

**THE MANAGEMENT OF CREDIT RISKS BY SECURITIES FIRMS  
AND RECOMMENDATIONS TO FIRMS AND REGULATORS**



**Report of the Technical Committee  
of the  
International Organization of Securities Commissions**

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Securities firms historically have been exposed to counterparty credit risk in a number of ways through margin lending, bridge financing and repurchase agreements, as well as in the form of settlement-related risk. Measuring the credit exposure associated with these transactions is relatively straightforward and securities firms traditionally managed their credit risk by ensuring their exposures were sufficiently collateralised and marked to the market. Historically, unsecured credit extensions, such as outright loans, have not been a significant element in securities business. This of course is aside from sometimes substantial outright holdings in investment grade and non-investment grade debt instruments.

As the use of derivative instruments by securities firms has increased in recent years, credit risk management has in consequence become more complex. In particular, difficulties in estimating potential future exposures with derivative instruments, and the corresponding complications in collateral management, have led to an increased likelihood that securities firms inadvertently will incur unsecured credit exposures. In addition, competitive pressures from banks and other financial intermediaries have induced securities firms volitionally to incur more unsecured credit risk in derivatives transactions.

Accordingly, credit risk issues are a growing concern for securities firms. This paper will (a) describe the nature of credit risk for securities firms, with a particular emphasis on credit risks associated with derivatives transactions; (b) explore a number of best practices in the industry; and (c) make some recommendations to regulators on the actions they should take to promote an active and efficient management of credit risks in supervised entities.

## **I. CREDIT RISK IN SECURITIES FIRMS**

### **A) What is credit risk?**

Credit risk can be defined as the risk of loss arising from the failure of a counterparty to perform its obligations under a contract. It has three main components.

- **Credit exposure:** credit exposure relates to the amount of loss in the event of counterparty default. It is possible to identify a current and future component. Current credit exposure in a derivatives transaction is usually interpreted as the replacement value of the contract in the event of default. Potential future exposure is an estimate of the replacement cost of the transaction if a counterparty defaults at some future time during the life of the transaction. Potential future exposure for derivatives transactions is often modelled in a similar way to value-at-risk for market risk, incorporating market volatility and portfolio effects among all outstanding transactions with a specific counterparty. It can be modelled both on the basis of historic data and plausible stress scenarios.
- **Probability of default:** the probability that the counterparty will fail to perform a contractual obligation. This will reflect the current creditworthiness of the counterparty and its prospective creditworthiness over the lifetime of any transaction.

This will depend, *inter alia*, on the counterparty's vulnerability to asset price movements. Tools in estimating the probability of default include the counterparty's credit rating, a measure of credit rating migration (probability of upgrades / downgrades), and public or proprietary default statistics.

- Recovery rate: the proportion of the market value of a position that is expected to be recovered if the counterparty defaults.

## **B) Credit risk has become a source of heightened concern for securities firms**

Traditionally, credit risk was mainly the concern of bank managements and specialist credit rating analysts. The basic question was whether to grant a loan and the credit exposure embodied in any transaction was readily related to the book value of the amount loaned plus any accumulated interest. Concern traditionally focussed on the risk that loans would become non-performing. This governed pricing and the control of credit risks mainly through rationing and diversification. Limits were imposed internally and were supplemented by large exposure regulation and risk asset ratios.

Securities firms, mainly relying on collateral, have focused on marking to market and, therefore, on measuring market risks. Analytical tools for analysing and managing credit risk at securities firms were relatively underdeveloped since they were largely unneeded.

Credit risk arising from derivatives has two features unfamiliar to traditional banking. Credit exposure generated by a derivative is a function of the market value of the contract over time; and different types of contracts tend to either accumulate or disburse credit exposure over time. Together, these characteristics mean that controlling the credit risk generated by derivatives involves a much more complex process of quantifying exposures.

A central issue in the management of portfolios comprising mostly derivatives is that total credit exposure may be different from the sum of the credit exposures from each instrument. This means that the ultimate goal of any organisation dealing with large volumes of derivatives is to quantify the true net credit exposures generated by their global portfolio of contracts on a day-by-day basis, across all instruments and profit centres, and to be able to calculate the incremental effect of adding new contracts to that global portfolio in real time. The ability to do this is essential if the firm is to allocate economic capital efficiently.

## **C) Credit risk and market risk are related concepts**

Credit risk is a function of the amount of risk, the probability of default and recovery rates.

Market and credit risks are conceptually different and it is important that they are separately identified. However, the same event may have consequences for both type of risks which makes it difficult in practice to make a clear distinction between market risks and credit risks:

- Changes in market risk factors (FX, stock prices, interest rates, spread volatilities) affect the size of the losses in the event of a counterparty default.
- Changes in market prices may themselves affect the probability of default.
- Market risk to a specific counterparty is, to some extent, equivalent to credit risk.
- The emergence of loan securitisation and credit derivatives and their growth in the last few years, has made part of the credit risk exposure tradable and therefore subject to more active and competitive portfolio management.

#### **D) Difficulties in the assessment of credit risks**

Credit risks are complex to assess and have become more so as markets and structures of intermediation have themselves become more complex. Assessment of credit risk can be problematic in the case of traded instruments. This paper concerns itself principally with the credit risks arising from derivatives. Whilst credit risks from conventional loans and bonds are still significant, a great deal of credit risk now arises from this source. Moreover, the newer credit risks are often less transparent and more difficult to assess than traditional credit risks. They are more difficult to assess for four main reasons:

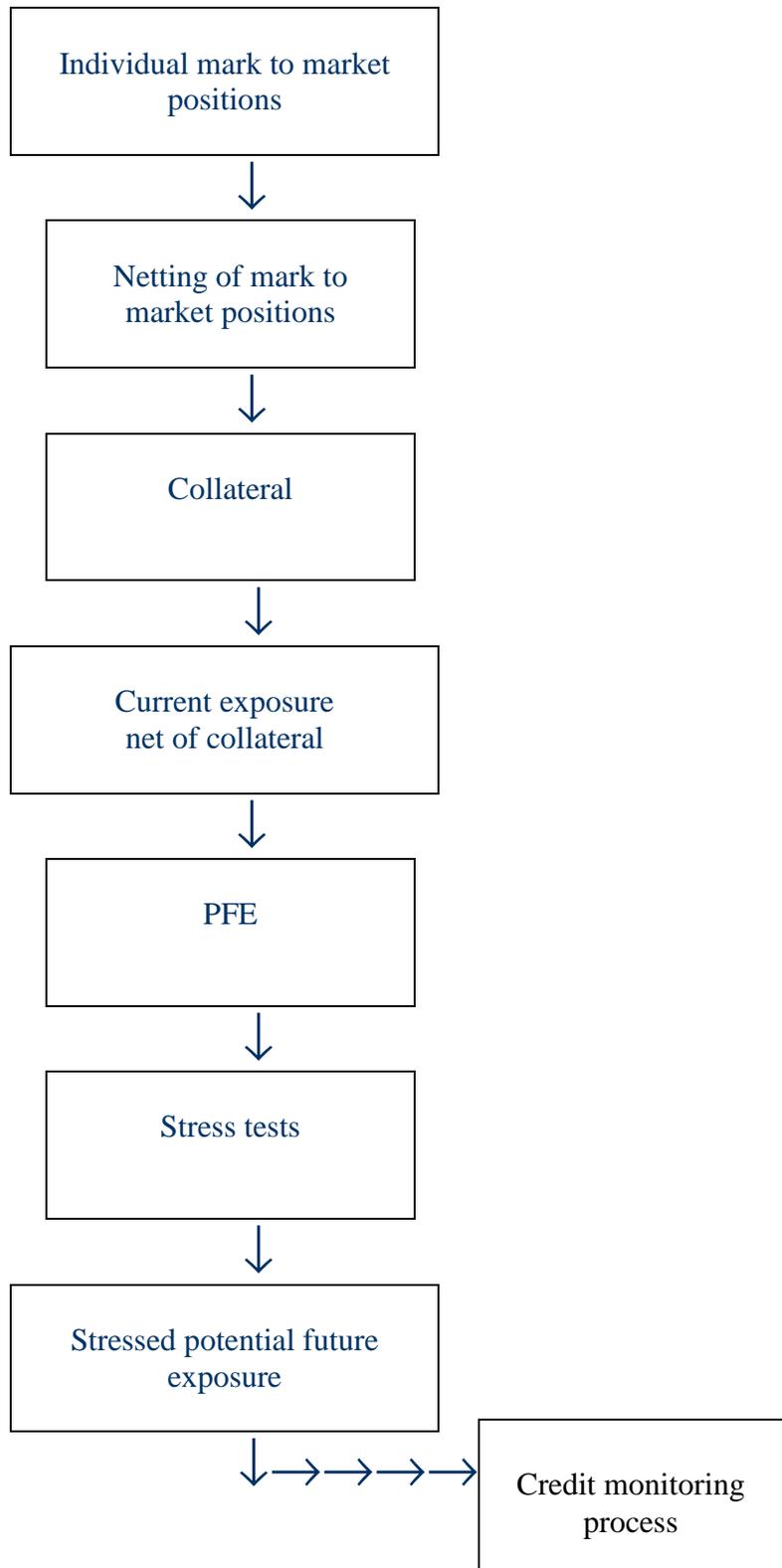
- Notional amounts often give little idea about derivative credit exposures. With derivatives contracts there is often no clear relation between a contract's value and the credit exposure embodied in it. For example, swap or forward contracts will usually have zero credit risk at initial values, yet either can produce large losses if the underlying variables move strongly in the wrong direction. Hence, there is a strong time dimension to credit exposure which needs to be taken into account.
- The credit risks associated with derivatives positions can vary enormously and in complicated ways with movements in the prices of the underlying instrument.
- Derivatives credit risk is further complicated by portfolio effects. With loans, the total exposure is closely related to the total gross amount loaned. However, with derivatives there are no simple rules to relate total credit exposure to the gross size of a derivatives portfolio. It is not possible to get an accurate picture of overall credit exposure by adding up individual exposures, because the individual exposures will interact with or offset one another.
- Credit risk mitigation techniques are being used more frequently. Structured finance, asset securitisation techniques, collateral and netting and credit risk derivatives are increasingly used by firms to mitigate or hedge their risks. The increase in the use of such techniques and instruments can make it difficult for both firms and regulators to assess accurately credit risks associated with underlying assets or with hedging instruments themselves. Indeed, residual credit risks may arise whenever the hedge or mitigation is imperfect. Such residual risks may relate to changes in market prices that could create a shortfall in value of the hedge, to maturity mismatches or to asset mismatches.

Consequently, it is not surprising that institutions had difficulty when they first started to handle derivatives credit risks, and resorted to convenient rules of thumb. For example,

when interest rate swaps were first being used in the early 1980s, institutions tended to treat swaps as offsetting bond purchases because doing so implied that a swap had the same credit risk as a bond purchase from the same counterparty. This procedure overlooks an important difference: while mutual bond purchases imply commitments to make both coupon and principal payments, an interest rate swap involves no exchange of principal at maturity and only implies a commitment to make mutual coupon payments. Hence, an interest rate swap typically involves a much lower credit exposure than a corresponding mutual bond purchase. The result was that companies tended to overstate the default risk of swaps. Yet, as time passed and defaults were seen to be relatively rare, the opposite tendency arose to understate default risk. Some of the firms which made this error incurred sizeable losses in the early 1990s. Interest rate swaps do incorporate credit risks, albeit to a lesser extent than bonds, but it is only possible to assess their credit risk with an appropriate methodology.

#### **E) Analytical framework for assessing credit risks**

The diagram below describes the main elements of an analytical framework for assessing credit risk. A central aspect of this is the effective measurement of Potential Future Exposure (PFE) taking into account the effect of the mitigants which can be used to address credit risk. These mitigants include credit derivatives, netting and collateral. The resulting measure of PFE is a central feature of counterparty risk management.



## II. ADVICE TO FIRMS

It is essential that securities firms recognise the full extent of the credit risk they incur. The following recommendations should be considered as guidelines for sound practices, though it is recognised that the appropriate structures for recognising and controlling credit risks will vary from firm to firm.

### Organisation

The interrelation of credit and market risk has consequences for the internal organisation of firms as well as the processes by which they manage their risks. The internal firm structure required for effective credit risk management is clearly an important practical consideration. It may be appropriate for an institution to have either a single risk management committee with responsibilities for both market and credit risk or separate committees. It is, however, imperative that overall risk management and information provided to those responsible for setting the firm's risk appetite and monitoring performance against this recognises the inter-relationship of credit and market risk. Any separate credit risk management committee should, in most cases, include the head of credit risk, business managers and a legal or compliance officer who can provide guidance on questions of *vires* and netting. Among its tasks should be:

- To establish an overall system of credit exposure and settlement risk exposure limits. Credit exposures should be closely monitored by the firm within the context of the firm's overall risk tolerance and using an integrated framework that evaluates the linkages between market risk, credit risk and liquidity. Limits should apply to exposures arising from all transactions or services exposing the firm to credit risk and should be developed in accordance with the overall risk strategy and policy. Limits should be also established for individual counterparties. Limits should be monitored at least daily.
- To determine a detailed netting policy for the institution and to pay particular attention to the legal status of netting in jurisdictions where the firm operates, as well as with respect to the products counterparties with which it deals.
- (To establish a policy regarding acceptable counterparty classes, based on an analysis of *vires*. For this purpose, firms should have effective counterparty risk rating systems.)
- To set out a collateral policy, specifying acceptable forms of collateral and the procedures to be used to manage this. Collateral agreements with counterparties should be clearly documented and aligned with the firm's assessment of counterparty credit risk. As a general rule, collateral should be valued at least daily.
- To establish a policy for the methodology of calculation of credit exposure. In particular, it should detail the methods to be used to measure potential future exposure, as well as stress testing and scenario analyses to be used to test exposures.

The credit risk management unit or some other unit independent of the trading area should be responsible for the day-to-day monitoring of compliance with counterparty limits.

In all cases a clear distinction must be established between the different functions:

- Risk strategy, policy and processes, which is specified by senior management and approved by the Board of Directors.
- Risk management, which is the clear responsibility of individual business lines in respect of processes specified by senior management.
- Risk control, which is performed by a department independent of line management. This department should ensure that the risk framework is adhered to on an ongoing basis and, especially, that the business lines are compliant with approved credit limits. It also should maintain documentary evidence of control processes.

### **Credit limits**

Counterparty risk limits must be well established. The assessment of the credit quality of counterparty in a derivatives trade will be the same as that for on-balance sheet products. However, there will be differences when measuring exposure. In this respect, assessment of credit risk will involve a measure of the institutions current exposure to a counterparty plus its potential future exposure. When establishing a limit structure, aggregate limits for counterparties covering all types of exposure will be required, perhaps including maturity limits. However, the institution should also consider the extent to which sublimits are appropriate for derivatives or by maturity of instruments, taking into account correlations and the fact that the credit risk assessment is not the same in all aspects for each instrument. Firms need to manage counterparty concentration risk effectively and should have some adequate arrangements for dealing with it.

### **Netting**

Participants in OTC derivatives transactions can reduce the potential impact of counterparty default through the use of bilateral close out netting agreements.

It is common nowadays for dealers who frequently engage in transactions with the same counterparties to use master agreements. The agreements provide for the netting of payments across a set of contracts. In the event of default, a counterparty cannot stop payments on contracts that have negative value while demanding payment on those with positive value. Essentially, this system reduces the exposure to the net payment for all the contracts covered by netting agreement.

Most derivatives transactions are OTC transactions for which bilateral netting remains the norm. Therefore, firms have developed bilateral netting agreements that may be:

- a bilateral contract between two counterparties under which any obligation to each other to deliver a given value on a given date is automatically amalgamated with all other obligations for the same instrument and value date, legally substituting one single net amount for the previous gross obligations (netting by novation);

- a bilateral contract which provides that, if an event is triggered, the outstanding obligations between the two are accelerated and netted to determine the counterparty's net exposure (close-out netting).

When netting is used it is essential that the legal basis for it is clear and robust. The more the netting master agreement is based on a standard legal format, the greater the reliance which may be placed on it; the minimum assurance should be a legal opinion although there is a hierarchy of forms this opinion could take. The legal enforceability of netting agreements can also vary between countries. Institutions must have a clear knowledge of these differences; the materiality of any uncertainty will depend on the size of the exposures concerned.

Provided the legal basis for netting is clear and robust, an institution should focus on the net exposure and establish a net limit. In doing so, however, it should be mindful of the limitations of such agreements, particularly when applied across jurisdictions. The use of netting agreements itself poses legal risk and firms need to take account of this.

Multilateral netting is aimed at extending the benefits of netting to cover transactions which originate among any group of counterparties that participate in the netting arrangement. A clearing house, acting as central counterparty to all transactions that participants agree to submit for clearing, is the most common feature of such an arrangement. The clearing house assumes the responsibility for managing credit risk. Such multilateral netting in OTC derivatives markets is relatively undeveloped however.

### **Affiliated Counterparty Groups**

Credit risk management may become more complex when an institution enters into transactions with affiliated counterparties, both with respect to netting and assessments of counterparty concentration risk.

In general, netting agreements have been used on an individual counterparty-by-counterparty basis. Depending on the instrument and jurisdiction involved, however, it may be possible to net the rights and obligations of affiliated entities that are part of a 'controlled' group. Because netting reduces credit risk, institutions should explore opportunities to broaden the use of netting agreements to affiliated groups of counterparties. Care must be taken, however, to ensure that such agreements rest on a sound legal foundation.

In addition, in assessing counterparty concentration risk, institutions should look at 'connected' exposures, such as those arising through affiliated entities. An entity is likely to support the obligations of an affiliate even in the absence of a legal duty to do so. Accordingly, institutions should be mindful of the impact a failure or near-failure of one entity may have on its affiliates.

## Collateral

For any transaction that involves an extension of credit, the credit risk can be reduced by requiring that acceptable collateral be posted. The collateral should act as a mitigant to net exposure if the counterparties have in place a master agreement and pledge documentation which are enforceable in the relevant jurisdiction(s).

In the case of OTC derivatives, the transaction is marked to market and collateral is posted in accordance with the mark to market size of the exposure, together with any initial margin to reflect the volatility of the position. Acceptable forms of collateral include not only cash but also mutually acceptable securities. Securities that have been used as collateral include government and agency securities, subject to a “haircut” to reflect their credit, volatility or liquidity risk. Foreign or domestic equities, foreign debt securities, and non-investment grade debt have also been used as collateral.

Collateral agreements tend typically to be bilateral – both parties are required to post collateral when the market value of their side of the contract gives rise to a credit risk. However, collateral agreements may be unilateral – with only the party with the weaker credit standing required to post collateral.

To reduce the cost of collateral arrangements, it is common to specify thresholds above which the parties agree to post more collateral. In such a structure, collateral is posted only if the agreement is “triggered”. Two kinds of triggers have been observed in the market:

*Value trigger.* Collateral is posted only if the mark-to-market value of the transaction exceeds a specified threshold. To facilitate transactions between counterparties with different levels of creditworthiness, uneven thresholds can exist i.e. the threshold for the higher-rated counterparty may be set at a higher level.

*Event trigger.* While value triggers are more common, agreements have been structured such that collateral is required (or the level of collateral is increased) when a counterparty’s credit rating is downgraded or when capital ratios fall below specified levels. Some counterparties use a “tiered” collateral system. As a counterparty’s rating declines, the threshold exposure declines, and calls for collateral will occur more frequently. For the worst credits, collateral may be required even where a contract has a positive market value.

An institution should have a clearly articulated policy which sets out its approach to the use and management of collateral. As with netting, this must be implemented and monitored by the credit risk management function. The institution’s collateral policy is likely to specify the extent to which collateral may be used to reduce credit exposure and the various forms that are considered acceptable. The documentation and legal framework must also be addressed, with procedures and controls put in place, and adequate resources assigned to ensure these are met. Care should be taken to recognise the potential legal complexities posed by cross-border holdings of collateral.

An institution needs to set out clear procedures for collateral monitoring and maintenance. Areas that should be covered include methods of assessing the price volatility, quality and liquidity of the collateral in order to determine the appropriate level of haircuts to be applied to it, as well as valuation frequency and methods. As a general rule, collateral should be marked to market no less frequently than daily, and the institution should have the ability to call margin on a daily basis. The institution therefore needs to be aware of the risk it faces from substantial intraday movements in the value of collateral. It should be noted that the need to maintain collateral to cover the net exposure to a counterparty may lead to disputes over the exact mark-to-market valuation of a position, and, therefore, the amount of collateral required. The institution should address this eventuality in its collateral policy and any agreements with counterparties on the use of collateral.

The institution must be aware of the risk related to the change of market value of the collateral in the event of counterparty failure and even in the case of a general and adverse market move. Finally, firms must recognise that, in addition to credit, liquidity and legal risks, the use of collateral introduces operational risks. Therefore, they have to develop effective controls and devote sufficient resources to manage collateral properly and actively. Back-offices have a major role to play in this area.

### **Credit Derivatives and Other Third-Party Risk Mitigation Devices**

As part of their credit risk management programmes, institutions also may wish to consider using third-party credit risk mitigation devices such as credit derivatives, letters of credit and guarantees. When such devices are used, institutions should examine carefully the credit quality of the issuer of the credit enhancement since the credit risk of that entity, at least to some degree, is being substituted for the credit risk of the original counterparty.

Credit derivatives are contracts that convey credit risk between counterparties and include such instruments as credit default contracts, total return swaps, credit spread contracts, and credit linked notes. As the use of these products is relatively new and they are in a state of rapid evolution, an institution should review carefully the pricing, terms and legal status of any credit derivative contract it contemplates using.

### **Potential future exposure**

An assessment of credit risk for derivatives cannot be divorced from an assessment of market risk, notwithstanding the fact that these are conceptually separate. In particular, it needs to take full account of the impact of possible future market movements which may increase the exposure of an institution to a particular counterparty. As a result, an institution needs to have a workable, credible and appropriate methodology to measure potential future exposure (PFE). This will normally involve adding a factor representing PFE to the calculation of mark-to-market current exposure to a counterparty when assessing compliance with credit limits.

A variety of methodologies may be employed to account for PFE. There is no industry-wide consensus on the appropriate measurement methodology. An “add-on” factor may be based on the institution’s own assessment of historic volatilities for a particular instrument class, the institution as a whole, and across trading and non-trading activities. The measurement of PFE is a necessary adjunct to close monitoring of the credit standing of counterparties on an on-going basis.

Potential exposure can be calculated using one of two general approaches:

- On the basis of statistical models, drawing on historic volatility data which allows firms to estimate potential exposure at any point over the life of the contract, including the maximum exposure. Such methodologies are still in the process of development and there is no uniformly agreed model for such estimates. IOSCO and the Basel Committee are working jointly with the financial industry to monitor progress in the development of these techniques.
- Using potential exposure and add-ons which are drawn from a set of standard multiplicative factors that are applied to the notional value of the particular transaction, determined by the remaining maturity of the transaction and based on historic volatility of the asset category concerned.

When PFE is modelled (rather than based on standard add-ons), the institution needs to monitor the methodology used to determine the add-on, provide regular updates and give careful consideration to the confidence interval, correlations and other assumptions and parameters used.

The institution should decide the level of aggregation at which PFE will be assessed: add-ons may be derived for categories of instrument, perhaps by currency or for individual instruments. A breakdown by broad product type (interest rate, equity, forex, etc.) may be appropriate unless a single add-on is based on the most volatile product class. In addition, an institution must conduct stress testing to assess its exposure to PFE. This is particularly important for firms with high levels of connected counterparty exposure.

The institution should consider how frequently PFE is calculated in relation to each counterparty. For most institutions this will be done on a daily basis (to coincide with daily marking to market) in order to assess current exposure and compliance with credit limits.

When recognising netting, institutions should consider policies that allow anticipation of peaks in future exposure as contracts that have the effect of reducing overall credit risk mature. This is likely to require regular reports on credit risk that allow for consideration of the maturity profile of transactions with a counterparty. In some instances, system limits by maturity or limits on peak exposure may be deemed appropriate. However, to provide an accurate picture, the full range of transactions with a counterparty needs to be assessed, even if this may be difficult to implement for global trading institutions.

## **Stress testing**

The use of historical data in the estimation of PFE does not provide a guide to the behaviour of exposure in conditions of stress. Stress testing should be based on hypothesised market movements which are outside the range of historical experience but still plausible. Firms should therefore undertake stress testing in order to evaluate such effects. In addition to examining the effects of unusual price movements, firms should also assess the effects of disturbances to liquidity. These may result particularly from concentrations of positions, though other factors may also result in a drying-up of liquidity. In conducting stress tests firms should also bear in mind that historic correlations may break down in extreme market circumstances.

### **III. GUIDANCE FOR REGULATORS**

In scrutinising the adequacy of firms' credit risk management arrangements, regulators will need to take full account of the guidance to firms listed above. Three important points need to be recognised in this connection:

- Several of the areas highlighted are ones in which industry practice is still evolving. This applies both to organisational issues (such as the extent to which credit and market risk functions should be merged) and to technical issues (such as the measurement of PFE).
- It is appropriate that the financial industry should itself take the lead in formulating sound practice in a number of areas (particularly the measurement of exposure). Regulators need to maintain an active dialogue with firms but should not aim to be too prescriptive.
- While there is an absolute need for firms to understand and manage credit risk, there is clearly considerable scope both for the application of judgement on the part of managements and for the range of risk mitigation techniques deployed to ensure that relative weaknesses in some areas are offset by additional prudence in others. Uncertainty about the measurement of exposure, for example, would typically be offset by calling for additional collateral.

The task of regulators is therefore to seek to establish that overall processes for identifying, measuring and managing credit risks are adequate. At a minimum this means ensuring that managements understand the sources of credit risk; that they specify overall risk tolerances; that exposures are measured and monitored; that netting and collateralisation policies are robust and that information flows are adequate to enable managements to monitor credit risk profiles accurately.

Specific actions for regulators to consider include the following:

- (a) Regular meetings with firms to focus among other things, on the adequacy of their **overall credit policies**, including limit setting and monitoring.
- (b) Regulators may also wish to receive regular **reports on credit exposures** and conduct meetings with senior management to assess the adequacy of credit risk policies and their implementation.
- (c) All securities regulators currently impose capital requirements for market risks and most have additional requirements for credit risk. Depending on the regime, some regulators may wish to use tools at their disposal to provide **incentives for firms to move in the direction of sound practice** (though this will evolve over time). Such tools could in some cases include the application of additional capital requirements (where these are available) to firms whose procedures were judged inadequate, or increases in the level of regulatory scrutiny. In extreme circumstances where credit policies or their implementation are clearly deficient, regulators may need to issue directions for improvement or place limitations on the scope of the business.
- (d) The development of **internal ratings** is part of a credit culture and regulators should help create an environment for the development and use of internal ratings. Adequate counterparty assessment is the core of a credit risk management process. Competent rating agencies can play a role in this. However, many counterparties are not rated and some countries are only covered to a limited degree by internationally recognised agencies. Accordingly, regulators may wish to encourage an environment for the development and the use of internal ratings in securities firms.
- (e) Regulators may also wish to encourage the **development and refinement by firms of credit risk models**. Many problems remain to be resolved, however, before the use of such models for calculating capital charges could be contemplated. In any use of statistical models, the availability and integrity of data is an important issue. In the case of credit risk modelling, it is likely that long runs of detailed data will be needed in order to assess creditworthiness over protracted periods. Data requirements for credit risk modelling are therefore more extensive and onerous than in the case of market risk modelling. There is the additional risk that historical data on creditworthiness may become invalid as a result of changes over time in economic conditions and structures.

If these significant concerns could be resolved, some regulators may view credit risk models as providing a promising way forward. If such models were to be used as the basis for capital calculation they would need to be subject to restrictions on their use and the implementation of capital buffers at least as rigorous as those which currently apply to the use of market risk models. Regulators should continue to follow technical progress in this area.