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RISK MANAGEMENT SYSTEM
IN
CLEARING AND SETTLEMENT*

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Abstract

This study presents an overview of risk management systems in clearing and settlement. In addition, against the recommendations proposed by Group of Thirty and revised by the International Society of Securities Administrators, current practices of 13 organized stock exchanges in the Asian and Pacific region are presented. Policy issues related to the co-existence of both underlying equity and financial derivative markets in the region and increasing volume of cross-border transactions are also discussed.

RISK MANAGEMENT SYSTEM IN CLEARING AND SETTLEMENT: ASIAN AND PACIFIC EQUITY MARKETS

I. Introduction

Equity markets in the Asian and Pacific Region experienced remarkable growth in trading activities as summarized in Table 1. During the last 9-year period between 1990 and 1999, trading value rose from $950 billion to $2.75 trillion, recording an annual growth rate of 12.56 percent.[1] The increase in trading value has not always been good news. As was experienced by the Hong Kong market in October 1987, trading activities outstripped the capacity of existing risk control mechanisms built for the clearing and settlement system then and eventually led to the crash in the equity index futures and underlying cash markets.[2] This experience was not unique only to Hong Kong, China. Strains in the clearing and settlement systems were apparent in a number of advanced markets including the United Kingdom and United States.[3] As a result, increasing attention has been focused on risk management systems in clearing and settlement during the last decade to improve their effectiveness.

[Insert Table 1]

In retrospect, two important lessons were learned from the October 1987 market break [Rhee(1995)]. First, there are two dimensions to securities market efficiency: informational efficiency and operational efficiency. The former implies that security prices fully reflect all available information relevant to determining their value, while the latter requires the operating system of financial markets to function in an optimal manner. Second, the existence of operational efficiency can not be assumed. Prior to 1987, modern finance theory had concentrated on the

[1] These figures exclude Japan. With Japan included, annual growth rate is adjusted downward to 6.77 percent.

[2] See Hong Kong Securities Review Committee Report (1988).

[3] See International Stock Exchange, Quality of Markets Quarterly (Winter 1987/1988), the Brady Commission Report (1988), and the NYSE Report (1990).

informational efficiency of securities markets, while taking operational efficiency for granted. The Hong Kong experience demonstrated that the failure cost in the operating system could be as large as or even greater than the social cost associated with informational inefficiency. The core of operational efficiency is clearing and settlement in support of smooth securities transactions. This study reviews the current status of clearing and settlement of equity markets in the Asian and Pacific Region to identify best practices of risk management systems in the securities industry.

II. Sources and Types of Risks in Clearing and Settlement

Risks in clearing and settlement have yet to be clearly defined. Although more than two dozen reports focusing on clearing and settlement systems appeared since the October 1987 market break, surprisingly some of these reports did not define the types of risks to be contained under risk management systems. Only a limited number of studies made meaningful efforts in defining clearing and settlement-related risks in general. The most perceptive discussions on the types and sources of risks are found in a Bank for International Settlements (BIS) report (1992) on delivery versus payment (DVP) (to be referred to as the DVP report). The overall conceptual framework of the DVP report was adopted by a number of follow-up studies and reports.[4] For the purpose of this report, the original conceptual framework in the DVP report (1992) is expanded and modified as shown in Figure 1 to illustrate three categories of risks in clearing and settlement. They include: third party credit risk, operational risk, and counterparty risk.

Market participants in the clearing and settlement system face the risk of failure by a settlement bank or other intermediary. This is called a third party credit risk since it is a function of the credit standing of financial institutions that are involved with clearing and settlement. Parkinson, et al. (1992) reports that

[4] The follow-up studies/reports include: (i) Parkinson, A. Gilbert, E. Gollob, L. Hargraves, R. Mead, J. Stehm, and M. A. Taylor (1992); (ii) International Organization of Securities Commissions (1992); (iii) Federation Internationales des Bourses de Valeurs (1996); (iv) Stehm (1996); and (v) Bank for International Settlements (1995, 1997).

the third party credit risk was much greater prior to the October 1987 market break than in the present time for two reasons. First, responsibilities of banks and clearing organizations were not clearly defined when a clearing member failed to meet its settlement obligations due to insufficient funds. Second, conditions under which payments were made from a settlement bank to the clearing entity were ambiguous.

[Insert Figure 1]

Market participants also face operational risk defined as the risk of breakdowns in the clearing and settlement operational system. This may be caused by human error, management failure, and the failure of hardware, software, and communication network. It may also be caused by power failure or natural disasters such as earthquakes or floods.

Of the three categories, counterparty risk is what risk management systems are designed to contain since settlement failure by individual participants in clearing and settlement may cause a chain reaction of failures, raising the possibility of creating risks of systemic proportion. Therefore, market regulators are concerned about this type of breakdown in view of the potential of systemic risks for the entire financial system [OECD(1991) and Rhee (1992)]. Hence, this study's focus is limited to counterparty risk. Three sources of counterparty risk are: (i) price volatility; (ii) unsynchronized payment and delivery; and (iii) illiquidity. Given the three sources of risks, counterparty risk can be further classified into: (i) replacement cost risk; (ii) principal risk; and (iii) liquidity risk. Replacement cost risk is generated by price volatility; principal risk stems from unsynchronized payment and delivery; and liquidity risk is attributed to illiquidity.

If no settlement occurs, then a buyer loses as the market price moves up after the trade and a seller loses as the market price moves down. As the price moves away from the original contract price, the replacement of original trade may become costly and this cost must be borne by one of the counterparties.

Thus, one of the counterparties faces replacement cost risk with price volatility between the date of transaction and the date of settlement.[5]

With payment and delivery unsynchronized, there exists the risk that a seller of a security may deliver without receiving a corresponding payment or that a buyer may make payment without receiving a corresponding delivery. In this situation, the full principal value of the security can be at risk. Thus, one of the counterparties faces principal risk.[6]

If the buyer fails its payment, the seller may have to borrow funds or liquidate his assets to make up for the shortfall and, if the seller fails its delivery, the buyer may have to borrow the security from a third party. However, the cost of borrowing funds or securities is subject to market liquidity. Thus, one of the counterparties always faces liquidity risk. For example, one counterparty may face heightened liquidity risk toward the end of a business day due to lower market liquidity prior to the close of business. All three types of risks are conditioned upon settlement failure. However, this failure is permanent in the case of both replacement cost risk and principal risk, but is temporary in the case of liquidity risk. The degree of failure also varies from one component of risk to another. Principal risk may cause the loss of the entire transaction value, whereas only a partial loss may be incurred under replacement cost risk and liquidity risk.

III. An Overview of Risk Management Systems

The major objective of a risk management system in clearing and settlement is to minimize counterparty risks. To achieve this objective, a number of safeguards are employed. They may be classified into four major categories: (i) membership standards and monitoring program of financial performance; (ii) financial safeguards; (iii) guarantee funds; and (iv) post-default program.

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[5] Replacement cost risk is also referred to as market risk. See OECD (1991).

[6] Principal risk is also referred to as capital risk. See OECD (1991).

The role of two financial intermediaries, clearing house and central securities depository, is critically important in designing the risk management system in clearing and settlement. A clearing house provides trade comparison and multilateral netting services. A central securities depository eliminates physical movement of securities certificates during transfers of ownership by storing them in a vault (immobilization) or eliminates physical certificates of documents by having securities exist only as computer records (dematerialization). The two organizations are not necessarily separate. Depending on the institutional evolvement, the services offered by the two organizations may be consolidated in a single entity. In some countries, organized exchanges provide trade comparison services and matching as part of their automated trading system, leaving settlement-related functions with clearing entities. No matter what organizational form is adopted, the single most important safeguard in maintaining the financial integrity of the system is the membership standards. Stehm (1996) calls participation standards and the on-going monitoring of participants' financial condition the "first line of defense."

The clearing entity defines minimum capital requirements for its members, which oftentimes exceed regulatory capital requirements. The initial membership application and approval process is the vehicle utilized to ensure the financial health of clearing members. For the success of the clearing and settlement entity's operations, a critical mass of participation must be achieved. Potential participants consist of: investment dealers/brokers, commercial banks, insurance companies, trusts, central banks, and institutional investors (mutual funds and

pension funds). A broader participation, however, raises some regulatory complications in terms of minimum capital requirements, oversight of institutional risk management systems, financial surveillance, and regulatory de-fragmentation, etc., while the critical mass contributes to substantial cost savings in clearing and settlement.[7] The clearing entity also imposes stringent standards on operational capabilities that include record keeping and reporting through computer and communication systems. To maintain membership standards on a continuous basis, clearing members must submit periodic financial reports and material information relevant to their financial performance. They are subject to periodic audit and inspection on compliance with regulatory requirements and also subject to a comprehensive system for the prompt detection of financial and operational weaknesses. For effective monitoring, their trade positions should be monitored on a real-time basis.

Several financial safeguards have been introduced to contain counterparty risk. They include (i) delivery versus payment, (ii) position limits, (iii) netting, (iv) marking-to-market, (v) collateral requirement, (vi) same-day funds, (vii) securities borrowing and lending, and (viii) clearing funds.

Delivery versus Payment: DVP is the most important safeguard to protect counterparties to securities trade from principal risk that is caused by unsynchronized delivery and payment because it represents the direct link between securities delivery and a funds payment. If the clearing entity is placed in the middle of settlements, the clearing entity faces principal risk. DVP may reduce liquidity risk but it is not an effective device for reducing replacement cost

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[7] The author is grateful to the referee for raising this point in his comment.

risk. Not all DVP approaches, however, can eliminate principal risk. It depends on the types of DVP approach. The DVP report (1992) identifies three broad approaches to achieving DVPs: (i) SFI DVP in which all deliveries and payments are simultaneous, final, and irrevocable on a trade-by-trade (gross) basis; (ii) net cash DVP in which deliveries are settled on a trade-by-trade (gross) basis, but funds are paid on a net basis at the end of the processing cycle; and (iii) batch DVP in which deliveries and payments are settled on a net basis at the end of the processing cycle. Because both net cash DVP and batch DVP cannot completely eliminate principal risk, they are usually complemented by other risk management devices. For example, the net cash DVP would expose the seller of securities to principal risk unless the seller receives an irrevocable commitment from the buyer's bank.[8] For the batch DVP, book-entry transfers of securities do not occur until the end of the processing cycle, leaving all funds and securities transfers provisional. As a result, counterparties to trade still face potential liquidity risk and replacement cost risk unless an extension of credit is made available to a participant who may encounter settling difficulty.

Position Limits: The clearing entity imposes position limits on its clearing members.[9] Position limits are a function of a clearing member's liquid assets, trading volume, and its exposure to a single client. While position limits represent a direct way of limiting credit losses, they may also discourage market manipulation.

Netting: Trade-for-trade settlement is the most fundamental form of clearing and settlement since the identity of the counterparty is always maintained. In a strict

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[8] However, the seller is still exposed to the third party credit risk.

[9] A position limit is the maximum amount of buy and sell orders that can be owned or controlled by a stock exchange member in a single security.

sense, the trade-for-trade settlement does not represent a "netting" process; it works like a netting scheme if the settlement computes net balances for the counterparty [IOSCO (1992)]. It works in low-volume markets or in high-volume markets with a highly automated system. Since the identity of the counterparty is known, transactions do not have to be guaranteed by the clearing entity. Two most common netting methods are multilateral netting (or daily netting) and continuous net settlement (CNS). Multilateral netting is a netting process in which all trades in the same security are sorted into final long and short positions for each participant. As counterparties to the transactions may change for settlement purposes, trade guarantees are essential. Since no offsetting is made with subsequent days' trades, as the name "daily netting" implies, the frequency of failed trades may be higher than in a netting scheme that allows interday netting. CNS is being considered as a promising alternative for many high-volume markets because it allows interday netting. With the adoption of CNS, the clearing entity interposes itself between the buyer and the seller to become the counterparty to both parties. At the end of the CNS process, net positions of all participants should sum up to zero for the clearing entity in terms of the number of securities and the amount of funds. The IOSCO report (1992) identifies three advantages of the CNS systems: (i) a large volume increase does not require large increase in computer processing capacity, (ii) a high rate of settlement can be achieved, and (iii) "gridlock" is not a problem unlike in the trade-for-trade settlement systems. One drawback of this netting system is that the buyer and seller in the original transaction lose their identity after CNS processing. Hence, trade unwinding is not usually possible. If outstanding positions remain unfulfilled for extended periods due to the difficulty in unwinding, then the parties to clearing and settlement may face replacement cost risk. Therefore, the clearing entity protects itself from the replacement cost risk by employing a process of marking-to-market.[10]

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[10] The referee correctly identifies an operational difficulty in implementing "marking-to-market" when the market suffers from the well-known "thin" trading problem which is common in the Asian and Pacific region. However, the "thin" trading problem is not the main reason for slow adoption of "marking-to-market" systems in the region. Rather, relevant reasons may be found from the region's institutional and historical evolvements of the regulatory processes.

Marking-to-Market: Under the marking-to-market process, the value of all open positions is marked-to-market and any unrealized losses (or gains) from the previous day's value are paid to (or collected from) the clearing entity. The working modality differs from one clearing organization to another. For example, the Options Clearing Corporation of Chicago collects unrealized losses, while it does not pay unrealized gains, whereas the National Securities Clearing Corporation maintains a symmetric treatment of losses and gains [Parkinson, et al. (1992)].

Collateral Requirement: Each member is required by the clearing entity to collateralize its obligations. Full collateralization can be achieved if marking-to-market is performed on a real-time basis. The securities to be traded can be used as part of the collateral, but with an appropriate "haircut." The rest of the collateral must consist of cash and highly liquid assets such as government-issued securities.

Same-Day Funds: Same-day funds settlement requires that the necessary payment be made by wire transfer rather than certified checks. Using central banks' settlement facilities, an increasing number of countries move toward the same-day funds system that reduces counterparty risks as well as third party credit risk.

Securities Borrowing and Lending: A well-functioning securities borrowing and lending (SBL) system is essential in facilitating clearing and settlement, short sales, and unwinding arbitrage positions. In addition, the SBL may be able to promote (i) market liquidity; (ii) arbitrage; (iii) elimination of illegal underground financial activities; and (iv) price stabilization, if adequately managed. Usually, SBL is done on a fully collateralized basis where acceptable collateral is in the form of government securities, high quality corporate issues, letters of credit, and cash.

Clearing Funds: The clearing entity usually establishes a clearing fund (or guarantee fund) to protect against potential losses as a result of default or failure by its members. Parkinson, et al. (1992) states that the objective of this fund is to collateralize a clearing member's direct obligations as well as its contingent liabilities in the event of default by another member. Although the IOSCO report (1992) suggests that the purpose of fund is to provide the clearing and settlement entity with the resources to pay out on its obligations (even when a participant fails to make good on its payment obligations), Parkinson's insight should be considered more appropriate for the Asian and Pacific region's equity markets in view of the low credit standings usually observed among relatively small-sized firms listed on the organized exchanges. There is no magic formula to determine an optimum size of the guarantee fund. Some of the factors that may affect the size of the guarantee fund are (i) daily market turnover, (ii) market volatility, (iii) settlement period, and (iv) counterparty risk. In the event that a participating member fails to meet its obligations, the clearing entity would (i) liquidate the member's position by purchasing securities to cover a failed delivery obligation or by selling securities received in the event of a payment failure, (ii) have access to the defaulted participant's deposit in the clearing fund, (iii) utilize the clearing house's retained earnings, and (iv) charge against non-defaulting members' contributions to the clearing fund if the retained earnings are insufficient. This charge against non-defaulting members varies from one clearing entity to another. It may be pro rata on the basis of the non-defaulting members' bilateral dealings with the defaulting member or on the basis of non-defaulting members'

required contributions to the clearing fund. Because it usually takes time to implement the post-default program, clearing houses arrange lines of credit with banks to ensure the availability of immediate liquidity.

IV. Industry Standards, Industry Practices, and Best Practices

A. The G-30 and ISSA Recommendations

Recognizing that clearing and settlement practices in each country were not uniform and uneven in quality, the Group of Thirty (G-30), an international private sector group of capital market institutions, made necessary recommendations to set industry standards after the October 1987 market break. The G-30 (1989) proposed nine recommendations relating to the clearing and settlement systems of national equity markets. The Executive Board of the International Society of Securities Administrators (ISSA)(1995), however, endorsed some revisions to the original G-30 recommendations that are contrasted in Appendix.

B. Current Practices in the Asian and Pacific Stock Exchanges and FIBV Best Practices

Table 2 summarizes the current status of clearing and settlement systems utilized by 13 stock exchanges in the Asian and Pacific Region.[11] To facilitate comparison, the first column presents the G-30 recommendations.

[Insert Table 2]

Trade Comparison between Direct Market Participants: Indonesia, Japan, Malaysia, Philippines, Singapore, Taipei,China and Thailand report that trade comparison and verification are done either on real-time basis or on day T+0.

[11] Stock exchanges from 13 countries include: Australian Stock Exchange; Stock Exchange of Hong Kong; National Stock Exchange of India; Jakarta Stock Exchange; Tokyo Stock Exchange; Korea Stock Exchange; Kuala Lumpur Stock Exchange (KLSE); New Zealand Stock Exchange; Karachi Stock Exchange; Philippine Stock Exchange; Stock Exchange of Singapore; Taiwan Stock Exchange; and Stock Exchange of Thailand.

All other countries in the region meet the G-30 recommendation of T+1. A Federation Internationale des Bourses de Valeurs (FIBV) report (1996) indicates that trade verification and confirmation are usually fully integrated or real-time linked (over 90 percent of the cases) to meet the G-30 recommendation for T+1 trade comparison between direct market participants. As the trading system is computerized and linked to the C&S systems at an increasing number of exchanges, about one-half of responding exchanges report completion of comparisons within the first hour of trading.

Participation of Indirect Market Participants: Although almost two thirds of FIBV members do not have centralized trade confirmation involving indirect market participants (mainly institutional investors), Korea, Malaysia, Singapore, and Taipei,China report that trade comparison among indirect market participants is done on a real-time basis. Other countries in the region appear to have met the T+1 recommendation by G-30 with the exception of India.

Central Securities Depository: All stock exchanges in the region report that CSDs are in operation, whereas the FIBV reports that CSDs operate in 83 percent of the responding exchanges. In some exchanges, all physical scrips are stored at the CSDs, but the overall storage ratio is 65 percent. The degree of immobilization ranges from India's 8 percent to Singapore's 100 percent. Dematerialization has yet to be implemented among the region's exchanges.

Trade Netting: Surprisingly, of the 13 countries surveyed in Asia, stock exchanges in Australia and Hong Kong, China are the only two exchanges that use CNS. However, multilateral netting is common among all the countries

except Pakistan. According to the FIBV report (1996), 12 percent of responding FIBV members do not use any netting method, whereas 6 percent uses bilateral netting, which is a rudimentary form of netting. The remaining exchanges use multilateral netting. Although the G-30 strongly recommended the adoption of CNS, a relatively small number of exchanges operate it, which is consistent with our findings in the region.

Delivery versus Payment: DVP is the system most crucial in reducing counterparty principal risk. India and Indonesia are the only countries in the region which do not use the DVP system. Although the simultaneous, final, and irrevocable DVP model is the most effective among the DVP approaches in containing principal risk, only 9 percent of FIBV members rely on this model. Most exchanges (53 percent) use the “batch” DVP model with settlement guarantee schemes. Surprisingly, a few exchanges have no direct link between delivery and payment at all, exposing their C&S systems to principal risk. The commonly adopted settlement guarantee schemes include insurance, margin/collateral, and participant guarantee. Other indirect guarantee mechanisms suggested by FIBV members include position limits and capital adequacy test.

Same Day Funds: “Same day” fund convention has yet to be adopted by India, Indonesia, and Pakistan. Japan adopted it from December 1997. Although the G-30 recommendation called for the “same day funds” convention across all instruments, the FIBV questionnaire was more concerned with the use of automated fund transfer and the availability of credit for settlement purposes. As

a result, it is not clear whether “same day funds” rather than “next day funds” are implied in automated transfer. It is noted that checks are widely used for settlement.

Rolling T+3 Settlement: Approximately two thirds of FIBV member exchanges have adopted a rolling T+2 or T+3 settlement schedule, making the G-30 recommendation for T+3 settlement an industry standard. At present, all exchanges surveyed for this study adopted either T+2 or T+3 with the exception of Indonesia, Pakistan, Philippines, and India. Average non-settlement (or “fail”) rates range from 0 percent to 15 percent, with an average of 2.5 percent for responding exchanges. An important related issue was the frequency of the settlement processing cycle per day. Three quarters of the responding exchanges operate one settlement cycle per day, which indicates that multiple daily processing cycles have yet to be adopted to improve overall system performance.

Securities Borrowing and Lending: The G-30 recommendation for SBL has yet to be widely adopted. Only one half of the responding exchanges permit SBL. In this region, Indonesia, New Zealand, Philippines, and Pakistan have not introduced SBL. Korea and Taipei,China established an SBL system in the 1970s which was modeled after the Japanese system. After a trial period, the Stock Exchange of Hong Kong, China has been expanding short-selling activities in Hong Kong, China. Malaysia established a domestic market in securities borrowing and introduced rules on regulated short-selling in December 1995. However, these were suspended with the onset of the recent Asian financial

crisis, with a view to a reinstatement at an appropriate time. Thailand completed the SBL framework in 1997 and necessary tax amendments have been passed since 1998 with the condition that the loan transactions must be conducted through the TSD or a licensed SBL intermediary. Banks and finance companies (if permitted by the Bank of Thailand) and securities firms are eligible to apply for a SBL license.

ISIN System: The introduction of the ISIN system is in the planning stage in India and Pakistan, while the Philippines will introduce it soon. All other exchanges had adopted it.

C. Risk Management Systems in Practice

Table 3 presents key features of risk management systems in clearing and settlement in the Asian and Pacific Region. Since CSD participants are largely stock exchange members, no separate financial requirements are imposed by the CSDs. For those countries with CSD requirements specified, it is observed that the requirements do not differ from those of stock exchanges for member brokers.

With the exception of Singapore, Taipei,China, and Thailand, many organized stock exchanges do not impose position limits. This contrasts with financial derivative markets where position limits represent one of the important financial safeguards for C&S entities.

[Insert Table 3]

Clearing and settlement funds are fairly common among the region's stock exchanges. Summarized below is the size of clearing and settlement funds

relative to annual trading value as reported by eight exchanges at the end of 1997 when the survey was conducted:

Country	Relative Size of Clearing and Settlement Funds
Thailand	0.1211%
Taipei,China	0.1175%
Korea	0.0423%
Australia	0.0354%
Pakistan	0.0227%
Indonesia	0.0187%
Hong Kong	0.0094%
Japan	0.0043%*

*This figure includes default compensation fund

The relative size of clearing and settlement funds ranges from 0.0043% (Japan) to 0.1211% (Thailand) and 0.1175% (Taipei,China). Even though no generalization is allowed by a small number of observations, it appears market turnover and price volatility are important determinants of the relative size of clearing and settlement funds. The three economies that are well known for high price volatility and market turnover maintain the largest clearing and settlement

funds. When this survey was conducted in 1997, Malaysia, New Zealand and Philippines reported that the funds were not in place.

The region's equity markets finally caught up with the practices in the advanced markets by adopting marking-to-market as part of their risk management systems subsequent to the recent Asian financial crisis. Two exceptions are Indonesia and Philippines. Hong Kong, China, India, Korea, Pakistan, and Thailand report the imposition of collateral requirements. With the exception of Australia, all other countries report the adoption of participant guarantee and/or loss sharing.

The most interesting finding from the risk management survey is the novation feature where the clearinghouse becomes the counterparty to the buyer and the seller of the original contract. Once novation is complete, the clearinghouse is usually obligated to make payment or delivery if a participant failed to meet its settlement obligations. In Japan, Malaysia, Philippines, and Taipei,China, there is no novation of contract in a strict legal sense. Singapore reports that novation is applicable only to clearing members of the exchange. Although it is understandable why Malaysia and Philippines do not have the novation feature in view of their trade-for-trade settlement, no significant differences in risk management systems are noted between those countries with and without contract novation.

V. Policy Considerations for Improvement of Clearing and Settlement

Given the current status of capital market development in the Asian and Pacific Region, two important observations are in order: first, an increasing number of countries are joining the exclusive club of capital markets with financial derivatives; and second, Second, inter- and interregional capital flows are increasing in the form of cross-border portfolio investment. These new developments require serious policy considerations for the improvement of clearing and settlement in practice.

Hong Kong, China and Singapore established derivative markets in 1986. These two markets introduced options on individual stocks in 1986, while the Republic of Korea introduced equity index futures and options in 1996 and 1997, respectively, and Malaysia also introduced equity index futures in 1995. Taipei,China established an organized exchange called the Taiwan International Mercantile Exchange to trade equity index futures. With demutualization of stock and futures exchanges and clearing organizations, Hong Kong, China, Malaysia, and Singapore are now in a position to consolidate two separate clearing entities for the cash market and derivate market, whereas one single entity handles clearing and settlement of both types of instruments in Korea. Taipei,China utilizes two separate clearing houses for financial derivatives and the underlying cash markets. Given the diversity of instruments and clearing structure in these emerging markets, the U.S. experience in the wake of the October 1987 market break must be carefully studied for a better, particularly more efficient, risk management system. Harmonization of settlement cycles across different

instruments, cross-margining, and information sharing between clearing entities must be promoted. One of the five recommendations made by the Brady Commission (1988) was related to clearing and settlement. The Brady Commission recommended the unification of clearing systems across marketplaces to reduce financial risk because (i) no clearing house is able to accurately assess intermarket exposure among its clearing members and among their customers, and (ii) separate clearing also hampers lenders' assessment of the risk exposure of market participants and interferes with collateralization of intermarket positions. Hence, it was suggested that stocks, stock index futures, and stock options be cleared through a single mechanism. The ISSA and U.S. General Accounting Office (1990) also made similar recommendations for the harmonization of rules and practices to reduce potential risks associated with clearing and settlement. A single clearing and settlement mechanism will emerge as a critical policy issue in Korea and Taipei,China since two economies adopted the policy of allowing two separate exchanges to manage the equity market and the financial derivative market. It is too early to predict market structure in India, Indonesia, Pakistan, Philippines, and Thailand since financial derivatives have yet to be launched.

In view of the policy recommendations made by a number of studies including the Brady Commission report (1988) and the U.S. GAO report (1990) and on-going consolidation processes of stock and financial derivative exchanges in Hong Kong, Malaysia, and Singapore, it is strongly recommended that a single entity of clearing and settlement be adopted in those economies

when the financial derivative markets are created. For Korea and Taipei,China, trade-off between a single entity and multiple clearing and settlement entities must be weighed carefully.

With the volume of cross-border investment increasing, the clearing and settlement system of each of the domestic markets must be coordinated. The task force appointed by the FIBV made four recommendations for improved cross-border settlement in the future [FIBV (1989)]: (i) adoption of international settlement conventions as proposed by the G-30, the IOSCO, and the European Community; (ii) establishment of cross-border settlement links among national and international central securities depositories; (iii) immobilization of securities in the issuer's country and transfer by a book-entry system; and (iv) listing of foreign securities in their original form. A recent BIS study (1995) on cross-border settlement notes that cross-border trades usually involve additional intermediaries (e.g., local agents, global custodians, and international CSDs) and their involvement complicates the analysis of risks. Unfortunately, domestic and international settlement procedures are not the same and they require uniform cross-system treatments. This is one area that calls for immediate attention to facilitate international capital flows with a minimum amount of disturbances.[12]

[12] Refer to Rhee (2000a, 2000b) for updated information on post-crisis capital market reforms in the region and regionalization efforts.

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Appendix

G-30 and ISSA Recommendations on Clearing and Settlement

Recommendation 1: Trade Comparison between Direct Market Participants

G-30: By 1990, all comparisons of trades between direct market participants should be accomplished by T+1.

ISSA: All comparisons should be accomplished by T+0. Matched trade details should be linked to the settlement system.

Recommendation 2: Participation of Indirect Market Participants

G-30: By 1992, indirect market participants should be members of the T+1 trade comparison system.

ISSA: Indirect market participants should achieve positive affirmation of trade details on T+1.

Recommendation 3: Central Securities Depository

G-30: By 1992, each country should have a central securities depository function (CSD) in place.

ISSA: Each country should have in place an effective and fully developed central securities depository, organized and managed to encourage the broadest possible direct and indirect industry participation. The range of depository eligible instruments should be as wide as possible. Immobilization or dematerialization of financial instruments should be achieved to the utmost extent possible. If several CSDs exist in the same market, they should operate under compatible rules and practices, with the aim of reducing settlement risk and enabling efficient use of funds and available cross-collateral.

Recommendation 4: Trade Netting

G-30: Each country should study whether a trade netting system would be beneficial and, if so, implement it by 1992.

ISSA: Each market is encouraged to reduce settlement risk by introducing either real time gross settlement or a trade netting system that fully meets the "Lamfalussy recommendations."[13]

Recommendation 5: Delivery Versus Payment

G-30 DVP should be employed as the method for settling all securities transactions and should be in place by 1992.

ISSA: DVP should be employed as the method of settling all securities transactions where DVP is defined as simultaneous, final, irrevocable and immediately available exchange of securities and cash on a continuous basis throughout the day.

Recommendation 6: Same Day Funds

G-30: All securities administration and settlement payments should be made consistent across all instruments and markets by adopting the "same day funds" convention.

ISSA: No change.

Recommendation 7: Rolling T+3 Settlement

G-30: A "Rolling Settlement" system should be adopted by all markets. Final settlement should occur on T+5 by 1990 at the latest and on T+3 by 1992.

ISSA: A rolling settlement system should be adopted by all markets. Final settlement for all trades should occur no later than by T+3.

Recommendation 8: Securities Borrowing and Lending

G-30: Securities borrowing and lending should be encouraged as a method of expediting the settlement of securities transactions. Existing regulatory and taxation barriers that inhibit the practice of lending securities should be removed by 1990.

[13] The Lamfalussy Report refers to a BIS report (1990).

ISSA: Securities borrowing and lending should be encouraged as a method of expediting the settlement of securities transactions. Existing regulatory and taxation barriers that inhibit the practice of lending and borrowing securities should be removed by 1990.

Recommendation 9: ISIN Numbering System

G-30: By 1992, each country should adopt the standard for securities messages developed by the International Organization of Standardization (ISO Standard 7775). In particular, countries should adopt the international securities identification number (ISIN) system for securities as defined in the ISO Standard 6166, at least for cross-border transactions. These standards should be universally applied by 1992.

ISSA: By 1992, each country should adopt the standard for securities messages developed by the International Organization of Standardization (ISO Standard 7775). In particular, countries should adopt the ISIN numbering system for securities issues as defined in the ISO 6166.