by banks can be seen as another *positive effect* of the transition to the RTGS under the BAHTNET system, particularly from a perspective of credit risk and hence systemic risk reduction.

➤ The introduction of *the electronic cheque-clearing system (ECS)* by the BOT in July 1996. The introduction of this system has also been seen an important step toward the use of electronic cheque collection and presentment, thus leading to a more efficient and cost effective.

Chart 4

## Daily Average Value of Transaction Settled through BOT Account: 1996 – 2003

*(Billion Baht)*

<i>Payment System</i>	<b>1996</b>	<b>1997</b>	<b>1998</b>	<b>1999</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>
<b>BAHTNET</b>	33.5 (6.22)	58.8 (9.48)	67.5 (17.64)	26.9 (8.96)	247.32 (68.81)	275.26 (79.98)	266.29 (77.38)	318.2 (78.93)
<b>ECS</b>	495 (91.89)	553.36 (89.18)	309.11 (80.76)	267.39 (89.01)	102.98 (28.65)	61.64 (17.91)	69.33 (20.15)	75.69 (18.77)
<b>Provincial Cheque</b>	10.2 (1.89)	8.3 (1.34)	5.9 (1.54)	5.77 (1.92)	8.64 (2.40)	6.52 (1.89)	7.4 (2.15)	7.7 (1.91)
<b>SMART</b>	- -	0.04 (0.01)	0.24 (0.06)	0.33 (0.11)	0.49 (0.14)	0.74 (0.22)	1.12 (0.33)	1.45 (0.35)
<b>Total</b>	<b>538.7</b> <b>(100)</b>	<b>620.5</b> <b>(100)</b>	<b>382.75</b> <b>(100)</b>	<b>300.39</b> <b>(100)</b>	<b>359.43</b> <b>(100)</b>	<b>344.17</b> <b>(100)</b>	<b>344.15</b> <b>(100)</b>	<b>403.04</b> <b>(100)</b>

*Notes:* Figures in parentheses are percentage share.

Data for 2003 covers the period of January-August.

*Source:* Bank of Thailand

➤ The implementation of *image signature technology* in February 2003. The development of the kind can help reduce time of clearing cycle of Bill for Collection from 6 to 3 business days. The new arrangements are seen to be more efficient than the previous ones, as they could help reduce the time of clearing cycle of Bill for Collection to a three-day cycle. More specifically, the *processing cost* under the new arrangements tends to be lower than the previous ones. Such a lowering of cheque-clearing times associated with the introduction of the B/C 3 day tends to have lowered the cost of processing to some certain degree, and thus contributing to a lowering of real resource costs for the use of cheque.

➤ *Potential introduction of the new system for electronically presenting cheques.* A project is in hand to replace the paper presentment of cheque with electronic presentment. To gain further enhancement of the efficiency of the cheque-processing system, the Bank is in the process of studying the possibility in the *introduction of the new system for electronically presenting cheques*. The main essence of such a system includes capturing and storing the image of cheque and enabling institutions to make payment decisions in real time by accessing these images through the Internet.

➤ *Improvement of operational risk.* Reflecting the commitment of the BOT to maintain its highly quality in providing payment services, especially in the area of cheque service, the BOT has initiated a scheme to help reduce risks in its back office cheque-processing operations. This scheme, covering the period from March 1, 2002 to February 28, 2003, is intended to improve operating efficiency while maintaining high-quality cheque services to depository institutions nationwide. As documented elsewhere, the BOT has been now able to identify various types of risks associated with its cheque service operation, including in particular Even Risk, Operational Risk, Technology Risk. Risk reduction involved in the Bank's cheque service operation can partly be minimized through a combination of streamlining the cheque management structure.

Concurrently, improvements in operational efficiency were also made to match technologies and transaction volumes in the payments system. The key points from restructuring included the following:

- Setting roles, duties, and responsibilities to serve the policy guidelines of the Bank of Thailand;
- Improving the working process in the policy and strategy areas, including tasks related to project management;
- Changing the working process to one-stop service at the ECS;
- Pooling staff ranked between levels 4-6 into a common systems development group in order to increase the flexibility in utilizing human resources and delegating tasks, which is suitable for project-styled work;
- Reviewing the structure and the number of departmental staff once again in May 2003.

Apart from these, the BOT finds it indispensable to continue its efforts to enhance the “safety” and “efficiency” of the payment and settlement system under the rapidly changing financial and technological systems where financial globalization is intensifying cross-border linkages with settlement troubles in one country affecting the settlement system in other countries. Additional reform measures undertaken to help address the mentioned issues include:

- *The enhancement of BAHTNET system in December 2001.* The aims of the newly designed system of BAHTNET are to support real time gross settlement and delivery versus payment for securities and to serve as an infrastructure to support the development of financial and capital markets in the country.<sup>4</sup> As alluded to above, the establishment of the BAHTNET

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<sup>4</sup> The new design of BAHTNET2 contains a number of salient features, including in particular a real time automated DvP system for the Thai government securities trading and an application of SWIFT network as the fund transfer message carrier. However, for some participants not being a SWIFT member, a web-based service via the BOT Web Portal is provided to gain the access to BAHTNET2. Apart from the usual fund transfer service, participants are entitled to acquire a set of additional services via the BOT Web Portal. These include inquiry of account balance and movement, queue management, message communication, and reports. For non-SWIFT BAHTNET participants, Web services will also facilitate funds transfer and DvP transactions.

system has also contributed to a more efficient settlement for government securities market. This is particularly so under the newly designed system of BAHTNET2 that has been developed to replace the previous system of BAHTNET1. The new system has become operative since December 11, 2001. Prior to the implementation of the BAHTNET2 system on RTGS-DVP basis, settlements in government securities trading have been made by cheque that has the finality one-day after completely delivering the securities to counter party. Practice of this kind has made the sellers vulnerable to the principal risk. However, the principal risk tends to have mitigated or eliminated under the new settlement of RTGS-DVP, as the delivery of securities occurs if and only if the payment occurs. The BOT, at this stage, has placed an increasing emphasis on the use of DvP for transfer of funds between financial institutions participating in the Government securities market. The Bank will ensure that all Thai securities are settled with full DvP, thus leading to a major structural reduction in systemic risk.<sup>5</sup>

- *The efficiency improvements in cheque clearing process through the introduction of cheque truncation and the development of three-day clearing for the bill for collection system.* The introduction of the new systems is intended to shorten the collection time from six to three working days. The latter system was launched in February 2003.
- *The improvement of the retail payments system through the upgrading of the SMART system.* This is aimed to promote efficiency and convenience, along with encouraging public sector agencies to move funds transfer transactions into the electronic payments system.
- *The launching of feasibility studies on the cross-border linkages.* The aims are to explore preferred strategies, including in particular EMEAP-PvP, HK-PvP, CLS and ASEAN-Pay,

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<sup>5</sup> Prior to the BAHTNET implementation on RTGS-DvP basis, the buyers and the sellers of securities are required to settle their obligations over the counter at the BOT. The mentioned obligations refer to the transfer of funds through cheque usage and the transfer of securities.

for Thailand in managing risks involved in cross border payment systems in a more efficient manner.

- *The improvement of ILF (Intra-day liquidity facilities).* As innovation in information technology is advancing at a fast pace, the specific nature of services required for the fulfillment of an efficient settlement system of the Bank has been further changed. More specifically, some certain parts of the existing design of ILF have been modified to gain more efficiency in smoothing out fund settlements via BAHTNET accounts. The newly modified ILF, effective July 5, 2003, include:

(i) the implementation of book entry system in the registration of collateralized securities for the use of ILF,

(ii) the use of “mark to the market” and “hair-cut” method in the calculation of the value of collateral, and

(iii) the increased flexibility for BAHTNET members to manage their liquidity needs during the day.

In addition, the BOT will ensure that the proposed model for a new design of ILF exists a mechanism to prevent the liquidity injection via the ILF channel from “spilling over” into overnight and longer liquidity provision and thereby having monetary consequences.

Other developments and/or reforms include:

➤ (i) legal developments, aiming to

-- Diminish risk that will be incurred in the clearing and settlement process, particularly “Systemic risk”;

-- Clarify “Settlement finality”, principally in the netting and settlement scheme;

-- Protect the end users of the payment services;

-- Define the rights, obligations and responsibilities of all parties involved in the payment systems.

➤ (ii) the potential adoption of delivery versus payment arrangements for transactions in the securities market;

➤ (iii) the potential adoption of payment versus payment (PvP) arrangements (where the two legs of a deal are settled simultaneously) for transactions in foreign exchange transactions.

## IV. Reform options for wholesale payments and the salient features of RTGS in Thailand

### 4.1 Reform options and situation of the Thai payments system before the reform

As pointed out in the previous section, the BOT has been pursuing a number of specific objectives in its management of the payment system reform. However, as it can be argued, such the objectives for payment system reform may be summarized as *reducing risk* and *promoting efficiency* in payment systems. Like many central banks, the BOT has placed more emphasis in risk reduction, especially those related to the large-value wholesale payments systems. This is due mainly to the likely sizable impact associated with this sort of large-value payments on the domestic financial stability should a serious failure of the payment system occur. It should be noted in this connection that though risk reduction has received more attention in the first phase of payment system reform, promoting efficiency of the payment system is also viewed as a complementary goal and needs to be addressed in the subsequent stages of payments system reform.

Since reduced risk considerations have received more focus over greater efficiency, it was clear in the design of the reform of the Thai payments system that reforming the large-value payment circuit has been given more important than modifying the low-value (retail) payment circuit in the early stage of the implementation of payment system reform. This reflects that wholesale payments tend to generate by far the largest inter-bank exposure and that rolling unsettled wholesale market transactions backwards could cause serious problems in wholesale markets. On the contrary, the majority of payments by cash, credit card, direct credit, direct debit, and other similar payment instruments are for smaller amounts and the inter-bank risk exposure issue are not so cute. The new design of BAHTNET system, where individual payments are settled in bank's central bank accounts continuously or in real time, has been viewed as having the advantage of eliminating inter-bank risk in the payment system.<sup>6</sup>

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<sup>6</sup> However, the new system creates a need for banks to have, or to be able to generate, throughout the day in real time, the balances in the BOT' accounts required to fund outgoing payments.

Prior to the transition to the RTGS system, almost all of the transactions settled through BOT accounts were processed on a net basis of the so-called a deferred net settlement (DNS) basis. In the conventional designated-time settlement, payment instructions are accumulated until designated settlement times instead of immediate settlement for each instruction. At the designated-time, 1 p.m. in Thailand, the net settlement position of each financial institution is calculated and its account is credited or debited simultaneously. In designated-time settlement, as is commonly agreed, financial institutions need only the funds equivalent to their net debited positions at the time of settlement. This is seen as an efficient system from a viewpoint of fund management. However, the previous system seems to be vulnerable to a high degree of systemic risk if the failure of a single financial institution in the system in meeting its obligation were to create a series of liquidity shortages or defaults, and thus cause a suspension in the entire payment and settlement systems.

#### **4.2 System reform for large-value transactions**

The establishment of BAHTNET has been a major step on the part of the BOT in the process of developing a modern clearing and settlement system in Thailand. This new design for high-value payment system has many *positive features*, including in particular: (i) the possibility of continuous settlements through out the day and (ii) the built-in mechanism for releasing a gridlock situation in gross settlement. Apart from these, the establishment of the BAHTNET system has entailed a number of important changes in the settlement processes: (i) the requirement for cover in relation to payment settlement through BOT and (ii) the establishment of intra-day liquidity information in real time.

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As mentioned earlier, the introduction of the RTGS system via BAHTNET, was seen as an important step on the part of the BOT to put in place a new design of settlement arrangement that can contribute to the reduction of the systemic risk inherent in the settlement of funds between financial institutions. The introduction of this kind of payment systems has been subsidized in various forms by the BOT: through the gratuity of ILF and through the resort to a queuing mechanism which implicitly provides intra-day liquidity with no cost. Although there is no interest rate charge on intra-day credit under the present system of ILF, banks are required to hold a portion of collateralization of any credit. Although at first glance there appears to be no *actual cost* involved in the use of ILF by financial institutions, a closer look at the detailed arrangements seems to have provided different answer.

As one can see, financial institutions are required to maintain at least 10 percent of high-quality securities at the BOT as eligible collateral for the use of ILF. Although this practice incurs cost of some kind on participants, it has help protected the central bank's balance sheet. The cost of this kind is commonly referred to as the *opportunity cost*, as banks have to hold the assets accepted by the BOT as collateral rather than those that the bank would freely choose. It is for this reason that intra-day credit may be costly for some banks, particularly those that have continuously retained a relatively high level of unused ILF. Experiences over the past many years suggest that some certain banks of the Thai banking industry have occasionally claimed that the provision of collateral appears to be costly and requested the central bank to minimize its use. Nevertheless, any possible solution for this needs to take into account some related issues,

including for instance the positive externality associated with the availability of ILF and the protection of the central bank's balance sheet.

#### **4.3 The architecture and salient features of RTGS in Thailand**

The establishment of the BAHTNET system in May 1995 has been seen as a milestone on the part of the BOT to create a new payments system that can be used to help reduce risk in the payment system. Under the previous settlement system, financial transactions --particularly fund transfer for non-resident Baht account, Baht settlement for foreign exchange trading, inter-bank borrowing and lending, securities trading-- was largely executed by cheques. The value of domestic inter-bank payments via the use of cheques has long gained a lion share compared with those using the BAHTNET despite the fact that the use of cheques in the fund settlement has subjected to a number of risks: settlement risk, systemic risk, and operational risk.

As pointed out in Pariwat and Hataiseree (2002), cheques usage played an important role as the country's major means of fund transfer during 1997-1999. However, the pattern of cheques usage has changed remarkably since 2000, following the BOT initiative in launching the measure<sup>7</sup> of the so-called "migration of high-value cheque" on 10 March 2000. Since around the second half of the year 2000 onward, however, financial transactions in the inter-bank market through the use of cheque have gained less in importance. By contrast, the large bulk of inter-bank funds transfer has been settled via BAHTNET, accounting for more than 80 percent of the total value of cheque clearing transaction in Bangkok and its vicinities.

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<sup>7</sup> According to this measure, commercial banks are requested to settle the afore-mentioned four types of financial transaction via BAHTNET. The measure is basically aimed to help reduce the amount of cheque usage for high value payments and thus mitigate the level of risks involved in the payment system, especially the settlement risk. Furthermore, the introduction of the measure is also aimed to comply with the Core Principles for systemically important payment system initiated by the Bank for International Settlements (BIS).

In addition to its help in minimizing risks in the payments system, the transition to the BAHTNET system can be of some help in the enhancement of the efficiency in the Thai payment system for various reasons. First, transaction costs involved in the financial transactions via BAHTNET system tend to be much lower compared with those conducted by using cheque. As is commonly agreed, the use of cheque in the funds settlement may give rise to various types of costs, including the issuing cost, the collection cost, the timing cost, the unwind cost<sup>8</sup>, and more importantly the opportunity cost from holding funds in the system for the next day finality of cheque collection. By contrast, the settlement through the BAHTNET system is real time finality.

Second, the arrangements under the BAHTNET system allow BAHTNET members to access information concerning their cash and securities account at the BOT anytime during the service hours via BAHTNET Web Service. This kind of arrangements can assist BAHTNET members in managing their accounts more efficiently, and thus leading to a more effective liquidity management by BAHTNET members. Third, the use of SWIFT network as the main interface under the BAHTNET system has provided an increased degree of flexibility for the integration of future services such as the future cross-border linkages with other foreign payment systems. This may have contributed to a more efficiency enhancement of the Thai economy as a whole.

Third, the new design of BAHTNET system, the so-called BAHTNET2, has provided a positive contribution to the enhancement of the operational efficiency. The new system of BAHTNET2 has been modified by using SWIFT network as the main interface to enable Straight Through Processing (STP) and to be consistent with international practice. As one can see, STP can support the operational efficiency by facilitating the information inputs and sustaining the large amount of business transactions. This creates the economy of scale. Moreover, the

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<sup>8</sup> Unwind is the situation that some financial institutions in the cheque clearing system are facing with the liquidity shortage and unable to cover their net position. This in turn results in the recalculation of the net position of cheque clearing by excluding the doubtful cheque of those financial institutions.

information executed by STP can be used immediately for further process resulting in the reduction of the paper-based operation, operational error and timing, especially in the securities transactions.

## **V. Policy measures and the contribution of the BAHTNET system in reducing risk**

### **5.1 Supporting policy measures for reducing risks in large- fund transfers**

As suggested elsewhere, RTGS system usually requires more liquidity than net settlement systems, and participants have to immobilize liquid assets as collateral for intra-day credit. In order to minimize liquidity need in the BAHTNET system and at the same time to help contain liquidity risk in the payment system, the BOT has put in place a number of important measures. First and foremost, the BOT has offered intra-day loans against collateral to financial institutions participating in the BAHTNET arrangements. Second, the BOT has put in place a set of built-in “queuing mechanism” and “anti-gridlock function”. These two measures are of some particular importance for a successful implementation of the BAHTNET system, as will be discussed in more details below.

The BOT, as portrayed in Chart 5, has also initiated several policy measures aimed to support the smooth functioning of high-value funds transfers via BAHTNET. Of particularly important in this regard are:

- (i) the pricing incentive scheme to encourage an early transfer of funds,
- (ii) the so-called 30:70 percent measure,
- (iii) the high-value cheque migration,
- (iv) the use of credit balance from cheque clearing.

**Chart 5****Important Measures Introduced by the BOT to Help Reduce Liquidity Risk**

- *Queuing mechanism and gridlock resolution.* These are tools that have been developed to handle the queue of funds transfer instructions that are unable to be settled due to the inadequacy of funds in the sending institution's account. Payment instructions remain queued until the sender has sufficient funds to settle them. When several instructions from various institutions stand in the queue, the system will search for the group of instructions and calculate the net position of each institution. If the net balance of each related institution is a positive amount, the system will then process all the related instructions simultaneously. This would reduce the liquidity needs in the system. These mechanisms were put in place on August 11, 1997 and allow participants to manage their queues by reordering the priority of their transactions.
- *Intra-day liquidity facilities (ILF).* ILF provides participants with access to collateralized overdraft at the BOT. The facility is limited to 30% of the allocated loan window credit line, which must be collateralized by government bonds. Members are charged for using the facility, which was introduced on February 1, 1999. The BOT terminated this cap of 30% of the loan window credit line on March 10, 2000, and currently allows ILF members limited use of the facility without charges during the day, but requiring at least 10 percent of collateralization for any credit with the value of fund transfer exceeding B500 million.
- *High-value cheque migration.* Inter-bank loans, inter-bank foreign exchange, funds transfer for non-residents, and government securities settlement have been settled through BAHTNET since March 10, 2000. Previously, these types of transactions have accounted for over 80% of cheque clearing transactions. This change is an important development to reduce settlement risk.

**Chart 5 (continued)****Important Measures Introduced by the BOT to Help Reduce Liquidity Risk**

- *Use of credit balance from cheque clearing.* The BOT has considered allowing member banks to use the credit balance from the normal round of cheque clearing operations to settle any drawn ILF credit line or other funds transfer transactions in BAHTNET. This may reduce short-term interest rate fluctuations in the money market, reduce the cost burden of member banks, and reduce liquidity risk in the system. However, members must have an allocated ILF credit line above 10% of the average funds transfer value in BAHTNET in the past two weeks. Also, the BOT will treat the ILF backed-up bonds as a collateral for the use of the cheque clearing credit balance. Previously, the BOT did not allow for the use of the credit balance from the normal round of cheque clearing and held such credit balance until the return round of cheque clearing returned has been settled the following morning.
- *30-70 percent measure.* The BOT requires participants in BAHTNET to send funds transfer instructions amounting to at least 30% of their daily average funds transfer value prior to 12:00 a.m. and up to at least 70% prior to 15:00 p.m. This condition was imposed in early-2001 and is aimed to ensure the smooth operation of the settlement process and to avoid the heavy congestion of instructions, particularly in the afternoon, and liquidity management problems.

*Source:* Modified from **EMEAP Working Group on Payment and Settlement Systems (2002)**

The launching of a series of such measures has been seen as the reflection on the part of the BOT to put in place necessary measures to guide the changes to the *market practices* intended to help reduce risks for all market participants. As is discussed in more details in the subsequent sections, the afore-mentioned policy measures can be of some help in reducing credit risk and/or systemic risk from the payment and settlement process. For example, the introduction of the pricing incentive scheme by charging a relatively lower fee for an early transfer of funds appears to have exerted a considerable impact on the part of commercial banks operating in the BAHTNET market.

Apart from these, the BOT has also launched a series of studies aimed at increasing the efficiency and reducing risk for settlement of the Thai government securities. The studies have been carried out with a close collaboration with several organizations both internationally and locally, including for instance Reserve Bank of Australia, World Bank, the Ministry of Finance, the Office of Securities and Exchange Commission, the Stock Exchange of Thailand, Thai Securities Depository Company, and several financial institutions. The major initiatives in this connection are to encourage the greater use of Delivery versus Payment (DvP), set up a legally certain netting arrangements and consider the transferring the operation of the Thai government securities settlement system to private sector.

## **5.2 Significant achievement in risk reduction and the likely success factors of the current efforts**

Empirical evidences, summarized in Chart 6, seem to lend support of the notion that the establishment of the BAHTNET system coupled with the launching of a series of supporting measures by the BOT can have the *positive* impact on the reduction of risks involved in the payment and settlement systems of Thailand.

Chart 6

**Significant achievement in risk reduction in the Thai payment system  
Following the introduction of BAHTNET system**

	<b>Before May 1995</b>	<b>Now</b>
● Systemic risk	High	Reduced by over 80 percent
● Credit risk	High	Substantially reduced by about 80 percent
● Liquidity risk	Moderate	Partially reduced (Partially through the significant improvement of efficient ratio)
● FX settlement risk	High	Partially reduced (Partially through the shorter times of Baht reconciliation)
● Timely settlement	Next day	Continuously

Firstly, there are many indications suggesting that credit risk and hence systemic risks in the Thai payment and settlement systems have been reduced to some certain degree. Continuous settlement has reduced the “size” and “duration” of banks’ exposure to each other. As pointed out in Pariwat and Hataiseree (2002), there have been remarkable changes with respect to the behavior of financial institutions in sending funds transfer instructions for settlement via BAHTNET accounts. It has become apparent that commercial banks tended to complete the sending of the large bulk of funds transfer instructions to the BOT at the relatively early hours of before 12.00 a.m., especially in the period after the launching of the BAHTNET2 and the implementation of price-incentive scheme in December 2001.

The changing pattern of funds settlement of this kind can have the positive impact on the reduction of systemic risk through the reduction of the amount outstanding of transactions remaining unsettled on the settlement day. It is evident that market participants tended to expose to credit risk on a relatively smaller scale, as the large bulk of financial transactions in the inter-bank market was transferred and settled at the early hours on a real time basis. However, further enhancements to the BAHTNET were required to take full advantages of the benefits of RTGS in view of the fact that there has been significant use of queuing mechanism by members of the BAHTNET, although the “size” of queues has shown sign of a declining trend.

Secondly, there seems to have sufficient evidence suggesting that liquidity problem under the BAHTNET system has been less in importance than it had earlier been mentioned. As pointed out in Pariwat and Hataiseree (2002), continuous settlement has reduced banks’ positions against each other through the virtues of “positive externalities”. The virtues of this kind coupled with the gratuity of ILF by the BOT as well as the establishment of built-in an “anti-gridlock function” have made the Thai payment and settlement system become less vulnerable to the liquidity risk problems as suggested by a number of supporting indicators, including in particular the sharp improvement in “the efficiency ratio”.

Thirdly, evidence regarding the Baht reconciliation times appears to suggest that changes to the *market infrastructure* through the establishment of the BAHTNET system has contributed to reducing the FX settlement risk for the Thai *baht leg* of FX transactions. Evidence has shown that the weighted average reconciliation times for the Thai baht tends to be *shorter* under RTGS compared with those settled under Thailand’s deferred net settlement system (DNS). This sort of positive result is an encouraging outcome. It also points to the need on the part of private commercial banks and the BOT to closely cooperate to explore ways and means to put in place additional measures necessary for the further reduction of reconciliation times.

Thus, it becomes apparent that the new payment and settlement systems via the BAHTNET have contributed to the reduction of systemic risk and other risks in many aspects. In other words, it has become apparent that the new payment and settlement systems via the

BAHTNET tend to be more efficient than the previous one in many respects. Despite such positive results, the achievement of further risk reduction in the Thai payment and settlement systems is still called for and indeed is regarded as a central part of the Bank's financial stability work. To achieve this end, the BOT will be closely involved in developing and improving the infrastructure, and strengthening the system to help further reduction of risks in the payment and settlement systems.

In particular, the following set of success factors for reform on Thailand's wholesale payments will be given more emphasis in the search of more "safety" and "efficiency" in the payment and settlement systems by the BOT. Such likely success factors include:

- High degree of involvement from all interested parties;
- Well suited to the user need and high degree of flexibility in adjusting to the changing requirement of customers;
- Proper mix of supporting policy measures and the use of moral suasion techniques.

## VI. Possible options for managing risks in foreign exchange settlement

Similar to the experiences of the payment systems in many other countries, it is important to point out that Thailand's payment system is also vulnerable to a fairly substantial amount of foreign exchange (FX) settlement risk. This risk is taken place because parties involved in the FX trade usually have to send the currency sold long before they know whether the currency they have purchased has been received on time. In other words, risk in FX settlement arises mainly because the *two legs* of the transaction do not settle simultaneously. This type of settlement risk is often referred to as "Herstatt risks" which exist with respect to cross-border foreign exchange transactions, following the insolvency of Bankhaus Herstatt, a small Germany bank, in 1974.<sup>9</sup>

As has been pointed earlier, the transition to gross settlement system under the BAHTNET arrangements has to some certain degree helped reduce settlement risk, in particular credit risk, in the Thai payment and settlement systems. However, as it has been claimed, the transition to this new system may *not* have removed a substantial portion of what may represent the largest risk in the country's settlement system of the so-called FX settlement risk. As mentioned in the survey reported in BOT (2001), risk in FX settlement tends to be substantial. This may be attributed to the significant reliance by Thai banks on correspondent banks, and in part to the time zone difference (EMEAP, 2001).

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<sup>9</sup> Based on the survey data by the BOT in 2000, it is apparent that trading and settlement in FX currency are concentrated on three currencies: US dollar, Thai baht, and Japanese yen. These three currencies accounted for over 90 percent of trading and settlement during the period under review. Of these, the *baht* portion of foreign exchange turnover makes up a significant part of the turnover in the gross settlement system, accounting for an approximate share of 40 percent of the total value of foreign exchange transactions. In addition, the daily average value of foreign exchange trading and settlement in *baht* has shown sign of a continuous increase from an approximate amount of \$US4,000 million in 2000 to around \$US4,067 million in 2001 (BOT, 2001). The survey also finds that branches of foreign banks as a whole have played an important role in the trading activities in the Thai FX market. The share of foreign banks in the total trading values in Thai FX market is reported to be about 70 percent compared with around 30 percent for domestic commercial banks in 2001.

Against this background, the BOT is now under consideration to undertake the further survey of “FX Settlement Risk” similar to those conducted by the EMEAP Payment System Working Group in 2000. The rationale behind this further survey is to improve our understanding of the “size” and “duration” of these risks in the Thai context. For the next step, the BOT will start to explore more fully the possible options for managing the risks more effectively—whether through the use of some kind of linkages of RTGS systems of different currencies to provide Payment versus Payment (PvP) arrangements where the two legs of a deal are settled simultaneously, through the use of netting systems.

### **6.1 Nature and evidence on the FX settlement risk**

According to the mentioned survey by the BOT, the “duration” of FX settlement exposure for a single day’s settlement for Thailand’s case can be varied from “2 hours” to “32 hours”, while the bank’s exposure duration for most currency pairings are found to be in the range of 20-30 hours. Although this duration exposure tends to be in line with the average duration of the exposure of countries in the EMEAP region<sup>10</sup>, it suggests that institutions should be aware of the inter-day nature of the risk and reflects this in their risk management procedures. This is particularly so for some Thai banks which appear to have higher levels of duration exposure when compared with the average level of duration exposure of the Thai banking industry.

The BOT survey also indicates that the “size” of FX settlement exposure appears to be reasonably high. Single day exposure is reported to be around US\$3,000 million, while inter-day exposure is around US\$3,500 million. It is important, however, to note that for Thailand’s case the *size* of banks’ exposure in relation to their capital is much small when compared with those in the EMEAP region. Based on figures contained in the report by EMEAP (2001), the *size* of banks’ exposures of many countries in the EMEAP region are found to be larger than their

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<sup>10</sup> The group comprises of 11 countries, including Australia, China, Hong Kong, Indonesia, Japan, Korea, Malaysia, New Zealand, Philippines, Singapore, and Thailand.

capital, while it is approximately to 0.5 for Thailand's Banking Industry (BOT, 2001). In some cases, Australia for instance, the potential exposure is estimated to be 2.5 or 3 times of capital.

## **6.2 Possible options for managing the risks**

Over the years, the BOT has also explored other ways and means to help further reduction of FX settlement risk. At this stage, as is discussed in more details in a separate paper, the BOT has carried out an internal study to identify FX settlement risk among Thai banks in the same way as has been conducted in G10 countries and EMEAP Group. It also plans to study a possible inclusion of Thai baht as part of eligible currencies in the FX settlement system under CLS Bank.

High in its agenda is the study of the possibility to use *payment-versus-payment* (PvP) system as an additional device to help reduce the FX settlement risk at some point in the future. Of particular interest in this regard is the HK-PvP model that has been initiated by the HKMA and the EMEAP-PvP model. Other possible solutions for the reduction of the FX settlement risk include, for instance, the possible application of the inclusion of the baht in the CLS system.

However, the "cost dimension" for being a member of the CLS system seems to be a central issue for the possible inclusion of the baht currency. This cost involves not only the entry cost of US\$ 5 million, but also the adjustment costs related to the changes of the banking practice in the FX trading process as well as the costs associated with the enhancement of the current systems of computer and telecommunication network.

Apart from these, the volume of the daily FX turnover for Thailand relative to its GDP is relatively much small compared with some other prospective members of CLS Bank. As one can see, the ratio is about 3.3 for Thailand, while it is equal to 229.9 for Singapore and 43.5 for Hong Kong (BOT, 2001). In view of this, the *net benefits* of being a prospective member of CLS system for Thailand may be of minimal when compared with some other alternative solutions for

use in the possible reduction of FX settlement risk. For instance, Thai banks can participate in CLS through Third Party Service.

From a viewpoint of financial stability, however, it is equally important on the part of commercial banks to develop a framework to equally gain control over FX settlement risk as they do over other types of credit risks. The recent introduction of a CLS Bank reflects a joint effort of major international banks and organizations, i.e. a group of major banks in G10 countries, to put in place a simultaneous FX settlement that can be used as an effective device to reduce FX settlement risk.

Under this sort of settlement, FX transactions are settled simultaneously on a PVP basis. As is widely accepted, settlement arrangements in the form of PVP can be of useful help in eliminating the credit risk connected with transactions in those currencies included in CLS. Despite its potential merit in reducing the credit risk, settlement arrangements under the PVP system has not yet been widely implemented as part of an important measures for risk reduction in the settlement. As indicated in Pariwat and Hataiseree (2002), the PVP has not yet gained an adequate popularity among many central banks, as it has been only used by the HKMA.

The benefits brought by the CLS have resulted in an increased interest among many central banks outside a group of original members of CLS Bank to consider the possibilities of having their currencies as an eligible currency under the CLS settlement arrangement. Examples for this include, for instance, Reserve Bank of Australia, the Norges Bank, the Monetary Authorities of Singapore. Although the application for the possible inclusion of baht as an eligible currency under the CLS appears not to be high in its agenda, the BOT has at this stage conducted an internal study to shed some light on the benefits and costs of being a member's currency in the CLS.

Existing evidences seem to have indicated that participating in the CLS system tends to lead to significant reductions in FX settlement risk. However, as it has been claimed, such the potential benefits may be greater than the real thing. As has been pointed out elsewhere (RBA,

1999), there are a number of uncertain factors associated with the CLS system. For one thing, CLS Bank has just been in actual operation for less than 10 months. It is therefore still too early to claim a firm success. For another, not all currencies will be settled by CLS Bank. This follows that there are still risks involved in the FX transactions. In addition, it becomes apparent that not all banks will be able to directly access the services of CLS Bank. This means that some commercial banks will have to use correspondent banks to avail themselves of risk reduction capabilities.

It is important to note in this connection that the introduction of the BAHTNET system tends to have contributed to reducing the FX settlement risk for the Thai *baht leg* of FX transactions, although it is quite early at this stage to clearly locate the degree through which the BAHTNET system has help reduce such risk. As commonly agreed, reducing settlement risk primarily requires a reduction in the duration of FX settlement exposure through better management of procedures at every step in the settlement process. As delineated in more details in RBA (1999), there are two channels that a bank, participating in the FX trading and settlement, can opt for in order to reduce the duration of exposure:

*(i) the bank in question can extend the period during which it can cancel the instruction to deliver the sold currency; and/or*

*(ii) the bank in question can reduce the period during which it confirms that the bought currency has been received with finality, or that it did not receive the bought currency from its counter party.*

At this stage, it can be claimed that the introduction of the BAHTNET system have contributed to reducing the FX settlement risk for the Thai *baht leg* of FX transactions. It is likely that the weighted average reconciliation times for the Thai *baht* tends to be *shorter* under RTGS compared with those settled under Thailand's deferred net settlement system (DNS). As one can see, under the DNS payment, receipt with finality was not achieved until 1.00 p.m. on the morning after value date. However, this seems to be not the case for payments under RTGS via

BAHTNET accounts, as payments become final as they are made. For more details, see Pariwat and Hataiseree (2002).

## VII. Future developments and challenges

The implementation of an RTGS system, the BAHTNET system, has been seen as one of the major reforms to the Thai payment and settlement system since its inception in May 1995. As alluded to above, the introduction of the BAHTNET system is a significant reform in the domestic payment and settlement system that has contributed greatly to the reduction of various types of risks inherent in the payment and settlement system, particularly those of *systemic risk* that is found to reduce by over 80% following the adoption of the BAHTNET system. As implied above, the implementation of the real time gross settlement system for the large-value payments under the BAHTNET system has led to a significant achievement not only for its participants but also for the entire financial sector as well.

While the payment system reforms in Thailand have been reasonably successful, the BOT finds it indispensable to continue its efforts to enhance the “safety” and “efficiency” of the payment and settlement systems under the rapidly changing financial and technological systems where financial globalization is intensifying cross-border linkages with settlement troubles in one country affecting the settlement system in other countries. There are at least *five* major areas of developments and challenges deserved paying more attention. These include:

- Proper models for use in reducing settlement risk in the foreign exchange transaction;
- Improvement in the efficiency of “retail” payments system;
- Efficiency improvements in the Cheque-clearing System;
- System development for payment and e-commerce transactions;
- Proposed changes in the legal and regulatory infrastructure of the payment system.

One of such developments and challenges will be in the area of cross-border settlement, particularly those related to the settlement risk reduction in the foreign exchange transactions. The BOT proactively responds to the changing needs of cross border linkage by setting up the cross-border linkage task force to undertake a study of the possibility of connections between BAHTNET system and certain types of international payment systems, particularly those of CLS, HK-PvP, EMEAP-PvP systems.<sup>11</sup> The main objectives are to examine the feasibility for the proper linkages with international payment systems in order to reduce settlement risk in the trading of foreign exchange and securities transactions. In addition, the BOT has also conducted a continuous consultation with domestic and foreign experts in the field to consider possible implications of increasing integration of RTGS linkages on fundamental policies, business practices, techniques, legal concerns, operations, costs and other related issues as well as rising opportunities that might be created by these linkages.

Apart from these, in the near future, the BOT plans to undertake a survey of FX Settlement Risk at regular intervals, to see how far – if at all – the banks’ practices have in the meantime been improved. The proposed survey is in general similar to the one undertaken by the EMEAP Payment Systems Working Group in 2000 which gives a useful picture of the state of the FX market arrangements at that time. It is expected that the BoT would thereby have a more rounded picture covering both the trading activity and the settlement arrangements in the Thai FX market.

Another set of developments and challenges is related to “*the reform in the retail-payment system*”. As mentioned above, the adoption of real time gross settlement for wholesale market transactions has been viewed as the major reform to Thailand’s payment and settlement system. However, this type of reform tends to have little effects for users of the payment system

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<sup>11</sup> This task force was set up on January 1, 2002. The components of the task force include the representatives from the Financial Institutions Policy Group, Financial Markets Operations Group, Monetary Policy Group, Information Technology Group, Legal Group and Payment Systems Group. It should be noted that Payment Systems Group acts as the leader and secretary of the working group.

outside of participants in the wholesale financial markets. This is particularly so for those payments in the retail transactions in which the payments are normally made by cash, cheques, direct debit, direct credit. As pointed out in the recent paper by Pariwat and Hataiseree (2003), there seems to be sufficient rooms for the BOT to manoeuvre a number of supporting policy measures and/or initiatives to gain further improvements of the efficiency in the Thai retail payments system. Examples of these include:

- encouraging the exploitation of new technologies to improve the efficiency of cheque collection and processing;
- fostering wider implementation of cost-based pricing for payment services;
- encouraging the exploitation of economies of scale and network externalities;
- fostering greater innovation in payments instruments/services, especially those related to cash substitution instruments; and
- encouraging greater use of electronic payments.

Some forms of developments in the area of the Thai “retail” payment systems are as follows:

First, the BOT has recently initiated a project on “Electronic Retail Payment Systems Improvement”. This project, covering the period from 2001-2003, is aimed to improve the efficiency of electronic inter-bank retail payment systems to serve as a payments infrastructure for funds receipts and payments from the government sector, along with the market’s payment needs in the present and business expansion in the future.

The project aims to improve the efficiency of electronic inter-bank retail payment systems that can be served as a payments infrastructure for funds receipts and payments from the government sector, along with the market’s payment needs in the present and business expansion in the future. The main activities laid down in the project are as follows:

- (1) *Encourage the government sector to utilize electronic payment systems for funds transfer transactions.* From 2003 to 2005, the Bank of Thailand will act as the sending bank in the SMART system for the Comptroller General’s Department under the project to reform the

payments system. This is particularly for salary payments, wages, and government pensions. Salary payments under the Comptroller General's Department and government pensioners in 2002 were effected through the system in January 2003.

(2) *Improve electronic retail payment systems.* The project aims at improving efficiency in the areas of convenience and speed for both users in the public and private sectors. The plan includes extending the data presentment time for member banks, speeding up settlement time, and developing an on-line receipt and delivery record system.

(3) *Study on the development guidelines for a cross border payment system for ASEAN member countries (ASEANPay).* The project aims to increase the competitive capabilities of ASEAN member countries. The first meeting, joining by the BOT, the Monetary Authority of Singapore and Bank Negara Malaysia, was held on October 18, 2002. The following phase would involve the preparedness of each country and the feasibility for joint development.

Second, The Bank of Thailand will have a role in the oversight of systemically important payment systems (SIPS), whereby the failure of one participant may have major consequences to the whole national payments system. Therefore, oversight of their management is required, including design and operations that are efficient, safe and compliant with international standards such as the BIS Core Principles for Systemically Important Payment Systems. The Bank of Thailand will organize seminars to increase understanding and to welcome comments from relevant parties, and will evaluate the payment system according to the BIS Core Principles accordingly.

The third area of development envisaged is "*the improvements of efficiency in the Cheque-clearing System*". The objective of the project is to improve the efficiency of the inter-bank cheque collection system. The project, covering the period 2002-2004, is made of two sub-projects as follows:

(1) *Project on three-day bill for collection (B/C-3D) across clearing offices.* The objective is to speed up the bill for collection time from six to three working days, with the use of signature image technology to verify the payer's signature and to allow member banks to authorize cheque payments for paying banks at the center rather than at branch levels. The B/C-3D system started services since February 14, 2003 with the initial phase covering Bangkok for B/C that have payer bank branches in the central region. Nationwide coverage is expected in the future.

(2) *Project on cheque truncation.* The objective is to develop inter-bank cheque collection with the use of cheque image in substitute of physical cheque. This allows for cost reductions for cheques, particularly for sorting and transportation costs, and reduces the risk of losses in the collection process. Also, it serves as a key foundation for the development and expansion of the cheque collection area in Bangkok. The BOT has improved cheque standards and announced it effective since January 1, 2003, in order to support cheque image development in the proceeding phases.

Another area of developments and challenges is related to *"the system development for payment and e-commerce transactions"*, especially in the area of "the setting up a joint platform for dealing with payment and e-commerce transactions. The BOT and a number of commercial banks is currently in the process to set up a company to run an "Inter-bank Transaction Management and Exchange" (ITMX) system, which will provide a core inter-bank infrastructure to support a payment system and e-commerce. The primary objectives of the introduction of the ITMX are to provide an infrastructure for e-commerce transactions, to reduce duplicate investment, and to offer an efficient service for payments between banks and their customers.

Until now each bank has run its own systems for payment and e-commerce transactions. However, as it is commonly agree, the introduction of the ITMX will enable banks to run on the same platform. In particular, the ITMX will be a center for transactions and settlement management. Apart from these, the newly designed system will enable customers to do electronic transactions and also support online transaction processing. As the setting up of the ITMX has based on an open platform and defined standard messaging for inter-bank transactions, the new

system will also support cross-border transactions in the near future. By this year, the BOT's Payment System Committee and the sub-committee on payment facilitation will conclude its work. The ITMX project is expected to launch its first operation in early 2005.

The fifth area of development envisaged is "*the proposed changes in the legal and regulatory infrastructure of the payment system*". The BOT has improved related legislation, during the absence of an explicit payment systems legislation, to give it more power in overseeing payment systems owned or provided by non-financial institutions. The expansion of the original scope of responsibilities that has specifically focused on financial institutions is necessary, as the private sector has presently entered into business areas that are similar to financial institutions such as credit card issuance and electronic money. Improved legislation is sought to create confidence in the efficiency and safety of the national payments system.

Examples of legislative improvements include Article 5 of the draft *Financial Institutions Business Act*, which is under review by a joint committee, or Article 66 of the draft *Bank of Thailand Act*, which is currently under improvements to give more oversight power of the payments system to the BOT. As for the *Electronic Transactions Act*, which has been effective since April 3, 2002 and guarantees the equivalent status of electronic data as paper, the issuance of a successive Royal Decree is required. The BOT and NECTEC is currently conducting joint studies on the suitable guidelines for legislation that will oversee risks and efficiency in the payments system.

One related topic on which the Payment Systems Group plans to carry out some work, in conjunction with the Legal Department, concerns the validity under Thai law of bilateral obligation netting. The 1996 G-10 report made it clear that this technique has a useful role to play by assisting banks to reduce the amount at risk in the settlement of their trades. Additional project is in the pipeline to provide an analysis of the question, to see what steps might be taken, including any necessary amendments of Thai law, to ensure that bilateral obligation netting is legally valid.

Under the rapidly changing financial and technological systems where financial globalization is intensifying cross-border linkages with settlement troubles in one country affecting the settlement system in other countries, the Bank therefore finds it increasingly important to work closely with other central banks and the private sector to further improve the payment and settlement system by reviewing the safety standards as necessary from a global perspective, as recently suggested by “The Committee on Payment and Settlement Systems (CPSS)” in Bank for International Settlements (BIS) which has established 10 core principles with which all systemically important settlement systems must comply in order to limit risk in the payment system.

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