

Chapter 4

Own funds requirements

4.12 K-NPR requirement

- 4.12.1** **R** A MIFIDPRU investment firm must calculate its K-NPR requirement by reference to every position referred to in **■** MIFIDPRU 4.11.8R that does not form part of a portfolio for which the firm has been granted a K-CMG permission.
- 4.12.2** **R**
- (1) The K-NPR requirement of a MIFIDPRU investment firm must be calculated in accordance with Title IV of Part Three of the UK CRR in the form in which it stood at 31 December 2021.
 - (2) Any reference in this section to the UK CRR is to the UK CRR as applied by (1) and modified by the rules in this section.
 - (3) When applying the UK CRR in accordance with (1):
 - (a) any provision in the UK CRR relating to the effect that the market risk of a position has on the "own funds requirement" should be interpreted as relating instead to the effect that the position has on the K-NPR requirement of the MIFIDPRU investment firm;
 - (b) article 363 of the UK CRR does not apply;
 - (c) any reference in Title IV of Part Three of the UK CRR to:
 - (i) article 363 of the UK CRR (permission to use internal models) refers to **■** MIFIDPRU 4.12.4R to **■** MIFIDPRU 4.12.7R; and
 - (ii) permissions granted under article 363 of the UK CRR refers to equivalent permissions granted under **■** MIFIDPRU 4.12.4R to **■** MIFIDPRU 4.12.7R.
- 4.12.2A** **R**
- (1) When applying the UK CRR for the purposes of this section, a firm must apply the following, as modified by (2):
 - (a) the *Appropriately Diversified Indices RTS*;
 - (b) the *Market Definition RTS*; and
 - (c) the *Non-Delta Risk of Options RTS*.
 - (2) The relevant modifications are as follows:
 - (a) a reference to an "institution" is a reference to the firm;
 - (b) a reference to "Regulation (EU) No 575/2013" is a reference to the UK CRR as modified by the rules in MIFIDPRU;

- (c) a reference to an “own funds requirement” is a reference to the contribution of a position to the *firm’s K-NPR requirement*; and
- (d) a reference to the calculation of requirements “on a consolidated basis” is a reference to the calculation of those requirements on a *consolidated basis* under ■ MIFIDPRU 2.5.

[Note: BTS 525/2014, BTS 528/2014 and BTS 945/2014.]

4.12.2B **R** Where a provision in Title IV of Part Three of the *UK CRR* requires a *firm* to determine a risk weighting by reference to the Standardised Approach to credit risk, for the purposes of this section, a *firm* must:

- (1) apply the provisions in the *UK CRR* relating to the Standardised Approach to credit risk in the form in which they stood on 31 December 2021; but
- (2) for the purposes of determining any mapping of credit quality steps under the provisions in (1), use the ECAI mappings applied by the *PRA* for the purposes of the rules in the *PRA Rulebook* relating to the Standardised Approach to credit risk for *CRR* firms, as amended from time to time.

[Note: BTS 2016/1799.]

4.12.2C **G** (1) Certain market risk provisions in the *UK CRR* (in the form in which it stood on 31 December 2021) require a *firm* to consider the underlying credit risk attaching to a position under the *UK CRR* Standardised Approach to credit risk. In certain cases, the credit risk rules require a *firm* to determine the risk attaching to the position by reference to “credit quality steps”, which are mapped to credit ratings issued by particular *credit rating agencies*. As the credit risk requirements in the *UK CRR* are no longer directly relevant under *MIFIDPRU*, the *FCA* will no longer be maintaining an *FCA* version of the ECAI credit quality step mappings in BTS 2016/1799 for these purposes.

(2) The effect of ■ MIFIDPRU 4.12.2BR is that where a *firm* needs to determine the underlying credit risk of a position for the purposes of the *K-NPR requirement* by reference to credit quality steps, the *firm* should use the updated ECAI mappings maintained by the *PRA* for the purposes of the Standardised Approach to credit risk as it applies to *CRR* firms under the *PRA Rulebook*.

4.12.2D **R** A *firm* may treat the currency pairs listed in ■ MIFIDPRU 4 Annex 13R as closely correlated for the purposes of article 354(1) of the *UK CRR*.

Instruments for which no treatment is specified in the UK CRR

4.12.3 **R** (1) Where a *MIFIDPRU investment firm* has a position in a *financial instrument* for which no treatment is specified in the *UK CRR*, it must consider whether:

- (a) the position is sufficiently similar to a position for which a treatment is specified in the *UK CRR*; and

- (b) the application of the treatment in (a) would be prudent and appropriate.
- (2) If there is a treatment in the *UK CRR* that meets the requirements in (1), the *firm* must calculate the *K-NPR requirement* resulting from that position by applying that treatment.
- (3) If there are multiple treatments in the *UK CRR* that meet the requirements in (1), the *firm* must calculate the *K-NPR requirement* resulting from that position by applying the most appropriate treatment.
- (4) If there are no appropriate treatments in the *UK CRR*, the *firm* must add an appropriate percentage of the current value of the position to its overall *K-NPR requirement*. An appropriate percentage is either 100%, or a percentage that takes into account the characteristics of the position.
- (5) A *firm* must document its policies and procedures for calculating the *K-NPR requirement* of positions under this *rule* in its *trading book* policy statement.

Permission to use internal models

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- (1) A *firm* must obtain prior permission from the *FCA* before using an internal model to calculate any of the following requirements under Part Three, Title IV, Chapter 5 of the *UK CRR*:
 - (a) general risk of equity instruments;
 - (b) specific risk of equity instruments;
 - (c) general risk of debt instruments;
 - (d) specific risk of debt instruments;
 - (e) foreign exchange risk; and
 - (f) commodities risk.
- (2) To obtain the permission in (1), a *firm* must:
 - (a) complete the application form in ■ MIFIDPRU 4 Annex 2R and submit it to the *FCA* using the *online notification and application system*; and
 - (b) in the application, demonstrate to the satisfaction of the *FCA* that:
 - (i) the *firm* meets the conditions for the use of the internal model specified in Part Three, Title IV, Chapter 5 of the *UK CRR*, as supplemented by the *rules* and *guidance* in this section; and
 - (ii) the internal model covers a significant share of the positions of the relevant risk category in (1).
- (3) A *firm* must obtain a separate permission under this *rule* for each risk category in (1).

4.12.5 **G** ■ MIFIDPRU 4.12.8R to ■ MIFIDPRU 4.12.65G contain *rules* and *guidance* setting out requirements for internal models and explaining the factors that the *FCA* will consider when deciding whether to grant permission to use an internal model.

4.12.6 **R**

- (1) A *firm* that has a permission under ■ MIFIDPRU 4.12.4R for an internal model must obtain approval from the *FCA* before it:
 - (a) implements a material change to the use of the model; or
 - (b) makes a material extension to the use of the model.
- (2) To determine if a change or extension is material for the purposes of (1), a *firm* must apply the criteria and methodology set out in article 3 (to the extent that it relates to the Internal Models Approach (IMA)), articles 7a and 7b and Annex III of the *Market Risk Model Extensions and Changes RTS*.
- (3) To obtain the approval in (1), a *firm* must:
 - (a) complete the application form in ■ MIFIDPRU 4 Annex 3R and submit it to the *FCA* using the *online notification and application system*; and
 - (b) perform an initial calculation of stressed value-at-risk in accordance with article 365(2) of the *UK CRR* on the basis of the model as changed or extended and submit the results as part of the application in (a).

4.12.7 **R**

- (1) A *firm* that has a permission under ■ MIFIDPRU 4.12.4R for an internal model must notify the *FCA* before it:
 - (a) implements a change to the use of the model that is not a material change; or
 - (b) extends the use of the model in a manner that is not material.
- (2) A *firm* must notify the *FCA* by completing the form in ■ MIFIDPRU 4 Annex 4R and submitting it using the *online notification and application system*.

Use of internal models: risk capture

4.12.8 **R** A *MIFIDPRU investment firm* that has a permission to use an internal model in accordance with Part Three, Title IV, Chapter 5 of the *UK CRR* must:

- (1) identify any material risks (or group of risks are material in aggregate) that are not captured by those models;
- (2) hold *own funds* to cover those risk(s) in addition to the *own funds* required to comply with the *K-NPR requirement*, calculated in accordance with Part Three, Title IV, Chapter 5 of the *UK CRR*; and
- (3) hold additional *own funds* for value-at-risk (VaR) and stressed value-at-risk (sVaR) models that apply to the *firm*.

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- (1) The methodology for identifying the risks in ■ MIFIDPRU 4.12.8R and calculating additional *own funds* for VaR and sVaR models is called the "Risks not in VaR (RNIV) framework". A *firm* is responsible for identifying these additional risks and this should be an opportunity for risk managers and the *firm's* management to better understand the shortcomings of the *firm's* models. Following this initial assessment, the *FCA* will engage with the *firm* to provide challenge and ensure an appropriate outcome.
- (2) The RNIV framework is intended to ensure that *own funds* are held to meet all risks that are not captured, or not captured adequately, by the *firm's* VaR and sVaR models. These include, but are not limited to, missing and/or illiquid risk factors such as cross-risks, basis risks, higher-order risks, and calibration parameters. The RNIV framework is also intended to cover event risks that could adversely affect the relevant business.
- (3) A *firm* should systematically identify and measure all risks that are not captured, or not captured adequately. This analysis should be carried out at least quarterly, but the *FCA* may request more frequent analysis. The measurement of these risks should capture the losses that could arise due to the risk factor(s) of all products that are within the scope of the permission for the relevant internal model, but are not adequately captured by the relevant internal model.
- (4) On a quarterly basis, the *firm* should identify and assess individual risk factors covered by the RNIV framework. The *FCA* will review the results of this exercise and may require that *firms* identify additional risk factors as being eligible for measurement.
- (5)
 - (a) Where sufficient data is available, and where it is appropriate to do so, the *FCA* expects a *firm* to calculate a VaR and sVaR metric for each risk factor within scope of the framework. The stressed period for the RNIV framework should be consistent with that used for sVaR. No offsetting or diversification may be recognised across risk factors included in the RNIV framework. The multipliers used for VaR and sVaR should be applied to generate a *K-NPR requirement*.
 - (b) If it is not appropriate to calculate a VaR and sVaR metric for a risk factor, a *firm* should instead measure the size of the risk based on a stress test. The confidence level and capital horizon of the stress test should be commensurate with the liquidity of the risk, and should be at least as conservative as comparable risk factors under the internal model approach. The capital charge should be at least equal to the losses arising from the stress test.

Standardised approach for options

4.12.10

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- (1) A *MIFIDPRU investment firm* may use its own estimates for delta for the purposes of the standardised approach for options under article 329, article 352(1) or article 358 of the *UK CRR* if:
 - (a) the option is:
 - (i) an over-the-counter option; or
 - (ii) is traded on an exchange, but delta for the option is not available from that exchange;

- (b) the *firm* adequately reflects non-delta risks in the *K-NPR requirement* in accordance with the *Non-Delta Risk of Options RTS*;
 - (c) the model the *firm* uses meets the minimum standards set out in ■ MIFIDPRU 4.12.12G to ■ MIFIDPRU 4.12.18G (Minimum standards for own estimates of delta) for each type of option for which it calculates delta;
 - (d) the *firm* notifies the *FCA* that the requirements in (a) to (c) have been met before the *firm* begins to use its own estimates for the relevant delta; and
 - (e) the notification in (d) is made using the form in ■ MIFIDPRU 4 Annex 5R and submitted using the *online notification and application system*.
- (2) The value of delta is 1 where:
- (a) a *MIFIDPRU investment firm* is not permitted to use its own estimates for delta in accordance with (1); and
 - (b) if the option is traded on an exchange, delta is not available from that exchange.

4.12.11 **G** If a *MIFIDPRU investment firm* has notified the *FCA* under ■ MIFIDPRU 4.12.10R that a model meets the minimum standards for a particular option type, but is subsequently unable to demonstrate to the *FCA* that the model meets those minimum standards, the *FCA* may apply a capital add-on and agree a risk mitigation plan. If a *firm* does not comply with the risk mitigation plan within the mandated timeframe, the *FCA* may take further supervisory measures. This may include variation of a *firm's Part 4A permission* so that the *firm* is no longer allowed to trade the relevant option types.

Minimum standards for own estimates of delta

4.12.12 **G** The sophistication of a pricing model used to calculate own estimates of delta for use in the standardised approach for options should be proportionate to the complexity and risk of each option and the overall risk of the *firm's* options trading business. In general, the *FCA* considers that the risk of sold options will be higher than the risk of the same options when bought.

4.12.13 **G** Delta should be recalculated at least daily. A *firm* should also recalculate delta promptly if there are significant movements in the market parameters used as inputs to calculate delta.

4.12.14 **G** The pricing model used to calculate delta should be:

- (1) based on appropriate assumptions that have been assessed and challenged by suitably qualified parties independent of the development process;
- (2) independently tested, including validation of the mathematics, assumptions and software implementation; and
- (3) developed or approved independently of the trading desk.

4.12.15 **G** A *firm* should use generally accepted industry standard pricing models for the calculation of own deltas where these are available, such as for relatively simple options.

4.12.16 **G** The IT systems used to calculate delta should be sufficient to ensure delta is calculated accurately and reliably.

4.12.17 **G** A *firm* should have adequate systems and controls in place when using a pricing model to calculate delta. This should include the following documented policies and procedures:

- (1) clearly defined responsibilities of the various areas involved in the calculation;
- (2) frequency of independent testing of the accuracy of the model used to calculate delta; and
- (3) guidelines for the use of unobservable inputs, where relevant.

4.12.18 **G** A *firm* should ensure its risk management functions are aware of weaknesses of the model used to calculate a delta. Where a *firm* identifies weaknesses, it should ensure that estimates of delta result in a prudent contribution to the *K-NPR requirement*. The outcome should be prudent across the whole portfolio of options and underlying positions at all times.

Netting: convertible

4.12.19 **R** The netting of a *convertible* and an offsetting position in the underlying instrument is permitted for the purposes of article 327(2) of the *UK CRR* (Netting).

4.12.20 **G** For the purposes of article 327(2) of the *UK CRR*, the *convertible* should be:

- (1) treated as a position in the *equity* into which it converts; and
- (2) the component of the *firm's K-NPR requirement* attributable to the general and specific risk in its *equity* instruments should be adjusted by making:
 - (a) an addition equal to the current value of any loss that the *firm* would make if it did convert to *equity*; or
 - (b) a deduction equal to the current value of any profit that the *firm* would make if it did convert to *equity* (subject to a maximum deduction equal to the *K-NPR requirement* that would be attributable to the notional position underlying the *convertible*).

Offsetting derivative instruments

4.12.21 **G** Article 331(2) of the *UK CRR* (Interest rate risk in derivative instruments) sets out conditions that must be met before a *firm* not using interest rate pre-processing models can fully offset interest rate risk on derivative instruments. One of the conditions is that the reference rate (for floating-rate positions) or coupon (for fixed-rate positions) should be 'closely matched'. The *FCA* will

normally consider a difference of less than 15 basis points as indicative of the reference rate or coupon being 'closely matched' for the purposes of this requirement. A *firm* that wishes to use sensitivity models to calculate interest rate risk on derivative instruments in accordance with article 331(1) of the UK CRR should refer to ■ MIFIDPRU 4.12.66R.

Exclusion of overshootings when determining multiplication factor addends

- 4.12.22 **G**
- (1) The FCA's starting assumption is that all overshootings should be taken into account to calculate addends. If a *firm* believes that an overshooting should not count for that purpose, it should seek a variation of its VaR model permission from the FCA in accordance with ■ MIFIDPRU 4.12.4R to exclude the overshooting.
 - (2) An example of when a *firm's* overshooting might properly be disregarded is when it has arisen as a result of a risk that is not captured in a *firm's* VaR model but against which *own funds* are already held.

Derivation of notional positions for standardised approaches: general

- 4.12.23 **G**
- MIFIDPRU 4.12.24G to ■ MIFIDPRU 4.12.38G set out *guidance* for the derivation of notional positions for standardised approaches to market risk under the UK CRR.

Futures and forwards on a basket or index of debt securities

- 4.12.24 **G**
- Futures or forwards on a basket or index of debt securities should be converted into forwards on single debt securities as follows:
- (1) futures or forwards on a single currency basket or index of debt securities should 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 that 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 notional debt security; and
 - (2) futures or forwards on multiple currency baskets or indices of debt securities should be treated as either:
 - (a) a series of forwards (using the method in (1)(a)); or
 - (b) a series of forwards, each one on a notional debt security to represent one of the currencies in the basket or index, of an amount that is a proportionate part of the total underlying the contract according to the weighting of the relevant currency in the basket.

- 4.12.25 **G**
- Notional debt securities derived through this treatment should be assigned a specific risk position risk adjustment and a general market risk position risk adjustment equal to the highest that would apply to the debt securities in the basket or index.

4.12.26 G The debt security with the highest specific risk position risk adjustment within the basket might not be the same as the one with the highest general market risk position risk adjustment. A *firm* should select the highest percentages, even if 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.

Bonds where coupons and principal are paid in different currencies

4.12.27 G Where a debt security pays coupons in one currency but will be redeemed in a different currency, it should be treated as:

- (1) a debt security denominated in the coupon’s currency; and
- (2) a foreign currency 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 swaps

4.12.28 G Other futures, forwards, and swaps for which a treatment is not specified in article 328 of the *UK CRR* (Interest rate futures and forwards) should 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, as set out in the table in ■ MIFIDPRU 4.12.29G.

4.12.29 G This table belongs to ■ MIFIDPRU 4.12.28G.

Instrument	Notional positions	
Foreign currency forward or future	A long position denominated in the currency purchased	and A short position denominated in the currency sold
Gold forward or future	A long position if the forward or future involves an actual (or notional) sale of gold	or A short position if the forward or future involves an actual (or notional) purchase of gold

Instrument	Notional positions	
Equity forward or future	A long position if the contract involves an actual (or notional) sale of the underlying equity	or A short position if the contract involves an actual (or notional) purchase of the underlying equity

Deferred start interest rate swaps or foreign currency swaps

4.12.30 **G** Interest rate swaps or foreign currency swaps with a deferred start should be treated as two notional positions (one long, one short). The paying leg should be treated as a short position in a zero specific risk security with a coupon equal to the fixed rate of the swap. The receiving leg should be treated as a long position in a zero specific risk security that also has a coupon equal to the fixed rate of the swap.

4.12.31 **G** The maturities of the notional positions in **■ MIFIDPRU 4.12.30G** are set out in the table in **■ MIFIDPRU 4.12.32G**.

4.12.32 **G** This table belongs to **■ MIFIDPRU 4.13.31G**.

	Paying leg	Receiving leg
Receiving fixed and paying floating	The maturity equals the start date of the swap	The maturity equals the end date of the swap
Paying fixed and receiving floating	The maturity equals the end date of the swap	The maturity equals the start date of the swap

Swaps where only one leg is an interest rate leg

4.12.33 **G** For interest rate risk, a *firm* should treat a swap (such as an equity 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) that is a long position if the *firm* is receiving interest payments and is a short position if making interest payments.

Foreign exchange forwards, futures and contracts for differences

4.12.34 **G**

- (1) A *firm* should treat a foreign currency forward, future or contract for differences as two notional currency positions as follows:
 - (a) a long notional position in the currency that the *firm* has contracted to buy; and
 - (b) a short notional position in the currency that the *firm* has contracted to sell.
- (2) In (1), the notional positions should have a value equal to either:

4.12.35

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- (a) the contracted amount of each currency to be exchanged in a forward, future or contract for differences held outside the *trading book*; or
- (b) the present value of the amount of each currency to be exchanged in a forward, future or contract for differences held in the *trading book*.

Foreign currency swaps

4.12.36

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- (1) A *firm* should treat a foreign currency swap as:
 - (a) a long notional position in the currency in which the *firm* has contracted to receive interest and principal; and
 - (b) a short notional position in the currency in which the *firm* has contracted to pay interest and principal.
- (2) In (1), the notional positions should have a value equal to either:
 - (a) the nominal amount of each currency underlying the swap if it is held outside the *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*.

Futures, forwards and contract for differences on a single commodity

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Where a forward, future or contract for differences settles according to:

- (1) the difference between the price set on trade date and the price prevailing at contract expiry, the notional position should:
 - (a) equal the total quantity underlying the contract; and
 - (b) have 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, a notional position should be derived 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.

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

Commitments to buy or sell at the average spot price of the commodity prevailing over some period between trade date and maturity should 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 should be:
 - (a) long, where the *firm* will buy at the average price; or
 - (b) short, where the *firm* will sell at the average price; and

- (2) a series of notional positions, one for each of the reference dates where the contract price remains unfixed, each of which should:
 - (a) be long if the position under (1) is short, or short if the position under (1) is long;
 - (b) be equal to a fractional share of the total quantity underlying the contract; and
 - (c) have a maturity date of the relevant reference date.

Cash legs of repurchase agreements and reverse repurchase agreements

4.12.38 **G** The forward cash leg of a repurchase agreement or reverse repurchase agreement should be treated as a notional position in a zero specific risk security that:

- (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 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
 - 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.

Expectations relating to internal models

4.12.39 **G** ■ MIFIDPRU 4.12.40G to ■ MIFIDPRU 4.12.65G describe some of the standards that the FCA expects to be met when it is considering an application under ■ MIFIDPRU 4.12.4R to use an internal model.

High-level standards

4.12.40 **G** A firm should be able to demonstrate that it meets the risk management standards in article 368 of the UK CRR (Qualitative requirements) on a legal entity and business-line basis where appropriate. This is particularly important for a subsidiary in a group subject to matrix management where the business lines cut across legal entity boundaries.

Categories of position

4.12.41 **G** A VaR model permission generally sets out the broad classes of position within each risk category in its scope. It may also specify how individual products within one of the classes may be brought into or taken out of the scope of the VaR model permission. The broad classes of permission are:

- (1) linear products, which comprise securities with linear pay-offs (such as bonds and *equities*) and derivative products which have linear pay-offs in the underlying risk factor (such as interest rate swaps, *FRAs*, and total return swaps);
- (2) European, American and Bermudan put and call options (including caps, floors, and swaptions) and investments with these features;
- (3) Asian options, digital options, single barrier options, double barrier options, look-back options, forward-starting options, compound options and investments with these features; and
- (4) all other option-based products (such as basket options, quantos, outperformance options, timing options, and correlation-based products) and investments with these features.

Data standards

4.12.42 G A *firm* should ensure that the data series used by its VaR model is reliable. Where a reliable data series is not available, the *firm* may use proxies or any other reasonable value-at-risk measurement if the model meets the requirements in article 367(2)(e) of the *UK CRR* (Requirements on risk measurement). The technique must be appropriate and must not materially understate the modelled risks.

4.12.43 G Data may be insufficient if, for example, it contains missing data points or data points that contain stale data. For less liquid risk factors or positions, the *FCA* expects the *firm* to make a conservative assessment of those risks, using a combination of prudent valuation techniques and alternative VaR estimation techniques to ensure there is a sufficient cushion against risk over the close-out period, which takes account of the illiquidity of the risk factor or position.

4.12.44 G A *firm* is expected to update data sets to maintain standards of reliability in accordance with the frequency set out in its VaR model permission, or more frequently if necessary due to volatility in market prices or rates. This is in order to ensure a prudent calculation of the VaR measure.

Aggregating VaR measures

- 4.12.45** G
- (1) In determining whether it is appropriate for a *firm* to use empirical correlations within risk categories and across risk categories within a model, the *FCA* will consider whether such an approach is sound and implemented with integrity. In general, the *FCA* expects a *firm* to determine the aggregate VaR measure by adding the relevant VaR measure for each category, unless the *firm's* permission provides for a different method of aggregating VaR measures that is empirically sound.
 - (2) The *FCA* does not expect a *firm* to use the square root of the sum of the squares approach when aggregating measures across risk categories unless the assumption of zero correlation between these categories is empirically justified. If correlations between risk categories are not empirically justified, the VaR measures for each category should simply be added to determine its aggregate VaR

measure. However, to the extent that a *firm's* VaR model permission provides for a different way of aggregating VaR measures:

- (a) that method applies instead; and
- (b) if the correlations between risk categories used for that purpose cease to be empirically justified then the *firm* is expected to notify the *FCA* immediately.

Testing prior to model validation

4.12.46 **G** A *firm* should demonstrate its ability to comply with the requirements for a VaR model permission. In general, a *firm* should have a back-testing programme in place and should provide 3 *months* of back-testing history.

4.12.47 **G** A *firm* should carry out a period of initial monitoring or live testing before the *FCA* will recognise a VaR model. This will be agreed on a *firm-by-firm* basis.

4.12.48 **G** The *FCA* will take into account the results of internal model validation procedures used by the *firm* to assess the VaR model when assessing the *firm's* VaR model and risk management.

Back-testing

4.12.49 **G** ■ MIFIDPRU 4.12.50G to ■ MIFIDPRU 4.12.53G provide further *guidance* on how a *firm* should comply with the requirements in article 366 of the *UK CRR* (Regulatory back testing and multiplication factors).

4.12.50 **G** If the *day* on which a loss is made is day *n*, the value-at-risk measure for that *day* will be calculated on day *n-1*, or overnight between day *n-1* and day *n*. Profit and loss figures are produced on day *n+1*, and back-testing also takes place on day *n+1*. The *firm's* supervisor should be notified of any overshootings by close of business on day *n+2*.

4.12.51 **G** Any overshooting initially counts for the purpose of the calculation of the plus factor, even if subsequently the *FCA* agrees to exclude it. Therefore, where the *firm* experiences an overshooting and already has 4 or more overshootings during the previous 250 *business days*, changes to the multiplication factor resulting from changes to the plus factor become effective at day *n+3*.

4.12.52 **G** A longer time period generally improves the power of back-testing. However, a longer time period may not be desirable if the VaR model or market conditions have changed to the extent that historical data is no longer relevant.

4.12.53 **G** The *FCA* will review a *firm's* processes and documentation relating to the derivation of profit and loss used for back-testing when assessing a VaR model permission application under ■ MIFIDPRU 4.12.4R. A *firm's* documentation should clearly set out the basis for cleaning profit and loss. To the extent that certain profit and loss elements are not updated every *day*

(for example, certain reserve calculations), the documentation should clearly set out how such elements are included in the profit and loss series.

Planned changes to the VaR model

- 4.12.54 G Under ■ MIFIDPRU 4.12.6R, a *firm* must provide the *FCA* with details of any significant planned changes to the VaR model before those changes are implemented. This must include detailed information about the nature of the change, including an estimate of the impact on VaR numbers and the incremental risk charge. Material changes to internal models or material extensions to the use of internal models will require prior approval from the *FCA*.

Bias from overlapping intervals for 10-day VaR and stressed VaR

- 4.12.55 G The use of overlapping intervals of 10-day holding periods for article 365 of the *UK CRR* (VaR and sVaR calculation) introduces an autocorrelation into the data that would not exist should truly independent 10-day periods be used. This may give rise to an under-estimation of the volatility and the VaR at the 99% confidence level. To obtain clarity on the materiality of the bias, a *firm* should measure the bias arising from the use of overlapping intervals for 10-day VaR and sVaR when compared to using independent intervals. A report on the analysis, including a proposal for a multiplier on VaR and sVaR to adjust for the bias, should be submitted to the *FCA* for review and approval.

Stressed VaR calculation

- 4.12.56 G Under article 365 of the *UK CRR* (VaR and sVaR calculation), a *firm* that uses an internal model for calculating its *K-NPR requirement* must calculate, at least weekly, a sVaR of their current portfolio. The *FCA* would expect a sVaR internal model to contain the features in ■ MIFIDPRU 4.12.57G to ■ MIFIDPRU 4.12.60G before the *FCA* will grant permission to use the relevant model.

Quantile estimator

- 4.12.57 G A *firm* should calculate the sVaR measure to be greater than or equal to the average of the second and third worst loss in a 12-month time series comprising of 250 observations. The *FCA* expects, as a minimum, that a corresponding linear weighting scheme should be applied if the *firm* uses a larger number of observations.

Meaning of ‘period of significant financial stress relevant to the institution’s portfolio’

- 4.12.58 G A *firm* should ensure that the sVaR period chosen is equivalent to the period that would maximise VaR, given the *firm’s* portfolio. A stressed period should be identified at each legal entity level at which capital is reported. Therefore, group level sVaR measures should be based on a period that maximises the group level VaR, whereas entity level sVaR should be based on a period that maximises VaR for that entity.

Antithetic data

4.12.59 **G** The *firm* should consider whether the use of antithetic data in the calculation of the sVaR measure is appropriate to the *firm's* portfolio. The *firm* should provide a justification to the *FCA* for using or not using antithetic data as part of an application to use an internal model.

Absolute and relative shifts

4.12.60 **G** In its application to use an internal model, the *firm* should explain the reasons for the choice of absolute or relative shifts for both VaR and sVaR methodologies. In particular, the *firm* should evidence the statistical processes driving the risk factor changes for both VaR and sVaR.

4.12.61 **R** A *firm* that uses an internal model must submit the following information to the *FCA* on a quarterly basis:

- (1) analysis to support the equivalence of the *firm's* current approach to a VaR-maximising approach on an ongoing basis;
- (2) the reasons for the selection of key major risk factors used to find the period of significant financial stress;
- (3) a summary of ongoing internal monitoring of stressed period selection for the current portfolio;
- (4) analysis to support capital equivalence of upscaled 1-day VaR and sVaR measures to corresponding full 10-day VaR and sVaR measures;
- (5) a graphed history of sVaR/VaR ratio;
- (6) analysis to demonstrate accuracy of partial revaluation approaches specifically for sVaR purposes (for *firms* using revaluation ladders or spot/vol-matrices), including a review of the ladders/matrices or spot/vol-matrices, ensuring that they are extended to include wider shocks to risk factors that occur in stress scenarios; and
- (7) minutes of risk committee meetings or other evidence of governance and senior management oversight of sVaR methodology.

4.12.62 **G** Under article 372 of the *UK CRR* (Requirement to have an internal IRC model), a *firm* that uses an internal model for calculating own funds requirements for specific risk of traded debt instruments must also have an internal incremental default and migration risk (IRC) model in place to capture the default and migration risk of its trading book positions that are incremental to the risks captured by its VaR model. When the *FCA* considers a *firm's* application for permission to use an IRC internal model under **MIFIDPRU 4.12.4R**, it expects that the matters in **MIFIDPRU 4.12.63G** to **MIFIDPRU 4.12.65G** will be included to demonstrate compliance with the standards in article 372.

Basis risks for migration

4.12.63 **G** The *FCA* expects the IRC model to capitalise pre-default basis risk. In this respect, the model should reflect that in periods of stress the basis could

widen substantially. The *firm* should disclose to the *FCA* its material basis risks that are incremental to those already captured in existing market risk capital measures (VaR-based and others). This must take into account actual close-out periods during periods of illiquidity.

Price/spread change model

- 4.12.64 **G** The price/spread change model used to capture the profit and loss impact of migration should calibrate spread changes to long-term averages of differences between spreads for relevant ratings. These should either be conditioned on actual rating events, or use the entire history of spreads regardless of migration. Point-in-time estimates are not acceptable, unless the *firm* can demonstrate that they are as conservative as long-term averages.

Dependence of the recovery rate on the economic cycle

- 4.12.65 **G** To achieve a soundness standard comparable to those under the Internal Ratings Based (IRB) approach, loss given default (LGD) estimates should reflect the economic cycle. Therefore, the *FCA* expects a *firm* to incorporate dependence of the recovery rate on the economic cycle into the IRC model. If the *firm* uses a conservative parameterisation to comply with the IRB standard of the use of downturn estimates, the *firm* should submit evidence of this in its quarterly reporting to the *FCA*. A *firm* should note that for trading portfolios that contain long and short positions, downturn estimates will not be a conservative choice in all cases.

Permission to use sensitivity models to calculate interest rate risk on derivative instruments

- 4.12.66 **R**
- (1) A *firm* must obtain prior permission from the *FCA* to use a sensitivity model in accordance with article 331(1) of the *UK CRR* to calculate the interest rate risk for positions in:
 - (a) derivative instruments under articles 328 to 330 of the *UK CRR*; or
 - (b) any bond which is amortised over its residual life, rather than via one final payment of principal.
 - (2) To obtain the permission in (1), a *firm* must:
 - (a) where the permission relates to one or more of the derivative instruments in (1)(a), mark to market the instruments and manage the interest rate risk on the instruments on a discounted cash flow basis;
 - (b) complete the form in **■ MIFIDPRU 4 Annex 6R** and submit it using the *online notification and application system*; and
 - (c) in its application under (b), demonstrate to the satisfaction of the *FCA* that:
 - (i) the model generates positions that have the same sensitivity to interest rate changes as the underlying cash flows; and
 - (ii) the sensitivity in (i) is assessed with reference to independent movements in sample rates across the yield curve, with at least one sensitivity point in each of the maturity bands set out in Table 2 in article 339 of the *UK CRR*.

- (3) Where a *firm* has been granted permission to apply a sensitivity model under this *rule*, any relevant positions must be included in the *firm's* calculation of its general risk of debt instruments for its *K-NPR requirement*.