Getting Started with SWS

A quick guide to starting to use the Speedwell Weather System

Contents

I. Introduction

This guide is intended to be used with the full system documentation. For any questions or technical assistance please contact us by email support@speedwellweather.com or by phone on:

- +44 (0) 1582 465 569 (UK)
- (843) 737-4843 (USA)

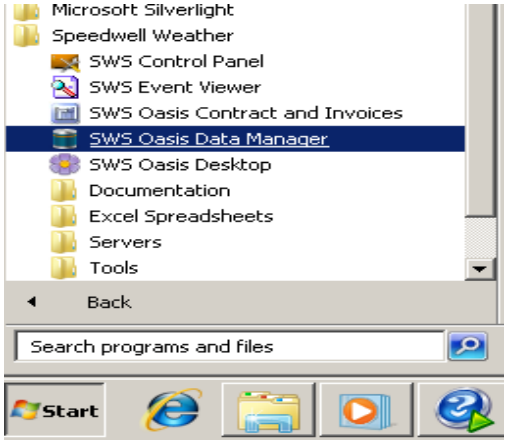
II. Database Management

It is important to maintain the database to ensure optimum performance and for disaster recovery purposes. It is recommended that the following is carried out periodically:

Database backup: This should be done daily. With SQL server, use the SQL server backup function.

A. Adding Historical Weather Data

SWS uses a database to store historical weather data. This database may be local or server based. Updates to this may be performed through SWS Oasis Data Manager. Three methods are provided: via CSV file, via FTP or by copying and pasting from a grid such as MS Excel. The copy and paste from a spreadsheet method has a wizard that can be used for quick and easy importation.
To run SWS Oasis Data Manager, go to the Windows "**Start**" menu then click on the "SWS – Oasis Data Manager" shortcut.



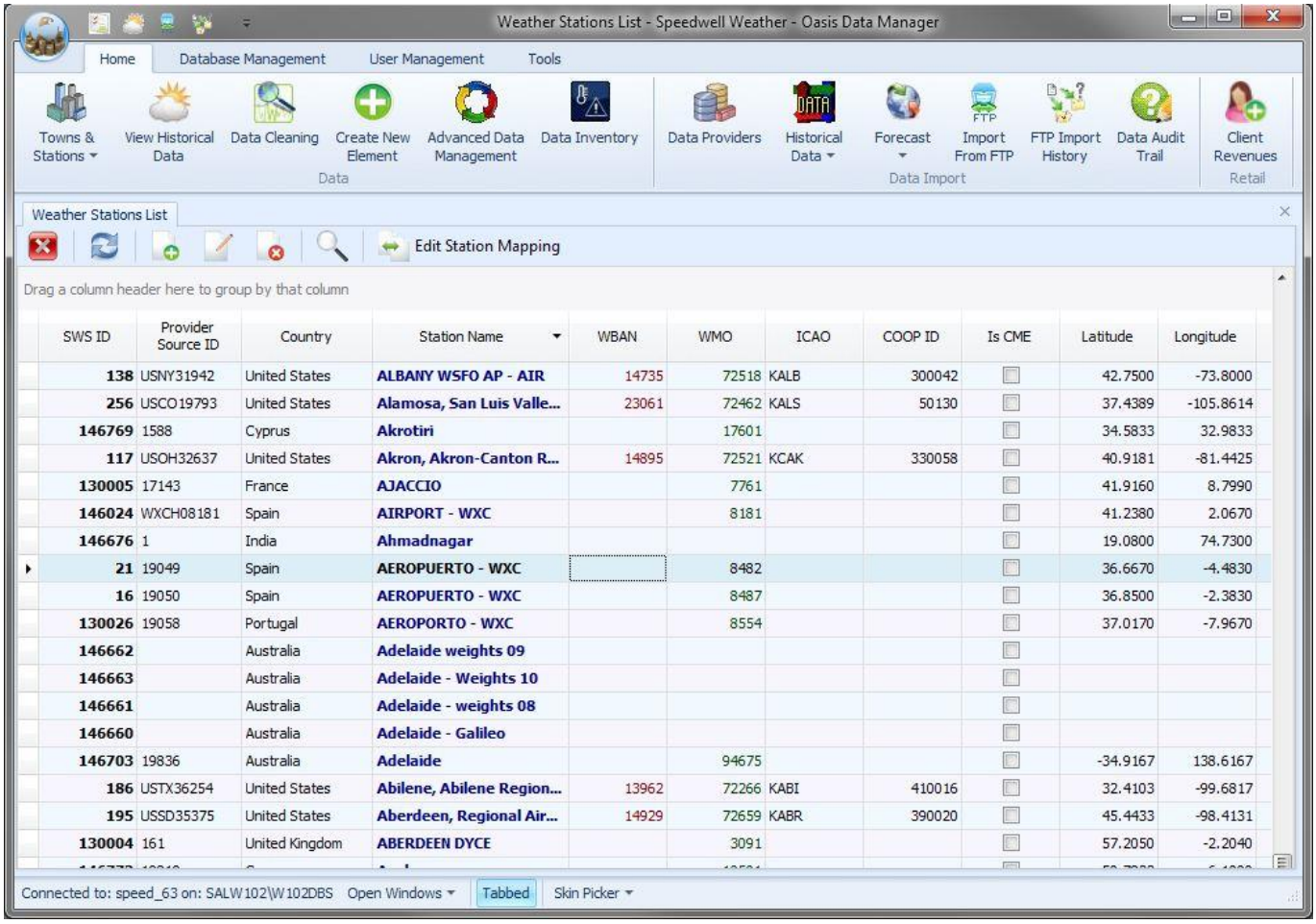
The following describes only the simple method of copying data from MS Excel into the database. Please view the documentation on SWS Oasis Data Manager for descriptions of the other methods including automatic data download from a provider's FTP site. It is assumed that the site for which data is being added is not already defined in the database.

B. Creating a new Reference Site

If a town / site has not already been created, then it is necessary to define it first before a copy and paste operation or automated data download. A new town will automatically be created.

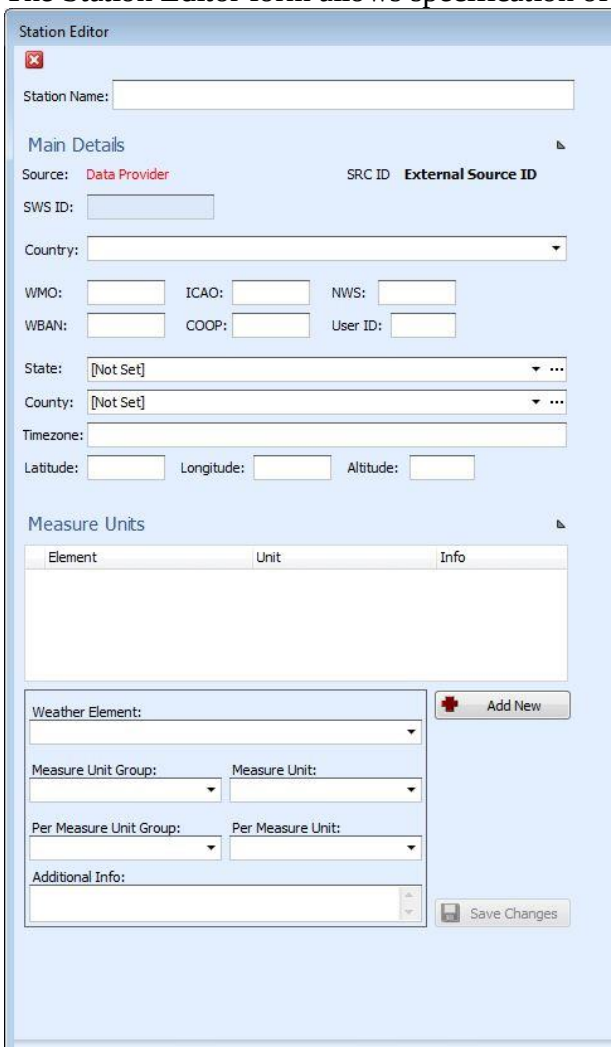
To create a station, open SWS Oasis Data Manager and go to the **Home** tab. Choose the **Town & Stations** control and then pick **List of Stations**. If the station is already specified please miss this section and go to **Adding Data**.

This opens the form shown below which defaults to the first town site alphabetically:



To add a new station, simply click on the **Add New Station** button.

The Station Editor form allows specification of the station details:



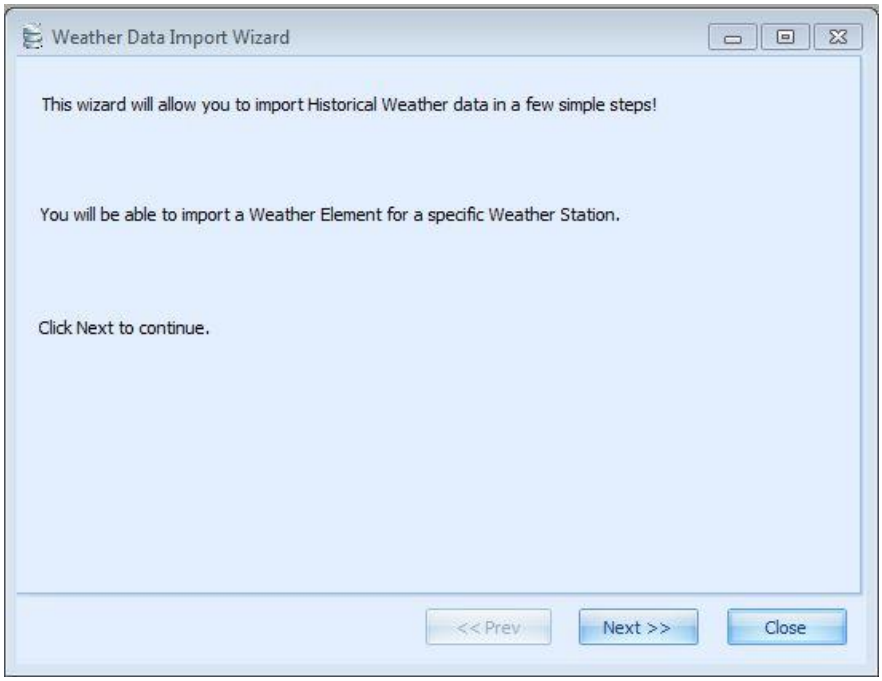
Only the **Station Name** is obligatory. It is highly recommended to specify the country, the latitude and the longitude. To save the information press the **Save** key. The new site should then appear in the list.

The **Town Details** window can now be closed.

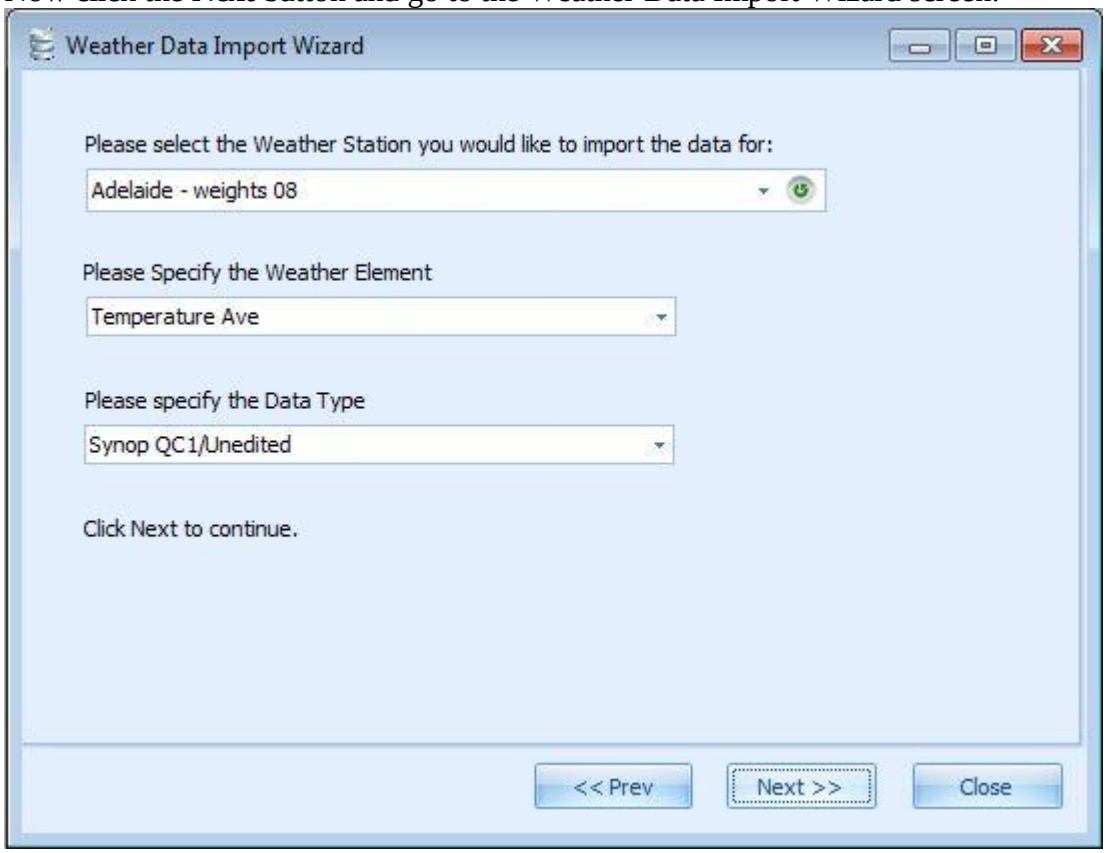
C. Entering the Data - Copy and Paste from a spreadsheet method

The method described below allows data to be imported by copying and pasting. This could be from MS Excel for example. On the **Home tab** choose **Historical Data | Import from Spreadsheet (Excel) Wizard**.

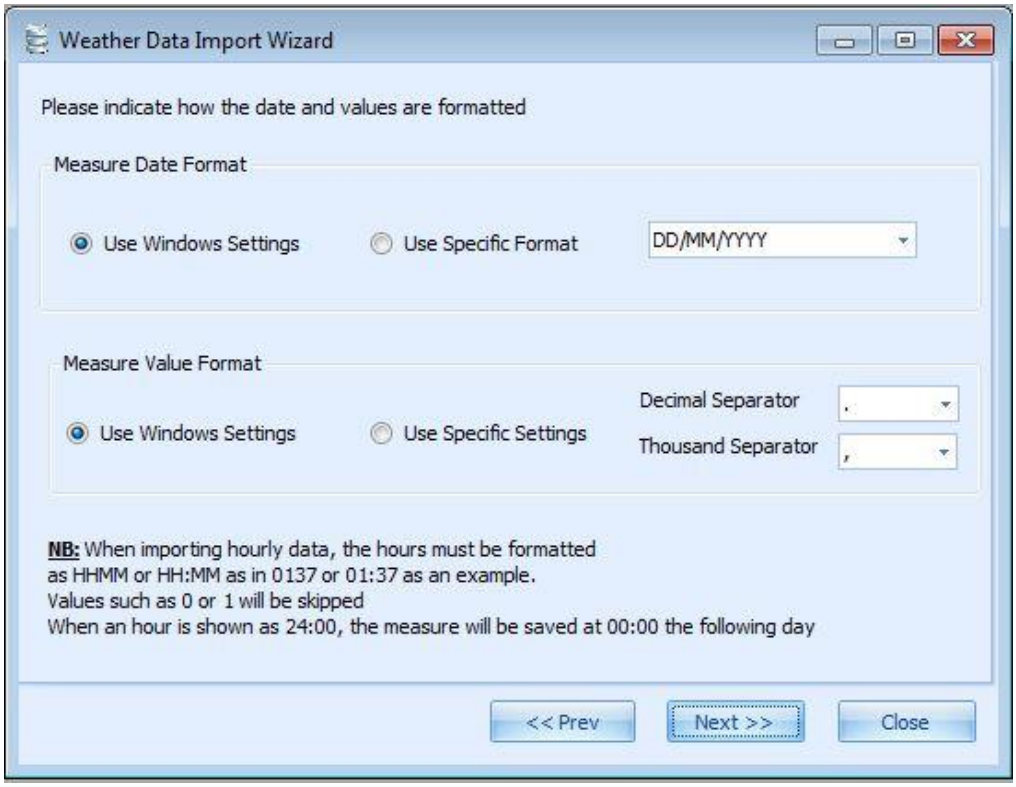
This brings up the form shown below



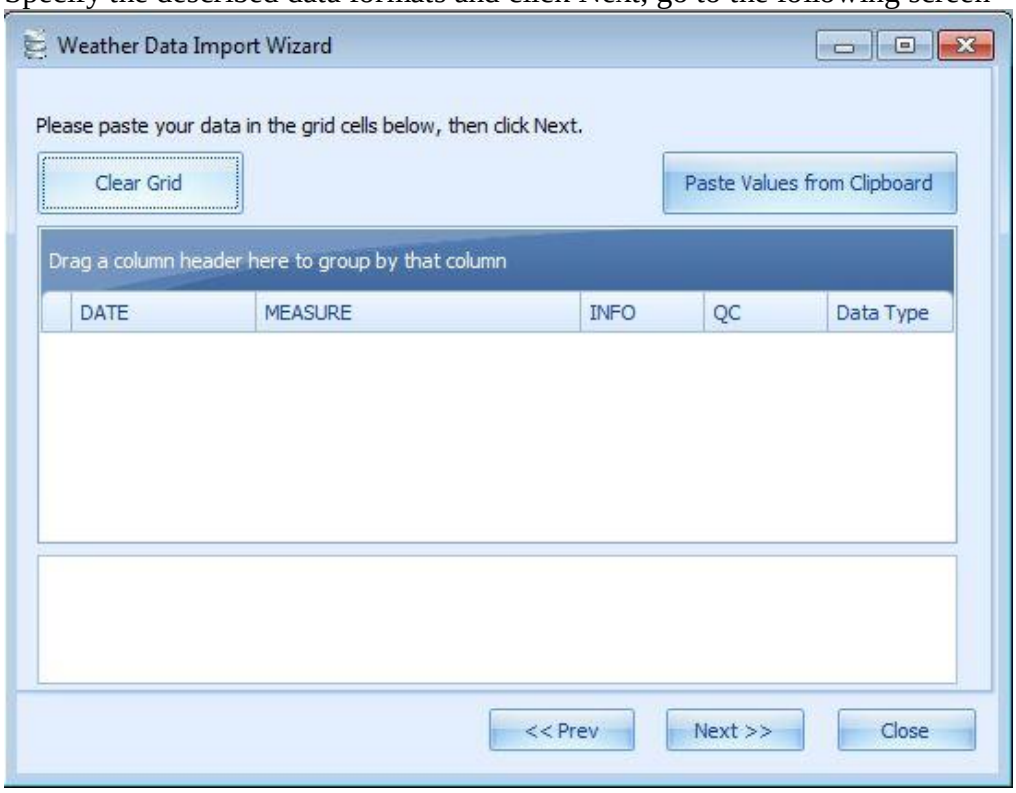
Now click the **Next** button and go to the Weather Data Import Wizard screen.



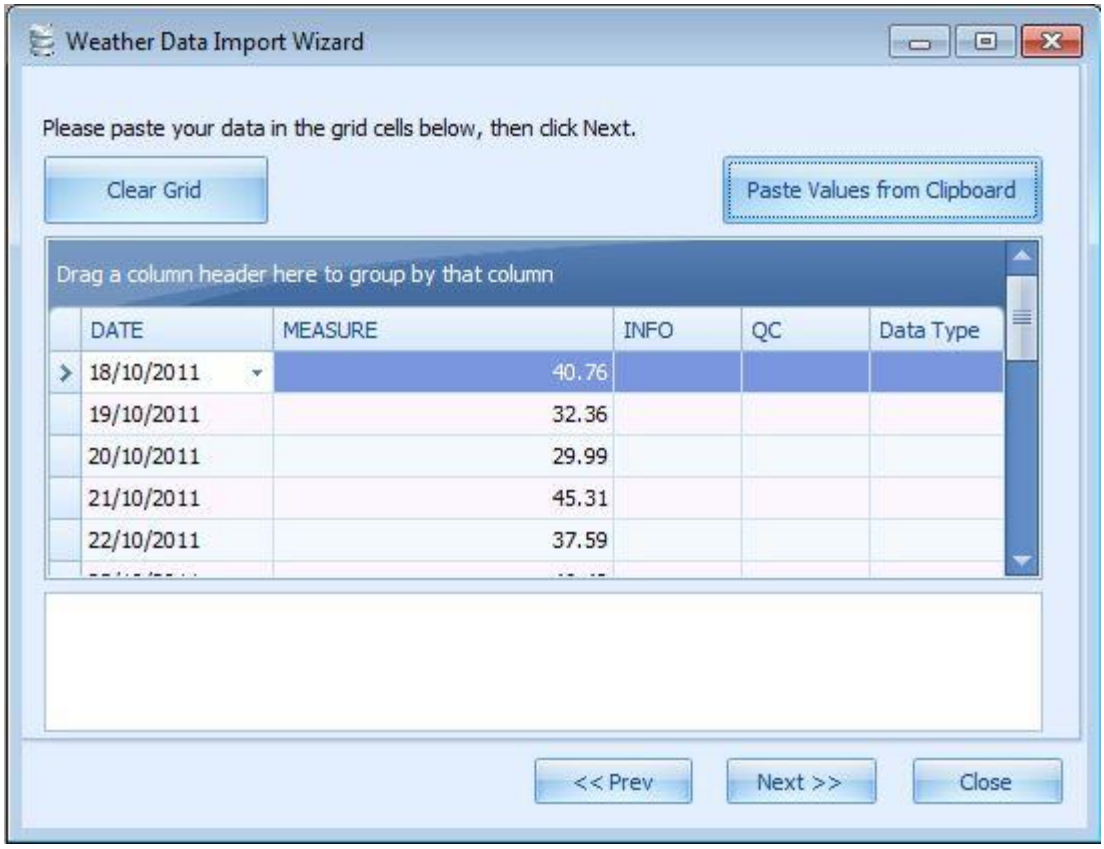
Select the station, element and data type in the related drop down boxes and click the Next button.



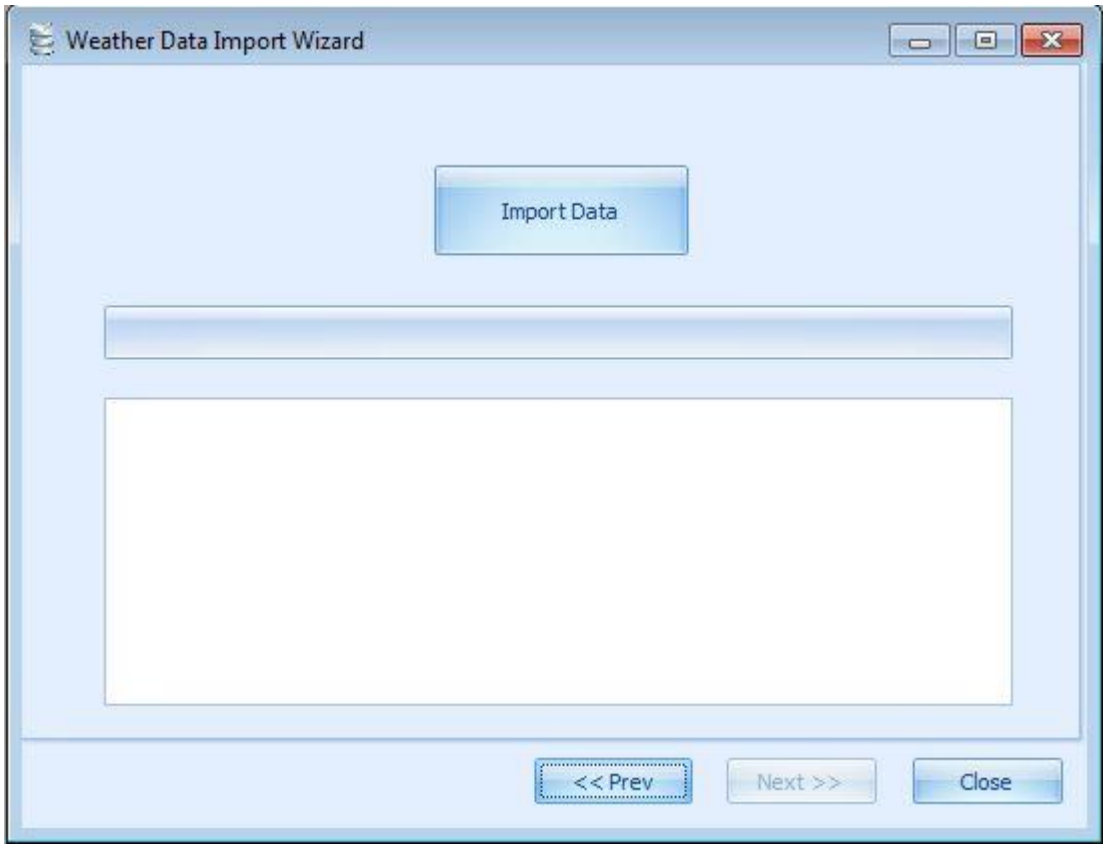
Specify the described data formats and click Next, go to the following screen



Now go to the MS Excel sheet. It is first necessary to ensure that no non-numeric values are entered for data. Now go to the Excel source sheet and copy the data required on to the grid by selecting the cell at the top left of the Dates column and clicking the **Paste Values from clipboard** button. (i.e. the dates and the weather data). Only the second and third fields (dates and measure) are obligatory. Do not copy the header. The copied data will be displayed in the grid.



Now click the Next button to go to the final step



Press the **Import Data** button. This data is now inserted. If SWS is run at the same time it may be necessary to close the pricing window and the re-open first for the new site to be registered in the drop down list of site options.

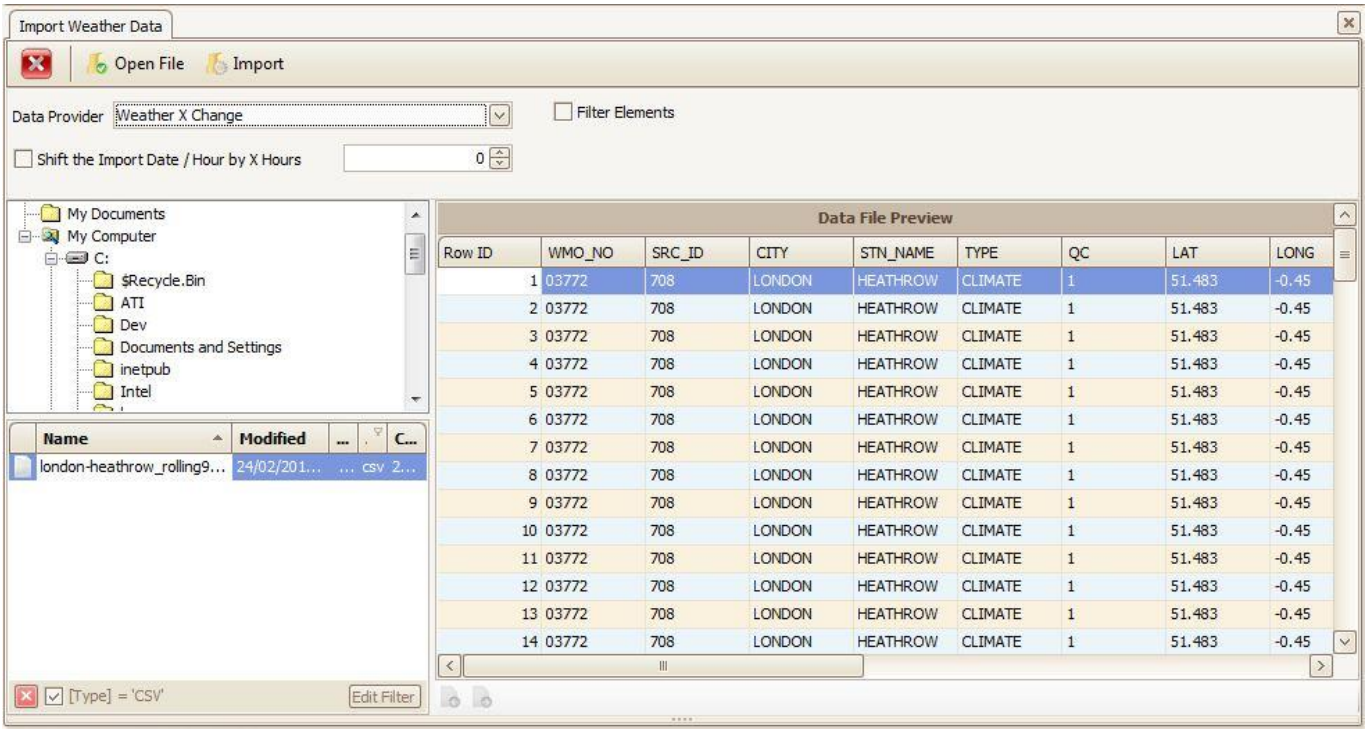
D. Entering the Data - Automatic Download: Speedwell/weatherXchange² method

SWS is an open system. Data can be imported from any source. However, for a number of data providers an automated process has been generated to download data from files where the data format is predefined. This uses a template. In this example, the process of downloading data from Speedwell at the press of a button is shown.

The pre-defined template allows data delivered from Speedwell in the form of a .csv as shown below to be downloaded. Note that the .csv file does not actually have to be opened.

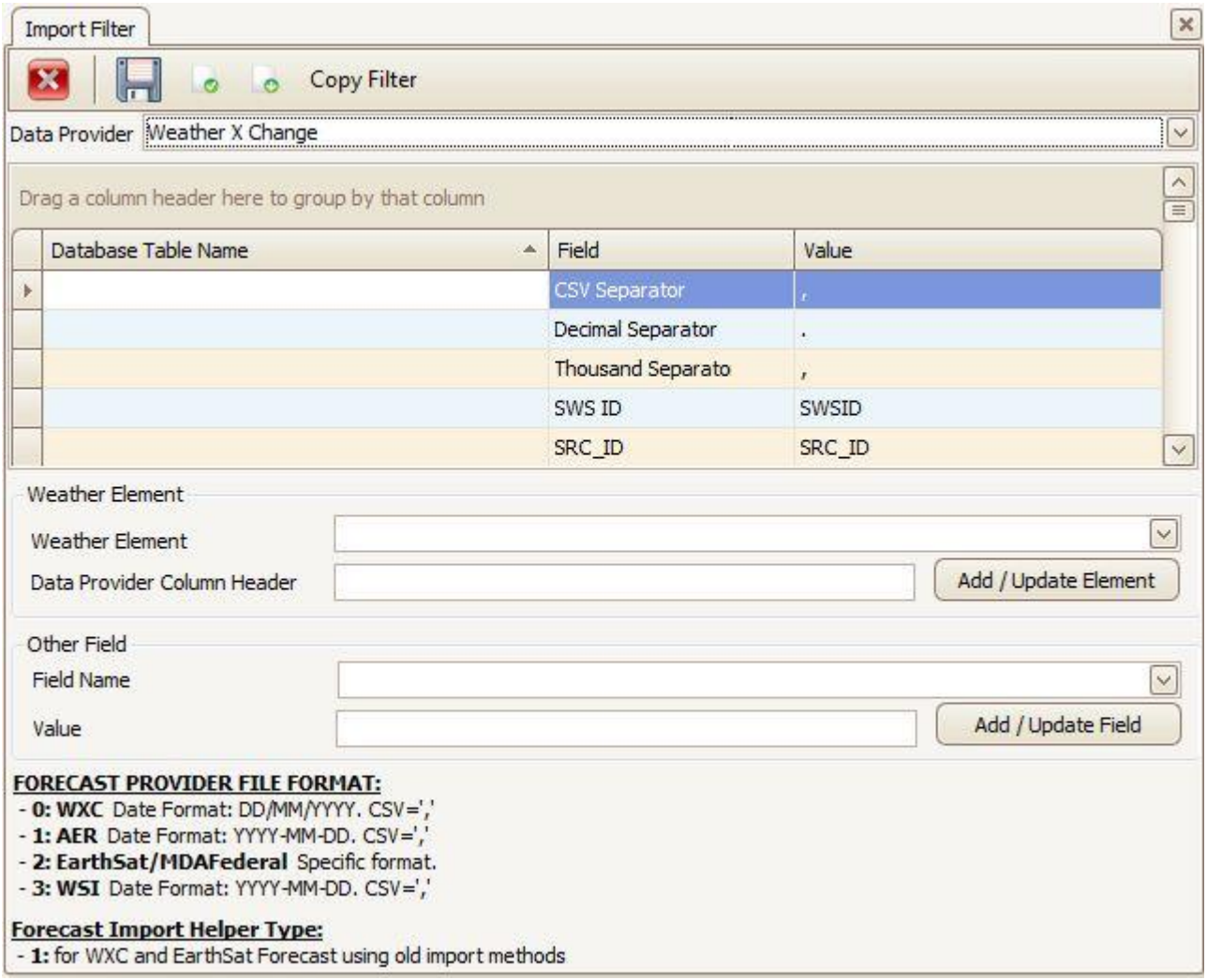
From **SWS Data Manager** choose the **Home tab,** then **Historical Data | Import from CSV** option.

This generates the form shown below. Choose data provider and browse to the source file.



Press the **Open File** button. This now populates the grid with the data.

The data is imported as defined by the data filter for the selected Data Provider. To view the data filter, go to the **Home** tab and select **Data Providers**. Double click in the row of the respective data provider and click the **Edit Import Filter** button



The filter maps the column names in the data file to the field names in the database. If the field name is not already defined in the filter, select the Weather Element in the drop down box, and then enter the respective Column Header name from the data file.

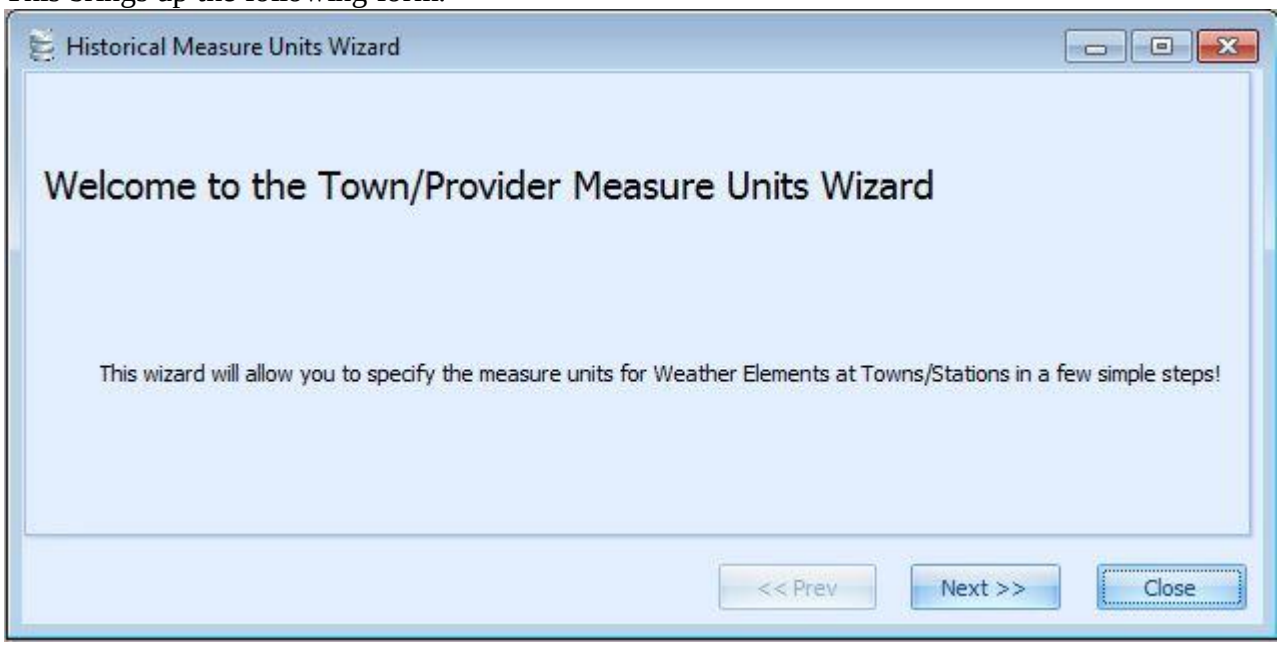
Return now to the original form and press the **Import** button. The data will be downloaded. Note that it is also possible to select multiple files and download these in one operation: just press **Import All Selected Files.**

Note that if the town has not already been created in the table of sites, it is necessary to do this. Please see the section titled **Creating a New Reference Site**. Note that in this operation, the key for the reference site should be set to correspond to the STN_NAME field in the above example.

E. Entering the Data Units and adding notes

To annotate data with units and other notes choose the **Home tab,** then **Towns & Stations | Historical Data Measure Units Wizard**.

This brings up the following form:

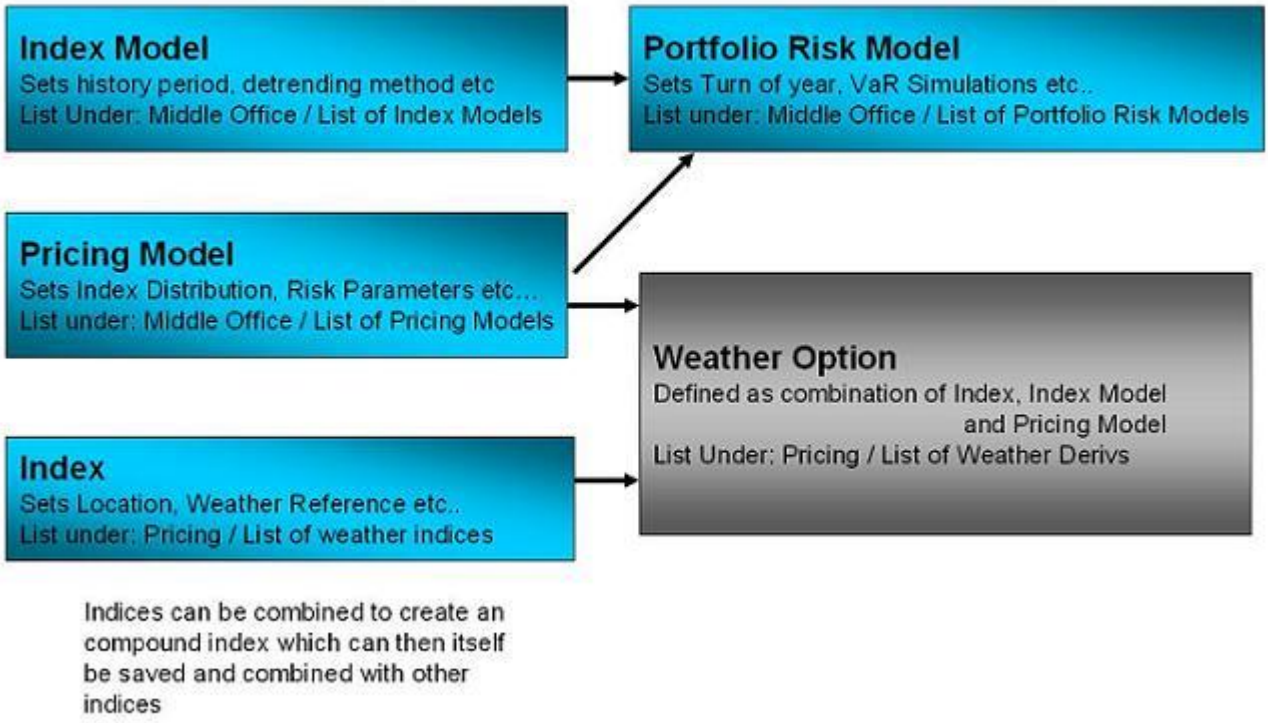


By use of the wizard (please see the help file for more information on this feature), the process can be automated for a number of different measures and number of different sites together.

III. Model Structure

SWS takes an "object-oriented" approach to the properties of a weather derivative.
SWS allows the following to be saved and then retrieved to build weather derivative options:

Index (site, weather variable etc...)
Index model (defining how the index is detrended and what period of history is used)
Pricing Model (defining how the option is priced and what method is used)
Portfolio Risk Model (defining the Index and Pricing Model and what settings are overridden)

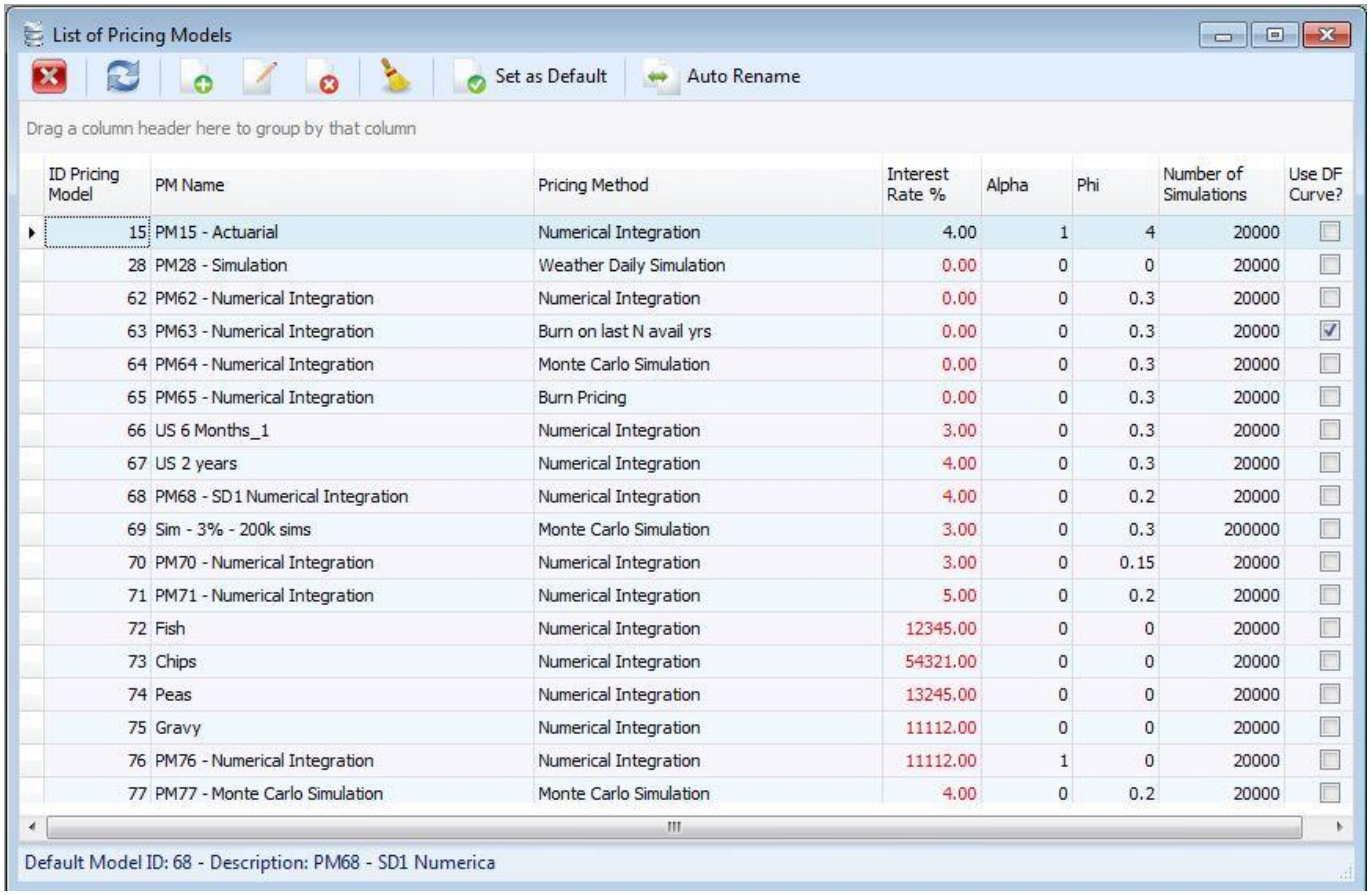


IV. Pricing an HDD-based Weather Derivative

This example shows how to derive the price of an HDD call option on a site for which it is assumed there is no price in the underlying swap. This therefore requires analysis of the underlying index first. Note that there is no "right" way of estimating the forward of an index that does not trade (Some market participants use the 10 year average as the basis of a fair value estimate).
For a full user guide please see the SWS Documentation. This covers more detail on other pricing tools such as looking at distributions, simulation, basket options and risk management.
The process of pricing a WD described here involves first establishing fair value of the index by looking at the history and the trends. Also the historic payoff of the option itself is looked at in the same way. Additionally, using the detrended forwards and volatility the structure is then priced using an assumed distribution.

A. Adding a Pricing Model

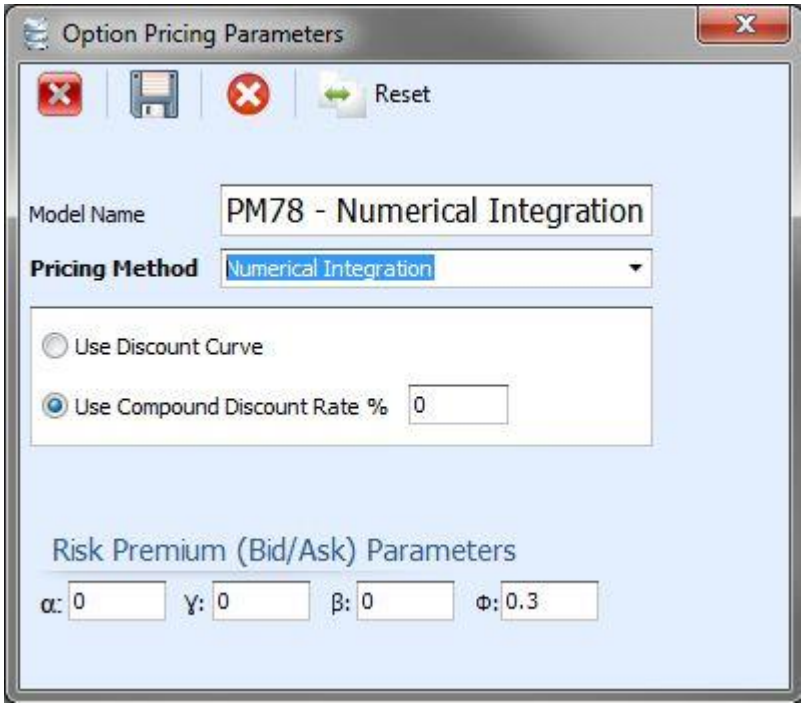
SWS enables the use of specific models that allow further specification of pricing factors. These Pricing models can be applied to any Index, option or portfolio that is chosen. To access the Pricing model list, choose the **Middle office / Pricing Models** within the SWS Oasis Desktop application



ID Pricing Model	PM Name	Pricing Method	Interest Rate %	Alpha	Phi	Number of Simulations	Use DF Curve?
15	PM15 - Actuarial	Numerical Integration	4.00	1	4	20000	☐
28	PM28 - Simulation	Weather Daily Simulation	0.00	0	0	20000	☐
62	PM62 - Numerical Integration	Numerical Integration	0.00	0	0.3	20000	☐
63	PM63 - Numerical Integration	Burn on last N avail yrs	0.00	0	0.3	20000	☑
64	PM64 - Numerical Integration	Monte Carlo Simulation	0.00	0	0.3	20000	☐
65	PM65 - Numerical Integration	Burn Pricing	0.00	0	0.3	20000	☐
66	US 6 Months_1	Numerical Integration	3.00	0	0.3	20000	☐
67	US 2 years	Numerical Integration	4.00	0	0.3	20000	☐
68	PM68 - SD1 Numerical Integration	Numerical Integration	4.00	0	0.2	20000	☐
69	Sim - 3% - 200k sims	Monte Carlo Simulation	3.00	0	0.3	200000	☐
70	PM70 - Numerical Integration	Numerical Integration	3.00	0	0.15	20000	☐
71	PM71 - Numerical Integration	Numerical Integration	5.00	0	0.2	20000	☐
72	Fish	Numerical Integration	12345.00	0	0	20000	☐
73	Chips	Numerical Integration	54321.00	0	0	20000	☐
74	Peas	Numerical Integration	13245.00	0	0	20000	☐
75	Gravy	Numerical Integration	11112.00	0	0	20000	☐
76	PM76 - Numerical Integration	Numerical Integration	11112.00	1	0	20000	☐
77	PM77 - Monte Carlo Simulation	Monte Carlo Simulation	4.00	0	0.2	20000	☐

Choose the **Add New** option. There are a number of selections to be made here. Firstly there are the basic menu options:

- **Save changes:** Save the current selections
- **Cancel:** Cancel the window
- **Reset to Default:** Reset the selections to the pricing model defaults

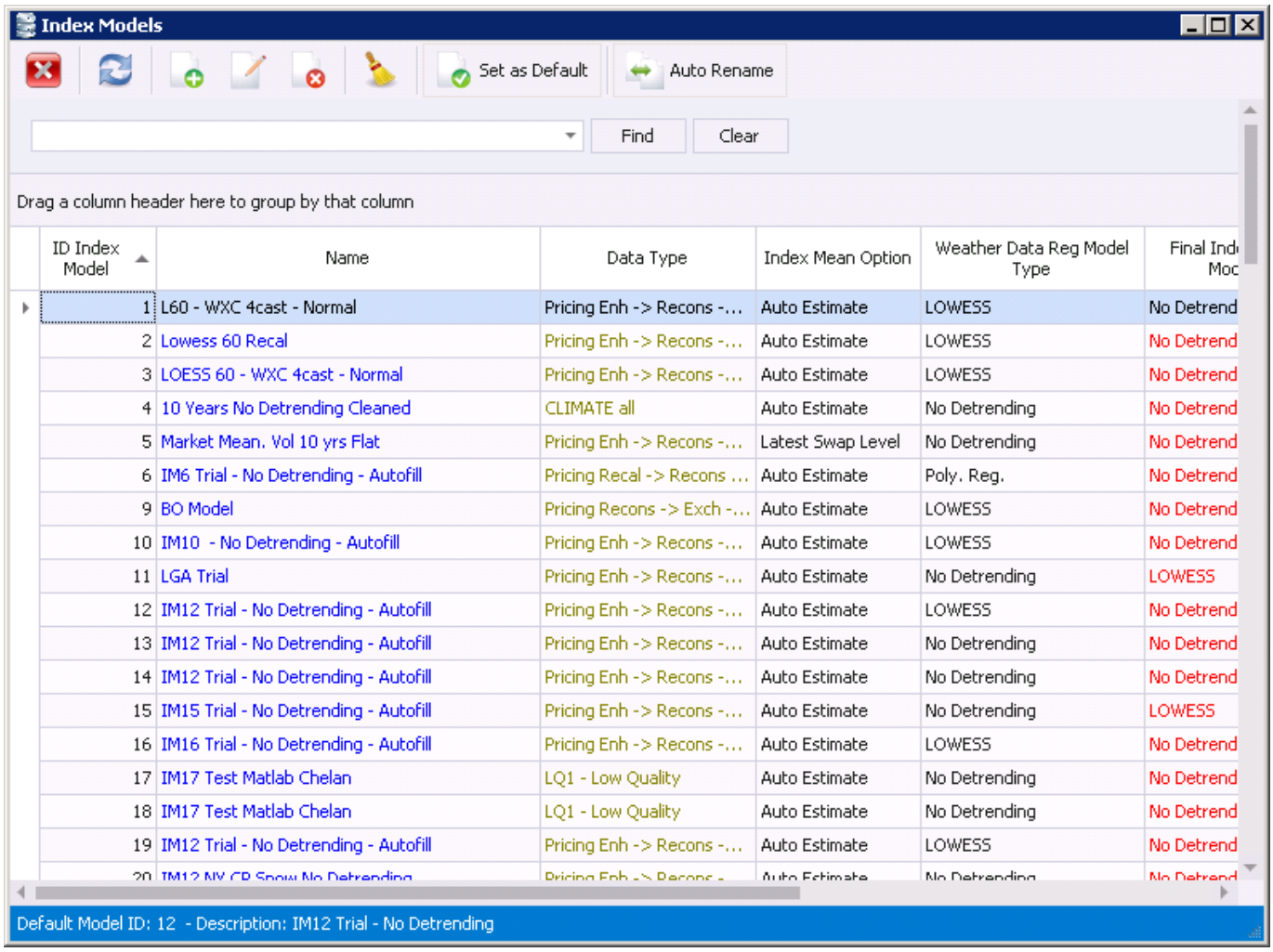


Then there are the selections themselves:

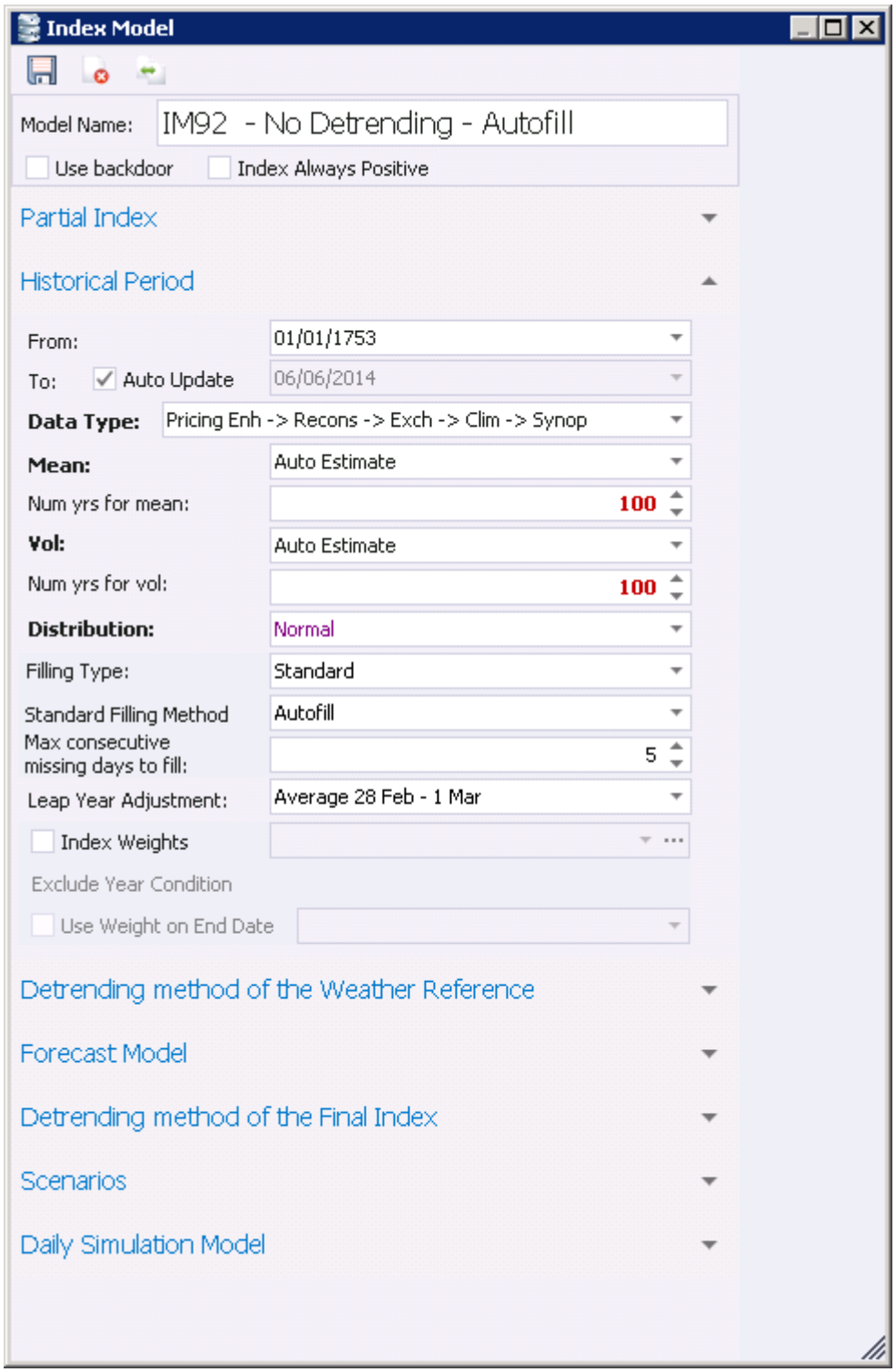
- **Model Name:** Allows specification of the chosen model name
- **Pricing Method:** This selection requires a choice of the type of Pricing model (Numerical integration, Weather Daily Simulation, Burn Pricing, Monte Carol Simulation, Burn on last N avail yrs)
- **Risk Premium (Bid/Ask) Parameters:** Allows specification of the parameters used to formulate the risk premium
- **Use Compound Discount Rate:** Allows specification of the interest rate alternative use the "Use Discount Curve" function to use an interest rate curve that will be updated every day or from time to time.

B. Adding an Index Model

SWS also enables the creation of models that specifically pertain to created indices. To access the Index Model list choose **Middle Office | Index Models**.



Click the **Add New** button, the Index Model entry form is displayed:



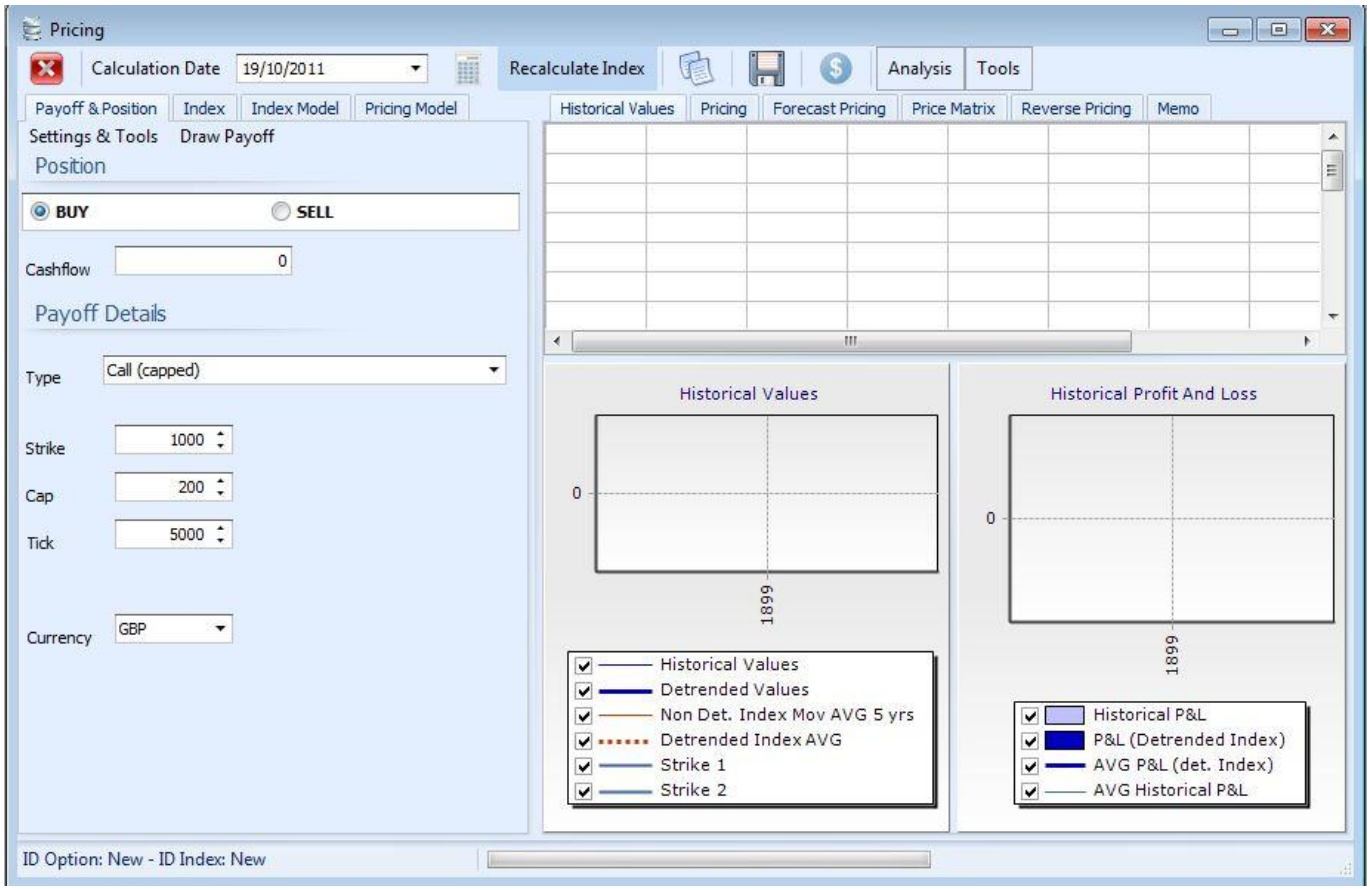
There are numerous options:

- **Model Name**: A name for the model can be specified here
- **Index Always Positive**: Make sure that the Index is always positive
- **Partial Index**: Options for the Partial Index - No Partial Index, Auto Recalc or Users Values
- **Historical Period**: **From, To:** Allows specification of a historical period for the Index data. If Auto Update is ticked, then the Period To: parameter is automatically set to today
- **Data Type**: Allows specification of the data type used for the Index Model
- **Years for Mean and Vol**: Allows specification of the number of years to use for the mean and the volatility
- **Filling type**: Allows specification of the method of filling in missing data
- **Max consecutive missing days to fill**: Allows specification of the maximum number of missing data to fill in for
- **Hourly Filling Method**: Allows specification of the method used to fill gaps in hourly data sets
- **Leap Year adjustment**: Allows specification of the method of Leap Year Adjustment
- **Index Weights**: Select which Index Weightings list to use
- **Use Weight on End Date**: Specify whether the weight is used on the end date (an average is used if this not ticked)
- **Exclude Year Condition**: Allows setting of the conditions for excluding a year from the index calculations
- **Detrending method of the Weather Reference**: Allows specification of the trending method for the weather reference.
- **Override Child Index Trend**: Specifies whether or not all the child indices use the same weather detrending method
- **Forecast Model**: Sets the forecast data provider and the method for handling ensemble forecasts
- **Detrending method of the Final Index**: Allows specification of the trending method for the Index
- **Scenarios:** Allows specification of the bump and multiplier settings
- **Daily Simulation Model**: Sets the method by which the daily simulation is calculated

C. Analysing the Underlying Index and History

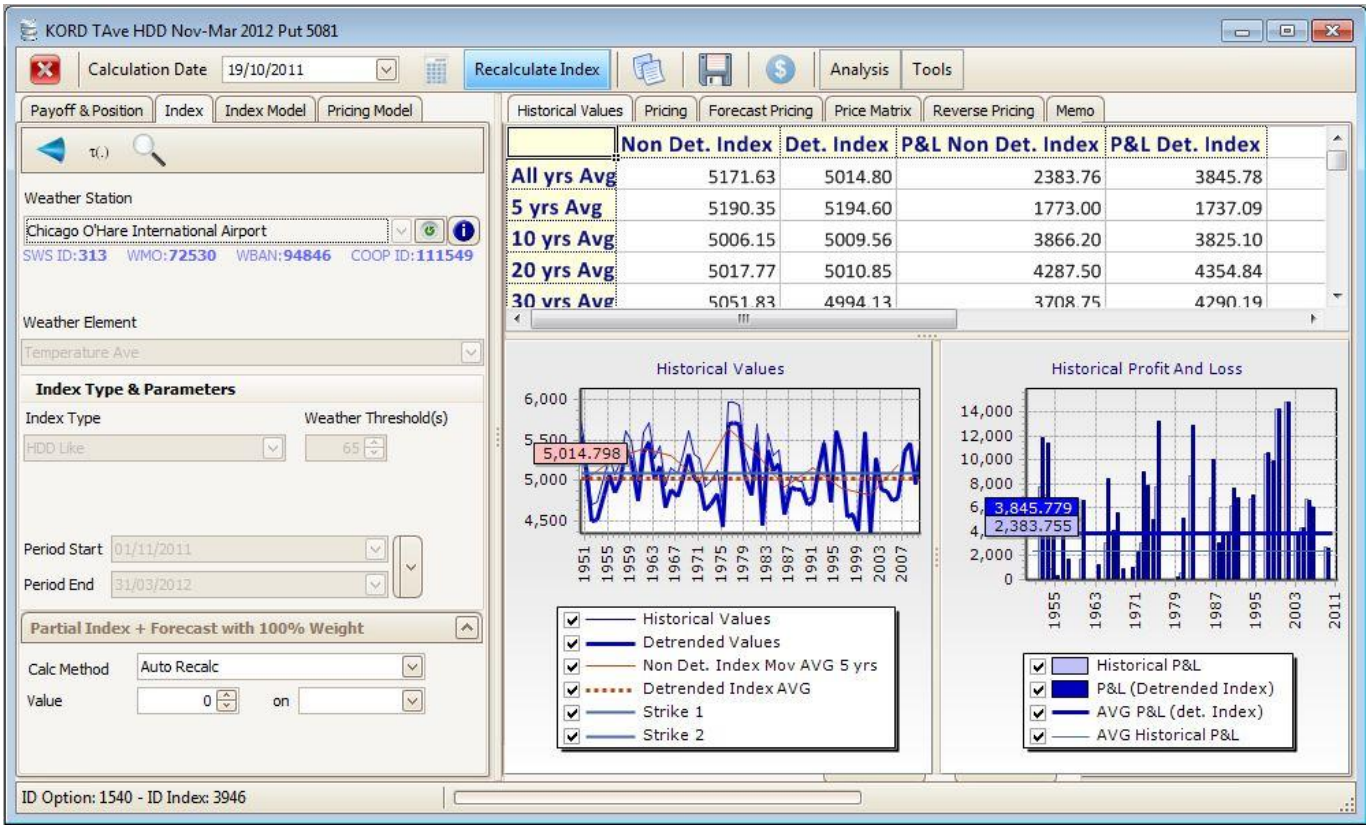
To enter the weather derivative pricing utility, choose the **Pricing / Price Weather Derivatives** option menu.

In the form choose the structure required as shown below:



Index Tab

Choose the **Weather element** from the drop down box. For a fuller range of references, click on the button to the right. This allows other options including wave height for example to be accessed. The **Period Start and End** defines the period of data that are used to analyse the data set. Standard terms can be accessed by pressing the **Preset Period** button. To see the data set available click on the **Town/Site** field. In this example we are deriving the underlying index and pricing a 1700 call with 200 cap on London. The payoff of the structure can be visualised by clicking the **Draw Payoff** button (Nb. this is under the ***Payoff& Position*** tab). The levels of cap, strike and weather trigger are initially set by default (change defaults through the **Tools / Options** menu if desired) but can be changed (once again under the ***Payoff& Position*** tab).



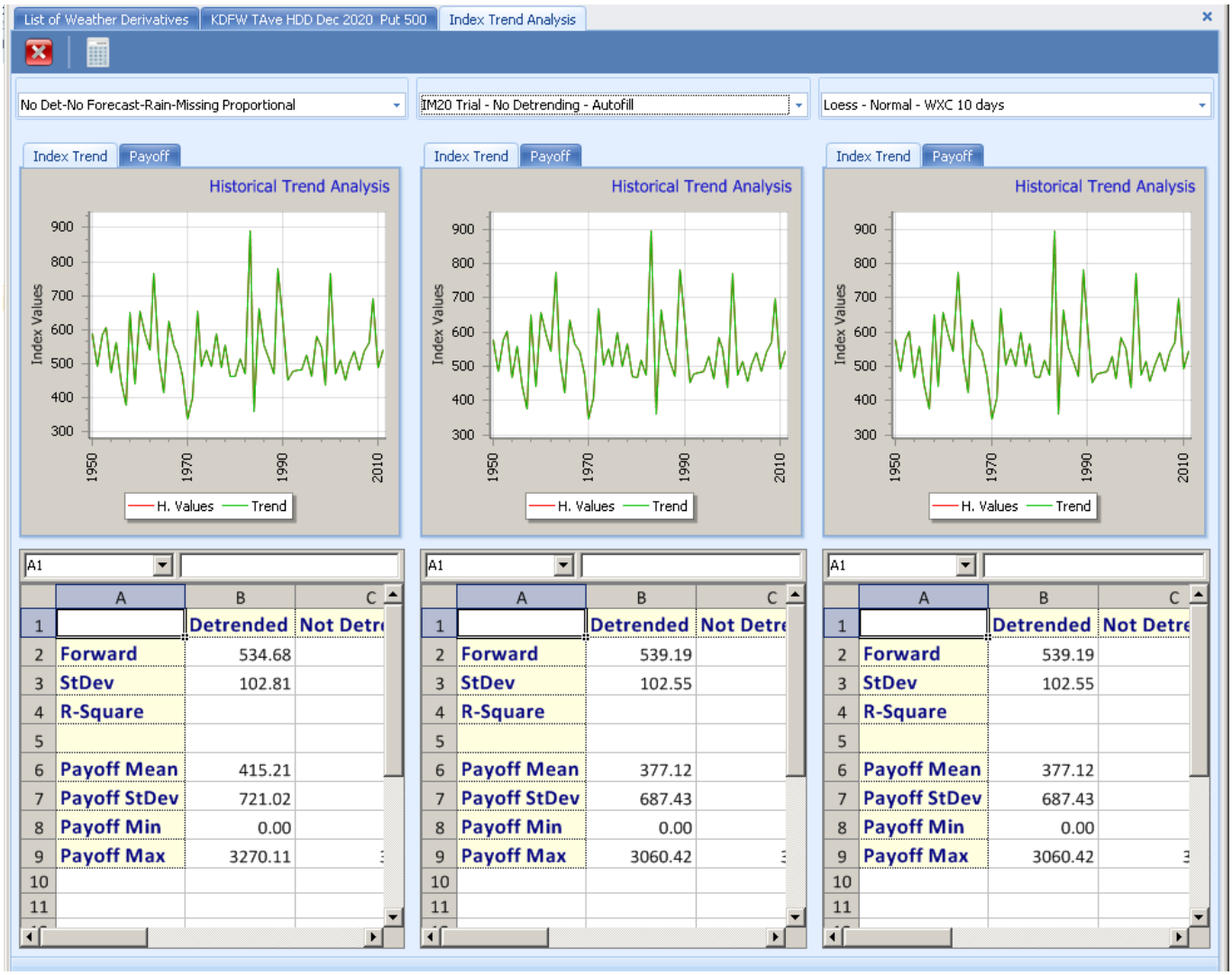
Press the **Calculate** button. This now calculates the index, detrended index (projected using the detrending selected in the index model to the end date of the period specified) and the payoffs of the option. To the right hand side are summarised means, volatilities and historic minima and maxima. The index is visualised in both non-detrended and detrended views in the graphs shown above. To see the figures go to the ***Historical Values*** tab. The data in the grids can be exported (right click on the grid and choose the **Open In Excel** option). Different detrending methods can be chosen via the Index Model.

To see a small summary of the figures simply go to the ***Pricing*** tab.

The detrended pay-off of the option forms the basis of one way of pricing the option using the assumption that the detrended historic payoff is a valid measure of fair-value.

D. Analysing the Impact of Detrending Methods

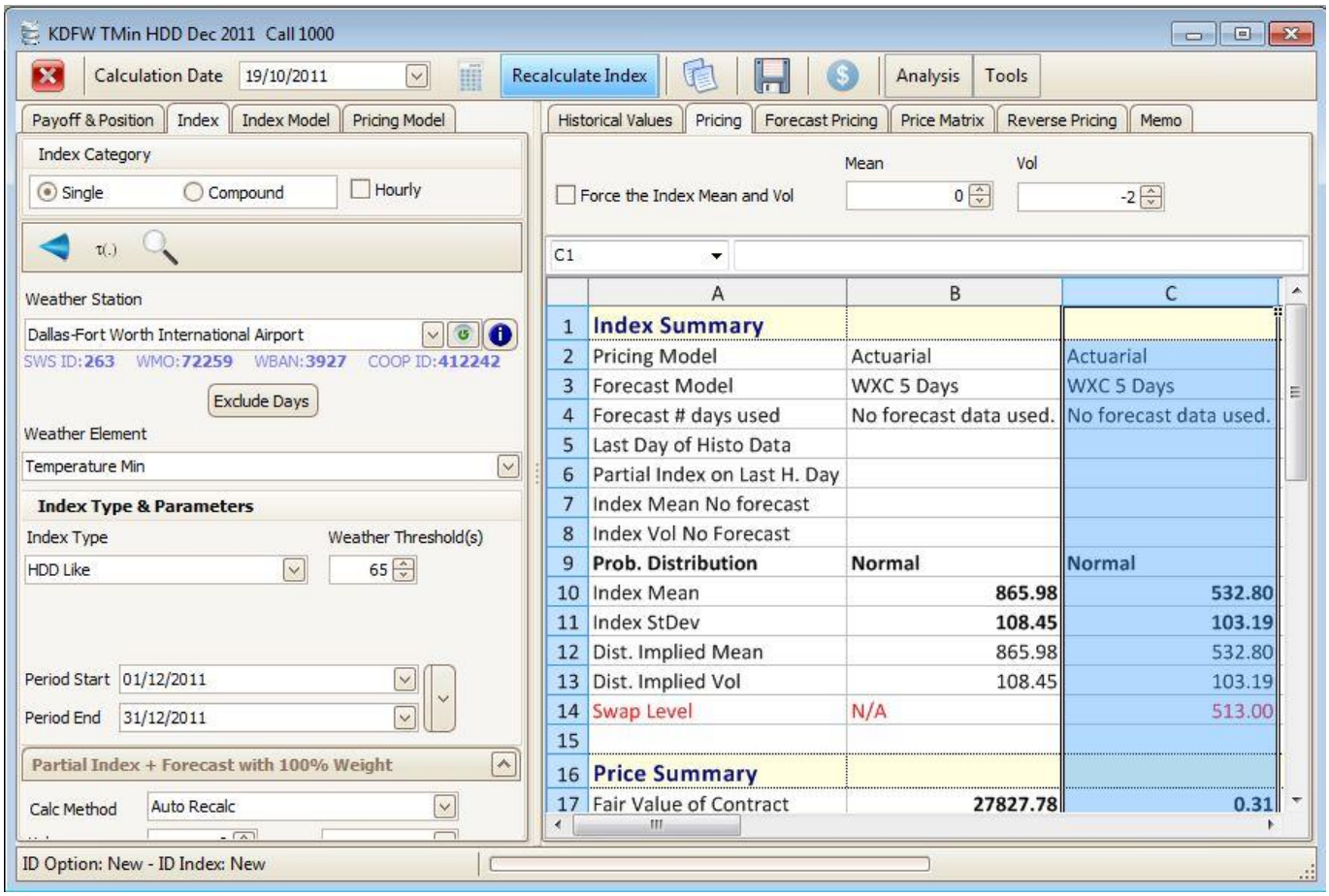
The trends and the forwards can be further analysed by pressing the **Analysis / Index Model Analysis** button from the main Pricing form.



Up to 3 index models can be compared at one time by selecting them in the relevant drop down box and then pressing the Calculate button.

E. Pricing the Option using a Chosen Distribution

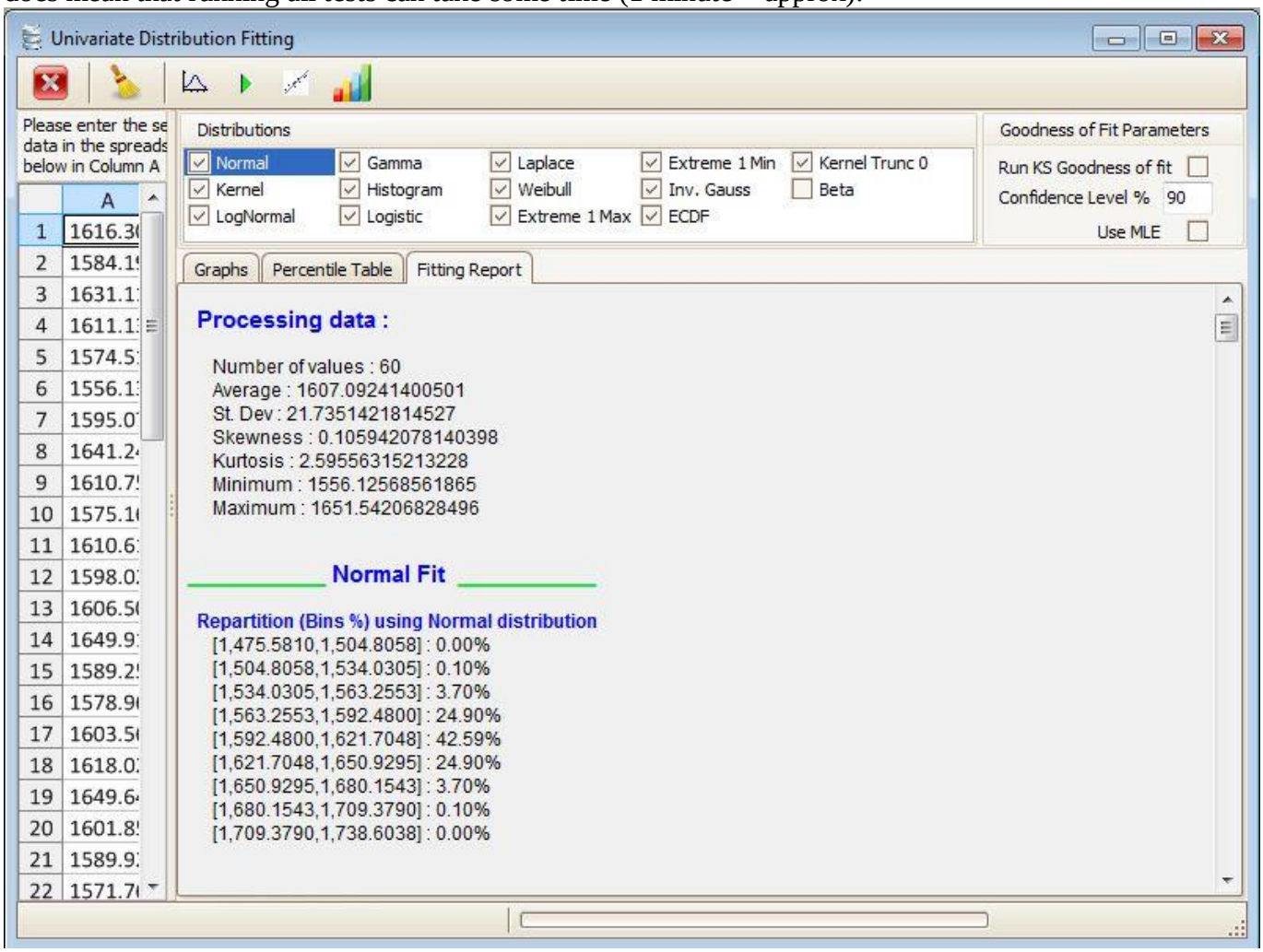
By clicking on the ***Pricing*** tab the fair value can be observed (providing the **Calculate** button has been pressed to generate the historical values and price the option):



By default this shows the price of a structure using a normal distribution. (The default detrending methods can be set via the **Tools/ Options** menu). To change the Pricing parameters, use the options provided under the ***Pricing Model*** tab (shown on the left hand portion of the above screen shot). For more information on these parameters, please see the SWS Help Documentation.

It is also possible to analyse which distribution best describes the data set. To do this press the **Analysis / Distribution Fitting** button from the main pricing window. Different distributions can be analysed for goodness of fit. The form below is shown after the **Perform Ticked Distributions** button was pressed. This finds the best fit. The goodness of fit tests use a sampling technique rather than a closed form equation. This allows the goodness of fit tests to be applied if the means and volatility are modified but

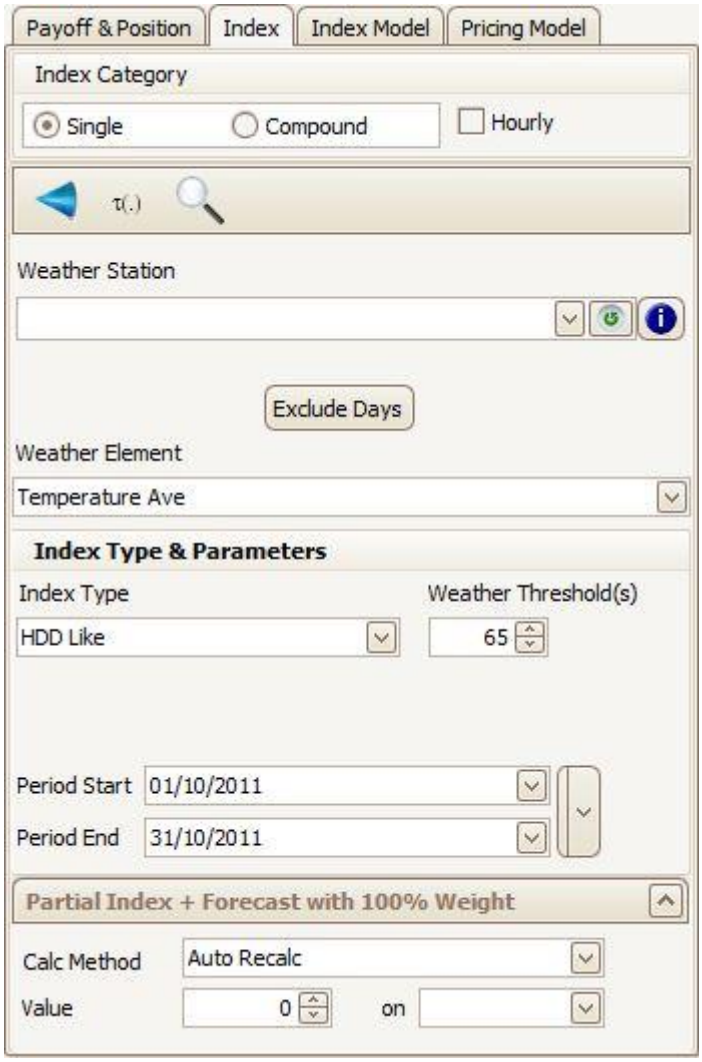
does mean that running all tests can take some time (1 minute + approx).



In the above, the **Extreme 1 Max** distribution was found to offer the best fit. This can now be chosen in the pricing window (under the Pricing model options in the ***Pricing*** tab) instead of the default **Normal** distribution in order to get a more accurate price for the structure.

F. Pricing contracts within their accruing period

If data is available for part of the period of a contract, then the partial index value can be entered. To do this click on the Partial Index field and select **Auto Recalc**. Then select a Calculation date at the top of the Pricing screen that lies within the accruing period. Finally press **Calculate** to generate the Index values. The value of the recorded data up to the Pricing date specified (i.e. the Partial Index value) is displayed in the field next to the Auto Recalc selection:

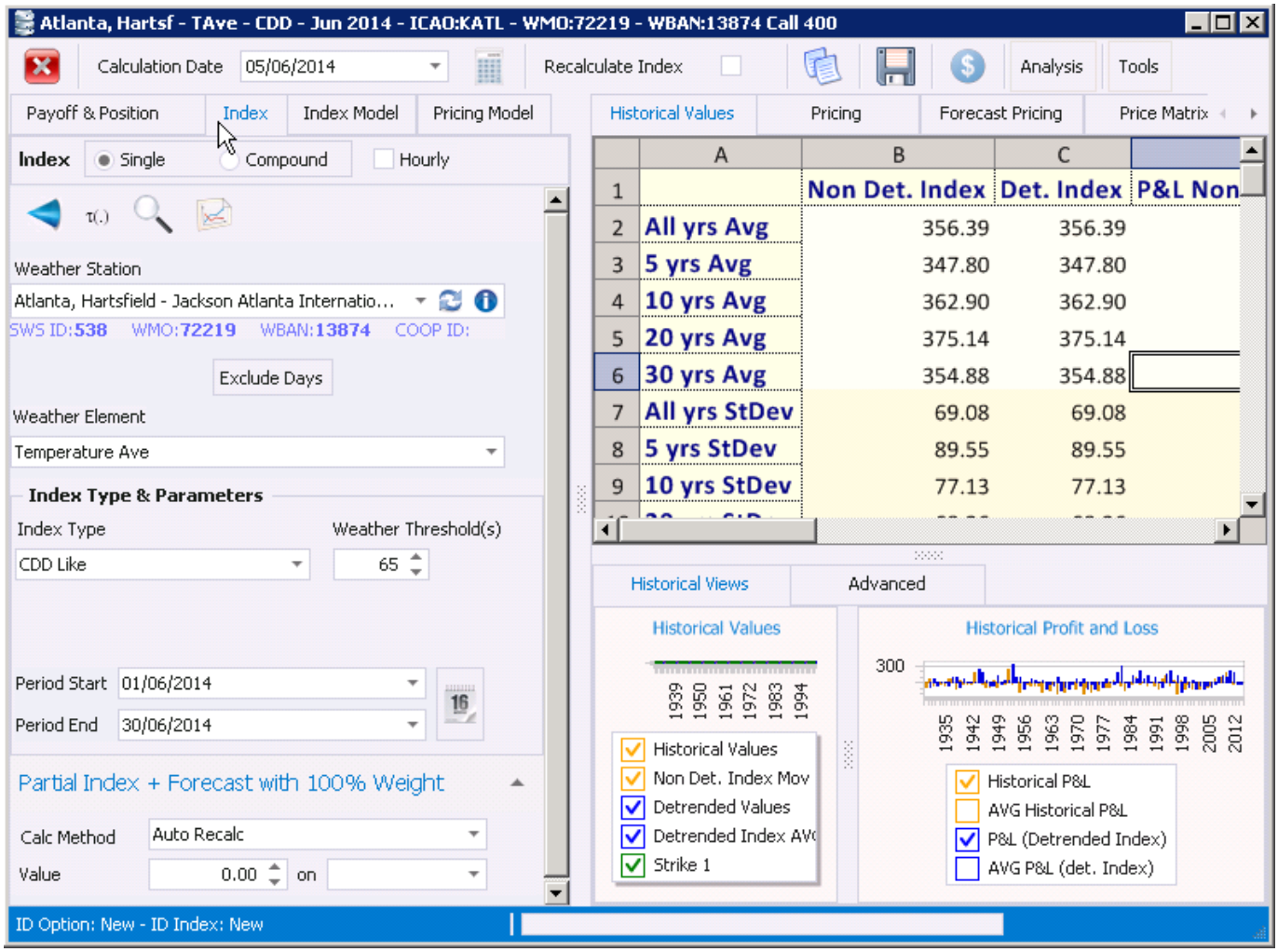

Payoff & Position
Index
Index Model
Pricing Model
Index Category
Single
Compound
Hourly
τ(.)
Weather Station
Exclude Days
Weather Element
Temperature Ave
Index Type & Parameters
Index Type
Weather Threshold(s)
HDD Like
65
Period Start
01/10/2011
Period End
31/10/2011
Partial Index + Forecast with 100% Weight
Calc Method
Auto Recalc
Value
0
on

V. Pricing an Exotic Weather Derivative

It is possible to use the full SWS statistical and risk management tools even if the index type is not supported directly by SWS, for example, a multiple-trigger index. To do this first calculate the index manually (e.g. by using a spreadsheet). On SWS first clear any data in the main pricing (**Pricing / Price Weather Derivatives / Historical Values**) form. Do this by right clicking on the form, selecting any data, then right clicking the mouse and selecting **Delete**

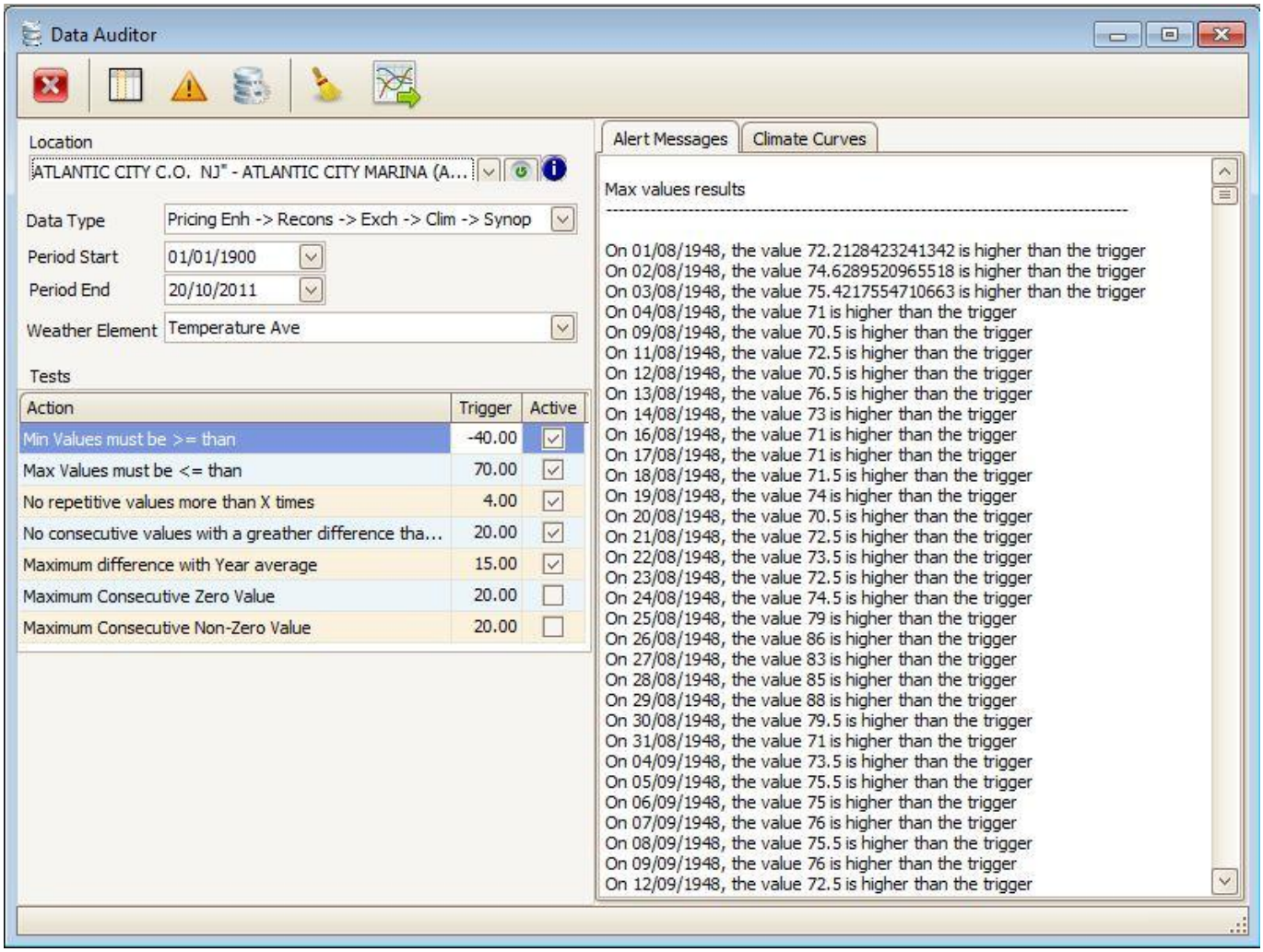
Now copy and paste the dates and index into the historical values grid.

With the **Recalculate Index** option *deselected*, any normal choice of site or index in the options to the left are suppressed and only the data entered on the form are used – the column is highlighted in grey to emphasise this. By pressing the **Calculate** button, the normal analysis of trends can be carried out. It is then possible to use the **Analysis** and **Pricing** functions as usual.

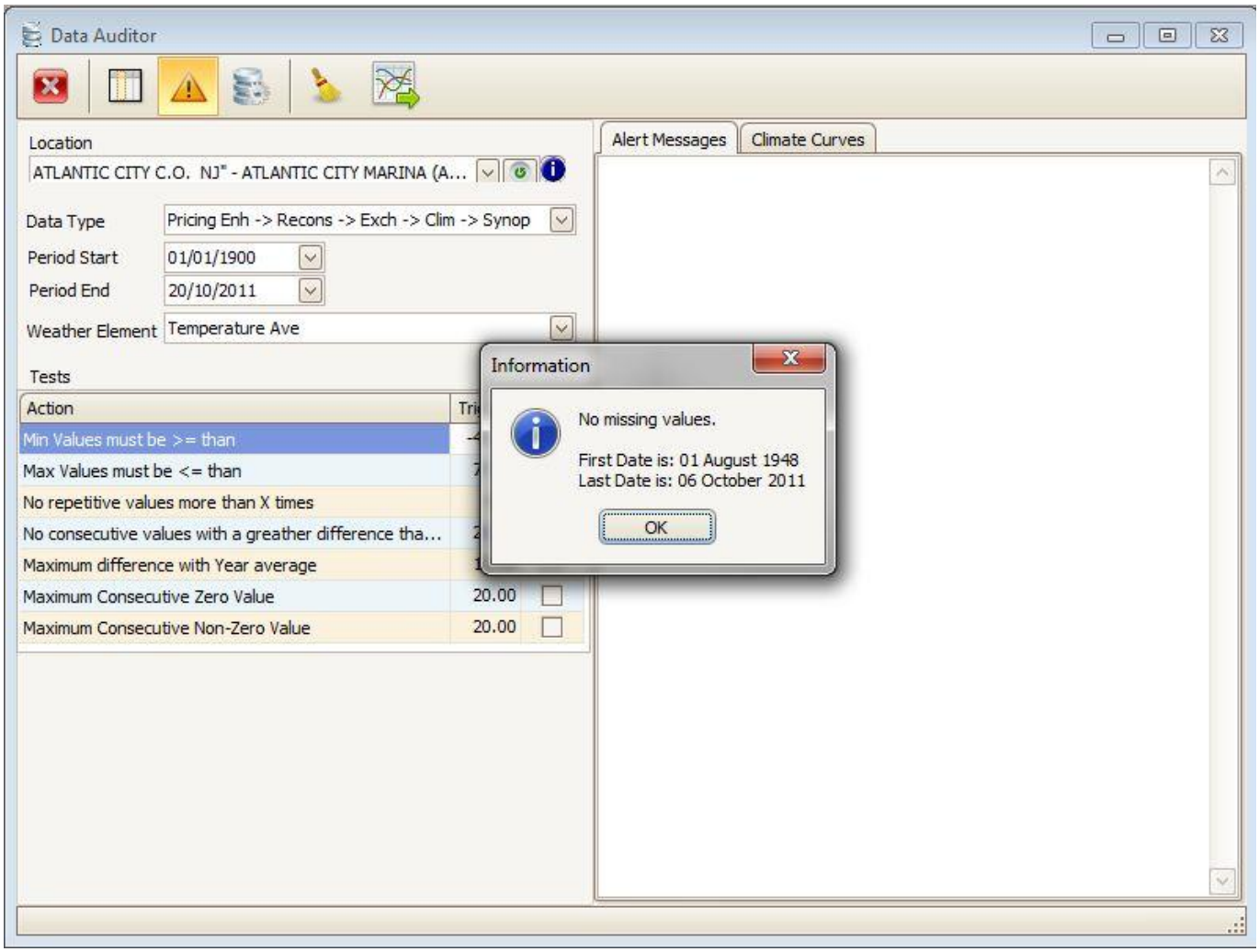


A. Checking Weather Data Integrity

A general data auditing tool can be accessed through the **Data & Forecast / Data Auditor** menu option. This brings up the form shown below. Select the ***Alert Messages*** tab.



Choose the site and then press the **Missing Data** button. Any missing data points are reported in a log.



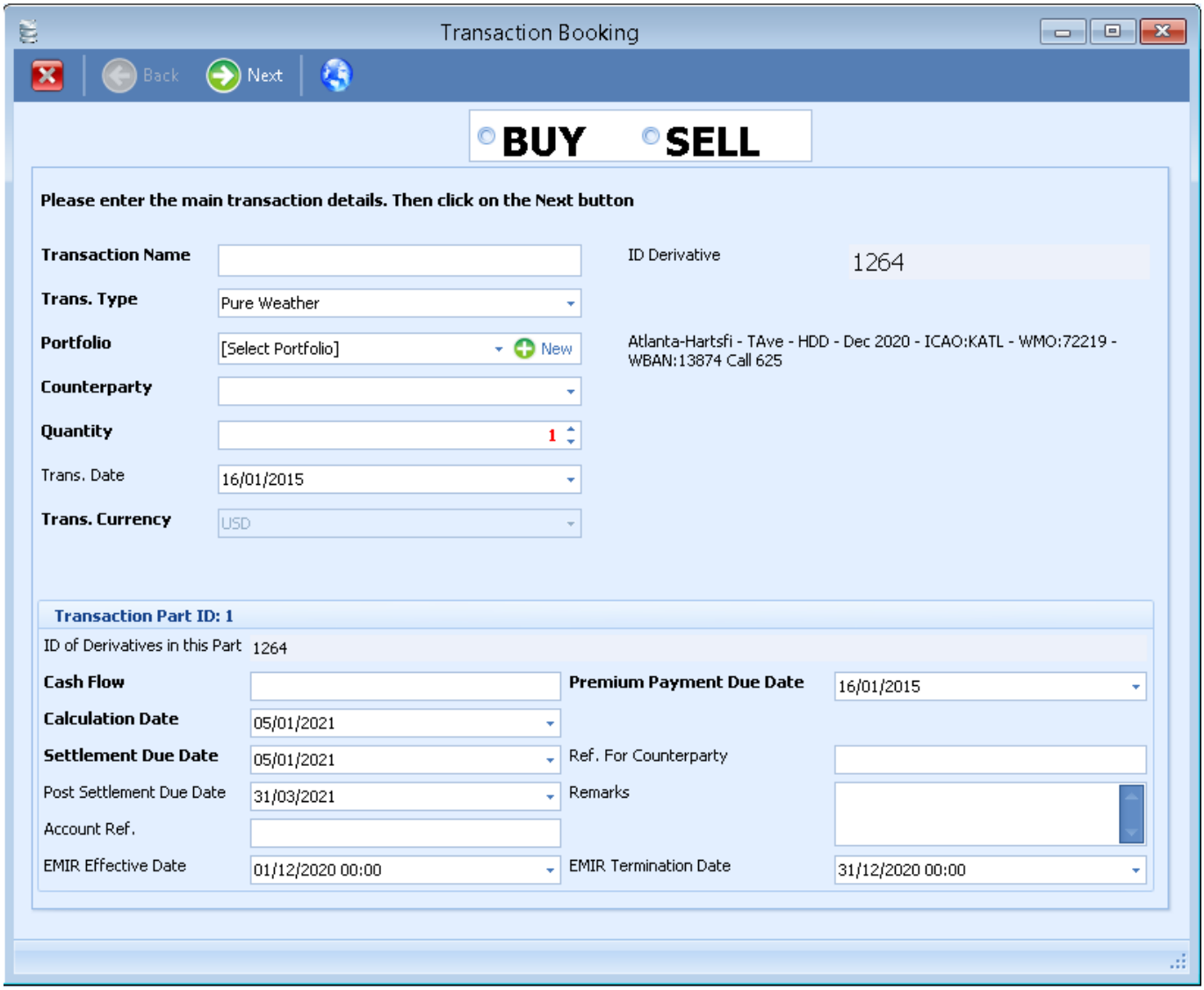
The validity of weather data can also be checked. Choose the weather element, then decide which tests to perform on the data and the triggers that generate the alerts in the **Tests** section. Press the **Audit** button and the results of the tests are posted to the right. This can be printed. Close this report to continue using SWS.

SWS also automates the procedure to fill data gaps according to the WRMA process. This can be done through the **Weather Data / WRMA Fill Method** option.

VI. Booking a Trade

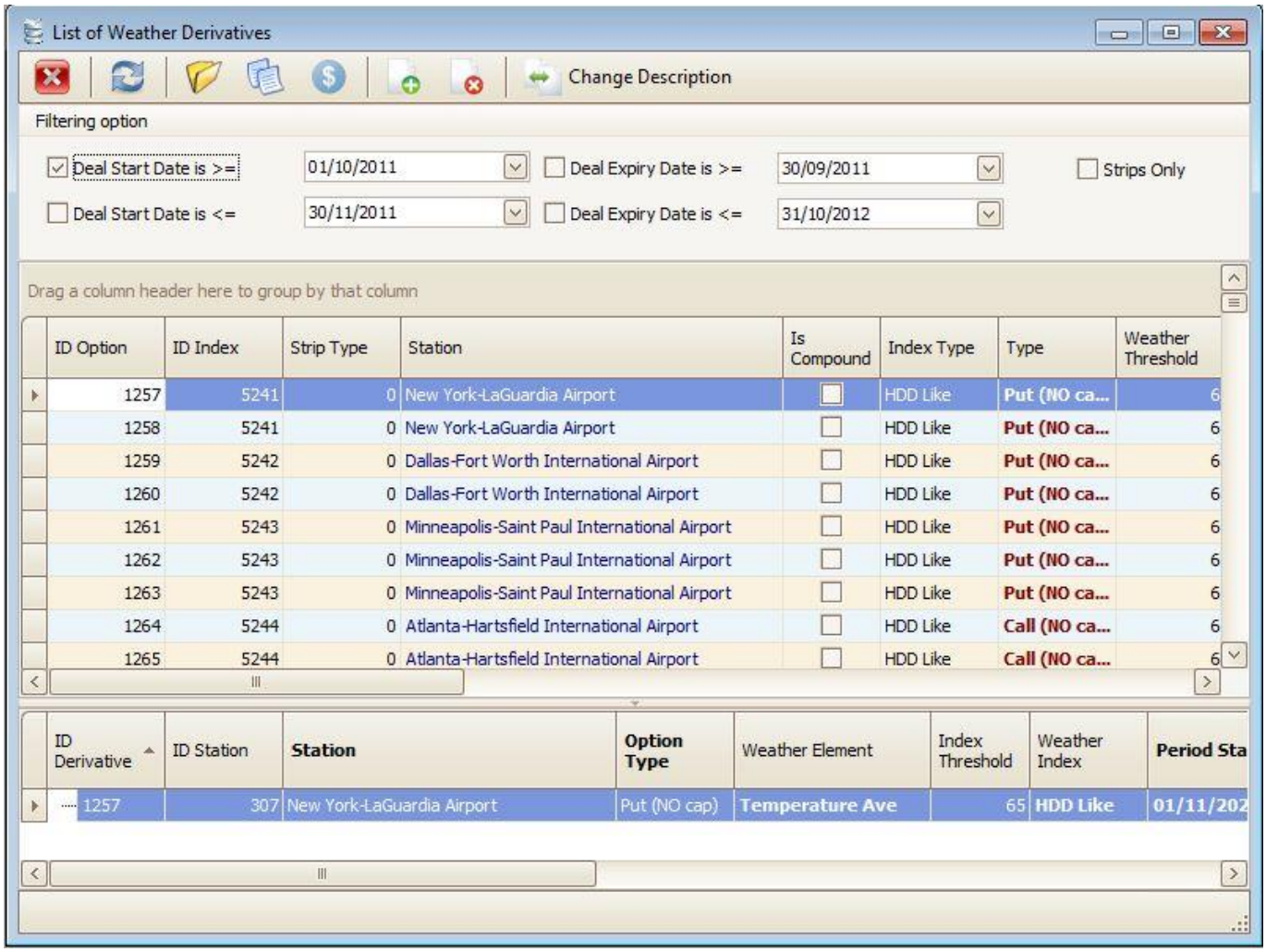
Before attempting to book a trade it is necessary to create a list of counterparty clients. This is done through the **Back Office / List of Companies** menu option. If booking a trade on an exchange, the exchange should be created as above, and the Type field set to 'Exchange'. When a trade is booked with the exchange in the Counterparty field, the trade is marked as 'Listed'. The portfolio to which the trade will be added must also be selected. It is therefore also necessary to define a portfolio. Do this via the **Portfolios / Manage / New Portfolio** menu option. There is no limit to the number that can be created.

Trades can be booked from the pricing window (in addition to a number of other places). This applies to the single-option or compound index option. From the pricing window press the **Trade Derivative** button at the top of the form. The standard Trade booking wizard form is generated:



When the fields have been completed, press the **Book Trade** button. Pressing **Refresh** will then update the Transaction list to reflect the new trade.

Once an option has been traded the need to re-define it via the pricing window can be avoided by going to the **Pricing / List of Weather Derivatives** menu.
From here the following is generated which lists all options:



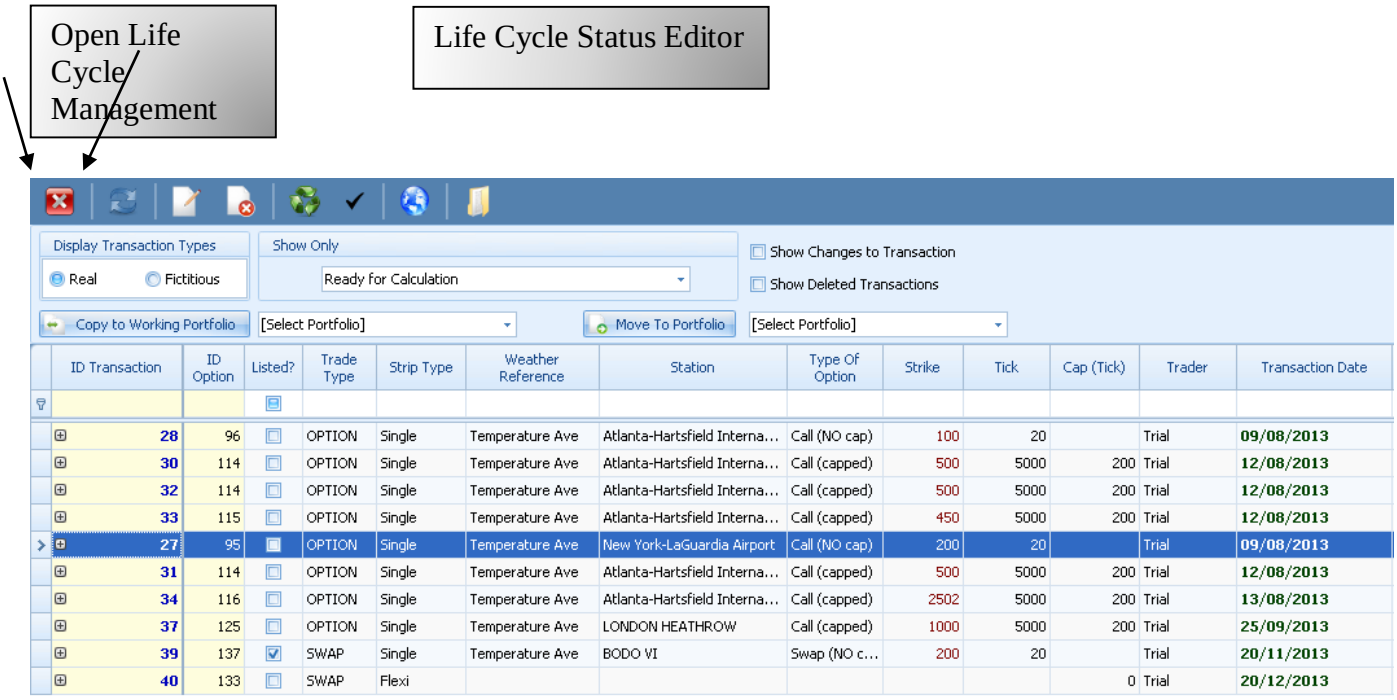
Click on the existing option in the list at the top and press the **Trade** button.

All transactions can be viewed. To do this, choose the **Portfolios / List of Transactions** option.

VII. Transaction Life Cycle

Once a trade has been booked, the back office is responsible for moving it through the transaction life cycle. The permissions needed to perform various actions are listed in Appendix I. The life cycle typically contains steps for confirmation, exchange of premiums, settlement, payment and post-settlement. However, the name and number of steps and the order in which they occur can be tailored by the user. Do this at **Back Office / Transaction Life Cycle Management** then press the 'Life Cycle Status Editor' button.

To move a transaction through the life cycle, go to **Back Office / Transaction Life Cycle Management**. The current transactions are filtered by Transaction Type (Real/Fictitious) and Life Cycle step (eg ready for Settlement). Select a transaction and press the 'Open Life Cycle Management' button



ID Transaction	ID Option	Listed?	Trade Type	Strip Type	Weather Reference	Station	Type Of Option	Strike	Tick	Cap (Tick)	Trader	Transaction Date
28	96		OPTION	Single	Temperature Ave	Atlanta-Hartsfield Interna...	Call (NO cap)	100	20		Trial	09/08/2013
30	114		OPTION	Single	Temperature Ave	Atlanta-Hartsfield Interna...	Call (capped)	500	5000	200	Trial	12/08/2013
32	114		OPTION	Single	Temperature Ave	Atlanta-Hartsfield Interna...	Call (capped)	500	5000	200	Trial	12/08/2013
33	115		OPTION	Single	Temperature Ave	Atlanta-Hartsfield Interna...	Call (capped)	450	5000	200	Trial	12/08/2013
27	95		OPTION	Single	Temperature Ave	New York-LaGuardia Airport	Call (NO cap)	200	20		Trial	09/08/2013
31	114		OPTION	Single	Temperature Ave	Atlanta-Hartsfield Interna...	Call (capped)	500	5000	200	Trial	12/08/2013
34	116		OPTION	Single	Temperature Ave	Atlanta-Hartsfield Interna...	Call (capped)	2502	5000	200	Trial	13/08/2013
37	125		OPTION	Single	Temperature Ave	LONDON HEATHROW	Call (capped)	1000	5000	200	Trial	25/09/2013
39	137	☑	SWAP	Single	Temperature Ave	BODO VI	Swap (NO c...	200	20		Trial	20/11/2013
40	133		SWAP	Flexi						0	Trial	20/12/2013

This screen can also be used to create a copy of a real transaction and add it to a working portfolio ('Copy to Working Portfolio') or moving a transaction to a different portfolio ('Move to Portfolio')

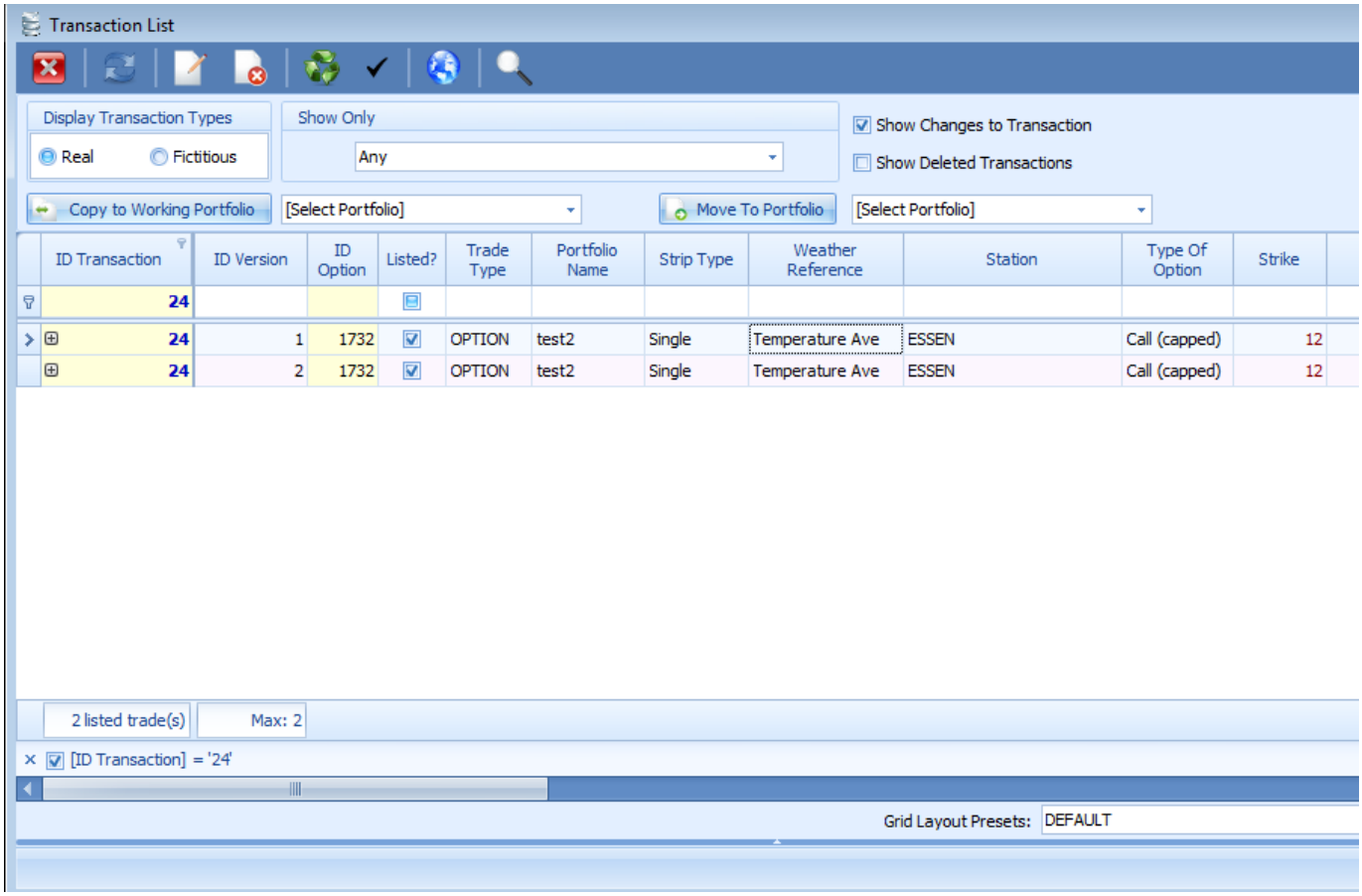
A. Real vs Fictitious Transactions

Whether a transaction is real or fictitious depends on the type of portfolio to which it is added. A **real** transaction is booked in a **real** portfolio. A **fictitious** transaction is booked in a **working** portfolio. These are generally used for testing 'what if' scenarios.

B. Editing a Transaction

Go to **Portfolios / List of Transactions**, select a transaction and press the **Edit** button. The Transaction type, Portfolio, Counterparty and Transaction Currency fields cannot be changed. If these are wrong, the transaction will have to be deleted and re-entered. If the other fields are changed, a new version of the

transaction is created. To see the different versions, go to **Portfolios / List of Transactions** and check the **Show Changes to Transaction** box

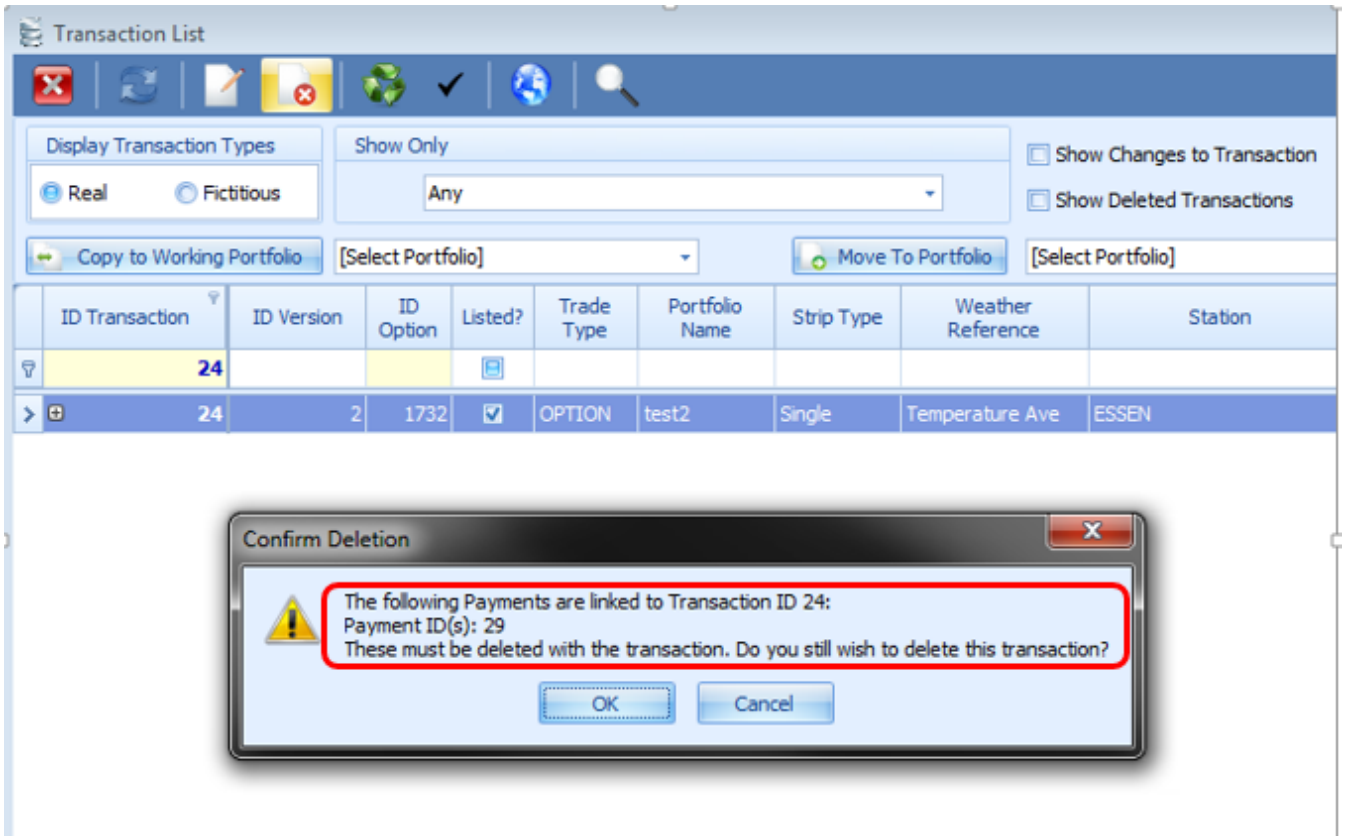


C. Deleting a Transaction

A real transaction cannot be deleted, instead it is marked as deleted. To see such transactions, go to **Portfolios / List of Transactions** and check the **Show Deleted Transactions** box.

A fictitious transaction can be deleted from the database.

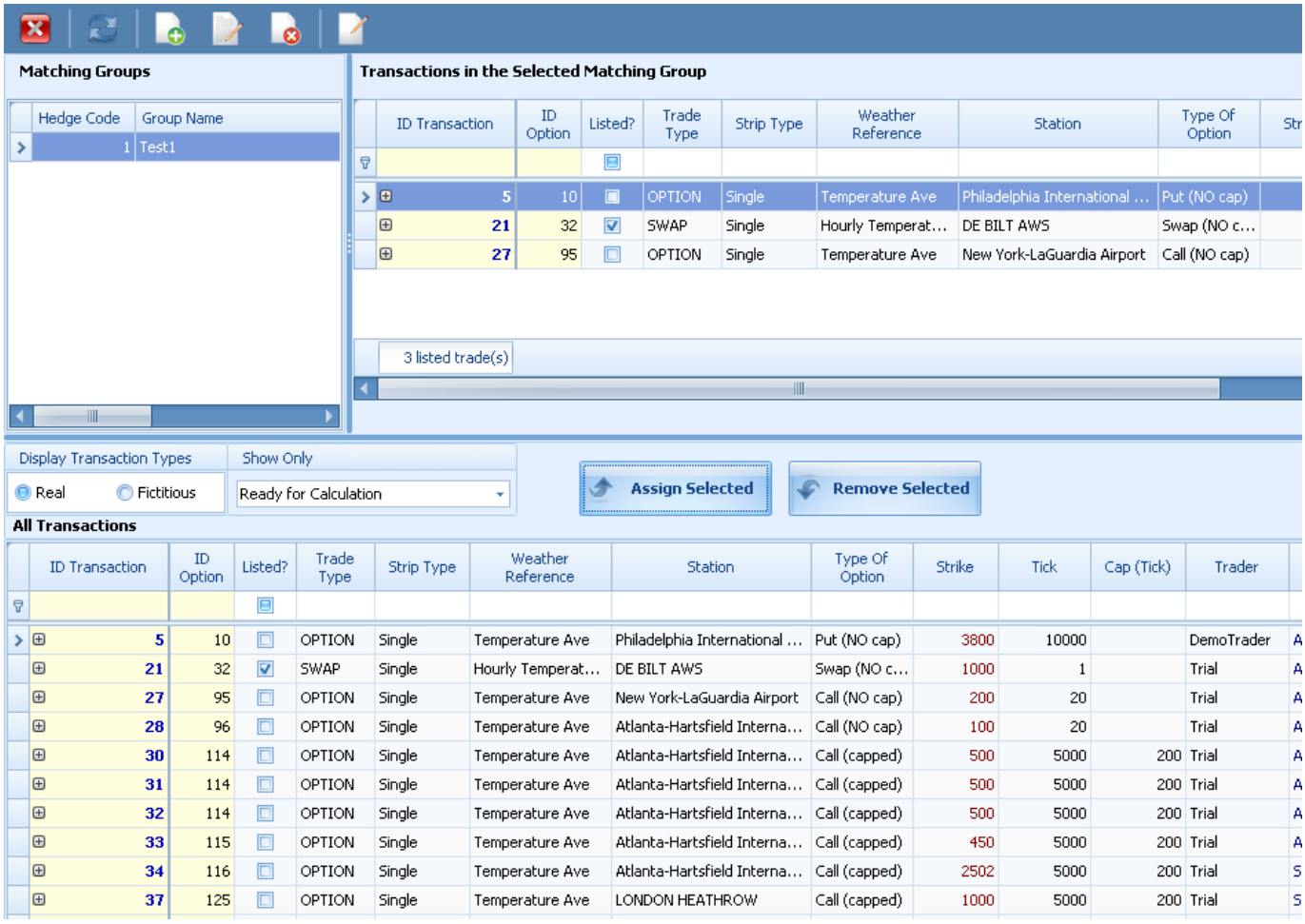
Note that a deleted transaction will 'reappear' in any report that is run before the day it was deleted. When a transaction is deleted, corresponding payments will also be deleted. The user is prompted to enter a reason for deleting the payment. Note that even if a transaction has settled, it can still be deleted.



D. Grouping Transactions

As well as transactions being assigned to a portfolio, they can also be grouped together and the group given a meaningful name. Note that this is purely a way of displaying linked transactions, all risk calculations are run at a portfolio level.

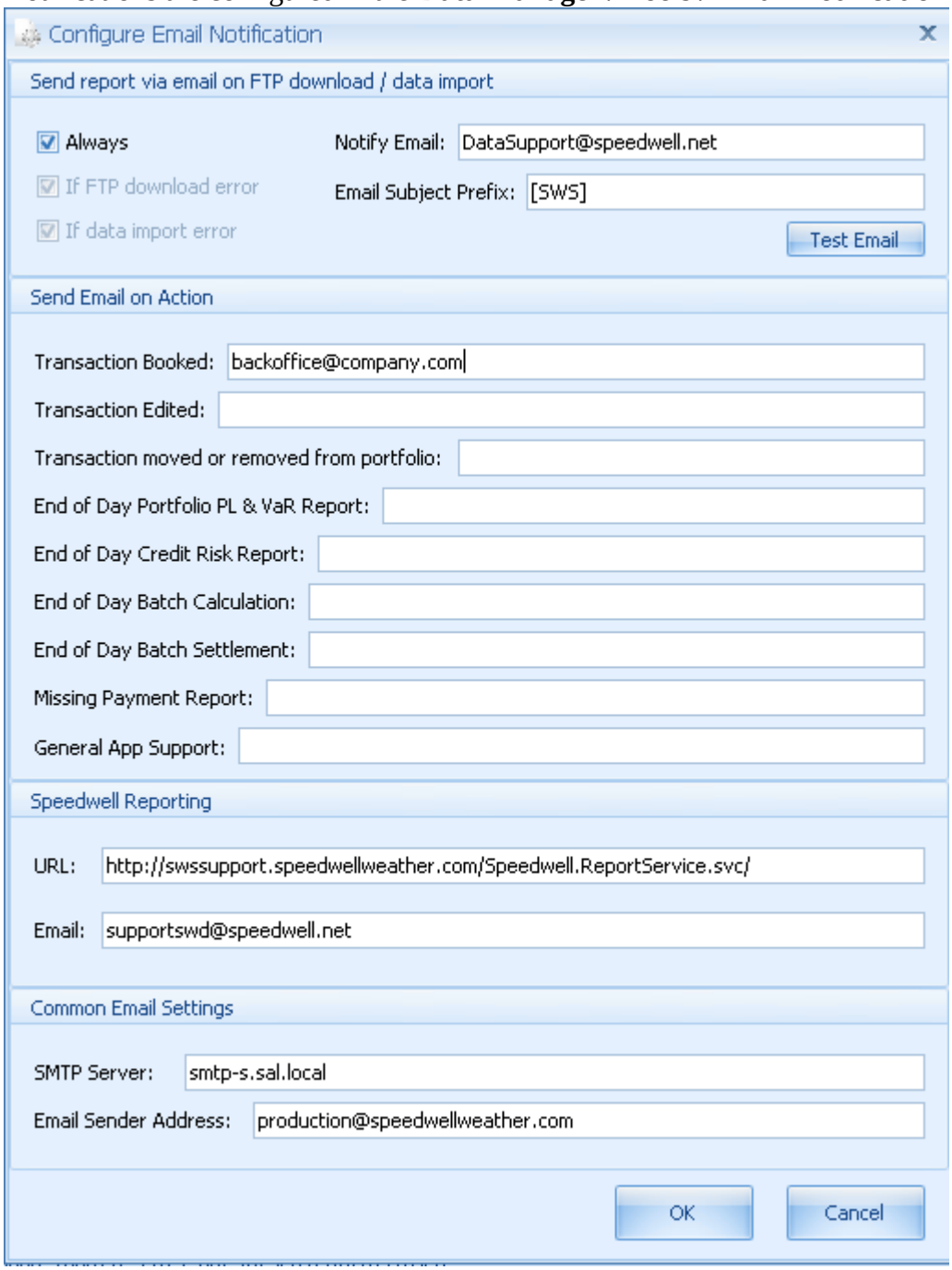
To create a new group, go to **Portfolios / List of Grouped Transactions**. Press the '**New Group**' button and enter a name and description for the group. Then use the '**Assign Selected**' button to move the selected transaction(s) from the list of All transactions to the current group.



Note that if a transaction is deleted from the database, the transaction group will be cleared. The **Transaction Matching** field of a trade is not modified when transactions are linked together in a group. This may need to be checked when adding a transaction to a group.

E. Notifications

Notifications are configured in the **Data Manager / Tools / Email Notification Configuration**



The Speedwell Reporting section may be used when SWS detects an error. When this happens, the user is presented with a dialog that lets them report the error to Speedwell if desired.

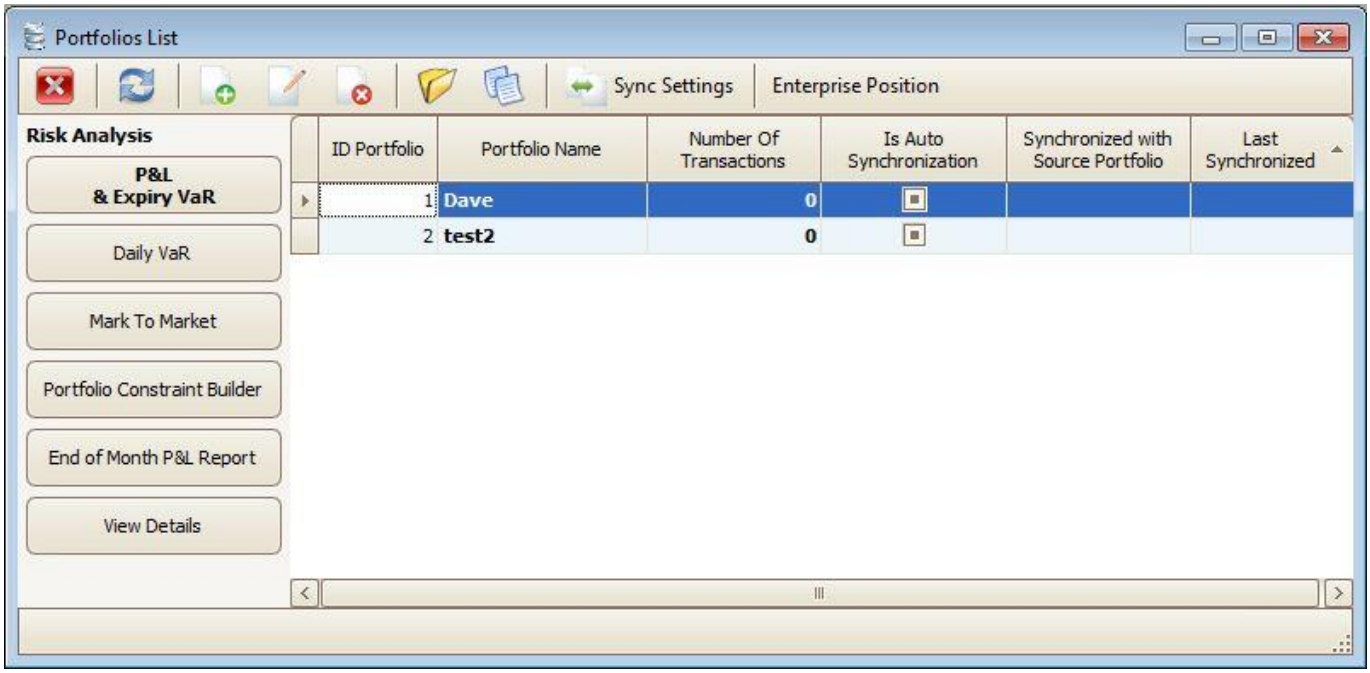
VIII. Calculating Portfolio Risk

The sequence of calculating VaR is as follows:

- Create portfolio
- Look at historic performance of the portfolio
- Generate correlations from history
- Simulate the portfolio
- Report VaR and other measures

SWS supports portfolio analysis of swaps, options, exotics and basket options. Portfolio operations such as viewing a portfolio, looking at historic payouts and calculating VaR are accessed through the main **Portfolios** menu.

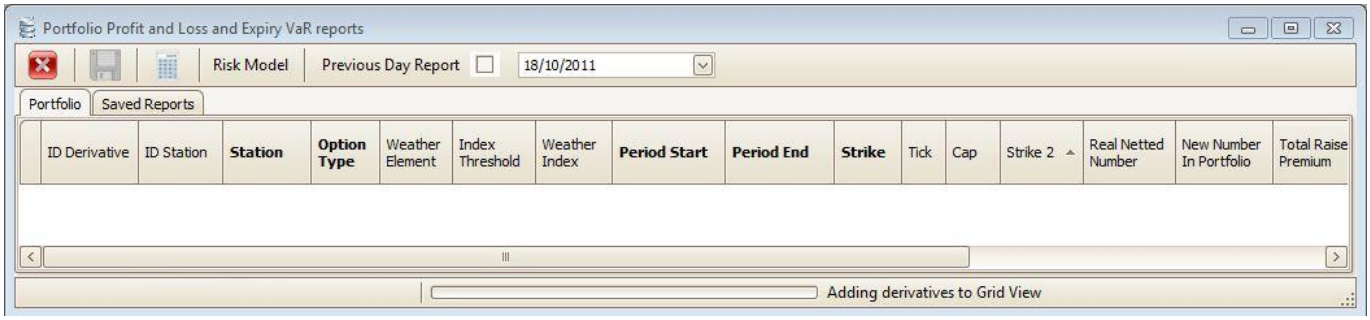
To view the list of Portfolios and define new ones etc…. simply select the menu option **Portfolios / Manage**. This generates the following form from which an existing portfolio can be accessed or a new one added:



A. Creating a New Portfolio or Book

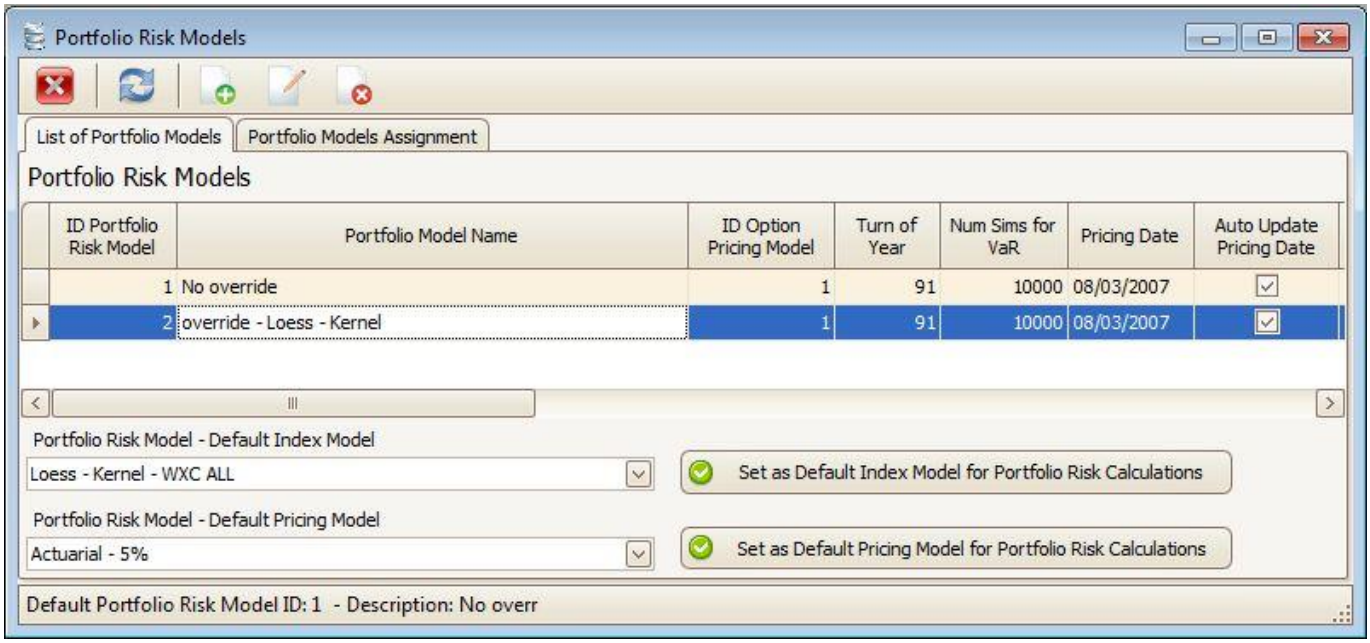
To create a new portfolio press **New Portfolio** and enter the details as shown below:

Select the new portfolio. This brings up an empty portfolio as shown below into which trades can be added:

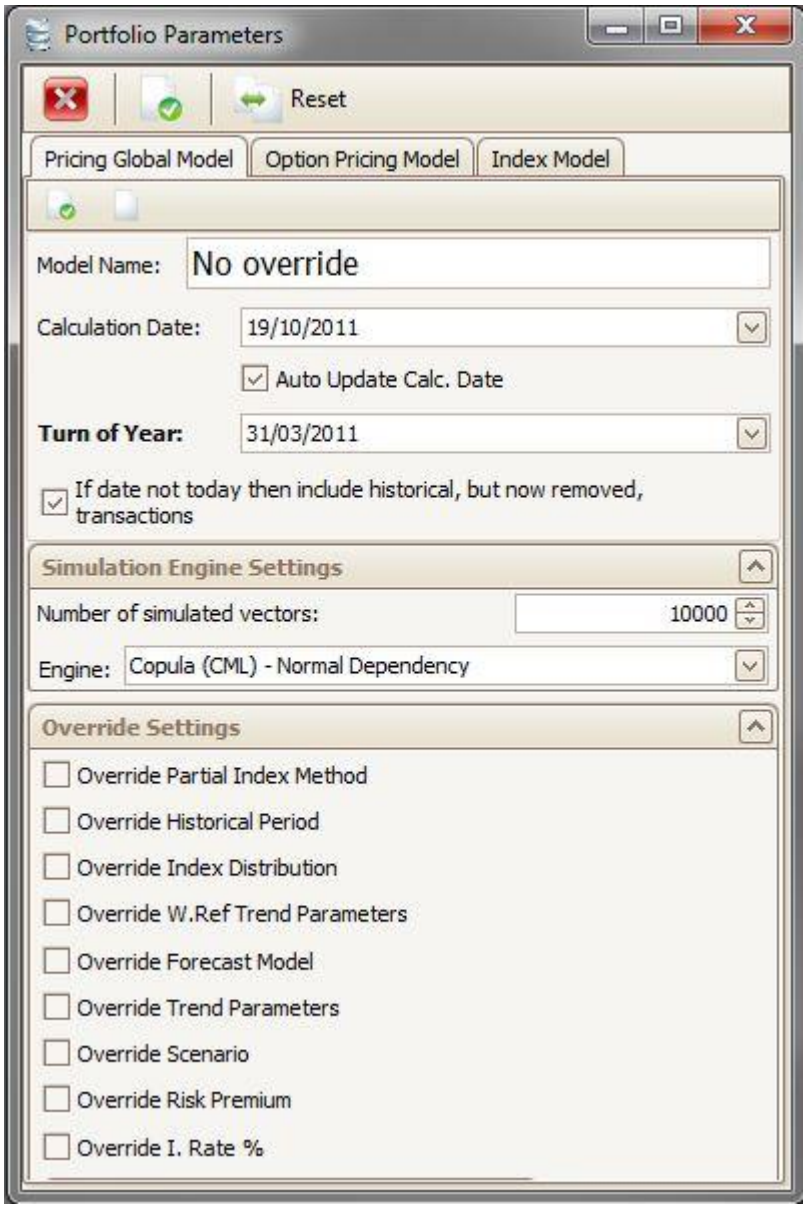


B. Adding a Portfolio Risk Model

SWS enables the definition of specific models for each option, portfolio and index that has been created. Each model can be specified separately and tailored to suit specific scenarios. To access the Portfolio Risk Model functionality select the **Middle Office / Portfolio Risk Models** menu option:



Click the **Add** button to bring up the form shown below:



This form allows specification of a number of different options to tailor the Portfolio Risk Model.

There are a number of options:

- **Model Name:** The chosen model name can be specified here.
- **Calculation Date:** The date of calculation can be entered here.
- **Auto Update Calc Date:** Automatically update calculation date to the present.
- **Turn of Year:** Change the date of Turn of Year.
- If date not today then include historical, but now removed transactions: If the date is not the present day, then use historical transactions that have been removed.

- **Simulation Engine Settings:** Allows specification of the number of Simulations and simulation engine used to calculate Value at Risk.
- **Override Partial Index Method:** Override any partial index that may have been selected.
- **Override Historical Period:** Override the settings for the historical period.
- **Override Index Distribution:** Override the selected Index Distribution.
- **Override W.Ref Trend Parameters:** Override the selected weather reference trend parameters
- **Override Forecast Model**: Override the selected forecast model.
- **Override Trend Parameters:** Override the parameters for the trend.
- **Override Scenario**: Override the scenario
- **Override Risk Premium:** Override the selected risk premium level.
- **Override I.Rate:** Override the selected Interest Rate.

C. Adding a Derivative to the Portfolio

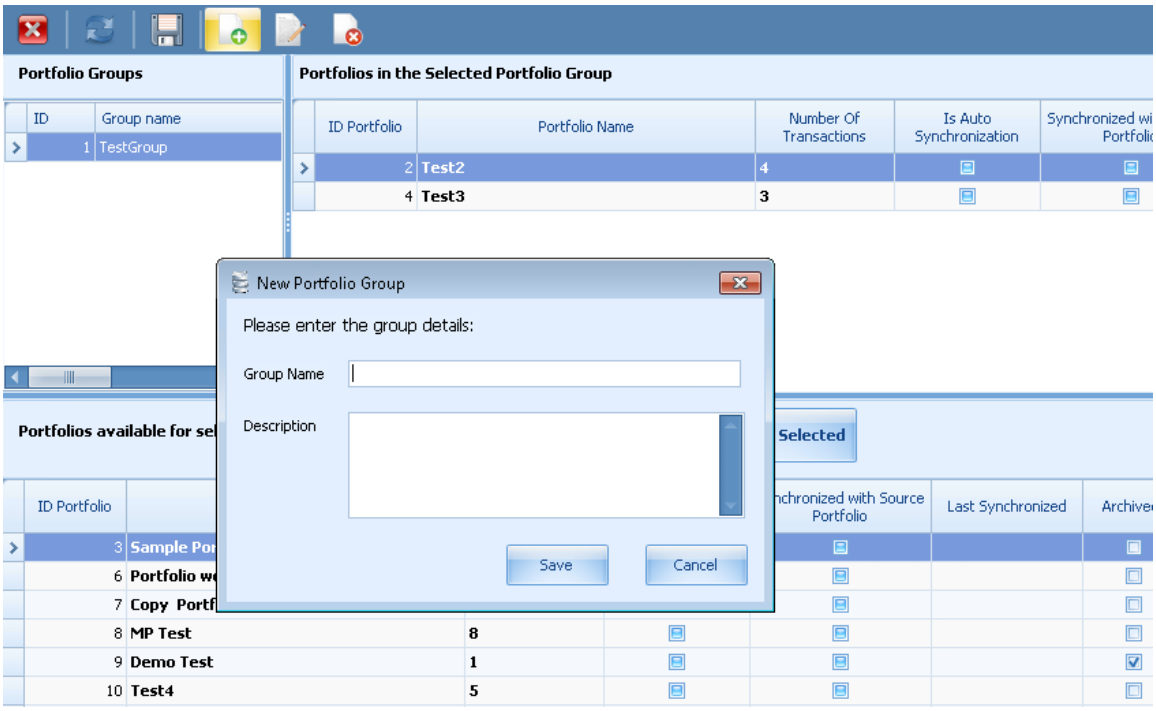
A trade is entered into a portfolio when it is booked as described in the section above. A derivative can also be entered into a portfolio before a trade is completed to see the impact on the portfolio.

The derivative can be added to a portfolio from the List of Weather Derivatives form by selecting the derivative and then pressing the **Add to Portfolio** button. SWS will now ask for a portfolio to be specified from the list. Select a portfolio and click the **OK** button. This adds the structure to the portfolio.

To view the portfolio, select **Portfolios / Manage**, select the portfolio and then press the **Open** button

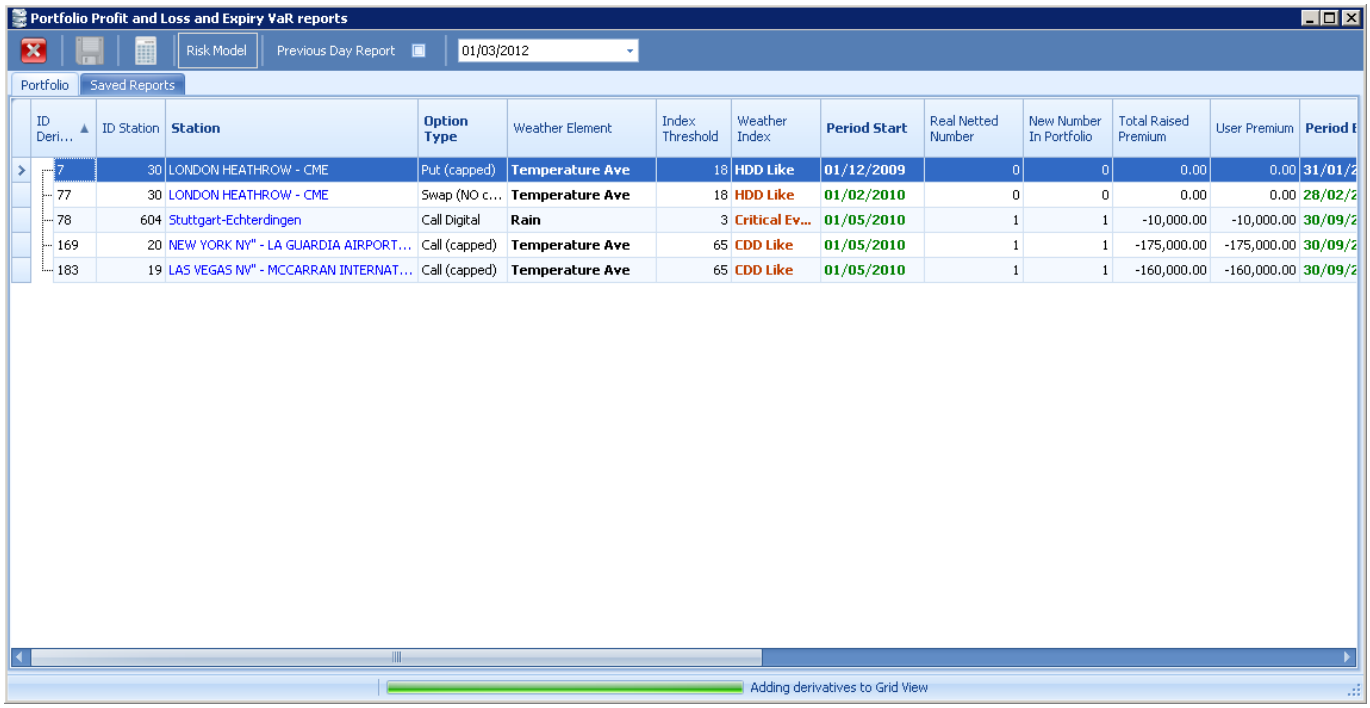
D. Grouping Portfolios

Portfolios can also be grouped together. This can be useful to link portfolios in SWS to books in the client's risk management system. Again, there is no additional functionality at the group level it is simply an alternative way of organizing the portfolios.
To create a new group, go to **Portfolios / List of Grouped Portfolios**. Press the '**New Group'** button, then use the '**Assign Selected**' button to move the selected portfolio from the list of all portfolios to the current group.

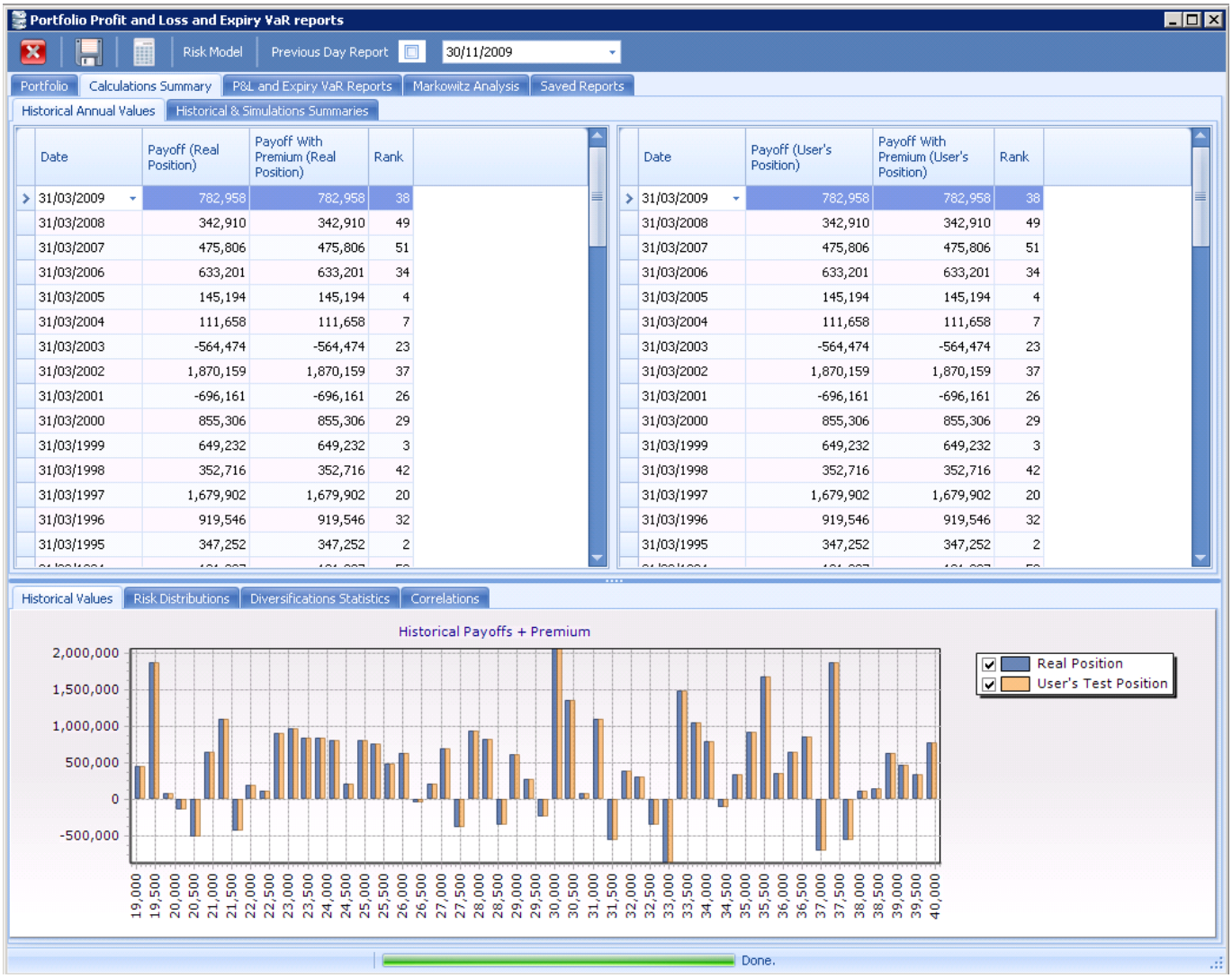


E. Looking at the History

To view the risk analysis of a particular portfolio, firstly select the required portfolio from the list in the same manner as was described in the previous section. Then press the **Risk Analysis** button. Before running the Risk analysis, there is also the possibility of viewing the impact of a change in the number of options or the premium figures for each option. These can be changed by inserting new figures into the **New Number** and **User Premium** fields (note that the order of the fields may be different):

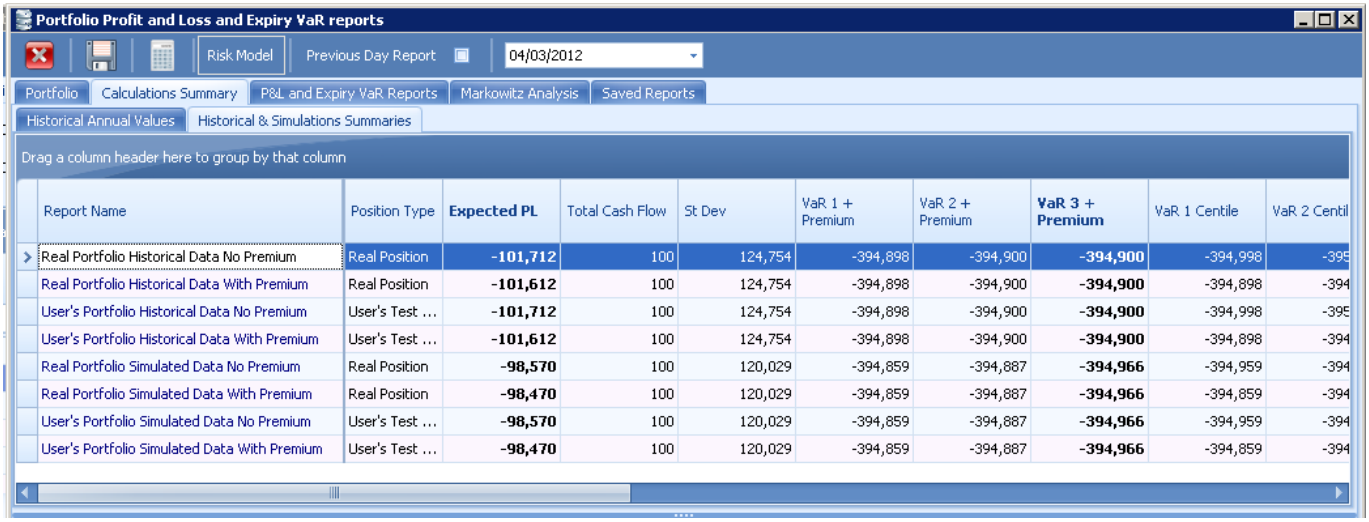


Press the **Run** button and the historical values of the payoff for the portfolio are displayed using all the available historical data



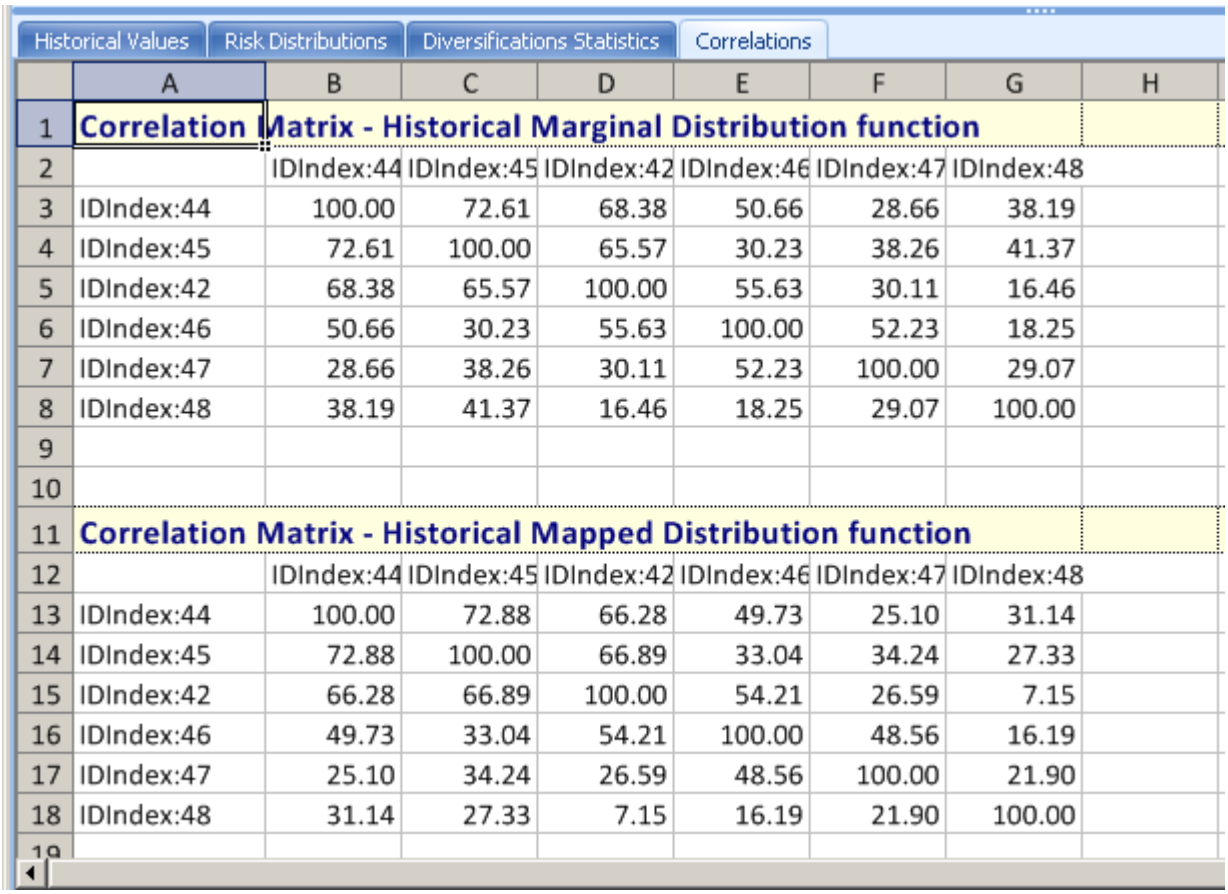
This tab shows the historical portfolio values on an actual and simulated basis. Furthermore the user figures that can be entered in the ***Portfolio*** tab are rated against the **Real Portfolio** figures and shown graphically (as can be seen above). The figures are also available by year on the grid above (this includes the Premium figure comparison). Under the Diversification Statistics tab is shown the Secondary Stochastic Dominance Test. This assesses which of the two portfolios (the Real one or the User one) would have been the best one to have on an historical and simulated basis once again.

The data is also available graphically under the respective tabs. The **Calculations Summary / Historical & Simulations Summaries** tab shows a summary of volatility, VaR and expected return figures:



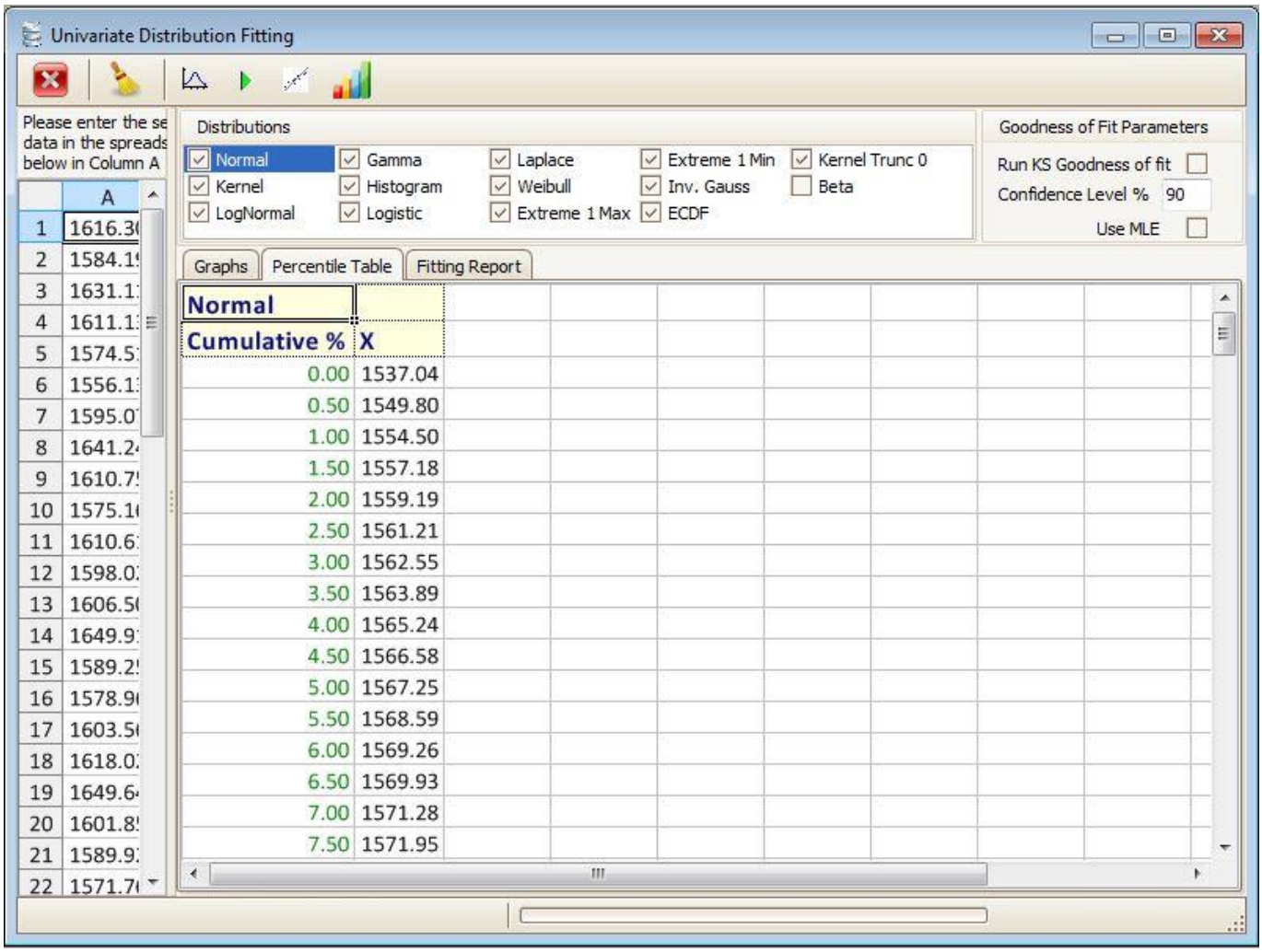
Report Name	Position Type	Expected PL	Total Cash Flow	St Dev	VaR 1 + Premium	VaR 2 + Premium	VaR 3 + Premium	VaR 1 Centile	VaR 2 Centil
Real Portfolio Historical Data No Premium	Real Position	-101,712	100	124,754	-394,898	-394,900	-394,900	-394,998	-395
Real Portfolio Historical Data With Premium	Real Position	-101,612	100	124,754	-394,898	-394,900	-394,900	-394,898	-394
User's Portfolio Historical Data No Premium	User's Test ...	-101,712	100	124,754	-394,898	-394,900	-394,900	-394,998	-395
User's Portfolio Historical Data With Premium	User's Test ...	-101,612	100	124,754	-394,898	-394,900	-394,900	-394,898	-394
Real Portfolio Simulated Data No Premium	Real Position	-98,570	100	120,029	-394,859	-394,887	-394,966	-394,959	-394
Real Portfolio Simulated Data With Premium	Real Position	-98,470	100	120,029	-394,859	-394,887	-394,966	-394,859	-394
User's Portfolio Simulated Data No Premium	User's Test ...	-98,570	100	120,029	-394,859	-394,887	-394,966	-394,959	-394
User's Portfolio Simulated Data With Premium	User's Test ...	-98,470	100	120,029	-394,859	-394,887	-394,966	-394,859	-394

The correlations of the underlying index are calculated under the ***Correlations*** tab, as shown below. Note that the correlations are derived using the period of data defined when the structure is added to the portfolio using both historical data and the simulated samples.



	A	B	C	D	E	F	G	H
1	Correlation Matrix - Historical Marginal Distribution function							
2		IDIndex:44	IDIndex:45	IDIndex:42	IDIndex:46	IDIndex:47	IDIndex:48	
3	IDIndex:44	100.00	72.61	68.38	50.66	28.66	38.19	
4	IDIndex:45	72.61	100.00	65.57	30.23	38.26	41.37	
5	IDIndex:42	68.38	65.57	100.00	55.63	30.11	16.46	
6	IDIndex:46	50.66	30.23	55.63	100.00	52.23	18.25	
7	IDIndex:47	28.66	38.26	30.11	52.23	100.00	29.07	
8	IDIndex:48	38.19	41.37	16.46	18.25	29.07	100.00	
9								
10								
11	Correlation Matrix - Historical Mapped Distribution function							
12		IDIndex:44	IDIndex:45	IDIndex:42	IDIndex:46	IDIndex:47	IDIndex:48	
13	IDIndex:44	100.00	72.88	66.28	49.73	25.10	31.14	
14	IDIndex:45	72.88	100.00	66.89	33.04	34.24	27.33	
15	IDIndex:42	66.28	66.89	100.00	54.21	26.59	7.15	
16	IDIndex:46	49.73	33.04	54.21	100.00	48.56	16.19	
17	IDIndex:47	25.10	34.24	26.59	48.56	100.00	21.90	
18	IDIndex:48	31.14	27.33	7.15	16.19	21.90	100.00	
19								

The distribution of the payoffs can be seen and tested. Press the **Analyse Portfolio Distribution** and choose whether to use Historical or Simulated Values for the Real or User's portfolio under the Settings button:



In this view, the percentage probability of gaining or losing each amount under each distribution is listed in the grid to the right. There is also the option here to use either historical or simulated data (simply check the appropriate box).

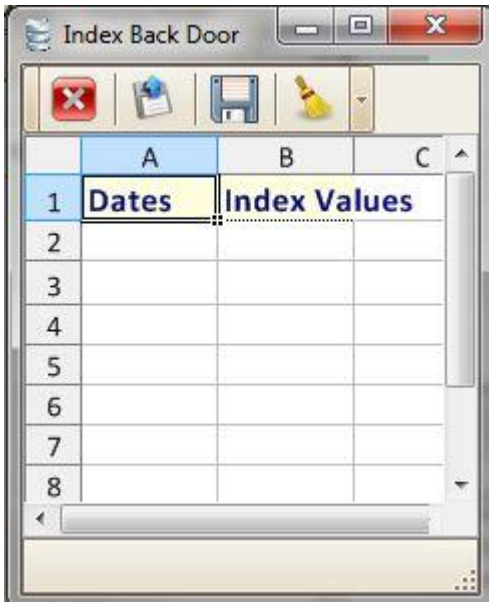
NB. Please also see the final section entitled '**Calculating VaR**' for further information on Risk Analysis.

F. Using the back door to price deals without data

From time to time, you may want to enter a deal for which you have not got the underlying data. In this case, you can use 2 different techniques. The first one is to create fictitious daily values that you manually import into the database under a given table like tblTemperatureAve, tblTemperatureMax, tblRain or any other weather table you have created for this purpose (recommended method). You will have created those values so that when SWS cumulates them (or averages, or performs any other index transformation

on them) you find the historical index values that SWS is unable to calculate. It is the recommended method as by updating the daily value every day in the future you will be able to smoothly work out the partial index effect.

The second method is to use the back door concept. SWS incorporates the facility to have a 'back door' that enables deals to be priced without data in the main database. Select the weather derivative for which you need to store the historical index values in the database from the option list (**Pricing** / **List of Weather Derivatives**). Under the **Tools** menu on the Pricing screen, there is an item called **Back Door – Set Values**. The following new form will appear:



Please paste in it the historical values that SWS must use to perform calculations and press the **Save the historical Values to the database** button. The dates must be equal to the historical end dates for the previous year and must be formatted under your current MS Windows date settings. As an example, in the USA, where the date format is 'MM/DD/YYYY', and for an option that starts the 1st of November and terminates the 31st of March the following year, the data that you would need to paste in the grid should look like the ones in the following table:

Dates	Index Values
03/31/2003	1627
03/31/2002	1651.15
03/31/2001	1764.95
03/31/2000	1667.35
03/31/1999	1678.3
03/31/1998	1541.8
03/31/1997	1809.85
03/31/1996	1951.05
03/31/1995	1575.75
03/31/1994	1769.45
03/31/1993	1738.85

03/31/1992	1783.8
03/31/1991	1849.55
03/31/1990	1540.95
03/31/1989	1661.1
03/31/1988	1765.85
03/31/1987	1936.95
03/31/1986	2046.25
03/31/1985	1971.15
03/31/1984	1850.05

When using the back door, you need to keep in mind that SWS will always use those values in the portfolio risk calculation as long as the portfolio risk models is so configured. You will also need to update the historical index values daily during the accruing period of the trade if you want to monitor the effect of the partial index.

G. Calculating VaR

So far the actual historical outcomes have been analysed. The calculation of value at risk requires that the portfolio be simulated. This is done using a Monte Carlo process and uses the entered parameters of all of the structures in the portfolio. These include the defined mean and volatility. Before the VaR figures can be observed a Portfolio must firstly be opened. Having done this click on the **Risk Analysis** button and when this screen opens press the **Run** button. To observe the VaR figures, go to the ***P&L and Expiry VaR Reports*** tab at the top of the screen and the ***Risk Report*** tab at the bottom of the screen.

The VaR figures are displayed in this screen. There are also numerous other useful statistics available here, and on the other tabs: ***Profit & Loss*** and ***Greeks***.

NB. Please see the earlier section entitled '**Looking at the History**' to see further information on risk analysis, including testing the effect of different numbers of options on an existing portfolio.

H. Open Position Report

To view all the transactions that have open positions at a given Close of Business date, go to **Back Office / Open Position Report**. The report can be filtered by Trade type (All, Listed, OTC) and the Close of Business Date selected. Then press the 'Run report' button.

Run Report

Trade Type: All Open Position as of CoB: 26/07/2014

Drag a column header here to group by that column

Transactions IDs			Open Position for All trades as of close of business 26/07/2014. Report run on 27/01/2015 19:30:10.							
ID Transaction	ID Transaction Part	Portfolio Group Name	Transaction Type	Transaction Date	Purchase Or Sale	Station	Index Type	Period Start	Period End	Cou Trac
27	1	TestGroup	Option	09/08/2013	P	New York-LaGuardia Airport	Call (NO cap)	01/06/2013	30/06/2013	
28	1	TestGroup	Option	09/08/2013	S	Atlanta-Hartsfield International ...	Call (NO cap)	01/06/2013	30/06/2013	
30	1		Option	12/08/2013	S	Atlanta-Hartsfield International ...	Call (capped)	01/08/2013	31/08/2013	
31	1		Option	12/08/2013	P	Atlanta-Hartsfield International ...	Call (capped)	01/08/2013	31/08/2013	
32	1		Option	12/08/2013	S	Atlanta-Hartsfield International ...	Call (capped)	01/08/2013	31/08/2013	
33	1		Option	12/08/2013	S	Atlanta-Hartsfield International ...	Call (capped)	01/08/2013	31/08/2013	
34	1		Option	13/08/2013	P	Atlanta-Hartsfield International ...	Call (capped)	01/11/2013	31/03/2014	
37	1		Option	25/09/2013	P	LONDON HEATHROW	Call (capped)	01/11/2013	31/03/2014	
39	1		Swap	20/11/2013	P	BODO VI	Swap (NO cap)	01/10/2012	30/09/2013	

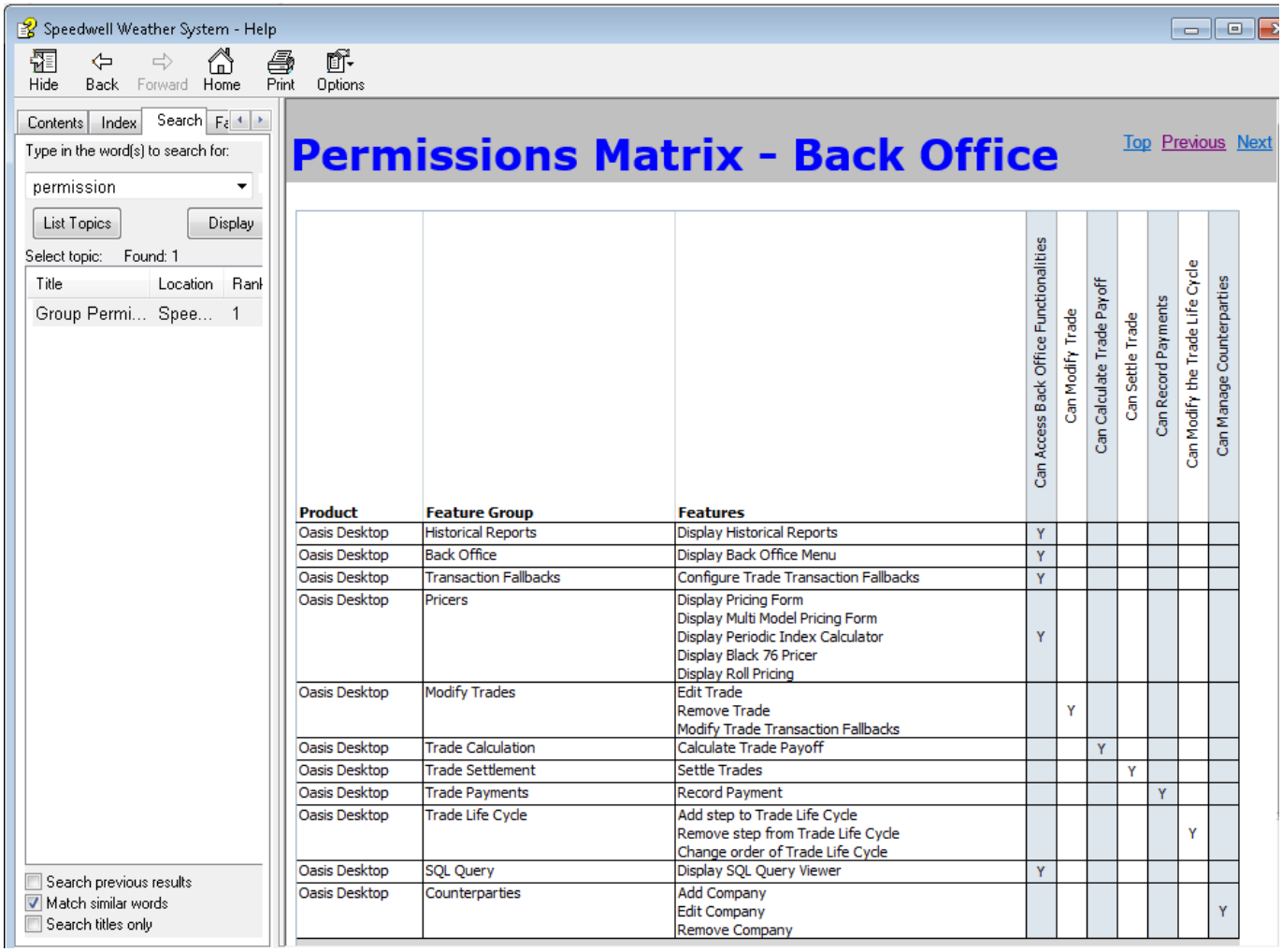
Note that the columns ‘Expected Sim PL – MTM Original’ and ‘MTM in USD Discounted’ will only be populated if the calculations for the relevant portfolio have been run and are saved.

IX. Appendix I

In order to perform back office actions, a user must have the relevant permissions. These can be found in the **Oasis Data Manager / User Management / Group Permissions** under Category Name = Back Office. They are summarized below:

ID Access Flag	Flag Name
100	Can Access Back Office Functionalities
101	Can Modify Trade
102	Can Calculate Trade Payoff
103	Can Settle Trade
104	Can Record Payments
105	Can Modify the Trade Life Cycle
106	Can Manage Counterparties
107	Can Modify Trade External Pricing Model

Searching under Help shows what the Flag Names refer to:



Product	Feature Group	Features	Can Access Back Office Functionalities	Can Modify Trade	Can Calculate Trade Payoff	Can Settle Trade	Can Record Payments	Can Modify the Trade Life Cycle	Can Manage Counterparties
Oasis Desktop	Historical Reports	Display Historical Reports	Y						
Oasis Desktop	Back Office	Display Back Office Menu	Y						
Oasis Desktop	Transaction Fallbacks	Configure Trade Transaction Fallbacks	Y						
Oasis Desktop	Pricers	Display Pricing Form Display Multi Model Pricing Form Display Periodic Index Calculator Display Black 76 Pricer Display Roll Pricing	Y						
Oasis Desktop	Modify Trades	Edit Trade Remove Trade Modify Trade Transaction Fallbacks		Y					
Oasis Desktop	Trade Calculation	Calculate Trade Payoff			Y				
Oasis Desktop	Trade Settlement	Settle Trades				Y			
Oasis Desktop	Trade Payments	Record Payment					Y		
Oasis Desktop	Trade Life Cycle	Add step to Trade Life Cycle Remove step from Trade Life Cycle Change order of Trade Life Cycle						Y	
Oasis Desktop	SQL Query	Display SQL Query Viewer	Y						
Oasis Desktop	Counterparties	Add Company Edit Company Remove Company							Y

Regarding software and consultancy services please see **www.SpeedwellWeather.com** or contact:

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