IAS-39 Hedge Accounting Version 1.0.0

1 Introduction

The IAS 39 accounting rules disciplines the representation and the valuation of financial instruments on the balance sheet. A fundamental principle in IAS is that all derivatives are measured at fair value; the IAS 39 principle introduces relevant advances in the hedging instruments accounting ("Hedge Accounting").

"Hedge Accounting" seeks to reflect the results of hedging activities, in particular hedging using derivatives, by reporting the effects of the derivative and the risk being hedged in the same period. These rules allow you to "*evaluate at the same time the effects at income statement level derived by hedging instrument and hedged item fair values changes*".

IAS 39 "Hedge Accounting" can be done if the hedging is <u>highly effective</u>. In detail, a hedge is regarded highly effective, from the IAS point of view, only if both of the following tests are passed:

- **Prospective Effectiveness Test**: from the beginning of the derivatives (and for the length of the hedging operation), the company can expect that changes to the fair value, or of the subsequent cash flows given by the hedged activity ("hedged item"), will be almost compensated by changes of the fair value or cash flows of the "hedging instrument".

  It is required, at a minimum, at the inception of the hedge and at each reporting date.

- **Retrospective Effectiveness Test**: the recorded relative changes must fall in the 80-125% interval.

  It is required, at a minimum, at each reporting date.

This plug-in implements both the IAS-39 hedge accounting prospective and retrospective tests for any derivative contract you can model with Fairmat.

For more information on the IAS 39 approach to accounting see `http://www.ifrs.org` and [PWC, 2006].

2   How to use the plug-in

The IAS 39 Test can be performed on Fairmat projects where two different "hedged items" and "hedging instruments" are defined using the Fairmat option map scenarios. The first scenario represents the hedged item cash flows, and the second the hedging instrument.

Good practice when preparing a contract for IAS is to model the hedge item and the hedging instrument as two branches and connect them using a SUM or Functional operator as shown in the figure below.
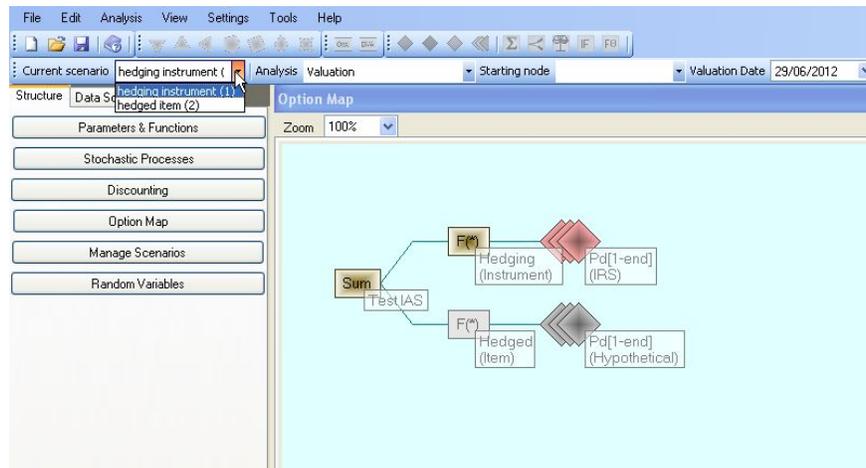

Figure 1: A Fairmat project suitable for the IAS-39. The two scenarios represent the Hedging Instrument and the Hedged Item.

With the objective of testing efficacy, the "hedged item", interest rates can be modeled as a "hypothetical derivative". This hypothetical derivative should be identified right at the beginning of the hedging operation and represent a perfect hedge of the underlying exposure in terms of contract specifications (payments and reset dates, notional etc.) and market conditions.

Analysis preferences

After having created the project, before running IAS 39 analysis check out the IAS 39 preferences **Settings / Fairmat Preferences / Plug-ins preferences / IAS-39** as shown in Figure 2.
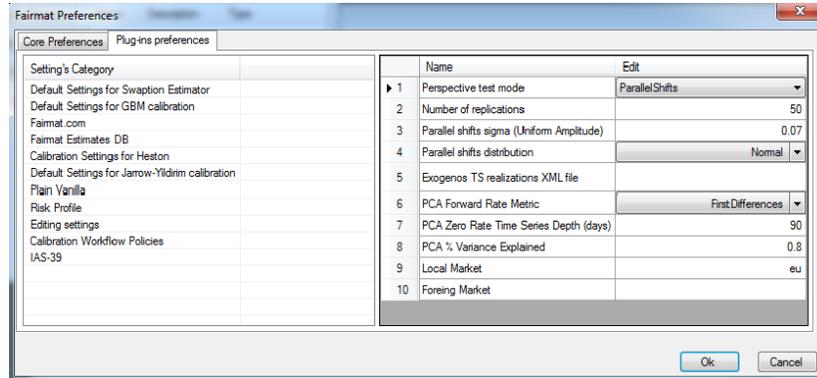

Figure 2: The IAS-39 Plug-in preferences form.

IAS-39 plug-in preferences are expressed by the following parameters:

- Prospective test mode:

    - `Custom Parallel Shifts`: Zrs are extracted uniformly from an user defined interval.

    - `Historical Parallel Shifts`: Zrs are extracted from a normal distribution calibrated from historical data.

    - `Exogenous Shifts`: Zrs shifts are loaded from an external file.

    - `Historical Principal Component Shifts`: Zrs shifts are calculated using Principal Component Analysis (PCA) on the historical time series of Zr.

- Number of replications: it identifies the number of independent random scenarios implied in the prospective test.

- Custom parallel shift range: when `Custom Parallel Shifts` mode is selected, the range withing Zrs will be shifted. Enter R to obtain shifts taken from $s \in U(-r, r)$.

- Exogenous TS realizations XML file: paths to the XML file which will be used to extract realizations.

- Historical Zero Rate Time Series Depth (days): specifies the length of ZR time series used in the two historical analyses. It is expressed in terms of

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calendar days (i.e. if you set 365 having 250 zero rates curve likes effective labor-market open days).

- PCA % explained variance: specifies how much variance must be explained by the PCA.

2.1   The prospective test

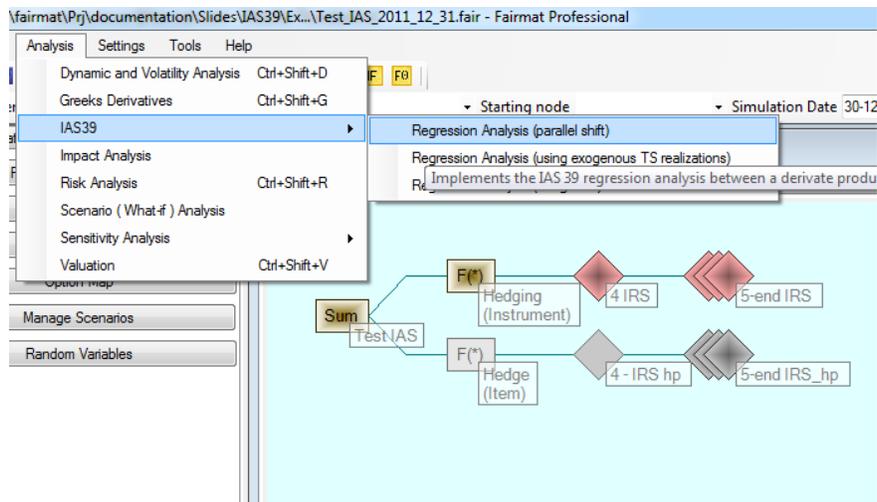IAS-39 analysis can be found under **/Analysis/IAS-39/Prospective Test** menu.

Figure 3: This figure represents a Fairmat project suitable for the IAS-39. The available analysis are highlighted.

The output of the prospective test plug-ins is the **regression analysis** which calculates the correlation between the changes in the fair-value of the "hedging instrument" (the dependent variable Y) with respect to the changes in the fair value of the "hedged item" (the independent variable X).

$$Y = \alpha + \beta X + \varepsilon$$

Y: the dependent variable, changes in fair-value of hedging instrument.

X: the independent variable, changes in fair-value of hedged item.

α: intercept of the regression.

β: coefficient of the regression.

ε: statistic error.

The critical test statistics to determine an effective hedge relationship using regression analysis are:

1. β must be negative: $-1.25 \leq \beta \leq -0.8$;

2. $R^2 > 0.96$;

3. F-statistic must be significant.

This three statistic parameters are the output of the prospective test with Fairmat.

Figure #1, IAS-39 prospective test (regression analysis) (Project's root)		

	Parameter	Value
1		
2	Regression outputs:	
3	Intercept	-4.28723241031633
4	Slope	-1.01621497370619
5	R-Squared	0.999999967736973
6	F-Statistic	Significant
7		
8	Outcome	The prospective test is passed
9		The hedging is expected to be highly effective
10		
11	Analysis details:	
12	# of Zr scenarios	50
13	Zr simulation details:	Custom Uniform Shifts in [-1%,1%]

Figure 4: Fairmat output: number of scenarios and the three critical test statistics to determine the prospective effectiveness hedging relationship when using regression analysis.
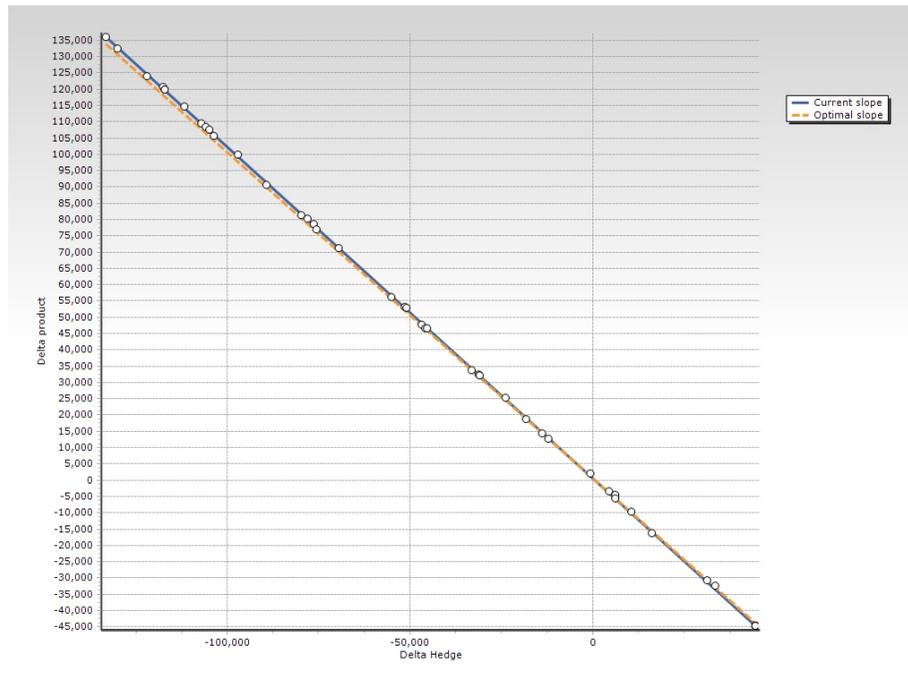
Figure 5: Fairmat output: deltas on hedged item and hedging instrument calculated in different scenarios of interest rate evolution. The solid line represents the regression line, while the dashed line represents the optimal angular coefficient.

2.2   The retrospective test

IAS-39 retrospective test can be found under **/Analysis/IAS-39/Retrospective Test** menu.

The plug-in calculates the retrospective effectiveness using the specific algorithm **dollar offset method**: by comparing the cumulative change in the fair value of the "hedging instrument" with the cumulative change in the fair value of the "hedged item" attributable to the hedged risk.

$$Ratio = \frac{\Delta \ fair \ value \ hedging \ instrument}{\Delta \ fair \ value \ hedged \ item}$$

where: $\Delta \ fair \ value$ is the difference between fair-value at the testing date ($Valuation \ Date$) and fair-value at the beginning of the hedging ($Trade \ Date$). The test is passed if delta "Ratio" falls within the required range of 80%-125%.

	Parameter	Value
	Figure #8, IAS-39 Retrospectrive Test (Project's root)	
	Data	
1	Trade/Effective Date	20/03/2012
2	Hedging Instrument	-34086.8706248064
3	Hedged Item	-6.07938895313964E-09
4		
5	Valuation Date	29/06/2012
6	Hedging Instrument	-72403.4347676519
7	Hedged Item	40086.8598398507
8		
9	Outcome:	
10	Ratio	-0.955838504086291
11	Retrospective test	Passed

Figure 6: Fairmat's Retrospective Test output.

Note that in order to execute the retrospective test correctly, the Fairmat model must be linked to market data, because Fairmat needs to calibrate models and evaluate the contracts either at the actual `Valuation Date` and at the `Trade/Effective Date`.

Fairmat uses the effective date as a trade date unless a constant called `TradeDate` is found on the `Parameters & Function` list.

Examples

A detailed tutorial (including sample) can be found in `http://www.fairmat.com/resources/view/implementing-ias-39-with-fairmat`.

References

[PWC, 2006] PWC (2006). Ias 39 achieving hedge accounting in practice. Available at PWC inform.