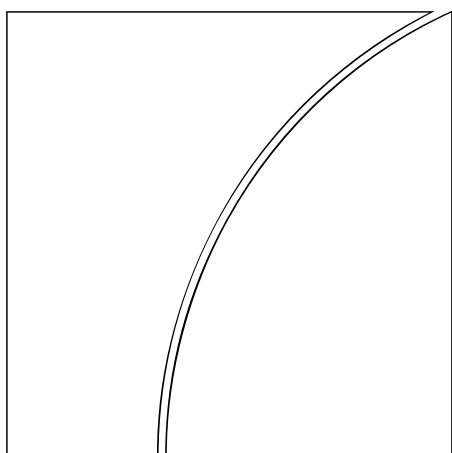Basel Committee
on Banking Supervision

Working Paper on Risk
Sensitive Approaches for
Equity Exposures in the
Banking Book for IRB
Banks

August 2001

BANK FOR INTERNATIONAL SETTLEMENTS

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Risk Sensitive Approaches for Equity Exposures in the Banking Book for IRB Banks

The purpose of this paper prepared by the Models Task Force of the Basel Committee is to further the Committee's dialogue with the industry on the IRB treatment of equity exposures in the banking book. Comments on the issues outlined in this paper would be welcome, and should be submitted to relevant national supervisory authorities and central banks and may also be sent to the Secretariat of the Basel Committee on Banking Supervision at the Bank for International Settlements, CH-4002 Basel, Switzerland. Comments may be submitted via e-mail: BCBS.capital@bis.org[1] or by fax: + 41 61 280 9100. Comments on working papers will not be posted on the BIS website.

Introduction

Chapter 6 of the Supporting Document on the Internal Ratings Based approach attached to the January 2001 consultative paper set out key issues in developing capital approaches to equity exposures for banks implementing the IRB approach to credit risk ("IRB banks"). In particular, the supporting document invited feedback on ways of implementing market-based and PD/LGD approaches to equity exposures. It also requested comments on the appropriateness, applicability, and feasibility of applying the two broad approaches to different types of equity holdings. Furthermore, the Committee invited comments on other possible approaches to the treatment of equity holdings in the banking book.

The consultative period ended on 31 May. Only a limited number of written comments addressed the approaches to equity exposures for IRB banks. However, the Models Task Force of the Basel Committee has undertaken further work and engaged in dialogue with a number of individual institutions and trade associations. This working paper summarises the results of this further work and consultative dialogue, and describes the proposed treatment currently under consideration. National supervisors will use this document as a basis for further discussions with the industry in the development of appropriate methodologies.

This working paper is structured as follows:

Scope - definitions of equity positions to be covered and exclusions.

Management practices, exposure measures, and capital calculations.

Market-based approaches.

PD/LGD approach.

Implications of the PD/LGD approach for regulatory capital.

Pillar Two and Pillar Three

Further Work

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[1] Please use this e-mail address only for submitting comments and not for correspondence.

Annex 1.   Sound risk management practices for banking book equity investment activities.

Annex 2.   Standards for implementing the internal models market-based approach.

Annex 3.   Background empirical work underlying the proposed risk weights for the simple market-based approach.

Annex 4.   Standards for implementing the PD/LGD approach.

Scope - definitions of equity positions to be covered and potential exclusions

An institution using an IRB approach for a credit portfolio (for example, corporates) is required to use one of the approaches identified in this document for its equity investments subject to the limits and qualifications identified herein. For exposition purposes, the proposed approaches are collectively termed "IRB bank" approaches and are designed to be more risk-sensitive than the current standardised approach to equity holdings.

The capital approaches advanced in this document apply only to certain equity interests held in the banking book (equity investments) of internationally active banking organisations, and do not apply to those held in trading accounts.[2] In addition, paragraph 16 of Section E of the Scope of Application of the New Basel Accord states that:

> "Significant minority and majority investments in commercial entities which exceed certain materiality levels will be deducted from banks' capital. Materiality levels will be determined by national accounting and/or regulatory practices. Materiality levels of 15% of the bank's capital for individual significant investments in commercial entities and 60% of the bank's capital for the aggregate of such investments, or stricter levels, will be applied."

Accordingly, the proposed approaches for assessing capital against equity investments apply to all equity holdings in commercial entities below these limits at institutions employing any IRB approach to credit portfolios, subject to the exclusions and materiality considerations discussed below.

Definition of equity holdings

For the purposes of assessing capital requirements, equity holdings are defined on the basis of the economic intent of the holding or transaction and include the following.

(a)   *Direct Holdings* - Holdings in securities, warrants, partnership interests, trust certificates and other instruments (including derivatives instruments and obligations on repo) that are, are convertible into, or have their principal values directly related to the value of, ownership interests in a commercial endeavour, whether voting or non-voting, that convey a residual interest in the assets and income of the enterprise. The appropriate treatment of convertibles is under consideration.

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[2]   Trading account assets are subject to the market risk capital rule.

(b)   *Indirect Holdings and Fund Investments* - Holdings in a corporation, partnership, limited liability company or other type of enterprise (including any form of special purpose vehicle) that issues ownership interests and is engaged in the business of investing in the instruments defined above.

(c)   *Residual Interests* – Holdings in residual ownership interests of commercial enterprises that allow the enterprise to waive or defer interest or other contractual remuneration to the holder such as perpetual preferred shares (the appropriate treatment of non-perpetual preferred shares is under consideration).

(d)   Any security (other than convertible bonds) that ranks pari passu in liquidation with any element included in (a), (b) or (c) above.

(e)   Debt obligations (such as reverse repo and other transactions) where the economic substance is essentially an extension of credit using equity interests as collateral are not defined as equity holdings. Similarly, debt obligations where the principal amount is fixed and the amount of this principal due at maturity or any call date is not related to the value of ownership interests as defined above are also not considered equity holdings.

(f)   Debt obligations and other securities, partnerships or other vehicles structured with the intent of conveying the economic intent of equity ownership would be considered an equity holding.[3] Conversely, equity investments which are structured with the intent of conveying the economic intent of debt holdings would not be considered an equity holding.

(g)   Although they do not constitute an investment in a commercial entity, investments in financial institutions, are treated as falling within these definitions and would be subject to the proposed capital treatments except where these are consolidated or deducted pursuant to the Scope of Application of the New Accord. For example, the Scope of Application calls for certain significant minority investments and majority investments to be deducted. As a result, non-consolidated interests in financial institutions would be subject to the proposed capital treatment [4]

Exclusions from the use of "IRB bank" approaches to equity investments

Based on national discretion, supervisors may exclude certain holdings subject to the considerations and limitations identified below regarding zero risk weighted investments, legislated programmes, materiality, and transitional arrangements. In all of the cases noted below, excluded holdings would be subject to the capital charges required under the standardised approach.

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[3]   Equities that are recorded as a loan but arise from a debt/equity swap made as part of the orderly realisation or restructuring of the debt are included.

[4]   Where some G10 countries retain their existing treatment as an exception to the deduction approach, the treatment of such equity investments by IRB banks is under consideration.

Zero weighted holdings

Equity holdings in entities whose debt obligations would receive a zero risk weight under the standardised approach for credit risk (including those publicly sponsored entities [PSEs] where a zero weight has been applied) would be excluded from consideration under any of the proposed IRB bank approaches to equity.

Legislated programmes

At national discretion, equity investments made pursuant to legislated programmes that are designed to promote equity investment in specified sectors of their domestic economies may be excluded from the proposed IRB capital charges. This exclusion would be subject to an aggregate limit of either 10 percent of Tier 1 and Tier 2 combined or 15 percent of Tier 1 capital. Investments would only be eligible for this exclusion where they are subject to a legislated programme that includes supervisory oversight that places restrictions on the equity investments. Such restrictions could include limitations on the size and types of businesses in which the bank is investing, allowable amounts of ownership interests, geographical location and other pertinent factors that limit the potential risk of the investment to the banking organisation. These restrictions will need to be specified further to prevent inappropriate application of this exclusion.

Materiality

In general, a bank using an IRB approach for a credit portfolio (for example, corporates) is required to use an IRB bank approach for all of its holdings including equity investments. The need for this, however, is clearly dependent on the materiality and concentration of the institution's equity investments. Accordingly, it is proposed (consistent with the general approach taken elsewhere in the IRB framework) that supervisors may, at national discretion, exclude equity holdings from one of the IRB bank approaches based on materiality. Materiality is measured using all equity investments as defined above including those subject to any grandfathering provisions and/or made pursuant to "legislated programmes". National supervisors would generally regard a portfolio as being material if any one of the following criteria is met:

(a)   The ratio of the total value of equity investments (measured as noted above) to the bank's Tier 1 and Tier 2 capital exceeded, on average over the prior year, 10 percent. This initially proposed 10 percent threshold is still under consideration and is subject to adjustment pending further analysis. National supervisors may of course use a lower materiality threshold than is ultimately specified.

(b)   The equity portfolio is highly concentrated, defined as consisting of less than 10 individual holdings, and exceeded, on average over the prior year, a ratio of a total value compared to the bank's Tier 1 and Tier 2 capital of 5 percent.

If the institution moves to an IRB approach elsewhere in its business and if its equity portfolio is considered to be material, then it will be required from this point to use an IRB bank approach for its equity portfolio. This requirement extends to all holdings, except for: (1) the portion of equity investments made pursuant to legislated programmes which, in aggregate, is less than or equal to the exemption amounts discussed above, and (2) any transitional/grandfathering provisions (discussed below). Supervisors may of course require banks to employ one of the IRB bank approaches even though the bank may not employ an IRB approach to credit, and should do so if the portfolio is a significant part of the bank's business.

Transitional /grandfathering provisions

Final decisions have not been made on the nature of any transitional arrangements in adopting IRB bank approaches to equity investments. There is clearly, however, an interaction between the final form of the market-based and PD/LGD approaches and the extent of any transitional or grandfathering provisions. The current thinking on this issue is to allow extensive carve-outs for equities held at the time of the publication of the New Accord, as specified below.

The carve-outs would apply, at national discretion, to particular shareholdings owned (or out on repo) at this date. The exempted position would be measured as the shares held in a portfolio company as of that date and any additional shares arising directly as a result of owning those holdings and not initiated by the investing banking organisation (for example, stock splits). Any additional shareholdings arising from existing positions could not increase the proportional share of ownership in a portfolio company. Any transaction involving ownership changes in shares in a portfolio company initiated by the investing organisation subsequent to the publication of the Accord would affect the exemption. Acquisitions of new interests in companies already held and subject to exclusion would not be covered. Also, sale and buy-backs purely for tax purposes would void transitional status. As a summary example, if an institution holding 100 shares in a particular portfolio company lowered its investment to 80 shares and then raised its holdings to 120 shares it would have only 80 shares in transitional status. In this case, the remaining 40 shares would be subject to an IRB bank treatment for equities.

Specific treatments of the transition/exemption status in cases of mergers and acquisitions of investing institutions and portfolio companies remain under consideration. In cases where an investing institution merges with, or is acquired by, another banking organisation, one option being considered is to allow the transition or exemption rights on the individual investment interests to convey, on a pro-rated basis subject to the holding period identified in the final transitional arrangements. Acquisitions of portfolio companies by other parties constitute an economic divestment or liquidation and would end the transitional status of the investment regardless of any retained interests or re-acquisitions. However, in cases where a portfolio company merges with or acquires another commercial enterprise, the treatment of the transition/exemption status is less clear. Where the banking institution has substantial control over the portfolio company, such transactions could be used to circumvent the proposed capital rules if the transition status of the original portfolio company is left unaffected. At the same time, acquisitions by the portfolio company where there is little control may unduly penalise the investing institution. A possible treatment in such situations might be to revoke the transitional status of an investment where the investing institution has control over the portfolio company directly, indirectly or through a group acting in concert. Specific definitions of control, which may be different for public and private equity holdings are under development (possibly based on national laws).

It is envisaged that the transition status would be available for ten years. The Committee is still considering the final form of possible transition provisions. Use of transitional provisions would be a required disclosure under Pillar Three.

Management practices, exposure measures, and capital calculations

Management practices

Regardless of the nature and materiality of their equity holdings and the applicability of IRB bank approaches for assessing minimum capital requirements, all banking organisations are expected to employ sound risk management practices in managing their equity investment portfolios. Annex 1 sets out proposed sound practice standards for managing the risk of banking book equity investments. These general practices should be applied for all banking book equity investment activities, although the specific form in which they are implemented would be expected to be commensurate with the size, nature, complexity and sophistication of the holdings and the institution. In many cases they will also be relevant to equity investment activities which do not fall within the banking book. As is the case for other business and product lines, the sound practices emphasise the need for active board and senior management oversight, adequate policies, procedures and management information systems, and comprehensive internal controls. Importantly, these sound practices point out the need for documented policies and procedures for periodically valuing and evaluating the performance of equity investments. They also point to the need for institutions routinely to validate both the valuations and the appropriateness of their valuation policies. The need is stressed for there to be appropriate methodologies for valuing those equity investments for which a meaningful market price is not readily available. In the belief that institutions generally already employ sound practices in managing their equity investments, it is assumed that they have internal measures of both the cost and, in some form, the fair value of their equity investments.[5]

Exposure measures

As a general principle, the appropriate measure of exposure against which capital should be assessed is the value of an investment subject to loss that would directly impact regulatory capital. The Committee has long accepted that unrecognised and unrealised gains (or latent revaluation gains) on equity investments can act as a buffer against losses - as evidenced by counting a portion of these gains in Tier 2 capital under the existing Accord. This current Tier 2 treatment and any further recognition of unrealised gains in capital suggests using a gross concept of exposure that includes unrecognised and unrealised gains (or latent revaluation gains) where such gains are appropriately identified. Depending on national accounting conventions, methods for measuring such exposures could include:

(a)   For investments that are held at fair value with changes in value flowing directly through income and into regulatory capital, exposure is equal to the fair value presented in the balance sheet.

(b)   For investments that are held at fair value with changes in value *not* flowing through income but into a tax-adjusted separate component of equity (for example, available

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[5]   Fair value is generally defined as the amount for which an asset could be exchanged, or a liability settled, between knowledgeable, willing parties in an arm's length transaction. For publicly traded instruments, fair values may incorporate discounts from market value in light of various liquidity considerations and constraints. For instruments without readily identifiable fair values, third party transactions that provide information on changes in value can often be used to adjust the cost basis of investments to a fair market value.

for sale or AFS accounting), exposure is equal to the fair value presented in the balance sheet.[6]

(c)   For investments held at cost or the lower of cost or market (LOCOM) with reliably measurable fair values, exposure is measured as the LOCOM value presented in the institution's balance sheet plus all of the latent revaluation gains.

(d)   For investments held at cost or the lower of cost or market (LOCOM) without reliably measurable fair values, exposure is measured as the LOCOM value presented in the institution's balance sheet.

Pooled investment funds

Holdings in funds containing both equity investments in commercial entities and other non-equity types of investments can be treated as a single investment based on the majority of the fund's holdings or as separate and distinct investments in the fund's component holdings based on a look-through approach. Subject to certain conditions, it is proposed to allow a bank to use either or both approaches, provided that this is done in a consistent manner. The look-through approach would be appropriate where the holding in the fund was material. It would, however, be permitted only where the bank had satisfied its supervisor that it had access to appropriate information on component holdings of the fund which was at least as reliable and up-to-date as that available on the fund itself.

Hedged exposures

It is recognised that for those investments most likely to be subject to the proposed market-based approaches, short cash positions and derivatives booked in the banking book can be used to offset positions in individual stocks. Accordingly, it is proposed that such individual stock-hedging be recognised as mitigating the risks in those equity positions that are subject to one of the proposed market-based approaches. It is also recognised that both cash and derivative equity positions can be held in the banking book as direct hedges to deposit products and that this can be risk-mitigating. In general, the approaches adopted in recognising risk mitigation (and residual risks) in the corporate and other credit portfolios would be used, although some issues regarding the minimum maturity of such hedges will need to be addressed.

Based on industry comment to date, hedging is not currently significantly employed on the types of equity investments that are proposed for the PD/LGD approach (see below). Accordingly, it appears that no hedging treatment needs to be developed for such investments. This may, however, need to be done if there is likely in the future to be significant such hedging.

Capital calculations and the use of unrealised gains to off-set capital requirements

The benefits of consistency between the way equity exposures are measured and accounting developments such as the available for sale category and similar classifications

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[6] It is assumed that national or supervisory accounting conventions require the recognition in income of impairments to the value of investments held as available for sale.

have introduced a case for permitting greater recognition of unrealised gains as a credit to minimum capital charges. This recognition may pave the way for an appropriate treatment of unrealised gains under the equity IRB approach beyond the current Tier 2 treatment. It should be emphasised that no proposals are being made at this stage. In this context, options could include:

(a)   Allow no direct credit other than the current 45 percent credit to Tier 2.

(b)   Allow unrealised gains to offset equity investment capital requirements on the specific holding subject to a haircut (to account for market volatility and the fact that such gains may not reflect audited amounts). Any excess of the capital gains after the haircut and credit could be applied only to Tier 2.

(c)   Conceivably, allow unrealised gains to directly offset ($ for $) the capital requirements on the specific holding and allow any excess capital gains to be applied only as Tier 2.

(d)   Conceivably, allow unrealised gains to directly offset ($ for $) the capital requirements on the specific holding and allow any excess capital gains to be applied directly to meet the capital requirements computed for other equity holdings.

Options (c) and (d) are less likely to be available than the other options listed. In implementing any of these options, consideration should be given as to whether a particular option might be best applied to different types of holdings based on transitional status and the methodology used to calculate minimum capital charges. Within the context of the transition provisions discussed above and the proposed IRB bank equity investment capital methodologies discussed below, equity exposures fall within one of three broad categories: (i) those subject to the standardised approach as a result of transition/grandfathering provisions and materiality considerations, (ii) those assessed capital based on one of the proposed market-based approaches, and (iii) those assessed capital under the proposed PD/LGD approach. Based on both practicality and conceptual constructs, different treatment of unrealised capital gains may be necessary or appropriate for each, particularly where a portfolio market-based approach is used. For example, transitioned investments might receive only the current Tier 2 treatment. But this will require further consideration.

Market-based approaches

As envisaged in the consultative paper, market-based approaches are designed to take into account potential changes in the total returns (including changes in the fair values or market values) of equity holdings. Accordingly, market-based approaches cover a wide range of the factors and risks that give rise to variability in the value and total returns of equity investments. They are not limited to protecting only against the risk of traditional "default" (in itself a difficult concept to define for equity as discussed below in the section on the PD/LGD approach). Rather, they incorporate elements of both general market and idiosyncratic (i.e. specific) risk associated with equity holdings.

Current consideration is to require that the primary market-based approach for all IRB banks be the use of internal measurement systems or internal models to estimate the potential loss of an institution's equity holdings under supervisory determined criteria. Banks would be expected to hold capital equal to these potential losses. While there is currently no industry consensus on a single methodology for appropriately allocating internal capital to banking book equity investments, some major institutions employ risk measurement models for internal management, compensation, and capital allocation purposes that incorporate VaR

concepts, historical scenarios, or other methodologies focused on the volatility of returns of equity investments. Unlike internal models for credit risk, data considerations appear to be less of a stumbling block to devising adequate internal models for equity holdings given the availability of historical returns on publicly traded equities and established techniques for valuing positions using comparables, proxies, and other methodologies where actual market data may be unavailable.

In this light, consideration is being given to the use of standard VaR modelling parameters as the benchmark for establishing capital adequacy criteria. This suggests that institutions might be required to develop a VaR model for their banking book equity holdings. At the same time, however, the feasibility of allowing institutions to use methodologies other than standard VaR methods (for example, historical scenario analysis) for regulatory purposes is also under consideration. The use of non-VaR methods would be conditioned on the demonstration that the methodology and its estimated exposure are at least as stringent as would be entailed with the use of a VaR model calibrated to the benchmark VaR parameters. Regardless of the method used, however, supervisors would have to establish its rigour and robustness and would have to address various issues regarding the validation of internal models for banking book holdings. Industry input on the use of VaR and non-VaR techniques, as well as the validation and level playing field issues involved in using either method for banking book equities, is being solicited.

It is expected that many institutions that currently have material equity holdings already use, or will be able to develop by the 2005 implementation date, adequate internal market-based models for their equity holdings. By allowing banks to use internal measurement methodologies employed in the management of equity investments, supervisors can avoid the risk of diverting banking institution resources to rigidly standardised solutions.

At the same time, however, it is recognised that a relatively more simple approach is required for institutions transitioning into an IRB approach and for those institutions that do not meet the quantitative and qualitative standards for using internal models. Moreover, a simple but more risk sensitive approach than the current 100 percent risk weighting, provides supervisors with an alternative treatment to the standardised approach for non-IRB banks that have material equity holdings. Given all of the above, a second approach consisting of simple risk weights for publicly traded and privately held equity investments is also advanced. This approach would also be used to establish a floor for the internal models treatment. Specifically, the floor on the internal models approach would equal half of the required capital calculated under the simple risk weight approach.

Supervisory parameters underlying the market-based approaches

Under both the internal models and simple market-based approaches, consideration is being given to establishing capital adequacy criteria using standard VaR modelling parameters as a benchmark. In summary, regulatory capital would be required to be sufficient to cover the maximum quarterly loss at the 99.5 percent confidence interval. These loss estimates should be calculated over a sufficiently long sample period which, at a minimum, captures at least one equity market cycle relevant to the underlying holdings. The 99.5 percent confidence interval is consistent with that used in the calibration of the IRB risk weights for corporate credits and would, of course, be adjusted consistent with any corresponding changes in these weights made prior to final implementation

Although the use of a quarterly time horizon is the focus of current efforts, consideration is also being given to the use of an annual time horizon. The ultimate selection of the appropriate time horizon will require full evaluation of the issues surrounding the time frame

in which bank management reviews and is able to take action on equity investment holdings, as well as consideration of industry practices and established standards.

Arguments can be made for using either an annual or quarterly time horizon. On the one hand, use of a one-year time horizon may be viewed as consistent with the time horizon established with the IRB approach for credit exposures. It could also be advanced based on the grounds that liquidity constraints on some banking book equity holdings preclude more timely action in the case of deteriorating investments. At the same time, however, it appears unrealistic to assume that institutions take investment actions only on an annual basis in managing their banking book equity investment portfolio – especially for those investments where there are expectations of capital gain and that are subject to the market-based approach. Even in the context of private equity investments, deterioration in a portfolio company would be expected to receive reasonably timely management attention and specific actions to protect the investment, despite the fact that an overt liquidation or hedging transaction may not be instituted. As a result, a quarterly (as opposed to one-year) time horizon presents a more suitable time frame for calibrating capital charges for equity investments. It represents a compromise between the assumed 10-day horizon used for trading operations and the annual horizon used for credit exposures in the IRB approach. Consultations with industry representatives have suggested that the use of a quarterly time horizon would conform with industry practice in periodically valuing equity investments for performance evaluation purposes.

Internal models approach

The internal models approach is similar in many respects to that used in the 1996 Market Risk Amendment (MRA) to the 1988 Accord, with modifications necessary to reflect the risk characteristics and management practices relating to banking book equity investments. The supervisory assessment of internal models would also be broadly similar to that conducted on market risk models for trading activities. This assessment would, for example, focus on evaluating the extent to which model parameters conform to the benchmark criteria outlined above and on understanding the degree to which the risk measurement methods are integrated into the overall risk management infrastructure. Annex 2 outlines various aspects of the internal model approach and identifies both the qualitative and quantitative standards regarding their use in calculating supervisory capital requirements. It is drafted on the assumption that methodologies beyond the standard VaR models are permitted.

The approach involves the use of an institution's internal measurement systems to estimate potential losses that are at least as great as the quarterly loss on its equity holdings calculated subject to a benchmark VaR 99.5 percent confidence interval. It is not currently envisaged that an additional multiplier would be needed, particularly given the different confidence interval from that in the MRA. VaR model loss estimates would be required to be based on an historical observation period that includes a sufficient amount of data points to ensure statistically reliable estimates and should be robust to adverse market movements relevant to the primary risk factors of the specific holdings. Given the long-term nature of banking book equity holdings and in the interests of limiting the pro-cyclicality of capital charges, the sample data period should be as long as possible and should, at a minimum, encompass at least one complete equity market cycle. Similar to the general framework of the 1996 MRA for trading activities, no particular type of VaR model would be prescribed. However, it is expected that the internal modelling methodology used would be commensurate with the complexity and sophistication of the institution and its specific equity holdings.

Consideration is also being given as to the feasibility of allowing institutions to use other risk measurement methods if they can demonstrate that the methods and their resulting

exposure estimates are at least as stringent as those produced using a VaR model calibrated to the benchmark parameters. For example, in the case of historical scenario analysis, the 99.5 percent confidence interval over a quarterly time horizon suggests that the use of a 1 in 50 year tail event might represent a feasible alternative to the use of a standard VaR model. Industry input on the feasibility of such an option and the various supervisory review and validation issues is to be solicited as work in this area progresses.

If banks were allowed to use these other methods they would be expected to demonstrate that the approach is both conceptually sound and empirically valid. Supervisory review of these models would focus on evaluating the institution's analyses and documentation that demonstrates this. In cases where non-VaR techniques are allowed, consideration is being given to whether it would be necessary for institutions to run a parallel supervisory VaR model to evaluate adherence to the supervisory benchmark. Furthermore, institutions would be expected to have policies and procedures for rigorous validation that would be subject to supervisory review. Industry input on the above requirements as well as clarification on what constitutes rigorous validation of VaR and other possible methodologies (if allowed) is being solicited – especially in light of competitive considerations.

Under the internal models approach, the capital charge would equal the estimated equity portfolio loss measure derived by the bank's internal model. The capital charge would be incorporated into an institution's risk-based capital ratio through the calculation of risk-weighted equivalent assets. The risk weight used to convert holdings into risk-weighted equivalent assets would be computed by multiplying the expected loss measure (or capital charge) by 12.5 (i.e. the inverse of the current 8 percent risk-based capital requirement) and an additional factor of 1.3 to reflect the "elements of capital" adjustment applied to risk weights in the IRB approach. (Any changes to the methodology used for corporate credits would need also to be carried across to the equity portfolio.) There would be a floor such that the capital charge computed under this approach could be no lower than one half of the capital which would be produced by applying to each equity holding the simple market-based approach outlined below.

Simple market-based approach

For institutions transitioning into IRB capital regimes or IRB banks without adequate internal models, a relatively simple market-based approach is proposed. This simple approach would specify separate risk weights for public and private equity holdings. While clearly subject to misestimation of risk sensitivity relative to an internal models approach, this treatment has the merits of simplicity while providing greater risk sensitivity than the standardised approach.

A public holding would be defined as any security traded on a recognised exchange. A more precise distinction might be made on the basis of whether reliable market price information was available, but such a test would involve a significant number of definitional difficulties. The simple definition of public holdings recognises that there is some value in a security having an available market for liquidity purposes even if shares are not often traded or liquidation is restricted.

Annex 3 summarises the empirical work underlying the development of the range of proposed risk weights for the simple approach. In brief, the work analysed the historical volatility of total returns on several major international equity market indices using both quarterly and annual returns. Data spanning 1969 to 2000 for one world, six regional, and sixteen country-specific indices were analysed. Additionally, return data on US equity indices of different sized companies (as measured by market capitalisation) spanning 1946 to 2000 were investigated. As discussed in more detail in Annex 3, evaluation of the volatility of stocks of different size companies provided useful insights regarding the potential risk/return

profiles of private equity investments. All of the historical return data were assessed taking into account both historically observed and statistically generated tail events. In addition, literature on the risk profile of private equity investments was reviewed to provide insights into such investments.

As Annex 3 points out, the analysis conducted to date is preliminary and additional work along these lines and industry input is expected as the simple approach is finalised. Based on the analysis presented in Annex 3, the 99.5 percentile loss on a relatively long-term series of quarterly (annual) returns for several broad-based equity indices ranges roughly between 15 and 20 percent (25 and 30 percent). These loss estimates translate into risk weights ranging between 250 and 350 percent (400 and 500 percent) using quarterly (annual) return data.[7] Under certain assumptions, (for example, that banking institutions' portfolios of publicly traded equities are highly diversified) these risk weights provide a starting point for identifying minimum levels of required capital for publicly traded equity holdings within the simple market-based approach. The analyses presented in Annex 3 also suggests that risk weights ranging between 400 and 500 percent (500 and 800 percent) represent useful reference points in identifying appropriate risk weights for private equity holdings in the context of a quarterly (annual) time horizon. The risk weights reflect the long-run 99.5 percentile loss measures on a diversified portfolio of small capitalisation stocks. The following table summarises the range of proposed risk weights to be used in the simple market-based approach.

Ranges of Possible Risk Weights for the Simple Market-based Approach

	Quarterly Time Horizon	**Annual Time Horizon**
Publicly Traded Equities (based on MSCI World, NYSE, and S&P indices)	**250% to 350%**	**400% to 500%**
Privately Held Equities (based on small, micro cap. indices and study of PEI)	**400% to 500%**	**500% to 800%**

The final proposals will have a single risk weight for publicly traded equities and a single risk weight for privately held equities. As high levels of diversification will likely not be present in practice, and as the market-based approach does not generate the parameters that would allow equity holdings subject to it to be included in the granularity adjustment, it may be that use of figures at the higher end of the above ranges would be appropriate.

Clearly, the nature of the simple public and private risk weights risk will incorrectly estimate risk to the extent that actual portfolios deviate from the diversification assumptions inherent in the risk weights chosen. Nevertheless, for institutions just becoming IRB banks, the simple risk weight approach provides a transition mechanism until an adequate internal model is implemented.

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[7]   Risk weights are computed by scaling the 99.5 percentile loss by 12.5 (the inverse of the current 8 percent risk-based minimum capital requirement) and an additional factor of 1.3 that reflects the "elements of capital" adjustment.

PD/LGD approach

Except as noted below, this approach would apply the IRB foundation approach methodology used for corporate credits to the institution's equity holdings. Institutions would estimate a one year probability of default on the portfolio company (whether or not the bank itself had a holding of debt of the company and regardless of situations where a portfolio company may have no debt in its capital structure). An LGD of 100% would be assumed in deriving the appropriate risk weight. The required addition to risk-weighted assets on an individual investment would equal the derived risk weight, subject to any "maturity" and "definition of default" adjustments as discussed below, multiplied by the appropriate exposure measure. Baseline risk-weighted assets for the entire equity portfolio would equal the simple sum of the capital requirements on each investment. Equity positions would be included in the granularity adjustment. No advanced approach is proposed.

Annex 4 discusses the qualitative and quantitative standards to be used in implementing the PD/LGD approach.

With regard to a possible maturity adjustment of the derived risk weight, the implied 3 year average maturity embodied in the corporate debt risk weights is in line with the foundation approach for corporate debt but sits uneasily with the conceptually potentially infinite "maturity" of equity interests. Alternatively, a maturity adjustment equal to the maximum used elsewhere in the IRB framework could be used to develop a PD equity scaling factor to reflect the "maturity" of equity.

The definition of default would be essentially the same as that used for the corporate debt portfolio for a debt position. (For equities of companies which are/would be included in the retail portfolio it would be essentially the same as the definition of default used for that portfolio.) The definition would generally apply whether or not the bank itself had a position in that loan position. In summary, a default is considered to have occurred with regard to a particular firm (which is/would be included in the corporate portfolio) when one or more of the following events have taken place:

(a)   It is determined that the firm is unlikely to pay its debt obligations (principal, interest, or fees) in full,

(b)   A credit loss event associated with any obligation of the firm, such as a charge-off, specific provision, or distressed restructuring involving the forgiveness or postponement of principal, interest, or fees as well as any distressed restructuring of the equity itself (namely a capital write down)[8];

(c)   The firm is past due more than 90 days on any credit obligation; or,

(d)   The firm has filed for bankruptcy or similar protection from creditors.

In practice, if there is both an equity exposure and an IRB credit exposure to the same counterparty, a default on the credit exposure would thus trigger a simultaneous default for regulatory purposes on the equity exposure.

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[8]   In some countries this could in principle lead to an equity position being regarded as being in default before the debt of that entity triggered the corporate definition of default.

There may be cases where a bank does not itself hold debt of the company in whose equity it has invested (or where there is no such debt in issue) and where the bank does not have sufficient information on the position of that company to be able to use the above definition of default in practice. In such circumstances, only leg (d) of the above definition (or the capital measures element of leg (b)) is likely to be applicable. Where this is the case, the equity definition of default is likely, on average, to deliver a "later" outcome than the corporate definition. This, in turn, means that the risk weights derived from the corporate portfolio may not adequately reflect the risk of the equity portfolio. In recognition of this lagged/delayed effect, it is envisaged that a 1.5 scaling factor be applied to the PD/LGD weights in such circumstances.

Minimum capital charges on individual holdings calculated under the PD/LGD approach could be no less than those entailed in the standardised approach.

Implications of the PD/LGD approach for regulatory capital

The PD/LGD approach uses a significantly higher LGD for equities than will be the case for most debt positions, and thus unambiguously delivers more capital than does holding the debt of the same company. The market-based approaches are likely to deliver even higher capital charges for most equity holdings except where PDs are very high (for example, private equities) or an internal models market-based approach is applied to an ownership interest with a very low estimated risk. This difference is not surprising. The PD/LGD approach aims to capture only those risks from credit-related losses while the market-based approaches aim additionally to capture risks from various factors that can affect the volatility in value and total return of an equity interest – both systematic and idiosyncatic. Accordingly, the use of these different approaches by different national supervisors would clearly create competitive equity issues.

In the January 2001 Consultative Paper, the Committee indicated that the PD/LGD approach would be considered "more appropriate for equity investments that are not primarily held with the intent to resale for capital gains purposes. Rather, it includes investments in equity of such a borrower with an aim to improve the quality of information on a borrower." Consultations to date with industry representatives have mainly supported this view. In this regard, it is currently envisaged that the PD-LGD approach would be a viable option for the following cases.

a)   Public equities where the investment is part of a long-term customer relationship, any capital gains are not expected to be realised in the short term and there is no anticipation of (above trend) capital gains in the long-term. It is expected that in almost all cases, the institution will have lending and/or general banking relationships with the portfolio company so that the estimated probability of default is readily available. Given their long-term nature, specification of an appropriate holding period for such investments merits careful consideration. In general, it is expected that the bank will hold the equity over the long term (at least five years).

b)   Private equities where the returns on the investment are based on regular and periodic cash flows not derived from capital gains and there is no expectation of future (above trend) capital gain or of realising any existing gain.

It is possible that the availability of the PD/LGD approach to public equities could be further refined, for example to include any other portfolios which may be identified where the focus is not on credit-related issues. The feasibility and appropriateness of expanding the use of

the PD/LGD approach to other equity holdings is being explored. First, however, consideration would need to be given to the theoretical, conceptual and empirical rationales for using the PD/LGD approach to internally allocate capital and set regulatory capital standards for the credit risk of equity holdings.

It is also under consideration that the PD/LGD approach will not be available in all countries given some countries' desire to use broader measures of the risk of equity holdings different from the risks embodied in the PD/LGD approach. Accordingly, in light of the potential competitive equity issues, it is possible that geographical limits would be imposed on the availability of the PD/LGD approach, namely only to allow it for investments in companies incorporated in the same jurisdiction as that of the bank.

Industry comment is particularly solicited on the issues raised in this section.

Pillar Two and Pillar Three

Consistent with the general framework of the New Accord, the supervisory process (Pillar Two) and enhanced market discipline through public disclosure (Pillar Three) are critical complements to the proposed capital requirements described above. The standards identified in Annex 1, 2 and 4 provide supervisors and banking organisations with guidance that will structure supervisory reviews of sound risk management practices and compliance with the proposed minimum capital rules under both the market-based and PD/LGD approaches. In the January 2001 consultative package, the Committee set out proposals for Pillar Three. A large number of comments were received on this topic and, in the light of these, a working paper setting out a revised set of Pillar Three proposals will be issued in September. That working paper will also include disclosure requirements and recommendations relating to equity IRB disclosures. These will in turn be reviewed and updated as both the IRB equity framework and Pillar Three itself are further developed.

Further work

The nature of the dialogue with the industry to date, the relatively short time frame in which the proposals have been developed, and the ongoing development status of the various approaches have, inevitably, meant that not all interested parties have had the opportunity to consider the proposed approaches for equity holdings of IRB banks. Accordingly, additional industry discussions with national supervisors are imperative to ensure that the approaches ultimately adopted are appropriately risk-sensitive and targeted.

Annex 1

Sound risk management practices for banking book
equity investment activities

Introduction

While equity investments in commercial companies can contribute substantially to the earnings of banking organisations, such investment activities can entail significant risks. Accordingly, sound investment and risk management practices are critical in conducting these activities. As with any financial activity, sound management practices for these activities involve:

- Active involvement and oversight by the board of directors and senior management;

- Appropriate policies, procedures, limits, and management information systems for governing all elements of the investment decision-making and investment management process; and

- Adequate internal controls.

Board and senior management oversight[9]

Equity investment activities require the active oversight of the board of directors (or other body responsible for high-level policy oversight at the banking organisation) and senior management of the institution conducting the activities. The board should approve overall portfolio objectives, general investment strategies, and higher level organisational investment policies that are consistent with the institution's financial condition, risk profile, and risk tolerance. Portfolio objectives should address the types of investments, expected business returns, desired holding periods, diversification parameters, and other elements of sound investment management oversight. Board-approved objectives, strategies, policies, and procedures should be documented and clearly communicated to all personnel involved in their implementation. The board should actively monitor the performance and risk profile of equity investment activities in light of the established objectives, strategies, and organisational policies.

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[9] This section refers to a management structure composed of a board of directors and senior management. The Committee is well aware that there are significant differences in legislative and regulatory frameworks across countries as regards the functions of the board of directors and senior management. In some cases, the board has the main, if not exclusive, function of supervising the executive body (senior management, general management) so as to ensure that the latter fulfils its tasks. For this reason, in some cases, it is known as a supervisory board. This means that the board has no executive functions. In other countries, by contrast, the board has a broader competence in that it lays down the general framework for the management of the bank. Owing to these differences, the notions of the board of directors and the senior management are used here not to identify legal constraints but rather to label two decision-making functions within a bank.

The board should also ensure that there is an effective management structure for conducting the institution's equity activities, including adequate systems for measuring, monitoring, controlling, and reporting on the risks of equity investments. The board should approve policies and organisational structures that identify lines of authority and responsibility for both acquisitions and sales of investments. The board should also approve limits on aggregate investment and exposure amounts, the types of investments (e.g. direct and indirect, mezzanine financing, start-ups, seed financing) and appropriate diversification-related aspects of equity investments.

For its part, senior management should ensure that there are adequate policies, procedures, and management information systems for managing equity investment activities on a day-to-day and longer-term basis. Management should set clear lines of authority and responsibility for making and monitoring investments and for managing risk. Management should ensure that an institution's equity investment activities are conducted by competent staff, whose technical knowledge and experience are consistent with the scope of the institution's activities.

Management of the investment process

Banking organisations engaging in equity investment activities should have a sound process for executing all elements of the investment decision-making process, including initial due diligence, periodic reviews of holdings, investment valuation, and realisation of returns. This process requires appropriate policies, procedures, and management information systems, the formality of which should be commensurate with the scope, complexity, and nature of the organisation's equity investment activities. Accordingly, supervisors should ensure that they evaluate a banking organisation's stated tolerance for risk, the ability of senior management to govern these activities effectively, the materiality of the activities in light of the organisation's risk profile, and the capital position of the organisation relative to its equity holdings.

Policies

Banking organisations engaging in equity investment activities require effective policies that 1) govern the types and amounts of investments that may be made, 2) provide guidelines on appropriate holding periods for different types of investments, and 3) establish parameters for portfolio diversification. Investment strategies and permissible types of investments should be clearly identified. Portfolio diversification policies should identify factors pertinent to the risk profile of the investments being made, such as industry, sector, geographic, and market factors. Policies establishing expected holding periods should specify the general criteria for liquidation of investments and guidelines for the divestiture of an under-performing investment. Whereas decisions to liquidate under-performing investments are necessarily made on a case-by-case basis considering all relevant factors, policies and procedures stipulating more frequent review and analysis are generally used to address investments that are performing poorly or have been in portfolio for a considerable length of time.

Policies should identify the aggregate exposure that the organisation is willing to accept by type and nature of investment. Adherence to such limits should take into consideration unfunded, as well as funded, commitments.

Where hedging activities are conducted, formal and clearly articulated hedging policies and strategies that identify limits on hedged exposures and permissible hedging strategies are important.

If management of the business line co-invests in portfolio companies with the banking organisation, clear policies should be in place to govern these co-investments and any sales of portfolio company interests by employees of the banking organisation.

Procedures

Banking organisations may have different procedures for assessing, approving, and reviewing investments, based on the size, nature, and risk profile of their equity investments. Procedures used for public investments may differ from those used for private equity investments just as procedures used for direct investment may differ from those used for indirect investments made through funds. For example, different levels of due diligence and senior management approvals may be required. Accordingly, in constructing management infrastructures for conducting these activities, management should ensure that operating procedures and internal controls appropriately reflect the diversity and risk of investments, and the materiality of this business line to the safety and soundness of the banking organisation.

Well-founded analytical assessments of investment opportunities and formal processes for approving investments are important in conducting equity investment activities. While analyses and approval processes may differ by individual investments and across institutions, the methods and types of analyses conducted should be appropriately structured to assess adequately the specific risk profile, industry dynamics, management, and specific terms and conditions of the investment opportunity, as well as other relevant factors. All elements of the analytical and approval processes from initial review through formal investment decision should be documented and clearly understood by staff conducting these activities.

A banking organisation's evaluation of potential investments in equity funds, as well as reviews of existing fund investments, should where feasible, involve prior assessments of the adequacy of a fund's structure. Due consideration should be given to (a) management fees, (b) carried interest (i.e. the share of a partnership's return received by general partners or investment advisors) and the computation of carried interest on an aggregate portfolio basis, (c) the sufficiency of capital commitments by general partners in providing management incentives, (d) contingent liabilities of the general partner, (e) distribution policies and wind-down provisions, and (f) performance benchmarks and return calculation methodologies.

It is a sound practice to establish a system of internal risk ratings for equity investments. This involves assigning each investment a rating based on factors such as the nature of the company, the strength of management, industry dynamics, financial condition, operating results, expected exit strategies, market conditions, and other pertinent factors. Different rating factors may be appropriate for direct and indirect investments. For example, rating factors for investments in private equity funds could include an assessment of the fund's diversification, management experience, liquidity, and actual and expected performance. Rating systems should be used for assessments of both new investment opportunities and existing portfolio investments. The quantification of such risk ratings will vary based on the institution's needs. However, for those investments to which the PD/LGD capital adequacy approach is applied, formal probability of default estimates are required. The policies, procedures and results of such quantitative efforts should be fully documented and periodically validated.

Management should ensure that there is periodic and timely review of the banking organisation's equity investments. Reviews should be conducted at both individual investment and portfolio levels. Depending on the size, complexity, and risk profile of the investment, reviews should, where appropriate, include factors such as:

- the history of the investment, including the total funds approved;

- commitment amounts, principal cash investment amounts, cost basis, carrying value, major investment cash flows, and supporting information including valuation rationales and methodologies;

- a summary of recent events and current outlook;

- recent financial performance of portfolio companies, including summary compilations of performance and forecasts, historical financial results, current and future plans, key performance metrics, and other relevant items;

- internal investment risk ratings and rating change triggers;

- exit strategies, both primary and contingent, and expected internal rates of return upon exit; and

- other pertinent information for assessing the appropriateness, performance, and expected returns of investments.

Portfolio reviews should include an aggregation of individual investment risk and performance ratings, analysis of appropriate industry, sector, geographic and other pertinent concentrations, as well as total portfolio valuations. Portfolio reports containing the cost basis, carrying values, estimated fair values, valuation discounts, and other factors summarising the status of individual investments are integral tools for conducting effective portfolio reviews. Reports containing the results of all reviews should be maintained by the banking organisation.

Given the inherent uncertainties in equity investment activities, it is a sound practice for banking organisations to include in their periodic reviews consideration of best case, worst case, and probable case assessments of investment performance. Such reviews evaluate changes in market conditions and alternative assumptions used to value investments – including expected and contingent exit strategies. Major assumptions used in valuing investments and forecasting performance should be identified. Such assessments may include both quantitative and qualitative analyses. As in the case of all investment management systems, the formality and sophistication of the review should be appropriate for the overall level of risk incurred by the banking organisation from this business line.

Valuation methodologies play a critical role in effectively managing equity investments. For some equity investments, valuation can be more of an art than a science. Many equity investments are made in privately held companies, for which independent price quotations are either unavailable or not available in sufficient volume to provide meaningful liquidity or a market valuation. Valuations of some equity investments may involve a high degree of judgement on the part of management or the skilful use of peer comparisons. Similar circumstances may exist for publicly traded securities that are thinly traded or subject to resale and holding period restrictions or when the institution holds a significant block of a company's shares.

Accordingly, clearly articulated policies and procedures on the accounting and valuation methodologies used for equity investments are of paramount importance. Formal valuation

and accounting policies should be established for investments in public companies, direct private investments, indirect fund investments, and where appropriate, other types of investments with special characteristics. In establishing valuation policies, banking organisations should consider market conditions, taking account of lockout provisions, resale restrictions, liquidity features, dilutive effects of warrants and options, and industry characteristics and dynamics.

As is the case with all assets, impairments of value should be addressed promptly. Banking organisations should ensure that they take write-downs in a timely manner and in an appropriate amount.

Accounting and valuation of equity investments should be subject to regular periodic review. In all cases, valuation reviews should produce documented audit trails. Such reviews should assess the consistency of the methodologies used in estimating fair value.

It is important to review accounting and valuation treatments in light of their potential for abuse through the inappropriate management or manipulation of reported earnings on equity investments. For example, high valuations may produce overstatements of earnings through gains and losses on investments reported at "fair value." On the other hand, inappropriately understated valuations can provide vehicles for smoothing earnings by recognising gains on profitable investments when institutions' earnings are otherwise under stress. While reasonable people may disagree on valuations given to illiquid private equity investments, banking organisations should have rigorous valuation procedures that are applied consistently.

Returns and reported earnings on equity investments also may be highly affected by assumed and actual exit strategies. The principal means of exiting an equity investment in a privately held company include initial public stock offerings, sales to other investors, and share repurchases. A banking organisation's assumptions regarding exit strategies can significantly affect the valuation of the investment. Reasonable and comprehensive primary and contingent take-out strategies for equity investments are important. Policies and procedures should be established to govern the sale, exchange, transfer, or other disposition of the banking organisation's investments.

As with all financial activities, banking organisations should ensure that they have sufficient capital for conducting equity investment activities. Banking organisations should be expected to have or develop an internal capital allocation system that meaningfully links the identification, monitoring, and evaluation of the risks of the institution's equity investment activities to the determination of its need for economic capital. A review of these systems should be an important part of the investment management process, as well as an integral element of ongoing supervisory review and monitoring of the institution, either through on-site examination or off-site monitoring.

Internal controls

An adequate system of internal controls, with appropriate checks and balances and clear audit trails, is important for the effective conduct of equity investment activities. Appropriate internal controls should address all of the elements of the investment management process, and should focus on the appropriateness of existing policies and procedures, adherence to policies and procedures, and the integrity and adequacy of investment valuations, risk identification, regulatory compliance, and management reporting. In particular, regulatory compliance requirements should be incorporated into internal controls so managers outside

of the compliance or legal functions understand the parameters of permissible investment activities.

As with other financial activities, the assessment of compliance with both written and implied policies and procedures should be independent of line decision-making functions to the fullest extent possible. Large complex banking organisations with material equity investment activities should have periodic independent reviews of their investment process and valuation methodologies. In smaller, less complex institutions where limited resources may preclude independent review, alternative checks and balances should be established. Such checks and balances may include random internal audits, reviews by senior management independent of the function, or the use of outside third parties.

Documentation of key elements of the investment process, including initial due diligence, approval reviews, valuations, and dispositions, is an integral part of an effective system of internal controls for equity investments. Banking organisations should document their policies, procedures, and investment activities.

Lending to or engaging in other transactions with portfolio companies

Additional risk management issues may arise when a banking organisation or an affiliate lends to or has other business relationships with: (a) a portfolio company; (b) the general partner or manager of a equity fund that has also invested in a portfolio company; or (c) an equity-financed company in which the banking institution does not hold a direct or indirect ownership interest but which is an investment or portfolio company of a general partner or fund manager with which the banking organisation has other investments. Similar issues may arise in the context of derivatives transactions with, or guaranteed by, portfolio companies. Given their potentially higher than normal risk attributes and potential conflicts of interest, the terms and conditions of such relationships should be carefully reviewed by senior management of the banking organisation for consistency with the lending policies and procedures of the organisation.

Where a banking organisation lends to a private equity-financed company in which it has no equity interest but where the borrowing company is a portfolio investment of private equity fund managers or general partners with which the institution may have other relationships, care must be taken to ensure that the extension of credit is conducted on reasonable terms. In some cases, lenders may wrongly assume that the general partners or another third party implicitly guarantees or stands behind such credits. Reliance on implicit guarantees or comfort letters should not substitute for reliance on a sound borrower that is expected to service its debt with its own resources. As with any type of credit extension, absent a written contractual guarantee, the credit quality of a fund manager, general partner, or other third party should not be used to upgrade the internal credit risk rating of the borrower company or prevent the classification or special mention of a loan. Any tendency to relax this requirement when the general partners or sponsors of companies have significant business dealings with the banking organisation should be avoided.

In addition to limiting and monitoring exposure to portfolio companies that arises from traditional banking transactions, banking organisations should also consider adopting policies and practices that limit the legal liability of the banking organisation and its affiliates to the financial obligations and liabilities of portfolio companies. This may include, for example, the use of limited liability corporations or special purpose vehicles to hold certain types of investments, the insertion of corporations that insulate the banking organisation

from liability, and contractual limits on liability. Banking organisations should also be aware of legal or regulatory considerations that may be relevant to these business dealings.

Annex 2

Standards for implementing the proposed internal models approach

Introduction

Institutions that employ an IRB approach to credit and have material equity holdings not subject to grandfathering provisions or eligible for the PD/LGD approach would be required to use the internal models approach for calculating capital requirements on these holdings. This approach utilises a Value at Risk (VaR) loss estimation methodology as the benchmark in defining the appropriate level of capital to be held, although it is under consideration that other estimation methodologies could be employed upon supervisory review. In general, the approach is similar in many respects to that used in the 1996 Market Risk Amendment to the 1988 Accord, with modifications necessary to reflect the risk characteristics, management practices, and evolving internal modelling techniques relating to banking book equity investments. A supervisory review process for using internal models would be required. The following discussion outlines various aspects of the internal models approach for banking book equity positions and identifies both the quantitative and qualitative standards to be employed in using internal measurement systems in deriving supervisory capital requirements.

General description

The primary focus of a market-based approach is to assess capital based on an estimate of the loss at a given confidence interval on an institution's portfolio of equity holdings or, in simpler forms, its individual equity investments. Accordingly, the internal models approach uses a Value-at-Risk (VaR) methodology as a benchmark for measuring the risk of banking book equity investments against which regulatory capital is to be held. VaR is an estimate of the maximum amount that the value of relevant positions could decline during a fixed holding period within a stated confidence level. Under the proposed approach, VaR measures would be computed quarterly using a 99.5 percent (one tail) confidence level of estimated maximum loss over a quarterly time horizon (or annual horizon depending on the final determination of the Committee). Internal VaR models would be required to use an historical observation period that includes a sufficient amount of data points to ensure statistically reliable and robust loss estimates. The data sample should be long-term in nature and, at a minimum, should encompass at least one complete equity market cycle relevant to the institution's holdings[10]. The quality of the model would be subject to rigorous validation and industry input regarding validation issues is being actively pursued.

It is recognised that the type and sophistication of internal modelling systems will vary across institutions. These disparities arise due to differences in the nature and complexity of institutions' business lines in general and banking book equity holdings in particular.

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[10] It is recognised that a strict definition of a "market cycle" is difficult to advance while maintaining the intended modelling flexibility. In concept, the historical period chosen should include both increases and decreases in relevant equity values over a long-term data period.

Accordingly, no particular type of VaR model (e.g. variance-covariance, historical simulation, or Monte Carlo) is prescribed. Moreover, it is expected that the complexity of the methodologies employed will vary across banking institutions. For example, based on considerations involving materiality and the nature of equity holdings, relatively simple, one factor VaR models may prove sufficient for some institutions yet entirely inadequate for others. In general, the supervisory expectations regarding internal VaR models for banking book equities will be similar to those for VaR models for trading activities - institutions' internal models must be able to capture adequately the risk of equity returns. Institutions will be given the discretion to recognise empirical correlations within equity portfolios based upon documented empirical analysis where applicable.

It is also recognised that modelling techniques used in assessing the risk of equity investments are continuously evolving and that some institutions currently employ models for internal risk management and capital allocation purposes that, given the nature of their holdings, can be more risk-sensitive than some VaR models. For example, some institutions employ rigorous historical scenario analysis and other techniques in assessing the risk of their banking book equity portfolios. In the interests of capitalising on robust, non-VaR internal modelling techniques and of minimising unnecessary diversion of internal modelling resources at banking institutions, consideration is being given to the feasibility of allowing institutions to use alternative modelling techniques subject to supervisory review. Supervisors would consider, among other things, the rigor of these alternative techniques and whether the generated loss measures are at least as stringent as those produced using a VaR model subject to the benchmark parameters. For example, given the 99.5 percent confidence level over a quarterly holding period, a one in fifty year tail event relevant to the underlying holdings may be a sufficient scenario to merit the substitution of historical scenario analysis for a benchmark VaR model - depending upon the nature of an institution's holdings. Further industry input is being solicited on the feasibility of allowing such flexibility and on the supervisory review process and validation as well as level playing field issues involved in employing both VaR and non-VaR techniques.

The loss estimate derived from the internal model would constitute the capital charge to be assessed. The capital charge would be incorporated into an institution's risk-based capital ratio through the calculation of risk-weighted equivalent assets. The risk weight used to convert holdings into risk-weighted equivalent assets would be computed by multiplying the expected loss measure (or capital charge) by the factor 16.25. This factor is derived as the product of 12.5 (i.e. the inverse of the current 8 percent risk-based minimum capital requirement) and an additional scaling factor of 1.3 to reflect the "elements of capital" adjustment applied to corporate risk weights in the IRB approach. Any adjustments made to this "elements of capital" scaling factor in the IRB approach elsewhere would be similarly reflected in the treatment of banking book equity holdings.

Given the unique nature of equity portfolios and differences in modelling techniques, even within the context of VaR models, the supervisory model review and approval process will, in many respects, be institution-specific and address a number of issues in assessing the appropriateness of a given internal model. For example, in a VaR model that utilises estimates of individual stock volatilities and either assumed or estimated correlations, the time frame over which volatilities and correlations are estimated and the stability of these parameter estimates over time are two key issues that banks will need to substantiate during the supervisory review process. A lack of market prices adds yet another level of complexity to the internal modelling process, as proxies and mapping techniques become necessary to value holdings and compute expected loss measures. This additional layer of sophistication introduces further complexity into the supervisory review process, illustrating how the nature of the institutions' internal modelling systems will directly affect the supervisory review process.

While institutions would be afforded flexibility in developing the precise nature of their internal VaR models, these models, and the manner in which they are used by management, would be expected to meet certain quantitative and qualitative standards. The general supervisory standards that institutions must meet before they can set capital using an internal models approach are detailed below. Supervisory reviews would focus on evaluating banks' compliance with these standards.

Quantitative standards

While individual banks or their supervisors would have the discretion to apply stricter standards, the following minimum quantitative standards would apply for the purpose of calculating capital charges under the internal models approach.

a)   A capital charge no less than one based on a market shock equivalent to the 99.5 percentile, one-tailed confidence interval of quarterly excess returns over an appropriate risk-free rate computed over a long-term sample period. This period must include at least one market cycle that is robust to adverse market movements relevant to the risk profile of the institution's specific holdings. Institutions would have to demonstrate to supervisors their internal model's adherence to such criteria. No particular type of model (e.g., variance-covariance, historical simulation, or Monte Carlo) is prescribed. The model must be able to capture adequately the risk embodied in equity returns, both general market risk and idiosyncratic (i.e., specific) risk. Banks that can demonstrate this to their supervisor will have the discretion to recognise empirical correlations within equity portfolios included in the scope of the IRB equity portfolio. Where applicable, the use of explicit correlations (e.g., utilisation of a variance/covariance VaR model) must be supported using empirical analysis.

b)   Mapping of individual positions to proxies, market indices, and risk factors should be conceptually sound, fully documented, and demonstrated with both theoretical and empirical evidence to be appropriate for the specific holdings. Where factor models are used, either single or multi-factor models would be acceptable depending upon the nature of an institution's holdings. Banks would be expected to ensure that the factors are sufficient to capture the risks inherent in the banking book's equity portfolio. Risk factors should correspond to the appropriate equity market characteristics (for example, public, private, large cap, small cap, industry sectors) in which the bank holds significant positions. While banks will have discretion in choosing the factors, they must demonstrate through empirical analyses the appropriateness of those factors, including their ability to cover both general and idiosyncratic (i.e., specific) risk. Supervisors will, under Pillar Two, evaluate the extent to which the selected factors represent the underlying behaviour of both public and private equity holdings. Supervisors, in making judgements about banks' internal modelling systems, will focus on assessing supporting analyses and documentation.

c)   The sophistication and nature of the modelling technique used for a particular type of equity should correspond to the bank's exposure, concentration in individual equity issues of that type and the particular risk of the holding (including any optionality). In particular, institutions would be expected to use an internal model that is appropriate for the risk character and complexity of its equity portfolio. Supervisors, in their evaluations of institutions' internal models, would consider, among other factors, 1) the nature of equity holdings including the number and type of equities (for example, public, private, long, short), 2) the risk character and

makeup of institutions' portfolio holdings, including the extent to which publicly available price information is obtainable on them, and 3) the level and degree of concentration. Institutions with portfolios containing holdings with values that are highly nonlinear in nature (e.g. equity derivatives, convertibles) would be expected to employ an internal model designed to capture the risks associated with these instruments appropriately. Supervisory reviews that find otherwise would not permit the use of these models. Instead, institutions would be subject to risk weights set forth under the simple, market-based approach.

d)   A rigorous and comprehensive regime of stress testing model parameters and assumptions would be expected.

e)   The capital charge computed under the internal models treatment could be no lower than one half than that which would result from application to each equity position of the simple market-based approach.

Data considerations

The data used to represent return distributions should reflect as long a sample period for which data are available and meaningful in representing the risk profile of equity holdings. At a minimum, the data used should be sufficient to provide statistically reliable and robust loss estimates and should include at least one equity market cycle relevant to the particular holdings -- although more robust data are preferred. In this context and in the interest of ensuring that a model captures all material forms of risk affecting equity returns, institutions should take appropriate measures to limit the potential of both sampling bias and survivorship bias.

Survivorship bias is a particularly important issue in cases where banks choose to use databases of actual returns for private equities. Such bias arises in these data because the returns may reflect only those private equity investment firms that have experienced good returns and, therefore, were exited successfully (i.e. where a true market price has been revealed). In short, the returns on investments that have achieved success measure only the winners -- as opposed to entire population of relevant private equities (including those that failed). This imparts an upward bias on the ex-ante returns expected by banks.[11] Accordingly, banks that choose to use actual return statistics for individual private equity investments or private equity funds, whether provided by external vendors or internally generated data bases, should fully understand how these statistics are computed and, where necessary, make adjustments to account for any selection biases that may be present.

It is recognised that there are significant challenges associated with deriving market-based measures of risk for both privately held and publicly traded equities where objectively determined market prices may not be readily available. Accordingly, banks with significant equity holdings with these characteristics may need to use proxies in modelling the risks associated with these holdings. Where proxies are used, banks are expected to be able to

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[11]   To understand the effects of the fact that private equity investments are much more likely to go public when their value has risen, suppose that every private equity firm goes public when its value has grown by a factor of 10. In this case, every measured return is exactly 1,000 percent. Firms that have not reached this value remain private and are critically absent from the return database. Consequently, the mean measured return is 1,000 percent with a volatility of zero. Obviously, these are biased and optimistic estimates of the true mean and risks posed by such investments. See Cochrane, John H, "The Risk and Return of Venture Capital", NEBR Working Paper series, WP8066, January 2001.

demonstrate empirically that they adequately capture the risks of the underlying private equity portfolio. Where proxies and mapping are employed, institutions must have performed and documented rigorous analysis demonstrating that all chosen proxies and mappings are sufficiently representative of the risk of the equity holdings to which they correspond. The documentation should show, for instance, the relevant factors (e.g. business lines, balance sheet characteristics, geographic location, company age, industry sector and subsector, operating characteristics) used in mapping individual investments into proxies. In summary, institutions must demonstrate that the proxies and mappings employed:

a)   Are adequately comparable to the underlying holding or portfolio;

b)   Are derived using historical economic and market conditions that are relevant to the underlying holdings or, where not, that an appropriate adjustment has been made.

c)   Are robust estimates of the potential risk of the underlying holding.

It is recognised that the quarterly time horizon poses certain challenges to estimating equity excess returns and return volatilities for certain types of VaR models. It is expected that institutions will use to the fullest extent all of the available data on a specific holding. In constructing VaR models estimating potential quarterly losses, institutions may use quarterly data or convert shorter horizon period data to a quarterly equivalent using the square root of time where analytically appropriate. For example, volatilities based on monthly return data could be converted to quarterly – although the use of daily data would clearly be inappropriate. When employing such transformations, institutions would be expected to provide empirical evidence supporting their choice of the estimation timeframe, and to show how this timeframe does not invalidate the normality assumption required by the square root of time rule.

Stress testing

Banks that use the internal models approach to compute a capital charge for equity positions in the banking book would be expected to have in place a rigorous and comprehensive stress testing program. Stress testing of these processes is an important tool in assessing their robustness to normal and extreme variations in market conditions. As such, it facilitates an evaluation of equity performance estimates during extreme market conditions. For example, supervisors would expect to see banks subject their internal model and estimation procedures, including volatility computations, to either hypothetical or historical scenarios that reflect worst-case losses given underlying positions in both public and private equities. If these tests indicate the potential breakdown in internal modelling assumptions, a bank would be expected to reassess its existing assumptions and, where necessary, make appropriate changes. At a minimum, stress tests should be employed to provide information about the effect of tail events beyond the level of confidence assumed in the internal models approach. This information should provide greater transparency and awareness about potential weaknesses in the bank's internal modelling processes.

Qualitative standards

In general, IRB banks would be expected to utilise sound risk management practices pursuant to Annex 1 that are appropriate for the sophistication of the institution and the complexity of its equity holdings. In particular, institutions should have established policies and procedures to ensure the integrity of the modelling process used to derive regulatory capital standards including:

a)   Policies and procedures to ensure that proxies and mapping techniques are reviewed periodically and that they continue to reflect accurately the risks of the equity portfolio. Review procedures would include, for instance, a stress testing program that would evaluate the robustness of the estimation processes to adverse market environments.

b)   Established systems for ensuring compliance with regulatory capital standards and for ensuring that independent reviews of the internal model's processes, including direct verification of risk computations, are conducted on a periodic and regular basis. These reviews could be carried out, for instance, as part of the internal or external audit programs or could be conducted by an independent risk control unit.

c)   Internal models that are fully integrated into the overall management information systems of the institution and must be used in the management of the banking book equity portfolio. Internal models should be fully integrated into the institution's risk management infrastructure and should be used to establish equity price risk limits, evaluate overall capital adequacy, measure and assess equity portfolio performance (including the risk-adjusted performance), and allocate economic capital to equity holdings. The institution should be able to demonstrate, through for example, investment committee minutes, that internal model output is used in the investment management process.

d)   A process for periodically validating both the internal equity risk measures and the techniques used to estimate these measures. It is recognised that model validation presents significant challenges given the limited number of observations resulting from the use of a quarterly (or annual) time horizon. The requisite number of observations to conduct statistically powerful backtests would arise only after a significant number of years when using a quarterly time horizon. In light of such challenges, industry input on the validation techniques that could be used by supervisors in evaluating both VaR and non-VaR methodologies is being solicited.

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Annex 3

Background empirical work underlying the proposed risk weights for the simple market-based approach.

Introduction

In investigating alternative market-based approaches for assessing capital on equity holdings in the banking book, limited statistical analyses of the historical volatility of various equity market indices were conducted. In addition, various studies on the historical performance of private equity investments were reviewed. This Annex summarises some of the preliminary background work that has focused on identifying potential risk weights to be used in the simple market-based approach. Additional work is expected along these lines as the simple approach is finalised.

Publicly-traded equity

The analysis conducted for publicly traded equities used equity index data from two popular sources: Morgan Stanley Capital International (MSCI) and Ibbotson Associates. MSCI indices are standard benchmarks used widely by global portfolio managers.[12] Several broad-based world and regional composite indices, as well as several country-specific indices were selected to represent different levels of international equity market diversification. All indices are constructed using market capitalisation weighting and capture 60 percent of the total market capitalisation of the total equity universe in each country and/or in each specific region.[13]

The Ibbotson data provided insights into the risk-return profiles of equities with different market capitalisations. Ibbotson Associates' 2001 *Stocks, Bond, Bills, and Inflation*[TM] *(SBBI) Yearbook* provided the source of equity return series chosen to proxy a variety of equity positions in companies within different size categories. In particular, two return series were computed to proxy the performance of large- and small- (based on market capitalisation) sized companies. The large company stock return series is based on the S&P 500 Composite Index, with dividends reinvested, for the period spanning 1946 to 2000.[14] The small company stock return series is computed based on the fifth capitalisation quintile of stocks traded on the NYSE for the years 1946 to 1981 and the performance of the Dimensional Fund Advisors Small Company Fund for the period 1982 to 2000.[15] Analyses of other SBBI data on mid-cap, low-cap and micro-cap stocks comprising various deciles of

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[12] MSCI estimates that in North America and Asia over 90 percent of institutional equity assets are benchmarked to MSCI indices.

[13] See the MSCI website, www.msci.com, for further information about these series and the methodology used to construct them.

[14] Currently, the S&P 500 Composite includes 500 of the largest stocks (in terms of stock market value) in the United States. Prior to 1957, the index consisted of 90 of the largest stocks.

[15] *See Stocks, Bonds, Bills, and Inflation 2001 Yearbook*, Ibbotson Associates, Inc.

NYSE listed companies were also conducted and, while not summarised in this annex, concluded that the aggregate small-cap index provided a reasonable representation of this market sector for the purposes of this general review.

Return series on smaller stocks were evaluated in light of their potential use as proxies for private equity investments (PEI), the assumption being that the exogenous factors that affect the value of small private companies are the same factors that affect the value of small public companies. In addition, small company indices generally represent the market that serves as the primary exit vehicle for PEI – either through initial public offerings (IPOs) or via company valuation in the case of mergers and buy-outs. While actual valuations of individual PEI companies are obviously company-specific, it is assumed that volatilities and loss percentiles for small capitalisation stocks (or some subset of these stocks) provide useful background for calibrating risk weights for PEIs in the aggregate.

For each of the return series described above, descriptive statistics on annual and quarterly returns were computed, as were expected losses at the 99 and 99.5 percent confidence levels using both a non-parametric approach (i.e. historical simulation based on actual observed historical returns) and a parametric approach (i.e. a standard deviation approach assuming normally distributed returns). Under the historical simulation approach, returns were sorted and loss measures identified as the worst returns corresponding to the worst 99 and 99.5 percentiles. Where no specific observation corresponded with one of the selected percentiles, linear interpolation and extrapolation was used to estimate the associated loss.[16] Under the parametric approach, the standard deviation of returns was computed and then multiplied by the standard normal significance parameter corresponding to the appropriate confidence interval (e.g. 2.58 for a 99.5 percent confidence interval). This total was then adjusted downward by the expected (i.e. mean) excess return of the series to arrive at the loss measure.[17] The preliminary analysis conducted used the entire sample period of available data and further analysis of the implications of alternative sample periods is expected as the simple market-based approach is further developed.[18]

The attached tables summarise the results of the statistical work performed. Table 1 provides descriptive statistics for several return series computed using world, regional, and country-specific MSCI indices spanning the period 1969 to 2000. Table 2 presents value-at-risk (VaR) loss measures derived under non-parametric and parametric approaches for the MSCI series. The reported VaRs are the expected maximum losses at the associated confidence interval per dollar of equity, and, as such, represent potential capital charges under different solvency standards for the various indices. As can be seen, the 99.5 percentile long-run quarterly (annual) losses for the three major MSCI regional indices – World, North America, and EAFE – range between 18 and 24 percent (25 and 45 percent) depending upon the statistical technique used to estimate the series. The parametric

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[16] While this approximation is not valid for the annual return series with a limited number of observations (31 and 55 for the MSCI and Ibbotson series, respectively) it provides a reasonable estimation of the percentiles for quarterly series involving significantly more observations.

[17] With regard to the loss measures derived under the parametric approach, while no formal tests for normality were conducted, the excess skewness and kurtosis measures reported in Tables 1 and 3 for each return series are generally consistent with those for the normal distribution. Furthermore, previous research has shown that the normal distribution is a reasonable working approximation for portfolio returns computed over longer time intervals (e.g., quarterly and annually). Fama, E., *Foundations of Finance*, 1976 is a seminal work in this area.

[18] The distributions of annual and quarterly return series were examined using different starting months. The expected returns and standard deviations of both series were not significantly different across starting months to substantially alter the general observations made.

approach provides lower loss estimates for the quarterly series, while the historical or non-parametric estimated losses are lower for the annual return series. As illustrated in the remainder of Table 2, individual country loss estimates are quite diverse.

Whether benchmark indices adequately represent the risk of an institution's banking book equity portfolio depends on the relative diversification of that portfolio. Obviously, using expected losses computed using a relatively diversified benchmark like the World, North America or EAFE indices would not be appropriate as a proxy for the risk of a portfolio concentrated in one or a few countries. Nevertheless, the loss estimates of these relatively diversified indices could be used to establish a lower bound for a simple capital charge for publicly traded equity holdings in the banking book.

Table 3 reports descriptive statistics (Panel A) and loss measures (Panel B) for return series derived from the Ibbotson data on large-cap and small-cap U.S. stocks. Panel A shows that the long-run average quarterly (annual) return for large cap stocks is 3.28 percent (13.72 percent). The long-run average quarterly (annual) return for small-cap stocks is 3.88 percent (16.08 percent). Consistent with conventional wisdom on the determinants of firm risk, Panel A shows the well understood inverse association between firm size and firm risk – the information (Sharpe) ratio of returns divided by risk (standard deviation of returns) illustrates the higher risk/return profile of smaller stocks. Published research provides significant evidence that firm size (i.e. as proxied by market capitalisation) contributes consistently to explaining differential stock returns in US and international markets (in particular, Japan, UK, Germany, France, and Switzerland).[19]

This inverse association translates into higher loss measures for the small-cap return series versus the large-cap return series. Indeed, Panel B shows that the 99.5 percentile quarterly (annual) loss measures for the small-cap stocks are roughly 1.2 to 1.5 (1.2 to 1.7) times those for large-cap stocks. Non-parametric estimates provide the lower bound in this range. At the same time, the estimated quarterly (annual) losses on US large-cap stocks range between 16 and 22 percent (23 and 29 percent) – somewhat lower than the major MSCI regional indices. This is expected since U.S. large-cap stocks represent one of the most stable subsets of the World and North America MSCI indices.

The analyses conducted thus far have not investigated similar size effects for non-US equities, and this area is expected to be the focus of further work. However, despite the limited analyses performed to date, some generalisations as to the range of possible risk weights for publicly traded equities can be made using the data analysed. If publicly traded equities held in the banking book are primarily considered to be large-capitalisation stocks, the quarterly (annual) loss estimates presented in Table 3 for U.S. stocks of 16 to 22 percent (23 to 29 percent) could provide a possible reference point. Alternatively, quarterly loss estimates of a level estimated for the major MSCI world and regional indices may be reasonable to use under the assumption that banking book public equities represent well-diversified international portfolios. Table 2 illustrates that these loss estimates appear to group around 20 percent. Under these assumptions, 99.5 percentile quarterly loss estimates ranging between 16 and 22 percent would translate into weights that range roughly between 250 percent to 350 percent, taking into account the 1.3 "elements of capital" risk weight adjustment and the current 8 percent total capital requirement. (1.3/.08 x estimated 99.5 percentile loss). The 99.5 percentile losses based on annual return data suggest slightly higher capital charges ranging between roughly 23 percent (see Table 3, Panel B – Large-

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[19] See, for example, Beckers, Stan, "A Survey of Risk Measurement Theory and Practice," in *Risk Measurement and Analysis: Measuring and Modelling Financial Risk*, by Carol Alexander, 1998.

cap Stock) to 30 percent (see Table 2 – World Index) which translate into risk weights ranging roughly from 400 percent to 500 percent. Clearly, such risk weights should be viewed as defining the floor of possible risk weights used in the simple approach since it is unlikely that actual portfolios will exhibit such diversification. At the same time, however, recognition that institutions can take management action within the assumed holding period to mitigate potential losses may serve as rationale for considering such as reasonable minimum capital levels for publicly traded equities.

Private equity investments

Private equity investments (PEI), including start-up, venture capital, leveraged buyout, and mezzanine financing investments pose significant challenges with regard to estimating market volatilities comparable to publicly traded equities and indices. These challenges arise not only because market prices on these investments are unavailable, but also because private investments involve uneven cash flows and have long life cycles. Accordingly, industry practice is to assess the performance of private equity holdings using internal rates of return (IRR) which, by definition, are dollar-weighted returns based on the uneven cash flows involved. These dollar-weighted IRRs are not comparable to the time-weighted returns generally used to assess the performance and compute volatilities for public securities.

While data on the IRRs of private equity investment funds may provide little useful information regarding time-weighted volatilities, they do provide important insights into the risk profile of this asset class. Industry data on the performance of 830 venture and non-venture capital partnerships formed between 1969 and 1994, excluding funds too young to post reliable returns from resold investments, indicate annual net IRRs of 13.3 percent, with a standard deviation across partnerships of about 25 percent. [20] One-fourth of these partnerships have reported annual average net IRRs above 20 percent, while one-fourth posted IRRs of close to or below zero. Industry data on the performance of 320 venture capital partnerships formed between 1976 and 1998 show similar results. In particular, annual net IRRs averaged 14.9 percent, and the standard deviation approximated 69 percent. Further, one-quarter of these partnerships reported annual average net IRRs above 22 percent, while one-quarter posted IRRs below zero. Clearly, these statistics illustrate the wide dispersion in performance that is characteristic of this type of holding.

One simple technique for identifying possible risk weights for private equity investments would be to use return series on publicly traded small-cap stocks as a proxy under the assumption that the exogenous factors that affect the value of small private companies are the same factors that affect the value of small public companies. Moreover, small company equity markets generally represent the market that serves as the primary exit vehicle for PEI – either through IPO or via company valuation in the case of mergers and buy-outs. In addition, publicly traded companies are often used as comparables in management's periodic valuation and performance assessment of their PEI.

Using this simple technique, the data presented in the previous section indicate that the long-run 99.5 percentile quarterly (annual) losses for small-cap stocks (Table 3, Panel B)

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[20] The 830 partnerships include 627 venture capital partnerships and 203 non-venture partnerships; of these, only 43 were formed before 1980. Reported IRRs are net of fees and other expenses. 1999 Investment Benchmarks Report, Venture Capital, and 1999 Investment Benchmarks Report, Buyouts and Other Private Equity, Venture Economics, Newark, NJ, 1999.

range between 25 to 28 percent (29 to 48 percent). Assessing capital equal to these quarterly loss estimates translates into risk weights of approximately 400 to 450 percent on a quarterly basis and 500 to 780 percent on an annual basis [21] These risk weights assume that the return distribution for small-cap stocks is a suitable proxy for the risk of PEIs and, moreover, that PEI portfolio diversification is similar to that of the underlying small stock portfolio. Clearly, risk weights calibrated to a quarterly (annual) return horizon in the range of 400 to 500 percent (500 to 800 percent) would represent a lower bound for PEI.

The work conducted in identifying possible PEI risk weights for the simple approach also entailed reviews of various studies on the risk-return profile and estimated time-weighted returns of this asset class. However, researchers have pointed out that many of the risk-return metrics on PEIs are often inherently biased upward.[22] This bias stems from the fact that only returns for PEI that have either gone public or been acquired are reflected in these data bases. The probability of a venture capital investment going public or being acquired (and therefore of its price being observed in the market), however, is an increasing function of the underlying project's return.

Cochrane (2001) presents a technique for overcoming this bias and derives risk-return metrics for *all* (as opposed to only those that go public or get acquired) venture capital investments.[23] Such statistics provide better benchmarks for understanding the impact of a market-based capital charge for PEIs since they also capture the performance of investments that generate low returns (i.e. those that remain private). He derives several useful statistics using data on venture capital investments that come from the proprietary VentureOne database.

The table below reports descriptive statistics on annualised returns for approximately 17,000 venture capital financing rounds that occurred from the beginning of 1987 to June 2000 as reported in Cochrane (2001). Cochrane uses the financing round as the basic unit of analysis and computes returns as the percentage change from one financing round to the next, normalised to an annual basis.[24] Additionally, the underlying return data have been corrected to account for sample selection bias discussed above.

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[21] These risk weights are computed by multiplying the capital charge by 16.25 (i.e., 1.3/.08) reflecting both the current 8 percent risk based capital requirement and the 1.3 "elements of capital" scaling factor.

[22] See, for example, Cochrane, John H., "The Risk and Return of Venture Capital," NBER Working Paper 8066, January 2001.

[23] In particular, Cochrane uses a maximum likelihood estimation procedure to correct for the selection bias that results from not observing returns for projects that remain private (i.e. do not go public or are not acquired by a third party). See Cochrane, John H., "The Risk and Return of Venture Capital," NBER Working Paper 8066, January 2001 for the complete discussion of this model.

[24] More precisely, Cochrane computes returns as the logarithm of changes in round value and assumes a three-month time period between each round when deriving annual log returns. Arithmetic averages and standard deviations are reported in this paper.

Return Statistic	Venture Capital Returns	S&P 500 Returns 1987 to 2000	1991 to 2000
Mean	56.9%	17.2 %	19.7%
Standard Deviation	119.0%	13.0%	11.3%
Coefficient of Var.	2.09	0.76	0.57
Sharpe Ratio	0.48	1.32	1.75
Number Observations	16,720		

The adjusted mean and standard deviation for venture capital projects are quite large at approximately 57 percent and 119 percent, respectively. The standard deviation for venture capital investments is significantly higher than the 13 percent reported for the S&P 500 for the same time frame and, not surprisingly, suggests that the risk of these investments is much higher than publicly traded investments. Furthermore, the above statistics show that the return distribution for private equity investments is positively skewed, indicating that performance of these investments is relatively diverse. More specifically, the distribution of these investments reflects the significant tradeoffs between a high frequency of failed PEIs and their impact on expected returns versus extreme returns for successful PEIs. This trade-off is especially evident by the notably lower return-risk ratios (i.e. the Sharpe ratio) for PEIs.

While the results of this one study may not be sufficient to adequately calibrate a simple risk weight for PEI, they do illustrate a significantly higher risk-return profile for PEI than is implied in the use of small-cap stocks as a proxy. Accordingly, pending further research, consideration should be given to establishing higher simple approach risk weights for private equity holdings than the 400 to 500 percent weights (500 to 800 percent weights) implied by the quarterly (annual) loss estimates derived using long-run returns on US small-cap stocks.

The work conducted thus far, and summarised above, on the possible risk weights that could be used in a simple risk weighting approach should be viewed as preliminary and as a starting point for further investigation.

Table 1

Descriptive statistics for MSCI index based return series

MSCI Indices	Dates Available	Annual Returns						Quarterly Returns					
		Min	Max	Mean	Standard Deviation	Skew	Kurtosis	Min	Max	Mean	Standard Deviation	Skew	Kurtosis
Regional Indices													
THE WORLD INDEX	1969 – 2000	-27.832%	39.105%	9.629%	16.067%	-0.50	-0.09	-23.618%	24.634%	2.362%	8.066%	-0.27	1.29
NORTH AMERICA	1969 – 2000	-29.860%	33.650%	9.908%	15.740%	-0.63	0.15	-25.366%	21.236%	2.445%	8.127%	-0.48	1.18
EAFE	1969 – 2000	-25.597%	66.799%	11.098%	21.443%	0.41	0.34	-21.963%	30.539%	2.620%	9.238%	0.06	0.92
EUROPE	1969 – 2000	-26.857%	73.312%	10.494%	19.913%	0.82	2.02	-20.725%	34.100%	2.505%	8.694%	0.19	1.34
NORDIC COUNTRIES	1969 – 2000	-22.445%	85.106%	15.327%	24.782%	0.58	0.80	-20.674%	52.443%	3.590%	10.620%	0.59	3.08
PACIFIC	1969 – 2000	-34.955%	102.319%	14.044%	32.620%	0.89	1.01	-30.271%	35.620%	3.079%	12.001%	0.00	0.31
FAR EAST	1969 – 2000	-35.403%	127.091%	15.938%	36.094%	1.17	1.99	-30.984%	36.779%	3.431%	12.602%	0.05	0.21
Country-Specific Indices													
Australia	1969 – 2000	-37.215%	49.598%	6.486%	24.119%			-42.356%	30.139%	1.686%	11.966%		
Austria	1969 – 2000	-23.488%	172.030%	10.530%	37.532%			-29.189%	55.975%	2.199%	11.597%		
Belgium	1969 – 2000	-26.006%	71.861%	10.855%	24.708%			-22.523%	33.785%	2.580%	10.571%		
Canada	1969 – 2000	-29.959%	51.781%	8.485%	17.736%			-25.783%	30.135%	2.176%	9.519%		
Denmark	1969 – 2000	-36.770%	102.325%	13.548%	28.050%			-19.956%	45.393%	2.990%	9.953%		
France	1969 – 2000	-34.441%	78.445%	12.374%	28.013%			-37.600%	40.506%	2.975%	12.521%		
Germany	1969 - 2000	-26.728%	131.453%	11.870%	28.720%			-25.148%	35.227%	2.720%	10.674%		
Hong Kong	1969 - 2000	-59.122%	157.084%	23.107%	48.464%			-50.110%	73.144%	5.389%	20.709%		
Italy	1969 - 2000	-34.889%	127.557%	10.001%	37.775%			-26.529%	70.525%	2.192%	14.623%		
Japan	1969 - 2000	-36.432%	121.165%	15.859%	35.754%			-32.144%	39.568%	3.452%	12.856%		
New Zealand	1969 - 2000	-40.321%	109.817%	10.479%	45.047%			-47.557%	39.587%	1.815%	14.512%		
Spain	1969 - 2000	-39.314%	112.769%	8.132%	31.090%			-36.574%	66.755%	1.829%	13.242%		
Sweden	1969 - 2000	-25.406%	77.763%	15.769%	26.404%			-29.118%	45.926%	3.759%	12.009%		
Switzerland	1969 - 2000	-15.416%	102.476%	13.480%	24.665%			-21.492%	38.938%	3.214%	10.408%		
United Kingdom	1969 - 2000	-54.622%	103.455%	11.585%	27.781%			-30.329%	79.406%	2.649%	12.220%		
USA	1969 - 2000	-30.862%	34.737%	9.753%	16.319%			-26.669%	21.813%	2.399%	8.228%		

Table 2
Equity VaR percentiles
Source of index data: Morgan Stanley Capital International Inc. (www.msci.com)

MSCI Indices	Time Period	Annual Return Series				Quarterly Return Series			
		Parametric Approach		Non-parametric Approach*		Parametric Approach		Non-parametric Approach*	
		99th	99.5th	99th	99.5th	99th	99.5th	99th	99.5th
Regional Indices									
THE WORLD INDEX	1969-2000	-27.75%	-31.76%	-25.08%	-26.46%	-16.40%	-18.42%	-18.48%	-20.59%
NORTH AMERICA	1969-2000	-26.71%	-30.64%	-26.18%	-28.02%	-16.46%	-18.49%	-22.28%	-24.31%
EAFE	1969-2000	-38.79%	-44.14%	-25.33%	-25.46%	-18.87%	-21.18%	-21.21%	-21.70%
EUROPE	1969-2000	-35.83%	-40.80%	-23.54%	-25.20%	-17.72%	-19.89%	-18.43%	-19.43%
NORDIC COUNTRIES	1969-2000	-42.32%	-48.51%	-22.07%	-22.26%	-21.12%	-23.77%	-19.81%	-20.29%
PACIFIC	1969-2000	-61.84%	-69.98%	-32.39%	-33.67%	-24.84%	-27.83%	-24.28%	-26.71%
FAR EAST	1969-2000	-68.03%	-77.04%	-33.06%	-34.23%	-25.98%	-29.12%	-24.51%	-27.55%
Country-Specific Indices									
Australia	1969-2000	-49.62%	-55.64%	-34.17%	-35.69%	-26.15%	-29.14%	-35.09%	-39.30%
Austria	1969-2000	-76.78%	-86.15%	-21.13%	-22.31%	-24.78%	-27.67%	-23.75%	-26.88%
Belgium	1969-2000	-46.62%	-52.79%	-25.38%	-25.69%	-22.01%	-24.65%	-22.05%	-22.29%
Canada	1969-2000	-32.78%	-37.20%	-25.57%	-27.77%	-19.97%	-22.34%	-21.53%	-23.29%
Denmark	1969-2000	-51.71%	-58.71%	-34.49%	-35.63%	-20.16%	-22.65%	-18.12%	-19.34%
France	1969-2000	-52.79%	-59.79%	-32.23%	-33.34%	-26.15%	-29.28%	-23.45%	-29.23%
Germany	1969-2000	-54.94%	-62.11%	-26.50%	-26.62%	-22.11%	-24.78%	-22.85%	-24.75%
Hong Kong	1969-2000	-89.64%	-101.73%	-55.64%	-57.38%	-42.79%	-47.96%	-45.79%	-48.35%
Italy	1969-2000	-77.88%	-87.31%	-33.05%	-33.97%	-31.83%	-35.48%	-24.98%	-25.69%
Japan	1969-2000	-67.32%	-76.24%	-34.06%	-35.25%	-26.46%	-29.66%	-24.84%	-28.14%
Spain	1969-2000	-64.19%	-71.95%	-39.29%	-39.30%	-28.98%	-32.28%	-25.76%	-30.09%
Sweden	1969-2000	-45.66%	-52.25%	-24.71%	-25.06%	-24.18%	-27.18%	-23.22%	-25.52%
Switzerland	1969-2000	-43.90%	-50.06%	-15.36%	-15.39%	-21.00%	-23.60%	-20.92%	-21.23%
United Kingdom	1969-2000	-53.04%	-59.98%	-46.70%	-50.51%	-25.78%	-28.83%	-19.13%	-23.59%
USA	1969-2000	-28.21%	-32.28%	-27.22%	-29.04%	-16.74%	-18.80%	-22.29%	-24.74%

*Computed based on historical observations of respective MSCI return series for the period 1969 to 2000.

Table 3

Descriptive statistics and loss measures for Ibbotson return series

Panel A: Descriptive statistics

Return Series	Dates Available	Obs.	Minimum	Maximum	Mean	Median	Standard Deviation	Information Ratio	Skew	Kurtosis
Large Stock:										
Annual Series	1946-2000	55	-26.47%	52.62%	13.72%	16.48%	16.52%	83.05%	(0.11)	(0.38)
Quarterly Series	1946-2000	220	-25.16%	22.94%	3.28%	3.82%	7.61%	43.10%	(0.49)	1.44
Small Stock:										
Annual Series	1946-2000	55	-30.90%	83.57%	16.08%	17.62%	24.64%	65.26%	0.35	(0.09)
Quarterly Series	1946-2000	220	-32.70%	44.26%	3.88%	3.82%	11.56%	33.56%	0.02	1.02
Value-Weighted NYSE*	1946-1998	53	-26.91%	50.09%	13.67%	16.04%	16.29%	83.92%	(0.15)	(0.26)

*Value-Weighted NYSE series reflect statistics based on annual returns only.

Panel B: Historical simulation and statistical equity VaR percentiles

Ibbotson Return Series/ VaR Method	Time Period	Annual Returns				Quarterly Returns			
		95th	97th	99th	99.5th	95th	97th	99th	99.5th
Large Stock:									
Historical Simulation	1946 – 2000	-10.16%	-12.25%	-20.09%	-23.28%	-8.87%	-11.27%	-20.13%	-22.44%
Statistical Approach	1946 – 2000	-13.41%	-17.30%	-24.65%	-28.77%	-9.26%	-11.06%	-14.46%	-16.36%
Small Stock:									
Historical Simulation	1946 – 2000	-20.43%	-22.89%	-27.74%	-29.32%	-14.85%	-18.09%	-26.53%	-28.35%
Statistical Approach	1946 – 2000	-24.45%	-30.27%	-41.24%	-47.39%	-15.13%	-17.86%	-23.01%	-25.89%
Value-weighted NYSE Stocks									
Historical Simulation	1946 – 1998	-9.81%	-10.27%	-17.45%	-17.45%	N/A	N/A	N/A	N/A
Statistical Approach	1946 – 1998	-13.13%	-16.97%	-24.23%	-28.29%	N/A	N/A	N/A	N/A

Annex 4

Standards for implementing the PD/LGD approach

In the January consultative paper it was stated that the Committee believed that more than one approach to equity capital requirements would be necessary. The Committee has identified two broad approaches for further consideration. One is a PD/LGD based approach that would be conceptually similar to that adopted for corporate debt. This annex describes the PD/LGD approach for calculating minimum capital requirements on equity holdings in the banking book. It also specifies the qualitative and quantitative standards to be used in implementing the approach.

Outline

As stated above, the Committee believes that the PD/LGD approach should be conceptually similar to that adopted for corporate debt. The outline for equity exposures is therefore basically oriented to the statements and definitions applying to the IRB approach for corporate exposures referred to in Consultative Paper 2.

The derivation of risk weights for equity exposures (RW_E) is dependent on estimates of the PD, LGD. Whether maturity (M) will be considered for equity exposures is still under discussion.

Probability of default (PD) for equity exposures

To use the PD/LGD for equity exposures, banks will be required to estimate PDs for their equity exposures. The PD of an exposure is the greater of the one-year PD associated with the internal rating grade to which that exposure is assigned, or 0.03%. The minimum requirements for the derivation of the PD estimates associated with each internal rating grade are outlined below.

Loss given default (LGD) for equity exposures

Equity exposures will be assigned a 100% LGD compared to 50% LGD for senior claims on corporates and 75% LGD for subordinated claims on corporates. This assignment takes into account the nature of equity, which is the most subordinated form of capital. Banks will not be allowed to use their own LGD estimates under the (foundation) PD/LGD approach to equity exposures.

Maturity (M) for equity exposures

How maturity will be incorporated into the PD/LGD framework is still under consideration. On the one hand, a fixed LGD of 100% has to be used, and no own-estimates of LGD are allowed. The PD/LGD approach can therefore be viewed as a foundation approach, where, consistent with the IRB for corporate exposures, the effective maturity (M) assigned to all exposures should be the same (currently set at three years). On the other hand, equity has indefinite maturity and this should be covered explicitly within the PD/LGD approach. In this

case, the effective maturity will be seven years because the maturity for corporate exposures is not greater than seven years in any case. (Account will need to be taken of any further developments in the approach to maturity taken in the IRB corporate portfolio.)

Calculation of the risk weights (RW$_E$) for equity exposures

As noted above the PD/LGD approach for equity is intended to be conceptually similar to that adopted for corporate debt. The existing benchmark risk weights for C&I exposures are therefore used for equity exposures as well. The higher credit-related risks associated with equity is taken into account by using an LGD of 100%. Consideration is still being given to the possible need to scale up the resulting risk weights for equity by a certain fixed factor (1.5) to take into account the "later" outcome of definition of default for equity compared to debt. This would be available for those holdings where no default estimations for associated debt positions is possible (including where such debt does not exist).

Given an LGD of 100%, equity exposures will receive a risk weight that depends on the probability of default (PD), if the average maturity of all exposures is assumed to be three years. Thus, an exposure's risk weight, RW$_E$, can be expressed as a function of PD according to the following formula. In this equation, PD is expressed as a whole number – e.g. a PD of 10% would be input as 10.

$$RW_E = 2 \times BRW_C \ (PD), \text{ or } 1250, \text{ whichever is smaller.}[25]$$

In this expression, RW$_E$ denotes the risk weight associated with given values of PD for equity exposures, while BRW$_C$ denotes the corporate benchmark risk weight associated with a given PD, as defined in paragraph 174 of Consultative Paper 2, which is calibrated to an LGD of 50%. The BRW$_C$ assigned to each exposure reflects the PD of the exposure based on the following equation. In this equation, PD is expressed as a decimal – e.g. a PD of 10% would be input as 0.1.

$$BRW_C \ (PD) =$$
$$976.5 \times N \ (1.118 \times G \ (PD) + 1.288) \times (1 + .0470 \times (1 - PD) / PD^{0.44})[26]$$

where N(x) denotes the cumulative distribution function for a standard normal random variable (i.e. the probability that a normal random variable with mean zero and variance of one is less than or equal to *x)*, and where $G(z)$ denotes the inverse cumulative distribution function for a standard normal random variable (i.e. the value *x* such that $N \ (x) = z$).

If a maturity of explicitly seven years instead of the average three years were to be taken into account, the exposure's risk weight would be scaled upward. Thus, a corporate exposure's risk weight, RW$_C$, can be expressed as a function of PD (and M=7) according to the following formula:

$$RW_E = 2 \times BRW_C \ (PD) \times [1 + b \ (PD) \times 4], \text{ or } 1250, \text{ whichever is smaller.}$$

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[25] The purpose of the cap is to ensure that, prior to the granularity adjustment (see below), no risk weight can be more penal than would be the effect of deducting from capital the exposure's expected loss in the event of default.

[26] The functions N and G in the equation are generally available in spreadsheet and statistical packages. For both functions, the mean should be set at zero, and the standard deviation should be set at one.

The sensitivity of the maturity adjustment factor to M is denoted by b, and depends on PD.

In all cases RW_E can't be less than the 100% risk weight resulting from the standard approach.

As the PD/LGD approach focuses on credit or credit-related losses, net short positions of equity would get no capital charge. This is consistent with the IRB approach for C&I.

The granularity adjustment

For the incorporation of equity positions in the calculation of a granularity measure for the large C&I portfolio the counterpart can be treated like a loan customer. In order to ensure overall consistency in the new Capital Accord, the inclusion of equity positions in the granularity adjustment appears necessary given the fact that highly diversified equity portfolios in the trading book gain a preferential treatment because of reduced risk. C&I debt and equity positions of the same counterparty should be aggregated.

Standards for the PD/LGD approach

Standards for the PD/LGD approach for equity positions should be consistent with the already existing minimum requirements for C&I exposures, especially as the basic framework of the C&I IRB approach is utilised in the PD/LGD equity approach. In particular, the definition of default is based on the exposure being treated as a loan and the estimation of PD being based on conditions similar to those applying if the exposure were a loan. Except as noted below, the C&I standards thus apply.

The main possible differences between rating systems for equity and C&I rating systems lie in the assessment of performance prospects (expected rates of return) with regard to credit risk and the use of business plans submitted by the corresponding firm. There are several possible ways of classifying equity positions, which can serve as a basis for a rating scheme; for example:

- Focusing primarily on balance sheet data and other potentially, mainly qualitative available information; broadly comparable to debt ratings.

- A rating methodology where the bank analyses forward-looking information that is commonly provided for assessing the performance prospects (expected rate of return) on equity positions with regard to credit risk. This analysis is often done for "young companies" and is at least based on a business plan submitted by the firm. The plausibility of the business plan and positive or negative deviations from the business plan have to be taken into account.

- Focusing on the expected internal rate of return. The idea here is that a higher expected rate of return implies a higher risk (of default). Especially in the case of venture capital positions where a high internal rate of return is expected there is no need for a bank to have high leverage ratios in order to earn enough return on equity. Consequently, relatively high economic capital charges are often used.

The following quantitative standards for PD estimation which are similar to those proposed for C&I PD estimation in the January 2001 consultative paper should be applied. Hence, standards for PD estimation are needed which should be regarded as minimum requirements

for the approval of the approach. Furthermore, the same qualitative standards have to be met for equity as for C&I.

Proposed standards for PD estimation

The bank must estimate a one-year PD for each of its internal equity rating grades. Each estimate of PD must represent a conservative view of a long-run average PD for the internal rating grade in question, and thus must be based on historical experience and empirical evidence. At the same time, these estimates must be forward-looking. In meeting these requirements, banks may incorporate relevant adjustments based on a variety of factors. Such adjustments must be applied through a well-developed and well-documented thought process and analysis. Furthermore, they should be based on available empirical evidence and other historical information such as a material change in default rates or in the key drivers of future default. Where adjustments are made, the bank must ensure that they are applied conservatively and consistently over time.

Banks must basically use the same definition of default as that used for corporate exposures when estimating PD and collecting default data from their own experience. The definition is assessed as if the bank had debt of the counterparty (whether or not it has in practice). A minor modification is to add that any distressed restructuring of the equity itself also triggers default. External data sets used for estimating PDs must also be consistent with the reference definition of default.

Banks must document the specific definition of default used internally, and demonstrate its consistency with the reference definition. Conceivably, it may be possible to develop a technique through which PDs derived by a bank using definitions of default which were not consistent with the reference definition could be mapped to the reference definition.

Banks should consider all available information for estimating the average PD per grade. Banks may have a primary source of information, and use others as a point of comparison and potential adjustment to the initial PD estimate. Banks must recognise the importance of judgmental considerations in this process, particularly in ensuring a forward-looking PD estimate. Such judgement must be applied with a conservative bias. The degree of conservatism must be generally consistent over time.

On an ongoing basis, banks are required to have PD estimates that are properly calibrated, and which incorporate new information promptly as it becomes available. As a minimum, banks should review their PD estimates on a yearly basis.

A bank may use data on internal default experience for the estimation of PD. If only limited data are available, the bank should adopt a conservative bias in its estimate of PD.

The use of pooled data across institutions will also be recognised. A bank must demonstrate that the internal rating systems and criteria of other banks in the pool are comparable with its own.

The use of mapping techniques will also be recognised. Banks are allowed to attribute a PD to each internal equity grade in associating or mapping their internal equity grades to other scales (for example, internal C&I rating scale or scales used by an external credit assessment institution or similar institution), and then attribute the default characteristics observed for the other considered grades to the bank's grades.

Banks must provide meaningful mapping to the data set used and avoid possible bias or inconsistencies in the approach or underlying data. As such, the bank must demonstrate that

its internal rating criteria are comparable to those used in creating or differentiating the default frequencies embedded in the data source used. The analysis must also include comparison of the default definition used.

The bank must demonstrate that the population of equities represented in the data is representative of the population of the banks' actual equity portfolio.

Irrespective of whether a bank is using external, internal, pooled data sources, or a combination of the three for its PD estimation, the length of the underlying historical observation period used must be at least five years. If the available observation period spans a longer period, this longer period should be used.