Numerix XVA
Real-time Counterparty Credit Risk

- Counterparty exposure measures such as PFE, EE, EPE, & ENE
- XVA pricing adjustments – CVA, DVA, FVA & other XVAs
- Real-time calculations & incremental measures for pre-trade decision support
- Regulatory & accounting compliance, including Basel III
- CVA trading & hedging
Whether seeking to meet Basel II and III or other regulatory requirements, hedging or actively trading your CVA positions, Numerix provides the award winning, cross-asset class risk analytics you need to manage your counterparty risk across the institution.

Numerix XVA gives users the ability to calculate, analyze and limit exposures across business units and minimize capital charges for Basel III compliance, with fast and accurate PFE, CVA/DVA and FVA calculations, using an accelerated Monte Carlo simulation engine.

“In choosing Numerix CVA, we received the best performing methods for each instrument category and a reliable, flexible CVA solution, that above all else was easy to use.”

—Head of Risk Methods & Valuation, pbb Deutsche Pfandbriefbank
Numerix XVA enables users to:

- Calculate counterparty risk measures—CVA/DVA, PFE, EE, EPE, ENE—plus FVA and other XVA pricing adjustments
- Analyze “what if” trades to see incremental CVA for different counterparties
- Monitor exposure limits of traders, checking limit utilization and sending alerts when limits are breached
- “Slice and dice” calculation results in real-time to create custom reports and graphically visualize the results
- Determine collateral values and initial margin requirements, to optimize collateral usage
- Comply with accounting and regulatory requirements, including Basel III
- Trade and hedge CVA
NUMERIX XVA BENEFITS

Real-time results for fast trading and risk decisions
- Risk-adjusted pre-trade pricing
- “What-if” trades with pre-trade incremental CVA/DVA
- Calculations can be distributed to a grid or cloud for maximum performance

Optimize counterparty choices and reduce counterparty risk
- Pre-trade decision support tools assist with counterparty choice
- Exposure limit monitoring and alerts
- CVA sensitivities for CVA dynamic hedging

Transparency and flexibility
- XVA scripting to define and customize XVA measures
- CSA scripting to define all CSA terms
- In-memory pivot tables for interactive slicing & dicing of results
- One-click drill down into results to view trade-level details

Fast time-to-market for new trade types
- Handle any trade type, existing or imagined
- Deal with complex new CSAs using CSA scripting
- Manage risk of new deal types and capture market opportunities faster than competitors

Pivot View

Visualize results in graphs or interactive pivot tables.
NUMERIX XVA FEATURES

- Unilateral or bilateral CVA/DVA with deal price, deal aging, collateral posting and netting agreements
- Scenario analysis and stress testing to see impact of different market conditions on exposure profiles and counterparty risk measures
- Scalable server architecture can handle millions of trades
- Import trade, market and reference data from multiple trading and risk systems
- Flexible analytics platform allows for easy integration of new trade types (including exotics) and customization of pricing models, curves and calibration
- Consistent model calibration for both market scenarios and deal prices
- Web-based, easy-to-use interface is available on any browser or device

**Pivot View**

<table>
<thead>
<tr>
<th>Counterparty</th>
<th>CVA Unilateral</th>
<th>DVA Unilateral</th>
<th>BCVA Unilateral</th>
<th>CVA Bilateral</th>
<th>DVA Bilateral</th>
<th>BCVA Bilateral</th>
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<tbody>
<tr>
<td>Bank Of America</td>
<td>7,955.88</td>
<td>2,581.71</td>
<td>10,537.59</td>
<td>7,886.38</td>
<td>2,499.35</td>
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<tr>
<td>Deutsche Bank</td>
<td>18,567.57</td>
<td>7,290.72</td>
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<td>7,269.10</td>
<td>25,771.93</td>
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<td>HSBC</td>
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<td>150,622.31</td>
<td>410,963.41</td>
<td>247,632.62</td>
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<tr>
<td>JP Morgan Chase</td>
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<td>3,024.19</td>
<td>22,204.03</td>
<td>19,139.86</td>
<td>3,004.52</td>
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<td>Nomura</td>
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<td>4,216.05</td>
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<td>29,831.68</td>
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<td>Royal Bank of Scotia</td>
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<tr>
<td>UBS</td>
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<td>97,681.83</td>
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<td>95,687.00</td>
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</table>

*Analyze unilateral and bilateral CVA and DVA as well as other XVAs such as FVA.*
THE NUMERIX DIFFERENCE

Discover why the world’s leading banks and capital market firms use Numerix XVA for counterparty risk management:

**Real-time counterparty risk measures, instead of end-of-day calculations**

- American Monte Carlo engine is the most effective calculation approach for CVA of nonlinear instruments
- Calculations can be distributed to a grid or cloud for real-time performance

**Agile “future proof” platform is adaptable to future changes in the market and regulations**

- Collateral scripting can define even the most complex CSA terms
- XVA scripting enables customization of XVA measures to be included in computations
- In-memory pivot tables allow for real-time customization of reports
- Flexible analytics platform facilitates the easy addition of new trade types

**Market-proven, industry leading analytics**

- Hybrid model captures all correlations among underlying risk factors across asset classes, which is important for exposure calculations
- Numerix is a pioneer in American Monte Carlo and our method is widely used by clients

**Pre-trade decision support tools assist in choosing optimal counterparties and profitable trades**

- Create “what-if” trades to determine incremental CVA/DVA of proposed trades, to choose the best counterparty to trade with
- XVA adjustments integrated into pre-trade prices so traders can execute only profitable trades

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**Counterparty Info**

<table>
<thead>
<tr>
<th>PRODUCTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>NONDISCOUNTING CVA, DVA, CVA, DVA2, FCA, FVA, COLVA</td>
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<tr>
<td>NONDISCOUNTING SP_SELF_Prev, SP_CPTY_Prev</td>
</tr>
<tr>
<td>TEMPORARY DE_SELF, DE_CPTY</td>
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<tr>
<td>TEMPORARY FundingSpread, CollateralSpread, PE, NE</td>
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<tr>
<td>NONDISCOUNTING CWINC[ObservationDatesCOUNT], CWINC[ObservationDatesCOUNT]</td>
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<tr>
<td>NONDISCOUNTING CWINC[ObservationDatesCOUNT], DWMINC[ObservationDatesCOUNT]</td>
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<tr>
<td>TEMPORARY CUtemp, DUtemp</td>
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<tr>
<td>END PRODUCTS</td>
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</table>

**PayoffScript**

```plaintext
IF ISACTIVE(Today) THEN
    COLLATERAL = EXISTING_CREDIT_SUPPORT_BALANCE / CollateralAssetValue
    END IF
```

**Collateral Script**

```plaintext
PRODUCTS
NONDISCOUNTING Collateral+ObservationDates, PostMarginExposure
TEMPORARY CollateralBalance, ExposureWithID, CPTYCreditSupport, CPTYCreditSupport
TRANSFER TransferBeforeMTA, Transfer, Collateral+ObservationDates
END PRODUCTS
PAYOFFSCRIPT
IF ISACTIVE(ObservationDates) THEN
    IF ISACTIVE(ObservationDates) THEN
        SP_SELF_Prev = 1
        SP_CPTY_Prev = 1
    ELSE
        OP_SELF = (SP_SELF_Prev * SP_SELF) + (SP_CPTY_Prev * SP_CPTY)
        CollateralSpread = (Collateral+Rate * ModelRate) + ObservationDatesCDF
    END IF
    END IF
    END IF
```

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"XVA scripting and collateral scripting capabilities provide flexibility in adapting to market or regulatory changes"
**THE MOST ADVANCED ANALYTICS IN THE INDUSTRY**

**Leading the Industry in Advanced Models and Methods**

The Numerix CrossAsset library, which powers Numerix XVA’s calculations, offers the industry’s most comprehensive collection of models and methods. This allows institutions to price any conceivable instrument using the most advanced calculations, in addition to a wide range of calibration options for generating market-consistent valuations.

**Cross-Asset Class Coverage & Full Transparency**

Clients can price instruments across all asset classes, including: fixed income/rates, inflation, credit, equity, FX, commodities, volatility, life and hybrids—along with full transparency into pricing model assumptions and numerical methods.

**Advanced Hybrid Model**

Our unique hybrid model framework enables the production of consistent scenarios for large numbers of risk factors, which is critical to producing robust CVA calculations for large portfolios. It also captures all correlations among underlying risk factors across asset classes.

**Fast Monte Carlo Simulations**

Numerix’s American Monte Carlo engine uses the same set of paths for both market scenarios and prices, eliminating the need for a ‘Monte Carlo-on-Monte Carlo’ computation, making real-time CVA computations possible. It is the only computationally effective method for exotic instruments, and the most effective method for non-linear vanilla instruments.

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The Numerix Hybrid Model Framework: Unifying All Asset Classes

<table>
<thead>
<tr>
<th>IR/CC</th>
<th>EQ</th>
<th>FX</th>
<th>CR</th>
<th>CMDTY</th>
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<tr>
<td>HW1F</td>
<td>BS</td>
<td>BS</td>
<td>BK1F</td>
<td>Black</td>
<td>JY (BK)</td>
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<tr>
<td>BK1F</td>
<td>Dupire</td>
<td>Heston</td>
<td></td>
<td>Schwartz1F</td>
<td>JY (HW)</td>
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<tr>
<td>HW2F</td>
<td>Heston</td>
<td></td>
<td></td>
<td>GS2F</td>
<td></td>
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<tr>
<td>BK2F</td>
<td>LSV</td>
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<td>Heston</td>
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<td>LMMSV</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

Unique hybrid model framework allows users to select desired models based on underlyings, and use them as building blocks for the hybrid model.