

Quantax® News

Issue 11

April 2007

Welcome!

Welcome to another Issue of Quantax News, with news from the client side, a lot of new features in Quantax 4.5, and a farewell to the original creator of Quantax.

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News

We are very pleased to welcome the following clients to the Quantax user community:

- The **Raiffeisen Bausparkasse** (www.wohnbausparen.at). This specialized Austrian savings and mortgage institute is a market leader in the Austrian as well as in central and eastern European markets. Almost all functionality of Quantax will be used over a wide range of instruments, including exotics.
- **St. Galler Kantonalbank** and **Thurgauer Kantonalbank** will become the first users of Quantax with Avaloq. The banks will use Quantax as a risk management and position keeping add-on to Avaloq, from which it will obtain all transactions and reference data.

With these clients, there are now 11 Quantax customers in four countries. In order to bring the experience of these clients together, we plan to hold a first **Quantax User Meeting** in Zurich later this year.

The traditional occasion for an issue of *Quantax News* is the launch of a new release. **Quantax 4.5** is currently at the end of the alpha test phase and will be generally available in May 2007. As usual, this release brings many functional and technical changes, the most important being the new treatment of **interest-bearing instruments with floating coupons** and **Credit Value-at-Risk** calculations and

reporting, supporting Basel II requirements. The *Kahua* program reported in the last *Quantax News* (Issue 10) contributed the completely reengineered handling of portfolios and all static data objects.

Farewell to Hansjörg Anderegg

Hansjörg Anderegg is the original creator of Quantax. The software grew out of his long experience in the finance and risk management arenas. After 35 years in the software business, Hansjörg will retire from the daily business, but he will maintain an active interest in Quantax, and we count on him to make further contributions to the evolution of the product and its community.

Quantax would not be without Hansjörg; we would like to thank him for all his contributions, but also for his personal leadership to our group.

Hansjörg writes:

Let me add a personal note. After 35 years in the software business, including 25 hectic years of providing risk management and trading solutions for banks and asset managers, I'm happy to sail into more tranquil waters. I'm going to retire on April 30, 2007.

The last 9 years at COMIT have clearly been dominated by the development and deployment of our Quantax risk management software. I was very lucky to work in this team of highly motivated specialists, always in direct interaction with our clients. The Quantax solution has grown quite remarkably and is now in better shape than ever and ready for future challenges. I have learnt a lot in all these years, and I hope that I have been able to share some of this precious experience with our partners.

Although my priorities will change after April 30, the Quantax users and developers can still count on my support and active cooperation. I will step back, but I'm not letting go.

In this sense I extend my thanks and best wishes to the user community and the COMIT team.



Software that works in conjunction with Quantax may now carry the Quantax Add-On Logo, provided it fulfills basic requirements set forth by COMIT. Requirements have already been defined in the following areas:

- Import Interfaces
- Rate Interfaces
- External Browser Pages

New Issue Tracker Jira™

The Quantax team replaced the Bugzilla issue tracking by the world-leading [JIRA issue tracker](#). JIRA is much easier to use and allows clients to enter support issues and change requests directly and track them through the life cycle.

JIRA also contains *Quantax Articles*, short documents on a particular application or technical area.

JIRA can be accessed by registered clients over <http://www.quantax.com/Support/>.

Quantax Release 4.5

Instruments and Deal Capture

Interest-bearing Instruments

Handling of interest-bearing instruments (such as Loans, IRS, Bonds, etc.) has been rewritten to support:

- Valuation of floating structures based on the forward curve, instead of using the bond method as in Quantax 4.4.
- Payment periods that are independent of interest periods
- Compounding interest structures with more than one payment period (e.g., TOIS longer than one year)
- Arbitrary amortization structures (both positive and negative cashflows)
- Index expressions that specify the interest payout calculation for floating structures
- Estimated future floating cash flows are optionally shown in cashflow reports.
- Rate fixing in arrears: Fixing periods independent from underlying index period, e.g., for correct valuation of constant maturity swaps

Index expressions are new Quantax objects. They allow an expert user to provide a library of structures that can be used in Issues and OTC deals. Examples of structures supported by index expressions include:

- Relative spreads
- Reverse floater $10\% - 2 \times \text{index}$ with floor 0%
- Average over last 3 fixings, but first 2 periods constant 2.5% and 3.0%

Inflation Linked Swaps and Bonds

A new category of exotic assets, inflation linked bonds, is available. This asset class allows the modeling of inflation indexed bonds, notes and swaps (swap legs). The underlying risk factors are:

- the real rate (e.g., CPI.R) yield curve, similar to the foreign currency yield curve of an FX option
- the risk free (nominal) rate (e.g., EUR.R), similar to the domestic currency yield curve of an FX option
- the volatility surface of the real rate.

The inflation index values are fixed for the real rate risk factor (e.g., CPI.R) in the rate fixing history. The payoff is then computed by calculating the index ratios, starting from the issue date index value. Future index values are computed by a binomial tree model.

Credit Default Basket Swaps and Notes

A new kind of exotic asset is available: NTDBasket. This asset type covers both Nth to default basket notes and swaps on a basket of reference credits. First to default swaps are a special case of this instrument class.

The basket investor receives a periodic spread or premium from the protection buyer. Once the first N reference assets have defaulted, the protection buyer receives a payment from the protection seller corresponding to 1-R (R = current basket recovery rate), extinguishing the remaining duration of the trade.

Swap payoff of protection leg to the protection buyer: 0 if less than N defaults occurred during life of trade, 1-R as soon as N defaults occur, where R is the basket recovery rate.

In the case of an NTDBasket note, the basket investor pays the principal investment (par = 1) and receives R from the protection buyer in case of an Nth default. During the life of the trade the basket investor receives a periodic net interest from the principal investment, including the NTD swap spread.

The valuation model behind this new asset class is a Monte Carlo simulation of time to default of a basket of underlying credits (bonds). The simulation uses the credit default probability curves of the underlying bonds as marginal distributions and models the basket based on default correlations associated with the basket definition (composite asset correlation). If the default correlation is missing, correlation 0 is assumed.

Composites exposing Accrued Interest

Composites that are essentially bonds (plus some other components) are quoted with a clean price. The components may include accrued interest, which contributes to the overall value. Hence the valuation of the Composite is the market price plus all the accrued interest, which is also known as the dirty price. Accrued interest can also be entered in the Composite transaction, and is calculated automatically if the Composite exposes accrued interest.

Futures Variation Margin Extension

The Futures Variation Margin Process can now also be based on the current valuation, instead of the last EOD.

Debt Seniority

Debt issues include the new attribute *seniority*, which refers to the new Seniority object. Seniorities are used to calculate the beta distribution for credit risk. A number of pre-defined seniorities are added automatically.

Analytics and Reporting

Renamed Functions

Some functions have been renamed to better reflect their purpose and capabilities:

Old Menu Name	New Menu Name
Select Trxs	Use Define Portfolio instead
Comm Pos.	Issue Positions
PF Value	Valuation
PFV Analysis	Value Analysis
PF Riskmatrix	Riskmatrix
Risk Analysis	Sensitivity
Credit Analysis	Credit Risk
PF VaR	Value at Risk

Portfolios

The Portfolio Definition has been completely rewritten. Portfolios can now be edited and exported/imported as well. There are four ways to define a portfolio:

- Using a set of filter attributes (corresponding to the classic Define Portfolio function)
- Using a list of predefined named portfolios; the new portfolio being the union of those portfolios
- Selection of transactions from the current portfolio
- One or more specific transactions entered by transaction number

Moreover, a currency pair is now a valid input in the Commodity Selector: Currency and Currency pair are added to the selection list if the browser is used and if the substring contains the currency or the pair explicitly. Otherwise, there would be too many currency pairs to select from. This feature enables the definition of portfolios restricted to an explicit list of main currency pairs, as it is often required by FX traders.

Value at Risk Extensions

Expected Shortfall (Tail Loss) in parametric VaR: The parametric Value at Risk (VaR) module has been extended to calculate and report Expected Shortfall (Expected Tail Loss).

Component Value at Risk (CVaR) is now calculated in both parametric and Monte Carlo VaR functions. CVaR is calculated on all levels of a VaR report, such that the VaR contribution of each level is known. The sum of CVaR over all components (levels) is equal to the total VaR of the portfolio.

CVaR is also the basis of Incremental VaR (IVaR) and Marginal VaR (MVar):

- $MVaR = CVaR / \text{componentNPV}$ (corresponds to VaR delta)
- $IVaR = MVar * \text{incrementalPositions}$

Specific Risk (specific VaR) is now available in parametric value at risk reports. Svar shows the diversifiable, non-systematic, or specific, value at risk for equity exposures. The calculation is based on specific equity volatilities in the given rate scenario.

Student t distribution is now supported for MC VaR: The MC VaR calculation form accepts an additional parameter, *degrees of freedom*, which is relevant if Student's t distribution is selected.

Variance Inflation Factor: In case of a non positive semidefinite covariance matrix the MC VaR log now also shows the variance inflation factors of the correlation matrix for each VaR risk dimension. The variance influence factors are calculated as the diagonal of the inverse of the correlation matrix.

Banknotes and Metals

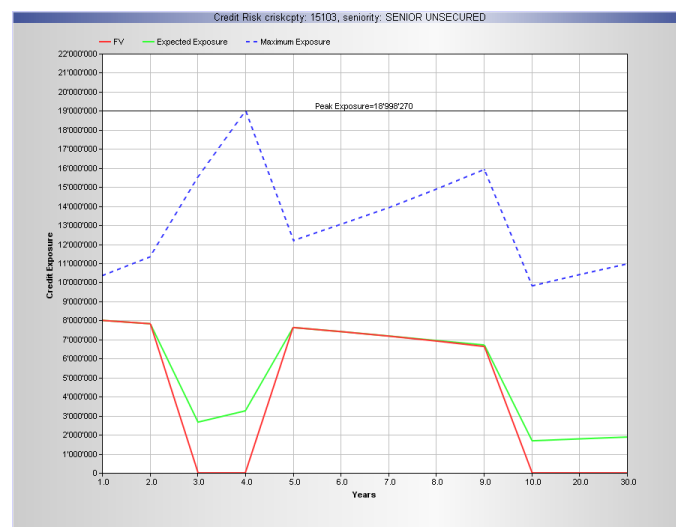
- Banknotes are modeled as commodities and can be mapped to the underlying currency for the purpose of VaR calculations.
- Physical metal commodities, e.g. coins, are mapped to RiskMetrics metal risk factors, applying the correct conversion factors (e.g., \$-Eagle to GLD (XAU in USD)). The existing commodity attribute `VaRmap` is used for this mapping.
- Metal currencies, e.g. gold in grams, are mapped to the underlying commodity risk factor (e.g. currency gold in grams to RF GLD: gold in ounces).

Credit Value at Risk

The Quantax Monte Carlo Credit Risk function implements the credit risk framework published by the RiskMetrics Group. The model estimates portfolio risk due to credit events, i.e., credit quality migrations or rating transitions and defaults. It measures the uncertainty in the forward value of the portfolio at the risk horizon – say, one year from now – caused by the possibility of up / downgrades and default.

The model allows measuring this risk for all instruments, not only traditional credit facilities, in a consistent manner. Estimates of potential loss are calculated based on rating scenarios generated by Monte Carlo simulation, statistic recovery rates and market volatility of underlying risk factors. Potential credit exposure is then calculated based on the forward value of portfolio positions and this potential loss distribution. The distribution of simulated potential exposures at the risk horizon is finally evaluated to calculate credit statistics, such as potential exposure not exceeded within a given confidence level, mean and standard deviation of potential exposure as Credit VaR.

The following Quantax Chart show a typical credit exposure over time for a given counterparty and debt seniority:



Combo Reports

In Quantax 4.4, combinations of reports were available as custom_12 reports. In Quantax 4.5, the concept has been formalized as Combo Reports. Two or more pivot reports can be combined with numeric operations applied amongst the cells of a pair of reports. Combo Reports are created with Positions → Combo Reports.

Extensions to Report Functions

Accrued Interest Report

Accrued and cash interest can now be reported in any given date grid, in the past or for future dates.

Cash Flow Report

Cumulative positions (running totals for date series) are now calculated for all cashflow categories, in original and in reporting currency. In addition, inverse cumulative positions are provided for all categories. Inverse cumulative positions are also known as exposures, representing the total cumulative *future* position of a cashflow category per date; e.g., the total nominal position for all dates later than a given date in the reporting grid. This allows reports on asset / liability cashflow, nominal or interest positions per date grid point.

Interest Simulation

The interest simulation function has been significantly extended:

- Direct absolute and relative yield curve entry: The user can now directly enter future yield curves in absolute terms or in relative terms by entering +/- basis point shifts per grid point. In this case the current scenario yield curve is appropriately shifted to generate the future yield curve.

- Absolute or relative volume change parameters: The user can now enter volume changes in relative terms or in absolute terms (target volume, e.g. 100m).
- Immediate reporting option: The interest simulation can now be run in three modes:
 - *Simulation report*: Run the simulation and produce a report based on given report parameters. The simulated transactions will not be retained in this case.
 - *Simulate Trxs*: Run the simulation and generate the resulting simulated transactions as private transactions.
 - *Yield curves*: Generate and display the simulated yield curves.

Issue Positions (formerly Comm Pos)

Additional attributes available:

- *begindate*, the begin date of the issue (might be useful for some regulatory reporting)
- *clean value*, the mkt value excluding accrued interest

P/L Analysis

Similarly to the Valuation Analysis report, the P/L Analysis report is now also based on the current portfolio. Existing reports will continue to work, provided that the current PF has no restrictions apart from book and product.

Comm FX Risk Position

Consolidated metal risk (in XAU, XAG etc.) can now be optionally calculated. The "artificial" (metal) currencies mapped to an official ISO currency code in their static data definition are consolidated.

FX Spot Position

If the FX Spot Position report is run with the delta adjusted option flag, the FX option positions are transformed to the underlying delta position

Static Data

Static Data Editing

Static Data handling has been completely rewritten as part of the Kahua project. The Define and Show Static Data functions have been combined into an Edit function that is used both to create new and edit existing objects. Editing, saving and importing/exporting objects is now much more consistent among objects.

Secondary Identifiers and Fields (SIDs) can now be configured using a wider variety of data types, including references to other static objects.

Seniority Object

A new object, Seniority, can be linked to credit issues and is used in the calculation of credit risk. Five standard seniorities are automatically added to the database, using the CreditMetrics distribution parameters.

Administration

Data Warehouse Cleanup

Reorg. DWH prunes fast-growing tables in the Data Warehouse, according to the configuration of horizons in the cleanup parameter in the SQL Formatter section of the Interface Configuration.

Rates

Scenarios can now also contain default price sets for the FX risk factor .XS. This is useful if many currencies are defined.

Cash Financing

Specific cash financing rates, independent of horizon, are now supported.

Archiving

The new transaction element `archiveDate` is filled in online exports before an archived transaction is deleted. Therefore, it can be used in the DWH to identify transactions that have been archived and hence are no longer in Quantax.

Exotic Asset transactions are now archived.

User Interface

User Groups

Users can now be grouped into **User Groups**. Each **user** belongs to one or more user groups. This group defines all roles and hence access rights for the user. Each **role** gives rights to some functionality within Quantax. The user group also defines the menu its users will see. In the multi-entity configuration of Quantax, the group also controls the contexts a user is entitled to enter.

Users and user groups are maintained using the [Group User Folder \(GRUF\)](#), which replaces the Zope built-in User Folder used in previous versions. GRUF also allows to plug in different authentication systems, such as LDAP.

Single Signon through LDAP integration

Quantax provides an optional interface to Identity Management Services over LDAP. The Identity Management Service (such as

ActiveDirectory) can provide login information, password handling, and roles and group management.

Handling of Bad Logins

A qconfig parameter defines how bad logins are handled. By default, bad logins are ignored. However, the password can be reset after a number of bad logins within a range of elapsed time.

New Portal

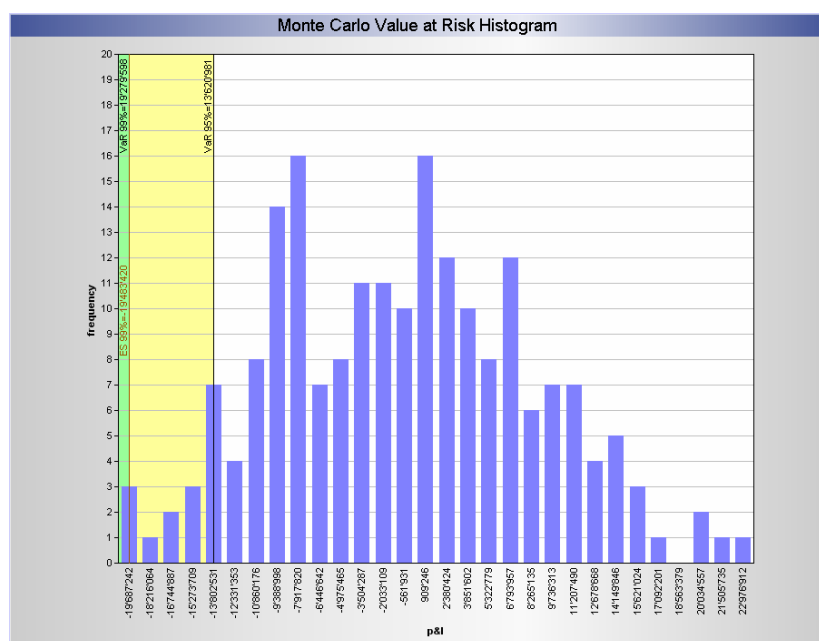
The Portal is used as a container for the Quantax functions and additional reporting functions (e.g., display and browse of files in a directory tree, access data from the relational warehouse with filter functionality). The Portal itself provides only a container for services; the services themselves are implemented by Quantax or additional software, such as a query browser into the DWH. However, the Portal itself does not require any additional software or database.

The Quantax menus presented to users are completely configurable per user group. Pages external to Quantax can be linked seamlessly into the menu. The user group defines the menu its users will see. If the user belongs to more than one user group for which there are menus defined, he will get a group selection box in the top menu bar. If he changes the selection, a new menu will be displayed.

External Pages can rely on authenticated user information, which is passed from the Portal to these pages.

New Charts

Charts available in Quantax Reports are produced using a new charting package, *ChartDirector*, resulting in charts that look more professional, such as the following Value-at-Risk chart:



Firefox Support

Firefox 2.0 or later is now supported for the Quantax GUI.

Integration

Locking of Interfaces

Interfaces can now be locked, e.g., to prevent transaction entry during end of day reporting.

New and changed Exportable / Importable Objects

- Exotic Instruments
- Portfolio Definitions no longer use opaque elements; the definition is now fully exposed.
- Menus (new object)
- Rate Index Functions (new object)
- Transition probability matrices (new object)
- Debt Seniorities (new object)
- The inclusion of payment cash flows is now optional in a transaction export, reducing the export size if omitted. This is controlled by a flag in the export selection.
- Date Terms (e.g., 2007-01-06 1M) in report results are now exported as the date + term string (in skey) as well as the date (in dkey)

Transaction Reports exportable as Pivot Reports

Transactions reports had their own export format in Quantax 4.4. In Quantax 4.5, transaction reports can be exported like pivot reports. The facts correspond to value attributes, the dimensions to non-value attributes. The names of dimensions and fact are the header names,

which may differ from the attribute names. There are no predefined element or column names required for the new style export of the Transaction Report, so no problems arise with the maximum number of columns for certain DBMS.

Export of Pivot Reports

An additional element *dlevel* has been added to *Report*→*Pivot*→*Cell*→*Descriptor* to distinguish levels of expanded elements. 0 is the root or only level.

The XML export of huge pivot reports (with thousands of cells) is now much faster and uses less memory.

SQL Procedure to read pivot reports

An MS SQL Server stored procedure, `sp_quantax_report` is now included in the Quantax distribution, and will be automatically installed into the data warehouse. The procedure generates a flat table from

Quantax pivot report result. This procedure was contributed by Daniel S. Weber, Raiffeisen Schweiz.

New Quantax Task Scheduler (QTS2)

The Quantax Task Scheduler 2 allows automated date and time driven Quantax task execution, e.g., for periodic report production, automatic end of day revaluation etc. Quantax URL requests are executed at times specified in a schedule and the output is directed to file directories and / or e-mail addresses as defined in the Output object. Any Quantax function accessible via URL can be automated.

QTS2 is a complete rewrite of the previous Quantax Task Scheduler. The main differences to the previous version are:

- The Tasks execute in parallel.
- The configuration file is executable and readable.
- QTS2 can be customized with callback functions.
- QTS2 may be invoked by external task schedulers, such as the Windows Task Scheduler.

Quantax Infotec Rate Feed (QIRF) Changes

QIRF now supports the *SecurePass* facility, so it is no longer necessary to keep a Quantax password in the configuration file.

The order in which rate data fields are used can now be easily specified per PriceSet or YieldCurve, using the fieldOrder keyword.

Technical

Quantax 4.5 is based on upgraded versions of the underlying Zope and Python infrastructure. In particular, all persistent Quantax objects are no longer special Extension Classes, but normal Python objects. This streamlines both the code and the operation. The re-write of static objects is based on these new objects.

For more than 25 years, the name COMIT has been synonymous with high quality IT advice and the implementation of specialized IT solutions. Our in-depth knowledge of our business sector has empowered us to build bridges between the IT and Finance. We are able provide our customers with true end-to-end solutions, from strategic consulting through system implementations to the operation of an implemented solution.

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