Algorithmica
Research AB

ARMS Performance Module

General design description

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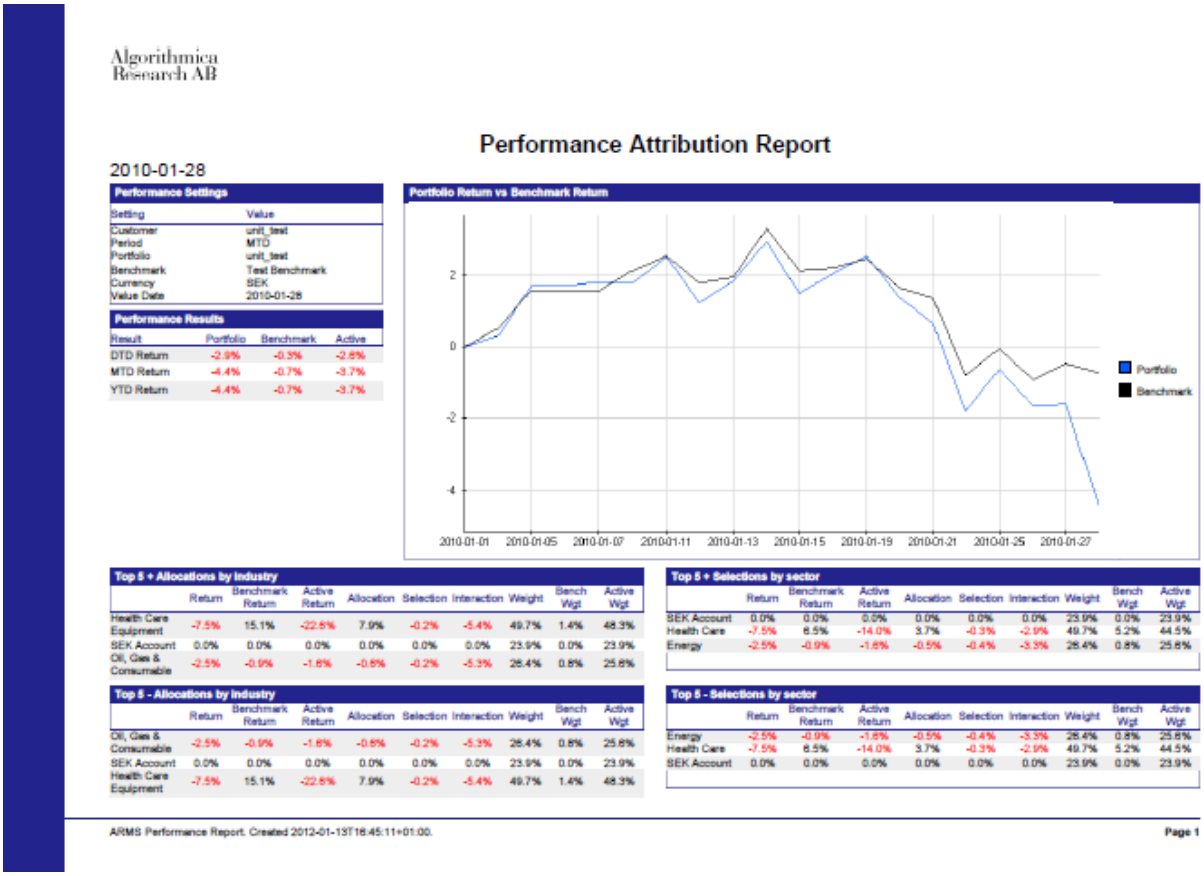
ARMS performance module



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Performance Attribution Report

2010-01-28

Performance Settings

Setting	Value
Customer	unit_test
Period	MTD
Portfolio	unit_test
Benchmark	Test Benchmark
Currency	SEK
Value Date	2010-01-28

Performance Results

Result	Portfolio	Benchmark	Active
DTD Return	-2.9%	-0.3%	-2.6%
MTD Return	-4.4%	-0.7%	-3.7%
YTD Return	-4.4%	-0.7%	-3.7%

Portfolio Return vs Benchmark Return

Top 5 + Allocations by Industry

	Return	Benchmark Return	Active Return	Allocation	Selection	Interaction	Weight	Bench Wgt	Active Wgt
Health Care Equipment	-7.5%	15.1%	-22.6%	7.9%	-0.2%	-5.4%	49.7%	1.4%	48.3%
SEK Account	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	23.9%	0.0%	23.9%
Oil, Gas & Consumable	-2.5%	-0.9%	-1.6%	-0.5%	-0.2%	-5.3%	26.4%	0.8%	25.6%

Top 5 + Selections by sector

	Return	Benchmark Return	Active Return	Allocation	Selection	Interaction	Weight	Bench Wgt	Active Wgt
SEK Account	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	23.9%	0.0%	23.9%
Health Care	-7.5%	6.5%	-14.0%	3.7%	-0.3%	-2.9%	49.7%	5.2%	44.5%
Energy	-2.5%	-0.9%	-1.6%	-0.5%	-0.4%	-3.3%	26.4%	0.8%	25.6%

Top 5 - Allocations by Industry

	Return	Benchmark Return	Active Return	Allocation	Selection	Interaction	Weight	Bench Wgt	Active Wgt
Oil, Gas & Consumable	-2.5%	-0.9%	-1.6%	-0.5%	-0.2%	-5.3%	26.4%	0.8%	25.6%
SEK Account	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	23.9%	0.0%	23.9%
Health Care Equipment	-7.5%	15.1%	-22.6%	7.9%	-0.2%	-5.4%	49.7%	1.4%	48.3%

Top 5 - Selections by sector

	Return	Benchmark Return	Active Return	Allocation	Selection	Interaction	Weight	Bench Wgt	Active Wgt
Energy	-2.5%	-0.9%	-1.6%	-0.5%	-0.4%	-3.3%	26.4%	0.8%	25.6%
Health Care	-7.5%	6.5%	-14.0%	3.7%	-0.3%	-2.9%	49.7%	5.2%	44.5%
SEK Account	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	23.9%	0.0%	23.9%

ARMS Performance Report. Created 2012-01-13T16:45:11+01:00. Page 1

Summary

ARMS performance module is designed for analyzing portfolios along position groupings and market factor drivers. Standard or custom benchmarks can be used for relative performance measures. An elaborate benchmark handling provides a new dimension to portfolio analysis since it allows for decomposition of the benchmark in the same way as the portfolio. Asset allocation and selection performance according to the popular Brinson-model is available together with more customized ways of splitting performance. Both natural splits such as asset class, instrument type, and risk-factor type as well as custom splits can be presented both from an absolute return and relative return perspective together with risk and stress testing.

In order to provide maximum flexibility in implementation and completeness, both actual portfolio transactions and benchmarks can be imported as real instrument transactions.

A simplified model for importing benchmark data will be available in order to present benchmark returns as comparative index when individual constituents are not available.

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Transaction based analysis

ARMS performance module is based on transactions. Transactions can be loaded into ARMS in a transaction specific XML format. Transactions should include information about the position type transacted, the transaction details, and any dynamic portfolio classifications. The purpose of the transaction is to provide information about when it was done and to what terms. Additionally, for other purposes than performance analysis, also settlement information, classifications etc can be provided in the same way as in the current ARMS Position format.

Transactions can be transformed to positions either in a scheduled batch procedure or dynamically in an ARMS desktop client. Server support will be provided to create normalized starting positions and backward position recalculation. Audit trail will be available for back dated transaction altering.

All transactions that comply with the minimum requirements of the XML schema will be available for performance as well as risk analysis.

If detailed bookkeeping transactions can be provided per underlying security and portfolio, correct profit and loss can be calculated at this level. If cash accounting only can be provided on aggregated level the total performance can only be measured on top portfolio level. Current actively performing assets will then be presented without realized flows.

A compact transaction format for exchange traded instruments will be provided but will require an available instrument definition database.

Transaction-based benchmark handling

Handling of benchmark information will mimic the handling of ordinary transactions. This will enable the user to configure benchmarks in a flexible and realistic manner. By monitoring index constituents as actual transactions, it will be possible, ex ante, to include cash positions in order to recreate a total return benchmark from a non-reinvesting index. It is also possible to provide dynamic transactions in a custom index at the same time as real transactions are made.

In the same way as with regular transactions, a hierarchy of portfolios can be created for each fund/client based on benchmark index portfolios. Index portfolios are stored in a standardized stand-alone context. By using a multi-level portfolio benchmark index, it is possible to split the performance attribution analysis on strategic (i.e. asset class) level and tactical level (i.e. instrument level).

Benchmark portfolios can be created using the same type of instruments that can be handled by ARMS for regular portfolios. This means that it is possible to create a custom benchmark index using regular bonds and frn:s as well as indices having total return features with corporate actions such as rights issues and spin-offs.

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Performance vs bookkeeping

In measuring performance on a year-to-date or period-to-period basis many choices can be made as to what and how it should be calculated and defined.

ARMS is a typical front-office system in terms of how valuations are done. Given a certain valuation date, ARMS will market value all positions using that day's "market state". Using a strict market valuation concept will have implications for certain type of transactions.

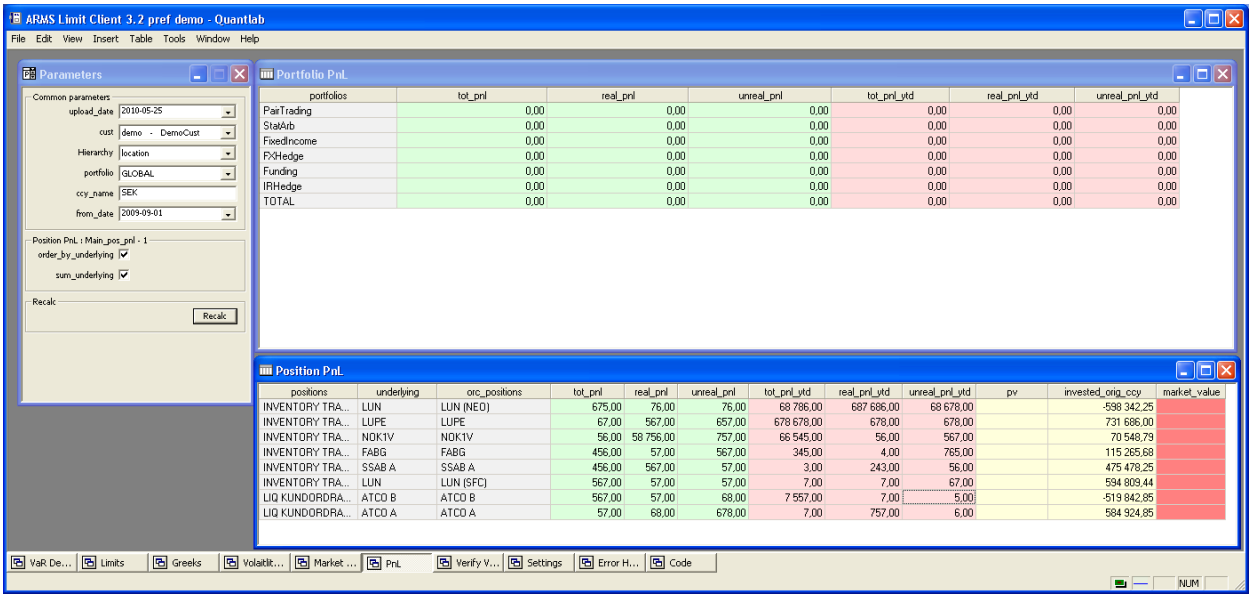
Bonds will be marked to market, or if market quotations are missing, marked to peer group generic curves. (I.e. marked-to-model using generalized market values coming from similar instruments.) This means that current accruals and market price differences will both contribute to performance.

Similarly, a deposit transaction will perform according to its replacement cost i.e. marked to market and not just interest accruals.

For equity related instruments and OTC transactions without intermediate cash-flows the marked-to-market concept will have no material implication how the results can be interpreted.

Total return, realized and unrealized

Portfolio return can be presented at any native level of portfolio and for any period of time. Portfolio performance can further be drilled down to current position level. At the lowest level, performance can be presented as realized and unrealized in the same type of instrument. Provided that information regarding cash reimbursements relating to an instrument type has been provided, realized performance can include such transactions on an "underlying" level.



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Theoretical and market valuations

Market valuations can be performed in many ways depending on the analysis at hand. ARMS will provide a possibility to value any asset according to a listing of market quoted prices. (I.e. last, mid, bid, ask). Also a pure theoretical valuation will be available in the same way as ARMS prices positions using a stylized set of valuation and risk factors.

Highlighting in the workspace where market prices are not valid is a practical feature.

Portfolio/position splits

A number of pre-defined position splitting levels will be provided for aggregation of performance in absolute and relative terms. Splitting positions commonly together with a certain benchmark comes with a limitation on how many natural split types that the benchmark is loaded with.

Typical natural common (absolute and relative) groups are:

- Currency of position
- Instrument type
- Asset class type
- Derivative vs. spot market instruments
- Underlying instrument classification

Position group	Theo mkt value	Weight %	Year to date PnL	Year to date PnL %	Benchmark weight %	Relative PnL	Relative PnL%	Theo mv long	VaR long	Relative VaR	VaR short	Mv gross
TOTAL	568 102 085	100,00%	15 965 993	2,81%	100,00%	15 965 993	100,00%	579 276 585	15 803 228	-11 174 500	485 560	590 451 085
SEK	55 500 517	13,18%	12 700 473	22,88%	9,77%	5 572 135	34,90%	66 675 017	12 757 092	-11 174 500	485 560	77 849 517
EUR	511 555 286	86,64%	10 612 908	2,07%	90,05%	3 221 223	20,18%	511 555 286	10 612 908	0	0	511 555 286
USD	1 046 282	0,18%	390 832	37,35%	0,18%	-146 485	-0,92%	1 046 282	390 832	0	0	1 046 282

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Position group	Theo mkt value	Weight %	Year to date PnL	Year to date PnL %	Benchmark weight %	Relative PnL	Relative PnL%	Theo mv long	VaR long	Relative VaR	VaR short	Mv gross
TOTAL	568 102 085	100,00%	15 965 993	2,81%	100,00%	15 965 993	100,00%	579 276 585	15 803 228	-11 174 500	485 560	590 451 085
equity	1 206 500	3,99%	118 950	9,86%	0,21%	1 190	0,01%	12 381 000	543 339	-11 174 500	485 560	23 555 500
ir_swap	4 071 220	0,69%	457 278	11,23%	0,72%	-34 449	-0,22%	4 071 220	457 278	0	0	4 071 220
bond	525 026 977	88,92%	15 672 216	2,99%	92,42%	14 902 474	93,34%	525 026 977	15 672 216	0	0	525 026 977
ir_future	1 972 242	0,33%	18 578	0,94%	0,35%	8 746	0,05%	1 972 242	18 578	0	0	1 972 242
fx_option	1 672 380	0,28%	124 972	7,47%	0,29%	7 890	0,05%	1 672 380	124 972	0	0	1 672 380
fx_barrier_option	469 634	0,08%	84 658	18,03%	0,08%	31 628	0,20%	469 634	84 658	0	0	469 634
fx_forward	1 046 282	0,18%	390 832	37,35%	0,18%	-146 485	-0,92%	1 046 282	390 832	0	0	1 046 282
cap	32 636 850	5,53%	1 035 396	3,17%	5,74%	417 265	2,61%	32 636 850	1 035 396	0	0	32 636 850

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Some additional position splits can be provided for both benchmark and portfolio given that the benchmark can be updated with the information for all constituents. For example, rating, sector, country.

In addition to the above natural split types that exist for both actual portfolio as well as for the benchmark, an unlimited number of custom specific position / transaction classifications are available. The custom classifications are position specific and must be provided together with the transactions in a classification XML structure.

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Analysis based on custom specific classifications can only be provided in an absolute return context.

Examples of custom classifications are:

- Natural portfolio
- Position strategy
- Economic capital classification
- Accounting headers
- Counterparty

Position group	Theo mkt value	Weight %	Year to date PnL	Year to date PnL %	Theo mv long	VaR long	Relative VaR	VaR short	Mv gross
TOTAL	568 102 085	100,00%	15 965 993	2,81%	579 276 585	15 803 228	-11 174 500	485 560	590 451 085
PairTrading	1 000 000	3,38%	91 803	9,18%	10 475 000	457 589	-9 475 000	426 280	19 950 000
StatArb	206 500	0,61%	69 292	33,56%	1 906 000	114 712	-1 699 500	93 304	3 605 500
FixedIncome	31 882 872	5,40%	659 086	2,07%	31 882 872	659 086	0	0	31 882 872
FXHedge	3 188 296	0,54%	343 621	10,78%	3 188 296	343 621	0	0	3 188 296
Funding	499 187 566	84,54%	15 698 872	3,14%	499 187 566	15 698 872	0	0	499 187 566
IRHedge	32 636 850	5,53%	1 035 396	3,17%	32 636 850	1 035 396	0	0	32 636 850

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Price/risk factor splits

All risk factors used in ARMS can be individually classified to an unlimited number of classification categories. By default only risk factor class type is defined; (i.e. equity, index, volatility, interest rate, credit spread, commodity, and fx).

All positions will be mapped to one or many of the risk factors available in ARMS. Since also the benchmark constituents will be mapped to the appropriate risk factors (ideally using a 1:1 mapping), a concurrent risk and performance analysis can be performed on the portfolio and benchmark in any of the available risk factor classifications.

Typical custom risk factor classifications are:

- Maturity buckets
- GICS sector classification
- Country
- Exchange trade vs over the counter pricing

Name	Factor PnL	Relative PnL %	Portfolio VaR	Benchmark VaR	Relative VaR
TOTAL	15 965 993	100,00%	15 965 993	15 803 228	485 560
a) less than 3-months	-1 301 443	-8,15%	0	0	0
b) up to 1-year	-1 305 648	-8,18%	7 934	7 934	0
c) up to 5-years	-288 781	-1,81%	1 703 914	1 703 914	0
d) up to 10-years	10 841 021	67,90%	14 805 270	14 805 270	0
e) up to 20-years	-1 301 443	-8,15%	0	0	0
f) more than 20-years	-1 301 443	-8,15%	0	0	0
z) unclassified	99 839	0,63%	4 720 709	4 720 709	0

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When performance is split on price/risk factors, individual and groups of risk factors do not additively explain the entire performance of a position or portfolio. This is typical for non-linear positions where there are interaction effects on the pricing function between different risk factors. For example, an option has interaction effects between underlying asset price and implied volatility. An additional "Interaction" classification will be introduced in order for the performance to be additive. For risk measures like Value-at-risk which is also a non-additive measure, the interaction factor can also be interpreted as a diversification effect.

Name	Factor PnL	Relative PnL %	Portfolio VaR	Benchmark VaR	Relative VaR
TOTAL	15 965 993	100,00%	15 965 993	15 803 228	485 560
interaction	1 425 432	8,93%	4 873 958	4 873 958	0
credit_spread	9 434 927	59,09%	15 866 154	15 866 154	0
equity	1 190	0,01%	118 950	543 339	485 560
fx	-121 920	-0,76%	335 507	335 507	0
index	0	0,00%	0	0	0
inflation	0	0,00%	0	0	0
interest_rate	-711 822	-4,46%	3 311 810	3 311 810	0
unclassified	0	0,00%	0	0	0
volatility	-234 147	-1,47%	1 735 599	1 735 599	0

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Multi-dimensional splits

Absolute risk and performance can also be calculated and presented in multi-dimensional splits. It is possible to create 2-dimensional position grouping splits and 2-dim factor-position splits. This is especially convenient when working with fixed income products where the combination performance should be explained along the maturity curve.

Position Groups	1m	3m	9m	2y	4y	6y	8y	10y	15y
GLOBAL	17 644 570	17 644 570	17 644 570	17 644 570	17 644 570	17 644 570	17 644 570	17 644 570	17 644 570
PairTrading	98 216	98 216	98 216	98 216	98 216	98 216	98 216	98 216	98 216
StatArb	76 313	76 313	76 313	76 313	76 313	76 313	76 313	76 313	76 313
FixedIncome	108 988	108 988	108 988	108 988	108 988	108 988	108 988	108 988	108 988
FXHedge	377 914	377 914	377 914	377 914	377 914	377 914	377 914	377 914	377 914
Funding	17 491 820	17 491 820	17 491 820	17 491 820	17 491 820	17 491 820	17 491 820	17 491 820	17 491 820
IRHedge	1 383 957	1 383 957	1 383 957	1 383 957	1 383 957	1 383 957	1 383 957	1 383 957	1 383 957

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Server-side calculations

All performance metrics that can be calculated in the client can also be configured to calculate and store in the result database for inclusion on performance reports etc.

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