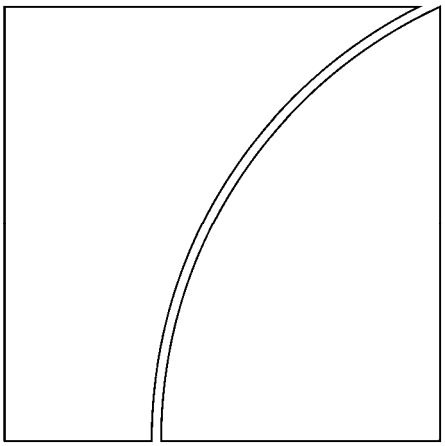
Basel Committee on Banking Supervision

Consultative document



Proposed revisions to the Basel II market risk framework

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BANK FOR INTERNATIONAL SETTLEMENTS

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I. Background and objectives

1. The Basel Committee/IOSCO Agreement reached in July 2005[1] contained several improvements to the capital regime for trading book positions. Among the revisions was a new requirement for banks that model specific risk to measure and hold capital against default risk that is incremental to any default risk captured in the bank's value-at-risk model. The incremental default risk charge was incorporated into the trading book capital regime in response to the increasing amount of exposure in banks' trading books to credit-risk related and often illiquid products whose risk is not reflected in value-at-risk. At its meeting in March 2008, the Basel Committee on Banking Supervision (the Committee) decided to expand the scope of the capital charge to capture not only defaults but a wider range of incremental risks, to improve the internal value-at-risk models for market risk and to update the prudent valuation guidance for positions subject to market risk of the Basel II Framework.

2. Given the interest of both banks and securities firms in the potential solutions to these particular issues, the Committee has worked jointly with the International Organization of Securities Commissions (IOSCO) to consult with industry representatives and other supervisors on these matters. While this work was undertaken jointly by a working group from the Committee and IOSCO, the resulting proposal represents an effort by the Committee to find prudential treatments for certain exposures held by banks under the Basel II Framework. Consequently, this text frequently refers to rules for "banks", banking groups, and other firms subject to prudential banking regulations. The Committee recognises that, in some cases, national authorities may decide to apply these rules not just to banks and banking groups, but also to investment firms, to groups of investment firms and to combined groups of banks and investment firms that are subject to prudential banking or securities regulation.

3. The decision to capture not only defaults but a wider range of incremental risks in the incremental risk capital charge is reflected in the proposed changes to the Basel II market risk framework outlined below. Additional guidance on the incremental risk capital charge is provided in a separate consultative document (referred to as "the Guidelines").[2]

4. The improvements in the Basel II Framework concerning internal value-at-risk models will in particular require banks to justify any factors used in pricing which are left out in the calculation of value-at-risk. They will also be required to use hypothetical backtesting at least for validation, to update market data at least monthly and to be in a position to update it in a more timely fashion if deemed necessary. Furthermore, the Committee clarifies that it is permissible to use a weighting scheme for historical data that is not fully consistent with the requirement that the "effective" observation period must be at least one year, as long as that method results in a capital charge at least as conservative as that calculated with an "effective" observation period of at least one year.

5. To complement the incremental risk capital framework, the Committee has made the language with respect to prudent valuation for positions subject to market risk (paragraphs

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[1] Basel Committee on Banking Supervision, *The Application of Basel II to Trading Activities and the Treatment of Double Default Effects*, July 2005

[2] Basel Committee on Banking Supervision, *Guidelines for computing capital for incremental risk in the trading book*, consultative document, July 2008.

690 to 701) more consistent with existing accounting guidance, and has clarified that regulators will retain the ability to require adjustments to current value beyond those required by financial reporting standards, in particular where there is uncertainty around the current realisable value of a position due to illiquidity. This guidance focuses on the current valuation of the position and is a separate concern from the risk that market conditions and/or variables will change before the position is liquidated (or closed out) causing a loss of value to positions held.

6. In June 2006, the Committee published a comprehensive version of the Basel II Framework[3] which includes the June 2004 Basel II Framework, the elements of the 1988 Accord that were not revised during the Basel II process, the 1996 *Amendment to the Capital Accord to Incorporate Market Risks*, and the July 2005 paper on *The Application of Basel II to Trading Activities and the Treatment of Double Default Effects*. Unless stated otherwise, this consultative document refers to the comprehensive version of the Basel II Framework.

7. Banks are expected to comply with the revised requirements in order to receive approval for using internal models for the calculation of market risk capital requirements according to paragraph 718(LXX). Banks must meet the requirements for calculating the incremental risk charge that are introduced through the revisions to Section VI.D.8 of the Basel II Framework as outlined below in order to receive specific risk model recognition.

8. For portfolios and products for which a bank has already received approval for using internal models for the calculation of market risk capital and/or specific risk model recognition, it would not have to comply with the revised requirements until 1 January 2010. Subject to supervisory approval, a bank that is unable to calculate an incremental risk charge for default and migration risks of credit positions to the satisfaction of its supervisor may use a temporary fallback option as described in the Guidelines between 1 January 2010 and 31 December 2010. Furthermore, banks will be allowed one more year (ie, until 1 January 2011) to incorporate into their incremental risk capital models all risks covered by the incremental risk capital charge beyond those attributable to default and migration risks for positions subject to credit risk.

9. For re-securitisations that are cash or derivative credit positions, banks are subject to a capital requirement as set out in paragraph 615 of the Basel II Framework starting 1 January 2009 until the bank has fully implemented both phases of the incremental risk capital charge for these positions.

[3] Basel Committee on Banking Supervision, *Basel II: International Convergence of Capital Measurement and Capital Standards: A Revised Framework - Comprehensive Version*, June 2006.

10. The Committee welcomes comments from the public on all aspects of this consultative paper by 15 October 2008. These should be addressed to the Committee at the following address:

Basel Committee on Banking Supervision
Bank for International Settlements
Centralbahnplatz 2
CH-4002 Basel
Switzerland

Alternatively, comments may be sent by e-mail to baselcommittee@bis.org.

II. Changes to the internal models approach to market risk

11. Section VI.D of the Basel II Framework outlining the internal models approach to market risk will be changed as follows. Changed wording is underlined. The original footnote numbers of the Basel II Framework are provided in brackets.

1. General criteria

718(Lxx). The use of an internal model will be conditional upon the explicit approval of the bank's supervisory authority. Home and host country supervisory authorities of banks that carry out material trading activities in multiple jurisdictions intend to work co-operatively to ensure an efficient approval process.

718(Lxxi). The supervisory authority will only give its approval if at a minimum:

- It is satisfied that the bank's risk management system is conceptually sound and is implemented with integrity;
- The bank has in the supervisory authority's view sufficient numbers of staff skilled in the use of sophisticated models not only in the trading area but also in the risk control, audit, and if necessary, back office areas;
- The bank's models have in the supervisory authority's judgement a proven track record of reasonable accuracy in measuring risk;
- The bank regularly conducts stress tests along the lines discussed in paragraphs 718(Lxxvii) to 718(Lxxxiv) below.

718(Lxxii). Supervisory authorities will have the right to insist on a period of initial monitoring and live testing of a bank's internal model before it is used for supervisory capital purposes.

718(Lxxiii). In addition to these general criteria, banks using internal models for capital purposes will be subject to the requirements detailed in paragraphs 718(Lxxiv) to 718(xcix).

2. Qualitative standards

718(Lxxiv). It is important that supervisory authorities are able to assure themselves that banks using models have market risk management systems that are conceptually sound and implemented with integrity. Accordingly, the supervisory authority will specify a number of *qualitative criteria* that banks would have to meet

before they are permitted to use a models-based approach. The extent to which banks meet the qualitative criteria may influence the level at which supervisory authorities will set the multiplication factor referred to in paragraph 718(lxxvi) (j) below. Only those banks whose models are in full compliance with the qualitative criteria will be eligible for application of the minimum multiplication factor. The qualitative criteria include:

(a) The bank should have an independent risk control unit that is responsible for the design and implementation of the bank's risk management system. The unit should produce and analyse daily reports on the output of the bank's risk measurement model, including an evaluation of the relationship between measures of risk exposure and trading limits. This unit must be independent from business trading units and should report directly to senior management of the bank.

(b) The unit should conduct a regular back-testing programme, i.e. an ex-post comparison of the risk measure generated by the model against actual daily changes in portfolio value over longer periods of time, as well as hypothetical changes based on static positions.

(c) The unit should also conduct the initial and on-going validation of the internal model.[4]

(d) Board of directors and senior management should be actively involved in the risk control process and must regard risk control as an essential aspect of the business to which significant resources need to be devoted.[5] In this regard, the daily reports prepared by the independent risk control unit must be reviewed by a level of management with sufficient seniority and authority to enforce both reductions of positions taken by individual traders and reductions in the bank's overall risk exposure.

(e) The bank's internal risk measurement model must be closely integrated into the day-to- day risk management process of the bank. Its output should accordingly be an integral part of the process of planning, monitoring and controlling the bank's market risk profile.

(f) The risk measurement system should be used in conjunction with internal trading and exposure limits. In this regard, trading limits should be related to the bank's risk measurement model in a manner that is consistent over time and that is well-understood by both traders and senior management.

(g) A routine and rigorous programme of stress testing[6] should be in place as a supplement to the risk analysis based on the day-to-day output of the bank's risk measurement model. The results of stress testing should be reviewed periodically by senior management, used in the internal assessment of capital adequacy, and reflected in the policies and limits set by management and the board of directors. Where stress tests reveal particular vulnerability to a given set of circumstances, prompt steps should be taken to manage those risks

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4 [159] Further guidance regarding the standards that supervisory authorities will expect can be found in paragraph 718(xcix).

5 [160] The report, *Risk management guidelines for derivatives*, issued by the Basel Committee in July 1994 further discusses the responsibilities of the board of directors and senior management.

6 [161] Though banks will have some discretion as to how they conduct stress tests, their supervisory authorities will wish to see that they follow the general lines set out in paragraphs 718(Lxxvii) to 718(Lxxxiiii).

appropriately (e.g. by hedging against that outcome or reducing the size of the bank's exposures, or increasing capital).

(h) Banks should have a routine in place for ensuring compliance with a documented set of internal policies, controls and procedures concerning the operation of the risk measurement system. The bank's risk measurement system must be well documented, for example, through a risk management manual that describes the basic principles of the risk management system and that provides an explanation of the empirical techniques used to measure market risk.

(i) An independent review of the risk measurement system should be carried out regularly in the bank's own internal auditing process. This review should include both the activities of the business trading units and of the independent risk control unit. A review of the overall risk management process should take place at regular intervals (ideally not less than once a year) and should specifically address, at a minimum:

- The adequacy of the documentation of the risk management system and process;
- The organisation of the risk control unit;
- The integration of market risk measures into daily risk management;
- The approval process for risk pricing models and valuation systems used by front and back-office personnel;
- The validation of any significant change in the risk measurement process;
- The scope of market risks captured by the risk measurement model;
- The integrity of the management information system;
- The accuracy and completeness of position data;
- The verification of the consistency, timeliness and reliability of data sources used to run internal models, including the independence of such data sources;
- The accuracy and appropriateness of volatility and correlation assumptions;
- The accuracy of valuation and risk transformation calculations;
- The verification of the model's accuracy through frequent back-testing as described in 718(lxxiv) (b) above and in the accompanying document: *Supervisory framework for the use of backtesting in conjunction with the internal models approach to market risk capital requirements*.

3. Specification of market risk factors

718(lxxv). An important part of a bank's internal market risk measurement system is the specification of an appropriate set of market risk factors, i.e. the market rates and prices that affect the value of the bank's trading positions. The risk factors contained in a market risk measurement system should be sufficient to capture the risks inherent in the bank's portfolio of on- and off-balance sheet trading positions. Although banks will have some discretion in specifying the risk factors for their internal models, the following guidelines should be fulfilled.

(a) Factors that are deemed relevant for pricing should be included as risk factors in the value-at-risk model. Where a risk factor is incorporated in a pricing model but not in the value-at-risk model, the bank must justify this omission to the satisfaction of its supervisor. In addition, the value-at-risk model must capture nonlinearities beyond those inherent in options (e.g. mortgage-backed securities, tranched exposures or n-th loss positions), as well as correlation risk and basis risk (e.g. between credit default swaps and bonds). Moreover, the supervisor has to be satisfied that proxies are used which show a good track record for the actual position held (i.e. an equity index for a position in an individual stock).

(b) For interest rates, there must be a set of risk factors corresponding to interest rates in each currency in which the bank has interest-rate-sensitive on- or off-balance sheet positions.

- The risk measurement system should model the yield curve using one of a number of generally accepted approaches, for example, by estimating forward rates of zero coupon yields. The yield curve should be divided into various maturity segments in order to capture variation in the volatility of rates along the yield curve; there will typically be one risk factor corresponding to each maturity segment. For material exposures to interest rate movements in the major currencies and markets, banks must model the yield curve using a minimum of six risk factors. However, the number of risk factors used should ultimately be driven by the nature of the bank's trading strategies. For instance, a bank with a portfolio of various types of securities across many points of the yield curve and that engages in complex arbitrage strategies would require a greater number of risk factors to capture interest rate risk accurately.

- The risk measurement system must incorporate separate risk factors to capture spread risk (e.g. between bonds and swaps). A variety of approaches may be used to capture the spread risk arising from less than perfectly correlated movements between government and other fixed income interest rates, such as specifying a completely separate yield curve for non-government fixed-income instruments (for instance, swaps or municipal securities) or estimating the spread over government rates at various points along the yield curve.

(c) For exchange rates (which may include gold), the risk measurement system should incorporate risk factors corresponding to the individual foreign currencies in which the bank's positions are denominated. Since the value-at-risk figure calculated by the risk measurement system will be expressed in the bank's domestic currency, any net position denominated in a foreign currency will introduce a foreign exchange risk. Thus, there must be risk factors corresponding to the exchange rate between the domestic currency and each foreign currency in which the bank has a significant exposure.

(d) For equity prices, there should be risk factors corresponding to each of the equity markets in which the bank holds significant positions:

- At a minimum, there should be a risk factor that is designed to capture market-wide movements in equity prices (e.g. a market

index). Positions in individual securities or in sector indices could be expressed in "beta-equivalents"[7] relative to this market-wide index;

- A somewhat more detailed approach would be to have risk factors corresponding to various sectors of the overall equity market (for instance, industry sectors or cyclical and non-cyclical sectors). As above, positions in individual stocks within each sector could be expressed in beta-equivalents[49] relative to the sector index;
- The most extensive approach would be to have risk factors corresponding to the volatility of individual equity issues.
- The sophistication and nature of the modelling technique for a given market should correspond to the bank's exposure to the overall market as well as its concentration in individual equity issues in that market.

(e) For commodity prices, there should be risk factors corresponding to each of the commodity markets in which the bank holds significant positions (also see paragraph 718(xlvii) above):

- For banks with relatively limited positions in commodity-based instruments, a straightforward specification of risk factors would be acceptable. Such a specification would likely entail one risk factor for each commodity price to which the bank is exposed. In cases where the aggregate positions are quite small, it might be acceptable to use a single risk factor for a relatively broad sub-category of commodities (for instance, a single risk factor for all types of oil);
- For more active trading, the model must also take account of variation in the "convenience yield"[8] between derivatives positions such as forwards and swaps and cash positions in the commodity.

4. Quantitative standards

718(lxxvi). Banks will have flexibility in devising the precise nature of their models, but the following minimum standards will apply for the purpose of calculating their capital charge. Individual banks or their supervisory authorities will have discretion to apply stricter standards.

(a) "Value-at-risk" must be computed on a daily basis.

(b) In calculating the value-at-risk, a 99th percentile, one-tailed confidence interval is to be used.

(c) In calculating value-at-risk, an instantaneous price shock equivalent to a 10 day movement in prices is to be used, i.e. the minimum "holding period" will be ten trading days. Banks may use value-at-risk numbers calculated according to shorter holding periods scaled up to ten days by, for example, the square

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[7] [162] A "beta-equivalent" position would be calculated from a market model of equity price returns (such as the CAPM model) by regressing the return on the individual stock or sector index on the risk-free rate of return and the return on the market index.

[8] [163] The convenience yield reflects the benefits from direct ownership of the physical commodity (for example, the ability to profit from temporary market shortages), and is affected both by market conditions and by factors such as physical storage costs.

root of time (for the treatment of options, also see 718(Lxxvi) (h) below). A bank using this approach must periodically justify the reasonableness of its approach to the satisfaction of its supervisor.

(d) The choice of historical observation period (sample period) for calculating value-at-risk will be constrained to a minimum length of one year. For banks that use a weighting scheme or other methods for the historical observation period, the "effective" observation period must be at least one year (that is, the weighted average time lag of the individual observations cannot be less than 6 months).[9]

(e) Banks ~~should~~ must update their data sets no less frequently than once every ~~three~~ month~~s~~ and reassess them whenever market prices are subject to material changes. Banks must have processes in place to update their data sets more frequently. The supervisory authority may also require a bank to calculate its value-at-risk using a shorter observation period if, in the supervisor's judgement, this is justified by a significant upsurge in price volatility.

(f) No particular type of model is prescribed. So long as each model used captures all the material risks run by the bank, as set out in paragraph 718(Lxxv), banks will be free to use models based, for example, on variance-covariance matrices, historical simulations, or Monte Carlo simulations.

(g) Banks will have discretion to recognise empirical correlations within broad risk categories (e.g. interest rates, exchange rates, equity prices and commodity prices, including related options volatilities in each risk factor category). The supervisory authority may also recognise empirical correlations across broad risk factor categories, provided that the supervisory authority is satisfied that the bank's system for measuring correlations is sound and implemented with integrity.

(h) Banks' models must accurately capture the unique risks associated with options within each of the broad risk categories. The following criteria apply to the measurement of options risk:

- Banks' models must capture the *non-linear price characteristics* of options positions;
- Banks are expected to ultimately move towards the application of a full 10 day price shock to options positions or positions that display option-like characteristics. In the interim, national authorities may require banks to adjust their capital measure for options risk through other methods, e.g. periodic simulations or stress testing;
- Each bank's risk measurement system must have a set of risk factors that captures the *volatilities of the rates and prices* underlying option positions, i.e. vega risk. Banks with relatively large and/or complex options portfolios should have detailed specifications of the relevant volatilities. This means that banks should measure the volatilities of options positions broken down by different maturities.
- Each bank must meet, on a daily basis, a capital requirement expressed as the higher of (i) its previous day's value-at-risk number

[9] A bank may calculate the value-at-risk estimate using a weighting scheme that is not fully consistent with (d) as long as that method results in a capital charge at least as conservative as that calculated according to (d).

measured according to the parameters specified in this section and (ii) an average of the daily value-at-risk measures on each of the preceding sixty business days, multiplied by a multiplication factor.

(i) The multiplication factor will be set by individual supervisory authorities on the basis of their assessment of the quality of the bank's risk management system, subject to an absolute minimum of 3. Banks will be required to add to this factor a "plus" directly related to the ex-post performance of the model, thereby introducing a built-in positive incentive to maintain the predictive quality of the model. The plus will range from 0 to 1 based on the outcome of so-called "backtesting." If the backtesting results are satisfactory and the bank meets all of the qualitative standards set out in paragraph 718(Lxxiv) above, the plus factor could be zero. The Annex 10a of this Framework presents in detail the approach to be applied for backtesting and the plus factor. Supervisors will have national discretion to require banks to perform backtesting on either hypothetical (i.e. using changes in portfolio value that would occur were end-of-day positions to remain unchanged), or actual trading (i.e. excluding fees, commissions, and net interest income) outcomes, or both.

(j) Banks using models will also be subject to a capital charge to cover specific risk (as defined under the standardised approach for market risk) of interest rate related instruments and equity securities. The manner in which the specific risk capital charge is to be calculated is set out in paragraphs 718(Lxxxvii) to 718(xcviii).

5. Stress testing

718(Lxxvii). Banks that use the internal models approach for meeting market risk capital requirements must have in place a rigorous and comprehensive stress testing program. Stress testing to identify events or influences that could greatly impact banks is a key component of a bank's assessment of its capital position.

718(Lxxviii). Banks' stress scenarios need to cover a range of factors that can create extraordinary losses or gains in trading portfolios, or make the control of risk in those portfolios very difficult. These factors include low-probability events in all major types of risks, including the various components of market, credit, and operational risks. Stress scenarios need to shed light on the impact of such events on positions that display both linear and nonlinear price characteristics (i.e. options and instruments that have options-like characteristics).

718(Lxxix). Banks' stress tests should be both of a quantitative and qualitative nature, incorporating both market risk and liquidity aspects of market disturbances. Quantitative criteria should identify plausible stress scenarios to which banks could be exposed. Qualitative criteria should emphasise that two major goals of stress testing are to evaluate the capacity of the bank's capital to absorb potential large losses and to identify steps the bank can take to reduce its risk and conserve capital. This assessment is integral to setting and evaluating the bank's management strategy and the results of stress testing should be routinely communicated to senior management and, periodically, to the bank's board of directors.

718(Lxxx). Banks should combine the use of supervisory stress scenarios with stress tests developed by banks themselves to reflect their specific risk characteristics. Specifically, supervisory authorities may ask banks to provide

information on stress testing in three broad areas, which are discussed in turn below.

(i) Supervisory scenarios requiring no simulations by the bank

718(lxxxi). Banks should have information on the largest losses experienced during the reporting period available for supervisory review. This loss information could be compared to the level of capital that results from a bank's internal measurement system. For example, it could provide supervisory authorities with a picture of how many days of peak day losses would have been covered by a given value-at-risk estimate.

(ii) Scenarios requiring a simulation by the bank

718(lxxxii). Banks should subject their portfolios to a series of simulated stress scenarios and provide supervisory authorities with the results. These scenarios could include testing the current portfolio against past periods of significant disturbance, for example, the 1987 equity crash, the Exchange Rate Mechanism ~~(ERM)~~ crises of 1992 and 1993 ~~or~~, the fall in bond markets in the first quarter of 1994, the 1998 Russian financial crisis, the 2000 bursting of the technology stock bubble or the 2007/2008 sub-prime turbulence, incorporating both the large price movements and the sharp reduction in liquidity associated with these events. A second type of scenario would evaluate the sensitivity of the bank's market risk exposure to changes in the assumptions about volatilities and correlations. Applying this test would require an evaluation of the historical range of variation for volatilities and correlations and evaluation of the bank's current positions against the extreme values of the historical range. Due consideration should be given to the sharp variation that at times has occurred in a matter of days in periods of significant market disturbance. ~~The 1987 equity crash, the suspension of the ERM, or the fall in bond markets in the first quarter of 1994, for~~ For example, the above-mentioned situations involved correlations within risk factors approaching the extreme values of 1 or -1 for several days at the height of the disturbance.

(iii) Scenarios developed by the bank itself to capture the specific characteristics of its portfolio.

718(lxxxiii). In addition to the scenarios prescribed by supervisory authorities under paragraphs 718(lxxxi) and 718(lxxxii) above, a bank should also develop its own stress tests which it identifies as most adverse based on the characteristics of its portfolio (e.g. problems in a key region of the world combined with a sharp move in oil prices). Banks should provide supervisory authorities with a description of the methodology used to identify and carry out the scenarios as well as with a description of the results derived from these scenarios.

718(lxxxiv). The results should be reviewed periodically by senior management and should be reflected in the policies and limits set by management and the board of directors. Moreover, if the testing reveals particular vulnerability to a given set of circumstances, the national authorities would expect the bank to take prompt steps to manage those risks appropriately (e.g. by hedging against that outcome or reducing the size of its exposures).

6. External validation

718(lxxxv). The validation of models' accuracy by external auditors and/or supervisory authorities should at a minimum include the following steps:

(a) Verifying that the *internal validation processes* described in paragraph 718(lxxiv) (i) are operating in a satisfactory manner;

(b) Ensuring that the *formulae* used in the calculation process as well as for the pricing of options and other complex instruments are validated by a qualified unit, which in all cases should be independent from the trading area;

(c) Checking that the *structure* of internal models is adequate with respect to the bank's activities and geographical coverage;

(d) Checking the results of the banks' *back-testing* of its internal measurement system (i.e. comparing value-at-risk estimates with actual profits and losses) to ensure that the model provides a reliable measure of potential losses over time. This means that banks should make the results as well as the underlying inputs to their value-at-risk calculations available to their supervisory authorities and/or external auditors on request;

(e) Making sure that data flows and processes associated with the risk measurement system are *transparent and accessible*. In particular, it is necessary that auditors or supervisory authorities are in a position to have easy access, whenever they judge it necessary and under appropriate procedures, to the models' specifications and parameters.

7. Combination of internal models and the standardised methodology

718(lxxxvi). Unless a bank's exposure to a particular risk factor, such as commodity prices, is insignificant, the internal models approach will in principle require banks to have an integrated risk measurement system that captures the broad risk factor categories (i.e. interest rates, exchange rates (which may include gold), equity prices and commodity prices, with related options volatilities being included in each risk factor category). Thus, banks which start to use models for one or more risk factor categories will, over time, be expected to extend the models to all their market risks. A bank which has developed one or more models will no longer be able to revert to measuring the risk measured by those models according to the standardised methodology (unless the supervisory authority withdraws approval for that model). However, pending further experience regarding the process of changing to a models-based approach, no specific time limit will be set for banks which use a combination of internal models and the standardised methodology to move to a comprehensive model. The following conditions will apply to banks using such combinations:

(a) Each broad risk factor category must be assessed using a single approach (either internal models or the standardised approach), i.e. no combination of the two methods will in principle be permitted within a risk category or across banks' different entities for the same type of risk (but see paragraph 708(i) above);[10]

(b) All the criteria laid down in paragraphs 718(lxx) to 718(xcix) of this Framework will apply to the models being used;

[10] [164] However, banks may incur risks in positions which are not captured by their models, for example, in remote locations, in minor currencies or in negligible business areas. Such risks should be measured according to the standardised methodology.

(c) Banks may not modify the combination of the two approaches they use without justifying to their supervisory authority that they have a good reason for doing so;

(d) No element of market risk may escape measurement, i.e. the exposure for all the various risk factors, whether calculated according to the standardised approach or internal models, would have to be captured;

(e) The capital charges assessed under the standardised approach and under the models approach are to be aggregated according to the simple sum method.

8. Treatment of specific risk

718(lxxxvii). Where a bank has a VaR measure that incorporates specific risk and that meets all the qualitative and quantitative requirements for general risk models, it may base its charge on modelled estimates, provided the measure is based on models that meet the additional criteria and requirements set out below. Banks which are unable to meet these additional criteria and requirements will be required to base their specific risk capital charge on the full amount of the specific risk charge calculated under the standardised method.

718(lxxxviii). The criteria for supervisory recognition of banks' modelling of specific risk require that a bank's model must capture all material components of price risk[11] and be responsive to changes in market conditions and compositions of portfolios. In particular, the model must:

- explain the historical price variation in the portfolio;[12]
- capture concentrations (magnitude and changes in composition);[13]
- be robust to an adverse environment;[14]
- capture name-related basis risk;[15]

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[11] Banks need not capture event risk, which is required to be captured in the incremental risk charge referred to in paragraphs 718(xciii) and 718(xciv).

[12] [165] The key ex ante measures of model quality are "goodness-of-fit" measures which address the question of how much of the historical variation in price value is explained by the risk factors included within the model. One measure of this type which can often be used is an R-squared measure from regression methodology. If this measure is to be used, the risk factors included in the bank's model would be expected to be able to explain a high percentage, such as 90%, of the historical price variation or the model should explicitly include estimates of the residual variability not captured in the factors included in this regression. For some types of models, it may not be feasible to calculate a goodness-of-fit measure. In such instance, a bank is expected to work with its national supervisor to define an acceptable alternative measure which would meet this regulatory objective.

[13] [166] The bank would be expected to demonstrate that the model is sensitive to changes in portfolio construction and that higher capital charges are attracted for portfolios that have increasing concentrations in particular names or sectors.

[14] [167] The bank should be able to demonstrate that the model will signal rising risk in an adverse environment. This could be achieved by incorporating in the historical estimation period of the model at least one full credit cycle and ensuring that the model would not have been inaccurate in the downward portion of the cycle. Another approach for demonstrating this is through simulation of historical or plausible worst-case environments.

[15] [168] Banks should be able to demonstrate that the model is sensitive to material idiosyncratic differences between similar but not identical positions, for example debt positions with different levels of subordination, maturity mismatches, or credit derivatives with different default events.

- ~~capture event risk;~~[16]
- be validated through backtesting.[17]

718(Lxxxix). (deleted) ~~Where a bank is subject to event risk that is not reflected in its VaR measure, because it is beyond the 10-day holding period and 99 percent confidence interval (i.e. low probability and high severity events), banks must ensure that the impact of such events is factored in to its internal capital assessment, for example through its stress testing.~~

718(xc). The bank's model must conservatively assess the risk arising from less liquid positions and/or positions with limited price transparency under realistic market scenarios. In addition, the model must meet minimum data standards. Proxies may be used only where available data is insufficient or is not reflective of the true volatility of a position or portfolio, and only where they are appropriately conservative.

718(xci). Further, as techniques and best practices evolve, banks should avail themselves of these advances.

718(xci-1-). Banks which apply modelled estimates of specific risk are required to conduct backtesting aimed at assessing whether specific risk is being accurately captured. The methodology a bank should use for validating its specific risk estimates is to perform separate backtests on sub-portfolios using daily data on sub-portfolios subject to specific risk. The key sub-portfolios for this purpose are traded-debt and equity positions. However, if a bank itself decomposes its trading portfolio into finer categories (e.g. emerging markets, traded corporate debt, etc.), it is appropriate to keep these distinctions for sub-portfolio backtesting purposes. Banks are required to commit to a sub-portfolio structure and stick to it unless it can be demonstrated to the supervisor that it would make sense to change the structure.

718(xci-2-). Banks are required to have in place a process to analyse exceptions identified through the backtesting of specific risk. This process is intended to serve as the fundamental way in which banks correct their models of specific risk in the event they become inaccurate. There will be a presumption that models that incorporate specific risk are "unacceptable" if the results at the sub-portfolio level produce a number of exceptions commensurate with the *Red Zone* as defined in Annex 10a of this Framework. Banks with "unacceptable" specific risk models are expected to take immediate action to correct the problem in the model and to ensure that there is a sufficient capital buffer to absorb the risk that the backtest showed had not been adequately captured.

718(xcii). In addition, the bank must have an approach in place to capture in its regulatory capital ~~default~~ risks ~~of~~in its trading book ~~positions~~ that ~~is~~are incremental to the risks captured by the VaR-based calculation as specified in paragraph 718(Lxxxviii) above. ~~To avoid double counting a bank may, when calculating its incremental default charge, take into account the extent to which default risk has already been incorporated into the VaR calculation, especially for risk positions that~~

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16 ~~[169] For debt positions, this should include migration risk. For equity positions, events that are reflected in large changes or jumps in prices must be captured, e.g. merger break-ups/takeovers. In particular, firms must consider issues related to survivorship bias.~~

17 [170] Aimed at assessing whether specific risk, as well as general market risk, is being captured adequately.

~~could and would be closed within 10 days in the event of adverse market conditions or other indications of deterioration in the credit environment.~~ No specific approach for capturing the incremental ~~default~~ risks is prescribed~~; it may be part of the bank's internal model or a surcharge from a separate calculation. Where a bank captures its incremental risk through a surcharge, the surcharge will not be subject to a multiplier or regulatory backtesting, although the bank should be able to demonstrate that the surcharge meets its aim~~. The Committee will issue guidelines to specify the positions and risks to be covered by this incremental risk capital charge.

718(xciii). ~~Whichever approach is used, t~~The bank must demonstrate that ~~it~~ the approach used to capture incremental risks meets a soundness standard comparable to that of the internal-ratings based approach for credit risk as set forth in this Framework (i.e., a 99.9% confidence interval over a one-year capital horizon), under the assumption of a constant level of risk, and adjusted where appropriate to reflect the impact of liquidity, concentrations, hedging, and optionality. A bank that does not capture the incremental ~~default~~ risks through an internally developed approach must use the specific risk capital charges under the standardised measurement method as set out in paragraphs 710 to 718 and 718(xxi) ~~the fallback of calculating the surcharge through an approach consistent with that for credit risk as set forth in this Framework~~.

718(xciv). ~~Whichever~~ Under any approach ~~is~~ used, cash or synthetic exposures that would be subject to a deduction treatment under the securitisation framework set forth in this Framework (e.g. equity tranches that absorb first losses),[18] as well as securitisation exposures that are unrated liquidity lines or letters of credit, would be subject to a capital charge that is no less than that set forth in the securitisation framework.

718(xcv). An exception to this treatment could be afforded to banks that are dealers in the above exposures where they can demonstrate, in addition to trading intent, that a liquid two-way market exists for the securitisation exposures or, in the case of synthetic securitisations that rely solely on credit derivatives, for the securitisation exposures themselves or all their constituent risk components. For purposes of this section, a two-way market is deemed to exist where there are independent bona fide offers to buy and sell so that a price reasonably related to the last sales price or current bona fide competitive bid and offer quotations can be determined within one day and settled at such price within a relatively short time conforming to trade custom. In addition, for a bank to apply this exception, it must have sufficient market data to ensure that it fully captures the concentrated ~~default~~ risk of these exposures in its internal approach for measuring the incremental ~~default~~ risks in accordance with the standards set forth above.

718(xcvi). (deleted) ~~Banks that already have received specific risk model recognition for particular portfolios or lines of business should agree a timetable with their supervisors to bring their model in line with the new standards in a timely manner as is practicable.~~

[18] [171] These include risk equivalent positions, e.g. inventories of credit exposures that the bank intends to sell through cash securitisations and for which it has in place tranched credit protections so that it retains an exposure that would be subject to deduction under the securitisation framework.

718(xcvii). (moved to paragraph 718(xci-1-))

718(xcviii). (moved to paragraph 718(xci-2-))

9. Model validation standards

718(xcix). It is important that banks have processes in place to ensure that their internal models have been adequately validated by suitably qualified parties independent of the development process to ensure that they are conceptually sound and adequately capture all material risks. This validation should be conducted when the model is initially developed and when any significant changes are made to the model. The validation should also be conducted on a periodic basis but especially where there have been any significant structural changes in the market or changes to the composition of the portfolio which might lead to the model no longer being adequate. More extensive model validation is particularly important where specific risk is also modelled and is required to meet the further specific risk criteria. As techniques and best practices evolve, banks should avail themselves of these advances. Model validation should not be limited to backtesting, but should, at a minimum, also include the following:

(a) Tests to demonstrate that any assumptions made within the internal model are appropriate and do not underestimate risk. This may include the assumption of the normal distribution, the use of the square root of time to scale from a one day holding period to a 10 day holding period or where extrapolation or interpolation techniques are used, or pricing models;

(b) Further to the regulatory backtesting programmes, testing for model validation ~~should~~ must use ~~additional tests, which may include for instance: Testing carried out using~~ hypothetical changes in portfolio value that would occur were end-of-day positions to remain unchanged. It therefore excludes fees, commissions, bid-ask spreads, net interest income and intra-day trading. Moreover, additional tests are required which may include, for instance:

- Testing carried out for longer periods than required for the regular backtesting programme (e.g. 3 years). The longer time period generally improves the power of the backtesting. A longer time period may not be desirable if the VaR model or market conditions have changed to the extent that historical data is no longer relevant;
- Testing carried out using confidence intervals other than the 99 percent interval required under the quantitative standards;
- Testing of portfolios below the overall bank level;

(c) The use of hypothetical portfolios to ensure that the model is able to account for particular structural features that may arise, for example:

- Where data histories for a particular instrument do not meet the quantitative standards in paragraph 718(lxxvi) and where the bank has to map these positions to proxies, then the bank must ensure that the proxies produce conservative results under relevant market scenarios;
- Ensuring that material basis risks are adequately captured. This may include mismatches between long and short positions by maturity or by issuer;

Ensuring that the model captures concentration risk that may arise in an undiversified portfolio.

III. Treatment for illiquid positions

12. Section VI.A.2 of the Basel II Framework outlining the prudent valuation guidance will be changed as follows. Changed wording is underlined.

2. Prudent valuation guidance

690. This section provides banks with guidance on prudent valuation for positions in the trading book. This guidance is especially important for positions without actual market prices or observable inputs to valuation, as well as less liquid positions which, although they will not be excluded from the trading book solely on grounds of lesser liquidity, raise supervisory concerns about prudent valuation.

691. A framework for prudent valuation practices should at a minimum include the following:

(i) Systems and controls

692. Banks must establish and maintain adequate systems and controls sufficient to give management and supervisors the confidence that their valuation estimates are prudent and reliable. These systems must be integrated with other risk management systems within the organisation (such as credit analysis). Such systems must include:

- Documented policies and procedures for the process of valuation. This includes clearly defined responsibilities of the various areas involved in the determination of the valuation, sources of market information and review of their appropriateness, guidelines for the use of unobservable inputs reflecting the bank's assumptions of what market participants would use in pricing the position, frequency of independent valuation, timing of closing prices, procedures for adjusting valuations, end of the month and ad-hoc verification procedures; and

- Clear and independent (ie independent of front office) reporting lines for the department accountable for the valuation process. The reporting line should ultimately be to a main board executive director.

(ii) Valuation methodologies

Marking to market

693. Marking-to-market is at least the daily valuation of positions at readily available close out prices in orderly transactions that are sourced independently. Examples of readily available close out prices include exchange prices, screen prices, or quotes from several independent reputable brokers.

694. Banks must mark-to-market as much as possible. The more prudent side of bid/offer must be used unless the institution is a significant market maker in a particular position type and it can close out at mid-market. Actual market prices or observable inputs should be considered even when the market is less liquid than historical market volumes, unless those prices are the result of a forced liquidation or distress sale.

Marking to model

695. ~~Where~~ Only where marking-to-market is not possible~~,~~ may banks ~~may~~ mark-to-model, but ~~where~~ this ~~can~~ must be demonstrated to be prudent. Marking-to-model is defined as any valuation which has to be benchmarked, extrapolated or otherwise calculated from a market input. When marking to model, an extra degree of conservatism is appropriate. Supervisory authorities will consider the following in assessing whether a mark-to-model valuation is prudent:

- Senior management should be aware of the elements of the trading book which are subject to mark to model and should understand the materiality of the uncertainty this creates in the reporting of the risk/performance of the business.

- Market inputs should be sourced, to the extent possible, in line with market prices (as discussed above). The appropriateness of the market inputs for the particular position being valued should be reviewed regularly.

- Where available, generally accepted valuation methodologies for particular products should be used as far as possible.

- Where the model is developed by the institution itself, it should be based on appropriate assumptions, which have been assessed and challenged by suitably qualified parties independent of the development process. The model should be developed or approved independently of the front office. It should be independently tested. This includes validating the mathematics, the assumptions and the software implementation.

- There should be formal change control procedures in place and a secure copy of the model should be held and periodically used to check valuations.

- Risk management should be aware of the weaknesses of the models used and how best to reflect those in the valuation output.

- The model should be subject to periodic review to determine the accuracy of its performance (eg assessing continued appropriateness of the assumptions, analysis of P&L versus risk factors, comparison of actual close out values to model outputs).

- Valuation adjustments should be made as appropriate, for example, to cover the uncertainty of the model valuation (see also valuation adjustments in paragraphs 698 to 701).

Independent price verification

696. Independent price verification is distinct from daily mark-to-market. It is the process by which market prices or model inputs are regularly verified for accuracy.

While daily marking-to-market may be performed by dealers, verification of market prices or model inputs should be performed by a unit independent of the dealing room, at least monthly (or, depending on the nature of the market/trading activity, more frequently). It need not be performed as frequently as daily mark-to-market, since the objective, ie independent, marking of positions should reveal any error or bias in pricing, which should result in the elimination of inaccurate daily marks.

697. Independent price verification entails a higher standard of accuracy in that the market prices or model inputs are used to determine profit and loss figures, whereas daily marks are used primarily for management reporting in between reporting dates. For independent price verification, where pricing sources are more subjective, eg only one available broker quote, prudent measures such as valuation adjustments may be appropriate.

(iii) Valuation adjustments ~~or reserves~~

698. ~~Banks~~ As part of their procedures for marking to market, banks must establish and maintain procedures for considering valuation adjustments~~/reserves~~. Supervisory authorities expect banks using third-party valuations to consider whether valuation adjustments are necessary. Such considerations are also necessary when marking to model.

699. Supervisory authorities expect the following valuation adjustments/reserves to be formally considered at a minimum: unearned credit spreads, close-out costs, operational risks, early termination, investing and funding costs, and future administrative costs and, where appropriate, model risk.

2a. Adjustment to the current valuation of less liquid positions

699(i). Banks must establish and maintain procedures for calculating an adjustment to the current valuation of less liquid positions. This adjustment would be in addition to any changes to the value of the position for financial reporting and should be designed to reflect the illiquidity of the position. Supervisory authorities expect banks to consider the need for an adjustment to a position's valuation to reflect current illiquidity whether the position is marked to market using market prices or observable inputs, third-party valuations or marked to model.

700. Bearing in mind that the ~~underlying 10-day~~ assumptions made about liquidity in the market risk capital charge ~~in paragraph 718(lxxvi) (c)~~ may not be consistent with the bank's ability to sell or hedge out less liquid positions ~~under normal market conditions~~, where appropriate, banks must ~~make downward valuation adjustments/reserves~~ take an adjustment to the current valuation of these ~~less liquid~~ positions, and ~~to~~ review their continued appropriateness on an on-going basis. Reduced liquidity ~~could~~ may have arisen from market events. Additionally, close-out prices for concentrated positions and/or stale positions should be considered in establishing ~~those valuation adjustments/reserves~~ the adjustment. Banks must consider all relevant factors when determining the appropriateness of ~~valuation adjustments/reserves~~ the adjustment for less liquid positions. These factors may include, but are not limited to, the amount of time it would take to hedge out the position/risks within the position, the average volatility of bid/offer spreads, the availability of independent market quotes (number and identity of market makers), the average and volatility of trading volumes (including trading volumes during

periods of market stress), market concentrations, the aging of positions, the extent to which valuation relies on marking-to-model, and the impact of other model risks not included in paragraph 699.

701. ~~Valuation adjustments/reserves~~ The adjustment to the current valuation of less liquid positions made under paragraph 700 must impact Tier 1 regulatory capital and will ~~may exceed those~~ be in addition to valuation adjustments made under financial reporting ~~accounting~~ standards and paragraphs 698 and 699.