FpML - Risk Definitions Component Definitions

Version: 4.3

This Version:

http://www.fpml.org/spec/2007/wd-fpml-4-3-2007-07-05

Latest Version:

http://www.fpml.org/spec/2007/wd-fpml-4-3-2007-07-05

Previous Version:

http://www.fpml.org/spec/2007/wd-fpml-4-3-2007-05-14/

Errata For This Version:

http://www.fpml.org/spec/errata/wd-fpml-4-3-2007-07-05-errata.html

Document built

Table Of Contents

1 Global Complex Types 7
1.1 AssetOrTermPointOrPricingStructureReference 8
1.1.1 Description: 8
1.1.2 Contents: 8
1.1.3 Used by: 8
1.1.4 Derived Types: 8
1.1.5 Figure: 8
1.1.6 Schema Fragment: 8
1.2 DenominatorTerm 9
1.2.1 Description: 9
1.2.2 Contents: 9
1.2.3 Used by: 9
1.2.4 Derived Types: 9
1.2.5 Figure: 9
1.2.6 Schema Fragment: 9
1.3 DerivativeCalculationMethod 10
1.3.1 Description: 10
1.3.2 Contents: 10
1.3.3 Used by: 10
1.3.4 Derived Types: 10
1.3.5 Figure: 10
1.3.6 Schema Fragment: 10
1.4 DerivativeCalculationProcedure 11
1.4.1 Description: 11
1.4.2 Contents: 11
1.4.3 Used by: 11
1.4.4 Derived Types: 11
1.4.5 Figure: 11
1.4.6 Schema Fragment: 11
1.5 DerivativeFormula 12
1.5.1 Description: 12
1.5.2 Contents: 12
1.5.3 Used by: 12
1.5.4 Derived Types: 12
1.5.5 Figure: 12
1.5.6 Schema Fragment: 12
1.6 FormulaTerm 13
1.6.1 Description: 13
1.6.2 Contents: 13
1.6.3 Used by: 13
1.6.4 Derived Types: 13
1.6.5 Figure: 13
1.6.6 Schema Fragment: 13
1.7 PerturbationType 14
1.7.1 Description: 14
1.7.2 Contents: 14
1.7.3 Used by: 14
1.7.4 Derived Types: 14
1.7.5 Figure: 14
1.7.6 Schema Fragment: 14
1.8 PricingParameterDerivative 15
1.8.1 Description: 15
1.8.2 Contents: 15
1.8.3 Used by: 15
1.8.4 Derived Types: 15
1.8.5 Figure: 15
1.8.6 Schema Fragment: 15
1.9 PricingParameterDerivativeReference 17
1.9.1 Description: 17
1.9.2 Contents: 17

1.9.3 Used by: 17
1.9.4 Derived Types: 17
1.9.5 Figure: 17
1.9.6 Schema Fragment: 17
1.10 PricingParameterShift 18
1.10.1 Description: 18
1.10.2 Contents: 18
1.10.3 Used by: 18
1.10.4 Derived Types: 18
1.10.5 Figure: 18
1.10.6 Schema Fragment: 18
1.11 SensitivityDefinition 19
1.11.1 Description: 19
1.11.2 Contents: 19
1.11.3 Used by: 19
1.11.4 Derived Types: 19
1.11.5 Figure: 19
1.11.6 Schema Fragment: 19
1.12 SensitivitySetDefinition 20
1.12.1 Description: 20
1.12.2 Contents: 20
1.12.3 Used by: 20
1.12.4 Derived Types: 20
1.12.5 Figure: 20
1.12.6 Schema Fragment: 20
1.13 WeightedPartialDerivative 22
1.13.1 Description: 22
1.13.2 Contents: 22
1.13.3 Used by: 22
1.13.4 Derived Types: 22
1.13.5 Figure: 22
1.13.6 Schema Fragment: 22
2 Groups 23
2.1 AnalyticDerivativeParameters.model 24
2.1.1 Description: 24
2.1.2 Contents: 24
2.1.3 Used by: 24
2.1.4 Figure: 24
2.1.5 Schema Fragment: 24
2.2 ComputedDerivative.model 25
2.2.1 Description: 25
2.2.2 Contents: 25
2.2.3 Used by: 25
2.2.4 Figure: 25
2.2.5 Schema Fragment: 25
2.3 DerivativeCalculationParameters.model 26
2.3.1 Description: 26
2.3.2 Contents: 26
2.3.3 Used by: 26
2.3.4 Figure: 26
2.3.5 Schema Fragment: 26
2.4 FiniteDifferenceDerivativeParameters.model 27
2.4.1 Description: 27
2.4.2 Contents: 27
2.4.3 Used by: 27
2.4.4 Figure: 27
2.4.5 Schema Fragment: 27
2.5 SensitivityDescription.model 28
2.5.1 Description: 28
2.5.2 Contents: 28
2.5.3 Used by: 28
2.5.4 Figure: 28
2.5.5 Schema Fragment: 28
2.6 SubstitutionDerivativeParameters.model

2.6.1 Description: 29
2.6.2 Contents: 29
2.6.3 Used by: 29
2.6.4 Figure: 29
2.6.5 Schema Fragment: 29
3 Schema listing 30

1 Global Complex Types

1.1 AssetOrTermPointOrPricingStructureReference

1.1.1 Description:

Reference to an underlying asset, term point or pricing structure (yield curve).

1.1.2 Contents:

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

- The abstract base class for all types which define intra-document pointers.

1.1.3 Used by:

- Complex type: PricingParameterDerivative
- Complex type: PricingParameterShift

1.1.4 Derived Types:

1.1.5 Figure:

1.1.6 Schema Fragment:

```
<xsd:complexType name="AssetOrTermPointOrPricingStructureReference">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      Reference to an underlying asset, term point or pricing structure
      (yield curve).
    </xsd:documentation>
  </xsd:annotation>
  <xsd:complexContent>
    <xsd:extension base="Reference">
      <xsd:attribute name="href" type="xsd:IDREF" use="required"/>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>
```

1.2 DenominatorTerm

1.2.1 Description:

The type defining a denominator term of the formula. Its value is (sum of weighted partials) ^ power.

1.2.2 Contents:

weightedPartial (exactly one occurrence; of the type WeightedPartialDerivative) A partial derivative multiplied by a weighting factor.

power (exactly one occurrence; of the type xsd:positiveInteger) The power to which this term is raised.

1.2.3 Used by:

- Complex type: DerivativeFormula

1.2.4 Derived Types:

1.2.5 Figure:

1.2.6 Schema Fragment:

```
<xsd:complexType name="DenominatorTerm">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      The type defining a denominator term of the formula. Its value is
      (sum of weighted partials) ^ power.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:sequence>
    <xsd:element name="weightedPartial" type="WeightedPartialDerivative">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          A partial derivative multiplied by a weighting factor.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
    <xsd:element name="power" type="xsd:positiveInteger">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          The power to which this term is raised.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
  </xsd:sequence>
</xsd:complexType>
```

1.3 DerivativeCalculationMethod

1.3.1 Description:

The method by which a derivative is computed.

1.3.2 Contents:

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

•

1.3.3 Used by:

- Complex type: DerivativeCalculationProcedure

1.3.4 Derived Types:

1.3.5 Figure:

1.3.6 Schema Fragment:

```
<xsd:complexType name="DerivativeCalculationMethod">
  <xsd:annotation>
    <xsd:documentation source="http://www.FpML.org" xml:lang="en">
      The method by which a derivative is computed.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:simpleContent>
    <xsd:extension base="xsd:normalizedString">
      <xsd:attribute name="derivativeCalculationMethodScheme" type="xsd:anyURI" default="http:/
    </xsd:extension>
  </xsd:simpleContent>
</xsd:complexType>
```

1.4 DerivativeCalculationProcedure

1.4.1 Description:

A description of how a numerical derivative is computed.

1.4.2 Contents:

method (zero or one occurrence; of the type DerivativeCalculationMethod) The method by which a derivative is computed, e.g. analytic, numerical model, perturbation, etc.

1.4.3 Used by:

- Complex type: PricingParameterDerivative
- Complex type: SensitivitySetDefinition

1.4.4 Derived Types:

1.4.5 Figure:

1.4.6 Schema Fragment:

```
<xsd:complexType name="DerivativeCalculationProcedure">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      A description of how a numerical derivative is computed.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:sequence>
    <xsd:element name="method" type="DerivativeCalculationMethod" minOccurs="0">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          The method by which a derivative is computed, e.g. analytic,
          numerical model, perturbation, etc.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
    <xsd:group ref="DerivativeCalculationParameters.model" minOccurs="0"/>
  </xsd:sequence>
</xsd:complexType>
```

1.5 DerivativeFormula

1.5.1 Description:

A formula for computing a complex derivative from partial derivatives. Its value is the sum of the terms divided by the product of the denominator terms.

1.5.2 Contents:

term (exactly one occurrence; of the type FormulaTerm) A term of the formula. Its value is the product of the its coefficient and the referenced partial derivatives.

denominatorTerm (exactly one occurrence; of the type DenominatorTerm) A denominator term of the formula. Its value is (sum of weighted partials) ^ power.

1.5.3 Used by:

1.5.4 Derived Types:

1.5.5 Figure:

1.5.6 Schema Fragment:

```
<xsd:complexType name="DerivativeFormula">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      A formula for computing a complex derivative from partial
      derivatives. Its value is the sum of the terms divided by the
      product of the denominator terms.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:sequence>
    <xsd:element name="term" type="FormulaTerm">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          A term of the formula. Its value is the product of the its
          coefficient and the referenced partial derivatives.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
    <xsd:element name="denominatorTerm" type="DenominatorTerm">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          A denominator term of the formula. Its value is (sum of
          weighted partials) ^ power.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
  </xsd:sequence>
</xsd:complexType>
```

1.6 FormulaTerm

1.6.1 Description:

A type defining a term of the formula. Its value is the product of the its coefficient and the referenced partial derivatives.

1.6.2 Contents:

coefficient (exactly one occurrence; of the type xsd:decimal) The coefficient by which this term is multiplied, typically 1 or -1.

partialDerivativeReference (one or more occurrences; of the type PricingParameterDerivativeReference) A reference to the partial derivative.

1.6.3 Used by:

- Complex type: DerivativeFormula

1.6.4 Derived Types:

1.6.5 Figure:

1.6.6 Schema Fragment:

```
<xsd:complexType name="FormulaTerm">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      A type defining a term of the formula. Its value is the product
      of the its coefficient and the referenced partial derivatives.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:sequence>
    <xsd:element name="coefficient" type="xsd:decimal">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          The coefficient by which this term is multiplied, typically 1
          or -1.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
    <xsd:element name="partialDerivativeReference" type="PricingParameterDerivativeReference" m
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          A reference to the partial derivative.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
  </xsd:sequence>
</xsd:complexType>
```

1.7 PerturbationType

1.7.1 Description:

The type of perturbation applied to compute a derivative perturbatively.

1.7.2 Contents:

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

-

1.7.3 Used by:

1.7.4 Derived Types:

1.7.5 Figure:

1.7.6 Schema Fragment:

```
<xsd:complexType name="PerturbationType">
  <xsd:annotation>
    <xsd:documentation source="http://www.FpML.org" xml:lang="en">
      The type of perturbation applied to compute a derivative
      perturbatively.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:simpleContent>
    <xsd:extension base="xsd:normalizedString">
      <xsd:attribute name="perturbationTypeScheme" type="xsd:anyURI" default="http://www.fpml.o
    </xsd:extension>
  </xsd:simpleContent>
</xsd:complexType>
```

1.8 PricingParameterDerivative

1.8.1 Description:

A definition of the mathematical derivative with respect to a specific pricing parameter.

1.8.2 Contents:

description (zero or one occurrence; of the type xsd:string) A description, if needed, of how the derivative is computed.

Either

parameterReference (zero or one occurrence; of the type AssetOrTermPointOrPricingStructureReference) A reference to the pricing input parameter to which the sensitivity is computed. If it is omitted, the derivative definition is generic, and applies to any input point in the valuation set.

Or

inputDateReference (one or more occurrences; of the type ValuationReference) Reference(s) to the pricing input dates that are shifted when the sensitivity is computed. Depending on the time advance method used, this list could vary. Used for describing time-advance derivatives (theta, carry, etc.)

calculationProcedure (zero or one occurrence; of the type DerivativeCalculationProcedure) The method by which a derivative is computed, e.g. analytic, numerical model, perturbation, etc., and the corresponding parameters

1.8.3 Used by:

1.8.4 Derived Types:

1.8.5 Figure:

1.8.6 Schema Fragment:

```
<xsd:complexType name="PricingParameterDerivative">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      A definition of the mathematical derivative with respect to a
      specific pricing parameter.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:sequence>
    <xsd:element name="description" type="xsd:string" minOccurs="0">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          A description, if needed, of how the derivative is computed.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
    <xsd:choice>
      <xsd:element name="parameterReference" type="AssetOrTermPointOrPricingStructureReference"
        <xsd:annotation>
          <xsd:documentation xml:lang="en">
            A reference to the pricing input parameter to which the
            sensitivity is computed. If it is omitted, the derivative
            definition is generic, and applies to any input point in
            the valuation set.
          </xsd:documentation>
        </xsd:annotation>
      </xsd:element>
      <xsd:element name="inputDateReference" type="ValuationReference" maxOccurs="unbounded">
        <xsd:annotation>
          <xsd:documentation xml:lang="en">
            Reference(s) to the pricing input dates that are shifted
            when the sensitivity is computed. Depending on the time
            advance method used, this list could vary. Used for
            describing time-advance derivatives (theta, carry, etc.)
          </xsd:documentation>
        </xsd:annotation>
      </xsd:element>
    </xsd:choice>
    <xsd:element name="calculationProcedure" type="DerivativeCalculationProcedure" minOccurs="0
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
```

```
          The method by which a derivative is computed, e.g. analytic,
          numerical model, perturbation, etc., and the corresponding
          parameters
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
  </xsd:sequence>
  <xsd:attribute name="id" type="xsd:ID"/>
</xsd:complexType>
```

1.9 PricingParameterDerivativeReference

1.9.1 Description:

Reference to a partial derivative.

1.9.2 Contents:

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

- The abstract base class for all types which define intra-document pointers.

1.9.3 Used by:

- Complex type: FormulaTerm

1.9.4 Derived Types:

1.9.5 Figure:

1.9.6 Schema Fragment:

```
<xsd:complexType name="PricingParameterDerivativeReference">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      Reference to a partial derivative.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:complexContent>
    <xsd:extension base="Reference">
      <xsd:attribute name="href" type="xsd:IDREF" use="required" ecore:reference="PricingParame
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>
```

1.10 PricingParameterShift

1.10.1 Description:

A definition of a shift with respect to a specific pricing parameter.

1.10.2 Contents:

parameterReference (exactly one occurrence; of the type AssetOrTermPointOrPricingStructureReference)

shift (exactly one occurrence; of the type xsd:decimal) The size of the denominator, e.g. 0.0001 = 1 bp.

shiftUnits (zero or one occurrence; of the type PriceQuoteUnits) The units of the denominator, e.g. currency. If not present, use the units of the PricingInputReference.

1.10.3 Used by:

- Complex type: DerivedValuationScenario
- Complex type: ValuationScenario

1.10.4 Derived Types:

1.10.5 Figure:

1.10.6 Schema Fragment:

```
<xsd:complexType name="PricingParameterShift">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      A definition of a shift with respect to a specific pricing
      parameter.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:sequence>
    <xsd:element name="parameterReference" type="AssetOrTermPointOrPricingStructureReference"/>
    <xsd:element name="shift" type="xsd:decimal">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          The size of the denominator, e.g. 0.0001 = 1 bp.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
    <xsd:element name="shiftUnits" type="PriceQuoteUnits" minOccurs="0">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          The units of the denominator, e.g. currency. If not present,
          use the units of the PricingInputReference.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
  </xsd:sequence>
  <xsd:attribute name="id" type="xsd:ID"/>
</xsd:complexType>
```

1.11 SensitivityDefinition

1.11.1 Description:

A set of characteristics describing a sensitivity

1.11.2 Contents:

name (zero or one occurrence; of the type xsd:string) The name of the derivative, e.g. first derivative, Hessian, etc. Typically not required, but may be used to explain more complex derivative calculations.

valuationScenarioReference (zero or one occurrence; of the type ValuationScenarioReference) Reference to the valuation scenario to which this sensitivity definition applies. If the SensitivityDefinition occurs within a SensitivitySetDefinition, this is not required and normally not used. In this case, if it is supplied it overrides the valuationScenarioReference in the SensitivitySetDefinition.

1.11.3 Used by:

- Complex type: SensitivitySetDefinition

1.11.4 Derived Types:

1.11.5 Figure:

1.11.6 Schema Fragment:

```
<xsd:complexType name="SensitivityDefinition">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      A set of characteristics describing a sensitivity
    </xsd:documentation>
  </xsd:annotation>
  <xsd:sequence>
    <xsd:element name="name" type="xsd:string" minOccurs="0">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          The name of the derivative, e.g. first derivative, Hessian,
          etc. Typically not required, but may be used to explain more
          complex derivative calculations.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
    <xsd:element name="valuationScenarioReference" type="ValuationScenarioReference" minOccurs=
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          Reference to the valuation scenario to which this sensitivity
          definition applies. If the SensitivityDefinition occurs
          within a SensitivitySetDefinition, this is not required and
          normally not used. In this case, if it is supplied it
          overrides the valuationScenarioReference in the
          SensitivitySetDefinition.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
    <xsd:choice>
      <xsd:group ref="ComputedDerivative.model"/>
      <xsd:group ref="SensitivityDescription.model"/>
    </xsd:choice>
  </xsd:sequence>
  <xsd:attribute name="id" type="xsd:ID"/>
</xsd:complexType>
```

1.12 SensitivitySetDefinition

1.12.1 Description:

A sensitivity report definition, consisting of a collection of sensitivity definitions.

1.12.2 Contents:

name (zero or one occurrence; of the type xsd:string) The name of the sensitivity set definition, e.g. "USDLIBOR curve sensitivities".

sensitivityCharacteristics (zero or one occurrence; of the type QuotationCharacteristics) The default characteristics of the quotation, e.g. type, units, etc.

valuationScenarioReference (zero or one occurrence; of the type ValuationScenarioReference) Reference to the valuation scenario to which this sensitivity definition applies, e.g. a reference to the EOD valuation scenario. If not supplied, this sensitivity set definition is generic to a variety of valuation scenarios.

pricingInputType (zero or one occurrence; of the type PricingInputType) The type of the pricing input to which the sensitivity is shown, e.g. a yield curve or volatility matrix.

pricingInputReference (zero or one occurrence; of the type PricingStructureReference) A reference to the pricing input to which the sensitivity is shown, e.g. a reference to a USDLIBOR yield curve.

scale (exactly one occurrence; of the type xsd:decimal) The size of the denominator, e.g. 0.0001 = 1 bp. For derivatives with respect to time, the default period is 1 day.

sensitivityDefinition (zero or more occurrences; of the type SensitivityDefinition) A set of sensitivity definitions. Either one per point reported, or one generic definition that applies to all points.

calculationProcedure (zero or one occurrence; of the type DerivativeCalculationProcedure) The method by which each derivative is computed, e.g. analytic, numerical model, perturbation, etc., and the corresponding parameters (eg. shift amounts).

1.12.3 Used by:

- Complex type: ValuationSet

1.12.4 Derived Types:

1.12.5 Figure:

1.12.6 Schema Fragment:

```
<xsd:complexType name="SensitivitySetDefinition">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      A sensitivity report definition, consisting of a collection of
      sensitivity definitions.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:sequence>
    <xsd:element name="name" type="xsd:string" minOccurs="0">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          The name of the sensitivity set definition, e.g. "USDLIBOR
          curve sensitivities".
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
    <xsd:element name="sensitivityCharacteristics" type="QuotationCharacteristics" minOccurs="0
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          The default characteristics of the quotation, e.g. type,
          units, etc.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
    <xsd:element name="valuationScenarioReference" type="ValuationScenarioReference" minOccurs=
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          Reference to the valuation scenario to which this sensitivity
          definition applies, e.g. a reference to the EOD valuation
          scenario. If not supplied, this sensitivity set definition is
```

```
          generic to a variety of valuation scenarios.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
    <xsd:element name="pricingInputType" type="PricingInputType" minOccurs="0">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          The type of the pricing input to which the sensitivity is
          shown, e.g. a yield curve or volatility matrix.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
    <xsd:element name="pricingInputReference" type="PricingStructureReference" minOccurs="0">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          A reference to the pricing input to which the sensitivity is
          shown, e.g. a reference to a USDLIBOR yield curve.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
    <xsd:element name="scale" type="xsd:decimal">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          The size of the denominator, e.g. 0.0001 = 1 bp. For
          derivatives with respect to time, the default period is 1
          day.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
    <xsd:element name="sensitivityDefinition" type="SensitivityDefinition" minOccurs="0" maxOcc
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          A set of sensitivity definitions. Either one per point
          reported, or one generic definition that applies to all
          points.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
    <xsd:element name="calculationProcedure" type="DerivativeCalculationProcedure" minOccurs="0
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          The method by which each derivative is computed, e.g.
          analytic, numerical model, perturbation, etc., and the
          corresponding parameters (eg. shift amounts).
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
  </xsd:sequence>
  <xsd:attribute name="id" type="xsd:ID"/>
</xsd:complexType>
```

1.13 WeightedPartialDerivative

1.13.1 Description:

A partial derivative multiplied by a weighting factor.

1.13.2 Contents:

partialDerivativeReference (exactly one occurrence; of the type PricingStructureReference) A reference to a partial derivative defined in the ComputedDerivative.model, i.e. defined as part of this sensitivity definition.

weight (exactly one occurrence; of the type xsd:decimal) The weight factor to be applied to the partial derivative, e.g. 1 or -1, or some other scaling value.

1.13.3 Used by:

- Complex type: DenominatorTerm

1.13.4 Derived Types:

1.13.5 Figure:

1.13.6 Schema Fragment:

```
<xsd:complexType name="WeightedPartialDerivative">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      A partial derivative multiplied by a weighting factor.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:sequence>
    <xsd:element name="partialDerivativeReference" type="PricingStructureReference">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          A reference to a partial derivative defined in the
          ComputedDerivative.model, i.e. defined as part of this
          sensitivity definition.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
    <xsd:element name="weight" type="xsd:decimal">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          The weight factor to be applied to the partial derivative,
          e.g. 1 or -1, or some other scaling value.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
  </xsd:sequence>
</xsd:complexType>
```

2 Groups

2.1 AnalyticDerivativeParameters.model

2.1.1 Description:

Parameters used in the computation of a derivative using analytical (closed form formula) techiques.

2.1.2 Contents:

derivativeFormula (zero or one occurrence; of the type xsd:string) The formula used to compute the derivative (perhaps could be updated to use the Formula type in EQS.).

2.1.3 Used by:

2.1.4 Figure:

2.1.5 Schema Fragment:

```
<xsd:group name="AnalyticDerivativeParameters.model">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      Parameters used in the computation of a derivative using
      analytical (closed form formula) techiques.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:sequence>
    <xsd:element name="derivativeFormula" type="xsd:string" minOccurs="0">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          The formula used to compute the derivative (perhaps could be
          updated to use the Formula type in EQS.).
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
  </xsd:sequence>
</xsd:group>
```

2.2 ComputedDerivative.model

2.2.1 Description:

A group describing a derivative as combination of partial derivatives.

2.2.2 Contents:

partialDerivative (one or more occurrences; of the type PricingParameterDerivative) A partial derivative of the measure with respect to an input.

formula (zero or one occurrence; of the type DerivativeFormula) A formula defining how to compute the derivative from the partial derivatives. If absent, the derivative is just the product of the partial derivatives. Normally only required for more higher-order derivatives, e.g. Hessians.

2.2.3 Used by:

- Complex type: SensitivityDefinition

2.2.4 Figure:

2.2.5 Schema Fragment:

```
<xsd:group name="ComputedDerivative.model">
  <xsd:annotation>
    <xsd:documentation source="http://www.FpML.org" xml:lang="en">
      A group describing a derivative as combination of partial
      derivatives.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:sequence>
    <xsd:element name="partialDerivative" type="PricingParameterDerivative" maxOccurs="unbounde
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          A partial derivative of the measure with respect to an input.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
    <xsd:element name="formula" type="DerivativeFormula" minOccurs="0">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          A formula defining how to compute the derivative from the
          partial derivatives. If absent, the derivative is just the
          product of the partial derivatives. Normally only required
          for more higher-order derivatives, e.g. Hessians.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
  </xsd:sequence>
</xsd:group>
```

2.3 DerivativeCalculationParameters.model

2.3.1 Description:

Parameters used in the computation of a derivative.

2.3.2 Contents:

2.3.3 Used by:

- Complex type: DerivativeCalculationProcedure

2.3.4 Figure:

2.3.5 Schema Fragment:

```
<xsd:group name="DerivativeCalculationParameters.model">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      Parameters used in the computation of a derivative.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:choice>
    <xsd:group ref="FiniteDifferenceDerivativeParameters.model"/>
    <xsd:group ref="AnalyticDerivativeParameters.model"/>
    <xsd:group ref="SubstitutionDerivativeParameters.model"/>
  </xsd:choice>
</xsd:group>
```

2.4 FiniteDifferenceDerivativeParameters.model

2.4.1 Description:

Parameters used in the computation of a derivative using numerical (finite difference) techniques.

2.4.2 Contents:

perturbationAmount (zero or one occurrence; of the type xsd:decimal) The size and direction of the perturbation used to compute the derivative, e.g. 0.0001 = 1 bp.

averaged (exactly one occurrence; of the type xsd:boolean) The value is calculated by perturbing by the perturbationAmount and then the negative of the perturbationAmount and then averaging the two values (i.e. the value is half of the difference between perturbing up and perturbing down).

perturbationType (zero or one occurrence; of the type PerturbationType) The type of perturbation, if any, used to compute the derivative (Absolute vs Relative).

2.4.3 Used by:

2.4.4 Figure:

2.4.5 Schema Fragment:

```
<xsd:group name="FiniteDifferenceDerivativeParameters.model">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      Parameters used in the computation of a derivative using
      numerical (finite difference) techniques.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:sequence>
    <xsd:element name="perturbationAmount" type="xsd:decimal" minOccurs="0">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          The size and direction of the perturbation used to compute
          the derivative, e.g. 0.0001 = 1 bp.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
    <xsd:element name="averaged" type="xsd:boolean">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          The value is calculated by perturbing by the
          perturbationAmount and then the negative of the
          perturbationAmount and then averaging the two values (i.e.
          the value is half of the difference between perturbing up and
          perturbing down).
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
    <xsd:element name="perturbationType" type="PerturbationType" minOccurs="0">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          The type of perturbation, if any, used to compute the
          derivative (Absolute vs Relative).
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
  </xsd:sequence>
</xsd:group>
```

2.5 SensitivityDescription.model

2.5.1 Description:

A group describing a specific sensitivity without an explicity reference to the market data input point.

2.5.2 Contents:

Either

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

2.5.3 Used by:

- Complex type: SensitivityDefinition

2.5.4 Figure:

2.5.5 Schema Fragment:

```
<xsd:group name="SensitivityDescription.model">
  <xsd:annotation>
    <xsd:documentation source="http://www.FpML.org" xml:lang="en">
      A group describing a specific sensitivity without an explicity
      reference to the market data input point.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:choice>
    <xsd:element name="term" type="TimeDimension">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          The time dimension of the sensitivity point (tenor and/or
          date)
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
    <xsd:group ref="PricingCoordinateOrReference.model" maxOccurs="unbounded">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          The input coordinates, or references to them (e.g.
          expiration, strike, tenor).
        </xsd:documentation>
      </xsd:annotation>
    </xsd:group>
  </xsd:choice>
</xsd:group>
```

2.6 SubstitutionDerivativeParameters.model

2.6.1 Description:

Parameters used in the computation of a derivative by substituting a supplied market environment.

2.6.2 Contents:

replacementMarketInput (exactly one occurrence; of the type PricingStructureReference) A reference to the replacement version of the market input, e.g. a bumped yield curve.

2.6.3 Used by:

2.6.4 Figure:

2.6.5 Schema Fragment:

```
<xsd:group name="SubstitutionDerivativeParameters.model">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      Parameters used in the computation of a derivative by
      substituting a supplied market environment.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:sequence>
    <xsd:element name="replacementMarketInput" type="PricingStructureReference">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          A reference to the replacement version of the market input,
          e.g. a bumped yield curve.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
  </xsd:sequence>
</xsd:group>
```

3 Schema listing

```
<xsd:schema ecore:nsPrefix="fpml" ecore:package="org.fpml" ecore:documentRoot="FpML" targetName
  <xsd:include schemaLocation="fpml-mktenv-4-3.xsd"/>
  <xsd:complexType name="AssetOrTermPointOrPricingStructureReference">
    <xsd:annotation>
      <xsd:documentation xml:lang="en">
        Reference to an underlying asset, term point or pricing
        structure (yield curve).
      </xsd:documentation>
    </xsd:annotation>
    <xsd:complexContent>
      <xsd:extension base="Reference">
        <xsd:attribute name="href" type="xsd:IDREF" use="required"/>
      </xsd:extension>
    </xsd:complexContent>
  </xsd:complexType>
  <xsd:complexType name="DenominatorTerm">
    <xsd:annotation>
      <xsd:documentation xml:lang="en">
        The type defining a denominator term of the formula. Its value
        is (sum of weighted partials) ^ power.
      </xsd:documentation>
    </xsd:annotation>
    <xsd:sequence>
      <xsd:element name="weightedPartial" type="WeightedPartialDerivative">
        <xsd:annotation>
          <xsd:documentation xml:lang="en">
            A partial derivative multiplied by a weighting factor.
          </xsd:documentation>
        </xsd:annotation>
      </xsd:element>
      <xsd:element name="power" type="xsd:positiveInteger">
        <xsd:annotation>
          <xsd:documentation xml:lang="en">
            The power to which this term is raised.
          </xsd:documentation>
        </xsd:annotation>
      </xsd:element>
    </xsd:sequence>
  </xsd:complexType>
  <xsd:complexType name="DerivativeCalculationMethod">
    <xsd:annotation>
      <xsd:documentation source="http://www.FpML.org" xml:lang="en">
        The method by which a derivative is computed.
      </xsd:documentation>
    </xsd:annotation>
    <xsd:simpleContent>
      <xsd:extension base="xsd:normalizedString">
        <xsd:attribute name="derivativeCalculationMethodScheme" type="xsd:anyURI" default="http
      </xsd:extension>
    </xsd:simpleContent>
  </xsd:complexType>
  <xsd:complexType name="DerivativeCalculationProcedure">
    <xsd:annotation>
      <xsd:documentation xml:lang="en">
        A description of how a numerical derivative is computed.
      </xsd:documentation>
    </xsd:annotation>
    <xsd:sequence>
      <xsd:element name="method" type="DerivativeCalculationMethod" minOccurs="0">
        <xsd:annotation>
          <xsd:documentation xml:lang="en">
            The method by which a derivative is computed, e.g.
            analytic, numerical model, perturbation, etc.
          </xsd:documentation>
        </xsd:annotation>
      </xsd:element>
      <xsd:group ref="DerivativeCalculationParameters.model" minOccurs="0"/>
    </xsd:sequence>
  </xsd:complexType>
  <xsd:complexType name="DerivativeFormula">
    <xsd:annotation>
      <xsd:documentation xml:lang="en">
        A formula for computing a complex derivative from partial
        derivatives. Its value is the sum of the terms divided by the
        product of the denominator terms.
      </xsd:documentation>
    </xsd:annotation>
    <xsd:sequence>
      <xsd:element name="term" type="FormulaTerm">
```

```
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          A term of the formula. Its value is the product of the its
          coefficient and the referenced partial derivatives.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
    <xsd:element name="denominatorTerm" type="DenominatorTerm">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          A denominator term of the formula. Its value is (sum of
          weighted partials) ^ power.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
  </xsd:sequence>
</xsd:complexType>
<xsd:complexType name="FormulaTerm">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      A type defining a term of the formula. Its value is the product
      of the its coefficient and the referenced partial derivatives.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:sequence>
    <xsd:element name="coefficient" type="xsd:decimal">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          The coefficient by which this term is multiplied, typically
          1 or -1.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
    <xsd:element name="partialDerivativeReference" type="PricingParameterDerivativeReference"
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          A reference to the partial derivative.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
  </xsd:sequence>
</xsd:complexType>
<xsd:complexType name="PerturbationType">
  <xsd:annotation>
    <xsd:documentation source="http://www.FpML.org" xml:lang="en">
      The type of perturbation applied to compute a derivative
      perturbatively.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:simpleContent>
    <xsd:extension base="xsd:normalizedString">
      <xsd:attribute name="perturbationTypeScheme" type="xsd:anyURI" default="http://www.fpml
    </xsd:extension>
  </xsd:simpleContent>
</xsd:complexType>
<xsd:complexType name="PricingParameterDerivative">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      A definition of the mathematical derivative with respect to a
      specific pricing parameter.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:sequence>
    <xsd:element name="description" type="xsd:string" minOccurs="0">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          A description, if needed, of how the derivative is
          computed.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
    <xsd:choice>
      <xsd:element name="parameterReference" type="AssetOrTermPointOrPricingStructureReferenc
        <xsd:annotation>
          <xsd:documentation xml:lang="en">
            A reference to the pricing input parameter to which the
            sensitivity is computed. If it is omitted, the derivative
            definition is generic, and applies to any input point in
            the valuation set.
          </xsd:documentation>
        </xsd:annotation>
      </xsd:element>
      <xsd:element name="inputDateReference" type="ValuationReference" maxOccurs="unbounded">
```

```
        <xsd:annotation>
          <xsd:documentation xml:lang="en">
            Reference(s) to the pricing input dates that are shifted
            when the sensitivity is computed. Depending on the time
            advance method used, this list could vary. Used for
            describing time-advance derivatives (theta, carry, etc.)
          </xsd:documentation>
        </xsd:annotation>
      </xsd:element>
    </xsd:choice>
    <xsd:element name="calculationProcedure" type="DerivativeCalculationProcedure" minOccurs=
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          The method by which a derivative is computed, e.g.
          analytic, numerical model, perturbation, etc., and the
          corresponding parameters
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
  </xsd:sequence>
  <xsd:attribute name="id" type="xsd:ID"/>
</xsd:complexType>
<xsd:complexType name="PricingParameterDerivativeReference">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      Reference to a partial derivative.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:complexContent>
    <xsd:extension base="Reference">
      <xsd:attribute name="href" type="xsd:IDREF" use="required" ecore:reference="PricingPara
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>
<xsd:complexType name="PricingParameterShift">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      A definition of a shift with respect to a specific pricing
      parameter.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:sequence>
    <xsd:element name="parameterReference" type="AssetOrTermPointOrPricingStructureReference"
    <xsd:element name="shift" type="xsd:decimal">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          The size of the denominator, e.g. 0.0001 = 1 bp.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
    <xsd:element name="shiftUnits" type="PriceQuoteUnits" minOccurs="0">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          The units of the denominator, e.g. currency. If not
          present, use the units of the PricingInputReference.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
  </xsd:sequence>
  <xsd:attribute name="id" type="xsd:ID"/>
</xsd:complexType>
<xsd:complexType name="SensitivityDefinition">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      A set of characteristics describing a sensitivity
    </xsd:documentation>
  </xsd:annotation>
  <xsd:sequence>
    <xsd:element name="name" type="xsd:string" minOccurs="0">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          The name of the derivative, e.g. first derivative, Hessian,
          etc. Typically not required, but may be used to explain
          more complex derivative calculations.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
    <xsd:element name="valuationScenarioReference" type="ValuationScenarioReference" minOccur
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          Reference to the valuation scenario to which this
          sensitivity definition applies. If the
          SensitivityDefinition occurs within a
```

```
          SensitivitySetDefinition, this is not required and normally
          not used. In this case, if it is supplied it overrides the
          valuationScenarioReference in the SensitivitySetDefinition.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
    <xsd:choice>
      <xsd:group ref="ComputedDerivative.model"/>
      <xsd:group ref="SensitivityDescription.model"/>
    </xsd:choice>
  </xsd:sequence>
  <xsd:attribute name="id" type="xsd:ID"/>
</xsd:complexType>
<xsd:complexType name="SensitivitySetDefinition">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      A sensitivity report definition, consisting of a collection of
      sensitivity definitions.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:sequence>
    <xsd:element name="name" type="xsd:string" minOccurs="0">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          The name of the sensitivity set definition, e.g. "USDLIBOR
          curve sensitivities".
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
    <xsd:element name="sensitivityCharacteristics" type="QuotationCharacteristics" minOccurs=
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          The default characteristics of the quotation, e.g. type,
          units, etc.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
    <xsd:element name="valuationScenarioReference" type="ValuationScenarioReference" minOccur
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          Reference to the valuation scenario to which this
          sensitivity definition applies, e.g. a reference to the EOD
          valuation scenario. If not supplied, this sensitivity set
          definition is generic to a variety of valuation scenarios.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
    <xsd:element name="pricingInputType" type="PricingInputType" minOccurs="0">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          The type of the pricing input to which the sensitivity is
          shown, e.g. a yield curve or volatility matrix.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
    <xsd:element name="pricingInputReference" type="PricingStructureReference" minOccurs="0">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          A reference to the pricing input to which the sensitivity
          is shown, e.g. a reference to a USDLIBOR yield curve.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
    <xsd:element name="scale" type="xsd:decimal">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          The size of the denominator, e.g. 0.0001 = 1 bp. For
          derivatives with respect to time, the default period is 1
          day.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
    <xsd:element name="sensitivityDefinition" type="SensitivityDefinition" minOccurs="0" maxO
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          A set of sensitivity definitions. Either one per point
          reported, or one generic definition that applies to all
          points.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
    <xsd:element name="calculationProcedure" type="DerivativeCalculationProcedure" minOccurs=
      <xsd:annotation>
```

```
        <xsd:documentation xml:lang="en">
          The method by which each derivative is computed, e.g.
          analytic, numerical model, perturbation, etc., and the
          corresponding parameters (eg. shift amounts).
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
  </xsd:sequence>
  <xsd:attribute name="id" type="xsd:ID"/>
</xsd:complexType>
<xsd:complexType name="WeightedPartialDerivative">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      A partial derivative multiplied by a weighting factor.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:sequence>
    <xsd:element name="partialDerivativeReference" type="PricingStructureReference">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          A reference to a partial derivative defined in the
          ComputedDerivative.model, i.e. defined as part of this
          sensitivity definition.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
    <xsd:element name="weight" type="xsd:decimal">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          The weight factor to be applied to the partial derivative,
          e.g. 1 or -1, or some other scaling value.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
  </xsd:sequence>
</xsd:complexType>
<xsd:group name="AnalyticDerivativeParameters.model">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      Parameters used in the computation of a derivative using
      analytical (closed form formula) techiques.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:sequence>
    <xsd:element name="derivativeFormula" type="xsd:string" minOccurs="0">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          The formula used to compute the derivative (perhaps could
          be updated to use the Formula type in EQS.).
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
  </xsd:sequence>
</xsd:group>
<xsd:group name="ComputedDerivative.model">
  <xsd:annotation>
    <xsd:documentation source="http://www.FpML.org" xml:lang="en">
      A group describing a derivative as combination of partial
      derivatives.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:sequence>
    <xsd:element name="partialDerivative" type="PricingParameterDerivative" maxOccurs="unbour
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          A partial derivative of the measure with respect to an
          input.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
    <xsd:element name="formula" type="DerivativeFormula" minOccurs="0">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          A formula defining how to compute the derivative from the
          partial derivatives. If absent, the derivative is just the
          product of the partial derivatives. Normally only required
          for more higher-order derivatives, e.g. Hessians.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
  </xsd:sequence>
</xsd:group>
<xsd:group name="DerivativeCalculationParameters.model">
```

```
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      Parameters used in the computation of a derivative.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:choice>
    <xsd:group ref="FiniteDifferenceDerivativeParameters.model"/>
    <xsd:group ref="AnalyticDerivativeParameters.model"/>
    <xsd:group ref="SubstitutionDerivativeParameters.model"/>
  </xsd:choice>
</xsd:group>
<xsd:group name="FiniteDifferenceDerivativeParameters.model">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      Parameters used in the computation of a derivative using
      numerical (finite difference) techniques.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:sequence>
    <xsd:element name="perturbationAmount" type="xsd:decimal" minOccurs="0">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          The size and direction of the perturbation used to compute
          the derivative, e.g. 0.0001 = 1 bp.
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
    <xsd:element name="averaged" type="xsd:boolean">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          The value is calculated by perturbing by the
          perturbationAmount and then the negative of the
          perturbationAmount and then averaging the two values (i.e.
          the value is half of the difference between perturbing up
          and perturbing down).
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
    <xsd:element name="perturbationType" type="PerturbationType" minOccurs="0">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          The type of perturbation, if any, used to compute the
          derivative (Absolute vs Relative).
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
  </xsd:sequence>
</xsd:group>
<xsd:group name="SensitivityDescription.model">
  <xsd:annotation>
    <xsd:documentation source="http://www.FpML.org" xml:lang="en">
      A group describing a specific sensitivity without an explicity
      reference to the market data input point.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:choice>
    <xsd:element name="term" type="TimeDimension">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          The time dimension of the sensitivity point (tenor and/or
          date)
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
    <xsd:group ref="PricingCoordinateOrReference.model" maxOccurs="unbounded">
      <xsd:annotation>
        <xsd:documentation xml:lang="en">
          The input coordinates, or references to them (e.g.
          expiration, strike, tenor).
        </xsd:documentation>
      </xsd:annotation>
    </xsd:group>
  </xsd:choice>
</xsd:group>
<xsd:group name="SubstitutionDerivativeParameters.model">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
      Parameters used in the computation of a derivative by
      substituting a supplied market environment.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:sequence>
    <xsd:element name="replacementMarketInput" type="PricingStructureReference">
```

```
        <xsd:annotation>
          <xsd:documentation xml:lang="en">
            A reference to the replacement version of the market input,
            e.g. a bumped yield curve.
          </xsd:documentation>
        </xsd:annotation>
      </xsd:element>
    </xsd:sequence>
  </xsd:group>
</xsd:schema>
```