

Interpretation and Implementation of BCBS 457 - SBM Equity

Atoti FRTB

5.1

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Equity

This section describes how the SBM Equity Risk Class is implemented and how the BCBS 457 specification is interpreted.

Also covered here is the specialization of the data, calculations, and configuration for the Equity risk-class, including:

- The data model, which describes the data used for the calculations and how it is structured, and how the data model is represented in the:
 - input files
 - datastore
 - cube
- The calculations, both in the ETL and at query time
- The parameters used in the query time calculations
- How the Solution is configured for Equity

Interpretation Note

In [MAR21.78](1) and (4) the equity issuer name is used. However, the issuer name is not mentioned in the description of the risk-factor in [MAR21.12]. This leads to two potential interpretations:

1. There may be multiple risk-factors per issuer, for example, different share classes or shares traded on different exchanges.
2. There is only a single risk-factor per issuer (modulo the Spot/Repo distinction).

The first option is closer to the description of the risk-factor in [MAR21.12], however in this case, given [MAR21.78](1), it is unclear what the correlation should be between two spot prices representing different equities from the same issuer.

In Atoti FRTB, for the Equity risk-class the same field is used for differentiating between risk-factors as for determining the correlations. Depending on your interpretation, this field could represent either the equity name (option 1) or the equity issuer name (option 2).

We will assume option 1, and refer to this field as the Equity Name.

Data Model (Core)

This section describes the data used for the Equity calculations, including how the data is structured.

For Equities, the Equity (Underlying) refers to the equity or equity issuer [MAR21.12](1), see [Interpretation note](#).

Each equity has an Equity Name, Bucket, Economy, Market Cap, and Sector.

The Risk Factor is used to identify sensitivities. However, it is not used directly in the calculations, instead the Equity, Type, and tenor fields are used (as appropriate for the risk-measure). This means that multiple Risk Factor Names may be used for the same risk-factor.

Additionally, for each Bucket a canonical Economy Category, Market Cap Category and Sector Category are identified.

Sensitivities

Field	Key	Risk Measure	Description
As-of Date	Y	All	Timestamp (at close of business) for the data (T-1)
Trade ID	Y	All	A unique identifier for the trade (or position)
Risk Factor Name	Y	All	A unique identifier for the risk-factor
Risk Class	Y	All	“Equity”
Risk Measure	Y	All	“Delta”, “Vega”, or “Curvature”
Option Maturity	Y	Vega	The maturity of the option
Sensitivity		Delta & Vega	The sensitivity value s_k
Shock Up/Down		Curvature	The up and down shocked prices.
Sensitivity Currency		All	Currency in which the sensitivity or shocked price is expressed.
Risk Weight		Curvature	Risk weight used for the shocked prices
PV Applied		Curvature	Has the PV been subtracted from the shocked prices?
Optionality		Delta	Should the Delta sensitivity be included in the Curvature Calculation?
Interpolated Sensitivities		Vega	Sensitivities interpolated to the prescribed vertices

Risk Factor [MAR10.9]

The Risk Factor is used to identify sensitivities. However, it is not used directly in the calculations, instead the Equity, Type, and tenor fields are used (as appropriate for the risk-measure). This means that multiple Risk Factor Names may be used for the same risk-factor.

Field	Key	Risk Measure	Description
As-of Date	Y	All	Timestamp (at close of business) for the data (T-1)
Risk Factor Name	Y	All	A name for the risk-factor
Risk Class	Y	All	“Equity”
Risk Measure	Y	All	“Delta”, “Vega”, or “Curvature”
Option Maturity	Y	Vega	The maturity of the option

Field	Key	Risk Measure	Description
Equity Name (Underlying)		All	Name of the equity or equity issuer (see Interpretation note).
Type		All	“Spot” or “Repo”.

For Vega and Curvature, the risk-factor is the same as the underlying.

Equity

The Equity (Underlying) refers to the equity or equity issuer [\[MAR21.12\]\(1\)](#), see [Interpretation note](#).

Field	Key	Description
As-of Date	Y	Timestamp (at close of business) for the data (T-1)
Equity Name (Underlying)	Y	Name of the equity or equity issuer (see Interpretation note).
Risk Class	Y	“Equity”
Bucket		1-13
Economy		“Advanced economy” or “Emerging economy”
Market Cap		“Large” or “Small”
Sector		The relevant sector of the equity issuer.

Calculations

This section describes ETL from the reference implementation and the transformations / calculations applied to the sensitivities in the post-processors after they have been aggregated.

First, the ETL (Extract, Transform, Load) layer will apply some transformations as the data is loaded from the input files into the datastore.

Once the data is loaded into the datastore, it is available in the cube. The sensitivities in the cube may be partially aggregated upon commit to the datastore for BITMAP and LEAF aggregate providers. The remainder of the sensitivity aggregation is performed by Atoti Server at query time.

Then, also at query time, the post-processors calculate the capital charge from the aggregated sensitivities.

ETL (Reference Implementation)

The ETL (Extract, Transform, Load) layer provided with Atoti FRTB, using the default file format, will perform the following transformations when data is loaded from the input files into the datastore.

Risk Factor Name

If the risk-factor name is not included in the input file (using the default file format), a name is generated as follows:

- Delta: Equity Name + Type
- Vega: Equity Name
- Curvature: Equity Name

Normalisation

In the default file format, each row of the sensitivities' files contains the sensitivity as well as a description of the risk factor and equity. The data normalisation splits this information across three stores in the datastore, as described in the data model.

Vectorisation

For efficiency, Vega sensitivities are stored in vectors. The entries of the vectors represent the maturities of the risk factors.

In the default file format, we allow sensitivities to be provided as either single values or as vectors. During the ETL, sensitivities are grouped together into vectors.

Interpolation

For compatibility with risk engines, Vega sensitivities may be loaded for any maturity. During the ETL, these sensitivities are interpolated to match the maturities in the specification.

Query Time (Core)

For the Equity risk class, there are three main chains of post-processor calculations: Delta, Vega, and Curvature.

Delta and Vega

The calculation steps for Delta and Vega are the same:

1. The calculations start by applying currency conversion to the aggregated raw sensitivities from the cube to get the Sensitivities.
2. The risk-weights are applied to get the Weighted Sensitivities (per risk-factor).
3. The (ρ) correlations are then used to calculate the Risk Position (per bucket).
4. The Risk Positions are combined across all buckets to calculate the Risk Charge.

In the bookmarks folder "ActiveViam FRTB" -> "Basel Framework" -> "SBM", there are bookmarks "Equity Delta" and "Equity Vega", which contain tabs that walk through these calculation steps and include the measures mentioned here.

Curvature

For Curvature, the calculation steps are:

1. Start with vectors of shocked prices indexed by risk-weight (per risk-factor).
2. The risk-weight then determines which Shock Up/Down Prices we want, subtracting the trade PV if necessary.
3. The delta sensitivities are filtered sensitivities from the Delta calculations, and aggregated per Curvature risk-factor.
4. These are then combined to calculate the CVR Up/Down (per risk-factor).
5. The Risk Position Up/Down are calculated per bucket.
6. The greater of the up and down risk-positions is identified by the Risk Position Scenario and used for the Risk Position (per bucket).
7. The Risk Positions are combined across all buckets to calculate the Risk Charge.

The bookmark “ActiveViam FRTB” -> “Basel Framework” -> “SBM” -> “Equity Curvature” contains tabs that walk through these calculation steps and includes the measures mentioned here.

Delta/Vega Sensitivities

The **Delta/Vega** Sensitivities measures are the s_k in [MAR21.4](1) and (2).

For each Sensitivity Currency, the Interpolated Sensitivities are converted to the reference currency using the IFxRates API (supplied by the reference implementation). After this currency conversion, the values are aggregated for each Risk Factor.

Delta Sensitivities Long/Short

The **Delta Sensitivities Long/Short** measures are the Positive or Negative Delta Sensitivities.

The Positive or Negative determination is made at the Equity Name and Type levels.

Curvature Scenario Up/Down PV.CCY

The Scenario Up/Down PV.CCY measures are vectors of shocked prices indexed by risk weight.

For each Sensitivity Currency, the Shock Up/Down prices are converted to the reference currency using the IFxRates API. After this currency conversion, the values are aggregated for each Risk Factor.

Delta/Vega/Curvature Risk Weight

The **Delta/Vega/Curvature** Risk Weight measures are RW_k in [MAR21.4](3) and $RW_k^{(Curvature)}$ in [MAR21.5](2)(e).

For Delta and Curvature, following [MAR21.77], the values are looked up based on the configuration for the Risk Factor's Bucket and Type.

For Vega, following [MAR21.92], the value is looked up based on the configuration for the Risk Class (and its liquidity horizon).

Delta/Vega Weighted Sensitivities

The **Delta/Vega** Weighted Sensitivities measures are WS_k in [MAR21.4](3).

For each Risk Factor k , the Delta/Vega Sensitivities measures are multiplied by the Delta/Vega Risk Weight.

Curvature Delta Sensitivities

The **Curvature Delta Sensitivities** measure is s_{ik} in [MAR21.5](2)(f).

For each Curvature Risk Factor k , it is all the Delta Sensitivities with the same Equity Name as the risk factor, filtered by Optionality.

Curvature Shock Up/Down Prices

The Curvature shock-up/down prices measures are $V_i(x_k^{RW^{(Curvature)\pm}}) - V_i(x_k)$ in [MAR21.5](2).

Using linear interpolation, the shocked prices corresponding to the Curvature Risk Weight are determined from the Curvature Scenario UP/Down.CCY vectors. And, if PV Applied is not true/yes, the trade PV is subtracted.

Curvature CVR Up/Down

The Curvature CVR Up/Down measures are CVR_k^\pm in [MAR21.5](2).

The Curvature Delta Sensitivities are multiplied by the Curvature Risk Weight and subtracted from/added to the Curvature Shocked Up/Down Prices (respectively).

Delta/Vega Risk Position Double Sums

The **Delta/Vega** Risk Position Double Sums measures are the $\sum_k \sum_l WS_k \cdot WS_l$ intermediate values that were requested for the 2017 and 2018 QIS exercises.

Within each Bucket (except the “other” bucket), each pair of Risk Factors, is categorised according to:

- Delta
 - Same or different Equity Name
 - Same or different Type
- Vega
 - Same or different Equity Name
 - Combinations of Option Maturities

Within each category, the pairs of Delta/Vega Weighted Sensitivities are multiplied together and summed.

Implementation Note: This calculation has been optimized so that it is performed with $O(N)$ (linear) time complexity, where N is the number of Risk Factors.

Delta/Vega Risk Position Correlations

The **Delta/Vega** Risk Position Correlation measures are ρ_{kl} in [MAR21.4](4).

Within each Bucket (except the “other” bucket), and for each category of Risk Factor pairs (see Delta/Vega Risk Position Double Sums) the values are looked up from the configuration for [MAR21.78] and [MAR21.94].

Note: The $\rho_{kl}^{(Delta)}$ in [MAR21.94] only refers to [MAR21.78](2) as the Vega Risk Factors only include the Spot Type.

Delta Vega Risk Position

The **Delta/Vega** Risk Position measures are K_b in [MAR21.4](4).

For each Bucket (except the “other” bucket), the Delta/Vega Risk Position is calculated from the Delta/Vega Weighted Sensitivities and Delta/Vega Risk Position Correlations using the formula in [MAR21.4](4).

For the “other” bucket, the Delta/Vega Risk Position is calculated as the sum of the absolute values of the Delta/Vega Weighted Sensitivities (as per [MAR21.79]).

Implementation Note: This calculation has been optimized so that it is performed with $O(N)$ (linear) time complexity, where N is the number of Risk Factors.

Curvature Risk Position Up/Down

The Curvature Risk Position **Up/Down** measures are K_b^\pm in [MAR21.5](3).

Within each Bucket (except the “other” bucket), the Curvature CVR Up/Down values are combined using the formula in [MAR21.5](3).

For the “other” bucket, the Curvature Risk Position Up/Down is calculated as the sum of the positive CVR Up/Down values.

Implementation Note: This calculation has been optimized so that it is performed with $O(N)$ (linear) time complexity, where N is the number of Risk Factors.

Curvature Risk Position Scenario

Within each Bucket, the **Curvature Risk Position Scenario** measure identifies which of the Curvature Risk Position Up and Curvature Risk Position Down values is the greater.

Curvature Risk Position

The **Curvature Risk Position** measure is K_b in [MAR21.5](3).

Within each Bucket, it is the greater of the Curvature Risk Position Up and Curvature Risk Position Down values.

Delta/Vega Risk Charge

The **Delta/Vega** Risk Charge measures are **Delta** and **Vega** in [MAR21.4](5).

They are calculated by combining the Delta/Vega Risk Positions (and aggregated Delta/Vega Weighted Sensitivities) over all Buckets according to [MAR21.4](5).

Curvature Risk Charge

The **Curvature Risk Charge** measure is **Curvature risk** in [MAR21.5](4).

It is calculated by combining the Curvature Risk Positions (and aggregated CVR Up or CVR Down values) over all Buckets according to [MAR21.5](4).

Input Files (Reference Implementation)

This section describes how the input files containing the sensitivities and mappings are used for the Equity risk class

The sensitivities are loaded from the Delta, Vega, Curvature, or **CRIF** sensitivity files.

The mapping of Sector, Market Cap, and Economy to Bucket is loaded from the **Equity Buckets** file into the EquityBucket store. A description of these buckets is loaded from the **Equity Bucket Descriptions** file.

SBM_Delta_Sensitivities*.csv

The Delta Sensitivity Data is loaded from the Delta files.

The following table lists the fields in the file format that is used for the Equity risk-class. See the **Delta** file format documentation for details on the file format. See Data Model (Core) for a description of the data model.

Data Model Field	File Column	Notes
As-Of Date	AsOfDate	
Trade ID	TradeID	
Sensitivity Currency	DeltaCcy	
Sensitivities	DeltaSensitivities	
Risk Class	RiskClass	“Equity”
Risk Factor Name	RiskFactor	(Optional) If not present, generated during ETL.
Type	RiskFactorType	“Spot” or “Repo”
Equity Name	Underlying	See Interpretation note
Bucket	Bucket	1-13
Economy	EquityEconomy	“Advanced economy” or “Emerging economy”
Market Cap	EquityMarketCap	“Large” or “Small”
Sector	EquitySector	
Optionality	Optionality	Should this sensitivity be included in the Curvature calculations (‘Y’) or not (‘N’)?

SBM_Vega_Sensitivities*.csv

The Vega Sensitivity Data is loaded from the Vega files.

The following table lists the fields in the file format that is used for the Equity risk-class. See the **Vega** file format documentation for details on the file format. See Data Model (Core) for a description of the

data model.

Data Model Field	File Column	Notes
As-Of Date	AsOfDate	
Trade ID	TradeID	
Risk Class	RiskClass	“Equity”
Option Maturity	OptionMaturity	May be single value, vector, or empty. If empty, treated as the prescribed maturities: 0.5;1;3;5;10.
Sensitivities	VegaSensitivities	May be single value or vector, with the same number of entries as maturities.
Sensitivity Currency	VegaCcy	
Risk Factor Name	RiskFactor	(Optional) If not present, generated during ETL.
Equity Name	Underlying	See Interpretation note
Bucket	Bucket	1-13
Economy	EquityEconomy	“Advanced economy” or “Emerging economy”
Market Cap	EquityMarketCap	“Large” or “Small”
Sector	EquitySector	

SBM_Curvature_Sensitivities*.csv

The Curvature Sensitivity Data is loaded from the Curvature files.

The following table lists the fields in the file format that are used for the Equity risk-class. See the [Curvature](#) file format documentation for details on the file format. See Data Model (Core) for a description of the data model.

Data Model Field	File Column	Notes
As-Of Date	AsOfDate	
Trade ID	TradeID	
Risk Class	RiskClass	“Equity”
Risk Factor Name	RiskFactor	(Optional) If not present, generated during ETL.
Shock Up	Shift_Up_PV	

Data Model Field	File Column	Notes
Shock Down	Shift_Down_PV	
Sensitivity Currency	CurvatureCcy	
Risk Weight	RiskWeight	(Optional)
PV Applied	PV Applied	Has the Trade PV already been subtracted from the shocked PVs ('Y') or not ('N')?
Equity Name	Underlying	See Interpretation note
Bucket	Bucket	1-13
Economy	EquityEconomy	“Advanced economy” or “Emerging economy”
Market Cap	EquityMarketCap	“Large” or “Small”
Sector	EquitySector	

Config Files

This section describes the reference implementation configuration used for the Equity risk class

frtb-config.properties

Data Model Field	Property	Reference
As-Of Date	as-of-date.level	AsOfDate@Date@Dates
Trade ID	trade.level	TradeId@Trades@Booking
Risk Class	risk-class.level	RiskClass@Risk Classes@Risk
Risk Measure	risk-measure.level	Risk Measure@Risk Measures@Risk
Bucket	equity.buckets.level	Equity Bucket@Equity Buckets@Buckets
Risk Factor Name	risk-factors.level	Risk Factor@Risk Factors@Risk

Data Model Field	Property	Reference
Option Maturity	equity.vega.option.maturity	Vertex@Vertices@Risk
Equity Name	equity.issuer.level	Underlying@Underlying@Market Data
Type	equity.type.level	Risk Factor Type@Risk Factor Types@Risk
Economy	equity.market-data.economy.level	Equity Issuer Economy@Equity Issuer Economy@Risk
Market Cap	equity.market-data.market-cap.level	Equity Market Cap@Equity Market Cap@Risk
Sector	equity.market-data.sector.level	Equity Sector@Equity Sector@Risk
PV Applied	equity.pv.applied.level	PVApplied@PVApplied@Currencies
	equity.delta.double-sums.levels	Issuer@Equity Delta Double Sums@Double Sums, Type@Equity Delta Double Sums@Double Sums
	equity.vega.double-sums.levels	Issuer@Equity Vega Double Sums@Double Sums, Maturity1@Equity Vega Double Sums@Double Sums, Maturity2@Equity Vega Double Sums@Double Sums

Datastore (Reference Implementation)

This section describes how the [SA datastore schema](#) is used for the Equity risk class.

The schema starts with the SaSensitivities store, which is an index of all the facts in the SA Cube. The SaSensitivities store has references to the risk-factor descriptions and sensitivities.

Risk Factor Descriptions

The risk-factor description starts with the RiskFactorDescription store, which contains the description of risk-factor independent of the equity, and a reference to the UnderlyingDescription store for a description of the equity.

The UnderlyingDescription store references the EquityBucketDesc store for the bucket descriptions.

Sensitivities

The sensitivities stores contain the sensitivity values, they are referenced from the TradeBase store.

Risk Measure	Sensitivity Store
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Risk Measure	Sensitivity Store
Delta	Delta
Vega	Vega
Curvature	Curvature

TradeBase

The SaSensitivities store is the base store in the SA Cube Schema. Each row in this table represents a fact in the SA Cube.

The following table lists the fields in the store that are used for the Equity risk-class. See the [SaSensitivities](#) store documentation for details on the store. See Data Model (Core) for a description of the data model.

Data Model Field	Store Field	Notes
As-Of Date	AsOfDate	
Trade ID	TradeId	
Risk Factor Name	Risk Factor	
Risk Class	RiskClass	“Equity”
Risk Measure	Risk Measure	“Delta”, “Vega”, or “Curvature”

RiskFactorDescription

The RiskFactorDescription store contains the description of risk-factor.

The following table lists the fields in the store that are used for the Equity risk-class. See the [RiskFactorDescription](#) store documentation for details on the store.

Data Model Field	Store Field	Notes
As-Of Date	AsOfDate	
Risk Factor Name	Risk Factor	
Risk Class	RiskClass	“Equity”
Risk Measure	Risk Measure	“Delta”, “Vega”, or “Curvature”
Equity Name	Underlying	
Type	Risk Factor Type	“Spot” or “Repo”
Sensitivity Tenors	Maturity	for Vega only

UnderlyingDescription

The UnderlyingDescription store contains the description of the equity.

The following table lists the fields in the store that are used for the Equity risk-class. See the [UnderlyingDescription](#) store documentation for details on the store.

Data Model Field	Store Field	Notes
As-Of Date	AsOfDate	
Equity Name	Underlying	
Risk Class	RiskClass	“Equity”
Bucket	Bucket	
Economy	EquityEconomy	“Advanced economy” or “Emerging economy”
Market Cap	EquityMarketCap	“Large” or “Small”
Sector	EquitySector	“high” or “low”

Delta

The SaSensitivities store contains the Delta sensitivities.

The following table lists the fields in the store that are used for the Equity risk-class. See the [SaSensitivities](#) store documentation for details on the store.

Data Model Field	Store Field	Notes
As-Of Date	AsOfDate	
Trade ID	TradeId	
Risk Factor Name	Risk Factor	
Risk Class	RiskClass	“Equity”
Risk Measure	Risk Measure	“Delta”
Sensitivity Currency	Ccy	
Sensitivities	DeltaSensitivities	
Optionality	Optionality	‘Y’ or ‘N’

EquityBucketDesc

The EquityBucketDesc store provides canonical descriptions for the Equity [buckets](#).

See the [EquityBucketDesc](#) store documentation for details on the store.

Data Model Field	File Column	Notes
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Data Model Field	File Column	Notes
Bucket	Bucket	Must match Bucket in Bucket file
Economy Category	Economy Category	
Market Cap Category	Market Cap Category	
Sector Category	Sector Category	

Vega

The SaSensitivities store contains the Vega sensitivities.

The following table lists the fields in the store that are used for the Equity risk-class. See the [SaSensitivities](#) store documentation for details on the store.

Data Model Field	Store Field	Notes
As-Of Date	AsOfDate	
Trade ID	TradeId	
Risk Factor Name	Risk Factor	
Risk Class	RiskClass	“Equity”
Risk Measure	Risk Measure	“Vega”
Sensitivity Currency	Ccy	
Sensitivities	VegaSensitivities	

Curvature

The SaSensitivities store contains the Curvature shocked prices.

The following table lists the fields in the store that are used for the Equity risk-class. See the [SaSensitivities](#) store documentation for details on the store.

Data Model Field	Store Field	Notes
As-Of Date	AsOfDate	
Trade ID	TradeId	
Risk Factor Name	Risk Factor	
Risk Class	RiskClass	“Equity”
Risk Measure	Risk Measure	“Curvature”
Shock Up	Shift_Up_PV	Vector-valued. Same size as Risk Weight

Data Model Field	Store Field	Notes
Shock Down	Shift_Down_PV	Vector-valued. Same size as Risk Weight
Risk Weight	RiskWeight	(optional) Vector-valued
PV Applied	PVApplied	'Y' or 'N'
Sensitivity Currency	Ccy	

EquityBuckets

The EquityBuckets store is used by the ETL to populate the Bucket.

See the [EquityBuckets](#) store documentation for details on the store.

Data Model Field	Store Field	Notes
Economy	IssuerEconomy	Must match Economy in UnderlyingDescription store
Market Cap	MarketCap	Must match Market Cap in UnderlyingDescription store
Sector	IssuerSector	Must match Sector in UnderlyingDescription store
Bucket	Bucket	1-13

Cube Schema (Reference Implementation)

The following table lists the levels and hierarchies in the Cube schema that are used in the Equity data model.

Data Model Field	Cube Level	Notes
As-Of Date	AsOfDate	Slicing Hierarchy
Trade ID	TradeId	
Risk Class	Risk Class	"Equity"
Risk Measure	Risk Measure	"Delta", "Vega", "Curvature"
Bucket	Equity Bucket	1-13
Risk Factor Name	Risk Factor	
Option Maturity	Vertex	Analysis Hierarchy
Equity Name	Underlying	See Interpretation note
Type	Risk Factor Type	"Spot" or "Repo"
Economy	Equity Issuer Economy	"Advanced economy" or "Emerging economy"

Data Model Field	Cube Level	Notes
Market Cap	Equity Market Cap	“Large” or “Small”
Sector	Equity Sector	
		Levels for the Delta Double Sums and Correlations
		Levels for the Vega Double Sums and Correlations

Configuration (Core)

This section describes how the calculations are configured for the Equity risk class

Bucket Risk Weights

Maps Buckets to Risk Weights.

The file EQTY_BucketsRiskWeights*.csv is loaded into the EquityBucketsRiskWeight store.

Data Model Field	File Column	Datastore Column	Notes
Bucket	Bucket	Bucket	1-13
RW_k (Spot) in [MAR21.77]	Risk Weight EQTY Spot	Risk Weight Spot	
RW_k (Repo) in [MAR21.77]	Risk Weight EQTY Repo	Risk Weight Repo	

Vertices

The list of Equity Vega Option Maturities.

The file Vertices*.csv is loaded into the Vertices store.

Data Model Field	File Column	Datastore Column	Notes
	Index	Index	0-4
Option Maturity	Vertex	Vertex	0.5;1;3;5;10 Option Maturities in [MAR21.12](2)
Risk Class	Risk Class	RiskClass	“Equity”
Risk Measure	Risk Measure	Risk Measure	“Vega”

Vega Liquidity Horizons

The file Vega_Liquidity_Horizons*.csv is loaded into the VegaRiskWeights store.

Data Model Field	File Column	Datastore Column	Notes
Risk Class	Risk Class	RiskClass	“Equity”
Market Cap	Risk Class Sub Type	Sub Type	“Large” or “Small”
$LH_{\text{risk class}}$ in [MAR21.92]	Vega LH	Liquidity Horizon	“20” or “60”

Miscellaneous Parameters

The file FRTBParameters*.csv is loaded into the FRTBParameters store.

Parameter	Parameter Name	Default Value
ρ_{kl} in [MAR21.78](1)	sa.equity.spot-to-repo.correlation	0.999
ρ_{kl} for Large Market Cap, Emerging Economy buckets in [MAR21.78](2)(a)	sa.equity.large-emerging-market.correlation	0.15
ρ_{kl} for Large Market Cap, Advanced Economy buckets in [MAR21.78](2)(b)	sa.equity.large-advanced.correlation	0.25
ρ_{kl} for Small Market Cap, Emerging Economy buckets in [MAR21.78](2)(c)	sa.equity.small-emerging-market.correlation	0.075
ρ_{kl} for Small Market Cap, Advanced Economy buckets in [MAR21.78](2)(d)	sa.equity.small-advanced.correlation	0.125
ρ_{kl} for Index buckets in [MAR21.78](2)(e)	sa.equity.index.correlation	0.8
ρ_{kl} multiplier for Spot \times Repo risk-factors in [MAR21.78](4)	sa.equity.spot-to-repo.different-issuer.correlation	0.999
γ_{bc} between buckets 1-10 in [MAR21.80](1)	sa.equity.delta.gamma.correlation	0.15
γ_{bc} between index buckets in [MAR21.80](3)	sa.equity.delta.gamma.index.correlation	0.75
γ_{bc} between buckets in 1-10 and index buckets in [MAR21.80](4)	sa.equity.delta.gamma.index-cross.correlation	0.45
RW_{σ} in [MAR21.92]	sa.vega.rw	0.55
Decimal places in RW_k in [MAR21.92]	sa.vega.rw.rounding-dp	4
α in [MAR21.93](1)(a)	sa.vega.rho-option-maturity.alpha	0.01