EBA/CP/2020/21

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Consultation Paper

Guidelines on criteria for the use of data inputs in the risk-measurement model referred to in Article 325bc under Article 325bh(3) of Regulation (EU) No 575/2013

Contents

1. Responding to this consultation

The EBA invites comments on all proposals put forward in this paper and in particular on the specific questions summarised in 5.2.

Comments are most helpful if they:

- respond to the question stated;
- indicate the specific point to which a comment relates;
- contain a clear rationale;
- provide evidence to support the views expressed/ rationale proposed; and
- describe any alternative regulatory choices the EBA should consider.

Submission of responses

To submit your comments, click on the 'send your comments' button on the consultation page by dd.mm.yyyy. Please note that comments submitted after this deadline, or submitted via other means may not be processed.

Publication of responses

Please clearly indicate in the consultation form if you wish your comments to be disclosed or to be treated as confidential. A confidential response may be requested from us in accordance with the EBA's rules on public access to documents. We may consult you if we receive such a request. Any decision we make not to disclose the response is reviewable by the EBA's Board of Appeal and the European Ombudsman.

Data protection

The protection of individuals with regard to the processing of personal data by the EBA is based on Regulation (EC) N° 45/2001 of the European Parliament and of the Council of 18 December 2000 as implemented by the EBA in its implementing rules adopted by its Management Board. Further information on data protection can be found under the Legal notice section of the EBA website.

2. Executive Summary

Regulation (EU) No 2020/876 (the Capital Requirements Regulation 2 – CRR2) amends Regulation (EU) No 575/2013 (the Capital Requirements Regulation – CRR), introducing in EU legislation, *inter alia*, the revised framework for minimum capital requirements for market risk, developed by the Basel Committee and published in their final version in January 2019.

The alternative internal model approach is one of the novelties introduced by the CRR2. The approach presents specific features aiming at enhancing the reliability in institution's capacity of appropriately capturing risks through internal models.

The alternative internal model approach is designed to capture market risks taking into account tail risks, risk of market illiquidity and the default risk through the sum of three components: i) the expected shortfall risk measure, which determines capital requirements for those risk factors for which a sufficient amount of observable data is available (modellable risk factors), ii) the stress scenario risk measure for risk factors with limited observable data (non-modellable risk factors), and iii) the own funds requirement for default risk associated with credit and equity positions.

Article 325bh(3) of the CRR gives the mandate to the EBA to develop guidelines (GLs) specifying the criteria for the use of data inputs referred to in Article 325bc of the CRR and used in calculating the partial expected shortfall in accordance with the same article. The GL should clarify the qualitative conditions that the data related to modellable risk factors should meet to be used in the institution's expected shortfall calculations.

3. Background and rationale

The CRR2 implements in EU legislation, *inter alia*, the revised framework for minimum capital requirements for market risk (also known as Fundamental Review of the Trading Book – FRTB), developed by the Basel Committee and published in its final version in January 2019.

One of the novelties introduced by the FRTB and included in the CRR2 is the alternative internal model approach, specifically revised to overcome the identified drawbacks in the Basel 2.5 internal model approach.

The alternative internal model approach comprises of three different components. The first component is the expected shortfall (ES) risk measure, which determines capital requirements for those risk factors with a sufficient amount of available observable market data (i.e. for risk factors identified as modellable). The second component is the stress scenario risk measure (SSRM), suitable for determining capital requirements for risk factors with limited observable market data (i.e. identified as non-modellable risk factors – NMRF). Finally, credit and equity positions are subject to own funds requirements for the associated default risk.

Institutions are required, under Article 325be of the CRR, to assess the modellability of the risk factors assigned to the trading desks included in the scope of the alternative internal model approach. Namely, institutions should verify that the modellable risk factors meet the criteria specified in the relevant RTS ('Draft Regulatory Technical Standards on Criteria for assessing the modellability of risk factors under the Internal Model Approach (IMA) under Article 325be(3) of Regulation (EU) No 575/2013'[1]). Those criteria relate to the identification of a sufficient number of verifiable prices, being representative for the risk factor over the preceding 12-months. Those quantitative criteria are intended to ensure that the risk factors, which institutions include in their Expected Shortfall risk measure, are sufficiently liquid and observable.

Once the set of modellable risk factor has been determined in accordance with Article 325be of the CRR, institutions should choose the most appropriate data inputs for each of those modellable risk factors in order to compute their ES risk measure. The need for outlining which data inputs can be suited to be included in the ES model is also underlined by the Basel Committee when defining principles[2] for the inclusion of risk factors in the ES model after they have been assessed modellable (i.e. after they have passed the Risk Factor Eligibility Test – RFET).

The data inputs used to determine the scenarios of future shocks applied to the modellable risk factors for the computation of the ES measure must, according to Article 325bc of the CRR, be calibrated to historical market data, from either the preceding 12-month period or a continuous

[1] https://eba.europa.eu/sites/default/documents/files/document_library//EBA-RTS-2020-03%20Final%20draft%20RTS%20on%20Risk%20factor%20modellability.pdf

[2] Minimum capital requirements for market risk, January 2019 (rev. February 2019), paragraphs 31.25 and 31.26

12-month period of financial stress. Institutions may use different sources or types of historical market data for this purpose. In particular, the EBA acknowledges that the historical market data used to calibrate the data inputs referred to in Article 325bc of the CRR does not necessarily need to be the data (i.e. verifiable prices) that was used to assess the modellability of the risk factors under Article 325be.

For this reason, once a risk factor has been deemed modellable, the institution should verify that the data inputs for that risk factor are accurate, appropriate, frequently updated, complete and that their use in the internal risk measurement model is overall consistent, based on the provisions included in the present GLs, for the drafting of which the EBA is entitled under Article 325bh(3).

In the present GLs, on top of general provisions that should always apply, specific provisions are included to cover specific cases where the EBA identified the need of addressing particular issues. Specific provisions are included to cover the following specific cases:

(a) multifactor models ("Beta approximations" throughout the rest of the GLs) used for generating data inputs;

(b) multiple sources of data inputs used in the internal risk-measurement model;

(c) interpolation and/or extrapolation techniques used for replacing missing or inconsistent data inputs.

Interactions with the CRR

The mandate included in the CRR explicitly restrict the scope of the present GLs to data inputs referred to in Article 325bc and used for the partial expected shortfall calculations, where data inputs are mentioned in relation to the determination of the scenarios of future shocks applied to the modellable risk factors.

In paragraphs (2)(c) and (2)(d) of that Article, the CRR requires that the data inputs used to determine the scenarios of future shocks applied to $PES_t^{\boldsymbol{RS}}$ and $PES_t^{\boldsymbol{RS},i}$ shall be calibrated to historical data from a continuous 12-month period of financial stress, and it is specified how institutions shall identify that period.

In paragraphs (3)(c) and (4)(c) of that Article, the CRR requires that the data inputs used to determine the scenarios of future shocks applied to $PES_t^{\boldsymbol{RC}}$, $PES_t^{\boldsymbol{RC},i}$, $PES_t^{\boldsymbol{FC}}$ and $PES_t^{\boldsymbol{FC},i}$ shall be calibrated to historical data from the preceding 12-month period[3], with those historical data to be updated on at least a monthly basis.

Article 325bi specifies qualitative requirements that an internal risk-measurement model shall satisfy, including the requirement for an institution to conduct an independent review of its internal

[3]Where there is a significant upsurge in the price volatility of a material number of modellable risks factors not in the reduced subset, competent authorities may require an institution to use historical data for a period shorter than the preceding 12-months, but not shorter than the preceding six-months. Competent authorities shall notify and substantiate any such decision to the EBA.

risk-measurement models. That review is required to assess, in particular, the accuracy and completeness of position data, the accuracy and appropriateness of volatility and correlation assumptions, the accuracy of valuation and risk sensitivity calculations, and the accuracy and appropriateness for generating data proxies where the available data are insufficient to meet the requirement set out in Part 3, Title IV, Chapter 1b.

In accordance with Article 325bh(3) of the CRR, the EBA has developed criteria for the use of the data inputs referred to in Article 325bc of the CRR. Those criteria relate to the accuracy, appropriateness and completeness, as well as frequent updating and consistent use of those data inputs in the ES model.

3.1 Accuracy of data inputs

The data inputs used in the ES model, in order to be accurate, should be reflective of prices observed and/or quoted in the market. The EBA considers that the first source of prices observed and/or quoted in the market should be represented by verifiable prices collected for the purpose of the modellability assessment performed in accordance to Article 325be of the CRR.

Where the data inputs used are not derived from verifiable prices collected for the purpose of the modellability assessment, the institution should demonstrate that those data inputs are derived from price data which is reasonably aligned with those verifiable prices. To that end, institutions should at least quarterly reconcile the values of a risk factor that are used as data inputs, as derived by the price data used in the ES model, with the values of that risk factor, as derived from verifiable prices only.

As the back office checks the validity of the front office prices, such data could also be included in the comparison with price data used in the ES model. In particular, front or back office prices could be used to demonstrate the accuracy of the price data used in the ES model, where verifiable prices are not widely available.

Volatility and correlation of data inputs

As volatilities and correlations are main drivers of the output of the ES model, the data inputs should allow the ES model to accurately reflect the volatility of the risk factors that are included in the scope of the ES model, as well as the correlations among those risk factors.

Institutions should verify that the volatility of modellable risk factors, as well as of the correlations among those risk factors, are not misestimated by the data inputs used. To that end, institutions should compare the volatilities and the correlations estimated using those data inputs, with those estimated using verifiable prices.

In addition, data transformations that institutions may perform in order to derive the data inputs for modellable risk factors should not lead to a misestimation of the volatilities of those risk factors, as well as of the correlations among those risk factors.

Beta approximations used for generating data inputs

Where Beta approximations are used for generating data inputs, the calibration of the coefficients used in the Beta approximations should be empirically based and should not be determined on judgmental basis. However, some judgmental considerations may complement the empirical calibration of the coefficients, provided that the institution is able to justify: a) the reasons for complementing the empirical calibration of the coefficients with additional judgmental considerations, b) the methodology used and the adjustments made to the coefficients empirically calibrated and c) that the choice of the values for the coefficients does not underestimate risk.

Data from a period of financial stress

The data inputs used to determine the scenarios of future shocks applied to the modellable risk factors and calibrated to historical data from the continuous 12-month period of financial stress should be sourced directly from that identified period of financial stress. The EBA, however, is consulting on whether there could be cases where the characteristics of current instruments or the characteristics of the market have changed so much compared to those that were applicable in the period of financial stress that adjustments to the above calibration could be warranted.

However, reflecting the effects of fundamental changes in the characteristics of financial instruments or in the characteristics of markets on the calibration of data inputs for the period of financial stress may prove difficult in practice. Such effects would have to be appropriately disentangled and quantified, in particular based on the use of more recent data in addition to the historical data observed in the period of financial stress. In addition, institutions would have to motivate any use of data other than the historical data from the period of financial stress, to objectively characterize the extent to which financial instruments or market structures have altered and to verify that the re-calibrated data inputs do not lead to an underestimation of risks.

Where institutions cannot sufficiently justify the use of additional data other than the historical data from the period of financial stress for instruments whose characteristics have changed since the identified period of financial stress, the institution should not be allowed to include the relevant risk factors of the instruments in the determination of $PES_t^{\boldsymbol{RS}}$ and $PES_t^{\boldsymbol{RS},i}$.

Similarly, where name-specific risk factors are used to calculate PES_t^{FC} and $PES_t^{FC,i}$ and data inputs of these names were not available in the identified period of financial stress, there is a presumption that the idiosyncratic part of these risk factors is not in the reduced set of risk factors identified in accordance with Article 325bc(2)(a) of the CRR.

3.2 Appropriateness of data inputs

The data inputs should allow both components of market risk to be captured in the ES model, i.e. general and specific risks, unless the related risk factors are capitalised under the SSRM. Documented analyses supported by convincing empirical evidence should be provided upon request to competent authorities, in order to demonstrate that general and specific risks are captured in the model.

According to Article 362 of the CRR, general market risk shall encompass the tendency of an instrument's value to change with the change in the value of the broader market, as represented by an appropriate index or indices. Idiosyncratic risk, on the other side, shall encompass the risk associated with a particular issuance.

If the data inputs used in the model do not reflect either idiosyncratic or general market risk, those aspects that are not adequately captured in the ES model should be integrated.

Furthermore, the data should allow capturing material idiosyncratic differences between similar, but not identical, positions.

Beta approximations used for generating data inputs

Where Beta approximations are used for generating data inputs, institutions should provide empirical evidence that the methodology applied and the output produced are adequate to capture both general market risk and specific risk.

On the one hand, statistical measures, including ones expressing the goodness of fit of the Beta approximation, should be used to show how general market risks are properly captured by the data inputs included in the ES model.

On the other hand, any assumptions that the residuals from the Beta approximations are uncorrelated to each other should be justified.

For instance, where an index is used in a Beta approximation to capture the risks common to a group of assets, the estimated model should have a sufficient explanatory power and the estimated coefficients should show statistical significance. In addition, where the remaining specific risks are assumed to be independent, the residuals of the estimated model should be demonstrably uncorrelated across the different assets, having analysed their dependence.

3.3 Frequency for updating the data inputs

An internal risk-measurement model requires large data sets. In order for the risk measure to reflect current market conditions, those data sets need to be updated frequently. Institutions should strive to update their data used to calibrate the ES risk measure as often as possible to

account for changing market conditions. Additionally, institutions should have a workflow process for updating the sources of data.

In any case, the data inputs used to determine the scenarios of future shocks for PES_t^{RC}, $PES_t^{RC,i}$, PES_t^{FC} and $PES_t^{FC,i}$ must be calibrated to historical data updated at a minimum on a monthly basis, in accordance with Article 325bc(3)(c). However, whenever needed (i.e. whenever a monthly update lead to an underestimation of the risks), those historical data should be updated on a more frequent basis.

Beta approximations used for generating data inputs

Where Beta approximations are used for generating data inputs, institutions should also recalibrate the estimated Beta coefficients on at least a monthly basis, in order to reflect any potential changes in the relations assumed among the market variables due to changes in the economic environment.

3.4 Completeness and consistent usage of the data inputs

In addition to being accurate, appropriate and frequently updated, the data inputs used in the ES model should prove to be complete. In that sense, institutions are required to have clear policies for the replacement of missing or inconsistent values in the time series of data inputs used to determine the scenarios of future shocks.

The requirements on volatility and correlation of data inputs, mentioned in Section 3.1, should also be met where missing or inconstant values in the time series of data inputs have been replaced before such replaced values may be used to determine the scenarios of future shocks.

The replacement of missing or inconsistent data should not be performed by means of stale data, as this replacement technique would lead to an underestimation of the volatility of the risk factor.

Institutions should be allowed to filter data or exclude outliers only where the excluded data correspond to inconsistent or stale data, or to data that does not satisfy the conditions mentioned in Section 3.1.

According to Article 325bb, only risk factors that have been assessed modellable in accordance to Article 325be of the CRR can be included in the ES model. Hence, where the data inputs for a given risk factor are generated using a method (including interpolation and extrapolation techniques) for filling gaps in times series and the method involves data from other risk factors, institutions should guarantee that also the other risk factors employed in the method are modellable.

Multiple sources of data inputs

The EBA acknowledges that different data sources can provide significantly different volatility and correlation measures for the same market variables.

For that reason, if multiple sources of data are available, institutions should verify that the choice of one source does not lead to an underestimation of the volatility, when compared to the volatility resulting from the other available sources.

Consider the example of multiple data sources available provided in Table 1. Source A and B provide similar values for each observation and the volatility resulting from one source is aligned to the volatility resulting from the other. On the contrary, Source C seems to be not aligned with the other two sources, both in terms of the values provided and in terms of the resulting volatility. Given that any "cherry-picking" behaviour should be ruled out, only A and B should be used as sources for data inputs. The use in combination of the two sources allows to fill the missing parts of the two data series.

Table 1: Example of multiple sources of data inputs available

Date	Source A	Source B	Source C
t-1	-0.33%	-0.23%	-0.33%
t-2	n/a	-1.58%	-0.79%
t-3	n/a	0.50%	0.36%
t-4	-0.43%	-0.43%	-0.43%
t-5	0.43%	0.44%	n/a
t-6	-1.00%	-1.00%	-0.50%
t-7	4.18%	4.18%	2.09%
t-8	-2.23%	-2.25%	-1.12%
t-9	-1.60%	-1.12%	-0.80%
t-10	0.43%	0.36%	0.43%
t-11	0.60%	n/a	0.30%
t-12	-2.55%	-2.55%	-2.55%

Interpolation and extrapolation techniques

Institutions should be allowed to interpolate and/or extrapolate values of risk factors for filling gaps in the time series of data inputs for those risk factors. Nevertheless, given that the estimated volatility for a given risk factor heavily depends on the specific techniques used for interpolating and extrapolating, the EBA deems appropriate to establish conditions under which those techniques can be employed.

With respect to interpolation, the interpolated values of the times series for a given risk factor should appropriately represent the missing values of that risk factor, regardless of the specific technique, that is employed.

With respect to extrapolation, where the extrapolation technique produces an extrapolated value for a given risk factor starting from the values of other risk factors observed on the same date, the data inputs derived by extrapolation should be used only if the given risk factor is within a reasonable distance from the closest of the modellable risk factors employed in the extrapolation technique. An institution shall assess the distance between two risk factors as reasonable if they belong to the same curve, surface or cube and there is no other risk factor between them.

In addition, the values for a given risk factor derived by extrapolation should not rely solely on data from the closest risk factor, but on data from more than one risk factor.

For instance, suppose an institution uses the 10y, 15y, 20y tenor points of a yield curve as risk factors (derived from market data) and extrapolates the 25y and 30y risk factors. Table 2 shows how different cases would be treated.

Table 2: Extrapolation of risk factor(s) from points on a yield curve

	10y RF	15y RF	20y RF	25y RF data in ES?	Explanation for 25y RF	30y RF data in ES?	Explanation for 30y RF
Case 1 25y RF: Extrapolated from 10y, 15y, 20y 30y RF: Extrapolated from 10y, 15y, 20y	✓	✓	✓	Y	✓ derived from a combination of solely MRF ✓ within a reasonable distance from the closest of these MRF which is not derived by extrapolation itself	N	✓ derived from a combination of solely MRF ✗ not within a reasonable distance from the closest of these MRF which is not derived by extrapolation itself
Case 2 25y RF: Extrapolated from 10y, 15y, 20y 30y RF: Extrapolated from 10y, 15y, 20y, 25y	✓	✓	✓	Y	✓ derived from a combination of solely MRF ✓ within a reasonable distance from the closest of these MRF which is not derived by extrapolation itself	N	✓ derived from a combination of solely MRF ✗ not within a reasonable distance from the closest of these MRF which is

	10y RF	15y RF	20y RF	25y RF data in ES?	Explanation for 25y RF	30y RF data in ES?	Explanation for 30y RF
							not derived by extrapolation itself
Case 3 25y RF: Extrapolated from 10y, 15y, 20y	✓	✓	×	N	× derived from a combination of MRF and NMRF		
Case 4 25y RF: Extrapolated from 10y, 15y, 20y	×	✓	✓	N	× derived from a combination of MRF and NMRF		
Case 5 25y RF: Extrapolated from 10y, 15y	✓	✓	✓	N	✓ derived from a combination of solely MRF × not within a reasonable distance from the closest of these MRF which is not derived by extrapolation itself		
Case 6 25y RF: Extrapolated from 10y, 15y	✓	✓	×	N	✓ derived from a combination of solely MRF × not within a reasonable distance from the closest of these MRF which is not derived by extrapolation itself		
Case 7 25y RF: Extrapolated from 10y, 15y	×	✓	✓	N	× derived from a combination of MRF and NMRF		

Legend

✓ modellable × non-modellable

The same provision can be extended to multidimensional cases, e.g. to a volatility surface. In those cases, the requirements should be met for each dimension separately, i.e. the extrapolation methodology should rely on more than one risk factor (including the closest risk factor) for each dimension. Table 3 shows how different cases would be treated. In the table, an institution is assumed to use all the modellable risk factors that are available on a given volatility surface to extrapolate the point (δ, t) = (0.02, 1). For instance, in Case 2 the points (0.1, 1), (0.5, 1), (0.02, 2)

are used in the extrapolation methodology, while the point (0.02, 5) is not used as it is non-modellable.

Table 3: Extrapolation of risk factor(s) from points on a volatility surface

	Volatility surface				(0.02, 1) RF data in ES?	Explanation for extrapolated RF
Case 1 (δ, t) = (0.02, 1) RF: Extrapolated from (0.1, 1), (0.5, 1), (0.02, 2), (0.02, 5) RFs		**0≤t<1.5**	**1.5≤t<3.5**	**3.5≤t<7.5**	Y	✓ within a reasonable distance from the closest of these MRF in each dimension ✓ derived from a combination of more than one MRF in each dimension
	0≤δ<0.05		✓	✓		
	0.05≤δ<0.3	✓	×	×		
	0.3≤δ<0.7	✓	×	×		
Case 2 (δ, t) = (0.02, 1) RF: Extrapolated from (0.1, 1), (0.5, 1), (0.02, 2) RFs		**0≤t<1.5**	**1.5≤t<3.5**	**3.5≤t<7.5**	N	✓ within a reasonable distance from the closest of these MRF in each dimension × not derived from a combination of more than one MRF in each dimension
	0≤δ<0.05		✓	×		
	0.05≤δ<0.3	✓	×	×		
	0.3≤δ<0.7	✓	×	×		
Case 3 (δ, t) = (0.02, 1) RF: Extrapolated from (0.1, 1), (0.5, 1), (0.1, 2), (0.5, 2), (0.02, 5), (0.1, 5), (0.5, 5) RFs		**0≤t<1.5**	**1.5≤t<3.5**	**3.5≤t<7.5**	N	× not within a reasonable distance from the closest of these MRF in each dimension ✓ derived from a combination of more than one MRF in each dimension
	0≤δ<0.05		×	✓		
	0.05≤δ<0.3	✓	✓	✓		
	0.3≤δ<0.7	✓	✓	✓		

Legend ✓ modellable × non-modellable

4. Guidelines on criteria for the use of data inputs in the risk-measurement model referred to in Article 325bc

In between the text of the draft Guidelines that follows, further explanations on specific aspects of the proposed text are occasionally provided, which either offer examples or provide the rationale behind a provision, or set out specific questions for the consultation process. Where this is the case, this explanatory text appears in a framed text box.

EBA/GL/20XX/XX

DD Month YYYY

Draft guidelines

on criteria for the use of data inputs in the risk-measurement model referred to in Article 325bc of Regulation (EU) No 575/2013

1. Compliance and reporting obligations

Status of these guidelines

1. This document contains guidelines issued pursuant to Article 16 of Regulation (EU) No 1093/2010[4]. In accordance with Article 16(3) of Regulation (EU) No 1093/2010, competent authorities and financial institutions must make every effort to comply with the guidelines.

2. Guidelines set the EBA view of appropriate supervisory practices within the European System of Financial Supervision or of how Union law should be applied in a particular area. Competent authorities as defined in Article 4(2) of Regulation (EU) No 1093/2010 to whom guidelines apply should comply by incorporating them into their practices as appropriate (e.g. by amending their legal framework or their supervisory processes), including where guidelines are directed primarily at institutions.

Reporting requirements

3. According to Article 16(3) of Regulation (EU) No 1093/2010, competent authorities must notify the EBA as to whether they comply or intend to comply with these guidelines, or otherwise with reasons for non-compliance, by ([dd.mm.yyyy]). In the absence of any notification by this deadline, competent authorities will be considered by the EBA to be non-compliant. Notifications should be sent by submitting the form available on the EBA website to compliance@eba.europa.eu with the reference 'EBA/GL/201x/xx'. Notifications should be submitted by persons with appropriate authority to report compliance on behalf of their competent authorities. Any change in the status of compliance must also be reported to EBA.

4. Notifications will be published on the EBA website, in line with Article 16(3).

[4] Regulation (EU) No 1093/2010 of the European Parliament and of the Council of 24 November 2010 establishing a European Supervisory Authority (European Banking Authority), amending Decision No 716/2009/EC and repealing Commission Decision 2009/78/EC, (OJ L 331, 15.12.2010, p.12).

2. Subject matter, scope and definitions

Subject matter

5. These guidelines specify criteria for the use of data inputs in the risk-measurement model referred to in Article 325bc according to Article 325bh(3) of Regulation (EU) No 575/2013.

Scope of application

6. These guidelines apply in relation to the permission for institutions to use alternative internal models in accordance with Title IV of Part Three, Chapter 1 of Regulation (EU) No 575/2013, and in particular to the compliance with the requirements set out in Articles 325bh of that Regulation.

7. Competent authorities should apply these guidelines in accordance with the level of application set out in Title II of Regulation (EU) No 575/2013.

Addressees

8. These guidelines are addressed to competent authorities as defined in point i-iv of Article 4(2) of Regulation (EU) No 1093/2010 and to financial institutions as defined in Article 4(1) of Regulation No 1093/2010.

Definitions

9. Unless otherwise specified, terms used and defined in Regulation (EU) No 575/2013 have the same meaning in the guidelines.

3. Implementation

Date of application

10. These guidelines apply from dd.mm.yyyy.

4. Requirements for the use of data inputs in the risk-measurement model referred to in Article 325bc of Regulation (EU) No 575/2013

11. The data inputs used by an institution in the risk-measurement model referred to in Article 325bc of Regulation (EU) No 575/2013 should have all of the following characteristics:

    (a) they should be accurate, as further specified in Section 4.1;

    (b) they should be appropriate, as further specified in Section 4.2;

    (c) they should be updated sufficiently frequently, as further specified in Section 4.3;

    (d) they should be complete and consistently used over time and across risk factors in the risk-measurement model, as further specified in Section 4.4.

4.1 Accuracy of data inputs

12. In order for the data inputs referred to in Article 325bc of Regulation (EU) No 575/2013 to be considered accurate, institutions should ensure that there is no material difference between the values of risk factors used as data inputs and the values of risk factors obtained from either of the following:

    (a) the verifiable prices referred to in Article 2 of Commission Delegated Regulation (EU) No XXX/20XX [RTS Modellability assessment], where a verifiable price is available for a given observation date;

    (b) prices based on the institutions' front-office or back-office pricing models, where a verifiable price is not available for a given observation date.

13. The data inputs referred to in Article 325bc of Regulation (EU) No 575/2013 should accurately reflect the volatility of the risk factors that are included in the scope of the risk-measurement model. To this end, institutions should ensure that there is no material difference between the volatility of a risk factor as estimated from the data inputs used in the risk-measurement model and the volatility of that risk factor as estimated from one of the following:

    (a) the volatility of that risk factor as estimated from the verifiable prices referred to in Article 2 of Commission Delegated Regulation (EU) No XXX/20XX [RTS Modellability

assessment], where the number of verifiable prices is sufficient to perform this assessment with accuracy;

(b) the volatility of that risk factor as estimated from the time series of values for that risk factor used in the institution's front-office or back-office pricing models, where the number of verifiable prices is not sufficient to perform this assessment with accuracy.

14. The data inputs referred to in Article 325bc of Regulation (EU) No 575/2013 should accurately reflect the correlations among the risk factors that are included in the scope of the risk-measurement model. To this end, institutions should ensure that there is no material difference between the correlations among risk factors as estimated from the data inputs used in the risk-measurement model and the correlations among those risk factors as estimated from one of the following:

(a) the verifiable prices referred to in Article 2 of Commission Delegated Regulation (EU) No XXX/20XX [RTS Modellability assessment], where the number of verifiable prices is sufficient to perform this assessment with accuracy;

(b) the time series of values for those risk factors used in the institution's front office or back-office pricing models, where the number of verifiable prices is not sufficient to perform this assessment with accuracy.

15. Institutions should carry out the assessment referred to in paragraph 12(b), 13 and 14 at least on a quarterly basis.

16. Where Beta approximations are used for generating data inputs referred to in Article 325bc of Regulation (EU) No 575/2013, the Beta coefficients used to generate the data inputs should be calibrated to the historical data referred to in Article 325bc. Where the Beta coefficients used to generate the data inputs are not calibrated to historical data referred to in Article 325bc only, but also based on judgmental considerations, the data inputs obtained as a result should not be considered accurate, unless the following conditions are met:

(a) the institution explains the reason why the coefficients cannot be calibrated to the historical data referred to in Article 325bc only;

(b) the institution describes the methodology used to obtain the values for the coefficients, including any adjustments made to coefficients calibrated to the historical data referred to in Article 325bc only;

(c) the institution demonstrates that the choice of the values for the coefficients does not underestimate risk.

Explanatory text for consultation purposes

In paragraph 31.26(7) of the BCBS document "Minimum capital requirements for market risk"[5], it is stated '*[…] A multifactor model must have significant explanatory power for the price movements of assets and must provide an assessment of the uncertainty in the final outcome due to the use of a proxy. The coefficients (betas) of a multifactor model must be empirically based and must not be determined based on judgment. Instances where coefficients are set by judgment generally should be considered as NMRFs.*'

In addition, a section of the BCBS document is dedicated to examples of the application of the principles for risk factor modellability, and paragraph 99.22(1) therin states: '*[…] Most importantly, where the estimated coefficients are not used (ie the parameters are judgment-based), the bank must describe how the coefficients are chosen and why they cannot be estimated, and demonstrate that the choice does not underestimate risk. In general, risk factors are not considered modellable in cases where parameters are set by judgment.*'

According to the BCBS document, in general institutions should not be allowed to set the parameters of Beta approximation by judgement. However, paragraph 99.22(1) seems to encompass specific instances where institutions, in derogation to the general principle and under specific conditions, could be allowed to apply judgmental considerations when setting such parameters.

The CRR text is quite clear in requiring institutions to calibrate the data inputs to historical data (see paragraphs 2(c), 2(d), 3(c) and 4(c) of Article 325bc), therefore ruling out any instances where parameters of Beta approximations are set purely based on judgmental considerations.

The only cases that could seem to be admissible under the CRR are those where institutions adjust the empirically calibrated coefficients with additional judgement-based considerations. The EBA considers that such cases should be exceptional, and that any judgemental adjustment to the empirically calibrated coefficients should be adequately justified. In order to determine whether the provision currently included in paragraph 16 should be maintained in the Guidelines, the EBA seeks feedback from the consultation to gather concrete cases where institutions envisage its application, explaining also the reasons why the coefficients cannot be calibrated to the historical data only. After assessment of the feedback received, the EBA could decide to remove this provision following consultation.

Question

Q1. To which extent do you intend to apply paragraph 16 of the present GL? Please provide concrete examples that could fall under the scope of paragraph 16 and explain why the coefficients cannot be calibrated to the historical data only.

[5] https://www.bis.org/bcbs/publ/d457_faq.pdf

17. The data inputs used to determine the scenarios of future shocks for the purposes of points (c) and (d) of Article 325bc(2) of Regulation (EU) No 575/2013 should be calibrated to historical data from a continuous 12-month period of financial stress identified by the institution in accordance with Article 325bc(2)(c) of that Regulation. Where, in exceptional cases, institutions do not use historical data from that period of financial stress only, but also more recent historical data in order to reflect the effect of fundamental changes that occurred in the characteristics of financial instruments or in the characteristics of the market compared to the characteristics that prevailed during the period of financial stress, the data inputs obtained as a result should not be considered accurate, unless the following conditions are met:

    (a) the institution is able to provide documented analyses supported by convincing empirical evidence to justify the additional use of historical data not observed in the identified period of financial stress for the calibration of the data inputs;

    (b) the institution demonstrates that the data inputs used accurately reflect changes in prices or spreads of similar instruments during the identified period of financial stress;

    (c) the institution demonstrates that the data inputs used do not underestimate risk.

Explanatory text for consultation purposes

The EBA is consulting on whether there could be cases where the characteristics of current instruments or the characteristics of the market have changed so much compared to those that were applicable in the period of financial stress that adjustments to the above calibration could be warranted.

In paragraph 31.26(6) of the BCBS document "Minimum capital requirements for market risk", it is stated '*[…] The data for the* $ES_{R,S}$ *model should be sourced directly from the historical period whenever possible. There are cases where the characteristics of current instruments in the market differ from those in the stress period. Nevertheless, banks must empirically justify any instances where the market prices used for the stress period are different from the market prices actually observed during that period*'.

However, reflecting the effects of fundamental changes in the characteristics of financial instruments or in the characteristics of markets on the calibration of data inputs for the period of financial stress may prove difficult in practice. Such effects would have to be appropriately disentangled and quantified, in particular based on the use of more recent data in addition to the historical data observed in the period of financial stress. In addition, institutions would have to motivate any use of data other than the historical data from the period of financial stress, to

objectively characterize the extent to which financial instruments or market structures have altered and to verify that the re-calibrated data inputs do not lead to an underestimation of risks.

Therefore, the EBA is seeking feedback on concrete cases where institutions could envisage the application of such provision. After assessment of the feedback received, in particular having regard to the harmonised application of CRR requirements in the EU, the EBA could decide to remove this provision following consultation.

Question

Q2. To which extent do you intend to apply paragraph 17 of the present GL? Please provide concrete examples that could fall under the scope of paragraph 17.

4.2 Appropriateness of data inputs

18. The data inputs referred to in Article 325bc of Regulation (EU) No 575/2013 should capture both of the following, where relevant:

    (a) all general market risks, as further specified in Section 4.2.1;

    (b) all specific market risks, as further specified in Section 4.2.2.

19. Institutions should produce documented analyses supported by convincing empirical evidence to show that those data inputs capture all material general market risks and all material specific market risks.

4.2.1 Data inputs capturing general market risks

20. Where historical data from market indices or other historical data representing characteristics shared by different instruments are used to generate the data inputs referred to in Article 325bc of Regulation (EU) No 575/2013 with a view to representing the general market risks of single-name instruments, the choice of such historical data should be conceptually sound.

21. Where Beta approximations are used to generate the data inputs referred to in Article 325bc of Regulation (EU) No 575/2013, empirical evidence, including statistical measures expressing the goodness-of-fit of the Beta approximation, should be used to show that general market risks are properly captured by those data inputs.

4.2.2 Data inputs capturing specific market risks

22. The data inputs referred to in Article 325bc of Regulation (EU) No 575/2013 should allow to capture all material risks arising from specific differences between similar, but not identical, positions.

23. Where Beta approximations are used to generate data inputs referred to in Article 325bc of Regulation (EU) No 575/2013, any assumption that the residuals from the Beta approximations are uncorrelated to each other should be justified.

4.3 Frequency for updating the data inputs

24. Institutions should update the historical data used to calibrate the data inputs referred to in Article 325bc(3)(c) of Regulation (EU) No 575/2013 more frequently than monthly, as is provided therein, where updating those data monthly leads to an inaccurate estimation of the market risk of the relevant trading book positions.

25. Where Beta approximations are used to generate data inputs referred to in Article 325bc of Regulation (EU) No 575/2013, institutions should recalibrate the Beta coefficients on at least a monthly basis.

4.4 Completeness and consistent usage over time and across risk factors of the data inputs

26. Where multiple data sources for the data inputs referred to in Article 325bc of Regulation (EU) No 575/2013 are available, the choice of one data source should not lead to an underestimation of the volatility when compared to the volatility resulting from the other available data sources.

27. Institutions should have procedures in place to ensure they can obtain the data inputs referred to in Article 325bc of Regulation (EU) No 575/2013 from alternative data sources in a timely manner, in case their data sources cease to be available.

28. Institutions should have clear policies for the replacement of missing or inconsistent values in the historical time series of data inputs referred to in Article 325bc of Regulation (EU) No 575/2013, including policies for verifying that such replacement of missing or inconsistent values complies with the conditions referred to in paragraphs 12, 13 and 14.

29. Institutions should not use old and unchanged (‘stale’) data as replacement of missing or inconsistent values in the historical time series of data inputs referred to in Article 325bc of Regulation (EU) No 575/2013.

30. Institutions should neither filter data nor exclude outliers, unless the excluded data correspond to inconsistent or stale data or data that does not satisfy the conditions referred to in paragraphs 12, 13 and 14.

31. Values of other risk factors, either included or not in the list of risk factors referred to in Article 325bg(3), may be used in the replacement of missing or inconsistent values in the historical time series of data inputs referred to in Article 325bc of Regulation (EU) No 575/2013, only where those other risk factors are considered modellable pursuant to Article 325be of Regulation (EU) No 575/2013.

Explanatory text for consultation purposes

Once a given risk factor has passed the modellability assessment, institutions should fulfil the conditions in this GL, to ensure that the data inputs used for that risk factor are appropriate. For that purpose, institutions could employ, among others, interpolated or extrapolated data. Interpolation or extrapolation techniques can be divided into two types. The first type of techniques produces the interpolated/extrapolated value starting from the values of the given risk factor observed on previous and subsequent dates. The second type of techniques produces the interpolated/extrapolated value starting from the values of other risk factors (e.g. neighbouring grid points of an interest rate curve) observed on the same date. Figure 1 below provides two examples of the first type of techniques.

Figure 1: interpolated value starting from the values of the given risk factor observed on previous and subsequent dates (left figure) and extrapolated value starting from the values of the given risk factor observed on previous dates (right figure)

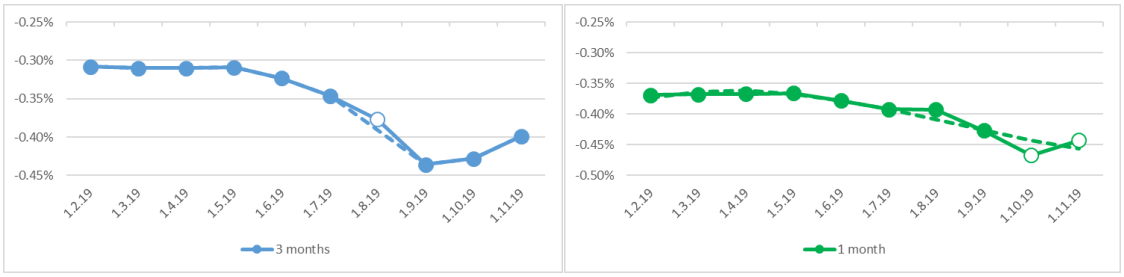
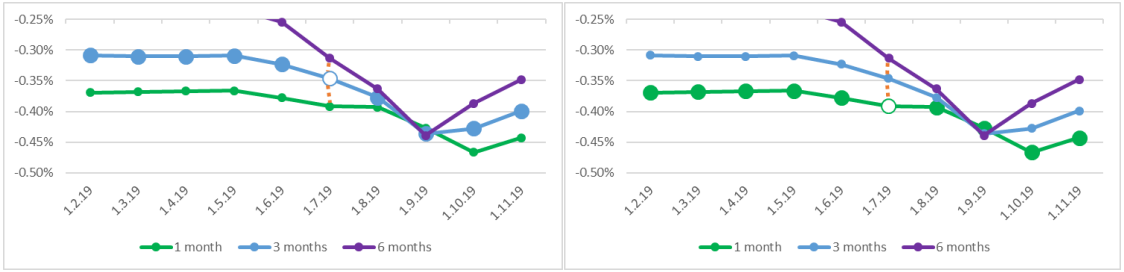


Figure 2: interpolated value starting from the values of other risk factors observed on the same date (left figure) and extrapolated value starting from the values of other risk factors observed on the same date (right figure)



Paragraph 31 is addressed to the second type of interpolation or extrapolation, and more in general, to all those replacing methodologies, which involve data corresponding to other risk factors.

Question

Q3. Do you agree with the inclusion of paragraph 31 in the GL? Do you envisage any issues that could be associated with paragraph 31?

4.4.1 Interpolated data replacing missing or inconsistent data inputs

32. Where interpolated values are used as replacement for missing or inconsistent values in the historical time series of data inputs referred to in Article 325bc of Regulation (EU) No 575/2013 for a risk factor, the interpolated values should appropriately represent the missing values regardless of the interpolation methodology used.

4.4.2 Extrapolated data replacing missing or inconsistent data inputs

33. Where extrapolated values are used as replacement for missing or inconsistent values in the historical time series of data inputs referred to in Article 325bc of Regulation (EU) No 575/2013 for a risk factor, the volatility as estimated from the extrapolated values should be equal to or higher than the volatility as estimated from the data used for extrapolating.

34. Where extrapolated values are used as replacement for missing or inconsistent values in the historical time series of data inputs referred to in Article 325bc of Regulation (EU) No 575/2013 for a risk factor, all of the following conditions should be met:

(a) the extrapolation methodology should be based on the closest risk factor in each dimension of that risk factor;

(b) the extrapolation methodology should be based on at least two risk factors for each dimension;

(c) the values of the two risk factors referred to in point b, including the closest risk factor, should not have been obtained by extrapolation.

For the purpose of point (a), closest risk factor means a risk factor that is mapped to the same bucket as the extrapolated risk factor, where the extrapolated risk factor is not the only risk factor in a bucket, or to an adjacent bucket, where the extrapolated risk factor is the only risk factor in a bucket, by virtue of Article 6 of Commission Delegated Regulation (EU) No XXX/20XX [RTS Modellability assessment].

Explanatory text for consultation purposes

Paragraph 34 is addressed to the second type of extrapolations (i.e. other risk factors are involved), and it is intended to transpose in the Guidelines the following additional requirements on extrapolation from paragraph 31.26(1)(b) of the "Minimum capital requirements for market risk": "*Subject to the approval of the supervisor, banks may extrapolate up to a reasonable distance from the closest modellable risk factor. The extrapolation should not rely solely on the closest modellable risk factor but on more than one modellable risk factor*".

Question

Q4. Do you agree with the inclusion of paragraph 34 in the GL? Do you envisage any issues that could be associated with paragraph 34?

5. Accompanying documents

5.1 Draft cost-benefit analysis / impact assessment

Article 325bc of Regulation (EU) No. 575/2013 (CRR) of the CRR2 requires the EBA to develop guidelines specifying the criteria for the use of data inputs in calculating the partial expected shortfall. The draft GLs should clarify the qualitative conditions that the data related to modellable risk factors should meet to be used in the institution's internal models calculations.

Article 16(2) of Regulation (EU) No 1093/2010 (EBA Regulation) provides that any guidelines and recommendations developed by the EBA should be accompanied by an analysis of 'the potential related costs and benefits'. This analysis should provide an overview of the findings regarding the problem to be dealt with, the solutions proposed and the potential impact of these options.

This section presents the cost-benefit analysis of the main policy options included in the draft GLs described in this CP. Given the nature and the scope of the draft GLs, the analysis is high-level and qualitative in nature.

A.Problem identification and Baseline scenario

The CRR2, following the FRTB standards, introduces an alternative internal model approach. This approach comprises of three components: a) the ES risk measure, which determines capital requirements for those risk factors with a sufficient amount of available observable data (i.e. for modellable risk factors – MRF); b) the stress scenario risk measure, suitable for determining capital requirements for risk factors with limited observable data (i.e. for NMRF); and c) the default risk capital requirement.

An institution must determine which risk factors within its trading desks that fall in the scope of the internal model approach are eligible to be included in the ES risk measure for regulatory purposes. For a risk factor to be classified as modellable it must meet the criteria specified in the RTS on Criteria for assessing the modellability of risk factors under the Internal Model Approach (IMA). Those criteria relate to the identification of a sufficient number of verifiable prices, being representative for the risk factor over the preceding 12-months. Those quantitative criteria are intended to ensure, that the risk factors, which institutions include in their ES risk measure, are sufficiently liquid and observable.

Once a risk factor has been deemed modellable under Article 325be of the CRR, the institution should choose the most appropriate data inputs to calibrate its ES model. The CRR asks EBA to develop draft GLs specifying the criteria for the use of data inputs in calculating the ES. The provisions in the draft GLs follow the spirit of the set of principles[6] defined by the Basel Committee

[6] Minimum capital requirements for market risk, January 2019 (rev. February 2019), paragraphs 31.25 and 31.26

for the inclusion of risk factors in the ES model after they have passed the Risk Factor Eligibility Test (RFET).

The lack of common criteria could result in an inconsistent use of data inputs across banks and undermine the calibration of the internal risk-measure models. Given that institutions may use many different types of models, and for any given model many different sources or types of data inputs, it is important that a set of minimum criteria is determined.

B. Policy objectives

The specific objective of the draft GLs is to establish common principles on the data inputs used to determine the scenarios of future shocks applied to the modellable risk factors. These principles aim to ensure that those data inputs are accurate, appropriate, frequently updated, complete and their use in the internal risk measurement model is overall consistent.

Generally, the draft GLs aim to create a level playing field, promote convergence of institutions practices and enhance comparability of own funds requirements across EU.

D. Options considered, Cost-Benefit Analysis and Preferred Options

This section presents the main policy options discussed during the development of the CP, the costs and benefits of these options, as well as the preferred options retained in the CP.

Scope of the Guidelines

The EBA is mandated, according to Article 325bh(3) of the CRR2, to draft specific GLs on the criteria for the use of data inputs in the risk-measurement model referred to in Article 325bc. The last part of the sentence, despite no explicit risk-measurement model is mentioned in Article 325bc (but only partial expected shortfall measures) clearly restrict the scope of the present guidelines to the data inputs that are used to calibrate the internal risk-measurement model for those risk factors deemed modellable (in accordance to Article 325be and the relative RTS), i.e. to those data inputs used to determine the scenarios of future shocks applied to the modellable risk factors.

Frequency of the reconciliation of data inputs with verifiable prices

FRTB principle four specifies that the data used must be reflective of prices observed and/or quoted in the market. Where data used are not derived from verifiable prices, the institution should demonstrate that the data used are reasonably representative of verifiable prices. To that end, the institution should periodically reconcile price data used in a risk model with front office and back office prices, where verifiable prices are not available. As the back office serves to check the validity of the front office price, risk model prices should be included in the comparison. In addition, FRTB principle three specifies that the data used must allow the model to reflect volatility and correlations of the risk positions. To that end, institutions should periodically reconcile the volatility and correlations estimated from the data used in the ES model with the volatility and correlations

estimated from verifiable prices, where available, or from front-office or back-office data. The EBA considered two options regarding the frequency of such reconciliations.

Option 1a: Specify the frequency of reconciliations to at least quarterly reconciliation.

Option 1b: Do not explicitly specify the frequency of reconciliations.

Option 1a ensures that such reconciliations of values, volatilities and correlations will be performed at least every quarter. As such, it provides for common minimum criteria across institutions and avoids infrequent reconciliations. The quarterly frequency matches with the frequency of the risk factor modellability assessment making it easier for institutions to synchronise the two processes. On the other hand, Option 1b provides a greater flexibility to institutions but at the same time can create inconsistent practices across the EU.

Option 1a has been retained.

Extrapolation

According to FRTB principle one, institutions may extrapolate up to a reasonable distance from the closest modellable risk factor. The extrapolation should not rely solely on the closest modellable risk factor but on more than one modellable risk factor. The EBA has adopted this principle and considered the following options on the notion of “reasonable distance”.

Option 2a: Specify further how banks can assess the distance between two risk factor as reasonable.

Option 2b: Do not further specify the notion of reasonable distance.

Option 2a sets additional criteria on what can be considered as reasonable distance. For example, a risk factor is considered to be within a reasonable distance from the closest of these modellable risk factors, which is not derived by extrapolation itself, if the closest modellable risk factor is mapped to the same bucket as the extrapolated risk factor, in case the extrapolated risk factor is not the only risk factor in a bucket, or to an adjacent bucket otherwise. . This ensures some level of harmonisation across institutions. On the other hand, Option 2b is more flexible allowing institutions to assess differently what is reasonable distance. However, this could create inconsistencies around the notion of “reasonable distance” across institutions, undermining the level playing field for institutions across the EU.

Option 2a has been retained.

5.2 Overview of questions for consultation

Q1. To which extent do you intend to apply paragraph 16 of the present GL? Please provide concrete examples that could fall under the scope of paragraph 16 and explain why the coefficients cannot be calibrated to the historical data only.

Q2. To which extent do you intend to apply paragraph 17 of the present GL? Please provide concrete examples that could fall under the scope of paragraph 17.

Q3. Do you agree with the inclusion of paragraph 31 in the GL? Do you envisage any issues that could be associated with paragraph 31?

Q4. Do you agree with the inclusion of paragraph 34 in the GL? Do you envisage any issues that could be associated with paragraph 34?