FpML - Market Environment Component Definitions

Version: 4.3

This Version:

http://www.fpml.org/spec/fpml-4-3-13-rec-2

Latest Version:

http://www.fpml.org/spec/fpml-4-3-13-rec-2

Previous Version:

https://www.fpml.org/spec/fpml-4-3-12-rec-1/

Errata For This Version:

http://www.fpml.org/spec/fpml-4-3-13-rec-2/html/fpml-4-3-errata.html

Document built

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1 Global Complex Types

1.1 CompoundingFrequency

1.1.1 Description:

The frequency at which a rate is compounded.

1.1.2 Contents:

Inherited element(s): (This definition inherits the content defined by the type xsd:normalizedString)

-

1.1.3 Used by:

- Complex type: ZeroRateCurve

1.1.4 Derived Types:

1.1.5 Figure:

1.1.6 Schema Fragment:

```
<xsd:complexType name="CompoundingFrequency">
  <xsd:annotation>
    <xsd:documentation source="http://www.FpML.org" xml:lang="en">
      The frequency at which a rate is compounded.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:simpleContent>
    <xsd:extension base="xsd:normalizedString">
      <xsd:attribute name="compoundingFrequencyScheme" type="xsd:anyURI" default="http://www.fp
    </xsd:extension>
  </xsd:simpleContent>
</xsd:complexType>
```

1.2 CreditCurve

1.2.1 Description:

A generic credit curve definition.

1.2.2 Contents:

Inherited element(s): (This definition inherits the content defined by the type PricingStructure)

- An abstract pricing structure base type. Used as a base for structures such as yield curves and volatility matrices..

creditEvents (zero or one occurrence; of the type CreditEvents) The material credit event.

seniority (exactly one occurrence; of the type CreditSeniority) The level of seniority of the deliverable obligation.

secured (exactly one occurrence; of the type xsd:boolean) Whether the deliverable obligation is secured or unsecured.

currency (exactly one occurrence; of the type Currency) The currency of denomination of the deliverable obligation.

obligations (zero or one occurrence; of the type Obligations) The underlying obligations of the reference entity on which you are buying or selling protection

deliverableObligations (zero or one occurrence; of the type DeliverableObligations) What sort of obligation may be delivered in the event of the credit event. ISDA 2003 Term: Obligation Category/Deliverable Obligation Category

1.2.3 Used by:

- Element: creditCurve

1.2.4 Derived Types:

1.2.5 Figure:

1.2.6 Schema Fragment:

```
<xsd:complexType name="CreditCurve">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      A generic credit curve definition.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:complexContent>
    <xsd:extension base="PricingStructure">
      <xsd:sequence>
        <xsd:group ref="CreditCurveCharacteristics.model" minOccurs="0"/>
      </xsd:sequence>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>
```

1.3 CreditCurveValuation

1.3.1 Description:

A set of credit curve values, which can include pricing inputs (which are typically credit spreads), default probabilities, and recovery rates.

1.3.2 Contents:

Inherited element(s): (This definition inherits the content defined by the type PricingStructureValuation)

- An abstract pricing structure valuation base type. Used as a base for values of pricing structures such as yield curves and volatility matrices. Derived from the "Valuation" type.

inputs (zero or one occurrence; of the type QuotedAssetSet)

defaultProbabilityCurve (zero or one occurrence; of the type DefaultProbabilityCurve) A curve of default probabilities.

Either

recoveryRate (exactly one occurrence; of the type xsd:decimal) A single recovery rate, to be used for all terms.

Or

recoveryRateCurve (exactly one occurrence; of the type TermCurve) A curve of recovery rates, allowing different terms to have different recovery rates.

1.3.3 Used by:

- Element: creditCurveValuation

1.3.4 Derived Types:

1.3.5 Figure:

1.3.6 Schema Fragment:

```
<xsd:complexType name="CreditCurveValuation">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      A set of credit curve values, which can include pricing inputs
      (which are typically credit spreads), default probabilities, and
      recovery rates.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:complexContent>
    <xsd:extension base="PricingStructureValuation">
      <xsd:sequence>
        <xsd:element name="inputs" type="QuotedAssetSet" minOccurs="0"/>
        <xsd:element name="defaultProbabilityCurve" type="DefaultProbabilityCurve" minOccurs="(
          <xsd:annotation>
            <xsd:documentation xml:lang="en">
              A curve of default probabilities.
            </xsd:documentation>
          </xsd:annotation>
        </xsd:element>
        <xsd:group ref="RecoveryRate.model" minOccurs="0">
          <xsd:annotation>
            <xsd:documentation xml:lang="en">
              A recovery rate value or curve.
            </xsd:documentation>
          </xsd:annotation>
        </xsd:group>
      </xsd:sequence>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>
```

1.4 DefaultProbabilityCurve

1.4.1 Description:

A set of default probabilities.

1.4.2 Contents:

Inherited element(s): (This definition inherits the content defined by the type PricingStructureValuation)

- An abstract pricing structure valuation base type. Used as a base for values of pricing structures such as yield curves and volatility matrices. Derived from the "Valuation" type.

baseYieldCurve (exactly one occurrence; of the type PricingStructureReference) A reference to the yield curve values used as a basis for this credit curve valuation.

defaultProbabilities (zero or one occurrence; of the type TermCurve) A collection of default probabilities.

1.4.3 Used by:

- Complex type: CreditCurveValuation

1.4.4 Derived Types:

1.4.5 Figure:

1.4.6 Schema Fragment:

```
<xsd:complexType name="DefaultProbabilityCurve">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
     A set of default probabilities.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:complexContent>
    <xsd:extension base="PricingStructureValuation">
      <xsd:sequence>
        <xsd:element name="baseYieldCurve" type="PricingStructureReference">
          <xsd:annotation>
            <xsd:documentation xml:lang="en">
             A reference to the yield curve values used as a basis for
             this credit curve valuation.
            </xsd:documentation>
          </xsd:annotation>
        </xsd:element>
        <xsd:element name="defaultProbabilities" type="TermCurve" minOccurs="0">
          <xsd:annotation>
            <xsd:documentation xml:lang="en">
             A collection of default probabilities.
            </xsd:documentation>
          </xsd:annotation>
        </xsd:element>
      </xsd:sequence>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>
```

1.5 ForwardRateCurve

1.5.1 Description:

A curve used to model a set of forward interest rates. Used for forecasting interest rates as part of a pricing calculation.

1.5.2 Contents:

assetReference (zero or one occurrence; of the type AssetReference) A reference to the rate index whose forwards are modeled.

rateCurve (exactly one occurrence; of the type TermCurve) The curve of forward values.

1.5.3 Used by:

- Complex type: YieldCurveValuation

1.5.4 Derived Types:

1.5.5 Figure:

1.5.6 Schema Fragment:

```
<xsd:complexType name="ForwardRateCurve">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      A curve used to model a set of forward interest rates. Used for
      forecasting interest rates as part of a pricing calculation.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:sequence>
    <xsd:element name="assetReference" type="AssetReference" minOccurs="0">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          A reference to the rate index whose forwards are modeled.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
    <xsd:element name="rateCurve" type="TermCurve">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          The curve of forward values.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
  </xsd:sequence>
</xsd:complexType>
```

1.6 FxCurve

1.6.1 Description:

An fx curve object., which includes pricing inputs and term structures for fx forwards.

1.6.2 Contents:

Inherited element(s): (This definition inherits the content defined by the type PricingStructure)

- An abstract pricing structure base type. Used as a base for structures such as yield curves and volatility matrices..

quotedCurrencyPair (exactly one occurrence; of the type QuotedCurrencyPair) Defines the two currencies for an FX trade and the quotation relationship between the two currencies.

1.6.3 Used by:

- Element: fxCurve

1.6.4 Derived Types:

1.6.5 Figure:

1.6.6 Schema Fragment:

```
<xsd:complexType name="FxCurve">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      An fx curve object., which includes pricing inputs and term
      structures for fx forwards.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:complexContent>
    <xsd:extension base="PricingStructure">
      <xsd:sequence>
        <xsd:group ref="FxCurveCharacteristics.model" minOccurs="0"/>
      </xsd:sequence>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>
```

1.7 FxCurveValuation

1.7.1 Description:

A valuation of an FX curve object., which includes pricing inputs and term structures for fx forwards.

1.7.2 Contents:

Inherited element(s): (This definition inherits the content defined by the type PricingStructureValuation)

- An abstract pricing structure valuation base type. Used as a base for values of pricing structures such as yield curves and volatility matrices. Derived from the "Valuation" type.

settlementCurrencyYieldCurve (zero or one occurrence; of the type PricingStructureReference)
forecastCurrencyYieldCurve (zero or one occurrence; of the type PricingStructureReference)
spotRate (zero or one occurrence; of the type FxRateSet)
fxForwardCurve (zero or one occurrence; of the type TermCurve) A curve of fx forward rates
fxForwardPointsCurve (zero or one occurrence; of the type TermCurve) A curve of fx forward point spreads.

1.7.3 Used by:

- Element: fxCurveValuation

1.7.4 Derived Types:

1.7.5 Figure:

1.7.6 Schema Fragment:

```
<xsd:complexType name="FxCurveValuation">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      A valuation of an FX curve object., which includes pricing inputs
      and term structures for fx forwards.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:complexContent>
    <xsd:extension base="PricingStructureValuation">
      <xsd:sequence>
        <xsd:element name="settlementCurrencyYieldCurve" type="PricingStructureReference" minOc
        <xsd:element name="forecastCurrencyYieldCurve" type="PricingStructureReference" minOccu
        <xsd:element name="spotRate" type="FxRateSet" minOccurs="0"/>
        <xsd:element name="fxForwardCurve" type="TermCurve" minOccurs="0">
          <xsd:annotation>
            <xsd:documentation xml:lang="en">
              A curve of fx forward rates
            </xsd:documentation>
          </xsd:annotation>
        </xsd:element>
        <xsd:element name="fxForwardPointsCurve" type="TermCurve" minOccurs="0">
          <xsd:annotation>
            <xsd:documentation xml:lang="en">
              A curve of fx forward point spreads.
            </xsd:documentation>
          </xsd:annotation>
        </xsd:element>
      </xsd:sequence>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>
```

1.8 FxRateSet

1.8.1 Description:

A collection of spot FX rates used in pricing.

1.8.2 Contents:

Inherited element(s): (This definition inherits the content defined by the type QuotedAssetSet)

- A collection of quoted assets.

1.8.3 Used by:

- Complex type: FxCurveValuation

1.8.4 Derived Types:

1.8.5 Figure:

1.8.6 Schema Fragment:

```
<xsd:complexType name="FxRateSet">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      A collection of spot FX rates used in pricing.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:complexContent>
    <xsd:extension base="QuotedAssetSet">
      <xsd:sequence/>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>
```

1.9 InterpolationMethod

1.9.1 Description:

The type of interpolation used.

1.9.2 Contents:

Inherited element(s): (This definition inherits the content defined by the type xsd:normalizedString)

•

1.9.3 Used by:

- Complex type: InflationRateCalculation
- Complex type: MakeWholeAmount
- Complex type: TermCurve

1.9.4 Derived Types:

1.9.5 Figure:

1.9.6 Schema Fragment:

```
<xsd:complexType name="InterpolationMethod">
  <xsd:annotation>
    <xsd:documentation source="http://www.FpML.org" xml:lang="en">
      The type of interpolation used.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:simpleContent>
    <xsd:extension base="xsd:normalizedString">
      <xsd:attribute name="interpolationMethodScheme" type="xsd:anyURI" default="http://www.fpr
    </xsd:extension>
  </xsd:simpleContent>
</xsd:complexType>
```

1.10 MultiDimensionalPricingData

1.10.1 Description:

A pricing data set that contains a series of points with coordinates. It is a sparse matrix representation of a multi-dimensional matrix.

1.10.2 Contents:

measureType (zero or one occurrence; of the type AssetMeasureType) The type of the value that is measured. This could be an NPV, a cash flow, a clean price, etc.

quoteUnits (zero or one occurrence; of the type PriceQuoteUnits) The optional units that the measure is expressed in. If not supplied, this is assumed to be a price/value in currency units.

side (zero or one occurrence; of the type QuotationSideEnum) The side (bid/mid/ask) of the measure.

currency (zero or one occurrence; of the type Currency) The optional currency that the measure is expressed in. If not supplied, this is defaulted from the reportingCurrency in the valuationScenarioDefinition.

timing (zero or one occurrence; of the type QuoteTiming) When during a day the quote is for. Typically, if this element is supplied, the QuoteLocation needs also to be supplied.

informationSource (zero or more occurrences; of the type InformationSource) The information source where a published or displayed market rate will be obtained, e.g. Telerate Page 3750.

time (zero or one occurrence; of the type xsd:dateTime) When the quote was observed or derived.

valuationDate (zero or one occurrence; of the type xsd:date) When the quote was computed.

expiryTime (zero or one occurrence; of the type xsd:dateTime) When does the quote cease to be valid.

cashFlowType (zero or one occurrence; of the type CashflowType) For cash flows, the type of the cash flows. Examples include: Coupon payment, Premium Fee, Settlement Fee, Brokerage Fee, etc.

point (one or more occurrences; of the type PricingStructurePoint)

1.10.3 Used by:

- Complex type: VolatilityMatrix

1.10.4 Derived Types:

1.10.5 Figure:

1.10.6 Schema Fragment:

```
<xsd:complexType name="MultiDimensionalPricingData">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      A pricing data set that contains a series of points with
      coordinates. It is a sparse matrix representation of a
      multi-dimensional matrix.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:sequence>
    <xsd:group ref="QuotationCharacteristics.model" minOccurs="0">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          Characteristics that apply to all quotations in the pricing
          structure.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:group>
    <xsd:element name="point" type="PricingStructurePoint" maxOccurs="unbounded"/>
  </xsd:sequence>
</xsd:complexType>
```

1.11 ParametricAdjustment

1.11.1 Description:

An adjustment used to accommodate a parameter of the input trade, e.g. the strike.

1.11.2 Contents:

name (exactly one occurrence; of the type xsd:normalizedString) The name of the adjustment parameter (e.g. "Volatility Skew").

inputUnits (zero or one occurrence; of the type PriceQuoteUnits) The units of the input parameter, e.g. Yield.

datapoint (one or more occurrences; of the type ParametricAdjustmentPoint) The values of the adjustment parameter.

1.11.3 Used by:

• Complex type: VolatilityMatrix

1.11.4 Derived Types:

1.11.5 Figure:

1.11.6 Schema Fragment:

```xsd
<xsd:complexType name="ParametricAdjustment">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      An adjustment used to accommodate a parameter of the input trade,
      e.g. the strike.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:sequence>
    <xsd:element name="name" type="xsd:normalizedString">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          The name of the adjustment parameter (e.g. "Volatility
          Skew").
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
    <xsd:element name="inputUnits" type="PriceQuoteUnits" minOccurs="0">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          The units of the input parameter, e.g. Yield.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
    <xsd:element name="datapoint" type="ParametricAdjustmentPoint" maxOccurs="unbounded">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          The values of the adjustment parameter.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
  </xsd:sequence>
</xsd:complexType>
```

1.12 ParametricAdjustmentPoint

1.12.1 Description:

A value of the adjustment point, consisting of the x value and the corresponding y value.

1.12.2 Contents:

parameterValue (exactly one occurrence; of the type xsd:decimal) The value of the independent variable (e.g. strike offset).

adjustmentValue (exactly one occurrence; of the type xsd:decimal) The value of the dependent variable, the actual adjustment amount.

1.12.3 Used by:

• Complex type: ParametricAdjustment

1.12.4 Derived Types:

1.12.5 Figure:

1.12.6 Schema Fragment:

```
<xsd:complexType name="ParametricAdjustmentPoint">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      A value of the adjustment point, consisting of the x value and
      the corresponding y value.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:sequence>
    <xsd:element name="parameterValue" type="xsd:decimal">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          The value of the independent variable (e.g. strike offset).
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
    <xsd:element name="adjustmentValue" type="xsd:decimal">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          The value of the dependent variable, the actual adjustment
          amount.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
  </xsd:sequence>
</xsd:complexType>
```

1.13 PricingStructurePoint

1.13.1 Description:

A single valued point with a set of coordinates that define an arbitrary number of indentifying indexes (0 or more). Note that the collection of coordinates/coordinate references for a PricingStructurePoint must not define a given dimension (other than "generic") more than once. This is to avoid ambiguity.

1.13.2 Contents:

Either

coordinate (exactly one occurrence; of the type PricingDataPointCoordinate) An explicit, filled in data point coordinate. This might specify expiration, strike, etc.

Or

coordinateReference (exactly one occurrence; of the type PricingDataPointCoordinateReference) A reference to a pricing data point coordinate within this document.

Either

underlyingAsset (exactly one occurrence; of the type Asset) Define the underlying asset when it is a listed security.

Or

underlyingAssetReference (zero or one occurrence; of the type AssetReference) A reference to an underlying asset that defines the meaning of the value, i.e. the product that the value corresponds to. For example, this could be a caplet or simple european swaption.

value (zero or one occurrence; of the type xsd:decimal) The value of the the quotation.

1.13.3 Used by:

• Complex type: MultiDimensionalPricingData

1.13.4 Derived Types:

1.13.5 Figure:

1.13.6 Schema Fragment:

```
<xsd:complexType name="PricingStructurePoint">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      A single valued point with a set of coordinates that define an
      arbitrary number of indentifying indexes (0 or more). Note that
      the collection of coordinates/coordinate references for a
      PricingStructurePoint must not define a given dimension (other
      than "generic") more than once. This is to avoid ambiguity.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:sequence>
    <xsd:group ref="PricingCoordinateOrReference.model" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:group ref="UnderlyingAssetOrReference.model" minOccurs="0"/>
    <xsd:group ref="Quotation.model">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          A quotation for a specific point, including anny
          characteristics that may be unique to that point.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:group>
  </xsd:sequence>
  <xsd:attribute name="id" type="xsd:ID"/>
</xsd:complexType>
```

1.14 TermCurve

1.14.1 Description:

A curve consisting only of values over a term. This is a restricted form of One Dimensional Structure.

1.14.2 Contents:

interpolationMethod (zero or one occurrence; of the type InterpolationMethod)
extrapolationPermitted (zero or one occurrence; of the type xsd:boolean)
point (one or more occurrences; of the type TermPoint)

1.14.3 Used by:

- Complex type: DefaultProbabilityCurve
- Complex type: ForwardRateCurve
- Complex type: FxCurveValuation
- Complex type: YieldCurveValuation
- Complex type: ZeroRateCurve

1.14.4 Derived Types:

1.14.5 Figure:

1.14.6 Schema Fragment:

```
<xsd:complexType name="TermCurve">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      A curve consisting only of values over a term. This is a
      restricted form of One Dimensional Structure.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:sequence>
    <xsd:element name="interpolationMethod" type="InterpolationMethod" minOccurs="0"/>
    <xsd:element name="extrapolationPermitted" type="xsd:boolean" minOccurs="0"/>
    <xsd:element name="point" type="TermPoint" maxOccurs="unbounded"/>
  </xsd:sequence>
</xsd:complexType>
```

1.15 TermPoint

1.15.1 Description:

A value point that can have a time dimension. Allows bid, mid, ask, and spread values to be represented.

1.15.2 Contents:

term (exactly one occurrence; of the type TimeDimension) The time dimension of the point (tenor and/or date)

bid (zero or one occurrence; of the type xsd:decimal) A price "bid" by a buyer for an asset, i.e. the price a buyer is willing to pay.

mid (zero or one occurrence; of the type xsd:decimal) A price midway between the bid and the ask price.

ask (zero or one occurrence; of the type xsd:decimal) A price "asked" by a seller for an asset, i.e. the price at which a seller is willing to sell.

spreadValue (zero or one occurrence; of the type xsd:decimal) The spread value can be used in conjunction with the "mid" value to define the bid and the ask value.

definition (zero or one occurrence; of the type AssetReference) An optional reference to an underlying asset that defines the meaning of the value, i.e. the product that the value corresponds to. For example, this could be a discount instrument.

1.15.3 Used by:

- Complex type: TermCurve

1.15.4 Derived Types:

1.15.5 Figure:

1.15.6 Schema Fragment:

```
<xsd:complexType name="TermPoint">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      A value point that can have a time dimension. Allows bid, mid,
      ask, and spread values to be represented.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:sequence>
    <xsd:element name="term" type="TimeDimension">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          The time dimension of the point (tenor and/or date)
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
    <xsd:group ref="BidMidAsk.model"/>
    <xsd:element name="spreadValue" type="xsd:decimal" minOccurs="0">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          The spread value can be used in conjunction with the "mid"
          value to define the bid and the ask value.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
    <xsd:element name="definition" type="AssetReference" minOccurs="0">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          An optional reference to an underlying asset that defines the
          meaning of the value, i.e. the product that the value
          corresponds to. For example, this could be a discount
          instrument.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
  </xsd:sequence>
  <xsd:attribute name="id" type="xsd:ID"/>
</xsd:complexType>
```

1.16 VolatilityMatrix

1.16.1 Description:

A matrix of volatilities with dimension 0-3.

1.16.2 Contents:

Inherited element(s): (This definition inherits the content defined by the type PricingStructureValuation)

- An abstract pricing structure valuation base type. Used as a base for values of pricing structures such as yield curves and volatility matrices. Derived from the "Valuation" type.

dataPoints (exactly one occurrence; of the type MultiDimensionalPricingData) The raw volatility matrix data, expressed as a multi-dimensional array.

adjustment (zero or more occurrences; of the type ParametricAdjustment) An adjustment factor, such as for vol smile/skew.

1.16.3 Used by:

- Element: volatilityMatrixValuation

1.16.4 Derived Types:

1.16.5 Figure:

1.16.6 Schema Fragment:

```
<xsd:complexType name="VolatilityMatrix">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      A matrix of volatilities with dimension 0-3.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:complexContent>
    <xsd:extension base="PricingStructureValuation">
      <xsd:sequence>
        <xsd:element name="dataPoints" type="MultiDimensionalPricingData">
          <xsd:annotation>
            <xsd:documentation xml:lang="en">
              The raw volatility matrix data, expressed as a
              multi-dimensional array.
            </xsd:documentation>
          </xsd:annotation>
        </xsd:element>
        <xsd:element name="adjustment" type="ParametricAdjustment" minOccurs="0" maxOccurs="unk
          <xsd:annotation>
            <xsd:documentation xml:lang="en">
              An adjustment factor, such as for vol smile/skew.
            </xsd:documentation>
          </xsd:annotation>
        </xsd:element>
      </xsd:sequence>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>
```

1.17 VolatilityRepresentation

1.17.1 Description:

A representation of volatilities of an asset. This is a generic structure whose values can be supplied in a specific volatility matrix.

1.17.2 Contents:

Inherited element(s): (This definition inherits the content defined by the type PricingStructure)

- An abstract pricing structure base type. Used as a base for structures such as yield curves and volatility matrices..

asset (exactly one occurrence; of the type AnyAssetReference) A reference to the asset whose volatility is modeled.

1.17.3 Used by:

- Element: volatilityRepresentation

1.17.4 Derived Types:

1.17.5 Figure:

1.17.6 Schema Fragment:

```
<xsd:complexType name="VolatilityRepresentation">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
     A representation of volatilities of an asset. This is a generic
     structure whose values can be supplied in a specific volatility
     matrix.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:complexContent>
    <xsd:extension base="PricingStructure">
      <xsd:sequence>
        <xsd:element name="asset" type="AnyAssetReference">
          <xsd:annotation>
            <xsd:documentation xml:lang="en">
             A reference to the asset whose volatility is modeled.
            </xsd:documentation>
          </xsd:annotation>
        </xsd:element>
      </xsd:sequence>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>
```

1.18 YieldCurve

1.18.1 Description:

A generic yield curve object, which can be valued in a variety of ways.

1.18.2 Contents:

Inherited element(s): (This definition inherits the content defined by the type PricingStructure)

- An abstract pricing structure base type. Used as a base for structures such as yield curves and volatility matrices..

algorithm (zero or one occurrence; of the type xsd:string)
forecastRateIndex (zero or one occurrence; of the type ForecastRateIndex)

1.18.3 Used by:

- Element: yieldCurve

1.18.4 Derived Types:

1.18.5 Figure:

1.18.6 Schema Fragment:

```
<xsd:complexType name="YieldCurve">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      A generic yield curve object, which can be valued in a variety of
      ways.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:complexContent>
    <xsd:extension base="PricingStructure">
      <xsd:sequence>
        <xsd:group ref="YieldCurveCharacteristics.model" minOccurs="0"/>
      </xsd:sequence>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>
```

1.19 YieldCurveValuation

1.19.1 Description:

The values of a yield curve, including possibly inputs and outputs (dfs, forwards, zero rates).

1.19.2 Contents:

Inherited element(s): (This definition inherits the content defined by the type PricingStructureValuation)

- An abstract pricing structure valuation base type. Used as a base for values of pricing structures such as yield curves and volatility matrices. Derived from the "Valuation" type.

inputs (zero or one occurrence; of the type QuotedAssetSet)
zeroCurve (zero or one occurrence; of the type ZeroRateCurve) A curve of zero rates.
forwardCurve (zero or more occurrences; of the type ForwardRateCurve) A curve of forward rates.
discountFactorCurve (zero or one occurrence; of the type TermCurve) A curve of discount factors.

1.19.3 Used by:

- Element: yieldCurveValuation

1.19.4 Derived Types:

1.19.5 Figure:

1.19.6 Schema Fragment:

```
<xsd:complexType name="YieldCurveValuation">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      The values of a yield curve, including possibly inputs and
      outputs (dfs, forwards, zero rates).
    </xsd:documentation>
  </xsd:annotation>
  <xsd:complexContent>
    <xsd:extension base="PricingStructureValuation">
      <xsd:sequence>
        <xsd:element name="inputs" type="QuotedAssetSet" minOccurs="0"/>
        <xsd:element name="zeroCurve" type="ZeroRateCurve" minOccurs="0">
          <xsd:annotation>
            <xsd:documentation xml:lang="en">
              A curve of zero rates.
            </xsd:documentation>
          </xsd:annotation>
        </xsd:element>
        <xsd:element name="forwardCurve" type="ForwardRateCurve" minOccurs="0" maxOccurs="unbou
          <xsd:annotation>
            <xsd:documentation xml:lang="en">
              A curve of forward rates.
            </xsd:documentation>
          </xsd:annotation>
        </xsd:element>
        <xsd:element name="discountFactorCurve" type="TermCurve" minOccurs="0">
          <xsd:annotation>
            <xsd:documentation xml:lang="en">
              A curve of discount factors.
            </xsd:documentation>
          </xsd:annotation>
        </xsd:element>
      </xsd:sequence>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>
```

1.20 ZeroRateCurve

1.20.1 Description:

A curve used to model a set of zero-coupon interest rates.

1.20.2 Contents:

compoundingFrequency (exactly one occurrence; of the type CompoundingFrequency) The frequency at which the rates are compounded (e.g. continuously compounded).

rateCurve (exactly one occurrence; of the type TermCurve) The curve of zero-coupon values.

1.20.3 Used by:

- Complex type: YieldCurveValuation

1.20.4 Derived Types:

1.20.5 Figure:

1.20.6 Schema Fragment:

```
<xsd:complexType name="ZeroRateCurve">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      A curve used to model a set of zero-coupon interest rates.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:sequence>
    <xsd:element name="compoundingFrequency" type="CompoundingFrequency">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          The frequency at which the rates are compounded (e.g.
          continuously compounded).
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
    <xsd:element name="rateCurve" type="TermCurve">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          The curve of zero-coupon values.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
  </xsd:sequence>
</xsd:complexType>
```

2 Global Elements

2.1 creditCurve

2.1.1 Description:

2.1.2 Contents:

Element creditCurve is defined by the complex type CreditCurve

2.1.3 Used by:

2.1.4 Substituted by:

2.1.5 Figure:

2.1.6 Schema Fragment:

```
<xsd:element name="creditCurve" type="CreditCurve" substitutionGroup="pricingStructure"/>
```

2.2 creditCurveValuation

2.2.1 Description:

2.2.2 Contents:

Element creditCurveValuation is defined by the complex type CreditCurveValuation

2.2.3 Used by:

2.2.4 Substituted by:

2.2.5 Figure:

2.2.6 Schema Fragment:

```
<xsd:element name="creditCurveValuation" type="CreditCurveValuation" substitutionGroup="pricing
```

2.3 fxCurve

2.3.1 Description:

2.3.2 Contents:
Element fxCurve is defined by the complex type FxCurve

2.3.3 Used by:

2.3.4 Substituted by:

2.3.5 Figure:

2.3.6 Schema Fragment:

```
<xsd:element name="fxCurve" type="FxCurve" substitutionGroup="pricingStructure"/>
```

2.4 fxCurveValuation

2.4.1 Description:

2.4.2 Contents:

Element fxCurveValuation is defined by the complex type FxCurveValuation

2.4.3 Used by:

2.4.4 Substituted by:

2.4.5 Figure:

2.4.6 Schema Fragment:

```
<xsd:element name="fxCurveValuation" type="FxCurveValuation" substitutionGroup="pricingStructu
```

2.5 volatilityMatrixValuation

2.5.1 Description:

2.5.2 Contents:

Element volatilityMatrixValuation is defined by the complex type VolatilityMatrix

2.5.3 Used by:

2.5.4 Substituted by:

2.5.5 Figure:

2.5.6 Schema Fragment:

```
<xsd:element name="volatilityMatrixValuation" type="VolatilityMatrix" substitutionGroup="pricir
```

2.6 volatilityRepresentation

2.6.1 Description:

2.6.2 Contents:

Element volatilityRepresentation is defined by the complex type VolatilityRepresentation

2.6.3 Used by:

2.6.4 Substituted by:

2.6.5 Figure:

2.6.6 Schema Fragment:

```
<xsd:element name="volatilityRepresentation" type="VolatilityRepresentation" substitutionGroup=
```

2.7 yieldCurve

2.7.1 Description:

2.7.2 Contents:

Element yieldCurve is defined by the complex type YieldCurve

2.7.3 Used by:

2.7.4 Substituted by:

2.7.5 Figure:

2.7.6 Schema Fragment:

```
<xsd:element name="yieldCurve" type="YieldCurve" substitutionGroup="pricingStructure"/>
```

2.8 yieldCurveValuation

2.8.1 Description:

2.8.2 Contents:

Element yieldCurveValuation is defined by the complex type YieldCurveValuation

2.8.3 Used by:

2.8.4 Substituted by:

2.8.5 Figure:

2.8.6 Schema Fragment:

```
<xsd:element name="yieldCurveValuation" type="YieldCurveValuation" substitutionGroup="pricingSt
```

3 Groups

3.1 BidMidAsk.model

3.1.1 Description:

The bid, mid, or ask values relevant for a quote

3.1.2 Contents:

bid (zero or one occurrence; of the type xsd:decimal) A price "bid" by a buyer for an asset, i.e. the price a buyer is willing to pay.

mid (zero or one occurrence; of the type xsd:decimal) A price midway between the bid and the ask price.

ask (zero or one occurrence; of the type xsd:decimal) A price "asked" by a seller for an asset, i.e. the price at which a seller is willing to sell.

3.1.3 Used by:

- Complex type: TermPoint

3.1.4 Figure:

3.1.5 Schema Fragment:

```
<xsd:group name="BidMidAsk.model">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      The bid, mid, or ask values relevant for a quote
    </xsd:documentation>
  </xsd:annotation>
  <xsd:sequence>
    <xsd:element name="bid" type="xsd:decimal" minOccurs="0">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          A price "bid" by a buyer for an asset, i.e. the price a buyer
          is willing to pay.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
    <xsd:element name="mid" type="xsd:decimal" minOccurs="0">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          A price midway between the bid and the ask price.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
    <xsd:element name="ask" type="xsd:decimal" minOccurs="0">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          A price "asked" by a seller for an asset, i.e. the price at
          which a seller is willing to sell.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
  </xsd:sequence>
</xsd:group>
```

3.2 CreditCurveCharacteristics.model

3.2.1 Description:

The set of characterstics that describe the outputs of a credit curve.

3.2.2 Contents:

Either

referenceEntity (exactly one occurrence; of the type LegalEntity) The entity for which this is defined.

Or

creditEntityReference (exactly one occurrence; of the type LegalEntityReference) An XML reference a credit entity defined elsewhere in the document.

creditEvents (zero or one occurrence; of the type CreditEvents) The material credit event.

seniority (exactly one occurrence; of the type CreditSeniority) The level of seniority of the deliverable obligation.

secured (exactly one occurrence; of the type xsd:boolean) Whether the deliverable obligation is secured or unsecured.

currency (exactly one occurrence; of the type Currency) The currency of denomination of the deliverable obligation.

obligations (zero or one occurrence; of the type Obligations) The underlying obligations of the reference entity on which you are buying or selling protection

deliverableObligations (zero or one occurrence; of the type DeliverableObligations) What sort of obligation may be delivered in the event of the credit event. ISDA 2003 Term: Obligation Category/Deliverable Obligation Category

3.2.3 Used by:

- Complex type: CreditCurve

3.2.4 Figure:

3.2.5 Schema Fragment:

```xsd
<xsd:group name="CreditCurveCharacteristics.model">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      The set of characterstics that describe the outputs of a credit
      curve.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:sequence>
    <xsd:group ref="CreditEntity.model"/>
    <xsd:element name="creditEvents" type="CreditEvents" minOccurs="0">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          The material credit event.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
    <xsd:element name="seniority" type="CreditSeniority">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          The level of seniority of the deliverable obligation.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
    <xsd:element name="secured" type="xsd:boolean">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          Whether the deliverable obligation is secured or unsecured.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
    <xsd:element name="currency" type="Currency">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          The currency of denomination of the deliverable obligation.
```

```xml
          </xsd:documentation>
        </xsd:annotation>
      </xsd:element>
      <xsd:element name="obligations" type="Obligations" minOccurs="0">
        <xsd:annotation>
          <xsd:documentation xml:lang="en">
            The underlying obligations of the reference entity on which
            you are buying or selling protection
          </xsd:documentation>
        </xsd:annotation>
      </xsd:element>
      <xsd:element name="deliverableObligations" type="DeliverableObligations" minOccurs="0">
        <xsd:annotation>
          <xsd:documentation xml:lang="en">
            What sort of obligation may be delivered in the event of the
            credit event. ISDA 2003 Term: Obligation Category/Deliverable
            Obligation Category
          </xsd:documentation>
        </xsd:annotation>
      </xsd:element>
    </xsd:sequence>
</xsd:group>
```

3.3 FxCurveCharacteristics.model

3.3.1 Description:

The set of characterstics that describe the outputs of a fx curve.

3.3.2 Contents:

quotedCurrencyPair (exactly one occurrence; of the type QuotedCurrencyPair) Defines the two currencies for an FX trade and the quotation relationship between the two currencies.

3.3.3 Used by:

- Complex type: FxCurve

3.3.4 Figure:

3.3.5 Schema Fragment:

```
<xsd:group name="FxCurveCharacteristics.model">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      The set of characterstics that describe the outputs of a fx
      curve.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:sequence>
    <xsd:element name="quotedCurrencyPair" type="QuotedCurrencyPair">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          Defines the two currencies for an FX trade and the quotation
          relationship between the two currencies.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
  </xsd:sequence>
</xsd:group>
```

3.4 RecoveryRate.model

3.4.1 Description:

The model of the recovery rate (single value or curve).

3.4.2 Contents:

Either

recoveryRate (exactly one occurrence; of the type xsd:decimal) A single recovery rate, to be used for all terms.

Or

recoveryRateCurve (exactly one occurrence; of the type TermCurve) A curve of recovery rates, allowing different terms to have different recovery rates.

3.4.3 Used by:

- Complex type: CreditCurveValuation

3.4.4 Figure:

3.4.5 Schema Fragment:

```
<xsd:group name="RecoveryRate.model">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      The model of the recovery rate (single value or curve).
    </xsd:documentation>
  </xsd:annotation>
  <xsd:choice>
    <xsd:element name="recoveryRate" type="xsd:decimal">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          A single recovery rate, to be used for all terms.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
    <xsd:element name="recoveryRateCurve" type="TermCurve">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          A curve of recovery rates, allowing different terms to have
          different recovery rates.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
  </xsd:choice>
</xsd:group>
```

3.5 UnderlyingAssetOrReference.model

3.5.1 Description:

Include or reference an underlying asset definition.

3.5.2 Contents:

Either

underlyingAsset (exactly one occurrence; of the type Asset) Define the underlying asset when it is a listed security.

Or

underlyingAssetReference (zero or one occurrence; of the type AssetReference) A reference to an underlying asset that defines the meaning of the value, i.e. the product that the value corresponds to. For example, this could be a caplet or simple european swaption.

3.5.3 Used by:

- Complex type: PricingStructurePoint

3.5.4 Figure:

3.5.5 Schema Fragment:

```
<xsd:group name="UnderlyingAssetOrReference.model">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
     Include or reference an underlying asset definition.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:choice>
    <xsd:element ref="underlyingAsset">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
         An underlying asset that defines the meaning of the value,
         i.e. the product that the value corresponds to. For example,
         this could be a caplet or simple european swaption.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
    <xsd:element name="underlyingAssetReference" type="AssetReference" minOccurs="0">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
         A reference to an underlying asset that defines the meaning
         of the value, i.e. the product that the value corresponds to.
         For example, this could be a caplet or simple european
         swaption.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
  </xsd:choice>
</xsd:group>
```

3.6 YieldCurveCharacteristics.model

3.6.1 Description:

The set of characteristics that describe the outputs of a yield curve.

3.6.2 Contents:

algorithm (zero or one occurrence; of the type xsd:string)
forecastRateIndex (zero or one occurrence; of the type ForecastRateIndex)

3.6.3 Used by:

- Complex type: YieldCurve

3.6.4 Figure:

3.6.5 Schema Fragment:

```
<xsd:group name="YieldCurveCharacteristics.model">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      The set of characteristics that describe the outputs of a yield
      curve.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:sequence>
    <xsd:element name="algorithm" type="xsd:string" minOccurs="0"/>
    <xsd:element name="forecastRateIndex" type="ForecastRateIndex" minOccurs="0"/>
  </xsd:sequence>
</xsd:group>
```

4 Schema listing

```xsd
<xsd:schema ecore:nsPrefix="fpml" ecore:package="org.fpml" ecore:documentRoot="FpML" targetName
  <xsd:include schemaLocation="fpml-riskdef-4-3.xsd"/>
  <xsd:include schemaLocation="fpml-cd-4-3.xsd"/>
  <xsd:complexType name="CompoundingFrequency">
    <xsd:annotation>
      <xsd:documentation source="http://www.FpML.org" xml:lang="en">
        The frequency at which a rate is compounded.
      </xsd:documentation>
    </xsd:annotation>
    <xsd:simpleContent>
      <xsd:extension base="xsd:normalizedString">
        <xsd:attribute name="compoundingFrequencyScheme" type="xsd:anyURI" default="http://www.
      </xsd:extension>
    </xsd:simpleContent>
  </xsd:complexType>
  <xsd:complexType name="CreditCurve">
    <xsd:annotation>
      <xsd:documentation xml:lang="en">
        A generic credit curve definition.
      </xsd:documentation>
    </xsd:annotation>
    <xsd:complexContent>
      <xsd:extension base="PricingStructure">
        <xsd:sequence>
          <xsd:group ref="CreditCurveCharacteristics.model" minOccurs="0"/>
        </xsd:sequence>
      </xsd:extension>
    </xsd:complexContent>
  </xsd:complexType>
  <xsd:complexType name="CreditCurveValuation">
    <xsd:annotation>
      <xsd:documentation xml:lang="en">
        A set of credit curve values, which can include pricing inputs
        (which are typically credit spreads), default probabilities,
        and recovery rates.
      </xsd:documentation>
    </xsd:annotation>
    <xsd:complexContent>
      <xsd:extension base="PricingStructureValuation">
        <xsd:sequence>
          <xsd:element name="inputs" type="QuotedAssetSet" minOccurs="0"/>
          <xsd:element name="defaultProbabilityCurve" type="DefaultProbabilityCurve" minOccurs=
            <xsd:annotation>
              <xsd:documentation xml:lang="en">
                A curve of default probabilities.
              </xsd:documentation>
            </xsd:annotation>
          </xsd:element>
          <xsd:group ref="RecoveryRate.model" minOccurs="0">
            <xsd:annotation>
              <xsd:documentation xml:lang="en">
                A recovery rate value or curve.
              </xsd:documentation>
            </xsd:annotation>
          </xsd:group>
        </xsd:sequence>
      </xsd:extension>
    </xsd:complexContent>
  </xsd:complexType>
  <xsd:complexType name="DefaultProbabilityCurve">
    <xsd:annotation>
      <xsd:documentation xml:lang="en">
        A set of default probabilities.
      </xsd:documentation>
    </xsd:annotation>
    <xsd:complexContent>
      <xsd:extension base="PricingStructureValuation">
        <xsd:sequence>
          <xsd:element name="baseYieldCurve" type="PricingStructureReference">
            <xsd:annotation>
              <xsd:documentation xml:lang="en">
                A reference to the yield curve values used as a basis
                for this credit curve valuation.
              </xsd:documentation>
            </xsd:annotation>
          </xsd:element>
          <xsd:element name="defaultProbabilities" type="TermCurve" minOccurs="0">
            <xsd:annotation>
              <xsd:documentation xml:lang="en">
```

```xsd
                    A collection of default probabilities.
                  </xsd:documentation>
                </xsd:annotation>
              </xsd:element>
            </xsd:sequence>
          </xsd:extension>
        </xsd:complexContent>
      </xsd:complexType>
      <xsd:complexType name="ForwardRateCurve">
        <xsd:annotation>
          <xsd:documentation xml:lang="en">
            A curve used to model a set of forward interest rates. Used for
            forecasting interest rates as part of a pricing calculation.
          </xsd:documentation>
        </xsd:annotation>
        <xsd:sequence>
          <xsd:element name="assetReference" type="AssetReference" minOccurs="0">
            <xsd:annotation>
              <xsd:documentation xml:lang="en">
                A reference to the rate index whose forwards are modeled.
              </xsd:documentation>
            </xsd:annotation>
          </xsd:element>
          <xsd:element name="rateCurve" type="TermCurve">
            <xsd:annotation>
              <xsd:documentation xml:lang="en">
                The curve of forward values.
              </xsd:documentation>
            </xsd:annotation>
          </xsd:element>
        </xsd:sequence>
      </xsd:complexType>
      <xsd:complexType name="FxCurve">
        <xsd:annotation>
          <xsd:documentation xml:lang="en">
            An fx curve object., which includes pricing inputs and term
            structures for fx forwards.
          </xsd:documentation>
        </xsd:annotation>
        <xsd:complexContent>
          <xsd:extension base="PricingStructure">
            <xsd:sequence>
              <xsd:group ref="FxCurveCharacteristics.model" minOccurs="0"/>
            </xsd:sequence>
          </xsd:extension>
        </xsd:complexContent>
      </xsd:complexType>
      <xsd:complexType name="FxCurveValuation">
        <xsd:annotation>
          <xsd:documentation xml:lang="en">
            A valuation of an FX curve object., which includes pricing
            inputs and term structures for fx forwards.
          </xsd:documentation>
        </xsd:annotation>
        <xsd:complexContent>
          <xsd:extension base="PricingStructureValuation">
            <xsd:sequence>
              <xsd:element name="settlementCurrencyYieldCurve" type="PricingStructureReference" mir
              <xsd:element name="forecastCurrencyYieldCurve" type="PricingStructureReference" minOc
              <xsd:element name="spotRate" type="FxRateSet" minOccurs="0"/>
              <xsd:element name="fxForwardCurve" type="TermCurve" minOccurs="0">
                <xsd:annotation>
                  <xsd:documentation xml:lang="en">
                    A curve of fx forward rates
                  </xsd:documentation>
                </xsd:annotation>
              </xsd:element>
              <xsd:element name="fxForwardPointsCurve" type="TermCurve" minOccurs="0">
                <xsd:annotation>
                  <xsd:documentation xml:lang="en">
                    A curve of fx forward point spreads.
                  </xsd:documentation>
                </xsd:annotation>
              </xsd:element>
            </xsd:sequence>
          </xsd:extension>
        </xsd:complexContent>
      </xsd:complexType>
      <xsd:complexType name="FxRateSet">
        <xsd:annotation>
          <xsd:documentation xml:lang="en">
            A collection of spot FX rates used in pricing.
          </xsd:documentation>
```

```
          </xsd:annotation>
      <xsd:complexContent>
        <xsd:extension base="QuotedAssetSet">
          <xsd:sequence/>
        </xsd:extension>
      </xsd:complexContent>
  </xsd:complexType>
  <xsd:complexType name="InterpolationMethod">
      <xsd:annotation>
        <xsd:documentation source="http://www.FpML.org" xml:lang="en">
          The type of interpolation used.
        </xsd:documentation>
      </xsd:annotation>
      <xsd:simpleContent>
        <xsd:extension base="xsd:normalizedString">
          <xsd:attribute name="interpolationMethodScheme" type="xsd:anyURI" default="http://www.f
        </xsd:extension>
      </xsd:simpleContent>
  </xsd:complexType>
  <xsd:complexType name="MultiDimensionalPricingData">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          A pricing data set that contains a series of points with
          coordinates. It is a sparse matrix representation of a
          multi-dimensional matrix.
        </xsd:documentation>
      </xsd:annotation>
      <xsd:sequence>
        <xsd:group ref="QuotationCharacteristics.model" minOccurs="0">
          <xsd:annotation>
            <xsd:documentation xml:lang="en">
              Characteristics that apply to all quotations in the pricing
              structure.
            </xsd:documentation>
          </xsd:annotation>
        </xsd:group>
        <xsd:element name="point" type="PricingStructurePoint" maxOccurs="unbounded"/>
      </xsd:sequence>
  </xsd:complexType>
  <xsd:complexType name="ParametricAdjustment">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          An adjustment used to accommodate a parameter of the input
          trade, e.g. the strike.
        </xsd:documentation>
      </xsd:annotation>
      <xsd:sequence>
        <xsd:element name="name" type="xsd:normalizedString">
          <xsd:annotation>
            <xsd:documentation xml:lang="en">
              The name of the adjustment parameter (e.g. "Volatility
              Skew").
            </xsd:documentation>
          </xsd:annotation>
        </xsd:element>
        <xsd:element name="inputUnits" type="PriceQuoteUnits" minOccurs="0">
          <xsd:annotation>
            <xsd:documentation xml:lang="en">
              The units of the input parameter, e.g. Yield.
            </xsd:documentation>
          </xsd:annotation>
        </xsd:element>
        <xsd:element name="datapoint" type="ParametricAdjustmentPoint" maxOccurs="unbounded">
          <xsd:annotation>
            <xsd:documentation xml:lang="en">
              The values of the adjustment parameter.
            </xsd:documentation>
          </xsd:annotation>
        </xsd:element>
      </xsd:sequence>
  </xsd:complexType>
  <xsd:complexType name="ParametricAdjustmentPoint">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          A value of the adjustment point, consisting of the x value and
          the corresponding y value.
        </xsd:documentation>
      </xsd:annotation>
      <xsd:sequence>
        <xsd:element name="parameterValue" type="xsd:decimal">
          <xsd:annotation>
            <xsd:documentation xml:lang="en">
              The value of the independent variable (e.g. strike offset).
```

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        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
    <xsd:element name="adjustmentValue" type="xsd:decimal">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          The value of the dependent variable, the actual adjustment
          amount.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
  </xsd:sequence>
</xsd:complexType>
<xsd:complexType name="PricingStructurePoint">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      A single valued point with a set of coordinates that define an
      arbitrary number of indentifying indexes (0 or more). Note that
      the collection of coordinates/coordinate references for a
      PricingStructurePoint must not define a given dimension (other
      than "generic") more than once. This is to avoid ambiguity.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:sequence>
    <xsd:group ref="PricingCoordinateOrReference.model" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:group ref="UnderlyingAssetOrReference.model" minOccurs="0"/>
    <xsd:group ref="Quotation.model">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          A quotation for a specific point, including anny
          characteristics that may be unique to that point.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:group>
  </xsd:sequence>
  <xsd:attribute name="id" type="xsd:ID"/>
</xsd:complexType>
<xsd:complexType name="TermCurve">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      A curve consisting only of values over a term. This is a
      restricted form of One Dimensional Structure.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:sequence>
    <xsd:element name="interpolationMethod" type="InterpolationMethod" minOccurs="0"/>
    <xsd:element name="extrapolationPermitted" type="xsd:boolean" minOccurs="0"/>
    <xsd:element name="point" type="TermPoint" maxOccurs="unbounded"/>
  </xsd:sequence>
</xsd:complexType>
<xsd:complexType name="TermPoint">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      A value point that can have a time dimension. Allows bid, mid,
      ask, and spread values to be represented.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:sequence>
    <xsd:element name="term" type="TimeDimension">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          The time dimension of the point (tenor and/or date)
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
    <xsd:group ref="BidMidAsk.model"/>
    <xsd:element name="spreadValue" type="xsd:decimal" minOccurs="0">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          The spread value can be used in conjunction with the "mid"
          value to define the bid and the ask value.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
    <xsd:element name="definition" type="AssetReference" minOccurs="0">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          An optional reference to an underlying asset that defines
          the meaning of the value, i.e. the product that the value
          corresponds to. For example, this could be a discount
          instrument.
        </xsd:documentation>
      </xsd:annotation>
```

```
        </xsd:element>
      </xsd:sequence>
      <xsd:attribute name="id" type="xsd:ID"/>
   </xsd:complexType>
   <xsd:complexType name="VolatilityMatrix">
      <xsd:annotation>
         <xsd:documentation xml:lang="en">
         A matrix of volatilities with dimension 0-3.
         </xsd:documentation>
      </xsd:annotation>
      <xsd:complexContent>
         <xsd:extension base="PricingStructureValuation">
            <xsd:sequence>
               <xsd:element name="dataPoints" type="MultiDimensionalPricingData">
                  <xsd:annotation>
                     <xsd:documentation xml:lang="en">
                     The raw volatility matrix data, expressed as a
                     multi-dimensional array.
                     </xsd:documentation>
                  </xsd:annotation>
               </xsd:element>
               <xsd:element name="adjustment" type="ParametricAdjustment" minOccurs="0" maxOccurs="u
                  <xsd:annotation>
                     <xsd:documentation xml:lang="en">
                     An adjustment factor, such as for vol smile/skew.
                     </xsd:documentation>
                  </xsd:annotation>
               </xsd:element>
            </xsd:sequence>
         </xsd:extension>
      </xsd:complexContent>
   </xsd:complexType>
   <xsd:complexType name="VolatilityRepresentation">
      <xsd:annotation>
         <xsd:documentation xml:lang="en">
         A representation of volatilities of an asset. This is a generic
         structure whose values can be supplied in a specific volatility
         matrix.
         </xsd:documentation>
      </xsd:annotation>
      <xsd:complexContent>
         <xsd:extension base="PricingStructure">
            <xsd:sequence>
               <xsd:element name="asset" type="AnyAssetReference">
                  <xsd:annotation>
                     <xsd:documentation xml:lang="en">
                     A reference to the asset whose volatility is modeled.
                     </xsd:documentation>
                  </xsd:annotation>
               </xsd:element>
            </xsd:sequence>
         </xsd:extension>
      </xsd:complexContent>
   </xsd:complexType>
   <xsd:complexType name="YieldCurve">
      <xsd:annotation>
         <xsd:documentation xml:lang="en">
         A generic yield curve object, which can be valued in a variety
         of ways.
         </xsd:documentation>
      </xsd:annotation>
      <xsd:complexContent>
         <xsd:extension base="PricingStructure">
            <xsd:sequence>
               <xsd:group ref="YieldCurveCharacteristics.model" minOccurs="0"/>
            </xsd:sequence>
         </xsd:extension>
      </xsd:complexContent>
   </xsd:complexType>
   <xsd:complexType name="YieldCurveValuation">
      <xsd:annotation>
         <xsd:documentation xml:lang="en">
         The values of a yield curve, including possibly inputs and
         outputs (dfs, forwards, zero rates).
         </xsd:documentation>
      </xsd:annotation>
      <xsd:complexContent>
         <xsd:extension base="PricingStructureValuation">
            <xsd:sequence>
               <xsd:element name="inputs" type="QuotedAssetSet" minOccurs="0"/>
               <xsd:element name="zeroCurve" type="ZeroRateCurve" minOccurs="0">
                  <xsd:annotation>
                     <xsd:documentation xml:lang="en">
```

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                        A curve of zero rates.
                      </xsd:documentation>
                    </xsd:annotation>
                  </xsd:element>
                  <xsd:element name="forwardCurve" type="ForwardRateCurve" minOccurs="0" maxOccurs="unb
                    <xsd:annotation>
                      <xsd:documentation xml:lang="en">
                        A curve of forward rates.
                      </xsd:documentation>
                    </xsd:annotation>
                  </xsd:element>
                  <xsd:element name="discountFactorCurve" type="TermCurve" minOccurs="0">
                    <xsd:annotation>
                      <xsd:documentation xml:lang="en">
                        A curve of discount factors.
                      </xsd:documentation>
                    </xsd:annotation>
                  </xsd:element>
                </xsd:sequence>
              </xsd:extension>
            </xsd:complexContent>
          </xsd:complexType>
          <xsd:complexType name="ZeroRateCurve">
            <xsd:annotation>
              <xsd:documentation xml:lang="en">
                A curve used to model a set of zero-coupon interest rates.
              </xsd:documentation>
            </xsd:annotation>
            <xsd:sequence>
              <xsd:element name="compoundingFrequency" type="CompoundingFrequency">
                <xsd:annotation>
                  <xsd:documentation xml:lang="en">
                    The frequency at which the rates are compounded (e.g.
                    continuously compounded).
                  </xsd:documentation>
                </xsd:annotation>
              </xsd:element>
              <xsd:element name="rateCurve" type="TermCurve">
                <xsd:annotation>
                  <xsd:documentation xml:lang="en">
                    The curve of zero-coupon values.
                  </xsd:documentation>
                </xsd:annotation>
              </xsd:element>
            </xsd:sequence>
          </xsd:complexType>
          <xsd:element name="creditCurve" type="CreditCurve" substitutionGroup="pricingStructure"/>
          <xsd:element name="creditCurveValuation" type="CreditCurveValuation" substitutionGroup="prici
          <xsd:element name="fxCurve" type="FxCurve" substitutionGroup="pricingStructure"/>
          <xsd:element name="fxCurveValuation" type="FxCurveValuation" substitutionGroup="pricingStruct
          <xsd:element name="volatilityMatrixValuation" type="VolatilityMatrix" substitutionGroup="pric
          <xsd:element name="volatilityRepresentation" type="VolatilityRepresentation" substitutionGrou
          <xsd:element name="yieldCurve" type="YieldCurve" substitutionGroup="pricingStructure"/>
          <xsd:element name="yieldCurveValuation" type="YieldCurveValuation" substitutionGroup="pricing
          <xsd:group name="BidMidAsk.model">
            <xsd:annotation>
              <xsd:documentation xml:lang="en">
                The bid, mid, or ask values relevant for a quote
              </xsd:documentation>
            </xsd:annotation>
            <xsd:sequence>
              <xsd:element name="bid" type="xsd:decimal" minOccurs="0">
                <xsd:annotation>
                  <xsd:documentation xml:lang="en">
                    A price "bid" by a buyer for an asset, i.e. the price a
                    buyer is willing to pay.
                  </xsd:documentation>
                </xsd:annotation>
              </xsd:element>
              <xsd:element name="mid" type="xsd:decimal" minOccurs="0">
                <xsd:annotation>
                  <xsd:documentation xml:lang="en">
                    A price midway between the bid and the ask price.
                  </xsd:documentation>
                </xsd:annotation>
              </xsd:element>
              <xsd:element name="ask" type="xsd:decimal" minOccurs="0">
                <xsd:annotation>
                  <xsd:documentation xml:lang="en">
                    A price "asked" by a seller for an asset, i.e. the price at
                    which a seller is willing to sell.
                  </xsd:documentation>
                </xsd:annotation>
```

```xml
        </xsd:element>
      </xsd:sequence>
    </xsd:group>
    <xsd:group name="CreditCurveCharacteristics.model">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          The set of characterstics that describe the outputs of a credit
          curve.
        </xsd:documentation>
      </xsd:annotation>
      <xsd:sequence>
        <xsd:group ref="CreditEntity.model"/>
        <xsd:element name="creditEvents" type="CreditEvents" minOccurs="0">
          <xsd:annotation>
            <xsd:documentation xml:lang="en">
              The material credit event.
            </xsd:documentation>
          </xsd:annotation>
        </xsd:element>
        <xsd:element name="seniority" type="CreditSeniority">
          <xsd:annotation>
            <xsd:documentation xml:lang="en">
              The level of seniority of the deliverable obligation.
            </xsd:documentation>
          </xsd:annotation>
        </xsd:element>
        <xsd:element name="secured" type="xsd:boolean">
          <xsd:annotation>
            <xsd:documentation xml:lang="en">
              Whether the deliverable obligation is secured or unsecured.
            </xsd:documentation>
          </xsd:annotation>
        </xsd:element>
        <xsd:element name="currency" type="Currency">
          <xsd:annotation>
            <xsd:documentation xml:lang="en">
              The currency of denomination of the deliverable obligation.
            </xsd:documentation>
          </xsd:annotation>
        </xsd:element>
        <xsd:element name="obligations" type="Obligations" minOccurs="0">
          <xsd:annotation>
            <xsd:documentation xml:lang="en">
              The underlying obligations of the reference entity on which
              you are buying or selling protection
            </xsd:documentation>
          </xsd:annotation>
        </xsd:element>
        <xsd:element name="deliverableObligations" type="DeliverableObligations" minOccurs="0">
          <xsd:annotation>
            <xsd:documentation xml:lang="en">
              What sort of obligation may be delivered in the event of
              the credit event. ISDA 2003 Term: Obligation
              Category/Deliverable Obligation Category
            </xsd:documentation>
          </xsd:annotation>
        </xsd:element>
      </xsd:sequence>
    </xsd:group>
    <xsd:group name="FxCurveCharacteristics.model">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          The set of characterstics that describe the outputs of a fx
          curve.
        </xsd:documentation>
      </xsd:annotation>
      <xsd:sequence>
        <xsd:element name="quotedCurrencyPair" type="QuotedCurrencyPair">
          <xsd:annotation>
            <xsd:documentation xml:lang="en">
              Defines the two currencies for an FX trade and the
              quotation relationship between the two currencies.
            </xsd:documentation>
          </xsd:annotation>
        </xsd:element>
      </xsd:sequence>
    </xsd:group>
    <xsd:group name="RecoveryRate.model">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          The model of the recovery rate (single value or curve).
        </xsd:documentation>
      </xsd:annotation>
```

```xml
      <xsd:choice>
        <xsd:element name="recoveryRate" type="xsd:decimal">
          <xsd:annotation>
            <xsd:documentation xml:lang="en">
              A single recovery rate, to be used for all terms.
            </xsd:documentation>
          </xsd:annotation>
        </xsd:element>
        <xsd:element name="recoveryRateCurve" type="TermCurve">
          <xsd:annotation>
            <xsd:documentation xml:lang="en">
              A curve of recovery rates, allowing different terms to have
              different recovery rates.
            </xsd:documentation>
          </xsd:annotation>
        </xsd:element>
      </xsd:choice>
    </xsd:group>
    <xsd:group name="UnderlyingAssetOrReference.model">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          Include or reference an underlying asset definition.
        </xsd:documentation>
      </xsd:annotation>
      <xsd:choice>
        <xsd:element ref="underlyingAsset">
          <xsd:annotation>
            <xsd:documentation xml:lang="en">
              An underlying asset that defines the meaning of the value,
              i.e. the product that the value corresponds to. For
              example, this could be a caplet or simple european
              swaption.
            </xsd:documentation>
          </xsd:annotation>
        </xsd:element>
        <xsd:element name="underlyingAssetReference" type="AssetReference" minOccurs="0">
          <xsd:annotation>
            <xsd:documentation xml:lang="en">
              A reference to an underlying asset that defines the meaning
              of the value, i.e. the product that the value corresponds
              to. For example, this could be a caplet or simple european
              swaption.
            </xsd:documentation>
          </xsd:annotation>
        </xsd:element>
      </xsd:choice>
    </xsd:group>
    <xsd:group name="YieldCurveCharacteristics.model">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          The set of characteristics that describe the outputs of a yield
          curve.
        </xsd:documentation>
      </xsd:annotation>
      <xsd:sequence>
        <xsd:element name="algorithm" type="xsd:string" minOccurs="0"/>
        <xsd:element name="forecastRateIndex" type="ForecastRateIndex" minOccurs="0"/>
      </xsd:sequence>
    </xsd:group>
</xsd:schema>
```