ARM

A commodity risk management system.

1. ARM: A commodity risk management system.

- ARM is a complete suite allowing the management of market risk and operational risk for commodities derivatives.

- 4 main modules are available:
  - 1.1. Market Data Management,
  - 1.2. Pre-trade pricing,
  - 1.3. Trade management,
  - 1.4. Market risk Analysis.

1.1. Market Data Management.

- Flat prices and volatility management following market conventions (ex. EFS and swap/swap for Platt's Products, Base metals leads by 3M contract…).
- Asset classes available: Oil, Precious Metals, Base Metals, Carbon Emissions, Coal, Iron Ore, Agricultural, Power, Natural Gas and Currencies.
- Real time links by contract with Bloomberg and Reuters.
- Real time charting capabilities of flat price, volatility, smile...
- Real time contribution and subscription across trading places.
- Official and time zone closings.
- Users can define their own layout by tab, each tab includes a set of curves or charts.
- Crack and differential can be defined dynamically.

1.1.1. Market Data Configuration Editor.

Actions (delete, open)

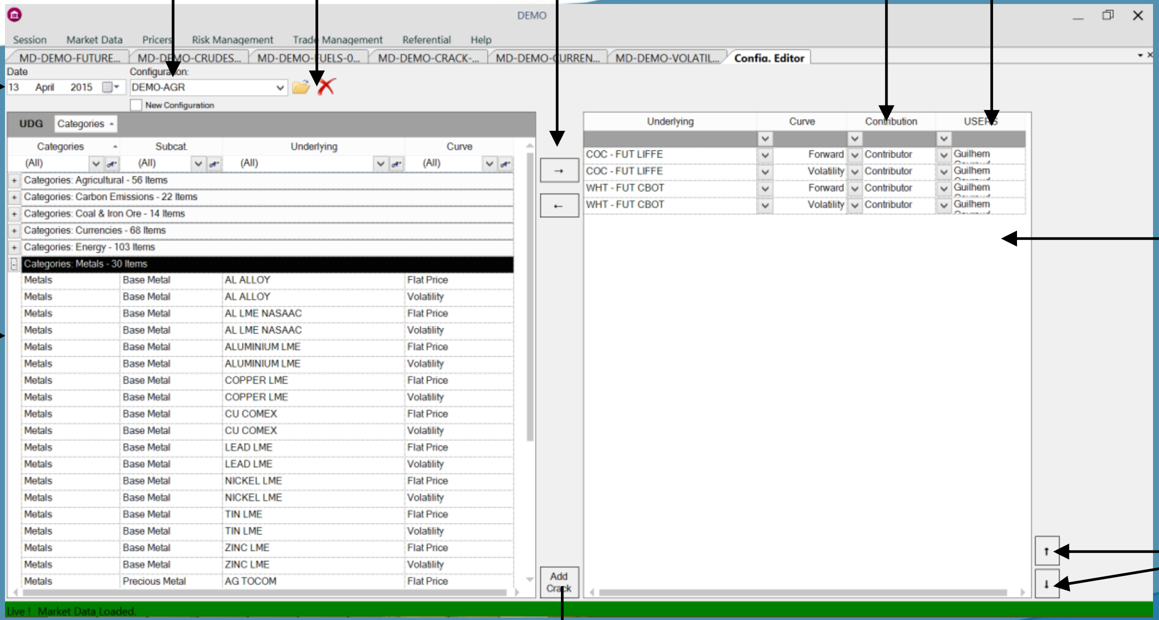
Contribution State

Configuration Name

Select or remove underlyings

User you subscribe to, or contribution under which token (Master or User)

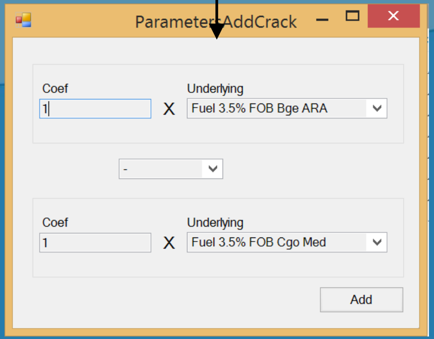
Trading date.



Selected underlyings.

Underlying Referential, classified by category, sub category and curve type (volatility, flat price ….)

Change underlying order.



User defined cracks and differential.

1.1.2. Oil.

Market Data block can be hidden

Average and Spread Calculator

EFS Pillars: Swap are recalculated from master future and the EFS

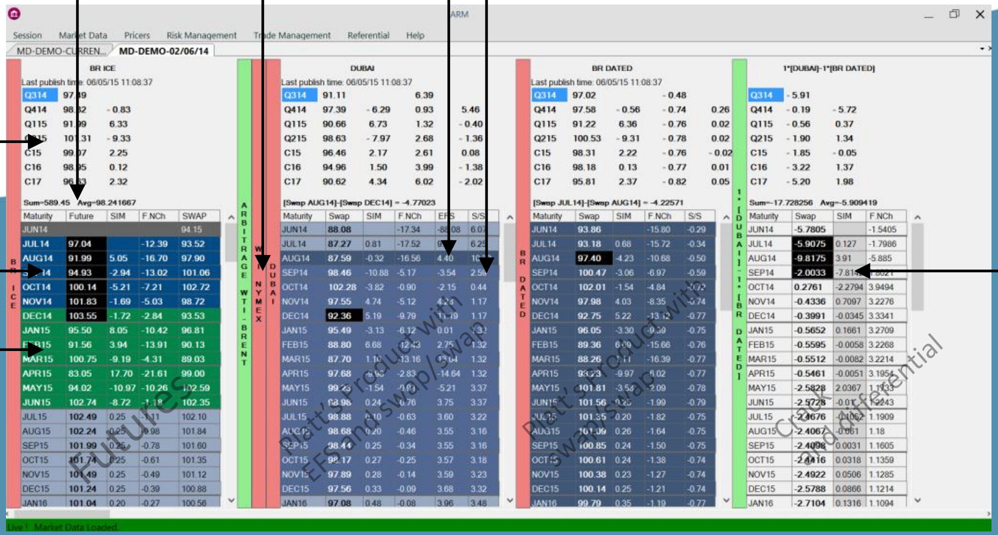
Swap/Swap Pillars: Swap are recalculated from master swap and the Swap/Swap

Swap pricer

Mid live feed from Bloomberg

Spread live feed from Bloomberg

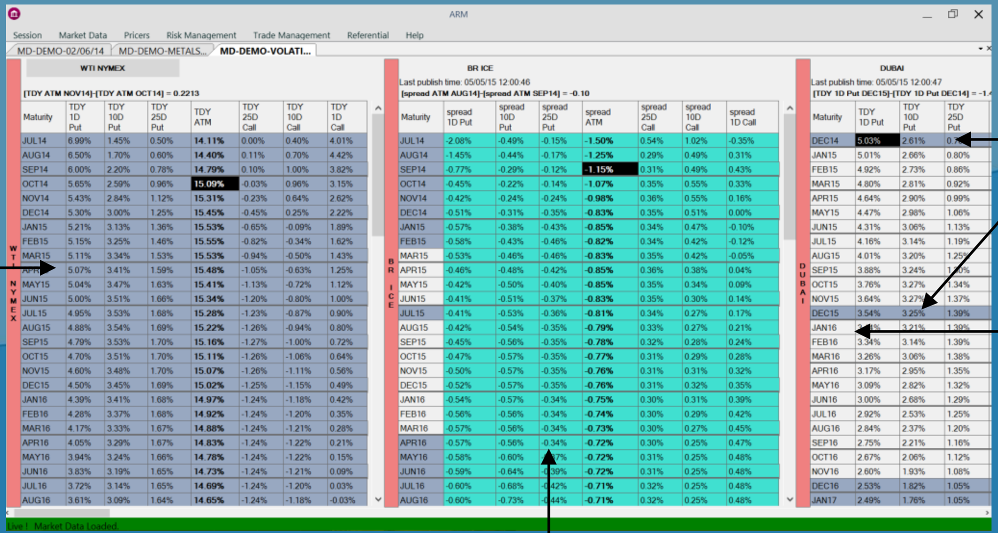
Crack and differential are updated in live



Master bullet volatility.

Pillars with interpolated values between.

Slave Asian volatility managed by spread, or volatility.



Slave bullet volatility, managed by spread, or volatility.

1.1.3. LME Base Metals.

Interpolated values between pillars.

Pillars

Reference Contract with live feed from Bloomberg

Volatility with live feed from Bloomberg

ARM

Session | Market Data | Pricers | Risk Management | Trade Management | Referential | Help

MD-DEMO-02/06/14

COPPER LME

Last publish time: 06/05/15 11:00:48

[Outright SEP14]-[Outright OCT14] = 6.00

Maturity	Promptdate	Outright	SIM	F.NCh	F.vs3M	Out.NCh
SPOT	04/06/2014	6999.22		0.08	74.00	81.22
JUN14	18/06/2014	6967.22	32.00	-5.92	42.00	75.22
JUL14	16/07/2014	6945.22	22.00	-4.92	20.00	76.22
AUG14	20/08/2014	6930.22	15.00	-1.92	5.00	79.22
3ML	02/09/2014	6925.22	5.00	81.14	0.00	81.14
SEP14	17/09/2014	6921.22	4.00	1.08	-4.00	82.22
OCT14	15/10/2014	6915.22	6.00	4.08	-10.00	85.22
NOV14	19/11/2014	6907.22	8.00	3.08	-18.00	84.22
DEC14	17/12/2014	6898.22	9.00	7.08	-27.00	88.22
JAN15	21/01/2015	6894.22	4.00	9.08	-31.00	90.22
FEB15	18/02/2015	6890.22	4.00	10.08	-35.00	91.22
MAR15	18/03/2015	6887.22	3.00	12.08	-38.00	93.22
APR15	15/04/2015	6884.22	3.00	13.08	-41.00	94.22
MAY15	20/05/2015	6881.22	3.00	14.08	-44.00	95.22
JUN15	17/06/2015	6878.22	3.00	14.08	-47.00	95.22
JUL15	15/07/2015	6875.22	3.00	14.08	-50.00	95.22
AUG15	19/08/2015	6871.72	3.50	13.58	-53.50	94.72
SEP15	16/09/2015	6868.22	3.50	13.08	-57.00	94.22
OCT15	21/10/2015	6864.72	3.50	12.58	-60.50	93.72
NOV15	18/11/2015	6861.22	3.50	12.08	-64.00	93.22
DEC15	16/12/2015	6858.22	3.00	12.08	-67.00	93.22
JAN16	20/01/2016	6854.72	3.50	12.58	-70.50	93.72
FEB16	17/02/2016	6851.22	3.50	13.08	-74.00	94.22
MAR16	16/03/2016	6847.72	3.50	13.58	-77.50	94.72
APR16	20/04/2016	6844.22	3.50	14.08	-81.00	95.22
MAY16	18/05/2016	6840.72	3.50	14.58	-84.50	95.72
JUN16	15/06/2016	6837.22	3.50	15.08	-88.00	96.22

Forward with daily maturities hidden

ALUMINIUM LME

Sum=14780.68623 Avg=1847.585779

Maturity	Promptdate	Outright	SIM	F.NCh	F.vs3M	Out.NCh
07/08/2014	07/08/2014	1841.87	-0.34	-0.66	-8.13	9.66
08/08/2014	08/08/2014	1842.20	-0.34	-0.65	-7.80	9.66
11/08/2014	11/08/2014	1843.22	-1.01	-0.63	-6.78	9.69
12/08/2014	12/08/2014	1843.55	-0.34	-0.62	-6.45	9.69
13/08/2014	13/08/2014	1843.89	-0.34	-0.62	-6.11	9.70
14/08/2014	14/08/2014	1844.23	-0.34	-0.61	-5.77	9.71
15/08/2014	15/08/2014	1844.56	-0.34	-0.60	-5.44	9.71
18/08/2014	18/08/2014	1845.58	-1.01	-0.58	-4.42	9.74
19/08/2014	19/08/2014	1845.91	-0.34	-0.57	-4.09	9.74
AUG14	20/08/2014	1846.25	-0.34	-0.57	-3.75	9.75
21/08/2014	21/08/2014	1846.46	-0.21	-0.52	-3.54	9.79
22/08/2014	22/08/2014	1846.67	-0.20	-0.48	-3.33	9.84
26/08/2014	26/08/2014	1847.51	-0.84	-0.30	-2.49	10.01
27/08/2014	27/08/2014	1847.72	-0.21	-0.26	-2.28	10.05
28/08/2014	28/08/2014	1847.93	-0.20	-0.22	-2.07	10.10
29/08/2014	29/08/2014	1848.14	-0.21	-0.17	-1.86	10.14
3ML	02/09/2014	1850.00	-1.86	10.32	0.00	10.32
SEP14	17/09/2014	1857.00	-7.00	0.68	7.00	11.00
OCT14	15/10/2014	1866.75	-9.75	0.68	16.75	11.00
NOV14	19/11/2014	1878.50	-11.75	0.68	28.50	11.00
DEC14	17/12/2014	1887.00	-8.50	0.68	37.00	11.00
JAN15	21/01/2015	1890.75	-3.75	1.18	40.75	11.50
FEB15	18/02/2015	1898.50	-7.75	1.43	48.50	11.75
MAR15	18/03/2015	1906.25	-7.75	1.43	56.25	11.75
APR15	15/04/2015	1913.50	-7.25	1.68	63.50	12.00
MAY15	20/05/2015	1921.75	-8.25	1.93	71.75	12.25
JUN15	17/06/2015	1928.50	-6.75	2.18	78.50	12.50

Forward with daily maturities

ALUMINIUM LME

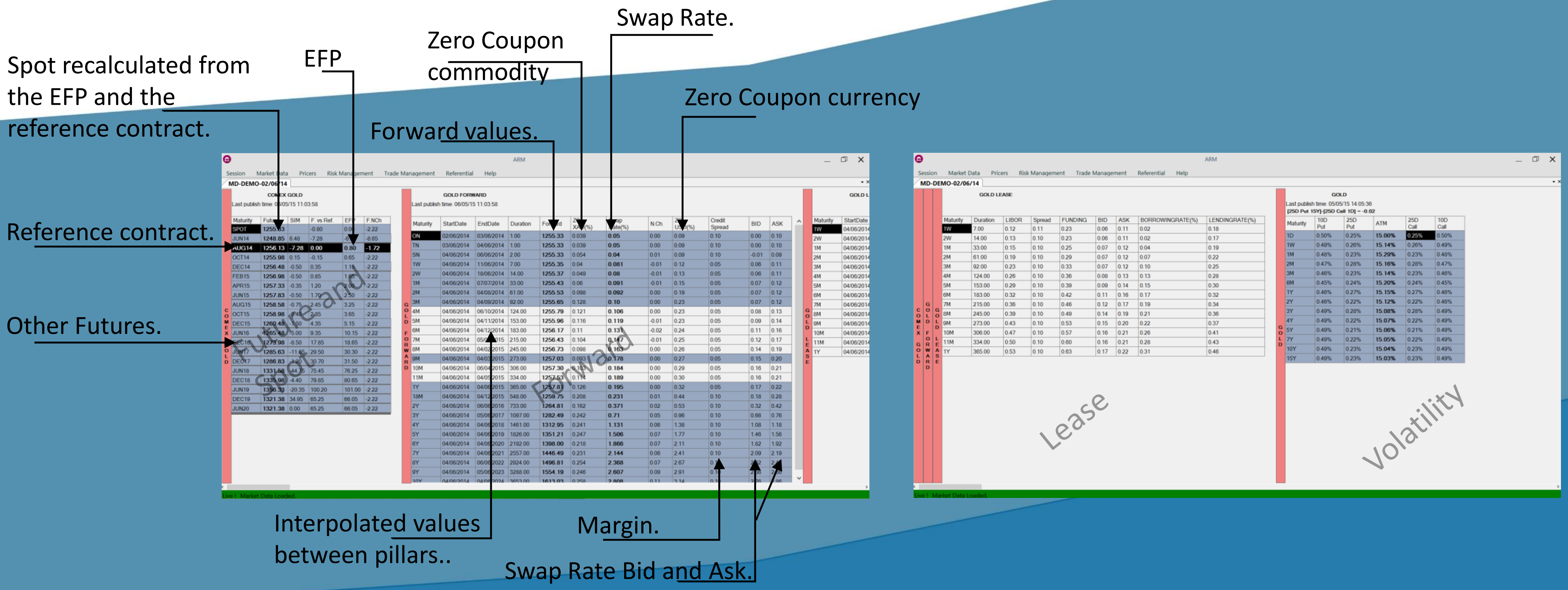
Last publish time: 06/05/15 11:00:41

Maturity	10D Put	25D Put	ATM	25D Call	10D Call
JUN14	17.86%	16.75%	16.25%	17.63%	19.21%
JUL14	17.09%	17.44%	16.05%	18.30%	17.24%
AUG14	16.77%	16.50%	16.56%	17.08%	18.26%
SEP14	16.71%	17.07%	17.20%	18.82%	16.67%
OCT14	16.89%	16.66%	16.72%	17.81%	18.22%
NOV14	17.01%	16.99%	16.80%	17.35%	19.17%
DEC14	16.08%	17.09%	15.81%	17.50%	18.19%
JAN15	17.53%	16.49%	16.87%	17.88%	18.08%
FEB15	17.55%	16.77%	16.46%	16.26%	18.93%
MAR15	17.96%	17.52%	15.95%	17.67%	17.89%
APR15	17.25%	17.26%	17.34%	18.33%	17.85%
MAY15	17.41%	16.80%	16.59%	17.30%	18.09%
JUN15	17.41%	16.80%	16.59%	17.29%	18.09%
JUL15	17.46%	16.84%	16.63%	17.32%	18.13%
AUG15	17.47%	16.84%	16.63%	17.32%	18.13%
SEP15	17.46%	16.83%	16.64%	17.27%	18.14%
OCT15	17.49%	16.85%	16.65%	17.28%	18.15%
NOV15	17.52%	16.89%	16.68%	17.31%	18.18%
DEC15	17.58%	16.95%	16.74%	17.37%	18.24%
JAN16	17.54%	16.95%	16.73%	17.35%	18.22%
FEB16	17.55%	16.95%	16.74%	17.36%	18.23%
MAR16	17.55%	16.96%	16.75%	17.37%	18.24%
APR16	17.58%	17.04%	16.77%	17.36%	18.23%
MAY16	17.58%	17.05%	16.78%	17.37%	18.24%
JUN16	17.59%	17.05%	16.79%	17.38%	18.24%
JUL16	17.63%	17.10%	16.83%	17.42%	18.27%

Volatility

Live ! Market Data Loaded.

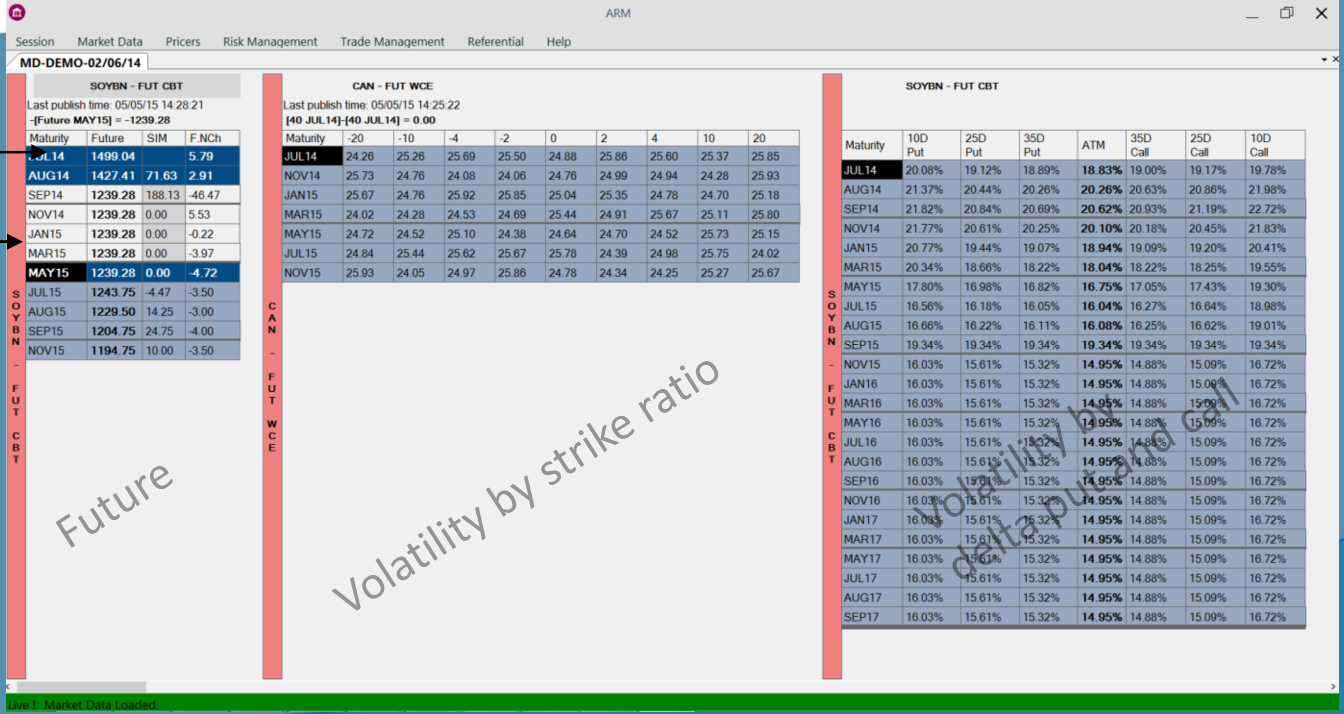
1.1.4. Precious Metals.



1.1.5. Agricultural Products.

Pillars with live Bloomberg feed.

Interpolated future.



SOYBN - FUT CBT

Last publish time: 05/05/15 14:28:21

-[Future MAY15] = -1239.28

Maturity	Future	SIM	F.NCh
JUL14	1499.04		5.79
AUG14	1427.41	71.63	2.91
SEP14	1239.28	188.13	-46.47
NOV14	1239.28	0.00	5.53
JAN15	1239.28	0.00	-0.22
MAR15	1239.28	0.00	-3.97
MAY15	1239.28	0.00	-4.72
JUL15	1243.75	-4.47	-3.50
AUG15	1229.50	14.25	-3.00
SEP15	1204.75	24.75	-4.00
NOV15	1194.75	10.00	-3.50

CAN - FUT WCE

Last publish time: 05/05/15 14:25:22

[40 JUL14]-[40 JUL14] = 0.00

Maturity	-20	-10	-4	-2	0	2	4	10	20
JUL14	24.26	25.26	25.69	25.50	24.88	25.86	25.60	25.37	25.85
NOV14	25.73	24.76	24.08	24.06	24.76	24.99	24.94	24.28	25.93
JAN15	25.67	24.76	25.92	25.85	25.04	25.35	24.78	24.70	25.18
MAR15	24.02	24.28	24.53	24.69	25.44	24.91	25.67	25.11	25.80
MAY15	24.72	24.52	25.10	24.38	24.64	24.70	24.52	25.73	25.15
JUL15	24.84	25.44	25.62	25.67	25.78	24.39	24.98	25.75	24.02
NOV15	25.93	24.05	24.97	25.86	24.78	24.34	24.25	25.27	25.67

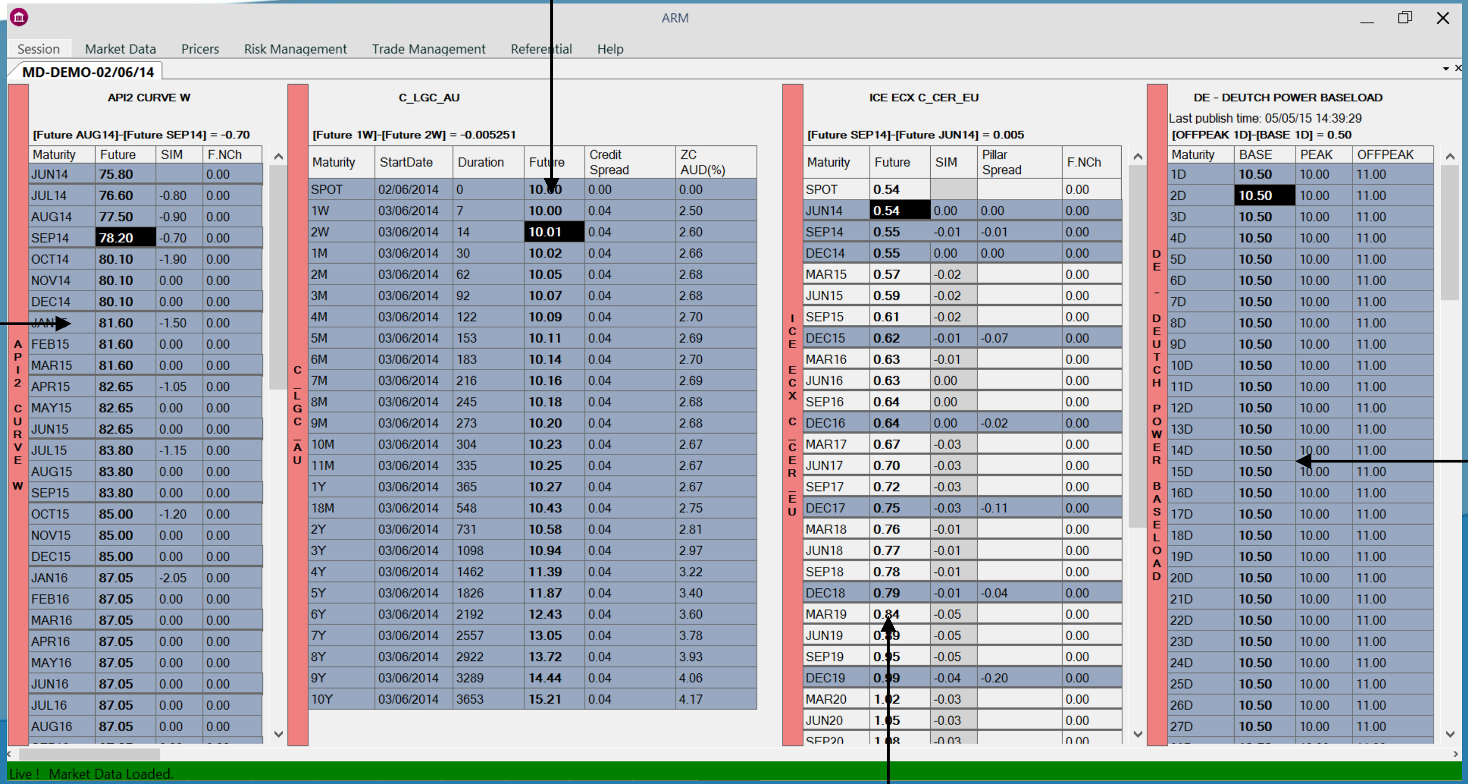
SOYBN - FUT CBT

Maturity	10D Put	25D Put	35D Put	ATM	35D Call	25D Call	10D Call
JUL14	20.08%	19.12%	18.89%	**18.83%**	19.00%	19.17%	19.78%
AUG14	21.37%	20.44%	20.26%	**20.26%**	20.63%	20.86%	21.98%
SEP14	21.82%	20.84%	20.69%	**20.62%**	20.93%	21.19%	22.72%
NOV14	21.77%	20.61%	20.25%	**20.10%**	20.18%	20.45%	21.83%
JAN15	20.77%	19.44%	19.07%	**18.94%**	19.09%	19.20%	20.41%
MAR15	20.34%	18.66%	18.22%	**18.04%**	18.22%	18.25%	19.55%
MAY15	17.80%	16.98%	16.82%	**16.75%**	17.05%	17.43%	19.30%
JUL15	16.56%	16.18%	16.05%	**16.04%**	16.27%	16.64%	18.98%
AUG15	16.66%	16.22%	16.11%	**16.08%**	16.25%	16.62%	19.01%
SEP15	19.34%	19.34%	19.34%	**19.34%**	19.34%	19.34%	19.34%
NOV15	16.03%	15.61%	15.32%	**14.95%**	14.88%	15.09%	16.72%
JAN16	16.03%	15.61%	15.32%	**14.95%**	14.88%	15.09%	16.72%
MAR16	16.03%	15.61%	15.32%	**14.95%**	14.88%	15.09%	16.72%
MAY16	16.03%	15.61%	15.32%	**14.95%**	14.88%	15.09%	16.72%
JUL16	16.03%	15.61%	15.32%	**14.95%**	14.88%	15.09%	16.72%
AUG16	16.03%	15.61%	15.32%	**14.95%**	14.88%	15.09%	16.72%
SEP16	16.03%	15.61%	15.32%	**14.95%**	14.88%	15.09%	16.72%
NOV16	16.03%	15.61%	15.32%	**14.95%**	14.88%	15.09%	16.72%
JAN17	16.03%	15.61%	15.32%	**14.95%**	14.88%	15.09%	16.72%
MAR17	16.03%	15.61%	15.32%	**14.95%**	14.88%	15.09%	16.72%
MAY17	16.03%	15.61%	15.32%	**14.95%**	14.88%	15.09%	16.72%
JUL17	16.03%	15.61%	15.32%	**14.95%**	14.88%	15.09%	16.72%
AUG17	16.03%	15.61%	15.32%	**14.95%**	14.88%	15.09%	16.72%
SEP17	16.03%	15.61%	15.32%	**14.95%**	14.88%	15.09%	16.72%

1.1.6. Iron Ore, Coal, Emissions and Power.

CO2 Emission forward recalculated from a zero coupon currency and the spot price.

Coal and Iron Ore can be managed with monthly contracts or market contracts.



Power with base price, recalculated from the peak and off peak prices

CO2 Emission future interpolated values between pillars

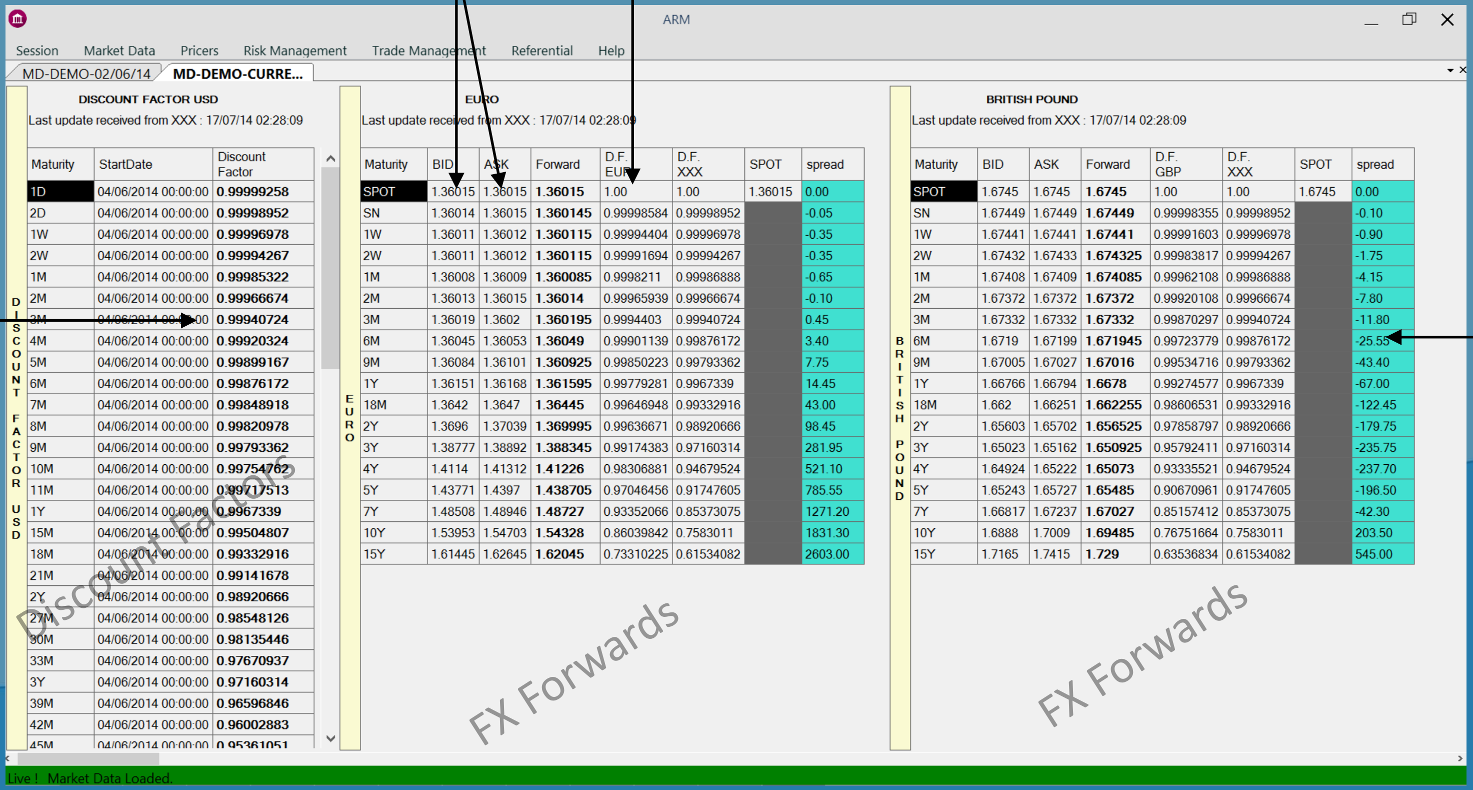
1.1.7. Currencies and Rates.

Live Bid and Ask from Bloomberg.

Live discount factor recalculated
from FX forwards and USD discount factors.

Live discount factors, bootstrapped
from cash rate, futures and IRS.

Forward points



DISCOUNT FACTOR USD

Last update received from XXX : 17/07/14 02:28:09

Maturity	StartDate	Discount Factor
1D	04/06/2014 00:00:00	0.99999258
2D	04/06/2014 00:00:00	0.99998952
1W	04/06/2014 00:00:00	0.99996978
2W	04/06/2014 00:00:00	0.99994267
1M	04/06/2014 00:00:00	0.99985322
2M	04/06/2014 00:00:00	0.99966674
3M	04/06/2014 00:00:00	0.99940724
4M	04/06/2014 00:00:00	0.99920324
5M	04/06/2014 00:00:00	0.99899167
6M	04/06/2014 00:00:00	0.99876172
7M	04/06/2014 00:00:00	0.99848918
8M	04/06/2014 00:00:00	0.99820978
9M	04/06/2014 00:00:00	0.99793362
10M	04/06/2014 00:00:00	0.99754762
11M	04/06/2014 00:00:00	0.99717513
1Y	04/06/2014 00:00:00	0.9967339
15M	04/06/2014 00:00:00	0.99504807
18M	04/06/2014 00:00:00	0.99332916
21M	04/06/2014 00:00:00	0.99141678
2Y	04/06/2014 00:00:00	0.98920666
27M	04/06/2014 00:00:00	0.98548126
30M	04/06/2014 00:00:00	0.98135446
33M	04/06/2014 00:00:00	0.97670937
3Y	04/06/2014 00:00:00	0.97160314
39M	04/06/2014 00:00:00	0.96596846
42M	04/06/2014 00:00:00	0.96002883
45M	04/06/2014 00:00:00	0.95361051

EURO

Last update received from XXX : 17/07/14 02:28:09

Maturity	BID	ASK	Forward	D.F. EUR	D.F. XXX	SPOT	spread
SPOT	1.36015	1.36015	1.36015	1.00	1.00	1.36015	0.00
SN	1.36014	1.36015	1.360145	0.99998584	0.99998952		-0.05
1W	1.36011	1.36012	1.360115	0.99994404	0.99996978		-0.35
2W	1.36011	1.36012	1.360115	0.99991694	0.99994267		-0.35
1M	1.36008	1.36009	1.360085	0.9998211	0.99986888		-0.65
2M	1.36013	1.36015	1.36014	0.99965939	0.99966674		-0.10
3M	1.36019	1.3602	1.360195	0.9994403	0.99940724		0.45
6M	1.36045	1.36053	1.36049	0.99901139	0.99876172		3.40
9M	1.36084	1.36101	1.360925	0.99850223	0.99793362		7.75
1Y	1.36151	1.36168	1.361595	0.99779281	0.9967339		14.45
18M	1.3642	1.3647	1.36445	0.99646948	0.99332916		43.00
2Y	1.3696	1.37039	1.369995	0.99636671	0.98920666		98.45
3Y	1.38777	1.38892	1.388345	0.99174383	0.97160314		281.95
4Y	1.4114	1.41312	1.41226	0.98306881	0.94679524		521.10
5Y	1.43771	1.4397	1.438705	0.97046456	0.91747605		785.55
7Y	1.48508	1.48946	1.48727	0.93352066	0.85373075		1271.20
10Y	1.53953	1.54703	1.54328	0.86039842	0.7583011		1831.30
15Y	1.61445	1.62645	1.62045	0.73310225	0.61534082		2603.00

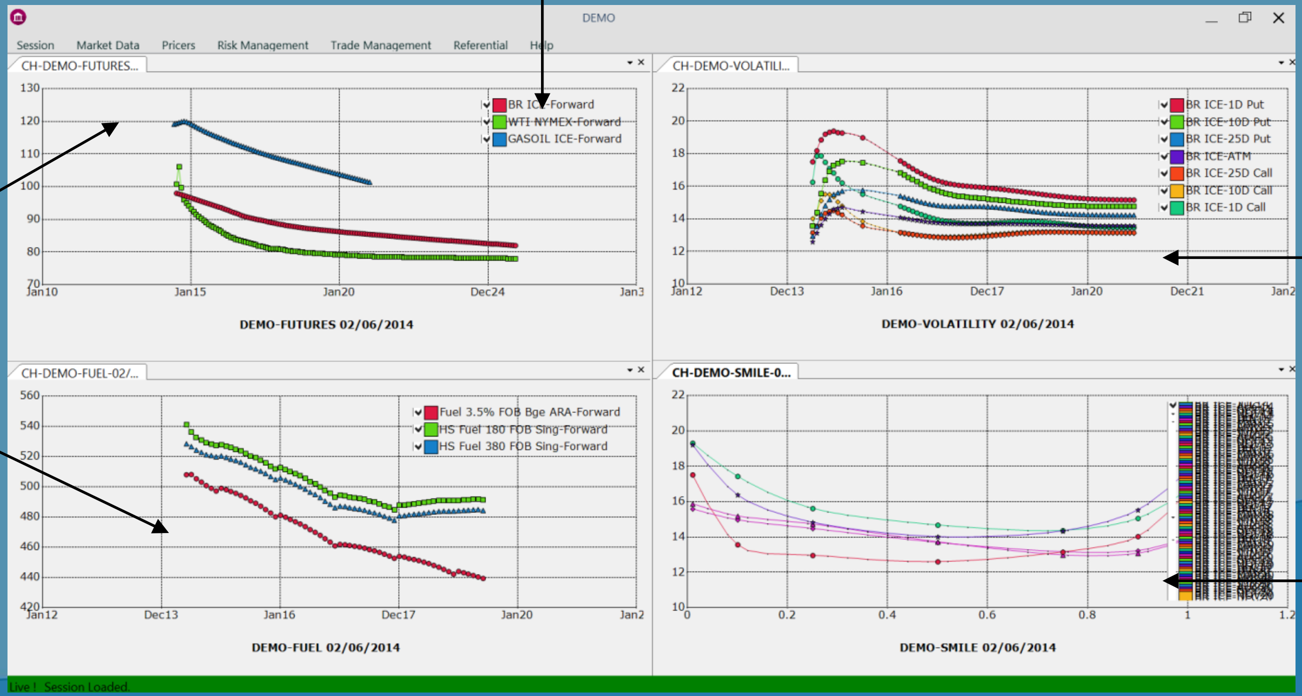
BRITISH POUND

Last update received from XXX : 17/07/14 02:28:09

Maturity	BID	ASK	Forward	D.F. GBP	D.F. XXX	SPOT	spread
SPOT	1.6745	1.6745	1.6745	1.00	1.00	1.6745	0.00
SN	1.67449	1.67449	1.67449	0.99998355	0.99998952		-0.10
1W	1.67441	1.67441	1.67441	0.99991603	0.99996978		-0.90
2W	1.67432	1.67433	1.674325	0.99983817	0.99994267		-1.75
1M	1.67408	1.67409	1.674085	0.99962108	0.99986888		-4.15
2M	1.67372	1.67372	1.67372	0.99920108	0.99966674		-7.80
3M	1.67332	1.67332	1.67332	0.99870297	0.99940724		-11.80
6M	1.6719	1.67199	1.671945	0.99723779	0.99876172		-25.55
9M	1.67005	1.67027	1.67016	0.99534716	0.99793362		-43.40
1Y	1.66766	1.66794	1.6678	0.99274577	0.9967339		-67.00
18M	1.662	1.66251	1.662255	0.98606531	0.99332916		-122.45
2Y	1.65603	1.65702	1.656525	0.97858797	0.98920666		-179.75
3Y	1.65023	1.65162	1.650925	0.95792411	0.97160314		-235.75
4Y	1.64924	1.65222	1.65073	0.93335521	0.94679524		-237.70
5Y	1.65243	1.65727	1.65485	0.90670961	0.91747605		-196.50
7Y	1.66817	1.67237	1.67027	0.85157412	0.85373075		-42.30
10Y	1.6888	1.7009	1.69485	0.76751664	0.7583011		203.50
15Y	1.7165	1.7415	1.729	0.63536834	0.61534082		545.00

1.1.8. Charting.

Displayed curves.



Flat Price Chart.

Volatility Chart.

Smile Chart.

1.2. Pricers.

1.2.1. Swap Pricer:

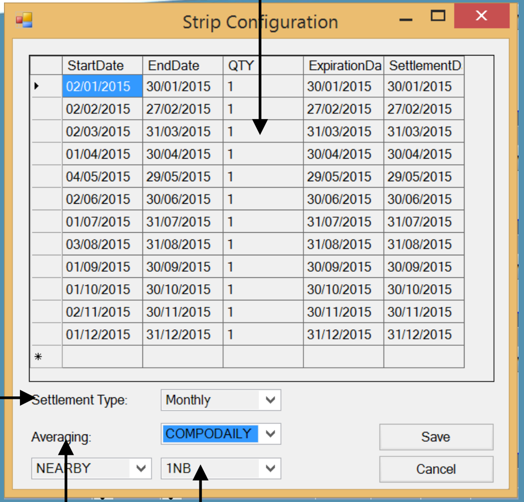
- Users can define 2 legs and calculate the spread.
- Real time update based on underlying market data changes.
- Pricing of swap and forward strip.
- Customisation of the strip : Start date, end date, quantity, settlement date of each period.
- Automatic generation of monthly, quarterly, yearly strip.
- Compo, quanto pricing.
- Rolling and fix nearby.
- Future rolling rules (at option expiry, notice date…).

1.2.2. Option Pricer:

- Same features as swap pricer (without the spread calculation).
- Users can define linear combinations of trades and calculate the total PV and Greeks.
- Strip Pricing of American, European and Asian options.
- Greeks calculation by scenarios.
- Cross and correlation override, volatility bump.
- Detailed risk analysis with scenarios.
- Detailed risk analysis in the future with fixing overrides.
- Display of pricing errors and warnings.

1.2.1. Swap Pricer (screenshots).

Strip definition. It could be fully customized



StartDate	EndDate	QTY	ExpirationDa	SettlementD
02/01/2015	30/01/2015	1	30/01/2015	30/01/2015
02/02/2015	27/02/2015	1	27/02/2015	27/02/2015
02/03/2015	31/03/2015	1	31/03/2015	31/03/2015
01/04/2015	30/04/2015	1	30/04/2015	30/04/2015
04/05/2015	29/05/2015	1	29/05/2015	29/05/2015
02/06/2015	30/06/2015	1	30/06/2015	30/06/2015
01/07/2015	31/07/2015	1	31/07/2015	31/07/2015
03/08/2015	31/08/2015	1	31/08/2015	31/08/2015
01/09/2015	30/09/2015	1	30/09/2015	30/09/2015
01/10/2015	30/10/2015	1	30/10/2015	30/10/2015
02/11/2015	30/11/2015	1	30/11/2015	30/11/2015
01/12/2015	31/12/2015	1	31/12/2015	31/12/2015

Strip generator (Monthly, Quarterly…)

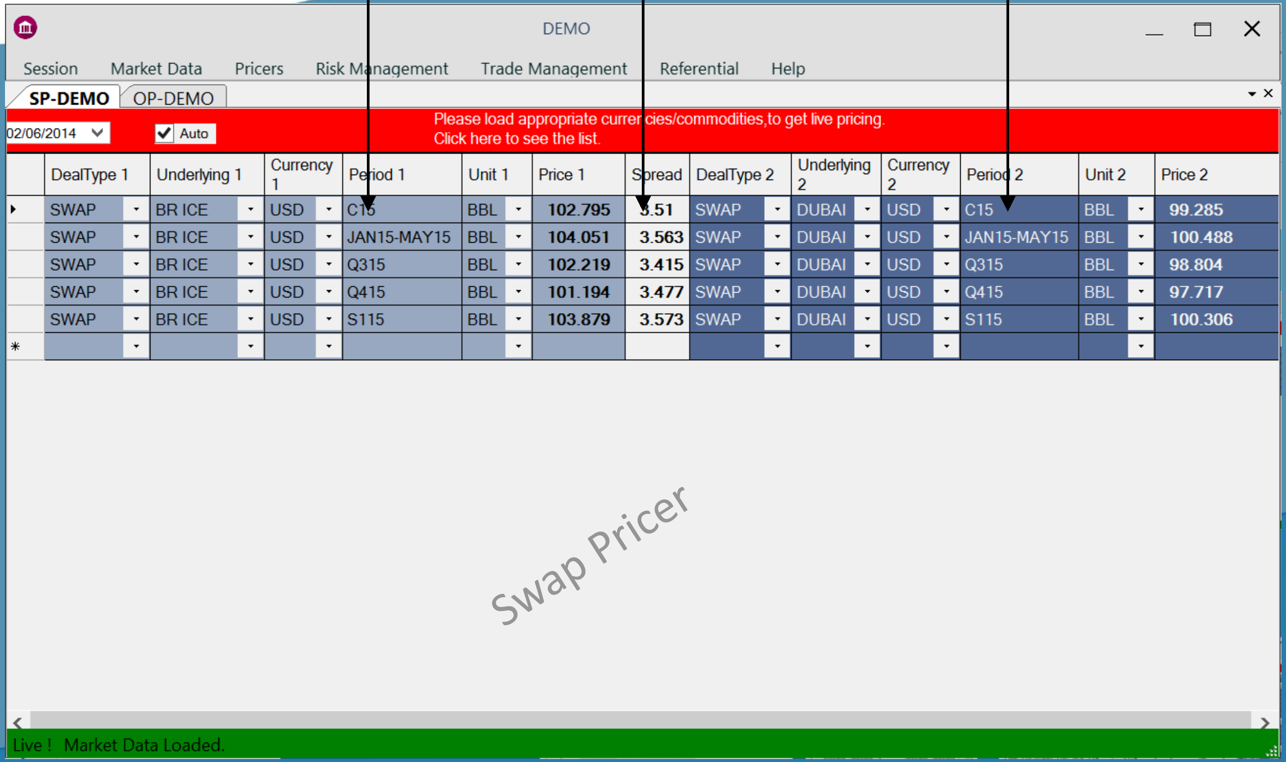
Averaging Method (Quanto, Compo …)

Fixing type

Leg 1.

Spread

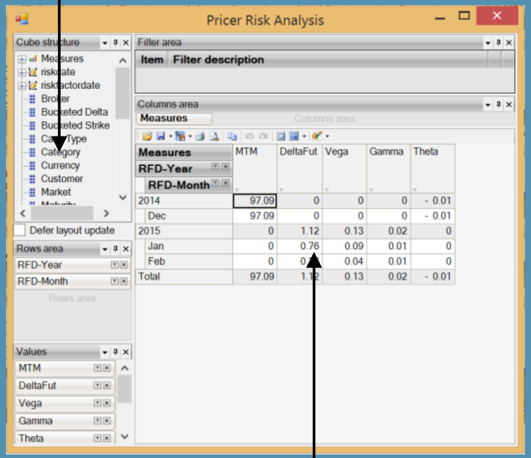
Leg 2.



DealType 1	Underlying 1	Currency 1	Period 1	Unit 1	Price 1	Spread	DealType 2	Underlying 2	Currency 2	Period 2	Unit 2	Price 2
SWAP	BR ICE	USD	C15	BBL	102.795	3.51	SWAP	DUBAI	USD	C15	BBL	99.285
SWAP	BR ICE	USD	JAN15-MAY15	BBL	104.051	3.563	SWAP	DUBAI	USD	JAN15-MAY15	BBL	100.488
SWAP	BR ICE	USD	Q315	BBL	102.219	3.415	SWAP	DUBAI	USD	Q315	BBL	98.804
SWAP	BR ICE	USD	Q415	BBL	101.194	3.477	SWAP	DUBAI	USD	Q415	BBL	97.717
SWAP	BR ICE	USD	S115	BBL	103.879	3.573	SWAP	DUBAI	USD	S115	BBL	100.306

1.2.2. Option Pricer (screenshots).

Dimensions and measures

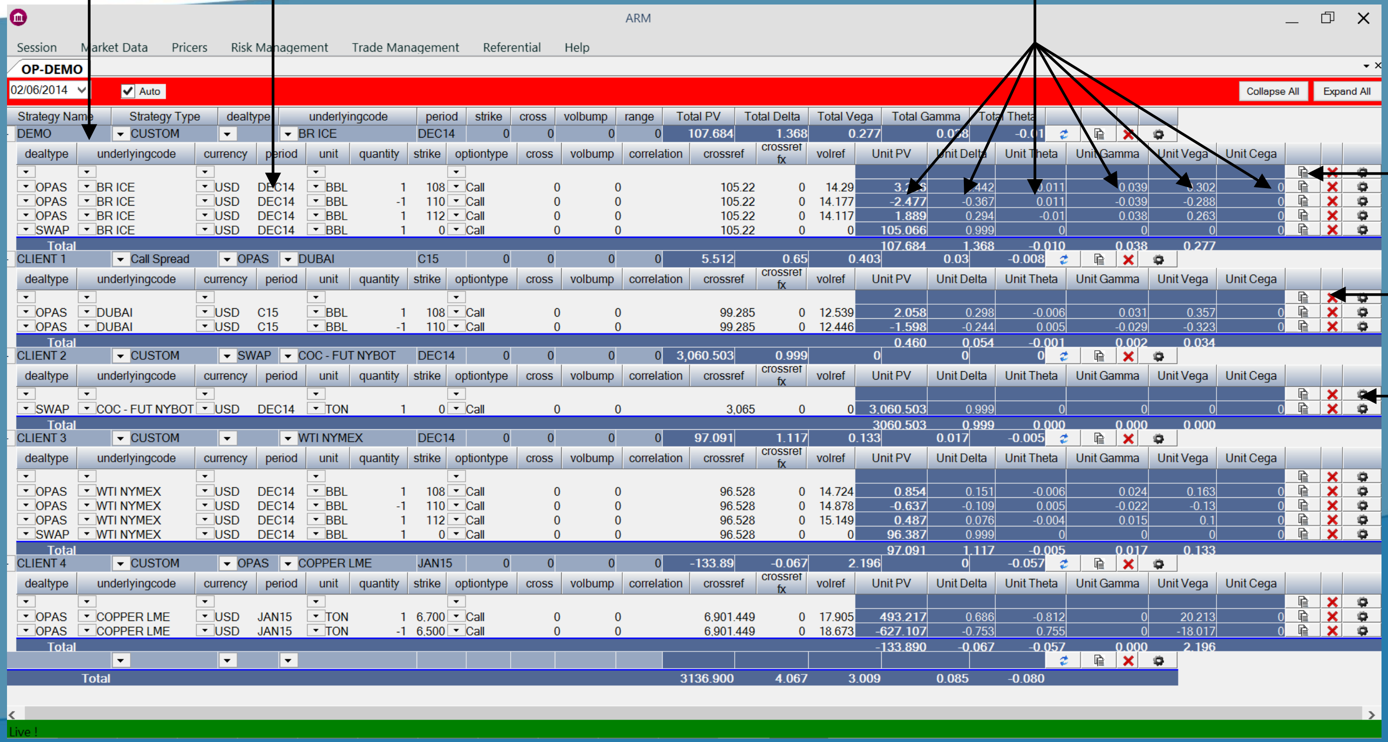


Pivot table

Header

Legs

Greeks and PVs can be displayed by unit, by period or total



Duplicate leg or header.

Delete leg or header.

Pricing option and Risk analysis configuration

1.3. Trade Management.

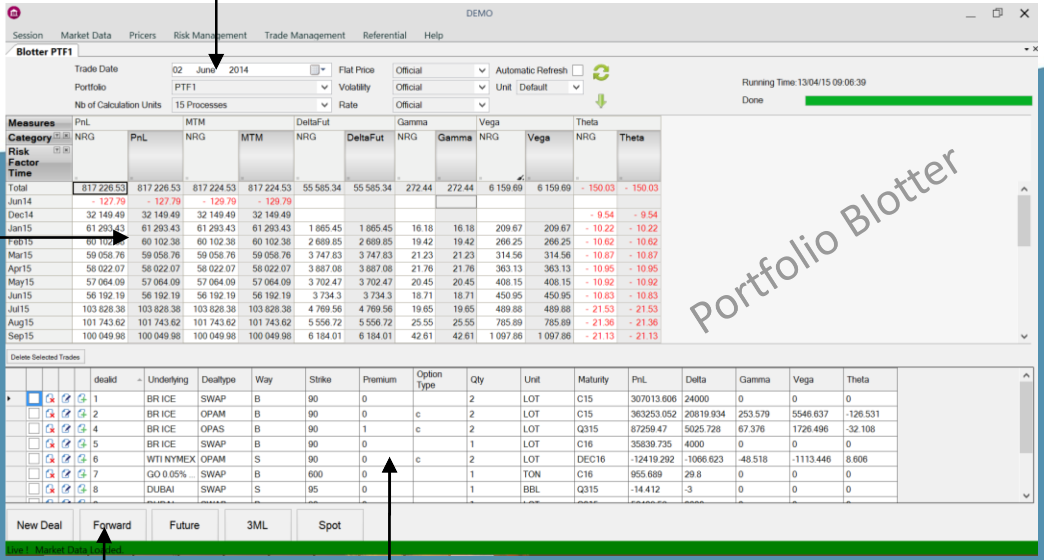
- Futures, Forwards, Swaps, American options, Asian options, European options can be inputted. Physical Contracts are under development and should be ready end of the year 2015.
- Trade versioning: every time a trade is modified or deleted a version is created. A complete trade history is available.
- Full strip customisation (see pricers for details).
- Automatic fees calculation depending on Broker and Clearer.
- Portfolio blotter:
  - Real time portfolio monitoring (PnL, fees, greeks).
  - Trade blotter with greeks and PnL.
  - Quick trade insertion with predefined templates.
  - Trade copy, deletion.
- Trade search by criteria (portfolio, trade type…)
- This module is available as C# heavy client.

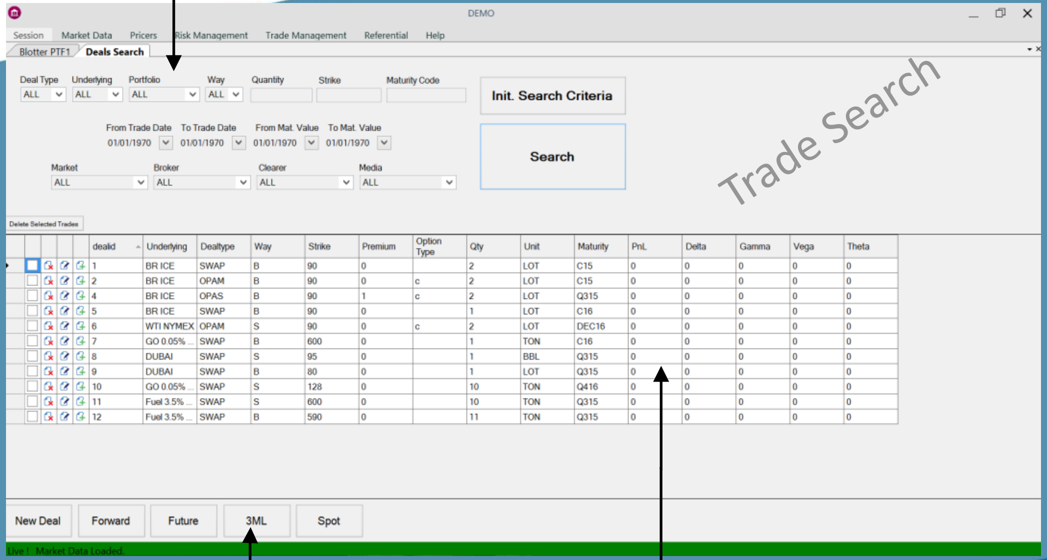
1.3. Trade Management (Heavy client screenshots).

Risk analysis definition, and deal scope definition

Trade search criteria.

Risk analysis



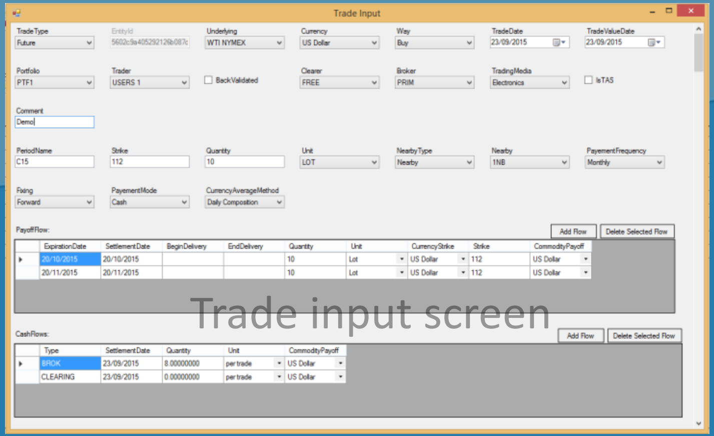


Trade shortcuts

Trade list

Trade shortcuts

Trade list



1.4. Risk Analysis.

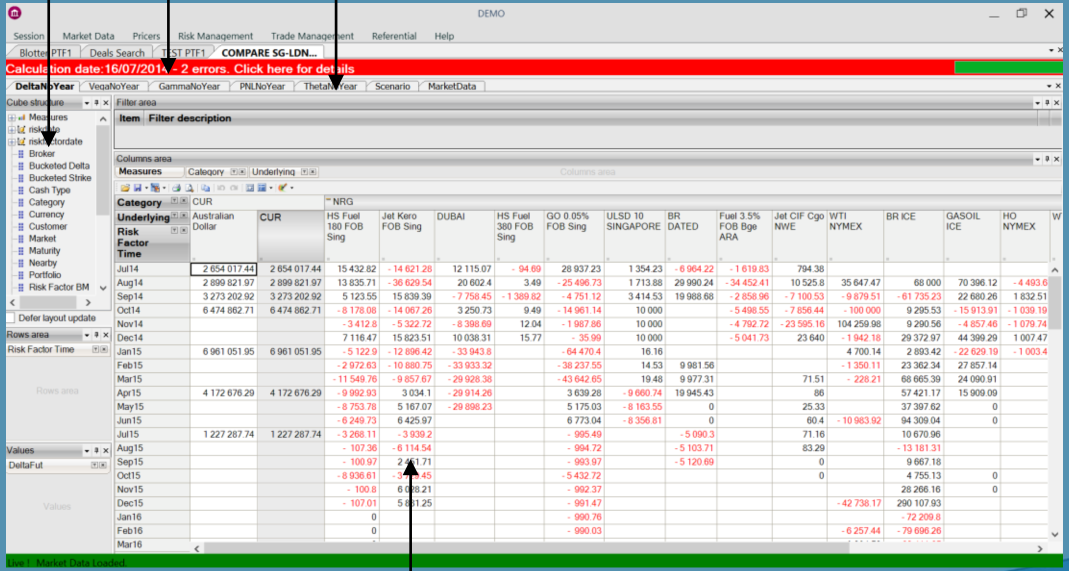
- Risk analysis can be defined by portfolio or trade list.
- Customisable view using pivot table and tab.
- PnL, Mark to Market, greeks and explained PnL ,greeks calculation.
- Bi-axes scenarios, flat price and volatility.
- Calculation distribution on a calculation farm.
- Risk projection on market contracts.
- Drill through to trade id.
- Strike and delta bucketing.
- More than 20 dimensions available (Underlying, portfolio, client…).
- Conditional formatting.
- Users can run risk analysis against different market data sets.
- Comparison of 2 risk analysis.
- Errors and warnings report.

1.4. Risk Analysis (screenshots).

Dimensions and measures

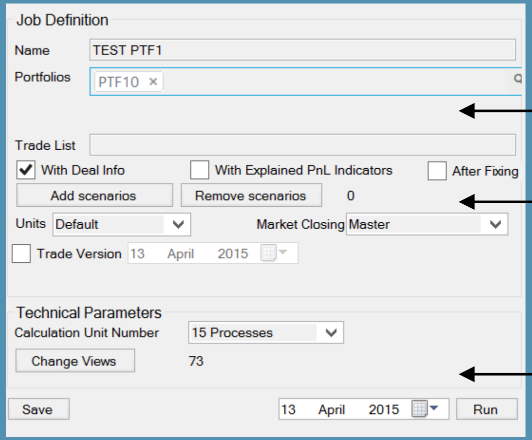
Errors and warnings

Views displayed by tab.



Pivot table

Simulation Definition.

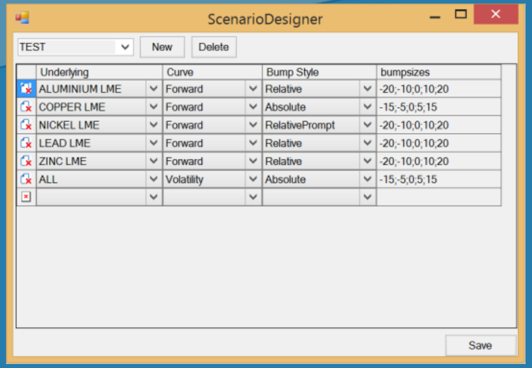


Trade scope definition.

Pricing options.

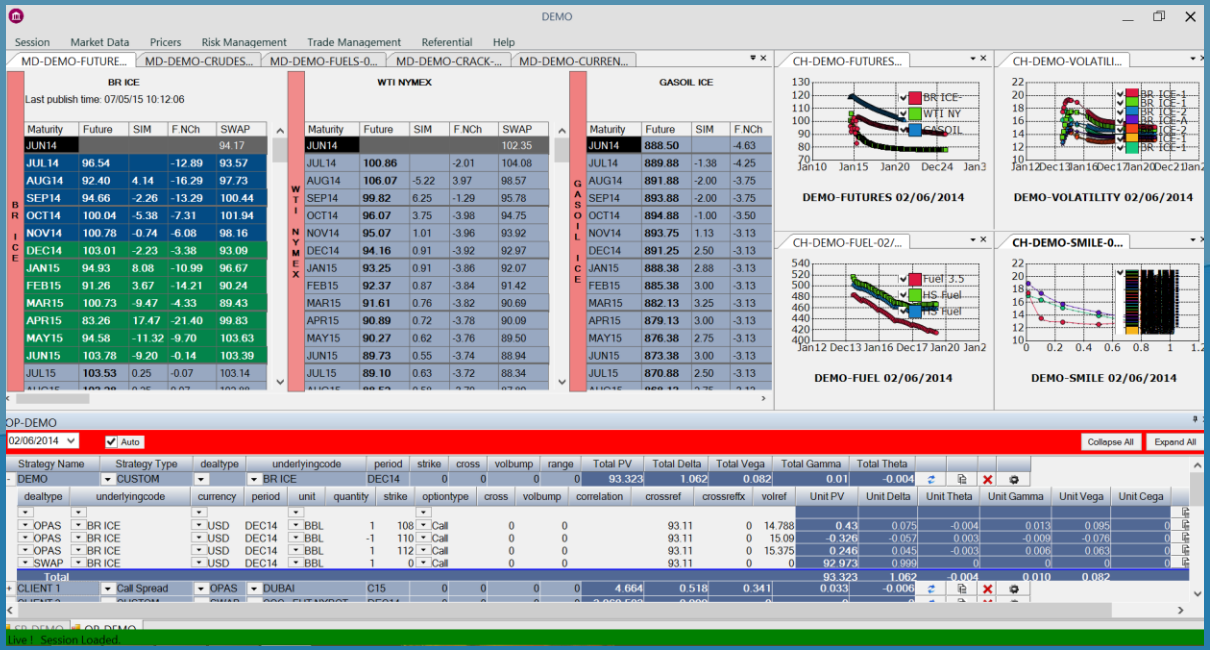
Technical Option

Scenario Designer.



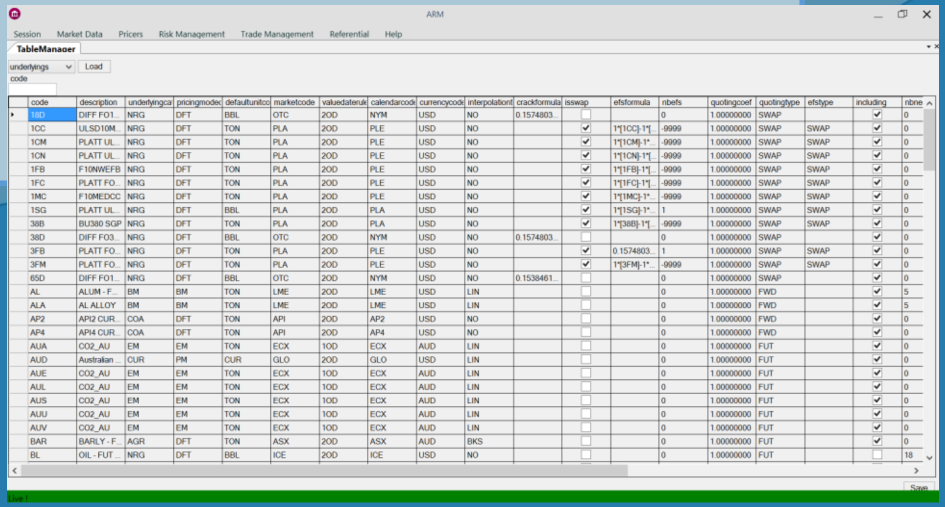
1.5. Session.

- Users can define their own layout, and save it.
- The layout is available from any computer.
- The session can be open manually or automatically at a given time.



1.6. Referential Management.

- The application has its own referential, it can be managed from the user interface, and it is stored into the database.
- Referential data includes calendars, market conventions, underlying definition, clients, analytical structure (portfolios, portfolio groups) …
- Referential can be fed from external sources.
- Referential can be exported in XML format.



1.7. Excel API.

- The main functionalities are available from the Excel API:
  - Price contribution and subscription.
  - Pricing of instrument (swap, options).
  - Trade insertion.

- Allow to quickly specify new needs or design tailor made pricing tools.

- Same level of security as the main application.

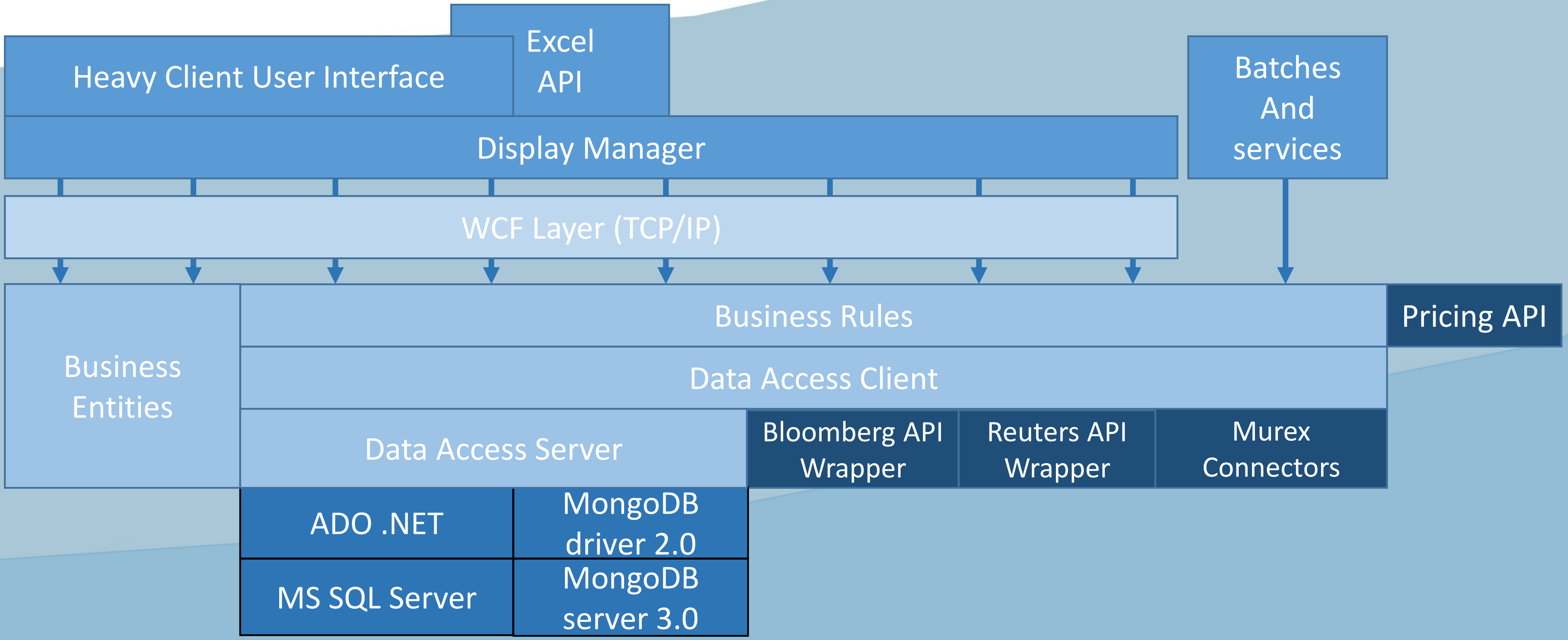
1.8. Connectivity with other systems.

- Bloomberg: API is implemented and allow to use either the client API or a B-Pipe connection. Closed days, live mid prices, fair values, settlements and fixings could be retrieved from the wrapper.
- Reuters: Live prices can be published or subscribed.
- Murex: Prices can published or retrieved from murex, users can specify the environment. And depending on the client configuration, trades could also be retrieved/inserted.
- Export/Import: Price can be exported to/imported from Totem or Super Derivatives, or by Email.
- Pricing API: The application has its own pricing library, but a client pricing library can be easily plugged using the pricing API wrapper.

1.9. Security and Audit.

- Transparent integrated Microsoft Windows security.
- Your own security module can be implemented.
- 4 different roles are available: Administrator, Trader, Sale, Operator.
- Only traders can publish prices.
- Market Data changes are audited.
- Trade changes are audited, i.e. a full history of the trade is available into the database.

1.10. Logical Architecture.



1.11. Technical Infrastructure.

- Thanks to the logical architecture, the technical infrastructure could be very flexible:
  - Simple client/server: with 1 database server, and clients. In this case, clients will act as calculation node for the risk analysis calculation distribution.
  - N tiers with an HPC grid: 1 database server, one or several application server, and one HPC calculation farm.
  - A middleware can be also added to speed up the curves sharing across geographical places.
- The technical infrastructure could be hosted and managed by the client, or we can propose a fully managed infrastructure.

2.12. Data storage.

- Referential data, market data, and market convention are stored in a relational database (MS SQL).
- Trades, and trade elements are stored in a document database (MongoDB).
- This design brings a high flexibility in trade storing and remove the constraint of high cost of maintainability of a complex relational data schema.
- New types of trade and trade modules can be added easily without changing the database. Only the user interface and business logic should be designed.