

**INTERIM PRUDENTIAL SOURCEBOOK FOR INVESTMENT BUSINESSES
(MARKET RISK) INSTRUMENT 2004**

Powers exercised

- A. The Financial Services Authority makes this instrument in the exercise of the following powers and related provisions in the Financial Services and Markets Act 2000 ("the Act"):
- (1) section 138 (General rule-making power);
 - (2) section 156 (General supplementary powers); and
 - (3) section 157 (Guidance).
- B. The rule-making powers listed above are specified for the purpose of section 153(2) (Rule-making instruments) of the Act.

Commencement

- C. Annex A comes into force on 1 July 2004. Annexes B, C and D to this instrument come into force on 1 July 2005.

Amendments to the Interim Prudential sourcebook for Investment Businesses

- D. The Interim Prudential sourcebook for Investment Businesses is amended in accordance with the Annexes to this instrument.

Citation

- E. This instrument may be cited as the Interim Prudential Sourcebook for Investment Businesses (Market Risk) Instrument 2004.

By order of the Board
20 May 2004

Annex A

Transitional provisions

In this Annex, underlining indicates new text.

Insert before Chapter 1 a new transitional provision as follows:

Transitional provisions

1 Table Transitional provisions applying to IPRU(INV)

(1)	(2)	(3)	(4)	(5)	(6)
	Material to which the transitional provision applies		Transitional provision	Transitional provision: dates in force	Handbook provision: coming into force
...					
<u>2</u>	<u>The provisions of IPRU(INV) added by the Interim Prudential Sourcebook for Investment Firms (Market Risk) Instrument 2004</u>	<u>R</u>	<p><u>(A) A securities and futures firm which is an investment firm may treat the material in column (2) of paragraph 2:</u></p> <p><u>(a) as being in force; and</u></p> <p><u>(b) as having replaced the material in IPRU(INV) that will be amended or deleted by the Interim Prudential Sourcebook for Investment Firms (Market Risk) Instrument 2004; at any time when this transitional provision is in force.</u></p> <p><u>(B) For this purpose, the following applies.</u></p> <p><u>(a) A firm must notify the FSA if it takes advantage of this transitional provision.</u></p> <p><u>(b) A firm's choice to take advantage of this transitional provision takes effect when notified to the FSA under (a).</u></p> <p><u>(c) A firm must not revoke the choice to make use of this transitional provision.</u></p> <p><u>(d) Any choice to take advantage of this transitional provision:</u></p> <p><u>(i) applies on a consolidated</u></p>	1 July 2004 – 30 June 2005	The material in the Interim Prudential Sourcebook for Investment Firms (Market Risk) Instrument 2004 comes into force for all securities and futures firms that are investment firms on 1 July 2005.

(1)	(2) Material to which the transitional provision applies	(3)	(4) Transitional provision	(5) Transitional provision: dates in force	(6) Handbook provision: coming into force
			<p><u>basis and a solo basis; and</u></p> <p><u>(ii) applies to all the material in column (2) of paragraph 2 and not part only.</u></p> <p><u>(e) A <i>firm</i> must not take advantage of this transitional provision unless every <i>firm</i> in its consolidated group to which this transitional provision can apply does so too in accordance with (b).</u></p> <p><u>(f) The Glossary in chapter 10 of <i>IPRU(INV)</i> applies to italicised terms in this transitional provision.</u></p>		

Annex B

Amendments to Chapter 10

In this Annex, underlining indicates new text and striking through indicates deleted text. Where an entire section of text is being deleted, the place where the change will be made is shown and the text is not struck through.

Valuation of positions

- 10-41(9) R A *firm* must value both *trading book* positions and *non-trading book investment* positions on a prudent and consistent basis, as well as having regard to the liquidity of the instrument concerned and any special factors which may adversely affect the closure of the position, and must adopt the following general policies:
- (a) a position must be valued at its close out price (close out price means that a long position is to be valued at current bid price and a short position at current offer price); where firm two way prices are not available a *firm* must value its position in accordance with the notes to this rule;
 - (b) ~~where a *firm* has been granted a modification or waiver by the FSA to use a risk assessment model in the calculation of its PRR on *options* positions (as described in the guidance at 10-82(4) and 10-101(2)), it may value its *options* using the values derived from the model;~~
where a *firm* has been granted a modification or waiver by the FSA to use a CAD1 or VaR model in the calculation of its PRR (as described in the guidance at Appendix 10 and 11), it may value its positions in instruments within the scope of that waiver using the values derived from the internal valuation model(s) that the firm uses to produce feeds for that CAD1 or VaR model.
 - (c) ~~where a *firm* does not use a model as described in (b) above and prices are not published for its *options* positions where prices are not published for its *options* positions and a *firm* does not have a waiver to use a model to value them,~~ it must determine the *mark to market* value of standard European and American *options* as follows:
 - (i) for purchased options, the *mark to market* value must be the in the money amount multiplied by the quantity underlying the *option*;
 - (ii) for written *options* the *mark to market* value must be the sum of:
 - (aa) the *in the money* amount multiplied by the quantity underlying the option; and
 - (bb) the initial premium received for the *option*;

G Where a *firm* has been granted a waiver by the *FSA* to use a CAD1 or VaR model in the calculation of its *PRR* or *FER* (as described in the guidance in Appendix 11 and 12), it may value its positions in instruments that come within the scope of that waiver using the values derived from the internal valuation models that the *firm* uses to feed that CAD1 or VAR model;

G If a written *option* was *in the money* at the time the contract was written, *in the money* amount in (aa) may be taken to be the current *in the money* amount less the *in the money* amount at the time the contract was written.

...

Valuing instruments at maximum loss

10-41(11) R A *firm* may exclude a position from its *PRR*, *CRR* and *LER* calculations if it values the position in either of the two following ways and it notifies the *FSA* in writing that it is doing so:

(a) a short position that is valued at maximum loss; or

(b) a long position that is valued at zero.

G For example, a *firm* might write a one touch digital *option* which requires the *firm* to pay out £100 where the price of the underlying exceeds a certain threshold. In the worst case (including ignoring the time value of money) the *firm* would lose £100 overall. If the *firm* valued this position at -£100 it would not have to include this position in its *PRR*, *CRR* and *LER* calculations.

...

10-64 LIQUIDITY AJUSTMENT

General rule

10-64 (1) R A *firm's* liquidity adjustment for its assets must be calculated -

(a) for *illiquid assets*, other than *commodities*, in accordance with rule 10-65;

(b) for other *non-trading book* assets, other than *commodities*, in accordance with rule 10-66; and

(c) for all *commodities* in accordance with ~~rule 10-166~~ appendix 6 (commodities *PRR*) and rule 10-170 (*CRR*).

...

PRIMARY REQUIREMENT

10-71 R A *firm's* primary requirement is the higher of:

- (a) the sum of its *PRR*, ~~*FER*~~, *CRR*, *LER* and base requirement (calculated in accordance with rule 10-72); or
- (b) the *firm's initial capital requirement* for a *category A, B, C* or *D firm*, calculated in accordance with 10-61(8).

BASE REQUIREMENT

10-72 R A *firm's* base requirement must be calculated in accordance with the following formula:

$$\text{Base requirement} = \text{expenditure requirement} \times \left[\frac{\text{expenditure requirement}}{\text{PRR} + \del{FER} + \text{CRR} + \text{LER} + \text{expenditure requirement}} \right]$$

...

Obligation to calculate PRR

10-80(2) R ~~A *firm* must calculate a minimum *PRR* in respect of any position according to one of the methods available under the rules below but it may calculate a higher *PRR* in any other way at its option, provided it is able to demonstrate that, in all circumstances, the calculation being employed does give rise to a higher *PRR* for the position.~~

G ~~A *firm* that wishes to use its internal model to calculate *PRR* in respect of all, or some, of its positions should apply for a modification or waiver from the relevant rules from the *FSA*.~~

G ~~Further guidance on the criteria which such models must meet, and the review process, can be obtained from the *FSA*.~~

A *firm* must calculate a minimum *PRR* as the sum of the minimum *PRRs* calculated in respect of its positions using:

- (a) the *PRR* calculations contained in the rules and appendices listed in the table below; or
- (b) another method provided the *firm* is able to demonstrate that in all circumstances the calculation being employed results in a higher *PRR* for the position than would be required under (a).

Table 10-80(2)R

<u>10-120R</u>	<u>CIS PRR</u>
<u>Appendix 4</u>	<u>Interest rate PRR</u>

<u>Appendix 5</u>	<u>Equity PRR & basic interest rate PRR for equity derivatives</u>
<u>Appendix 6</u>	<u>Commodity PRR</u>
<u>Appendix 8</u>	<u>Foreign exchange PRR</u>
<u>Appendix 9</u>	<u>Option PRR</u>

G A firm may seek a modification or a waiver to 10-80(2)R to use a CAD1 model or a VaR model as the basis for calculating part or all of the PRR on its positions. For further details on the use of such models see appendices 11 and 12 respectively.

G Appendix 7 (underwriting) does not contain a PRR calculation. Instead, it contains requirements on how to derive the net underwriting position or reduced net underwriting position. These positions are then included in the relevant PRR calculation listed above (i.e. appendix 4, appendix 5 or appendix 9, as well as appendix 8 if the position is denominated in a foreign currency).

...

10-81R to 10-111(5) [deleted]

...

10-130 to 10-169B(3) [deleted]

...

Counterparty exposure

10-174(3) R A firm must calculate the counterparty exposure on *derivative* transactions in accordance with either (a), (b) or (c) below:

- (a) where a counterparty has not fully paid a *margin requirement* on a *derivative* transaction listed on an *exchange* or cleared through a clearing house, or met it through the deposit of *acceptable collateral* not otherwise used, a firm must calculate the counterparty exposure as the shortfall;
- (b) where a *firm* sells or writes an *option* to a counterparty or buys an *option* on behalf of a counterparty and the counterparty has not paid the full *option* premium, or met it through the deposit of *acceptable collateral* not otherwise used, it must calculate the counterparty exposure as the uncovered premium on the transaction; or
- (c) a *firm* must calculate the counterparty exposure arising from a *derivative* transaction other than a written or sold *option* or a *derivative* transaction listed on an *exchange* or cleared through a *clearing house*, as the credit equivalent amount calculated in accordance with Table 10-174(3), not covered by the deposit of *acceptable collateral* not otherwise used.

...

If a *firm* uses the modified maturity ladder approach to calculate PRR under ~~rule 10-169~~ 30R of appendix 6, it may use Table 10-174(3B)

...

Calculation of LER

...

- 10-194(3) R Where the value of “R” is less than 25% of the value of *own funds*, the value of “T” may exceed 25% of the value of *financial resources*, subject to an *LER* calculated in accordance with (a) to (e) below –
- (a) calculate the excess of “T” over 25% of the value of *financial resources*, known as “D”;
 - (b) rank the *trading book exposures* in “T” on the basis of the specific risk weighting in the case of *positions*, discounted by the appropriate percentage ~~from table 10-133(5)~~ in accordance with table 27R of appendix 7 in respect of underwriting positions, and the counterparty weighting in the case of counterparty *exposures*, in descending order;
 - (c) sum the *trading book exposures* in “T”, starting with the *exposure* attracting the highest specific risk weighting or counterparty weighting, until the sum equals the excess “D”;

...

INTRA-GROUP OFFSETS AND NETTING

- 10-203 R If a group’s *financial resources*, calculated in accordance with rule 10-201, do not exceed the group’s *financial resources requirement*, calculated in accordance with rule 10-202, the *firm* may take into account:
- (a) the benefits of netting intra-group counterparty exposures;
 - (b) offsetting positions, for the purposes of the rules ~~10-80 to 10-153~~ in appendices 4, 5 and 8, held by different group companies; and
 - (c) the group’s share of capital surpluses in *subsidiaries* not subject to local regulatory capital requirements.

Annex C

Amendments to Chapter 10 Appendices

In this Annex, underlining indicates new text and striking through indicates deleted text. Where an entire section of text is being deleted, the place where the change will be made is indicated and the text is not struck through.

Amend, delete or add definitions to IPRU(INV) Chapter 10 Appendix 1 as shown:

<u>base currency</u>	<u>means the currency currently used by a firm to calculate its financial resource requirements;</u>
<i>basic PRA</i>	means for equities the equity method 1 PRAs in Appendix 49; and for interest rate instruments, the sum of the specific risk PRA and the maturity-based general market risk PRAs in Appendix 53;
<i>eap</i>	means an agreement in respect of a borrowing under which a counterparty contracts to pay any interest costs arising as a result of an increase in rates above an agreed rate: the effect being to provide protection to the holder against a rise above that agreed rate;
<u>CFDs</u>	<u>means <i>contract for differences</i>;</u>
<u>commodity</u>	<u>means any physical or energy product (except gold) which is, or can be traded on a secondary market. (NB: the definition of a commodity used for the purposes of Chapter 10 of IPRU(INV) deliberately differs from that in the main Handbook Glossary);</u>
<u>company</u>	<u>means any <i>body corporate</i>;</u>
<i>company issued warrant</i>	means a right (but not an obligation) to buy a <i>security</i> or other instrument at an agreed price or on an agreed basis, from the issuer of the <i>security</i> or instrument;
<u>equity</u>	<u>means <i>share</i>;</u>
<i>FER</i>	means the foreign exchange requirement of a <i>firm</i> as calculated in accordance with appendix 6;
<u>foreign currency</u>	<u>means a currency other than the <i>firm's base currency</i>;</u>
<i>forward</i>	means a security which is transacted for a settlement date beyond that which would normally apply in the market concerned, and where that forward settlement date is not yet passed; <u>A contract to buy or sell where the date for settlement has been agreed as a particular date in the future;</u>
<i>floor</i>	means an agreement in respect of a deposit under which a counterparty contracts to pay any lost income arising as a result of a fall in rates below an agreed rate: the effect being to provide protection to the holder against a fall below that agreed interest rate;
<i>in the money</i>	means, in relation to <i>call options</i> and <i>warrants</i>, that the exercise price is less than the current <i>mark to market</i> value of the <i>underlying instrument</i> and, in relation to <i>put options</i>, that the current mark to market value is less than the exercise price; <u>means the strike price of a call <i>option</i> or <i>warrant</i> is</u>

less than the current market value of the underlying instrument, or vice versa for a put *option*;

open currency position

means the position calculated under 18R of appendix 8;

option

means the investment specified in article 77 of the Regulated Activities Order (Options), which is an option to acquire or dispose of:

- (a) a security or contractually based investment (other than an option);
- (b) currency of the united Kingdom or of any other country or territory;
- (c) palladium, platinum, gold or silver; or
- (d) an option to acquire or dispose of an option specified in (a), (b) or (c);

means a contract which confers the right to buy or sell a security, contractually based investment, currency, gold or commodity at a given price on or before a given date. (NB: the definition of an option used for the purposes of Chapter 10 of IPRU (INV) deliberately differs from that in the main Handbook Glossary);

PRR

means the position risk requirement of a firm as calculated in accordance with rules 10-80 to 10-169B rule 10-120 and 4, 5, 6, 8 and 9;

qualifying debt security

means a debt security which-

- (1)(a) is, or has an "equivalent debt" which is, rated by a "relevant agency" at, or higher than, the level indicated in the Table in Appendix 34 and-
- (i) there has been no announcement that the rating will be down-graded below the level so indicated; and
- (ii) the firm has no reasonable cause to believe that another "relevant agency" has rated the security or "equivalent debt" below the level so indicated;

(b) is issued or fully guaranteed by-

- (i) a Zone A central government or central bank;
- (ii) a Zone B central government or central bank, provided that the security is denominated in its national currency;
- (iii) a Zone A public sector entity which represents no higher a risk than its central government ;
- (iv) an Zone A credit institution, provided that the security represents senior debt of the issuer;
- (v) a Zone B credit institution, provided that the security has a maturity of one year or less and is not part of the issuer's own funds;
- (vi) an investment firm or recognised third country investment firm;
- (vii) one of the following organisations—
The African Development Bank;
The Asian Development Bank;
The Bank for International Settlements;
The Caribbean Development Bank;
The Council of Europe;
Euratom (European Atomic Energy Community);
Eurofina (European Company for Financing of Railroad Rolling Stock);
The European Bank for Reconstruction and Development;
The European Coal and Steel Community;

The European Economic Community;
 The European Investment Bank;
 The Inter-American Development Bank;
 The International Bank for Reconstruction and Development (World Bank);
 The International Finance Corporation;
 The International Monetary Fund;
 The Nordic Investment Bank;
 (e) is collateralised by *securities* issued by a Zone A central government, Zone A central bank or one of the institutions listed in (a)(vii) above; or
 (d) is issued or fully guaranteed by a company whose equity satisfies the criteria set out in section 5(b) of Appendix 49; and
 (2) for the purposes of (1) above-
 (a) the issuer or guarantor of the *security* is not in default as to any payment on any other *security* issued or guaranteed by it;
 (b) in respect of any *security* of, or guaranteed by, any issuer or guarantor, "equivalent debt" means any debt which ranks *pari passu* with, or subordinated to, the *security* or (as the case may be) the guarantee; and
 (c) in relation to any issuer or guarantor, a "relevant agency" means one of the agencies names in Appendix 34 by reference to the category of issue or guarantor;
means a debt *security* which meets the conditions in 45R of appendix 4;
qualifying equity means an *equity* which meets the conditions in 35R of appendix 5;
qualifying equity index means an *equity* index which meets the conditions in 38R of appendix 5;
stock financing means a transaction where a *physical commodity* is sold forward and the cost of funding is locked in until the date of the forward sale;
synthetic future means a combination of a long (short) call option and a short (long) put option which are based on the same underlying and have the same notional amount, strike price and maturity;
underwriting means an arrangement made before the relevant securities are issued under which a party agrees to buy a specified quantity of those ~~in an issue of~~ securities on a given date and at a given price, if no other has purchased or acquired them;
working day zero means the working day on which the firm becomes unconditionally committed to accepting a known quantity of securities at an agreed price;
zero specific risk security means a hypothetical debt security used to represent the general interest rate risk arising from certain derivative and forward transactions;

Appendices 34 and 35 [deleted]

Appendices 49 to 54 [deleted]

Annex D

Additions to Chapter 10 Appendices

In this Annex, new text is being inserted and is not underlined.

Insert the following text as new IPRU(INV) Chapter 10 appendices 4 to 11 as follows:

Appendix 4

Interest rate PRR

General rule

- 1 R A *firm* must calculate its interest rate *PRR* by:
 - (1) identifying which positions must be included within the *PRR* calculation;
 - (2) deriving the net position in each debt *security* in accordance with 37R - 41R;
 - (3) including these net positions in the *PRR* calculation for general market risk and the *PRR* calculation for specific risk; and
 - (4) summing all *PRRs* calculated for general market risk and specific risk.
- 2 G The interest rate *PRR* calculation divides the interest rate risk into the risk of loss from a general move in market interest rates, and the risk of loss from an individual debt *security's* price changing for reasons other than a general move in market interest rates. These are called general market risk and specific risk respectively.

Scope of the Interest rate PRR calculation

- 3 R A *firm's* interest rate *PRR* calculation must:
 - (1) include all *trading book* positions in debt *securities*, *preference securities* and *convertibles*, except:
 - (a) positions in *convertibles* which have been included in the *firm's PRR* calculation for *equities* under appendix 5;
 - (b) positions fully deducted as *material holdings*, in which case the *firm* may exclude them; or
 - (c) positions hedging an *option* which is being treated under 26R of appendix 9; and
 - (2) include notional positions arising from *trading book* positions in the instruments listed in table 4R.
- 4 R Table: Instruments which result in notional positions (see 3R(2))

Instrument	See
<i>Futures, forwards or synthetic futures on debt securities</i>	13R
<i>Futures, forwards or synthetic futures on debt indices or baskets</i>	14R
Interest rate <i>futures</i> or <i>forward rate agreements (FRAs)</i>	18R
Interest rate <i>swaps</i> or foreign exchange <i>swaps</i>	21R
Deferred start interest rate <i>swaps</i> or foreign exchange <i>swaps</i>	24R
The interest rate leg of an <i>equity swap</i> (unless the <i>firm</i> calculates a <i>PRR</i> on the instrument using the basic interest rate <i>PRR</i> calculation in appendix 5)	27R
The cash leg of a <i>repurchase agreement</i> or a <i>reverse repurchase agreement</i>	30R
Cash borrowings or deposits	31R
<i>Options</i> or <i>warrants</i> on a <i>debt security</i> , interest rate or interest rate <i>future</i> or <i>swap</i> , or on a <i>future</i> on a <i>debt security</i> (unless the <i>firm</i> calculates a <i>PRR</i> on the <i>option</i> under appendix 9)	32R
Dual currency bonds	33R
Foreign exchange <i>futures</i> or <i>forwards</i>	34R
Gold <i>futures</i> or <i>forwards</i>	34R
<i>Forwards, futures</i> or <i>options</i> (except cliquets) on an <i>equity</i> , basket of <i>equities</i> or <i>equity</i> index (unless the <i>firm</i> calculates a <i>PRR</i> on the instrument using the basic interest rate <i>PRR</i> calculation in appendix 5)	34R
Credit derivatives	Appendix 63

- 5 G 3R(1) includes a *trading book* position in *debt security*, *preference security* or *convertible* that is subsequently repo'd under a *repurchase agreement* or lent under a stock lending agreement. Clearly, if the *security* had initially been obtained via a *reverse repurchase agreement* or stock borrowing agreement, the *security* would not have been included in the *PRR* calculation in the first place.
- 6 G 3R(1) includes net *underwriting* positions or reduced net *underwriting* positions in *debt securities*.
- 7 G *Firms* are reminded that table 5R in appendix 9 divides *options* and *warrants* on interest rates, *debt securities*, interest rate *futures* and *swaps* into:

- (1) those which must be treated under appendix 9; and
 - (2) those which must be treated under either appendix 4 or appendix 9, but *firms* can choose whether appendix 4 or 9 is used.
- 8 G Cliquets on *equities*, baskets of *equities* or *equity* indices do not attract an interest rate *PRR*. Table 4R excludes them from the scope of the interest rate *PRR* calculation in this appendix, and 45R of appendix 5 excludes them from the basic interest rate *PRR* calculation in that appendix.
- 9 G Table 4R shows that *equity derivatives* are excluded from this appendix's *PRR* calculation if they have been included in the basic interest rate *PRR* calculation in appendix 5 (see 45R of appendix 5).

Derivation of notional positions

GENERAL APPROACH

- 10 G This section converts the instruments listed in table 4R into notional positions in:
- (1) the underlying debt *security*, where the instrument depends on the price (or yield) of a specific debt *security*; and/or
 - (2) hypothetical debt *securities* to capture the pure interest rate risk arising from future payments and receipts of cash (including notional payments and receipts). Because they are designed to represent pure general market risk (and not specific risk) they are called *zero-specific-risk securities*.
- 11 R For the purposes of calculating *PRR*, unless specified otherwise, a *firm* must derive the value of notional positions as follows:
- (1) notional positions in actual debt *securities* must be valued as the nominal amount underlying the contract at the current market price of the debt *security*; and
 - (2) positions in *zero-specific-risk securities* must be valued using one of the two following methods. A *firm* must use the same method for all positions denominated in the same currency:
 - (a) Present value approach: The *zero-specific-risk security* is assigned a value equal to the present value of all the future cash flows that it represents.
 - (b) Alternative approach: The *zero-specific-risk security* is assigned a value equal to:
 - (i) the market value of the underlying notional *equity* position in the case of an *equity derivative*;
 - (ii) the notional principal amount in the case of an interest rate or foreign exchange *swap*; or

- (iii) the notional amount of the future cash flow that it represents in the case of any other instrument.

12 R A *firm* must use 11R(2)(a) in respect of any positions that it includes in the duration method calculation of general market risk (see 60R).

FUTURES OR FORWARDS ON A DEBT SECURITY

13 R *Futures* or *forwards* on a single debt *security* must be treated as follows:

(1) A purchased *future* or *forward* is treated as:

- (a) a notional long position in the underlying debt *security* (or the cheapest to deliver (taking into account the conversion factor) where the contract can be satisfied by delivery of one from a range of *securities*); and
- (b) a notional short position in a zero coupon *zero-specific-risk security* with a maturity equal to the expiry date of the *future* or *forward*.

(2) A sold *future* or *forward* is treated as:

- (a) a notional short position in the underlying *security* (or the cheapest to deliver (taking into account the conversion factor) where the contract can be satisfied by delivery of one from a range of *securities*); and
- (b) a notional long position in a zero coupon *zero-specific-risk security* with a maturity equal to the expiry date of the *future* or *forward*.

FUTURES OR FORWARDS ON A BASKET OR INDEX OF DEBT SECURITIES

14 R *Futures* or *forwards* on a basket or index of debt *securities* must be converted into *forwards* on single debt *securities* as follows (and then the resulting positions are treated under 13R).

(1) *Futures* or *forwards* on a single currency basket or index of debt *securities* must be treated as either:

- (a) a series of *forwards*, one for each of the constituent debt *securities* in the basket or index, of an amount which is a proportionate part of the total underlying the contract according to the weighting of the relevant debt *security* in the basket; or

(b) a single *forward* on a hypothetical debt *security*.

(2) *Futures* or *forwards* on multiple currency baskets or indices of debt *securities* must be treated as either:

- (a) a series of *forwards* (using the method described in (1)(a)); or

- (b) a series of *forwards*, each one on a hypothetical debt *security* to represent one of the currencies in the basket or index, of an amount which is a proportionate part of the total underlying the contract according to the weighting of the relevant currency in the basket.
- 15 G Under 14R(2)(b), a *forward* on basket of 3 Euro denominated debt *securities* and 2 Dollar denominated debt *securities* would be treated as a *forward* on a single hypothetical Euro denominated debt *security* and a *forward* on a single hypothetical Dollar denominated debt *security*.
- 16 R The hypothetical debt *securities* in 14R are assigned a specific risk *PRA* and a general market risk *PRA* equal to the highest that would apply to the debt *securities* in the basket or index.
- 17 G The debt *security* with the highest specific risk *PRA* within the basket might be a different debt *security* to that with the highest general market risk *PRA*. 16R requires a *firm* to select the highest percentages even where they relate to different debt *securities* in the basket or index, and regardless of the proportion of those debt *securities* in the basket or index.

INTEREST RATES FUTURES AND FORWARD RATE AGREEMENTS (FRAS)

- 18 R Interest rate *futures* or *FRAs* must be treated as the two notional positions (one long, one short) shown in table 19R.
- 19 R Table: Interest rate *futures* and *FRAs* (see 18R)

	1	2
	A short position in a zero coupon <i>zero-specific-risk-security</i>	A long position in a zero coupon <i>zero-specific-risk-security</i>
Where the <i>firm</i> buys an interest rate <i>future</i> or sells an <i>FRA</i>	Maturity equals the expiry date of the <i>future</i> (or settlement date of the <i>FRA</i>)	Maturity equals the expiry date of the <i>future</i> (or settlement date of the <i>FRA</i>) plus the maturity of the borrowing/deposit
Where the <i>firm</i> sells an interest rate <i>future</i> or buys an <i>FRA</i>	Maturity equals the expiry date of the <i>future</i> (or settlement date of the <i>FRA</i>) plus the maturity of the borrowing/deposit	Maturity equals the expiry date of the <i>future</i> (or settlement date of the <i>FRA</i>)

- 20 G The following example illustrates 18R and 19R in conjunction with 11R (the latter rule determines the value of notional positions). A *firm* sells £1mn notional of a 3v6 *FRA* at 6%. This results in:
- (1) a short position in a *zero-specific-risk-security* with a zero coupon, three month maturity, and a nominal amount of £1mn; and

- (2) a long position in a *zero-specific-risk-security* with a zero coupon, six month maturity, and nominal amount of £1,015,000 (i.e. notional plus interest at 6% over 90 days).

If a *firm* were to apply the approach in 11R(2)(a), the two nominal amounts would have to be present valued.

INTEREST RATE SWAPS OR FOREIGN EXCHANGE SWAPS

- 21 R Interest rate *swaps* or foreign exchange *swaps* without deferred starts must be treated as the two notional positions (one long, one short) shown in table 22R:
- 22 R Table: Interest rate and foreign exchange *swaps* (see 21R)

	1. Paying leg A short position in a <i>zero-specific-risk security</i>	2. Receiving leg A long position in a <i>zero-specific-risk security</i>
Receiving fixed and paying floating	coupon equals the floating rate and maturity equals the reset date	Coupon equals the fixed rate of the <i>swap</i> and maturity equals the maturity of the <i>swap</i>
Paying fixed and receiving floating	coupon equals the fixed rate of the <i>swap</i> and maturity equals the maturity of the <i>swap</i>	Coupon equals the floating rate and maturity equals the reset date
Paying floating and receiving floating	coupon equals the floating rate and maturity equals the reset date	Coupon equals the floating rate and maturity equals the reset date

- 23 G For a foreign exchange *swap*, the two notional *zero-specific-risk securities* would be denominated in different currencies. A foreign exchange *swap* is also included in the foreign exchange *PRR* calculation.

DEFERRED START INTEREST RATE SWAPS OR FOREIGN EXCHANGE SWAPS

- 24 R Interest rate *swaps* or foreign exchange *swaps* with a deferred start must be treated as the two notional positions (one long, one short) shown in table 25R.

- 25 R Table: Deferred start interest rate and foreign exchange *swaps* (see 24R)

	1. Paying leg	2. Receiving leg
	A short position in a <i>zero-specific-risk security</i> with a coupon equal to the fixed rate of the <i>swap</i>	A long position in a <i>zero-specific-risk security</i> with a coupon equal to the fixed rate of the <i>swap</i>
Receiving fixed and paying floating	maturity equals the start date of the <i>swap</i>	maturity equals the maturity of the <i>swap</i>
Paying fixed and receiving floating	maturity equals the maturity of the <i>swap</i>	maturity equals the start date of the <i>swap</i>

- 26 G For example, a *firm* enters into a five year *swap* which starts in two year's time. The *firm* has contracted to receive 6% and pay six month Libor on a principal amount of £1mn. This results in a long position in a 7 year debt *security* and a short position in a 2 year debt *security*. Both have a coupon of 6%.

SWAPS WHERE ONLY ONE LEG IS AN INTEREST RATE LEG (E.G. EQUITY SWAPS)

- 27 R A *firm* must treat a *swap* with only one interest rate leg as a notional position in a *zero-specific-risk security*:
- (1) with a coupon equal to that on the interest rate leg;
 - (2) with a maturity equal to the date that the interest rate will be reset; and
 - (3) which is a long position if the *firm* is receiving interest payments and short if making interest payments.
- 28 G 27R includes *equity swaps*, *commodity swaps* and any other *swap* where only one leg is an interest rate leg.

CASH LEGS OF REPURCHASE AGREEMENTS AND REVERSE REPURCHASE AGREEMENTS

- 29 G *Firm's* are reminded that for the purposes of 30R, a *repurchase agreement* includes a sell/buy back or stock lending; and a *reverse repurchase agreement* includes a buy/sell back or a stock borrowing.
- 30 R The forward cash leg of a *repurchase agreement*, or *reverse repurchase agreement*, must be treated as a notional position in a *zero-specific-risk security* which:

- (1) is a short notional position in the case of a *repurchase agreement*; and a long notional position in the case of a *reverse repurchase agreement*;
- (2) has a value equal to the market value of the cash leg;
- (3) has a maturity equal to that of the *repurchase agreement* or *reverse repurchase agreement*; and
- (4) has a coupon equal to:
 - (a) zero, if the next interest payment date coincides with the maturity date; or
 - (b) the interest rate on the contract, if any interest is due to be paid before the maturity date.

CASH BORROWINGS AND DEPOSITS

- 31 R A cash borrowing or deposit must be treated as a notional position in a zero coupon *zero-specific-risk security* which:
- (1) is a short position in the case of a borrowing and a long position in the case of a deposit;
 - (2) has a value equal to the market value of the borrowing or deposit;
 - (3) has a maturity equal to that of the borrowing or deposit, or the next date the interest rate is reset (if earlier); and
 - (4) has a coupon equal to:
 - (a) zero, if the next interest payment date coincides with the maturity date; or
 - (b) the interest rate on the borrowing or deposit, if any interest is due to be paid before the maturity date.

OPTIONS AND WARRANTS

- 32 R Where included in this appendix's *PRR* calculation (see table 4R), *options* and *warrants* must be treated as follows:
- (1) An *option* or *warrant* on a debt *security* must be treated as a position in that debt *security*.
 - (2) An *option* on an interest rate must be treated as a position in a zero coupon *zero-specific-risk security* with a maturity equal to the sum of the time to expiry of the *option* and the length of the period for which the interest rate is fixed.
 - (3) An *option* on an *future* – where the *future* is based on an interest rate or debt *security* – must be treated as:

- (a) a long position in that *future* for purchased call *options* and written put *options*; and
 - (b) a short position in that *future* for purchased put *options* and written call *options*.
- (4) An *option* on a *swap* must be treated as a deferred starting *swap*.

BONDS WHERE THE COUPONS AND PRINCIPAL ARE PAID IN DIFFERENT CURRENCIES

- 33 R Where a debt *security* pays coupons in one currency, but will be redeemed in a different currency, it must be treated as:
- (1) a debt *security* denominated in the coupon's currency; and
 - (2) a foreign exchange *forward* to capture the fact that the debt *security's* principal will be repaid in a different currency from that in which it pays coupons, specifically:
 - (a) a notional forward sale of the coupon currency and purchase of the redemption currency, in the case of a long position in the debt *security*; or
 - (b) a notional forward purchase of the coupon currency and sale of the redemption currency, in the case of a short position in the debt *security*.

INTEREST RATE RISK ON OTHER FUTURES, FORWARDS AND OPTIONS

- 34 R Other *futures, forwards, options* and *swaps* must be treated as positions in *zero-specific-risk securities*, each of which:
- (1) has a zero coupon;
 - (2) has a maturity equal to that of the relevant contract; and
 - (3) is long or short according to table 35R.

- 35 R Table: Interest rate risk on other *futures, forwards, options* and *swaps* (see 34R).

Instrument	Notional positions		
Foreign exchange <i>forward</i> or <i>future</i>	a long position denominated in the currency purchased	and	a short position denominated in the currency sold
Gold <i>forward</i> or <i>future</i>	a long position if the <i>forward</i> or <i>future</i> involves an actual (or notional) sale of gold	or	a short position if the <i>forward</i> or <i>future</i> involves an actual (or notional) purchase of gold
<i>Equity forward</i> or <i>future</i> , or <i>option</i> (unless a <i>PRR</i> is calculated under the basic interest rate calculation in appendix 5)	A long position if the contract involves an actual (or notional) sale of the underlying <i>equity</i>	or	A short position if the contract involves an actual (or notional) purchase of the underlying <i>equity</i>

Deriving the net position in each debt security

- 36 G The net position is the difference between the value of the *firm*'s long positions (including notional positions) and the value of its short positions (including notional positions) in the same debt *security*.

NETTING POSITIONS IN THE SAME DEBT SECURITY

- 37 R A *firm* must not net positions (including notional positions) unless:
- (1) Long and short positions are in the same debt *security*, and a debt *security* is the same as another if and only if:
 - (a) they enjoy the same rights in all respects; and
 - (b) are fungible with each other;
 - (2) Long and short positions are in different tranches of the same debt *security*, where the tranches:
 - (a) enjoy the same rights in all respects; and
 - (b) become fungible within 180 days, and thereafter the debt *security* of one tranche can be delivered in settlement of the other tranche.

NETTING THE CHEAPEST TO DELIVER SECURITY WITH OTHER DELIVERABLE SECURITIES

- 38 R A *firm* may net a short notional position in the cheapest to deliver *security* arising from a short *future* or *forward* (see 13R(2)(a)) against a long position in any deliverable *security* up to a maximum of 90% of the common nominal amounts. The residual long and short nominal amounts must be treated as separate long and short positions.
- 39 G The netting permitted by 38R only relates to where the *firm* has sold the *future* or *forward*. It does not relate to where the *firm* has bought a *future* or *forward*.

NETTING ZERO-SPECIFIC-RISK SECURITIES WITH DIFFERENT MATURITIES

- 40 R A *firm* may net a notional long position in a *zero-specific-risk security* against a notional short position in a *zero-specific-risk security* if:
- (1) they are denominated in the same currency;
 - (2) their coupons do not differ by more than 15 basis points; and
 - (3) they mature:
 - (a) on the same day, if they have residual maturities of less than one month;
 - (b) within seven days of each other, if they have residual maturities of between one month to one year; and
 - (c) within thirty days of each other, if they have residual maturities in excess of one year.

REDUCED NET UNDERWRITING POSITIONS IN DEBT SECURITIES

- 41 R A *firm* must not net a reduced net *underwriting* position in a debt *security* with any other debt *security* position.
- 42 G 41R only relates to reduced net *underwriting* positions.

Specific risk calculation

- 43 R A *firm* must calculate the specific risk *PRR* for each debt *security* by:
- (1) multiplying the market value of the individual net position (ignoring the sign) by the appropriate *PRA* from table 44R; and
 - (2) converting this amount into the *firm's base currency* at prevailing spot foreign exchange rates.

44 R Table: specific risk *PRA*s (see 43R).

Issuer	Residual maturity	<i>PRA</i>
An issue of, or fully guaranteed by, or fully collateralised by a <i>Zone A</i> central government or central bank or the European Communities	Any	0%
An issue of, or fully guaranteed by, a <i>Zone B</i> central government or central bank denominated in the local currency	Zero to 12 months	0%
Other <i>qualifying debt securities</i> (see 46R)	Zero to 6 months	0.25%
	6 to 24 months	1%
	Over 24 months	1.6%
<i>Non-qualifying debt securities</i>	Any	8%

45 G 43R includes both actual and notional positions. However, notional positions in *zero-specific-risk securities* do not attract specific risk. For example:

- (1) Interest rate *swaps*, foreign exchange *swaps*, *FRAs*, interest rate *futures*, foreign exchange *forwards*, foreign exchange *futures*, and the cash leg of *repurchase agreements* and *reverse repurchase agreements* create notional positions which will not attract specific risk; whilst
- (2) *Futures*, *forwards* and *swaps* which are based on the price (or yield) of one or more debt *securities* will create at least one notional position that attracts specific risk.

DEFINITION OF A QUALIFYING DEBT SECURITY

46 R A debt *security* is a *qualifying debt security* if:

- (1) it attracts zero specific risk under table 44R; or
- (2) it is issued by, or fully guaranteed by:
 - (a) a *Zone B* central government or central bank and the *security* is denominated in the local currency of the issuer;
 - (b) a *multilateral development bank*;

- (c) a *Zone A* public sector entity;
 - (d) a company whose *equity* is a constituent of one of the indices making up the FTSE All-World Index; or
 - (e) an issue of, or fully guaranteed by an *investment firm* or *recognised third-country investment firm*.
- (3) it is issued by, fully guaranteed by, endorsed or accepted by:
- (a) a *credit institution* incorporated in a *Zone A* country; or
 - (b) a *credit institution* incorporated in a *Zone B* country and the debt *security* has a residual maturity of one year or less.
- (4) it is a mortgage backed *security* which meets the criteria in 7e of section 3.2.5 of chapter BC of IPRU(Bank).
- (5) it is rated by at least one of the agencies shown in table 47R, and every such rating equals or exceeds the corresponding minimum shown in that table.

47 R Table: minimum ratings for *qualifying debt securities* (see 46R(5)).

Issuer	Rating agency	Minimum Rating	
		<i>Securities</i>	Money Market Obligations
Any	Moody's Investors Service	Baa3	P3
	Standard & Poor's Corporation	BBB-	A3
	FITCH Ratings Ltd	BBB-	F-3
Canadian	Canadian Bond Rating Service	B++low	A-3
	Dominion Bond Rating Service	BBB low	R-2
Japanese	Japan Credit Rating Agency, Ltd	BBB-	J-2
	Mikuno & Co	BBB	M-3
	Japan Rating & Investment Information Inc	BBB-	a-2

General market risk calculation

- 48 R A *firm* must calculate the general market risk *PRR* for each currency using either:
- (1) the simplified maturity method;
 - (2) the maturity method; or

- (3) the duration method (subject to 50R).
- 49 R A *firm* must convert all general market risk *PRRs* into its *base currency* using prevailing foreign exchange spot rates.
- 50 R A *firm* must not use the duration method for index-linked *securities*. Instead, these *securities* must:
- (1) be attributed a coupon of 3%; and
 - (2) treated separately under either the simplified maturity method or the maturity method.

SIMPLIFIED MATURITY METHOD

- 51 G The simplified maturity method weights individual net positions to reflect their price sensitivity to changes in interest rates. The weights are related to the coupon and the residual maturity of the instrument (or the next interest rate re-fix date for floating rate items).
- 52 R Under the simplified maturity method, the *PRR* for general market risk equals the sum of each individual net position (long or short) multiplied by the appropriate *PRA* in table 53R.
- 53 R Table: general market risk *PRAs* (see 52R).

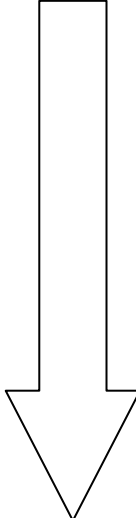
Zone	Maturity band		<i>PRA</i>
	Coupon of 3% or more	Coupon of less than 3%	
One	$0 \leq 1$ month	$0 \leq 1$ month	0.00%
	$> 1 \leq 3$ months	$> 1 \leq 3$ months	0.20%
	$> 3 \leq 6$ months	$> 3 \leq 6$ months	0.40%
	$> 6 \leq 12$ months	$> 6 \leq 12$ months	0.70%
Two	$> 1 \leq 2$ years	$> 1.0 \leq 1.9$ years	1.25%
	$> 2 \leq 3$ years	$> 1.9 \leq 2.8$ years	1.75%
	$> 3 \leq 4$ years	$> 2.8 \leq 3.6$ years	2.25%
Three	$> 4 \leq 5$ years	$> 3.6 \leq 4.3$ years	2.75%
	$> 5 \leq 7$ years	$> 4.3 \leq 5.7$ years	3.25%
	$> 7 \leq 10$ years	$> 5.7 \leq 7.3$ years	3.75%
	$> 10 \leq 15$ years	$> 7.3 \leq 9.3$ years	4.50%
	$> 15 \leq 20$ years	$> 9.3 \leq 10.6$ years	5.25%
	> 20 years	$> 10.6 \leq 12.0$ years	6.00%
		$> 12.0 \leq 20.0$ years	8.00%
		> 20 years	12.50%

THE MATURITY METHOD

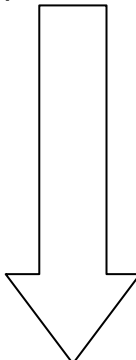
- 54 G The maturity method builds on the simplified maturity method by partially recognising offsetting positions. 57G provides an illustration of the maturity method.
- 55 R Under the maturity method, the *PRR* for general market risk is calculated as follows:
- (1) Step 1: each net position is allocated to the appropriate maturity band in table 53R and multiplied by the corresponding *PRA*.
 - (2) Step 2: weighted long and short positions are matched within:
 - (a) the same maturity band;
 - (b) the same zone (using unmatched positions from (a)); and
 - (c) different zones (using unmatched positions from (b)).
 - (3) Step 3: the *PRR* for general market risk is the sum of:
 - (a) 10% of the total amount matched within maturity bands;
 - (b) 40% of the amount matched within zone 1 under (2)(b);
 - (c) 30% of the amount matched within zones 2 & 3 under (2)(b);
 - (d) 40% of the amounts matched between zones 1 and 2, and between zones 2 and 3;
 - (e) 150% of the amount matched between zones 1 and 3; and
 - (f) 100% of the weighted positions remaining unmatched after (2)(c);
- 56 G Table 53R distinguishes between debt *securities* with a coupon of less than 3% and those with coupon in excess of 3%. However, this doesn't mean that the *firm* has to do a separate general market risk calculation for each, it merely ensures that when allocating debt *securities* to a particular band, their coupons are taken into account as well as their maturities. So for example, a 21 year 6% debt *security* falls into the same band as an 11 year 2% debt *security*. They are both weighted at 6%, and can be matched under the first part of step two because they fall within the same band.

57 G An example of the maturity method calculation. In this example, a *firm* with a £ sterling *base currency* is processing its euro denominated positions.

Weight each position



Match weighted positions



Calculate the general market risk

Zone	Totals of:		PRA		Weighted longs within each band	Weighted shorts within each band
	net longs within the band	net shorts within the band				
1	€100	€50	0.00%		0	0
	€250	€0	0.20%		0.50	0
	€200	€0	0.40%		0.80	0
	€0	€0	0.70%		0	0
2	€140	€0	1.25%		1.75	0
	€200	€300	1.75%		3.50	5.25
	€0	€400	2.25%		0	9
3	€0	€0	2.75%		0	0
	€200	€200	3.25%		6.50	6.50
	€300	€0	3.75%		11.25	0
	€200	€300	4.50%		9	13.50
	€0	€14.30	5.25%		0	0.75
	€300	€0	6.00%		18.00	0
	€0	€0	8.00%		0	0
€0	€0	12.50%		0	0	

same band		same zones		different zones	
Long	Short	Long	Short	Long	Short
0.50		0.50		1.30	
0.80		0.80			
		1.75	↔ 1.75		
1.75					9.00
3.50	↔ 5.25				
	9		9		
6.50	↔ 6.50				
11.25		11.25	↔ 4.50	24.00	
9	↔ 13.50				
	0.75		↔ 0.75		
18.00		18.00			
19 matched		7 matched		9 matched	

Matched within bands	19	@	10%	=	1.9
Matched within zone 1	0	@	40%	=	0
Matched within zones 2&3	7	@	30%	=	2.1
Matched between zones 1&2 and 2&3	9	@	40%	=	3.6
Matched between zones 1&3	0	@	150%	=	0
Unmatched after 2(c)	16.30	@	100%	=	16.30
total = € 23.90					
general market risk PRR (if €1=£0.60) = £14.34					

DURATION METHOD

58 G The duration method produces a more accurate measure of interest rate risk than the maturity methods but it is also more complex to calculate.

59 R *Firms* must use the following formula to calculate modified duration:

$$\text{Modified Duration} = \frac{D}{(1+r)} \qquad D = \frac{\sum_{t=1}^m \frac{tC_t}{(1+r)^t}}{\sum_{t=1}^m \frac{C_t}{(1+r)^t}}$$

Where: C_t = cash payment at time t

m = total maturity

r = yield to maturity, based on the current mark to market of the debt *security*. In the case of a floating rate instrument, this is calculated on the assumption that the principal is due on the date that the interest rate can next be changed

t = time

60 R Under the duration method, the *PRR* for general market risk is calculated as follows:

- (1) Step 1: allocate each net position to the appropriate duration zone in table 61R and multiply it by:
 - (a) its modified duration (using the formula in 59R); and
 - (b) the appropriate assumed interest rate change in table 61R.
- (2) Step 2: match weighted long and short positions:
 - (a) within zones; and
 - (b) across zones (using unmatched positions from (2)(a)); and
- (3) Step 3: calculate the general market risk as the sum of:
 - (a) 100% of the weighted positions remaining unmatched after (2)(b);
 - (b) 2% of the matched weighted position in each zone;
 - (c) 40% of the matched weighted position between zones 1 and 2, and between zones 2 and 3; and
 - (d) 150% of the matched weighted position between zones 1 and 3.

61 R Table: Assumed interest rate change in the duration method (see 60R).

Zone	Modified Duration	Assumed interest rate change (percentage points)
1	$0 \leq 12$ months	1.00
2	> 12 months ≤ 3.6 years	0.85
3	> 3.6 years	0.70

Appendix 5

Equity PRR

General rule

- 1 R A *firm* must calculate its *equity PRR* by:
- (1) identifying which *equity* positions must be included within the scope of the *PRR* calculation (see 2R);
 - (2) deriving the net position in each *equity* in accordance with 23R;
 - (3) including each of those net positions in either the simplified equity method (see 29R) or, subject to 27R, the standard equity method (see 32R); and
 - (4) summing the *PRR* on each net position as calculated under the simplified and standard equity methods.

Scope of the Equity PRR calculation

- 2 R A *firm's equity PRR* calculation must:
- (1) Include all *trading book* positions in *equities*, unless:
 - (a) the position is fully deducted as a *material holding*, in which case the *firm* may exclude it;
 - (b) the position is hedging an *option* or *warrant* which is being treated under 26R of appendix 9; and
 - (2) include notional positions arising from *trading book* positions in the instruments listed in table 3R.
- 3 R Table: Instruments which result in notional positions (see 2R(2))

Instrument	See
Depository receipts	12R
<i>Convertibles</i> where: (a) the <i>convertible</i> is trading at a market price of less than 110% of the underlying <i>equity</i> ; and the first date at which conversion can take place is less than three months ahead, or the next such date (where the first has passed) is less than a year ahead; or (b) the conditions in (a) are not met but the <i>firm</i> includes the <i>convertible</i> in its <i>equity PRR</i> calculation rather than including it in its interest rate <i>PRR</i>	13R

	calculation set out in appendix 4.	
	<i>Futures, forwards, CFDs and synthetic futures on a single equity</i>	14R
	<i>Futures, forwards, CFDs and synthetic futures on a basket of equities or equity index</i>	15R
	<i>Equity legs of an equity swap</i>	19R
	<i>Options or warrants on a single equity, an equity future, a basket of equities or an equity index (unless the firm calculates a PRR on the option or warrant under appendix 9).</i>	21R

- 4 G 2R(1) includes a *trading book* position in an *equity* that is subsequently repo'd under a *repurchase agreement* or lent under a stock lending agreement. Clearly, if the *equity* had initially been obtained via a *reverse repurchase agreement* or stock borrowing agreement, the *equity* would not have been included in the *trading book* in the first place.
- 5 G 2R(1) includes net *underwriting* positions, or reduced net *underwriting* positions in *equities*. 27R requires *firms* to use the simplified equity method in the case of reduced net *underwriting* positions. In the case of net *underwriting* positions that haven't been reduced according to 24R of appendix 7, there is no such restriction; a *firm* can choose which of the two equity methods to use.
- 6 G *Firms* are reminded that table 5R in appendix 9 divides *equity options* and *warrants* into:
- (1) those which must be treated under appendix 9; and
 - (2) those which must be treated under either appendix 5 or appendix 9, but *firms* can choose whether appendix 5 or 9 is used.
- 7 G Table 3R doesn't require every *convertible* to be included in this appendix's *PRR* calculation. Where a *convertible* is not included in this appendix's *PRR* calculation, 3R(1)(a) of appendix 4 requires that it is included in the appendix 4 *PRR* calculation.
- 8 G Some of the instruments listed in table 3R are also included in a *firm's* interest rate *PRR* calculation. For simplicity, a *firm* may use the interest rate *PRR* calculation at the end of this appendix rather than the calculation in appendix 4. 44G explains this in more detail.

Derivation of notional positions

- 9 G This section converts the instruments listed in table 3R into notional positions in individual *equities*, *equity* baskets or *equity* indices.

GENERAL RULE

- 10 R Unless specified otherwise, the value of each notional *equity* position equals the quantity of that *equity* underlying the instrument multiplied by the current market value of the *equity*.
- 11 G For example, the current market value of a particular *equity* is £2.50. If a *firm* contracts to sell this *equity* in five year's time for £3 it would treat the notional short *equity* position as having a value of £2.50 when calculating the *equity PRR*.

In effect, the forward position has been treated as being equivalent to a spot position for the purposes of calculating *equity PRR*. To capture the risk that the forward price changes relative to the spot price, forward *equity* positions are included in the *firm's* interest rate *PRR* calculation (see 45R of this appendix or table 4R of appendix 4).

DEPOSITORY RECEIPTS

- 12 R A depository receipt must be treated as a notional position in the underlying *equity*.

CONVERTIBLES

- 13 R Where a *convertible* is included in this appendix's *PRR* calculation (see table 3R):
- (1) it must be treated as a position in the *equity* into which it converts; and
 - (2) the *firm's equity PRR* must be adjusted by making:
 - (a) an addition equal to the current value of any loss which the *firm* would make if it did convert to *equity*; or
 - (b) a deduction equal to the current value of any profit which the *firm* would make if it did convert to *equity* (subject to a maximum deduction equal to the *PRR* on the notional position underlying the *convertible*).

FUTURES, FORWARDS AND CFDS ON A SINGLE EQUITY

- 14 R A *future*, *forward* or *CFD* on a single *equity* must be treated as a notional position in that *equity*.

FUTURES, FORWARDS AND CFDS ON EQUITY INDICES OR BASKETS

- 15 R A *future*, *forward* or *CFD* on an *equity* index or basket must be treated as either:
- (1) a position in each of the underlying *equities*; or
 - (2) the positions shown in table 16R.

16 R Table: *equity* index or basket contracts (see 15R(2))

	Under the simplified equity method (29R)	Under the standard equity method (32R)
Only one country in the index or basket (see 32R)	One position in the index or basket	One position in the index or basket
More than one country in the index or basket	One position in the index or basket	Several notional basket positions, one for each country Or One notional basket position in a separate, hypothetical country

17 G For example, a *firm* decides to treat a FTSE Eurotop 300 *future* under the standard equity method, and furthermore, chooses to treat it as one notional position. Table 16R requires that this notional position must be treated as if it were from a separate hypothetical “country” rather than any of the countries to which the underlying *equities* are from.

18 R The notional positions created under 15R have the following values:

- (1) where only one notional position is created, it has a value equal to the total market value of the *equities* underlying the contract; or
- (2) where more than one notional position is created, each one has a value which reflects the relevant *equity's* or country's contribution to total market value of the *equities* underlying the contract.

EQUITY LEGS OF EQUITY SWAPS

19 R The *equity* leg of an *equity swap* must be treated as a position in the underlying *equity*, *equity* basket or *equity* index, which is:

- (1) long, if the *firm* has contracted to receive any increase and pay any decrease in the value of the underlying *equities* or *equity* index; and
- (2) short, if the *firm* has contracted to receive any decrease and pay any increase in the value of the underlying *equities* or *equity* index.

20 G The interest rate leg of an *equity swap* is included in a *firm's* interest rate *PRR* calculation (see table 4R of appendix 4).

OPTIONS

- 21 R If included in this appendix's *PRR* calculation (see table 3R), *options* must be treated as follows:
- (1) an *option* on a single *equity* must be treated as a notional position in that *equity*;
 - (2) an *option* on a basket of *equities* or *equity* index must be treated as a *future* on that basket or index; and
 - (3) an *option* on an *equity future* must be treated as:
 - (a) a long position in that *future*, for purchased *call options* and written *put options*; and
 - (b) a short position in that *future*, for purchased *put options* and written *call options*.

Deriving the net position in each equity

- 22 G The net position is the difference between the value of the *firm*'s long positions (including notional positions) and the value of its short positions (including notional positions) in the same *equity*.
- 23 R When deriving the net position in each *equity*, a *firm* must not net long and short positions unless:
- (1) they are positions in the same *equity*. Two *equities* are the same if:
 - (a) they enjoy the same rights in all respects; and
 - (b) are fungible with each other; or
 - (2) they are positions in different tranches of the same *equity* and the tranches:
 - (a) enjoy the same rights in all respects; and
 - (b) become fungible for each other within 180 days, and thereafter the *equity* of one tranche can be delivered in settlement of the other tranche.
- 24 R A *firm* must not net a reduced net *underwriting* position with any other *equity* position.
- 25 G 24R only relates to reduced net *underwriting* positions.

Simplified and standard equity methods

- 26 G 1R(3) requires that the net position in each *equity* is included in either the simplified equity method or the standard equity method, though indicates that this choice is subject to the restriction in 27R. A *firm* does not have to use the same method for all *equities*.
- 27 R A *firm* must use the simplified equity method for reduced net *underwriting* positions.

- 28 G A *firm* may use either method for a net *underwriting* position; 27R only relates to reduced net *underwriting* positions.

SIMPLIFIED EQUITY METHOD

- 29 R Under the simplified method, the *PRR* for each *equity*, *equity* index, or *equity* basket equals the market value of the net position (ignoring the sign) multiplied by the appropriate *PRA* from table 30R. The result must be converted into the *firm's* base currency at current spot foreign exchange rates.
- 30 R Table: simplified equity method *PRAs* (see 29R)

	PRA
Single <i>equities</i>	12%
<i>Qualifying equity indices</i> (see 38R)	8%
All other <i>equity</i> indices or baskets	12%

STANDARD EQUITY METHOD

- 31 G The standard equity method divides the risk of loss from a *firm's* *equity* positions into the risk of loss from a general move in that country's *equity* market and the risk of loss from an individual *equity's* price changing relative to that country's *equity* market. These are called general market risk and specific risk respectively.
- 32 R Under the standard equity method, a *firm* must:
- (1) Group *equity* positions into country portfolios as follows:
 - (a) A position in an individual *equity* belongs to:
 - (i) the country it is listed in;
 - (ii) any of the countries it is listed in, if more than one; or
 - (iii) the country it was issued from, if unlisted.
 - (b) A position in *equity* basket or index that is treated under 15R(2), is allocated to one or more country portfolios based on the countries to which the underlying *equities* belong to under (a) above.
 - (2) Sum:
 - (a) the *PRRs* for specific risk calculated under 33R; and
 - (b) the *PRRs* for general market risk for each country portfolio as calculated under 41R and 42R.

STANDARD EQUITY METHOD: SPECIFIC RISK

- 33 R Under the standard equity method, a *firm* must calculate a *PRR* for specific risk based on the net position in each *equity*, *equity* index or *equity* basket by:
- (1) multiplying its market value (ignoring the sign) by the appropriate *PRA* from table 34R; and
 - (2) converting it into the *firm's base currency* using current spot foreign exchange rates.
- 34 R Table: *PRAs* for specific risk under the standard approach (see 33R(1))

	PRA
<i>Qualifying equities</i> (see 35R)	2%
<i>Qualifying equity indices</i> (see 38R)	0%
All other <i>equities</i> , <i>equity</i> indices or <i>equity</i> baskets	4%

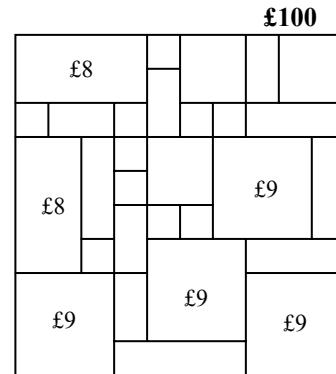
- 35 R For the purposes of table 34R, a *qualifying equity* is one which:
- (1) belongs to a country portfolio where:
 - (a) no individual position exceeds 10% of the portfolio's gross value; and
 - (b) the sum of positions (ignoring the sign) which individually represent between 5% and 10% of the portfolio's gross value, does not exceed 50% of the portfolio's gross value; and
 - (2) is a constituent of an index in table 39R.

- 36 G The following example illustrates 35R(1). A country portfolio has a gross value of £100 and is made up of positions in 29 different *equities* (some are long positions, others are short positions). Not all the *equities* are constituents of an index used to create the FT All-World Index (this criterion only becomes relevant once a *firm* has determined whether the country portfolio meets the test in 35R(1)).

Six positions exceed the 5% threshold. The diagram below shows the composition of the portfolio.

Part (a): the portfolio meets the first part of the test because no individual position is worth more than 10% of the portfolio's value.

Part (b): the portfolio fails the second part of the test because the sum (ignoring the sign) of the six relevant positions is £52; this exceeds 50% of the portfolio's value.

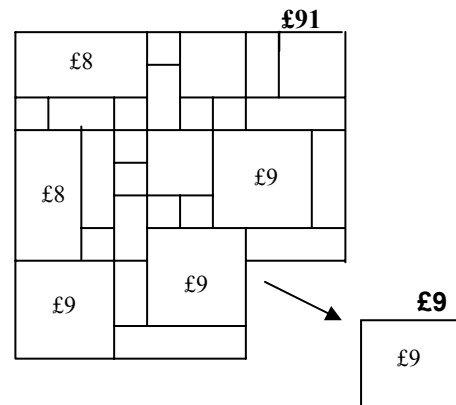


- 37 G A country portfolio can be split into two sub-portfolios if this enables one sub-portfolio to meet the requirements in 35R. Individual positions may be sub-divided between sub-portfolios.

Continuing the example above, one of the largest positions is taken out of the portfolio and put into a new portfolio. The new portfolio fails the two tests, but the amended portfolio meets both tests:

Part (a): no single remaining position exceeds £9.10.

Part (b): the sum of the five relevant positions is £43, this is less than 50% of the new portfolio's value of £91.



- 38 R A *qualifying equity index* is one which:

- (1) is listed in table 39R; or
- (2) is not listed in table 39R, but is constructed such that:
 - (a) it contains at least 20 *equities*;
 - (b) no single *equity* represents more than 20% of the total index; and
 - (c) no five *equities* combined represent more than 60% of the total index.

39 R Table: *Qualifying equity indices* (see 38R)

Qualifying equity indices	
Australia	All Ordinaries
Austria	Austrian Traded Index
Belgium	BEL 20
Canada	TSE 35, TSE 100, TSE 300
France	CAC 40, SBF 250
Germany	DAX
European	Dow Jones Stoxx 50 Index, FTSE Eurotop 300, MSCI Euro Index
Hong Kong	Hang Seng 33
Italy	MIB 30
Japan	Nikkei 225, Nikkei 300, TOPIX
Korea	Kospi
Netherlands	AEX
Singapore	Straits Times Index
Spain	IBEX 35
Sweden	OMX
Switzerland	SMI
UK	FTSE 100, FTSE Mid 250, FTSE All Share
US	S&P 500, Dow Jones Industrial Average, NASDAQ Composite, Russell 2000

STANDARD EQUITY METHOD: GENERAL MARKET RISK

40 R Under the standard equity method, a *firm* must apply approach one to each country portfolio (or part portfolio) unless the conditions in 42R are met, in which case the *firm* may instead apply approach two to the relevant country portfolios (or part portfolios).

APPROACH ONE: NO OFFSET BETWEEN DIFFERENT COUNTRY PORTFOLIOS

41 R Under approach one, the *PRR* for general market risk equals the net value (ignoring the sign) of the country portfolio multiplied by 8%. It must be converted into the *firm's base currency* using current spot foreign exchange rates.

APPROACH TWO: LIMITED OFFSET BETWEEN DIFFERENT COUNTRY PORTFOLIOS

42 R Under approach two, the *PRR* for general market risk is calculated using the following formula:

$$\sqrt{(8\% * CP_1)^2 + (8\% * CP_2)^2 + (8\% * CP_3)^2 + \dots + (8\% * CP_n)^2}$$

where CP_i denotes the net value of *i*th country portfolio (converted to the *firm's base currency* using current spot foreign exchange rates), and:

- (1) at least four country portfolios are included (that is: $n \geq 4$);
- (2) only country portfolios for countries which are full members of the *OECD*, Hong Kong or Singapore are included;
- (3) no individual country portfolio comprises more than 30% of the total gross value of country portfolios included; and
- (4) the total net value of country portfolios included equals zero, that is:

$$\sum_1^n CP_i = 0$$

- 43 G In order to meet 42R(4), it is likely that part of a country portfolio will have to be excluded from approach two (and therefore included in approach one), even if that country portfolio meets (1) to (3).

Basic interest rate PRR calculation for equity instruments

- 44 G A basic *PRR* calculation is included in this appendix for those *firms* that do not wish to use the calculation in appendix 4. However, it tends to result in higher charges than the methods in appendix 4, largely because the interest rate *PRR* is calculated on each notional equity position separately and then summed without offsetting long and short positions.
- 45 R Where a *firm* does not include a *forward*, *future*, or *option* (except cliquets) or *swap* on an *equity*, basket of *equities* or *equity* index in its appendix 4 *PRR* calculation, it must calculate an interest rate *PRR* as follows:
- (1) multiplying the market value of the notional *equity* position underlying the instrument by the appropriate percentage from table 47R; and
 - (2) summing the results from (1), ignoring the sign.
- 46 G Cliquets on *equities*, baskets of *equities* or *equity* indices do not attract an interest rate *PRR*. 45R excludes them from the basic interest rate *PRR* calculation and table 4R excludes them from the scope of the interest rate *PRR* calculation in appendix 4.

- 47 R Table: Percentages used in the basic interest rate *PRR* calculation for *equity* instruments (see 45R(1)).

Time to expiration	Percentage
$0 \leq 3$ months	0.20
$> 3 \leq 6$ months	0.40
$> 6 \leq 12$ months	0.70
$> 1 \leq 2$ years	1.25
$> 2 \leq 3$ years	1.75
$> 3 \leq 4$ years	2.25
$> 4 \leq 5$ years	2.75
$> 5 \leq 7$ years	3.25
$> 7 \leq 10$ years	3.75
$> 10 \leq 15$ years	4.50
$> 15 \leq 20$ years	5.25
> 20 years	6.00

Appendix 6

Commodity PRR

General rule

- 1 R A *firm* must calculate its *commodity PRR* by:
- (1) identifying which *commodity* positions must be included within the scope of the *PRR* calculation (see 2R);
 - (2) calculating an individual *PRR* for each *commodity* (see 20R);
 - (3) converting each *PRR* to the *firm's base currency* at current spot foreign exchange rates; and
 - (4) summing the resulting individual *PRRs*.

Scope of the commodity PRR calculation

- 2 R A *firm's commodity PRR* calculation must, regardless of whether the positions concerned are *trading book* or *non-trading book* positions:
- (1) include *physical commodity* positions;
 - (2) include notional positions arising from positions in the instruments listed in table 4R; and
 - (3) exclude positions constituting a *stock financing* transaction.
- 3 G Gold positions are excluded from the scope of the *commodity PRR*. Instead, they are included within the scope of the foreign exchange *PRR* (Appendix 8).
- 4 R Table: Instruments which result in notional positions (see 2R(3))

<i>Forwards, futures, CFDs, synthetic futures and options</i> on a single <i>commodity</i> (unless the <i>firm</i> calculates an <i>PRR</i> on the <i>option</i> under appendix 9)	8R
A commitment to buy or sell a single <i>commodity</i> at an average of spot prices prevailing over some future period	10R
<i>Forwards, futures, CFDs, synthetic futures and options</i> on a <i>commodity index</i> (unless the <i>firm</i> calculates an <i>PRR</i> on the <i>option</i> under appendix 9)	13R – 14R
<i>Commodity swaps</i>	16R – 17R

- 5 G 2R includes a *trading book* position in an *commodity* that is subsequently repo'd under a *repurchase agreement* or lent under a stock lending agreement. Clearly, if the *commodity* had initially been obtained via a *reverse repurchase agreement* or stock borrowing agreement, the *commodity* would not have been included in the *trading book* in the first place.
- 6 G *Firms* are reminded that table 5R in appendix 9 divides *commodity options* into:
- (1) those which must be treated under appendix 9; and
 - (2) those which must be treated under either appendix 6 or appendix 9, but *firms* can choose whether appendix 6 or 9 is used.

Derivation of notional positions

- 7 G This section converts the instruments listed in table 4R into notional positions in the relevant *commodities*. These notional positions are expressed in terms of quantity (tonnes, barrels, etc), not value. The maturity of the position is only relevant where the *firm* is using the maturity ladder approach or the modified maturity ladder approach.

Futures, forwards, CFDs and options on a single commodity

- 8 R Where a *forward, future, CFD, synthetic future* or *option* (unless already included in the *firm's option PRR* calculation) settles according to:
- (1) the difference between the price set on trade date and that prevailing at contract expiry, the notional position:
 - (a) equals the total quantity underlying the contract; and
 - (b) has a maturity equal to the expiry date of the contract
 - (2) the difference between the price set on trade date and the average of prices prevailing over a certain period up to contract expiry, there is a notional position for each of the reference dates used in the averaging period to calculate the average price, which:
 - (a) equals a fractional share of the total quantity underlying the contract; and
 - (b) has a maturity equal to the relevant reference date.
- 9 G The following example illustrates 8R(2). A *firm* buys a Traded Average Price Option (TAPO - a type of Asian option) allowing it to deliver 100 tonnes of Grade A copper and receive \$1,750 in June. If there were twenty *business days* in June the short notional positions will each:
- (1) equal 5 tonnes per day (1/20 of 100 tonnes); and
 - (2) have a maturity equal to one of the *business days* in June (one for each day).

In this example as each *business day* in June goes by the quantity per day for the remaining days does not change (5 tonnes per day) only the days remaining changes. Therefore, halfway through June there are 10, 5 tonne short notional positions remaining each for the ten remaining *business days* in June.

Buying or selling a single commodity at an average of spot prices prevailing in the future

- 10 R Commitments to buy or sell at the average spot price of the *commodity* prevailing over some period between trade date and maturity must be treated as a combination of:
- (1) a position equal to the full amount underlying the contract with a maturity equal to the maturity date of the contract which is:
 - (a) long, where the *firm* will buy at the average price; or
 - (b) short, where the *firm* will sell at the average price
 - (2) a series of notional positions, one for each of the reference dates where the contract price remains unfixed, each of which:
 - (a) is long if the position under (1) is short, or short if the position under (1) is long;
 - (b) equals a fractional share of the total quantity underlying the contract; and
 - (c) has a maturity date of the relevant reference date.

- 11 G The following guidance provides an example of 10R.

In January, a *firm* agrees to buy 100 tonnes of copper for the average spot price prevailing during the 20 *business days* in February, and will settle on 30 June. After entering into this agreement, the *firm* faces the risk that the average price for February increases relative to that for 30 June. Therefore, as highlighted in the table below:

- (1) the short positions reflect the fact that this could occur because any one of the remaining forward prices for February increase; and
- (2) the long position reflects the fact that this loss could occur because the forward price for 30 June falls.

- 12 G Table: Example of buying at the average spot price prevailing in the future (see 11G)

	Application of 10R(1)	Application of 10R(2)
From trade date to start of averaging period	Long position in 100 tonnes of copper with a maturity of 30 June.	A series of 20 notional short positions each equal to 5 tonnes of copper. Each position is allocated a maturity equal to one of the <i>business days</i> in February (one for each day).
During averaging period	Long position in 100 tonnes of copper with a maturity of 30 June.	As each <i>business day</i> goes by in February the price for 5 tonnes of copper is fixed and so there will be one less notional short position.
After averaging period	Long position in 100 tonnes of copper with a maturity of 30 June.	No short positions.

Futures, CFDs and options on a commodity index

- 13 R *Commodity index futures and commodity index options* (unless the *option* is included in the *firm's option PRR* calculation), must be treated as follows:
- (1) Step 1: The total quantity underlying the contract must be either:
 - (a) treated as a single notional *commodity* position (separate from all other *commodities*); or
 - (b) divided into notional positions, one for each of the constituent *commodities* in the index, of an amount which is a proportionate part of the total underlying the contract according to the weighting of the relevant *commodity* in the index.
 - (2) Step 2: Each notional position determined in step 1 must then be included:
 - (a) when using the simplified approach (24R), without adjustment; or
 - (b) when using the maturity ladder (25R) or modified maturity ladder approach (30R), with the adjustments in table 32R.
- 14 R Table: Treatment of *commodity index futures* and *commodity index options* (see 13R(2)(b)).

Construction of index	Notional position (or positions) and maturity
Spot level of index is based on the spot price of each constituent <i>commodity</i>	Each quantity determined in step 1 is assigned a maturity equal to the expiry date of the contract.
Spot level of index is based on an average of the forward prices of each constituent <i>commodity</i>	Each quantity determined in step 1 is divided (on a pro-rata basis) into a series of forward positions to reflect the impact of each forward price on the level of the index. The maturity of each forward position equals the maturity of the relevant forward price determining the level of the index when the contract expires.

- 15 G An example of using 13R and table 14R is as follows. A *firm* is long a three-month *commodity index future* where the spot level of the index is based on the one, two and three month forward prices of aluminium, copper, tin, lead, zinc and nickel (18 prices in total).

Step 1: the *firm* must decide whether to treat the full quantity underlying the contract as a single notional *commodity* position, or disaggregate it into notional positions in aluminium, copper, tin, lead, zinc and nickel. In this case the firm decides to disaggregate the contract into notional positions in aluminium, copper, tin, lead, zinc and nickel.

Step 2: if the *firm* uses the simplified method, nothing more need be done to arrive at the notional position. In this case the *firm* uses the maturity ladder approach and so subdivides each position in each metal into three because the level of the index is based on the prevailing one, two and three month forward prices. Since the *future* will be settled in three months' time at the prevailing level of the index, the three positions for each metal will have maturities of four, five and six months respectively.

Commodity swaps

- 16 R A *firm* must treat a *commodity swap* as a series of notional positions, one position for each payment under the *swap*, each of which:
- (1) equals the total quantity underlying the contract;
 - (2) has a maturity corresponding to the payment date; and
 - (3) is long or short according to 17R.
- 17 R Table: Treatment of *commodity swaps* (see 16R)

	Receiving amounts which are unrelated to any <i>commodity's</i> price	Receiving the price of <i>commodity 'b'</i>
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Paying amounts which are unrelated to any <i>commodity's</i> price	N/A	Long positions in <i>commodity</i> 'b'
Paying the price of <i>commodity</i> 'a'	Short positions in <i>commodity</i> 'a'	Short positions in <i>commodity</i> 'a' and long positions in <i>commodity</i> 'b'

- 18 G Table 17R shows that where the legs of the *swap* are in different *commodities*, a series of forward positions are created for each *commodity* (that is, a series of short positions in *commodity* 'a' and a series of long positions in *commodity* 'b').
- 19 G Table 17R also covers the case where one leg is unrelated to any *commodity's* price. This leg may be subject to a *PRR* under another appendix; for example, an interest rate based leg would have to be included in a *firm's* interest rate *PRR* calculation.

Calculating the *PRR* for each commodity

- 20 R A *firm* must calculate a *PRR* for each *commodity* separately using either the simplified approach (24R), the maturity ladder approach (25R) or the modified maturity ladder approach (30R).
- 21 G A *firm* need not use the same approach for all *commodities*.
- 22 R A *firm* must treat positions in different grades or brands of the same *commodity*-class as different *commodities* unless they:
- (1) can be delivered against each other; or
 - (2) have price movements which have exhibited a stable correlation coefficient of at least 0.9 over the last 12 months. The *firm* must then monitor the correlation on a continuing basis
- 23 R If a *firm* intends to rely on the approach in 22R(2) it must:
- (1) notify the *FSA* in writing at least twenty *business days* prior to the date the *firm* starts relying on it.
 - (2) when it notifies the *FSA* under (1) the *firm* must also provide to the *FSA* the analysis of price movements on which it relies.

SIMPLIFIED APPROACH

- 24 R A *firm* which calculates *PRR* using the simplified approach must do so by summing:
- (1) 15% of the net position multiplied by the spot price for the *commodity*; and

- (2) 3% of the gross position (long plus short, ignoring the sign) multiplied by the spot price for the *commodity*.

Maturity ladder approach

- 25 R A *firm* using the maturity ladder approach must calculate the *PRR* following the steps in 26R and then sum all spread charges, carry charges and outright charges that result.
- 26 R The *firm* must calculate the charges referred to in 25R as follows:
- (1) Step 1: Offset long and short positions maturing:
 - (a) on the same day; or
 - (b) (in the case of positions arising under contracts traded in markets with daily delivery dates) within 10 *business days* of each other.
 - (2) Step 2: Allocate the positions remaining after step 1 to the appropriate maturity band in table 28R (*physical commodity* positions are allocated to band 1).
 - (3) Step 3: Match long and short positions within each band. In each instance, calculate a spread charge equal to the matched amount multiplied first by the spot price for the *commodity* and then by the spread rate of 3%.
 - (4) Step 4: Carry unmatched positions remaining after step 3 to another band where they can be matched, then match them. Do this until all matching possibilities are exhausted. In each instance, calculate:
 - (a) a carry charge equal to the carried position multiplied by the spot price for the *commodity*, the carry rate of 0.6% and the number of bands by which the position is carried; and
 - (b) a spread charge equal to the matched amount multiplied by the spot price for the *commodity* and the spread rate of 3%.
 - (5) Step 5: Calculate the outright charge on the remaining positions (which will either be all long positions or all short positions). The outright charge equals the remaining position (ignoring the sign) multiplied by the spot price for the *commodity* and the outright rate of 15%.
- 27 G The matched amount in 26R is the lesser (ignoring the sign) of either the total long position or the total short position. For example, a band with 1000 long and 700 short results in a matched amount of 700. The unmatched amount would be 300.
- 28 R Table: Maturity bands for the maturity ladder approach (see 26R))

Band	Maturity of position
Band 1	$0 \leq 1$ month
Band 2	> 1 month ≤ 3 months
Band 3	> 3 months ≤ 6 months

Band 4	> 6 months ≤ 1 year
Band 5	> 1 year ≤ 2 years
Band 6	> 2 years ≤ 3 years
Band 7	> 3 years

- 29 G Figure: An example illustrating the calculation of the *PRR* on an individual *commodity* using the maturity ladder approach (26R).

Figure 29G: After a *firm* has carried out the pre-processing required by 26R(1) (that is, step 1), it follows steps 2 to 5 as shown below. Because the *firm* is using the maturity ladder approach the spread rate is 3%, the carry rate is 0.6% and the outright rate is 15%. The example assumes that the spot price for the *commodity* is £25.

Band	Step 2 Allocate remaining positions to appropriate maturity bands	Step 3 Match within bands. Each matched amount incurs a spread charge.	Step 4a Carry across bands. Each carried amount incurs a carry charge.	Step 4b Match within band. Each matched amount incurs a spread charge.	Step 6 Remaining position(s) incur an outright charge.																
0 ≤ 1 month																					
>1 month ≤ 3 months	1000 long 700 short	700 matched	300 carried																		
>3 months ≤ 6 months																					
>6 months ≤ 1 year																					
>1 year ≤ 2 years	600 short	Nothing matched	100 carried	400 matched	200 short remains																
>2 years ≤ 3 years																					
> 3 years	100 long	Nothing matched																			
<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%; padding-left: 40px;">Spread charges</td> <td style="padding-left: 20px;">700*£25*3% + 400*£25*3%</td> <td style="padding-left: 20px;">=</td> <td style="padding-left: 20px;">£825</td> </tr> <tr> <td style="padding-left: 40px;">Carry charges</td> <td style="padding-left: 20px;">300*£25*0.6%*3 + 100*£25*0.6%*2</td> <td style="padding-left: 20px;">=</td> <td style="padding-left: 20px;">£165</td> </tr> <tr> <td style="padding-left: 40px;">Outright charge</td> <td style="padding-left: 20px;">200*£25*15%</td> <td style="padding-left: 20px;">=</td> <td style="padding-left: 20px;">£750</td> </tr> <tr> <td colspan="3"></td> <td style="text-align: right; border-top: 1px solid black; border-bottom: 3px double black;">£1740</td> </tr> </table>						Spread charges	700*£25*3% + 400*£25*3%	=	£825	Carry charges	300*£25*0.6%*3 + 100*£25*0.6%*2	=	£165	Outright charge	200*£25*15%	=	£750				£1740
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Outright charge	200*£25*15%	=	£750																		
			£1740																		

Modified maturity ladder approach

- 30 R Until 31 December 2006 a *firm* may use the modified maturity ladder approach to calculate the *PRR* for a particular *commodity* provided the *firm*:
- (1) has a diversified *commodities* portfolio;

- (2) undertakes significant *commodities* business; and
- (3) notifies the *FSA* in writing:
 - (a) at least twenty *business days* before the date the *firm* intends to start using the modified maturity method; and
 - (b) If the facts and matters relied on to demonstrate that the *firm* meets the criteria in (1) and (2).

- 31 R A *firm* using the modified maturity ladder approach must calculate the *PRR* by:
- (1) following the same steps as in 26R but using the rates from table 32R rather than those in 26R; and
 - (2) summing all spread charges, carry charges and outright charge that result.

32 R Table: Alternative spread, carry and outright rates (see 31R).

	Precious metals (excluding gold)	Base metals	Softs (agricultural)	Other (including energy)
Spread rate (%)	2	2.4	3	3
Carry rate (%)	0.3	0.5	0.6	0.6
Outright rate (%)	8	10	12	15

- 33 G For the purposes of 30R(1) a *firm* has a diversified *commodity* portfolio where it holds positions in more than one of the *commodities* falling in any of the categories set out in table 32R and holds positions across different maturities in those individual *commodities*. A *firm* would not have a diversified *commodity* portfolio if it held positions in only one *commodity* in each of the categories set out in table 32R. This is because the rates in table 32R assume *firms* have positions in more than one of that category's *commodities*. Different *commodities* within a given category are likely to exhibit different volatilities, so where a *firm* does not have a diversified *commodity* portfolio in that category, the rates applying to that category might underestimate the regulatory capital required for a certain *commodity* at certain times.
- 34 G What constitutes significant business in 30R(2) will vary from *firm* to *firm*. The more regularly the *firm* undertakes trades in *commodities* and the more consistently it has positions in the relevant *commodity*, the more likely it is to be undertaking significant business for the purposes of 30R(2).
- 35 R Where a *firm* is:
- (1) treating a *commodity* index derivative as if it was based on a single separate *commodity* (see 13R(1)(a)); and

- (2) uses the modified maturity ladder approach to calculate the *PRR* for that *commodity*;

it must determine which index constituent incurs the highest rate in table 32R and apply that rate to the notional position for the purposes of 31R.

- 36 G Where an index is only based on precious metals, 13R allows the *firm* to treat the single notional position as precious metal for the purposes of 31R. However, if the index contained a mix of precious metals and base metals the *firm* would have to treat the notional position under 35R as a base metal (because base metals attract a higher rate than precious metals in table 32R).

Appendix 7

Securities Underwriting

General rules

- 1 G This appendix sets out the method for calculating a net *underwriting* position or reduced net *underwriting* position, which is then included in the *PRR* calculation in other appendices, or the liquidity adjustment calculation.

- 2 R A *firm* which *underwrites* or *sub-underwrites* an issue of *securities* must:
- (1) identify commitments to *underwrite* or *sub-underwrite* which give rise to an *underwriting* position (see 8R);
 - (2) identify the time of initial commitment (see 14R);
 - (3) calculate the net *underwriting* position (set out in 18R) or reduced net *underwriting* position (if permitted under 24R);
- 3 R A *firm* must include the net *underwriting* position or reduced net *underwriting* position in:
- (1) 3R(1) of appendix 4, where debt *securities* are being underwritten;
 - (2) 2R(1) of appendix 5, where *equities* are being underwritten;
 - (3) 22R of appendix 9, where *warrants* are being underwritten; or
 - (4) 10-66(1)R where the *firm* does not have a *trading book*; and
 - (5) 2R of appendix 8, where the *equities*, debt *securities* or *warrants* being underwritten are denominated in a *foreign currency*.
- 4 R A *firm* must comply with 2R from initial commitment (as determined under 8R) until the end of the fifth *business day* after *working day 0* (as determined under 23R).
- 5 G *Sub-underwriting* is a commitment given by one *firm* to someone other than the issuer or seller of the *securities*, to *underwrite* all or part of an issue of *securities*.
- 6 G The net *underwriting* position calculated in 18R will also be used in calculating the net *underwriting exposure* set out in 32R.
- 7 G The net *underwriting* position or reduced net *underwriting* position arising from *underwriting* or *sub-underwriting* a rights or *warrants* issue should be calculated using the current market price of the underlying *security* for the purposes of the *equity PRR* or *option PRR*. However, the *PRR* will be limited to the value of the net *underwriting* position calculated using the initial issue price of the rights or *warrants*.

Commitments to underwrite securities

- 8 R For the purpose of 2R(1), a *firm* has a commitment to *underwrite* or *sub-underwrite* an issue of *securities* where:
- (1) it gives a commitment to an issuer of *securities* to *underwrite* an issue of *securities*;
 - (2) it gives a commitment to a person, other than the issuer of *securities*, to *sub-underwrite* an issue of *securities*; or

- (3) it is a member of a syndicate or group that gives a commitment to an issuer to *underwrite* an issue of *securities* or a commitment to a person other than the issuer of *securities*, to sub-*underwrite* an issue of *securities*.
- 9 G Block trades including bought deals, private placements, revolving *underwriting* facilities and *underwriting* syndicated loans are not within the scope of this appendix.
- 10 R For the purpose of this appendix, *securities* include debt and *equity instruments*, and *instruments* which are convertible into *securities* but excludes loans.
- 11 R A *firm* that buys and sells *securities* before issue is dealing in the grey market. This appendix does not apply to a *firm* dealing in the grey market unless the *firm*:
- (1) has an *underwriting* commitment to the issuer in respect of those *securities*; or
 - (2) has a sub-*underwriting* commitment in respect of those *securities* and is using the grey market solely for the purpose of reducing that sub-*underwriting* commitment.
- 12 G In this appendix the grey market is the market in which dealers "buy" and "sell" securities ahead of issue. In reality the dealers are buying and selling promises to deliver the securities when issued.
- 13 R Where a single *firm* is involved in both *underwriting* or sub-*underwriting* an issue of *securities* as well as dealing in that issue for proprietary trading purposes this appendix will not apply to grey market transactions undertaken by the proprietary trading part of the *firm*.

Time of initial commitment

- 14 R Subject to 15R, the time of initial commitment is the earlier of:
- (1) the time the *firm* signs an agreement with the issuer of *securities* to *underwrite* those *securities*; or
 - (2) the time the price and allocation of the issue are set.
- 15 R If a *firm* has an irrevocable and unfettered right to withdraw from an *underwriting* commitment, exercisable within a certain period, the commitment commences when that right expires.
- 16 G Subject to the existence of a right described in 15R an *underwriting* commitment commences even if it is subject to formal, legal or other conditions that would normally be expected to be satisfied.
- 17 G A force majeure or material adverse change clause would not be a right of the sort referred to in 15R.

Calculating the net underwriting position

- 18 R A *firm* must calculate a net *underwriting* position by adjusting the gross amount it has committed to *underwrite* for:

- (1) any sales or sub-*underwriting* commitments received that have been confirmed in writing at the time of initial commitment;
 - (2) any *underwriting* or sub-*underwriting* commitments obtained from others since the time of initial commitment;
 - (3) any purchases or sales of the *securities* since the time of initial commitment, (other than those referred to in 13R); and
 - (4) any allocation of *securities* granted or received, arising from the commitment to *underwrite* the *securities*, since the time of initial commitment.
- 19 R A *firm* signing an *underwriting* agreement with an issuer of *securities* where the exact issue price or allocation of *securities* has not been fixed must calculate the gross amount, for the purposes of 18R, as the amount it has formally committed to under that agreement until the time the exact issue price and/or allocation is set.
- 20 G Allocations may arise, after date of initial commitment, from the agreement to *underwrite*. For example obligations or rights to or from the issuer, the *underwriting* group or syndicate.

GREY MARKET TRANSACTIONS

- 21 R Subject to 11R and 13R a *firm* may include grey market transactions when calculating the net *underwriting* position.

OVER-ALLOTMENT OPTIONS

- 22 R When calculating the net *underwriting* position, a *firm* must exclude an over-allotment option granted to it by the issuer, except to the extent it reduces:
- (1) from working day 0 an over-allotment made by the *firm*; or
 - (2) from working day 0 an over-allotment made by the *firm* on behalf of another member of the *underwriting* syndicate who has been granted the over-allotment option.
- 23 R For the purposes of this appendix ‘working day 0’ is the *business day* on which the *firm* becomes unconditionally committed to accepting a known quantity of *securities* at a specified price, as follows:
- (1) For debt issues and *securities* which are issued in a similar manner, ‘working day 0’ is the later of the date on which the *securities* are allotted, and the date on which payment for them is due.
 - (2) For *equity* issues and *securities* which are issued in a similar manner, ‘working day 0’ is the later of the date on which the offer becomes closed for subscriptions and the date on which the allocations are made public.
 - (3) For rights issues, ‘working day 0’ is first day after the date on which the offer becomes closed to acceptances for subscription.

Calculating the reduced net underwriting position

- 24 R A *firm* may apply the relevant reduction factors in table 27R to its net *underwriting* position if the *securities* it is *underwriting* or sub-*underwriting* are new *securities*.
- 25 R For the purposes of this appendix, a *firm* may treat as new *securities*:
- (1) *securities* that have not previously been offered for sale or subscription by an issuer;
or
 - (2) *securities* that have not previously been traded on a *recognised investment exchange, designated investment exchange* or a *regulated market*.
- 26 R To calculate the reduced net *underwriting* position a *firm* must apply table 27R to the net *underwriting* position (calculated under 18R) as follows:
- (1) In respect of debt *securities*, a *firm* must calculate two reduced net *underwriting* positions; one for inclusion in the *firm's* specific risk calculation (43R of appendix 4), the other for inclusion in its general market risk calculation (48R of appendix 4).
 - (2) In respect of *equities*, a *firm* must calculate only one reduced net *underwriting* position, and then include it in the simplified equity method (see 27R of appendix 5).

27 R Table: Net *underwriting* position reduction factors (see 26R)

<i>Underwriting timeline</i>	Debt		Equity
	General market risk	Specific risk	
Time of initial commitment until <i>working day 0</i>	0%	100%	90%
Working day 1	0%	90%	90%
Working day 2	0%	75%	75%
Working day 3	0%	75%	75%
Working day 4	0%	50%	50%
Working day 5	0%	25%	25%
Working day 6 and onwards	0%	0%	0%

28 G Figure: An example of the reduced net *underwriting* position calculation. The example is based on the *firm* starting with a commitment to underwrite £100 million of a new *equity* issue.

Time	Net <i>underwriting</i> position (see 18R)	Percentage reduction (see 27R)	Reduced net <i>underwriting</i> position¹
At initial commitment 9.00am Monday	£100m gross amount is reduced by £20m due to sales/ sub- <i>underwriting</i> commitments confirmed in writing at the time of initial commitment (see 18R(1)). = £80m	90%	£8m
Post initial commitment 9.02am Monday	Remaining £80m is reduced by £40m due to further sales, sub- <i>underwriting</i> commitments obtained and allocations granted (see 18R (2) – (4)). = £40m	90%	£4m
At the end of working day 1	Remaining £40m is reduced to £20m due to further sales. = £20m	90%	£2m
End of working day 3	Remaining £20m is reduced to £5m due to further sales. = £5m	75%	£1.25 m
End of working day 4	Remaining £5m is reduced to £2m due to further sales. = £2m	50%	£1m
End of working day 5	Remaining £2m is reduced to £1m due to further sales. = £1m	25%	£0.75 m
Start of working day 6	£1m remaining = £1m	0%	£1m

Note: ¹ *Firms* are reminded that in the case of an *equity*, the reduced net *underwriting* position must be treated under the simplified equity method (see 27R of appendix 5)

Large exposure risk from underwriting securities

CALCULATING THE NET UNDERWRITING EXPOSURE

- 29 R For the purposes of calculating the *LER* set out in 10-194R a *firm* must include net *underwriting exposures* to an issuer in the calculation of its total *exposure* to that issuer.
- 30 R A *firm* must include counterparty exposures to any sub-underwriters for the purposes of calculating the *LER* set out in 10-194R.
- 31 R A *firm*, before entering into a new *underwriting* commitment must be able to recalculate *LER* to the level of detail necessary to ensure that the *firm's financial resources requirement* does not exceed the *firm's financial resources*.
- 32 R A *firm* must calculate the net *underwriting exposure* to an issuer by applying the relevant reduction factors in table 33R to its net *underwriting* position calculated under 18R.
- 33 R Table: Calculation of net *underwriting exposure* (see 32R)

Time	Reduction factor to be applied to net <i>underwriting</i> position
Initial commitment to <i>working day 0</i>	100%
<i>Working day 0</i>	100%
Working day 1	90%
Working day 2	75%
Working day 3	75%
Working day 4	50%
Working day 5	25%
Working day 6 onwards	0%

- 34 R There is no *large exposure* limit or *LER* for net *underwriting exposures* between initial commitment and working day 0, except where specified by a requirement on a *firm's Part IV permission*. The *large exposure* requirements are set out in 10-190 to 10-196.

MONITORING AND REPORTING LARGE EXPOSURES

- 35 R For the purposes of *large exposures* monitoring only, a *firm* must report its net *underwriting exposure* from the date of initial commitment rather than working day 0.

Risk management

- 36 R A *firm* must take reasonable steps to establish and maintain such systems and controls to monitor and manage its *underwriting* and sub-*underwriting* business as are appropriate to the nature, scale and complexity of its *underwriting* and sub-*underwriting* business.
- 37 G The general requirements for systems and controls are set out in SYSC. 36G is specific to a *firm's underwriting* and sub-*underwriting* business.
- 38 G A *firm* must take reasonable steps to:
- (1) allocate responsibility for the management of its *underwriting* and sub-*underwriting* business;
 - (2) allocate adequate resources to monitor and control its *underwriting* and sub-*underwriting* business;
 - (3) satisfy itself that its systems to monitor *exposure* to counterparties will calculate, revise and update its *exposure* to each counterparty arising from its *underwriting* or sub-*underwriting* business;
 - (4) satisfy itself of the suitability of each person who performs functions for it in connection with the *firm's underwriting* business having regard for the person's skill and experience; and
 - (5) satisfy itself that its procedures and controls to monitor and manage its *underwriting* business address, on an on-going basis, the capacity of sub-*underwriters* to meet sub-*underwriting* commitments.

Appendix 8

Foreign exchange PRR

General rule

- 1 R A *firm* must calculate its foreign exchange *PRR* by:
- (1) identifying which *foreign currency* and gold positions to include in the *PRR* calculation;
 - (2) calculating the *open currency position* and net gold position; and
 - (3) multiplying the sum (ignoring the sign) of the *open currency position* and the net gold position by 8%.
- G For example, a *firm* has an *open currency position* of -£100 and a net gold position of £50. The sum (ignoring the sign) is £150, and so the foreign exchange *PRR* is £12.

Scope of the foreign exchange PRR calculation

- 2 R A *firm*'s foreign exchange *PRR* calculation must include the following items regardless of whether they are *trading book* or *non-trading book* positions:
- (1) all gold positions;
 - (2) all instruments which are denominated in a *foreign currency*, except:
 - (a) *foreign currency* assets which have been deducted in full from the *firm*'s *financial resources*;
 - (b) instruments hedging (a);
 - (c) instruments hedging the *firm*'s capital; or
 - (d) instruments hedging a future *foreign currency* income or expense which is known but not yet accrued; and
 - (3) notional positions arising from the instruments listed in table 4R:
- 3 R A *firm* must notify the *FSA* in writing if it uses the exclusions under 2R(2)(a)-(d).

- 4 R Table: instruments which result in notional *foreign currency* positions (see 2R(3)).

Foreign exchange <i>futures, forwards, synthetic futures</i> and <i>CFDs</i>	10R
Foreign exchange <i>swaps</i>	12R
Foreign exchange <i>options</i> or <i>warrants</i> (unless the <i>firm</i> calculates a <i>PRR</i> on the <i>option</i> or <i>warrant</i> under appendix 9).	14R
Gold <i>futures, forwards, synthetic futures</i> and <i>CFDs</i>	15R
Gold <i>options</i> (unless the <i>firm</i> calculates a <i>PRR</i> on the <i>option</i> under appendix 9).	16R

- 5 G *Firms* are reminded that table 5R in appendix 9 divides foreign exchange *options* and *warrants* into:
- (1) those which must be treated under appendix 9; and
 - (2) those which must be treated under either appendix 8 or appendix 9, but *firms* can choose whether appendix 8 or 9 is used.
- 6 R When determining the currency of denomination *firms* must:
- (1) use the currency in which the *firm* accounts for the instrument where an instrument is quoted in more than one currency; and
 - (2) treat depository receipts as positions in the underlying security.
- 7 G Instruments denominated in a foreign currency include, amongst other things, assets and liabilities (including accrued interest); non-foreign exchange *derivatives*; net *underwriting* positions; reduced net *underwriting* positions; and irrevocable guarantees (or similar instruments) that are certain to be called.
- 8 G Where a contract is based on a basket of currencies, the *firm* can choose either to derive notional positions in each of constituent currencies, or treat it as a single notional position in a separate hypothetical currency.

Derivation of notional positions

- 9 G This section derives notional currency positions for the instruments listed in table 4R.

FOREIGN EXCHANGE FORWARDS, FUTURES, CFDs AND SYNTHETIC FUTURES

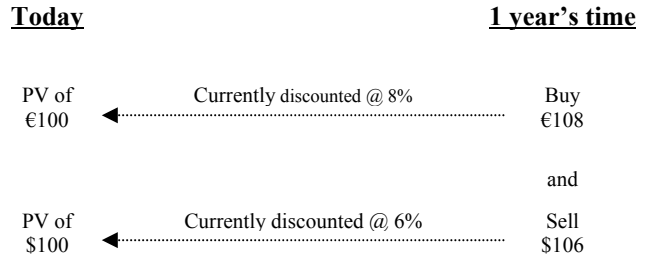
- 10 R A *firm* must treat a foreign exchange *forward, future* or *CFD* as two notional currency positions as follows:
- (1) a long notional position in the currency which the *firm* has contracted to buy; and
 - (2) a short notional position in the currency which the *firm* has contracted to sell;

where the notional positions have a value equal to either:

- (a) the contracted amount of each currency to be exchanged in the case of a *forward* or *future* held in the *non-trading book*; or
- (b) the present value of the amount of each currency to be exchanged in the case of a *forward* or *future* held in the *trading book*.

11 G For example, a *firm* contracts to sell \$106 for €108 in one year's time.

The present values of each cash flow are \$100 and €100 respectively.



- In the *non-trading book*, this *forward* would be treated as a combination of a €108 long position and a \$106 short position.
- In the *trading book*, this *forward* would be treated as a combination of a €100 long position and a \$100 short position.

Firms are reminded that foreign exchange *forwards* held in the *trading book* must also be included in the *firm's* interest rate *PRR* calculation (see 4R of appendix 4).

FOREIGN EXCHANGE SWAPS

12 R A *firm* must treat an foreign exchange *swap* as:

- (1) a long notional position in the currency which the *firm* has contracted to receive interest and principal;
- (2) a short notional position in the currency which the *firm* has contracted to pay interest and principal; and
- (3) where the notional positions have a value equal to either:
 - (a) the nominal amount of each currency underlying the *swap* if it is held in the *non-trading book*; or
 - (b) the present value amount of all cash flows in the relevant currency in the case of a *swap* held in the *trading book*.

13 G For example, a *firm* enters into a five year foreign exchange *swap* where it contracts to pay six month US\$ Libor on \$100 in return for receiving 6% fixed on €100. The present values of each leg are \$100 and €98 respectively.

- In the *non-trading book*, this *swap* would be treated as a combination of a €100 long position and a \$100 short position.
- In the *trading book*, this *swap* would be treated as a combination of a €98 long position and a \$100 short position.

Firms are reminded that foreign exchange *swaps* held in the *trading book* must also be included in the *firm's* interest rate *PRR* calculation (see table 4R of appendix 4).

FOREIGN EXCHANGE OPTIONS AND WARRANTS

- 14 R Where included in this appendix's *PRR* calculation (see table 4R), a foreign exchange *option* or *warrant* must be treated as a foreign exchange *forward*.

GOLD FORWARDS, FUTURES AND CFDS

- 15 R A *forward*, *future* or *CFD* on gold must be treated as a notional position in gold with a value equal to the amount of gold underlying multiplied by the current spot price for gold.

GOLD OPTIONS

- 16 R If included in the *PRR* calculation under this appendix (see table 4R), a gold *option* must be treated as a gold *forward*.

Open currency position

- 17 R A *firm* must calculate its *open currency position* by:
- (1) calculating the net position in each *foreign currency*;
 - (2) converting each net position into its *base currency* equivalent at current spot rates;
 - (3) summing all short net positions and summing all long net positions; and
 - (4) selecting the larger sum (ignoring the sign) from (3).

Net gold position

- 18 R A *firm* must calculate its net gold position by:
- (1) valuing all gold positions using the prevailing spot price for gold (regardless of the maturity of the positions);
 - (2) offsetting long and short positions; and
 - (3) converting the resulting net position into the *base currency* equivalent using the current spot foreign exchange rate.

Appendix 9

Option PRR

Option PRR calculation

- 1 R A *firm* must calculate its *option PRR* by:
 - (1) identifying which *option* positions must be included within the scope of the *option PRR* calculation under 3R to 5R;
 - (2) calculating the derived position in each *option* in accordance with 9R to 15R;
 - (3) calculating the *PRR* for each derived position in accordance with 16R to 32G;
 - (4) summing all of the *PRRs* calculated in accordance with (3).
- 2 G *Firms* are reminded that table 4R of appendix 4 and table 3R of appendix 5 also require an interest rate *PRR* to be calculated for *options* on *equities*, baskets of *equities* or *equity* indices. The interaction between this appendix and others is illustrated in 33G.

Scope of the option PRR calculation

- 3 R Except as permitted under 5R, a *firm's option PRR* calculation must include:
 - (1) each *trading book* position in an *option* on an *equity*, interest rate or debt *security*;
 - (2) each *trading book* position in a *warrant* on an *equity* or debt *security*; and
 - (3) each *trading book* and *non-trading book* position in an *option* on a *commodity*, currency or gold.
- 4 G 3R(2) includes net *underwriting* positions or reduced net *underwriting* positions in *warrants*.

5 R Table: Appropriate *PRR* calculation for an *option* or warrant (see 3R)

<i>Option type (see 18R) or Warrant</i>	<i>PRR calculation</i>
American <i>option</i> , European <i>option</i> , Bermudan <i>option</i> , Asian <i>option</i> or <i>warrant</i> for which the <i>in the money</i> percentage (see 6R) is equal to or greater than the appropriate <i>PRA</i> (see 7R and 8R)	Calculate either an <i>option PRR</i> , or the most appropriate to the underlying position of: (a) an <i>equity PRR</i> (b) an interest rate <i>PRR</i> (c) a <i>commodity PRR</i> (d) a foreign exchange <i>PRR</i>
American <i>option</i> , European <i>option</i> , Bermudan <i>option</i> , Asian <i>option</i> or <i>warrant</i> : (a) for which the <i>in the money</i> percentage (see 6R) is less than the appropriate <i>PRA</i> (see 7R and 8R); or (b) that is <i>at the money</i> ; or (c) that is <i>out of the money</i> .	Calculate an <i>option PRR</i>
All other types of <i>option</i> listed in 18R (regardless of whether <i>in the money</i> , <i>at the money</i> or <i>out of the money</i>).	

THE IN THE MONEY PERCENTAGE

6 R The *in the money* percentage is calculated as follows:

For a call *option*:

$$\frac{\text{Current market price of the underlying} - \text{Strike price of the option}}{\text{Strike price of the option}} * 100$$

For a put *option*:

$$\frac{\text{Strike price of the option} - \text{Current market price of the underlying}}{\text{Strike price of the option}} * 100$$

THE APPROPRIATE PRA

7 R The appropriate *PRA* for a position is that listed in table 8R against the relevant underlying position.

8 R Table: Appropriate *PRA* (see 7R)

Underlying Position	Appropriate PRA
<i>Equity</i>	The <i>PRA</i> applicable to the underlying <i>equity</i> or <i>equity</i> index in table 30R of Appendix 5 (simplified equity method)
Interest rate	The sum of the specific risk <i>PRA</i> (table 44R of appendix 4) and the general market risk <i>PRA</i> (53R of appendix 4) applicable to the underlying position
Debt <i>securities</i>	The sum of the specific risk <i>PRA</i> (table 43R of appendix 4) and the general market risk <i>PRA</i> (table 52R of appendix 4) applicable to the underlying position
<i>Commodity</i>	15% (unless the <i>firm</i> uses the modified maturity ladder approach in which case it is the outright rate applicable to the underlying position; see 30R-32R of appendix 6)
Currency	8%
Gold	8%

Calculating derived positions

- 9 R A *firm* must calculate the derived position specified in the table in 13R for each position included in its *option PRR* calculation.

NETTING POSITIONS

- 10 R A *firm* may calculate a derived position for its net position in an *option* or a *warrant*, if the relevant *options* or *warrants* are identical or may be treated as identical under 11R or 12R.
- 11 R A *firm* may treat *options* or *warrants* as identical if they have the same strike price, maturity (except for an interest rate cap or floor – see 12R) and underlying.
- 12 R A *firm* may treat as identical a purchased interest rate cap (or floor) and a written interest rate cap (or floor) only if they mature within 30 days of each other and all other terms are identical (a cap may not be netted against a floor).

DERIVED POSITIONS

- 13 R Table: Derived positions (see 9R)

	<i>Option (or warrant)</i>	Derived position
<i>Equity</i>	<i>Option (warrant)</i> on a single <i>equity</i> or <i>option</i> on a <i>future/forward</i> on a single <i>equity</i>	A notional position in the actual <i>equity</i> underlying the contract valued at the current market price of the <i>equity</i> .

	<i>Option (warrant) on a basket of equities or option on a future/forward on a basket of equities</i>	A notional position in the actual <i>equities</i> underlying the contract valued at the current market price of the <i>equities</i> .
	<i>Option (warrant) on an equity index or option on a future/forward on an equity index</i>	A notional position in the index underlying the contract valued at the current market price of the index.
Interest rate	<i>Option on an interest rate or an interest rate future/FRA</i>	A zero coupon <i>zero-specific-risk security</i> in the currency concerned with a maturity equal to the sum of the time to expiry of the contract and the length of the period on which the settlement amount of the contract is calculated valued at the notional amount of the contract.
	<i>Option on an interest rate swap</i>	A zero coupon <i>zero-specific-risk security</i> in the currency concerned with a maturity equal to the length of the <i>swap</i> valued at the notional principal amount.
	Interest rate cap or floor	A zero coupon <i>zero-specific-risk security</i> in the currency concerned with a maturity equal to the remaining period of the cap or floor valued at the notional amount of the contract.
Debt securities	<i>Option (warrant) on a debt security or option on a future/forward on a debt security</i>	The underlying debt <i>security</i> with a maturity equal to the time to expiry of the <i>option</i> valued as the nominal amount underlying the contract at the current market price of the debt <i>security</i> .
Commodity	<i>Option on a commodity or option on a future/forward on a commodity</i>	An amount equal to the tonnage, barrels or kilos underlying the <i>option</i> with a maturity equal to the expiry date of the <i>forward</i> or <i>futures</i> contract underlying the <i>option</i> .
Gold	<i>Option on gold or option on a future/forward on gold</i>	An amount equal to the troy ounces underlying the <i>option</i> with a maturity equal to the expiry date of the <i>forward</i> or <i>futures</i> contract underlying the <i>option</i> .

Currency	Currency <i>option</i>	The amount of the underlying currency that the <i>firm</i> will receive if the <i>option</i> is exercised converted at the spot rate into the currency that the <i>firm</i> will sell if the <i>option</i> is exercised.
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Combinations of options which can be treated as one option

- 14 R** A *firm* may treat (for the purpose of calculating an *option PRR* under this appendix) an *option* strategy listed in table 15R as the single position in a notional *option* specified against that strategy in table 15R, if:
- (1) each element of the strategy is transacted with the same *counterparty*;
 - (2) the strategy is documented as a single structure;
 - (3) each *option* in the structure has the same maturity and underlying; and
 - (4) the constituent parts of the structure form an indivisible single contract, so that neither party can unwind or default on one part of the structure without doing so for the contract as a whole.

15 R Table: *Option strategies* (see 14R)

<i>Option strategy</i> (and an example)	<i>Notional option position</i> (and rule it must be treated under)
Bull Spread (e.g. buy 100 call and sell 101 call)	One purchased <i>option</i> (treat under 20R)
Bear Spread (e.g. sell 100 put and buy 101 put)	One written <i>option</i> (treat under 21R)
Synthetic Long Call (e.g. long underlying and buy 100 put)	One purchased <i>option</i> (treat under 20R or 24R)
Synthetic Short Call (e.g. short underlying and sell 100 put)	One written <i>option</i> (treat under 21R or 24R)
Synthetic Long Put (e.g. short underlying and buy 100 call)	One purchased <i>option</i> (treat under 20R or 24R)
Synthetic Short Put (e.g. buy underlying and sell 100 call)	One written <i>option</i> (treat under 21R or 24R)
Long Straddle (e.g. buy 100 call and buy 100 put)	One purchased <i>option</i> (treat under 20R)
Short Straddle (e.g. sell 100 call and sell 100 put)	One written <i>option</i> (treat under 21R but with no reduction for the amount the <i>option</i> is <i>out of the money</i>)
Long Strangle (e.g. buy 101 call and buy 99 put)	One purchased <i>option</i> (treat under 20R)
Short Strangle (e.g. sell 99 call and sell 101 put)	One written <i>option</i> (treat under 21R but with no reduction for the amount the <i>option</i> is <i>out of the money</i>)
Long Butterfly (e.g. buy one 100 call, sell two 101 calls, and buy one 102 call)	One purchased <i>option</i> (treat under 20R)
Short Butterfly (e.g. sell one 100 put, buy two 101 puts, and sell one 102 put)	One written <i>option</i> (treat under 21R but with no reduction for the amount the <i>option</i> is <i>out of the money</i>)

The option PRR for an individual position

- 16 R A *firm* must calculate the *PRR* for each individual derived *option* position using the method specified in table 18R, or, if more than one method is permitted, using one of those methods.
- 17 R The resulting *PRRs* must be converted to the *firm's base currency* using spot foreign exchange rates.
- 18 R Table: *Option PRR* methods for different types of *option* (see 16R)

Option	Description	Method
American <i>option</i>	An <i>option</i> that may be exercised at any time over an extended period up to its expiry date.	Standard method or hedging method if appropriate
European <i>option</i>	An <i>option</i> that can only be exercised at expiry.	
Bermudan <i>option</i>	A cross between an American <i>option</i> and European <i>option</i> . The Bermudan <i>option</i> can only be exercised at specific dates during its life.	
Asian <i>option</i>	The buyer has the right to exercise at the average rate or price of the underlying over the period (or part of the period) of the <i>option</i> . One variant is where the payout is based on the average of the underlying against a fixed strike price; another variant is where the payout gives at expiry the price of the underlying against the average price over the <i>option</i> period.	
Barrier <i>option</i>	An <i>option</i> which is either cancelled or activated if the price of the underlying reaches a pre-set level regardless of the price at which the underlying may be trading at the expiry of the <i>option</i> . The knock-out type is cancelled if the underlying price or rate trades through the trigger; while the knock-in becomes activated if the price moves through the trigger.	
Corridor <i>option</i>	Provides the holder with a pay-out for each day that the underlying stays within a defined range chosen by the investor.	
Ladder <i>option</i>	Provides the holder with guaranteed pay-outs if the underlying trades through a pre-agreed price(s) or rate(s) at a certain point(s) in time, regardless of future performance.	
Lock-in <i>option</i>	An <i>option</i> where the pay-out to the holder is locked in at the maximum (or minimum) value of the underlying that occurred during the life of the <i>option</i> .	
Look-back <i>option</i>	An European style <i>option</i> where the strike price is fixed in retrospect, that is at the most favourable price (i.e. the lowest (highest) price of the underlying in the case of a call (put)) during the life of the <i>option</i> .	

Forward starting <i>option</i>	An <i>option</i> that starts at a future date.	
Compound <i>option</i>	An <i>option</i> where the underlying is itself an <i>option</i> (i.e. an <i>option</i> on an <i>option</i>).	
Interest rate cap	An interest rate <i>option</i> or series of <i>options</i> under which a <i>counterparty</i> contracts to pay any interest costs arising as a result of an increase in rates above an agreed rate: the effect being to provide protection to the holder against a rise above that agreed interest rate.	Standard method, but no reduction for the amount the <i>option</i> is <i>out of the money</i> is permitted.
Interest rate floor	An interest rate <i>option</i> or series of <i>options</i> under which a <i>counterparty</i> contracts to pay any lost income arising as a result of a fall in rates below an agreed rate: the effect being to provide protection to the holder against a fall below that agreed interest rate.	
Performance <i>option</i>	An <i>option</i> based on a reference basket comprising any number of assets, where the pay-out to the holder could be one of the following: the maximum of the worst performing asset, or 0; the maximum of the best performing asset, or 0; the maximum of the spreads between several pairs of the assets, or 0.	Standard method or hedging method - using the highest <i>PRA</i> of the individual assets in the basket
Quanto	Quanto stands for “Quantity Adjusted <i>Option</i> ”. A quanto is an instrument where two currencies are involved. The payoff is depended on a variable that is measured in one of the currencies and the payoff is made in the other currency.	Subject to 31R, the standard method
Cliquet <i>option</i>	A cliquet <i>option</i> consists of a series of forward starting <i>options</i> where the strike price for the next exercise date is set equal to a positive constant times the underlying price as of the previous exercise date. They initially act like a vanilla <i>option</i> with a fixed price but as time moves on, the strike is reset and the intrinsic value automatically locked in at pre-set dates. If the underlying price is below the previous level at the reset date no intrinsic value is locked in but the strike price will be reset to the current price attained by the underlying. If the underlying price exceeds the current level at the next reset the intrinsic value will again be locked in.	Standard method for a purchased cliquet, or the method specified in 30R for a written cliquet
Digital <i>option</i>	A type of <i>option</i> where the pay-out to the holder is fixed. The most common types: all-or-nothing and one-touch <i>options</i> . All-or-nothing will pay out the fixed amount if the underlying is above (call) or below (put) a set value at expiry. The one-touch will pay the fixed amount if the underlying reaches a fixed point any time before expiry.	The method specified in 29R
Any other		The method

<i>option or warrant</i>		specified for the type of instrument whose description it most closely resembles.
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19 R In table 18R:

- (1) "standard method" refers to the method specified in 20R to 22R; and
- (2) "hedging method" refers to the method specified in 23R to 28R.

The standard method

PURCHASED OPTIONS AND WARRANTS

20 R Under the standard method, the *PRR* for a purchased *option* or *warrant* is the lesser of:

- (1) the market value of the derived position (see 9R) multiplied by the appropriate *PRA* (see 8R); and
- (2) the market value of the *option* or *warrant*.

WRITTEN OPTIONS AND WARRANTS

21 R Under the standard method, the *PRR* for a written *option* or *warrant* is the market value of the derived position (see 9R) multiplied by the appropriate *PRA* (see 8R). This result may be reduced by the amount the *option* or *warrant* is *out of the money* (subject to a maximum reduction to zero).

UNDERWRITING OR SUB-UNDERWRITING AN ISSUE OF WARRANTS

22 R Under the standard method, the *PRR* for *underwriting* or *sub-underwriting* an issue of *warrants* is the net *underwriting* position (or reduced net *underwriting* position) multiplied by the current market price of the underlying *securities* multiplied by the appropriate *PRA*, but the result can be limited to the value of the net *underwriting* position (or reduced net *underwriting* position) calculated using the issue price of the *warrant*.

The hedging method

23 G The hedging method involves *option PRR* being calculated on a combination of the *option* and its hedge.

24 R Under the hedging method a *firm* must calculate *PRR* for individual positions as follows:

- (1) for an *option* or *warrant* on an *equity*, basket of *equities* or *equity* index and its *equity* hedge(s), to the extent specified or permitted in table 26R, using the calculation in table 27R;
 - (2) for an *option* or *warrant* on a debt *security*, basket of debt *securities* or debt *security* index and its debt *security* hedge(s), to the extent specified or permitted in table 26R, using the calculation in table 27R;
 - (3) for an *option* on gold and its gold hedge, to the extent specified or permitted in table 26R, using the calculation in table 27R; and
 - (4) for an *option* on a currency and its currency hedge, to the extent specified or permitted in table 26R, using the calculation in table 28R.
- 25 R A *firm* may not use the hedging method for:
- (1) an interest rate *option* and its hedge; or
 - (2) a *commodity option* and its hedge.
- 26 R Table: Appropriate treatment for *equities*, debt *securities* or currencies hedging *options* (see 24R)

Hedge	PRR calculation for the hedge	Limits (if the hedging method is used)	Naked positions
An <i>equity</i> (hedging an <i>option</i> or <i>warrant</i>)	The <i>equity</i> must be treated in either appendix 5 (<i>equity PRR</i>) or the hedging method (table 27R)	The hedging method must only be used up to the amount of the hedge that matches the notional amount underlying the <i>option</i> or <i>warrant</i>	To the extent that the amount of the hedge (or <i>option</i>) exceeds the notional amount underlying the <i>option</i> or <i>warrant</i> (or hedge), a <i>firm</i> must apply an <i>equity PRR</i> , interest rate <i>PRR</i> or foreign exchange <i>PRR</i> (or <i>option PRR</i>)
A debt <i>security</i> (hedging an <i>option</i> or <i>warrant</i>)	The debt <i>security</i> must be treated in appendix 4 (interest rate <i>PRR</i>) or the hedging method (table 27R)		
Gold (hedging a gold <i>option</i>)	The gold must be treated in either appendix 8 (foreign exchange <i>PRR</i>) or the hedging method (table 27R)		
A currency or currencies (hedging a currency <i>option</i>)	The currency must be treated in either appendix 8 (foreign exchange <i>PRR</i>) or the hedging method (table 28R)		

- 27 R Table: The hedging method of calculating the *PRR* (*equities*, debt *securities* and gold) (see 24R(1) to (3))

	<i>Option or warrant position</i>	<i>PRR</i>		
		<i>In the money by more than the PRA</i>	<i>In the money by less than the PRA</i>	<i>Out of the money</i>
Long in security	Long put	Zero	Wp	X
	Short call	Y	Y	Z
Short in security	Long call	Zero	Wc	X
	Short put	Y	Y	Z
Where:				
Wp	$[(PRA - 100\%) \times \text{The underlying position valued at strike price} + \text{The market value of the underlying position}]$			
Wc	$[(100\% + PRA) \times \text{The underlying position valued at strike price} - \text{The market value of the underlying position}]$			
X	The market value of the underlying position multiplied by the appropriate <i>PRR</i>			
Y	The market value of the underlying position multiplied by the appropriate <i>PRR</i> . This result may be reduced by the market value of the <i>option</i> or <i>warrant</i> , subject to a maximum reduction to zero.			
Z	The hedging method is not permitted; the standard method must be used.			

28 R Table: The hedging method of calculating the *PRR* (currencies) (see 24R(4))

<i>Option position</i>	<i>PRR</i>		
	<i>In the money by more than 8%</i>	<i>In the money by less than 8%</i>	<i>Out of the money</i>
Long calls & long puts	Zero	W_L	X
Short calls & short puts	Zero	Y	X
Where:			
W_L	[1.08 x The amount of the underlying currency that the <i>firm</i> will receive if the <i>option</i> is exercised, converted at the strike price into the currency that the <i>firm</i> will sell if the <i>option</i> is exercised		- The market value of the underlying position
X	The market value of the underlying position multiplied by 8%.		
Y	The market value of the underlying position multiplied by 8%. This result may be reduced by the market value of the <i>option</i> , subject to a maximum reduction to zero.		

Specific methods and treatments

DIGITAL OPTIONS

29 R The *PRR* for a digital *option* is the maximum loss of the *option*.

WRITTEN CLIQUET OPTIONS

30 R The *PRR* for a written cliquet *option* is the market value of the derived position (see 9R) multiplied by the appropriate *PRA* (see 8R) multiplied by F+1 (see below). This result may be reduced by the amount the *option* is *out of the money* (subject to a maximum reduction to zero).

$$\text{i.e. } [PRA * \text{underlying} * (F + 1)] - OTM$$

$$\text{where } F = \min \left[FR, \max \left(\frac{FR}{2}, Y \right) \right]$$

FR: Number of forward re-sets

Y: Years to maturity

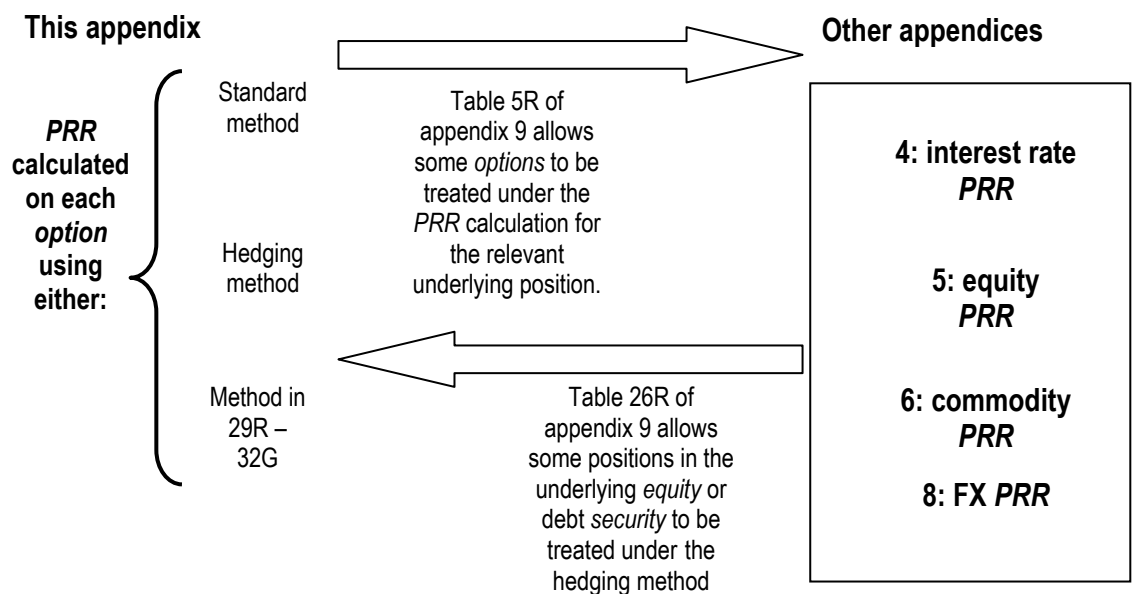
OTM: Out of the money amount

QUANTOS

- 31 R If the pay-out to the holder of a quanto *option* is fixed at the inception of the transaction a *firm* must add 8% to the *PRA* when applying the standard method.
- 32 G The additional *PRA* is to account for the forward foreign currency exchange risk.

Interaction with other appendices

- 33 G Figure: Diagram illustrating the relationship between this appendix and other appendices.



Appendix 10

Use of a CAD1 Model

Introduction

1. G A *firm* is required under 10-80(2)R to calculate *PRR* using the rules and appendices listed in table 10-80(2)R. However, the *FSA* may at the *firm's* request, waive or modify 10-80(2)R and thereby allow the *firm* to calculate all or part of its *PRR* using a "CAD1" (Capital Adequacy Directive) (for options risk aggregation and/or interest rate pre-processing) or "VaR" (value at risk) model instead. Appendix 11 deals with VaR model *waivers*.
2. G The purpose of this appendix is to provide guidance on the *FSA's* policy for granting CAD1 model *waivers* under section 148 of the *Act*. The policy recognises that CAD1 models may vary across *firms* but, as a minimum, the *FSA* will need to be satisfied about:
 - (1) the quality of the internal controls and risk management surrounding the model (see 18G to 22G for further details); and
 - (2) the quality of the model standards and that the CAD1 model captures and produces an accurate measure of the risks inherent in the portfolio covered by the CAD1 model (see 23G to 52G for further details).
3. G It also explains how the output from the model is fed into the 10-80 *PRR* calculation.
4. G If a CAD1 model recognition *waiver* is granted by the *FSA*, the *waiver* will contain certain conditions. In order to adequately address individual circumstances, these conditions may differ from the requirements set out in this appendix. The *waiver* will also confirm the *rules* to which the *waiver* applies, and the scope of CAD1 model recognition granted to a *firm*.
5. G As explained in *SUP* 8.3.1G, *waivers* permitting the use of models in the calculation of *PRR* will not be granted if that would be contrary to the CAD, and any *waiver* which is granted will only be granted on terms that are compatible with the CAD. The *FSA* considers it unlikely that it will deviate from this approach even where the *firm* making the *waiver* application is not subject to CAD. Accordingly, the only *waivers* permitting the use of models that the *FSA* is likely to grant are CAD1 and VaR models.
6. G If a *firm* ceases to meet any of these standards, the *FSA's* policy is that the *waiver* should cease to have effect.

Scope of CAD1 models

7. G The *FSA* recognises two types of CAD1 model. The table below sets out:

Options risk aggregation models		Interest rate pre-processing models
Brief description and eligible instruments	Analyse and aggregate <i>options</i> risks for <ul style="list-style-type: none"> • interest rate <i>options</i>, • <i>equity options</i>, • foreign exchange <i>options</i>; and • <i>commodity options</i>. 	May be used to calculate duration weighted positions for: <ul style="list-style-type: none"> • interest rate <i>futures</i>; • forward rate agreements (<i>FRAs</i>); • forward commitments to buy or sell debt instruments; • <i>options</i> on interest rates, debt instruments, and <i>swaps</i>; • <i>warrants</i>; • <i>swaps</i>; • amortising bonds; • <i>equity futures, forwards</i> and <i>options</i> (but only in relation to the interest rate risk inherent in these products); and • Foreign exchange <i>futures, forwards</i> and <i>options</i>, but only in relation to the interest rate risk inherent in these products.
The output and how it is used in the <i>PRR</i> calculation	Depending on the type of model and the conditions contained in any CAD1 model <i>waiver</i> granted, the outputs from an <i>options</i> risk aggregation model may be used as an input to the <i>PRR</i> calculation set out in <i>IPRU(INV)10-80R</i> .	Depending on the type of model and the conditions contained in any CAD1 model <i>waiver</i> granted, the individual sensitivity figures produced by this type of CAD1 model may be either input into a <i>firm's</i> standard duration method <i>PRR</i> calculation (see 60R of Appendix 4) or be converted into notional positions and input into a <i>firm's</i> maturity method <i>PRR</i> (see 55R of Appendix 4).

The CAD1 model waiver application and review process

8. G Details of the general *waiver* process are set out in *SUP 8*. Because of the complexity of a CAD1 model recognition *waiver*, it is recommended that, as set out in *SUP 8.3.3G*, a *firm* contact its usual contact at the *FSA* to discuss its proposed application. It should also be noted that the *waiver* recognition process in the case of a CAD1 model recognition *waiver* may take longer than the timescales indicated in *SUP 8.3.3G*.
9. G In order to consider a CAD1 model recognition *waiver* request, the *FSA* may undertake a review to ensure that it is adequate and appropriate for the *PRR* calculation.

10. G The model review process may be conducted through a series of visits covering various aspects of the *firm's* control and IT environment. Before these visits the *FSA* may ask the *firm* to provide some information relating to its *waiver* request accompanied by some specified background material. The model review visits are organised on a timetable that allows a *firm* being visited sufficient time to arrange the visit and provide the appropriate pre-visit information.
11. G As part of the model review process, the following may be reviewed: organisational structure and personnel; details of the *firm's* market position in the relevant products; profit and risk information; valuation and reserving policies; operational controls; IT systems; model release and control procedures; risk management and control framework; risk appetite and limit structure and future developments relevant to model recognition.
12. G The *FSA* will normally require meetings with senior management and staff from the front office, financial control, risk management, operations, systems development, information technology and audit areas.
13. G A review by a *skilled person* may be used before a CAD1 model *waiver* is granted to supplement the *waiver* process, or after the *waiver* has been granted to review the CAD1 model.
14. G If the *FSA* grants a *waiver* to allow the use of a CAD1 model, the *waiver* direction will specify the particular rule which has been modified, and set out the conditions on which the *waiver* has been granted. Conditions may include:
 - (1) the details of the calculation of *PRR*;
 - (2) the CAD1 model methodology to be employed;
 - (3) the products covered by the model (e.g. *option* type, maturity, currency);
 - (4) any notification requirements relating to the CAD1 model *waiver*; and
 - (5) any other conditions attached to the CAD1 model *waiver*.
15. G Where a *firm* operates any part of its CAD1 model outside the United Kingdom, the *FSA* may take into account the results of any home state supervisor's model review. The *FSA* may wish to receive information directly from the home state supervisor.

Maintenance of model recognition

16. G No changes should be made to a CAD1 model unless the change is not material. Material changes to a CAD1 model will require a renewed *waiver* to be issued. Materiality is measured from the time that the *waiver* is granted or, if the *waiver* has been varied in accordance with section 148 of the *Act*, the time of that variation. If a *firm* is considering making material changes to its CAD1 model, then it should notify the *FSA* at once. A *firm* must re-apply for a *waiver* if the products covered by the model change.
17. G If the CAD1 model ceases to meet the conditions of the *waiver*, the *firm* should notify the *FSA* at once. The *FSA* may then revoke the *waiver*, unless it is varied in accordance with section 148 of the *Act*.

Risk management standards

18. G A *firm* with a complex portfolio is expected to demonstrate more sophistication in its modelling and risk management than a *firm* with a simple portfolio.
19. G A *firm* should be able to demonstrate that it meets the risk management standards set out in this appendix for each legal entity that will have the benefit of the CAD1 model *waiver*. This is particularly important for subsidiaries in *groups* subject to matrix management where the business lines cut across legal entity boundaries.
20. G A *firm* should have a conceptually sound risk management system which is implemented with integrity and should meet the following minimum standards:
 - (1) A *firm* should have a risk control unit that is independent of business trading units and reports directly to senior management. The unit should be responsible for designing and implementing the *firm's* risk management system. It should produce and analyse daily reports on the risks run by the business and on the appropriate measures to be taken in terms of the trading limits.
 - (2) A *firm's* senior management should be actively involved in the risk control process, and the daily reports produced by the risk control unit should be reviewed by a level of management with sufficient authority to enforce reductions of positions taken by individual traders as well as in the *firm's* overall risk exposure.
 - (3) The risk control group should have a sufficient number of staff with appropriate skills in the use of models.
 - (4) A *firm* should have established procedures for monitoring and ensuring compliance with a documented set of appropriate internal policies and controls concerning the overall operation of the risk measurement and control framework. This should take into account the front, middle and back office functions.
 - (5) A *firm* should conduct, as part of its internal audit process, a review of the systems and controls surrounding its CAD1 model. This review should include the valuation process, compliance with the CAD1 model scope and the activities of the business trading units and the risk control units. This review should be undertaken by staff independent of the areas being reviewed.
21. G In assessing whether the risk management and control framework is implemented with integrity, the *FSA* will consider the IT systems used to run the CAD1 model and associated calculations. The assessment will include, where appropriate:
 - (1) feeder systems; risk aggregation systems; the integrity of the data (i.e. it is complete, coherent and correct); reconciliations and checks on completeness of capture; and
 - (2) system development, change control and documentation; security and audit trails; system availability and contingency procedures; network adequacy.
22. G A *firm* should take appropriate steps to ensure that it has adequate controls surrounding:

- (1) the derivation of the *PRR* from the CAD1 model output;
- (2) CAD1 model development, including independent validation;
- (3) reserving;
- (4) valuation (see *IPRU(INV)10-41(9)R*), including independent validation; and
- (5) the adequacy of the IT infrastructure.

Model standards

23. G A *firm* should take appropriate steps to ensure that its CAD1 model captures and produces an accurate measure of the risks inherent in the portfolio covered by the CAD1 model. These risks may include, but are not limited to, gamma, vega and rho.

OPTIONS RISK AGGREGATION MODELS

24. G For a *firm* to obtain a CAD1 model *waiver* for its *options* risk aggregation model, it should have in place an appropriate *options* valuation model.
25. G The *FSA* does not specify the methodology that a *firm* should employ in order to produce the appropriate outputs from its CAD1 model. However, 26G to 42G provide details of how a *firm* could meet the requirements to capture gamma, vega and rho risks using a scenario matrix approach. Where a *firm* adopts the scenario matrix approach then the standards set out in 26G to 42G should be followed. The *firm* should also take into account other risks not captured by the scenario matrix approach. Otherwise, a *firm* may use an equivalent methodology. If a *firm* uses an equivalent methodology, then it will need to demonstrate that the approach used meets the requirements of this appendix.
26. G A scenario matrix is an approach by which an *options* portfolio is revalued given a number of simultaneous shifts in both the spot level of the underlying and the implied volatility.
27. G The scenario matrix approach may be employed for all types of *options* on all types of underlying asset.
28. G The following provides an outline of the initial steps to be taken when using the scenario matrix approach:
 - (1) A value for an *option* should be obtained using the *firm's options* valuation model.
 - (2) The inputs into the *options* valuation model for implied volatility of the underlying asset and the price of the underlying asset should then be altered so that a new value for the *option* is obtained (details of the amount by which the implied volatility and the price of the underlying should be amended are set out in 29G-35G).
 - (3) The difference between the original value of the *option* and the new value obtained following the alterations should be input into the appropriate cell in the matrix, the value in the central cell where there is no change in implied volatility or price of the underlying should therefore be zero.

- (4) The process of obtaining a new price for the *option* should be repeated until the matrix is completed.
29. G The alteration to the implied volatility (known as the implied volatility shift) referred to in 28(2)G may be a proportional shift, the size of which depends on the remaining life of the *option* and the asset class of the underlying. Table 31G sets out the shifts that should be applied where a proportional shift is used. Alternatively, a *firm* may use a single shift across all maturities or use an absolute rather than a proportional implied volatility shift. Where an absolute shift is used it should be at least as conservative as the proportional shifts. This should be reviewed and, if necessary updated, on a regular basis.
30. G A *firm* may choose to use a less detailed term structure than that in Table 31G, but the shifts used should be no less conservative than those set out. For example, a *firm* that uses one <3 month band, rather than the two bands (<1 month, and 1-3 months) set out in the table, should use the most conservative shift set out in the table for the bands covered that is, 30% for the <3 month band.
31. G TABLE: PROPORTIONAL IMPLIED VOLATILITY SHIFTS (SEE 29G)

REMAINING LIFE OF OPTION	PROPORTIONAL SHIFT	
	EQUITIES & FX & COMMODITIES	INTEREST RATES
≤1 month	30%	30%
>1≤3 months	20%	20%
>3≤6 months	15%	15%
>6≤9 months	12%	12%
>9≤12 months	9%	9%
>1≤2 years	6%	9%
>2≤4 years	4.5%	9%
>4 years	3%	9%

32. G The size of the underlying price/rate shift depends on the asset class of the underlying and is set out in 33G:
33. G TABLE: UNDERLYING PRICE/RATE SHIFTS (SEE 32G)

UNDERLYING ASSET CLASS	SHIFT
Equities	±8%
Foreign Exchange	±8%
Commodities	±15%, (but a <i>firm</i> may use the percentages applicable under the extended maturity ladder approach, where permitted by the requirements of Appendix 6).
Interest Rates	±100bp (but a <i>firm</i> may use the sliding scale of shifts by maturity as outlined in Appendix 4).

34. G The shifts outlined above are the maximum shifts required; in addition there will be a number of intermediate shifts as a result of the minimum matrix size criteria set out in 35G.
35. G The minimum size of the scenario matrix should be 3x7, that is, three observations for implied volatility (including the actual implied volatility) and seven observations for the price of the underlying (including the actual price of the underlying). A *firm* should be able to justify its choice of granularity. Greater granularity may be required where the portfolio contains, for example, a large proportion of barrier *options*.
36. G A different scenario matrix should be set up for each underlying asset type:
- (1) for *equities* (including single *equities*, baskets and indices) this means a separate matrix for each national market or non-decomposed basket or non-decomposed multi-national index;
 - (2) for *foreign exchange* products this means a separate matrix for each currency pair where appropriate;
 - (3) for *commodity* products this means a separate matrix for each underlying as defined in Appendix 6; and
 - (4) for interest rate products this means a separate matrix for each currency; in addition, a *firm* should not offset the gamma and vega exposures (except in the circumstances set out in 37G) arising from any one of the following types of products with the gamma and vega exposures arising from any of the other products in the list:
 - (a) swaptions (options on interest rates);
 - (b) interest rate *options* (including *options* on exchange-traded *deposit* or bill *futures*);
 - (c) bond *options* (including *options* on exchange-traded bond *futures*);

- (d) other types of exotic *option* which do not fall easily into one of the other three categories and are required by the *FSA* to form their own separate underlying asset.
37. G A *firm* may offset gamma and vega exposures arising from the products listed in 36(4)G where it can demonstrate that it trades different types of interest rate-related *options* as a portfolio and takes steps to control the basis risk between different types of implied volatility. If this is the case, then an individual matrix is not required for each of the products listed in 36(4)G and a combined scenario matrix may be used.
38. G Where it is imprudent to fully offset long-dated and short-dated vega exposure due to non-parallel shifts in the yield curve, a *firm* should use an appropriate number of scenario matrices to take account of non-parallel shifts in the yield curve according to the maturity of the *option* or underlying.
39. G Following the steps outlined in 28G, a *firm* then removes the portion of the values in the matrix that can be attributed to the effect that delta has had on the change in the value of the *option* (a process known as delta-stripping).
40. G Once the effect of delta has been removed from the matrix, the values left in the matrix relate to gamma and vega risk. A *firm's PRR* in relation to gamma and vega risk on the individual *option* is the absolute of the most negative cell in the scenario matrix produced. Where all cells are positive the *PRR* is zero. The total *PRR* for the gamma and vega risk on the portfolio of *options* is a simple sum of the individual requirements. This amount should then be fed into a *firm's PRR* calculation.
41. G The values that have been obtained for the delta-equivalent positions of instruments included in the scenario matrix should then be treated in the same way as positions in the underlying. Where the delta obtained relates to interest rate position risk, the delta equivalent positions may be fed into a *firm's* interest rate pre-processing model providing that the positions fall within the scope of the interest rate pre-processing model set out in 7G, and that the *firm* has the appropriate CAD1 model *waiver*. Alternatively, the delta obtained should be fed into the standard *PRR* calculation in Appendix 4, 5, 6 or 8 as appropriate.
42. G In using the scenario matrix approach, none of the steps followed will take specific account of a *firm's* exposure to rho risk. Where a *firm* can demonstrate that for interest rate-related *options* the rho sensitivity is effectively included in the delta sensitivities produced, there is no separate capital requirement relating to rho. For all other *options* except commodity *options*, a *firm* should calculate a rho sensitivity ladder by currency as part of its CAD1 model and feed this either into the maturity or duration method *PRR* calculation set out in Appendix 4 or, where a *firm* has the appropriate *waiver*, into an interest rate pre-processing model.

INTEREST RATE PRE-PROCESSING MODELS

43. G A *firm* granted a *waiver* to use an interest rate pre-processing model is permitted to use it for the pre-processing of the instruments set out in 7G, from which the residual positions are fed into the maturity or duration method *PRR* calculation as set out in Appendix 4.

44. G There are a number of different methods of constructing pre-processing models. All pre-processing models should generate positions that have the same sensitivity to defined interest rate changes as the underlying cash flows.
45. G In an interest rate pre-processing model each transaction is converted into its constituent cash flows. The cash flows are discounted using zero coupon rates derived from the *firm's* own yield curves.
46. G The cash flows are then calculated again using the *firm's* own yield curve shifted by the amount set out in 48G.
47. G The difference between the present values calculated using the *firm's* own yield curve and those calculated using the *firm's* curve shifted by the amount specified are known as the sensitivity figures. Alternatively, *firms* may shift the yield curve by one basis point and multiply the sensitivity figures up by the appropriate amount in order to achieve the shifts set out in 48G. These sensitivity figures are then allocated to each of the 15 maturity bands set out in 48G.
48. G TABLE: YIELD CURVE SHIFTS (SEE 46G)

Zone	Modified Duration	Assumed interest rate change (percentage points)
1	0 ≤ 1 months	1.00
	> 1 ≤ 3 months	1.00
	> 3 ≤ 6 months	1.00
	> 6 ≤ 12 months	1.00
2	> 1.0 ≤ 1.9 years	0.90
	> 1.9 ≤ 2.8 years	0.80
	> 2.8 ≤ 3.6 years	0.75
3	> 3.6 ≤ 4.3 years	0.75
	> 4.3 ≤ 5.7 years	0.70
	> 5.7 ≤ 9.3 years	0.65
	> 7.3 ≤ 9.3 years	0.60
	> 9.3 ≤ 10.6 years	0.60
	> 10.6 ≤ 12 years	0.60
	> 12.0 ≤ 20 years	0.60
	> 20 years	0.60

49. G Sensitivity figures calculated by a *firm* using an interest rate pre-processing model are usually produced in the format of a net sensitivity by maturity bucket or by discrete gridpoint. These maturity buckets or gridpoints should then be allocated to the 15 bands set out in 48G. The number of maturity buckets or gridpoints used to represent a yield curve can be referred to as granularity. It is not a requirement that each of the 15 bands for *firms* have one or more maturity buckets or gridpoints allocated; however, for all *firms* the granularity should be adequate to capture the material curve risk in the portfolio. Curve risk can be defined as the risk associated with holding long and short positions at different points along the yield curve.

50. G Positive and negative amounts in each of the different maturity bands of the sensitivity calculation should then be netted off to produce one figure for each of the bands. There is no capital requirement for this netting process.
51. G The individual sensitivity figures produced should then be input into a *firm's* duration method *PRR* calculation as set out in Appendix 4. The individual sensitivity figures for each band should be included with the other positions in the weighted net positions column used in the duration method.
52. G Alternatively, *firms* may choose to use an approach based on the maturity method set out in Appendix 4, making appropriate adjustments to the sensitivity figures.

Appendix 11

Use of a Value at Risk Model

Introduction

- 1 G This appendix provides details of when the *FSA* expects to allow a *firm* to use its own Value at Risk (VaR) model for the purpose of calculating part or all of its *PRR*, and explains how the model will relate to the standard rules.
- 2 G The models described in this appendix are described as VaR models in order to distinguish them from the kinds of model originally contemplated by the Capital Adequacy Directive (CAD). (These are covered in Appendix 10 and referred to as "CAD 1 models".) A VaR model is a risk management model which uses a statistical measure to predict profit and loss movement ranges with a confidence interval. The standards described in this appendix, and which will be applied by the *FSA*, are based on and implement Annex VIII of the CAD.
- 3 G The aim of the VaR model approach is to enable a *firm* with adequate risk management systems to benefit from more accurate *financial resources requirements* than those generated by standard requirements, and to provide a *firm* with an incentive to measure market risks as accurately and comprehensively as possible. It is crucial that those responsible for managing market risk at a *firm* should be aware of the assumptions and limitations of the *firm's* VaR model.
- 4 G A VaR measure provides an estimate of the worst expected loss on a portfolio resulting from market movements over a period of time with a given confidence level. The *PRR* relating to the risks covered by the VaR model is based on the value produced by the VaR model. In undertaking the *PRR* calculation, a *firm* should apply a multiplication factor to the value produced by the VaR model (details of how the multiplication factor will affect a *PRR* are set out in 76G). The multiplication factor that should be applied is set by the *FSA*. The multiplication factor may be increased by a plus factor, which relates to the results of a *firm's* back-testing process (for further details on the plus factor see 63G).
- 5 G There are a number of methodologies for calculating *PRR* using a VaR model. These include variance-covariance, historical simulation, Monte Carlo or a hybrid of these. Although the section on model standards in this appendix sets out some general model standards that should be met, the *FSA* does not prescribe any one method of computing *PRR* using a VaR model. Moreover, it does not wish to discourage any *firm* from developing alternative risk measurement techniques. A *firm* should discuss the use of any alternative techniques used to calculate *PRR* with the *FSA*.

Overview

[LINK TO STANDARD PRR RULES](#)

- 6 G 10-80(2)R requires a *firm* to use the rules in appendices 4 to 9 to calculate *PRR*. Therefore, a *firm* needs to apply for a *waiver* in order to calculate its *PRR* using a VaR model instead of (or in combination with) the standard approaches required under 10-80(2)R.
- 7 G The VaR Model based *PRR* produced in accordance with this appendix should be included in the *firm's PRR* calculation set out in 10-80(2)R. The VaR model *PRR* should be used in place of the appropriate *PRR* for the risks covered by the VaR model.

BASIC REQUIREMENTS / SUMMARY OF CHAPTER

- 8 G Details of the general *waiver* process can be found in *SUP* 8. The *FSA* will not normally grant a VaR model *waiver* unless it is satisfied about the quality of:
- (1) the internal controls and risk management surrounding the VaR model (see 29G to 36G);
 - (2) the VaR Model Standards (see 37G to 45G);
 - (3) risk management standards including stress testing and backtesting procedures surrounding a VaR model; (see 46G to 74G); and
 - (4) the procedures in place at a *firm* to calculate its VaR model based *PRR*.
- 9 G The *FSA* recognises that the nature of VaR models will vary across *firms*. The scope of and the conditions set out in a VaR model *waiver* may therefore differ in substance or detail from the matters described in this appendix in order to address individual circumstances adequately. For example, a VaR model *waiver* may also include additional conditions to meet the particular circumstances of the *firm* or the model.
- 10 G If the *firm* ceases to meet any of these standards, the *FSA's* policy is that the *waiver* should cease to have effect. In many cases the ongoing need to meet these standards will be included in the *waiver* direction by imposing certain conditions. Even if they are not formally included as conditions, the *FSA* is likely to consider revoking the *waiver* if the standards are not met.
- 11 G The VaR Model Waiver Application and Review section of this appendix sets out the *FSA's* general policy on the VaR model application and review process and the conditions that the *FSA* may impose relating to alterations of the model.
- 12 G As explained in *SUP* 8.3.1G, *wavers* permitting the use of models in the calculation of *PRR* will not be granted if that would be contrary to the CAD, and any *waiver* which is granted will only be granted on terms that are compatible with the CAD. The *FSA* considers it unlikely that it will deviate from this approach even where the *firm* making the *waiver* application is not subject to CAD. Accordingly, the *FSA* is likely to grant only *wavers* permitting the use of models that are of the same nature as CAD1 and VaR models.

SCOPE OF VAR MODELS

- 13 G This appendix sets out the *FSA's* policy on the scope of a VaR model *waiver* and the manner in which the outputs of the model will be incorporated in the calculation set out in 10-80(2). Some of the standards described in this appendix may also be reflected in conditions attached to a VaR model *waiver*.
- 14 G A VaR model will be expected to cover one or more of the following types of risk category:
- (1) interest rate general market risk;
 - (2) interest rate specific risk (in conjunction with interest rate general market risk);
 - (3) *equity* general market risk;
 - (4) *equity* specific risk (in conjunction with equity general market risk);
 - (5) foreign-exchange risk; and
 - (6) *commodity* risk.
- 15 G It is the *FSA's* view that, where a *firm* uses a VaR model for one risk category, it is good practice to extend its model over time to calculate all of its *PRR* risk categories.
- 16 G For the purposes of 10-80(2)R, where a combination of the standard *PRR* rules, CAD1 model and VaR model approaches is used the *PRR* from each method should be added together. A *firm* should take appropriate steps to ensure that all of the approaches mentioned are applied in a consistent manner. For example, where the *PRR* for a particular portfolio is normally calculated using a VaR model, it should not switch between the standard market risk rules and a VaR model approach purely to achieve a more attractive *PRR*.
- 17 G A *firm* will not be required to capture immaterial risk or the market risk inherent in new products in a VaR model. If a *firm* does not capture immaterial risks or the market risk inherent in a new product in a VaR model, then the appropriate standard *PRR* rules to these risks will apply.

The VaR model waiver application and review process

- 18 G Details of the general *waiver* process are set out in *SUP* 8. Because of the complexity of a VaR model recognition *waiver*, it is recommended that, as set out in *SUP* 8.3.3G, a *firm* discusses its proposed application with its usual contact at the *FSA*. It should also be noted that the *waiver* recognition process in the case of VaR model recognition *waivers* is likely to take longer than the time-scale guidance set out in *SUP* 8.3.3G.
- 19 G In order for a VaR model recognition *waiver* to be granted, the *FSA* is likely to undertake a review to ensure that it is adequate and appropriate for the *PRR* calculation.

- 20 G The VaR model review process may be conducted through a series of visits covering various aspects of a *firm's* control and IT environment. Before these visits the *FSA* may ask that the *firm* provides some information relating to the *firm's waiver* request accompanied by some specified background material. The VaR model review visits are organised on a timetable that allows the *firm* being visited sufficient time to arrange the visit and provide the appropriate pre-visit information.
- 21 G As part of the of the VaR model review process the following may be reviewed: organisational structure and personnel; details of the *firm's* market position in the relevant products; profit and risk information; valuation and reserving policies; operational controls; IT systems; model release and control procedures; risk management and control framework; risk appetite and limit structure and future developments relevant to model recognition.
- 22 G A visit will usually involve the *FSA* wishing to meet senior management and staff from the front office, financial control, risk management, operations, systems development, information technology and internal audit areas.
- 23 G The *FSA* may complement its own review of a VaR model *waiver* request with one or more reviews by a *skilled person* under section 166 of the *Act*. Such a review may also be used where a VaR model *waiver* has been granted to ensure that the standards on which a VaR model *waiver* was based continue to be met.
- 24 G As set out in 9G the *FSA* will issue a *waiver* containing certain conditions. These conditions are likely to cover the standards described in this appendix to the extent that they are relevant to the circumstances, and may set out:
- (1) the details of the calculation of VaR model based *PRR*, which will contain the multiplication factor to be applied;
 - (2) the method of separating out specific risk if appropriate;
 - (3) the method agreed of calculating profit and loss accounts for backtesting purposes;
 - (4) the circumstances in which model refinements, new products, new markets and new locations should be notified to the *FSA*;
 - (5) any notification requirements relating to the VaR model *waiver*;
 - (6) any additional reporting requirements (e.g. electronic reporting of backtesting results);
 - (7) details of the changes to the VaR model which would be considered material by the *FSA*; and
 - (8) any other conditions attached to the VaR model *waiver*.
- 25 G Where a VaR model used outside of the United Kingdom differs from that used in the United Kingdom a *firm* the *FSA* may request details on the reasons for using different models.

- 26 G Where a *firm* operates any part of its VaR model outside of the United Kingdom, the *FSA* may take into account the results of the home supervisor's VaR model review. The *FSA* may wish to receive information directly from the home supervisor.

MAINTENANCE OF VaR MODEL WAIVER

- 27 G No changes may be made to a VaR model which is the subject of a *waiver* direction, unless the change is not material. Material changes to a VaR model will require a renewed *waiver* to be issued. Materiality is measured against the VaR model as it was at the time that the *waiver* was originally granted or, if the *waiver* has been varied in accordance with section 148 of the *Act*, as it was at the time of that variation. If a *firm* is considering making material changes to its VaR model then it should notify the *FSA* at once.
- 28 G If the VaR model ceases to meet the conditions of the *waiver*, a *firm* should notify the *FSA* at once. The *FSA* is likely then to revoke the *waiver*, unless it is varied in accordance with section 148 of the *Act*.

Risk management standards

- 29 G A *firm* with a complex portfolio is expected to demonstrate more sophistication in its modelling and risk management than a *firm* with a simple portfolio. For example, a *firm* will be expected to consider, where necessary, varying degrees of liquidity for different risk factors, the complexity of risk modelling across time zones, product categories and risk factors. Some trade-off is permissible between the sophistication and accuracy of the model and the conservatism of underlying assumptions or simplifications.
- 30 G A *firm* should be able to demonstrate that it meets the risk management standards set out in this section on a legal entity basis. This is particularly important for subsidiaries of *groups* subject to matrix management where the business lines cut across legal entity boundaries.
- 31 G A *firm* should have a conceptually sound risk management system surrounding the use of a VaR model which is implemented with integrity and should meet the following minimum standards:
- (1) the VaR model should be fully integrated into the daily risk management process of the *firm*, and serve as the basis for reporting risk exposures to senior management of the *firm*;
 - (2) a *firm* should have a risk control unit which is independent from business trading units, and which reports directly to senior management. The unit should be responsible for designing and implementing the *firm's* risk management system. It should produce and analyse daily reports on the output of the model and on the appropriate measures to be taken in terms of the trading limits;

- (3) a *firm's* directors and senior management should be actively involved in the risk control process, and the daily reports produced by the risk control unit should be reviewed by a level of management with sufficient authority to enforce both reductions of positions taken by individual traders as well as in the *firm's* overall risk exposure;
- (4) a *firm* should have sufficient numbers of staff skilled in the use of sophisticated models in the trading, risk control, audit and back office areas;
- (5) a *firm* should have established procedures for monitoring and ensuring compliance with a documented set of appropriate internal policies and controls concerning the overall operation of the risk measurement system;
- (6) a *firm's* VaR model should have a proven track record of acceptable accuracy in measuring risk;
- (7) a *firm* should conduct a programme of stress testing frequently, and the results of these tests should be reviewed by senior management and reflected in the policies and limits set;
- (8) a *firm* should have procedures to ensure that the valuation of assets and liabilities is appropriate, and that valuation uncertainty is identified and appropriate reserving is undertaken where necessary; and
- (9) at least once a year, a *firm* should conduct, as part of its regular internal audit process, a review of its risk management process. This review should include both the activities of the business trading units and of the independent risk control unit, and should be undertaken by suitably qualified staff independent of the areas being reviewed. This review should consider, at a minimum:
 - (a) the adequacy of the documentation of the risk management system and process;
 - (b) the organisation of the risk control unit;
 - (c) the integration of market risk measures into daily risk management and the integrity of the management information system;
 - (d) the process for approving risk pricing models and valuation systems used in front and back offices;
 - (e) the validation of any significant changes in the risk management process;
 - (f) the scope of risks and products captured by the VaR model;
 - (g) the accuracy and completeness of position data;
 - (h) the process used to ensure the consistency, timeliness, independence and reliability of data sources;
 - (i) the accuracy and appropriateness of volatility and correlation assumptions;

- (j) reserving policies, the accuracy of the valuation procedures, and risk sensitivity calculations;
 - (k) the process employed to evaluate the VaR model's accuracy, including the programme of backtesting;
 - (l) the controls surrounding VaR model development; and
 - (m) the process employed to produce the VaR model based *PRR*.
- 32 G A *firm's* VaR model output should be an integral part of the process of planning, monitoring and controlling a *firm's* market risk profile. The VaR model should be used in conjunction with internal trading and exposure limits. The links between these limits and the model should be consistent over time and understood by senior management.
- 33 G A *firm* should have adequate VaR model validation procedures to assess its model, and should have procedures in place to ensure that both the assumptions and approximations underlying the model and the limits of the model are appropriate. It should undertake testing of the accuracy of parts of the VaR models as well as the whole model. The *FSA* will require a period of initial monitoring or live testing before a VaR model can be recognised. Backtesting should be regarded as an additional safeguard rather than the primary model validation tool. A *firm* should therefore ensure that it has appropriate methods of assessing model validity and does not rely purely on the results of backtesting.
- 34 G In assessing whether the VaR model is implemented with integrity, the *FSA* will consider in particular the IT systems used to run the model and associated calculations. The assessment may include:
- (1) feeder systems; risk aggregation systems; time series databases; the VaR model system; stress testing system; the backtesting system including profit & loss cleaning systems where appropriate; data quality; reconciliations and checks on completeness of capture;
 - (2) system development, change control and documentation; security and audit trails; system availability and contingency procedures; network adequacy; and
 - (3) operational statistics relating to VaR model production process; examples of these statistics are timeliness, number of re-runs required and the reliability of data feeds.
- 35 G It is the responsibility of a *firm's* own management to ensure the accuracy and integrity of its VaR model. This responsibility includes obtaining appropriate independent validation of the VaR model.
- 36 G A *firm* should ensure that it has adequate controls surrounding:
- (1) the derivation of the VaR model based *PRR*;
 - (2) the integrity of the backtesting programme, including the calculation of the profit and loss account;

- (3) the integrity and appropriateness of the VaR model, including the model's geographic coverage and the completeness of data sources;
- (4) the VaR model's initial and ongoing development, including independent validation;
- (5) the valuation models, including independent validation; and
- (6) the adequacy and security/integrity of the IT infrastructure.

Model standards

- 37 G A *firm* should base its *PRR* calculation on the output of the VaR model which is used for its internal risk management rather than one developed specifically to calculate its *PRR*.
- 38 G The *FSA* accepts that the scope and nature of VaR models varies across *firms*. This means that different *firms* are likely to calculate different estimates of market risk for the same portfolio. Systematic differences are due to length of data series, choice of methodology (historical or Monte Carlo simulation or variance-covariance method or a hybrid of these), differences in aggregating risks within and across broad risk factors, the treatment of *options* and other non-linear products and the specification of risk factors.
- 39 G A *firm* that chooses to apply for a *waiver* to use a VaR model for the calculation of its *PRR* should calculate its market risk using the appropriate model parameters as set out in 40G.
- 40 G A *firm* should calculate its market risk by adopting the following minimum standards:
- (1) VaR should be calculated at least daily, using a 99% one-tailed confidence limit.
 - (2) VaR should be calculated using a holding period equivalent to ten *business days*.
 - (3) VaR measures should be based on an effective historical observation period of at least one-year, except where a shorter observation period is justified by a significant change in price volatility. If a weighting scheme or other method is used, then the effective observation period should be at least one year. The weighted average time lag of the individual observations should not be less than six months.
 - (4) Data sets should be updated no less frequently than quarterly, and more frequently whenever market prices are subject to material change.
- 41 G A *firm* may meet the appropriate model parameter requirement by using different model parameters and employing a suitable adjustment mechanism to produce a VaR figure which is equivalent to the figure produced using the parameters set out in 40G. For example, a *firm*'s own model may use a 95% one-tailed confidence limit, but a mechanism to convert the output of the model to reflect a 99% one-tailed confidence limit should be employed.

RISK FACTORS

- 42 G A VaR model should capture and accurately reflect, on a continuing basis, all material general market risks and, where a VaR model *waiver* has been granted in relation to specific risk, specific risks arising on the underlying portfolio, and should ensure that sufficient risk factors are properly specified.

GENERAL MARKET RISK

- 43 G A *firm's* VaR model should capture a sufficient number of risk factors in relation to the level of activity of the *firm*, in particular the following:
- (1) For interest rate risk, the VaR model should incorporate a set of risk factors corresponding to the interest rate curves in each currency in which the *firm* has interest rate sensitive positions. A *firm* should ensure that it captures the variations of volatility of rates along the yield curve. In order to achieve this, a *firm* should divide the yield curves of, at a minimum, the major currencies and markets where it has material interest rate exposures into a minimum of six maturity segments. The risk measurement system should also capture the risk of less than perfectly correlated movements between different yield curves.
 - (2) For foreign exchange risk, the VaR model should incorporate risk factors corresponding to the individual foreign currencies, including gold, in which the *firm's* positions are denominated.
 - (3) For *equity* risk, the VaR model should use a separate risk factor at least for each of the *equity* markets in which the *firm* has material exposures.
 - (4) For *commodity* risk, the VaR model should use a separate risk factor at least for each *commodity* in which the *firm* has material exposures. The VaR model should capture the risk of less than perfectly correlated movements between similar, but not identical, *commodities* and the exposure to changes in forward prices arising from maturity mismatches. It should also take account of market characteristics, notably delivery dates and the scope provided to traders to close out positions.
 - (5) A *firm* that deals in *options*, or products with *option*-like characteristics, should ensure that their VaR model captures non-linear risk. Steps should also be taken to ensure that adequate capital is set aside for any other risks not captured by the model. *Firms* are reminded that, under 42G, the standard *PRR* rules may instead be applied to these risks.
 - (6) Correlations within and between the risk factors in (1) to (4) may be used provided the system for measuring these correlations is sound and implemented with integrity.

SPECIFIC RISK

- 44 G Where a *firm* wishes to use a VaR model in relation to specific risk it should meet the following additional standards:

- (1) The model on which the VaR estimate is based should explain the price variation in the portfolio. For example, the VaR model may be based on a factor model or on a historical simulation model. The ability of the model to explain price variation could be demonstrated by a statistical comparison over the same period of time between actual price changes on the portfolio and the profit and loss impact of risk factors included within the model. A *firm* may wish to include an estimate of residual variation not explained by the model.
 - (2) The VaR model should be sensitive to changes in the level of concentration risk in the portfolio.
 - (3) The VaR model should be robust to an adverse environment.
 - (4) Where a *firm* calculates its specific risk surcharge under 78G(2) it should conduct specific risk backtesting for the traded debt portfolio and the *equity* portfolio separately. Specific risk backtesting is a comparison of the specific risk VaR measures against the corresponding actual P&L for sub-portfolios that contain material specific risk.
 - (5) The VaR model should be validated through empirical testing appropriate to the level of complexity and the assumptions made in the VaR model, which should be aimed at assessing whether specific risk is being adequately captured. Where specific risk is identified by examining relevant sub-portfolios, then these should be chosen in a consistent manner.
- 45 G A *firm* should have means to assess and, if necessary, mitigate or control event risk. For example, possible means include stress-testing procedures, or reserving policies. It is not however necessary to include factors to model event risk within a specific risk model unless warranted by the nature of the portfolio.

Stress testing and backtesting

STRESS TESTING

- 46 G Stress testing should involve identifying market scenarios or other low probability events in all types of risks that generate the greatest losses on a *firm's* portfolio.
- 47 G A *firm* should periodically and actively identify all the worst case scenarios that are relevant to its portfolio. Scenarios used should be appropriate to test the effect of adverse movements in market volatilities and correlations and the effect of any change in the assumptions underlying the VaR model. Scenarios involving low probability market events should nevertheless be plausible.
- 48 G A *firm* should have procedures to assess and respond to the results produced from stress testing. In particular, stress testing results should be:
- (1) used to evaluate its capacity to absorb such losses or identify steps to be taken to reduce risk.
 - (2) communicated routinely to senior management and periodically to the directors.

- 49 G Stress testing should capture non-linear effects.
- 50 G A *firm* should have the capacity to run daily stress tests. A *firm* may want to conduct the more complex stress tests at longer intervals or on an ad hoc basis.

BACKTESTING

- 51 G Backtesting is the process of comparing VaR risk measures to portfolio performance. It is intended to act as one of the mechanisms for the ongoing validation of a *firm's* VaR model and to provide incentives for *firms* to improve their VaR measures.
- 52 G Backtesting is only one method of assessing the performance of a VaR model and, although *firms* are required to carry out a backtesting programme, they should adopt other methods of measuring performance as well.
- 53 G Before a *waiver* will be granted to use a VaR model, a *firm* should have a backtesting programme in place and should provide three months of backtesting history.
- 54 G A *firm* should have the capacity to analyse its daily profit and loss account and compare the results to the VaR measure used for backtesting, both at the level of the whole portfolio covered by the VaR model and at the level of individual books that contribute material amounts to risk or the profit and loss account.
- 55 G VaR models are likely to undergo almost continuous refinements. This may make it difficult to backtest using 250 days' data if it is based upon a previous version of the model. If a refinement is not regarded as material, then a *firm* may use the last 250 days' data for backtesting purposes.
- 56 G A *firm* should compare each of its 250 most recent *business days'* profit and loss account figures with the corresponding one-day VaR measures. This comparison should be made daily using a rolling 250-day period.
- 57 G The VaR measure used for backtesting for these purposes should be calibrated to a one-day holding period and a 99% one-tailed confidence level, but otherwise the VaR model should be the same as that used to calculate the VaR model based *PRR*.
- 58 G The positions underlying the profit and loss account and VaR measures should not be materially different.
- 59 G If a *firm* uses a combination of the standard rules (and, where appropriate, CAD1 model) and VaR model approaches or does not model specific risk it should take appropriate steps periodically to ensure that this is taken into account in its backtesting procedures.
- 60 G An exception occurs each time a day's loss exceeds the corresponding VaR measure (at *firm* level). When an exception occurs, a *firm* should notify its supervisor by close of business two *business days* after the exception occurs (oral notification is acceptable).

- 61 G On a monthly basis, a *firm* should submit to the *FSA* a written account of the previous month's exceptions. The written account should include the cause of the exceptions and the *firm's* planned response. Nil returns will not be required.
- 62 G Where multiple exceptions occur, the multiplication factor used by a *firm* in its VaR model based *PRR* calculation should be increased by the appropriate plus factor set out in Table 63G (details of how the multiplication factor affects a *firm's* VaR model based *PRR* are set out in the Calculation of a VaR model based *PRR* section of this appendix). The table sets out the plus factor to be applied given the number of exceptions over the most recent 250 *business days*.
- 63 G Table: backtesting plus factors (see 62G)

Green	Fewer than 5	0.00
Yellow	5	0.40
	6	0.50
	7	0.65
	8	0.75
	9	0.85
Red	10	1.00

- 64 G The addition of a plus factor for VaR models that appear to be under-performing is designed to act as an incentive to ensure that the VaR model continues to perform well, and where it does not, that a *firm* takes prompt action to remedy the situation.
- 65 G If ten or more exceptions are recorded in a 250 day period, the *firm* should to take immediate corrective action. In these circumstances, the *FSA* may apply a plus factor greater than one, or the *FSA* may consider revoking a *firm's* VaR model *waiver*, unless it is varied in accordance with section 148 of the *Act*.
- 66 G If ten or more exceptions are recorded in a 250 day period due to the specific risk backtesting required in 44(4)G then the *firm* should take immediate corrective action on the specific risk part of the model or set aside additional capital.
- 67 G If a *firm* believes an exception should be disregarded it should submit to the *FSA* a written explanation of why the exception occurred and why it would be appropriate to disregard it. An exception may be disregarded only in exceptional situations. One example of when an exception might properly be disregarded is when it has arisen as a result of a risk that is not captured in its VaR model but against which regulatory capital is already held.

- 68 G The *FSA* may also consider disregarding a backtesting exception where, in a period of high volatility, multiple backtesting exceptions occur before the data set is updated.
- 69 G During the first 250 days after a *firm* starts to use its VaR model to calculate its VaR model based *PRR* the policy in 62G relating to plus factors only applies to the period from the date that VaR model recognition is granted.

DEFINITION OF PROFIT AND LOSS ACCOUNT FOR BACKTESTING PURPOSES

- 70 G Backtesting should be performed using a measure of actual profit and loss.
- 71 G Actual profit and loss means the day's profit and loss account arising from the trading activities within the scope of the VaR model. This should exclude material non-market elements which might mask a loss. Such elements include *fees* and *commissions*, reserving which is not directly related to market risk and one-off marketing profits from new deals.
- 72 G Actual profit and loss should reflect any price adjustments arising from position reconciliation in accordance with a *firm's* written policies and procedures. These policies and procedures should include a documented method of assigning valuation adjustments to backtesting data, such that the amount and the date of adjustment is unambiguous.
- 73 G A *firm* should have the capacity to perform backtesting against hypothetical profit and loss. The *FSA* may require firms to produce this information upon request. Hypothetical profit and loss means profit and loss that would have occurred had the portfolio remained unchanged.
- 74 G VaR models are likely to undergo almost continuous refinements. This may make it difficult to backtest using 250 days' data if it is based upon a previous version of the model. If a refinement is regarded as material then a new *waiver* may be required to use a VaR model and the original *waiver* may be revoked (as set out in 28G). If a refinement is not material then a *firm* may use the last 250 days' data for backtesting purposes.

Calculation of VaR model based *PRR*

- 75 G The calculation of a *PRR* under the VaR model approach is set out in this section. A *firm* will be required by the *waiver* to add its VaR model based *PRR* to its other *PRRs* calculated under 10-80(2)R.
- 76 G A *firm's* VaR model based *PRR* on a daily basis is equal to the higher of:
- (1) its previous day's VaR number; and
 - (2) the average of its daily VaR measures on each of the preceding sixty *business days* multiplied by a multiplication factor (increased by the appropriate plus factor referred to in 63G).

- 77 G The multiplication factor to be used is specified by the *FSA* in the formal VaR model *waiver* direction as a condition of its use. The minimum multiplication factor that the *FSA* will set is 3, although a higher multiplication factor may be applied. This multiplication factor is the factor that should be used, unless the *waiver* has been varied in relation to this factor in accordance with Section 148 of the *Act*.

G The following equation expresses 76G and 77G mathematically:

$$PRR_{VaR} = \text{Max} \left(VaR_t, f \times \frac{1}{60} \sum_{i=0}^{59} VaR_{t-i} \right) + SR$$

PRR_{VaR} is a *firm's* VaR model based *PRR*;

VaR_t represents the previous day's VaR figure;

VaR_{t-i} represents the VaR calculated for *i business days* earlier;

f is the multiplication factor referred to in 76(2)G and 77G;

SR is the specific risk surcharge which is only included in the calculation set out 78G where a *firm* has been granted a VaR model *waiver* in relation to specific risk. Details on the specific risk surcharge can be found in 79G to 80G.

- 78 G If the VaR model *waiver* granted enables a *firm* to calculate a specific risk *PRR* by the use of its VaR model then it should calculate its specific risk surcharge as either:

- (1) an amount equal to the specific risk portion of the VaR measure; or
- (2) an amount equal to the VaR measure of sub- portfolios that are subject to specific risk.

In both cases, the specific risk surcharge should be calculated as an average over the previous 60 *business days*.

- 79 G Where a *firm* calculates its specific risk surcharge using 78(1)G, then it should calculate specific risk for the purposes of calculating the surcharge as the difference between total value at risk and a measure of general market risk. In calculating general market risk for this purpose, positions that give rise to specific risk should be mapped to equivalent positions that bear general market risk only. In doing so, the following minimum standards should be adopted:

- (1) For *equities*, each position should be mapped to a factor that is representative of the national or international market to which they belong. For example, a stock may be mapped to a widely accepted broadly based stock market index for the country concerned.
- (2) For bonds, each position should be mapped using a reference interest rate curve for the currency concerned. The interest rate curves should be generally accepted by the market as broadly based reference curves for the currency concerned, for example, a government bond curve or a swap curve.

- 80 G Where a *firm* calculates its specific risk surcharge using 78(2)G, then the sub-portfolio structure should be identified in advance and any changes to the structure should be pre-notified to *FSA*. The sub-portfolios chosen should be those which contain positions that would produce a specific risk *PRR* under the standard rules approach