

**FINANCIAL RISK MANAGEMENT IN EMERGING MARKETS
FINAL REPORT**



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of the
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SUMMARY

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1. INTRODUCTION

The growth in volume and complexity of financial markets, specially derivatives markets, over the past few years, together with a handful of notorious financial disasters arising from ill-conceived derivatives transactions, in the context of worldwide integration of financial markets, have increased concern over the risk introduced by derivatives and other complex instruments into the global marketplace.

At individual firms' level, this poses an increasing threat to their ability to keep control over their exposure to risk in a diverse environment. At an aggregate level, there has been some fears that default by one firm could spread out to others in the same country or even cross-borders, and become a financial crisis of huge proportions. This is a major concern not only for regulators, but also for markets participants altogether.

In this context, risk management has become an essential part of firms' and regulators' activities. A risk management system is a valuable instrument for assessing the exposure to risk that participants in the financial sector in general are subject to. Using such systems, managers can measure risk across markets in terms of their potential impact on profit and loss, quantify capital allocation to markets and dealers, establish meaningful risk limits and supervise performance.

Risk systems also provide a measure of the amount of capital necessary to provide a cushion against potential future losses, a vital element for both managers and regulators. The financial marketplace strength, as a whole, ultimately depends upon individual firms' ability to cover unexpected losses with capital reserves. Even firms using the best risk management systems are statistically subject to losses, and then a proper capital cushion is essential. Not surprisingly, setting capital adequacy standards is at the core of regulators' responsibilities, together with efficient surveillance and supervision of market participants.

IOSCO, aiming at the development of "standards of best practices" related to regulatory matters, has been examining and assessing its members' current stage, actions and policies concerning risk management in financial markets. Several reports have been published, some of them together with the Basle Committee, focusing on banks and securities houses (see References). As part of this effort, the scope of discussion of the current stage of risk management has been extended to the members of the Emerging Markets Committee.

2. TYPES OF RISK

The analysis of the financial soundness of borrowers has been at the core of banking activity since its inception. This analysis refers to what nowadays is known as **credit risk**, that is, the risk that a counterparty fails to perform an obligation owed to its creditor. It is still a major concern for banks, but the scope of credit risk has been

immensely enlarged with the growth of derivatives markets. Another definition considers credit risk as the cost of replacing a cash flow when the counterparty defaults.

As far as derivatives are concerned, credit risk is much smaller in transactions consummated in organized exchanges, because of the intermediation of clearing houses, their guarantees represented by margins and daily marking-to-market and the strict monitoring of clearing members' exposures .

The extraordinary development and globalization of the financial markets, specially derivatives markets, has brought about another kind of risk almost unheard of not many years ago: **market risk**, or the risk that adverse movements in assets prices will result in loss for the firm. Here the definition encompasses not only financial and securities firms, but all kinds of firms, even Governmental bodies, which might be engaged in derivatives transactions.

At an aggregate level, the risk that a default by one individual firm triggers a wave of failures across the market is known as **systemic risk**. Depending on the specific circumstances of an individual failure, and on market factors during that period, systemic risk could become a real threat to vast portions of the financial system. The more markets interweave across segments and borders, the bigger the systemic risk becomes.

Another result of the growing complexity of financial markets and instruments is the increasing importance of **operational risk**, that is, the risk of loss due to human error or deficiencies in firms' systems and/or controls. In the same way, more complex arrangements and contracts bring about **legal risk**, or the risk that a firm suffers a loss as a result of contracts being unenforceable or inadequately documented. Finally, **liquidity risk** is the risk that a lack of counterparts leaves a firm unable to liquidate or offset a position, or unable to do so at or near the previous market price.

Evolution of risk management

Risk management evolved from a strictly banking activity, related to the quality of loans, to a very complex set of procedures and instruments in the modern financial environment. The first remarkable step to build a framework for systematic risk analysis was the Basle Capital Accord, issued in July 1988. The aim of the Basle initiative was to reach international convergence of rules governing the calculation of levels of capital reserves for banks. The Accord set out the details and the agreed framework for measuring capital adequacy and minimum standards to be achieved by banks within the jurisdiction of the national supervisory authorities represented on the Committee, intended to be implemented in their respective countries.

The Basle framework, in its original version, is mainly directed towards assessing capital in relation to credit risk. The model sets out capital requirements according to a formula based on risk factors applied to categories of assets, rated according to their potential risk. The Basle directives are standardized, and have been implemented not only in the ten countries that were original members of the Banking

Supervision Committee of the Bank for International Settlements, but also in many other countries throughout the world.

In 1993, the Basle methodology was revised, and credit risk analysis was improved. But, more importantly, new provisions, to take into account of market risk, already recognized as a major source of risk, were announced as a necessary development. A new methodology was put forward for discussion, contemplating a standard model for the assessment of market risk.

However, by that time many leading banks and securities houses had already developed their own proprietary models for the assessment of market risk. These models were based on the Value-at-Risk methodology, or VaR, and provided levels of capital reserves lower than those produced by the Basle Committee's proposed methodology. This is so because VaR uses a portfolio approach, measuring risk in a comprehensive and integrated manner, taking into account the correlations between the behaviour of prices of different assets that exist in diversified portfolios. The standard Basle methodology, on the other hand, uses a partial analysis, measuring risk as the summation of risks of individual assets, ignoring correlations and thus the effects of diversification, thereby tending to overestimate total risk. Firms argued that the VaR models were more accurate in capturing the overall exposure of large and diversified portfolios than the standard Basle methodology, and consequently their lower levels of capital reserves did not mean less safety.

Therefore, in January 1996, the Basle Committee on Banking Supervision released an amendment to the July 1988 Capital Accord to apply capital charges to the market risks incurred by banks. Another important innovation of the amendment was that it permits banks to calculate their market risk capital charges according to one of two models, the standardized measurement method or proprietary models based on VaR. Banks using internal models will be subject to a set of qualitative and quantitative standards, the outcome of their VaR calculations will have to be multiplied by three (i.e., take the model outcome and multiply it by 3 to set the level of regulatory capital required) and their models are subject to approval by national regulators. The amendment will come into effect by the end of 1997.

Currently, market risk management is a major concern not only for banks, which are usually subject to stricter regulations in terms of capital adequacy, but also for securities firms and broker-dealers. Also clearinghouses have developed models for the calculation of margins in derivatives markets and monitoring of risks incurred by their participants.

A word about Value-at-Risk

VaR can be defined as the maximum loss on a portfolio, over a standardized period of time, usually one day, that would result from an adverse market movement expected to occur once in a longer period of time, usually one hundred days, within a confidence interval, usually 99%. Alternatively, it can be seen as the estimated change from the present price of an instrument (or portfolio) until the point at which it could

be liquidated. The VaR methodology views a firm as a giant portfolio, and produces a single currency-denominated figure indicating the risk across many financial instruments and markets on a firm-wide level, avoiding the overestimation problem caused by partial analysis. Besides, it provides a tool for establishing meaningful risk limits on market activities and for assessing performance.

The concept is simple, although the implementation is less so. Price data relating to the components of a portfolio are collected for a chosen observation period. Volatilities, or standard deviations of assets prices, and correlations between assets prices movements are calculated. Statistical analysis combines all these data and allows the estimation of an interval for the value of the portfolio in response to changes in the prices of its components, with a certain probability. It also provides a distribution of values for losses or gains that would occur if the current positions were held for a specified holding period. A confidence interval is then applied to the distribution to assess the maximum loss that would be expected, not to be exceeded with a certain probability, thereby determining the Value-at-Risk of the current portfolio. In other words, this enables management to calculate the likely currency-denominated maximum loss for a certain period, and the figure is expressed in terms of a confidence level. A confidence interval of 99% means that the risk manager can define the maximum loss at 99% probability, that is, the loss that should be exceeded only one day out of a hundred.

If the portfolio contains derivatives, the analysis becomes more complex, since the prices of derivatives depend non-linearly on the prices of the underlying assets, specially in the case of options. Therefore, the changes in the values of derivatives in response to changes in the prices of the underlying assets, or risk factors, such as interest rates, exchange rates or equity indexes, must also be calculated and added to the mainstream analysis. Since the relationships between prices are not linear, this task involves a great deal of statistical work.

The main shortcomings of a VaR measure are: historical volatilities and correlations may not be representative of the future ones; lack of liquidity of some instruments is not taken into account; confidence intervals are only statistical assumptions, and not only can a firm lose more than the Value-at-Risk, it can lose more on certain occasions; there is the need for worst case stress tests; the non-linearity of risks associated with options, futures and other instruments with embedded options features; and, above all, it cannot be rigidly interpreted: personal judgement is needed to interpret the information, ask the right questions, make more realistic evaluations of what the future may hold and take the right action.

A benchmark in the development of VaR models was the RiskMetrics™ methodology, firstly released in the end of 1994, at the beginning of the discussion about whether or not VaR was a adequate tool for establishing levels of capital reserves. There are also other well-known risk management models, adopted by some clearinghouses that are based on the VaR methodology.

Topics of the current agenda

Integration of credit risk analysis into VaR techniques - as a result of the 1988 Capital Accord, many banks re-engineered their credit risk management systems in order to meet the standards. Later, firms felt that their most immediate concern was with inadequate, or even non-existent methods of managing market risk exposure. As a result of this dual approach, sophisticated VaR models have been developed with a primary focus on market risk, while credit risk management remains an area to be improved, where only the credit rating of counterparties matter. However, there have been recent efforts to developing the application of VaR techniques to measure credit exposure, the advantage being that those could be determined more accurately for a more complex network of customers or counterparty relationships. Many organizations have already merged the two functions - credit and market risks - under one position, like the chief risk officer. After all, the two types of risks mentioned above are not totally independent.

Agency risk - arises from existing conflicts of interest between the principal (firms and their shareholders) and agents (managers and/or employees); in the present context, it relates to the risk of traders/employees taking positions or decisions contrary to the firm's risk management procedures and best practices policies, or fail in pursuing these policies, due to personal interests, lack of incentives, bad remuneration or simply lax supervision of their superiors. Whereas market and credit risk seem to have been well monitored by banks and other financial institutions, many of the recent cases of failure associated with derivatives have been a result of mismanagement of agency risks (e.g., Barings, Sumitomo).

Controlling agency risk (and operational risk as well) is part of a broader process, namely, **internal controls** - set of rules and procedures designed to provide qualitative standards that are complementary to the quantitative analysis of risk within organizations. Broadly considered as important as the quantitative tools in risk management, internal controls and qualitative standards have to do with:

- * integrity of the risk management process: soundness of the models, quality and uniformity of the data input (values used as input for the models must be the same practiced in real transactions), validation and back-testing procedures, monitoring and observance of trading limits for traders and departments, marking-to-market procedures, rules for dealing with changes in volatilities;
- * the above functions should be performed by an independent risk control unit (middle office) reporting to the board; in any case risk monitoring must be separated from trading activities that create risk;
- * accountability at firm level: engagement of senior management in the process, supervision of traders;

- * information and documentation: transparency of reports and proper documentation of the risk control process; flow of information up and downwards within the organization; development of a **risk management culture** within the organization;
- * remuneration policy: reward high returns and consistent performance, according to the culture of risk management.

Accounting standards - the establishment of adequate accounting standards is essential not only for the assessment of individual firms' exposure to risk but also for the comparison of financial statements and aggregation of risks of different firms in order to allow the evaluation of systemic risk.

Netting agreements - these are arrangements between two or more firms to offset opposite positions of the same nature kept with each other, thereby resulting in a single net payment for one of them. They may vary from quite simple arrangements, involving only two firms and one type of financial instrument, to very complex schemes, entangling several organizations and multiple products. This kind of arrangements are typical of over-the-counter products, since in organized exchanges the clearinghouses perform the related activities. Netting contracts may also be difficult to enforce (the legal risk), specially if they involve cross-border transactions. There have been several proposals for the creation of institutions specially designed for the collection and management of collateral and payments associated with multilateral netting agreements. Besides requiring collateral, these firms would also reduce counterparty risk by screening participants.

Segregation of accounts and protection of customers' funds - separation between customers' and proprietary accounts should be a routine for banks and securities firms, so that customers' accounts can be closed out or transferred to other firms in case of bankruptcy. But internal segregation may not be enough, since it may not be fully consistent with **insolvency laws** within some jurisdictions. For the protection of customers' funds to be accomplished, these laws should provide for their segregation from the bankrupt institutions' assets and shield them from its creditors.

Regulatory burden - relates to the possibility of overstatement of risks (or "exaggeration of the reality") and the resulting imposition of excessive requirements by regulators with respect to capital reserves and disclosure of information vis-a-vis the real risks incurred. The extent of regulators' additional (and costly) requirements with respect to information and/or heavier capital charges should be weighed against their costs, bearing in mind that there exists a trade-off that should be analysed: too much regulatory requirements mean an excessive burden for financial firms, crippling their activities and making them less efficient (and also the market); but a lack of regulatory requirements may jeopardize the safety of the financial sector.

The role of regulators in risk management

The basic role of regulators regarding risk management is to seek an assemblage of rules and requirements that may, at the lowest possible cost, effectively

contribute to prevent an isolated failure or a crisis of small proportions from becoming a systemic problem threatening the market as a whole. In other words, the best solution for the trade-off referred to above. As mentioned earlier, this concern also pertains to the industry, as a matter of collective safety. Regulators and industry should thus work in tandem for the development and improvement of risk control systems and rules. This has been so in general, but on some occasions voluntary convergence is not easily reachable.

Regulators have recognized models based on the VaR methodology as good predictors for potential losses, and these models will be accepted for purposes of calculation of capital charges by banks and securities firms as from the end of 1997. But there is and there will always be a tension between the uses of VaR for management and for regulators. Take the issue of the multiplier factor of 3 imposed by the Basle Committee to allow banks to use proprietary VaR models to set capital reserves.

The reason for the use of this factor is that VaR produces, say, 99% confidence intervals for its predictions. In one sense, what happens within the interval is not of concern to regulators. It is what happens when reality falls outside the interval that scares regulators. But conservativeness is present also in the standard methodology put forward as an alternative to proprietary models, as well as in the original methodology for credit risk analysis: the multiplier and other forms of conservatism only try to “exaggerate normality” rather than establishing genuine and accurate worst case scenarios.

Traditionally, regulators have focused their job in the following main areas, with regard to risk management:

- * market surveillance, with a special attention on large positions and aggregated cross-market supervision;
- * setting levels of capital reserves;
- * disclosure of data and information about market value of financial instruments and risk policies; together with capital charges, this is an area where firms’ costs may increase significantly as a result of additional requirements; it has been suggested that firms be allowed to use for regulatory purposes the same kind of information used for internal purposes, to avoid duplication;
- * auditing of firms’ books and financial registers and internal controls, integrity and soundness of the models and segregation of accounts;
- * cooperation and exchange of information between regulators both at domestic and international level; this is one of the areas where regulators have concentrated a great deal of joint efforts and initiatives;
- * development of emergency procedures, that is, procedures to react effectively at the time of market emergencies.

All these topics have been extensively discussed in several studies and reports, and they are also the subject of the present study, addressing specifically these practices in emerging markets.

3. THE PRESENT STUDY

Scope

This study is meant to cover risk management activities related to derivatives transactions conducted by securities firms in organized exchanges and OTC markets in member countries of the EMC, reflecting the foundations and principles of risk management laid out in the preceding sections.

However, not all of what has been discussed so far applies to emerging markets, who lack many of the features found in more developed markets. But even among emerging markets, some striking differences stand up. In many countries, derivatives markets have not developed yet, and in many others, VaR models are still incipient. Capital reserves are required in most of them, but are based only on credit risk analysis, and apply only to banks. Banking supervision is more developed and stricter, in terms of risk management, than supervision of broker-dealers and securities houses.

Consequently, in many of the topics addressed below, it is not easy to distinguish what applies to banks and what applies to securities markets. Besides, the set of markets encompassed by the Emerging Markets Committee is very diverse with respect to degrees of development, an ingredient that makes the task of assembling these markets under the same survey more difficult than when there is homogeneity among members.

Another important caveat is that the study was prepared focusing on risk management at firms' level, primarily the concern of individual firms.

Goals

The goals of the study are:

- * to present a comparative analysis of the current stage in risk management policies and procedures in emerging markets;
- * to identify the main problems found by members in developing their risk management frameworks;
- * to provide standards of best practices for the development of risk management policies in those jurisdictions.

Methodology

As a method of gathering information from the member countries, a questionnaire was circulated among members of the EMC. The questionnaire was developed using the material listed as References.

4. SUMMARY OF FINDINGS COLLATED FROM THE QUESTIONNAIRE

Introduction

The questionnaire is a first step to obtain and gather information to analyze and compare different practices of risk management in those countries. The present summary grouped the original questions into a selected range of topics, regarded as representative of the uppermost issues involved in risk management in emerging markets, according to the plan of work approved in Montreal during the EMC Meeting that took place during the 1996 IOSCO Annual Meeting. A more detailed display of countries' answers is found in the enclosed Annex.

The following countries/jurisdictions, totaling 18, answered the questionnaire:

- * Amman Financial Market Authority
- * Argentina - CNV
- * Bermuda Monetary Authority
- * Brazil - CVM
- * Chile - Superintendencia de Valores y Seguros
- * Chinese Taipei - SEC
- * Colombia - Superintendencia de Valores
- * Costa Rica - CNV
- * Hungary - Banking and Capital Market Supervision
- * Korea - SEC
- * Malaysia - Securities Commission
- * Mauritius - Stock Exchange Commission
- * Peru - CNV
- * Poland - Polish Securities Commission
- * South Africa - Financial Services Board
- * Sri Lanka - SEC
- * Thailand - SEC
- * Turkey - Capital Market Board

The answers to the questionnaire were grouped in the following topics:

- * Existence of organized futures and options exchanges;
- * Existence of OTC markets for derivatives;
- * Regulatory Structure: governmental agencies in charge;

- * Regulatory structure: existence of active self regulatory organizations (SRO's);
- * Mechanisms of exchange of information and cooperation between regulators;
- * Mechanisms of obtaining cross-market information about aggregated risk (exchanges, clearinghouses);
- * Types of regulatory capital requirements for securities firms and financial institutions;
- * Mechanisms of risk control: internal controls and policies, proprietary models;
- * Major problems related to risk control procedures;
- * Existence of position limits, mechanisms for the identification of large positions and unwinding powers;
- * Public disclosure of derivatives by corporations, financial institutions and exchanges;
- * Foreigners' participation in derivatives markets;
- * Mechanisms for international cooperation between regulators;
- * Training programs on risk management provided by regulators.

All findings are as of February 1997. The tables enclosed in the Annex show the information at jurisdiction's level for each of the topics under which the answers were grouped.

Summary of findings

Existence of organized futures and options exchanges

There are active organized exchanges for futures and options in eight jurisdictions. In two of them derivatives are traded in stock exchanges. Another jurisdiction has an incipient futures market also in the stock exchange. In other words, less than half (around 45%) of the sample of emerging markets surveyed has organized exchanges for futures and options.

In one jurisdiction there is a commodities exchange already incorporated, but not yet active. Three others have already enacted regulation on derivatives, and expect trading to start soon. In one of them stock index futures will be traded in the stock exchange.

Existence of OTC markets for derivatives

Of the eight jurisdictions mentioned above, seven have OTC derivatives markets. Three others add to the list, totaling ten jurisdictions with OTC derivatives markets. That is, the number of countries that have OTC markets is bigger than the number of countries that have organized markets for futures and options.

An important consequence of this fact is that, since OTC markets are much less regulated and transparent than organized exchanges and lack the guarantees

provided by clearinghouses, the countries where OTC markets develop very fast should set up special arrangements to monitor systemic risk.

Regulatory Structure

Three jurisdictions have two different regulators. In these countries the regulation of some derivatives, depending on the nature of the underlying asset and/or the nature of the issuer and/or the purpose of the trading, is regarded as part of the regulation of money markets and financial institutions, and therefore falls under the jurisdiction of the Central Bank.

It is noticeable that this regulatory split is a different approach from that prevalent in other countries, where there is one regulator for cash markets and another for futures markets, the Central Bank apart.

In the other seven jurisdictions where derivatives markets exist, the same regulator supervises cash and derivatives markets. In the jurisdictions where derivatives trading is expected to start soon, there will be one single agency.

All jurisdictions declared exchanges to be SRO's able to set and enforce their own rules.

Aggregated cross-market surveillance

Cross market surveillance is more important where there are two or more different markets for derivatives. When those are organized exchanges, communication between clearinghouses is vital. The exchange of information between securities regulators and the Central Bank is also essential, since the latter usually has a broader view of financial firms and their trading in all markets, including OTC.

Out of the sample, three jurisdictions informed the existence of formal cooperation agreements between securities regulators and the Central Bank. In two others, although no formal agreements are in place, there are membership interconnections at board level between the securities regulator, the Central Bank and the Ministry of Finance.

Cross-market information sharing involving different exchanges/clearing houses was reported to exist in two jurisdictions. Three others declared that the aggregated market view in these jurisdictions is provided by one single central depository/clearing system.

Capital requirements

There are two basic types of capital requirements in the sample of countries surveyed: firstly, exchanges/clearing houses or regulators impose minimum levels to intermediaries (in some countries only these minimum fixed levels apply, differentiated according to categories of institutions or the markets/functions they trade/perform). Additionally, the number of positions a member of an exchange/clearing house is allowed to hold may be subject to its capital cushion.

Secondly, the Central Bank (or the securities regulator, in a few cases) assess capital adequacy requirements using the formula recommended by the Basle Committee for credit risk purposes. In the more developed markets within the sample, leading banks are already measuring market risk using VaR models. Regulatory capital to account for market risk, however, is not yet required. In most of the countries of the sample VaR models are not yet being used.

Eleven jurisdictions (61% of the sample) reported to have only fixed minimum capital requirements, depending on the type of institution and /or markets where they operate. Two of them stated that the number of positions held by institutions is subject to additional capital. Six jurisdictions declared to have capital adequacy rules that use a formula based on the standard Basle model to account for exposure to credit risk, in addition to minimum fixed requirements. One jurisdiction stated that it has no capital adequacy rules at all. Caveat: it is not clear from many answers whether the second type of capital requirements (standard formula for credit risk) applies for all intermediaries in financial markets or only for banks.

There are no capital adequacy rules relating to market risk in any of the countries surveyed. Proprietary models for risk calculation based on VaR methodology are allowed and encouraged in almost all jurisdictions, but none of them reported widespread use of such in-house models either by banks or securities firms. Apparently their development is still restricted to a few leading banks in the more developed markets. Moreover, in all jurisdictions the use of in-house models does not exempt firms from compliance with regulatory capital requirements.

Internal controls and prudential policies

Almost all jurisdictions reported a growing awareness of the importance of internal controls and prudential policies. But only two of them declared that securities firms are required to have written documents or report on their internal risk controls. None of the other jurisdictions reported whether or not securities regulators check firms' internal controls and prudential policies.

In one jurisdiction banks have "compliance manuals"; in another one they must appoint a director responsible for derivatives operations; in another one firms' internal controls are checked by the exchanges, and banks are expected to follow minimum standards of internal controls.

Position limits

The eight jurisdictions that reported to have exchange-traded derivatives and the jurisdiction where there is only OTC trading, declared to have position limits. This is consistent with the usual safety procedures existent in organized exchanges.

Regulators are able to identify the holders of large positions in all these jurisdictions. Regulators are also empowered to determine the unwinding of positions under certain circumstances in four of them. Another respondent declared that limits

are not defined yet, but regulators are empowered to determine the unwinding of positions.

Foreigners' participation in derivatives markets

None of the jurisdictions surveyed stated the existence of regulatory impediments to foreigners' participation in derivatives markets. This suggests that these countries should also be scrapping controls on cross-border capital flows and entering the globalization trend. Consequently, the need for international cooperation and exchange of information is increasing, since eventual disruptions in their markets may be caused by foreign institutions.

Public Disclosure

Five jurisdictions declared that corporations in general are required to publicly disclose their off-balance sheet positions (27% of the sample). In five others disclosure is mandatory only for financial institutions. Exchanges disclose open interest regularly in five jurisdictions.

International cooperation agreements

Five jurisdictions reported no international MOU's signed so far. Apparently this is consistent with the opening of the surveyed markets to foreigners' participation.

Training programs

In seven jurisdictions regulators' employees take regular training programs on risk management. The others reported either ad-hoc training or no training at all on the subject.

Major problems related to risk management procedures

The following difficulties were reported:

- * calculation of parameters (like correlations and volatilities);
- * provisions for extremely adverse situations;
- * lack of liquidity of many assets;
- * lack of technical knowledge and trained personnel;
- * high cost of information technology;
- * difficulties for banks to separate banking and trading books.

It seems that these are the same problems found in the more developed markets. Surely they have more resources to tackle the difficulties, specially concerning technical knowledge, training and information technology. But the

difficulties are the same, when it comes to calculation of correlations and volatilities, using historical data as predictors of future price behaviour and conducting test for adverse situations. In emerging markets the problems are aggravated, since volatilities tend to be higher and shifts in economic fundamentals tend to be more abrupt and radical. Also in emerging markets liquidity is often lower for many instruments.

5. CONCLUSION

The sample of countries surveyed is very diverse with respect to degrees of development, and the current stage of risk management procedures varies accordingly. Usually banks are ahead of broker-dealers concerning risk management. Oftentimes it was not easy to distinguish what applies to banks and what applies to broker-dealers and securities markets.

Despite the differences between the countries surveyed, the examination of the answers points out to the general finding that the major concern with respect to risk management in emerging markets lies on banking activities. Accordingly, banking regulators have introduced, or are introducing, capital requirements based on the standard credit risk procedures set up by the Basle Committee.

With respect to broker-dealers, the approach is the same, considering that such capital requirements apply not only to banks, but also to other financial institutions, including broker-dealers. It stands out that, differently from more developed markets, where securities regulators usually impose risk based capital requirements to broker-dealers, in emerging markets this is done by the banking regulators.

The conclusion from these findings is that risk management in emerging countries is still almost exclusively focused on credit risk, related to the quality of financial institutions' assets and the creditworthiness of their counterparts. Market risk, specifically market risk arising from derivatives activities, is included in this overall analysis, and not yet regarded as a key source of risk, as it is the view prevalent in developed markets.

This view compatible with the relatively small participation of derivatives in financial institutions' activities in emerging markets, and with the small size of derivatives markets in most of them, not to mention the significant number of countries that do not have derivatives markets in the sample surveyed.

About half of the countries have organized exchanges for futures and options. A slightly higher number of countries have OTC markets. Regulation of derivatives markets is either under the jurisdiction of one single regulator or split between a securities regulator and the Central Bank.

The self-regulatory framework exists in all the countries surveyed, in the sense that exchanges are responsible for laying down and enforcing their rules, subject to supervision by regulators. Aggregated cross-market surveillance exists in half of the countries that declared to have derivatives markets, but only in a few countries there are two or more exchanges.

Risk management activities are in an earlier stage relatively to developed markets. And this stage varies across the countries examined. Two thirds of them set

capital requirements in the form of minimum levels, depending on the category of institution and/or the markets where they operate. Seldom the number of positions held is subject to additional capital reserves. Only one third of the countries have requirements in addition to fixed minimum levels to cover credit risks, calculated through the standard formula of the Basle Committee. There are no regulatory capital requirements to account for market risk in any of the countries.

VaR models are restricted to a core of leading banks in the more developed markets of the sample. This narrow usage of VaR models, however, should not be considered a severe drawback, but as natural consequence of being emerging markets. Rather than push for the use of models VaR-like on a wide basis, emerging markets should develop a culture of risk management and a technical and regulatory framework for this purpose, while gradually training staff both in the industry and in the regulatory agencies and developing the expertise in statistical models.

However, emerging countries' banks and securities firms usually lack internal controls, and this deficiency should be regarded as a critical point. In the countries surveyed in general banks are expected to have internal controls, but they are not required to have written documents setting forth these controls, and there are no regulations requiring so. As a matter of fact, internal controls within financial firms are a critical aspect for the development of a pervasive culture of risk management across the financial market.

Derivatives markets tend to be globalized, in the sense that there are no impediments for foreigners' participation. This points to the need of international cooperation and exchange of information; accordingly, two thirds of the countries have signed MOUs.

Position limits exist in organized exchanges, but only in around half of them regulators are empowered to determine the unwinding of positions. Disclosure of derivatives transactions is still incipient, and less than one third of the sample reported requirements of public disclosure of market value of derivatives and risk policies followed by firms.

6. GENERAL GUIDELINES FOR RISK MANAGEMENT BEST PRACTICES IN EMERGING MARKETS

Emerging markets can draw on the experience of developed markets, reported in several studies prepared within the ambit of IOSCO, G-30 and other organizations. A tentative set of guidelines would include the following points:

- * Regulators should work together with market participants to establish and enforce risk management rules. Banks and securities firms should be encouraged to discuss common policies for risk management, and joint regulators in their efforts to minimise systemic risk.
- * Cooperation agreements between regulators (e.g., banking and broker-dealers regulators) are highly recommended.

- * There should be a clear distinction between regulation of risk control for banks and broker-dealers, even if some of the material requirements are the same for both kinds of institutions.
- * Besides capital requirements and other quantitative requisites, regulators should set forth and enforce qualitative requirements for internal controls; financial institutions (and broker-dealers) should be required to have written risk control policies.
- * There should be an efficient auditing of banks and securities firms with respect to their exposure to risk and their internal controls.
- * Regulators should develop proper means to supervise firms' activities across different markets (e.g. stock exchanges, futures exchanges, OTC), where applicable, including overseas activities.
- * Well developed clearing facilities should be in place, in order to enhance risk management at an aggregate level; cooperation agreements between clearings acting in different markets are essential for supervision across markets.
- * At firm levels, VaR and similar quantitative models are an important tool, but useless without a corporate culture of risk management, that includes proper internal controls, flow of information, engagement of senior management and qualitative standards in general.
- * Due to the lack of trained professionals, a technical expertise in handling quantitative models should be gradually developed.
- * Attendance at international seminars and training programs is an important source of knowledge for both regulators' and firms' employees. Such programs should be regularly held on a domestic basis, as a means of disseminating knowledge, experience and the culture of risk management.

7. TOPICS FOR FURTHER RESEARCH

The analysis of the answers to the questionnaire revealed some areas where further research is desirable, either because of incomplete answers or due to important topics not covered in the questionnaire, and also because of its very nature the focus being on risk management at firm level.

Therefore, the first point for further research concerns the lack of information about systemic risk, more specifically, how regulators monitor systemic risk and how SRO's are involved in this task.

Other topics are:

- * More clear distinctions between the regulatory regimes applicable to banks and broker-dealers; more detailed description of capital requirements for broker-dealers vis-a-vis banks; the separation between the regulatory regimes of banks and financial institutions and broker-dealers is not clear, specially with respect to capital adequacy.
- * Operational characteristics of clearing houses and their role in risk management

- * Regulators' attitude towards firms' internal controls and prudential policies; the very existence of such controls is a critical issue, not thoroughly covered by the questionnaire.
- * Extension/range of exchange-traded and OTC-traded derivatives, since this distinction may carry different regulatory concerns.

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ANNEX**QUESTIONNAIRE ON RISK MANAGEMENT****COMPILATION OF ANSWERS**

The following tables display the compilation of the answers provided by the 18 jurisdictions that answered the questionnaire. The titles of the tables, however, do not necessarily correspond to the questions in the questionnaire.

This is so because, when handling the answers, it was noticed that in some cases the same subject was addressed in the answers to different questions or different subjects were covered in the same answer.

The contents of the answers were thus regrouped under the titles assigned to the tables, regarded as representative of the uppermost issues involved in risk management in emerging markets, according to the plan of work approved in Montreal during the EMC Meeting realized in the ambit of the 1996 IOSCO Annual Meeting.

Existence of active organized futures and options exchanges

Amman	no
Argentina	yes
Bermuda	commodities exchange already incorporated, not yet active
Brazil	yes
Chile	yes (derivatives traded in stock exchanges)
Chinese Taipei	not yet; regulation already passed, futures exchange expected to be set up soon
Colombia	no
Costa Rica	incipient market in the stock exchange
Hungary	yes (futures traded also in stock exchanges)
Korea	yes (stock index futures, introduced in May 96, traded in stock exchange - no options)
Malaysia	yes
Mauritius	no
Peru	no
Poland	not yet; trading expected to start soon in the stock exchange
South Africa	yes
Sri Lanka	no
Thailand	no
Turkey	not yet; regulation already issued, trading expected to start soon in the stock exchange (stock index futures) and gold exchange (gold futures and options)

Existence of active OTC market for futures, options, swaps

Amman	no
Argentina	yes, privately arranged transactions not regulated by the CNV
Bermuda	no
Brazil	yes, for currency and interest rate swaps and options; screen based on registering of transactions, clearing and settlement, regulated by the Central Bank
Chile	yes, inter-bank market not regulated by the SVS
Chinese Taipei	yes, interbank market for swaps and options
Colombia	yes, incipient unregulated market of swaps and options
Costa Rica	no
Hungary	yes, for options
Korea	yes, privately arranged swaps and options between financial institutions; however, neither active nor officially allowed for securities companies so far
Malaysia	yes, for currency swaps and forwards
Mauritius	no
Peru	yes, for interest rate and currency forwards
Poland	allowed, but not active
South Africa	yes; unregulated
Sri Lanka	no
Thailand	yes, for currency and interest rate swaps and options
Turkey	no

Regulatory Structure: governmental agencies in charge¹

Amman	one agency (no derivatives markets)
Argentina	one agency: CNV oversees both stock and futures exchanges
Bermuda	one agency, including money markets, banks and government bonds markets (no derivatives markets)
Brazil	two agencies: CVM (equities and debt issued by corporations and equity-related derivatives (options on stocks and stock index futures) and Central Bank (all other derivatives)
Chile	one agency: SVS oversees both stock and futures exchanges
Chinese Taipei	one agency
Colombia	one agency (no derivatives markets)
Costa Rica	one agency (derivatives trading not significant)
Hungary	one agency: HBCMS oversees both stock and futures exchanges
Korea	one agency: Securities Commission oversees stock, stock index futures and stock index futures options markets
Malaysia	two agencies: Securities Commission and Central Bank (oversee securities and derivatives issued and traded by financial institutions)
Mauritius	one agency (no derivatives markets)
Peru	one agency (no derivatives markets)
Poland	one agency (no derivatives markets; PSC regulates public trading of all securities, including government and treasury bonds)
South Africa	one agency: FSB oversees both stock and futures exchanges
Sri Lanka	one agency (no derivatives markets)
Thailand	two agencies: Securities Commission and Central Bank (securities and derivatives issued and traded by financial institutions)
Turkey	one agency (no derivatives markets yet; law delegates to the CMB the authority to regulate these markets when they come into existence)

¹ Only for securities and derivatives markets; money markets, banks and government bonds markets are regulated by Central Banks in most cases

Regulatory structure: existence of active self regulatory organizations (SRO's)

Amman	exchanges are SRO's
Argentina	stock and futures exchanges are active SRO's; their by-laws and rules have to be approved by regulator(s)
Bermuda	exchanges are SRO's
Brazil	stock and futures exchanges and clearing houses are active SRO's; their by-laws and rules have to be approved by regulator(s)
Chile	stock and futures exchanges and clearing houses are active SRO's; their by-laws and rules have to be approved by regulator(s)
Chinese Taipei	exchanges are SRO's
Colombia	exchanges are SRO's
Costa Rica	exchanges are SRO's
Hungary	stock and futures exchanges are active SRO's; their by-laws and rules have to be approved by regulator(s)
Korea	exchanges have some regulatory responsibilities, such as setting margins for futures transactions
Malaysia	stock and futures exchanges and clearing houses are active SRO's; their by-laws and rules have to be approved by regulator(s)
Mauritius	exchanges have some regulatory responsibilities
Peru	self-regulation not yet implemented
Poland	not available
South Africa	stock and futures exchanges are active SRO's
Sri Lanka	exchanges are SRO's
Thailand	stock and futures exchanges are active SRO's; their by-laws and rules have to be approved by regulator(s)
Turkey	exchanges are SRO's; their by-laws and rules have to be approved by regulator(s)

Mechanisms for exchange of information and cooperation between regulators

Amman	no formal cooperation agreement
Argentina	no formal cooperation agreement
Bermuda	no formal cooperation agreement
Brazil	cooperation agreement between CVM and Central Bank for exchange of information and mutual assistance
Chile	no formal cooperation agreement
Chinese Taipei	exchange of information between the Securities Commission and the Central Bank on a regular basis
Colombia	no formal cooperation agreement
Costa Rica	no formal cooperation agreement
Hungary	no formal cooperation agreement
Korea	no formal cooperation agreement
Malaysia	no formal cooperation agreement; there are membership interconnections at board level between the Securities Commission, the Central Bank and the Ministry of Finance
Mauritius	no formal cooperation agreement
Peru	no formal cooperation agreement
Poland	no formal cooperation agreement
South Africa	close cooperation between FSB and Central Bank
Sri Lanka	no formal cooperation agreement
Thailand	no formal cooperation agreement; there are membership interconnections at board level between the Securities Commission, the Central Bank and the Ministry of Finance
Turkey	no formal cooperation agreement

**Mechanisms for obtaining cross-market information about aggregated risk
(exchanges, clearing houses)**

Amman	the issue of cross-market aggregated risk does not apply
Argentina	no formal agreements
Bermuda	the issue of cross-market aggregated risk does not apply
Brazil	formal agreements of cooperation and exchange of information between clearing houses in different markets
Chile	no formal agreements; certain combined limits for broker-dealers operating across markets apply
Chinese Taipei	there is a central depository corporation
Colombia	the issue of cross-market aggregated risk does not apply
Costa Rica	the issue of cross-market aggregated risk does not apply
Hungary	no formal agreements
Korea	no formal agreements
Malaysia	there is only one clearinghouse, which clears transactions in cash and futures markets, and thereby has the cross-market view of risk; securities and futures exchanges are working towards joint inter-market surveillance
Mauritius	the issue of cross-market aggregated risk does not apply
Peru	the issue of cross-market aggregated risk does not apply
Poland	the issue of cross-market aggregated risk does not apply
South Africa	concept of the leading exchange, to which the others have to report for information sharing purposes and calculation of members' capital requirements
Sri Lanka	the issue of cross-market aggregated risk does not apply
Thailand	there is only one clearinghouse, which clears transactions in cash and futures markets, and thereby has the cross-market view of risk
Turkey	the issue of cross-market aggregated risk does not apply

Types of regulatory capital requirements for securities firms and financial institutions

Amman	minimum fixed amounts
Argentina	capital requirements set according to exposure to risk, i.e., number of positions an intermediary can hold is subject to its capital cushion
Bermuda	minimum fixed amounts
Brazil	two types: minimum fixed amounts plus: first, Central Bank's requirements, set according to a standardized model based on Basle Committee's (capital charges assigned to each category of assets according to risk factors) for financial institutions and broker-dealers; second, clearing house's requirements for their clearing members, calculated according to positions held
Chile	two types: minimum fixed amounts plus additional requirements, set according to a standardized model based on Basles Committee's (capital charges assigned to each category of assets according to risk factors)
Chinese Taipei	minimum fixed amounts
Colombia	minimum fixed amounts plus Central Bank's requirements, set according to a standardized model based on Basles Committee's (capital charges assigned to each category of assets according to risk factors) for financial institutions
Costa Rica	minimum fixed amounts, plus rules based on Basle Committee agreement for banks
Hungary	two types: minimum fixed amounts plus additional requirements, set according to a standardized model based on Basles Committee's (capital charges assigned to each category of assets according to risk factors)
Korea	new regulation sets capital requirements according to exposure to risk, i.e., the number of positions an intermediary can hold is subject to its capital cushion
Malaysia	two types: minimum fixed amounts plus: first, Central Bank's requirements, set according to a standardized model based on Basles Committee's (capital charges assigned to each category of assets according to risk factors) for financial institutions and broker-dealers; second, clearing house's requirements for their clearing members, calculated according to positions held
Mauritius	minimum fixed amounts
Peru	minimum fixed amounts, differentiated according to categories of institutions

Poland	minimum fixed amounts
South Africa	two types: capital adequacy requirements set by the FSB for financial institutions and broker-dealers; second, requirements set by the exchanges for their members
Sri Lanka	minimum fixed amounts plus extra capital for brokers, calculated according to level of operations
Thailand	for banks: capital requirements set according to a standardized model based on Basles Committee's (capital charges assigned to each category of assets according to risk factors) for financial institutions; for broker-dealers: capital requirements as a percentage of total liabilities
Turkey	minimum fixed amounts

Mechanisms of risk control: internal controls and policies, proprietary models

Amman	no regulation with respect to proprietary models and internal controls
Argentina	proprietary models allowed; no regulation in this respect; no written policies required
Bermuda	proprietary models allowed but not developed; banks do have written policies
Brazil	broker-dealers and financial institutions not required to have written policies; proprietary models allowed and encouraged, but do not exempt firms from compliance with capital requirements; few banks do have written documents concerning risk control; growing awareness of the importance of internal controls; controls not checked by authorities; financial institutions required to appoint a director responsible for derivatives
Chile	proprietary models allowed; no written policies; regulation requires broker-dealers to remain within levels of liquidity and solvency
Chinese Taipei	proprietary models allowed but not developed; larger firms do have written policies
Colombia	proprietary models allowed but not developed; growing awareness of the importance of internal controls
Costa Rica	no regulation with respect to proprietary models and internal controls
Hungary	no regulation with respect to proprietary models and internal controls
Korea	proprietary models allowed if approved by the SEC in principle; however, the concept of risk management is relatively new, and seems to have a long way to go; regulation moving towards assessment of internal controls for purposes of capital requirements
Malaysia	proprietary models allowed and encouraged, but do not exempt firms from compliance with capital requirements; growing awareness of the importance of internal controls; controls checked by exchanges; banks expected to follow minimum standards of internal controls
Mauritius	no regulation with respect to proprietary models and internal controls
Peru	no regulation with respect to proprietary models and internal controls
Poland	proprietary models allowed but not developed; brokers have written policies concerning risk management and have to report on risk control activities
South Africa	proprietary models allowed, but must be submitted to FSB; banks do have "compliance manuals" - written policies stating internal controls

Sri Lanka	proprietary models allowed but not developed; growing awareness of the importance of internal controls; larger firms do have written policies
Thailand	proprietary models allowed but not developed; encouragement of internal controls
Turkey	no proprietary models developed; securities firms required to write down their risk control procedures prior to authorization to operate; internal controls checked in the course of on-site inspections

Major problems related to risk control procedures

Amman	not applicable
Argentina	not applicable
Bermuda	poor estimation of parameters
Brazil	calculation of parameters (correlations and volatility); difficulties to provide for extremely adverse situations; lack of liquidity of many assets
Chile	model is static and does not include all positions in derivatives
Chinese Taipei	credit risk cannot be quantified properly
Colombia	lack of technical knowledge and personnel with expertise in risk management
Costa Rica	not applicable
Hungary	not applicable
Korea	not applicable
Malaysia	calculation of parameters (correlations and volatility); difficulties to provide for extremely adverse situations; legal and operational risk; lack of technical knowledge and personnel with expertise in risk management
Mauritius	not applicable
Peru	risk arising from international circumstances; political risk
Poland	delays of brokers in sending reports to PSC; lack of information or incomplete information
South Africa	difficulties for banks to separate their banking and trading books
Sri Lanka	not applicable
Thailand	lack of technical knowledge and personnel with expertise in risk management; different methodologies; high cost of information technology
Turkey	misuse of customers' funds and/or assets

Existence of position limits, mechanisms for the identification of large positions and unwinding powers

Amman	not applicable
Argentina	position limits for futures and options; no powers to order the unwinding of positions
Bermuda	not applicable
Brazil	position limits for futures and options; regulators and exchanges are empowered to identify holders of any positions; regulators and clearing houses are empowered to order the unwinding of positions in certain circumstances
Chile	existent limits not accurate enough; regulators exchanges are empowered to identify holders of large positions; no powers to order the unwinding of positions
Chinese Taipei	limits not defined yet; regulators are empowered to order the unwinding of positions
Colombia	not applicable
Costa Rica	there are position limits set by the exchange; the exchange is responsible for enforcing such limits, and is empowered to take proper action in case of violations
Hungary	position limits for futures and options; regulators are empowered to identify holders of large positions; regulators and clearing houses are empowered to order the unwinding of positions in certain circumstances
Korea	not applicable
Malaysia	position limits for futures and options; exchanges are empowered to identify holders of large positions; regulators and clearing houses are empowered to order the unwinding of positions in certain circumstances
Mauritius	not applicable
Peru	not applicable
Poland	no position limits; regulators are empowered to identify holders of large positions and to order the unwinding of positions
South Africa	position limits for futures and options; exchanges are empowered to identify holders of large positions; regulators and clearing houses are empowered to order the unwinding of positions in certain circumstances

Sri Lanka	not applicable
Thailand	position limits apply only for OTC; regulators are empowered to identify holders of large positions; no powers to order the unwinding of positions
Turkey	not applicable

Public disclosure of derivatives by corporations, financial institutions and exchanges

Amman	only commercial banks are required to disclose off-balance sheet positions
Argentina	exchanges are required to disclose open interest statistics; no regulation regarding disclosure of positions by corporations
Bermuda	only financial institutions are required to disclose off-balance sheet positions
Brazil	The Futures Exchange BM&F daily discloses distribution of open interest in all contracts by categories of investors; corporations are required to disclose the market value of all positions in financial instruments in their financial statements as explanatory notes
Chile	clearing houses daily disclose open positions by broker-dealer
Chinese Taipei	corporations are required to disclose off-balance sheet positions
Colombia	only financial institutions are required to disclose off-balance sheet positions
Costa Rica	exchanges disclose open interest statistics; no regulation regarding disclosure of positions by corporations
Hungary	exchanges disclose open interest statistics; no regulation regarding disclosure of positions by corporations
Korea	not applicable
Malaysia	exchanges disclose open interest statistics; no regulation regarding disclosure of positions by corporations
Mauritius	no regulation regarding disclosure of positions by corporations
Peru	not applicable
Poland	corporations are required to disclose off-balance sheet positions
South Africa	exchanges disclose trading volume and prices; off-balance sheet positions must be disclosed and are accounted for capital requirements
Sri Lanka	corporations are required to disclose off-balance sheet positions as explanatory notes
Thailand	only commercial banks are required to disclose off-balance sheet positions
Turkey	corporations are required to disclose off-balance sheet positions

Foreigners' participation in derivatives markets

Amman	not applicable
Argentina	not available
Bermuda	not applicable
Brazil	no impediments for foreigners' participation in derivatives markets
Chile	not available
Chinese Taipei	not available
Colombia	not applicable
Costa Rica	no impediments for foreigners' participation in derivatives markets
Hungary	no impediments for foreigners' participation in derivatives markets
Korea	no impediments for foreigners' participation in derivatives markets, except that individual foreign investors may not be allowed to buy more than a certain portion of open interest in markets
Malaysia	no impediments for foreigners' participation in derivatives markets
Mauritius	not applicable
Peru	not applicable
Poland	not applicable
South Africa	significant foreigners' participation in derivatives markets
Sri Lanka	not applicable
Thailand	not available
Turkey	not applicable

Mechanisms for international cooperation between regulators

Amman	MOU's only with Arab markets
Argentina	several MOU's
Bermuda	two MOU's
Brazil	several MOU's
Chile	several MOU's
Chinese Taipei	several MOU's
Colombia	several MOU's
Costa Rica	eleven MOU's
Hungary	several MOU's
Korea	no MOU's so far
Malaysia	several MOU's
Mauritius	one MOU
Peru	several MOU's
Poland	no MOU's so far
South Africa	several MOU's; domestic financial services providers must disclose any risk they have in other jurisdictions
Sri Lanka	no MOU's so far
Thailand	several MOU's
Turkey	no MOU's so far

Training programs on risk management provided by regulators

Amman	no training
Argentina	sporadic
Bermuda	SEC's employees take regular programs
Brazil	CVM's and exchanges' employees take regular programs
Chile	SVS's employees take regular programs
Chinese Taipei	sporadic
Colombia	no training
Costa Rica	no training so far
Hungary	not available
Korea	no training so far
Malaysia	Commission's employees take regular programs
Mauritius	no training
Peru	no training
Poland	no training
South Africa	FSB's and exchanges' employees take regular programs
Sri Lanka	SEC's employees take regular programs
Thailand	SEC's employees take regular programs
Turkey	sporadic