



# Nasdaq Calypso

## Hedge Recommendation

### Version 18

Revision 3.0

April 2025

Approved

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### *Document History*

Revision	Published	Summary of Changes
1.0	February 2024	First revision for version 18.
2.0	May 2024	Second revision for version 18. Logging process has been updated.
3.0	April 2025	Third revision for version 18.

**This function is currently off-catalog and requires a specific license agreement.**

When you run the Multi Sensitivity analysis with a set of hedge instruments, you can bring up the Hedge Recommendation Window in the Calypso Workstation to add/remove hedging instruments on-the-fly and create the hedging trades.

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# 1. Hedge Recommendation

## 1.1 Objectives and Contents

The Hedge Recommendation Window is designed to analyze the sensitivities of both a portfolio and an associated, user-defined, hedge instrument set in order to produce a hedge recommendation which effectively mitigates the portfolio's risk.

### *Overview*

Expanding upon the extensive and flexible Risk Analyses that Calypso already provides, a full Hedge Solution is now available. Through this solution, users can now not only view their risk to a variety of market variables, but view hedge recommendations for these risks as well – all in a custom pivot view.

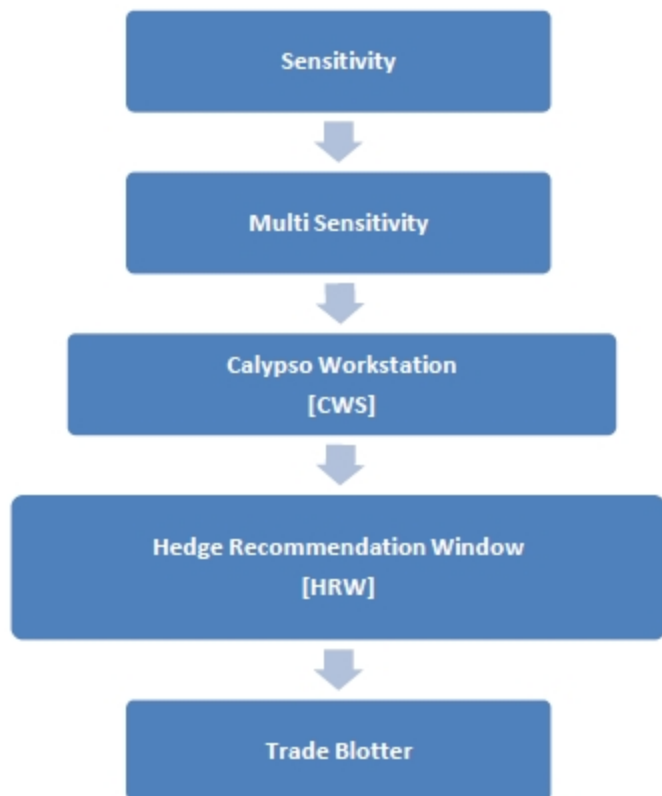
Aligned with the flexibility of the underlying analyses, the hedge instruments used in these recommendations are completely user-defined and customizable. Users can also add custom risk measures and trade attributes into the reports for informational purposes.

Upon receiving a hedge recommendation, the trades and amounts can be fine tuned as needed then created directly into the Trade Blotter for quick pricing and booking. The Hedge Recommendation Window is integrated with the Calypso Workstation in order to provide a more fluid user experience.

- Global Hedge Recommendation Window with many sensitivities
- Some sensitivities are to be hedged
- Some sensitivities are information
- Expected risk
- Easy trade creation

## 1.2 System Configuration

### *Global Picture*





### 1.2.1 Sensitivity Analysis

The first step is to define the parameters of one or more sensitivity reports. These parameters include, among others, analysis type, shift amount, shift type, and risk measures.

Sensitivity analyses can be configured using [Configuration > Reporting & Risk > Analysis Designer](#).

Sensitivity: IRD.Sensitivity.Rate.10bps.D5

Designer Weightedvega Save  Delete  Save As...

<b>Market</b>	
Type	Rate
Perturbation Type	Underlyings
Amount	10
Amount Type	bps
Sensitivity As	Single Sided
Include Gamma	<input type="checkbox"/>
Include Underlying Delta	<input checked="" type="checkbox"/>
Benchmark Instruments	<input type="checkbox"/>
PreShift	<input type="checkbox"/>
<b>Settings</b>	
Measures	rateDELTA,undRateDELTA
Custom Measures	rateInstrumentEquivalent
<b>Advanced Settings</b>	
Hedge Accounting	NONE
Shift Driver	Curve
Scaling Factor	1
Trade Attributes	Trade Id,Book,CounterParty,Trade Currency,Trader,Product Description,Sub Type,Product Type
Grid: Trades per job	0
Explode Trades	<input type="checkbox"/>
Generate rolled items	<input checked="" type="checkbox"/>
Market Data Structure	<input type="checkbox"/>
<b>Generate dependents</b>	<input type="checkbox"/>
Include probability	<input type="checkbox"/>
Include basis	<input type="checkbox"/>
<b>Alternate Curve</b>	
Use alternate interpolator	<input type="checkbox"/>
Fast Curves Approx.	<input type="checkbox"/>
Comments	

► Refer to the Calypso Sensitivity documentation for general information on Sensitivity.

### 1.2.2 Multi Sensitivity Analysis

The next step is to add one or more Sensitivity analyses into a single Multi Sensitivity, each with a unique set of hedging instruments.

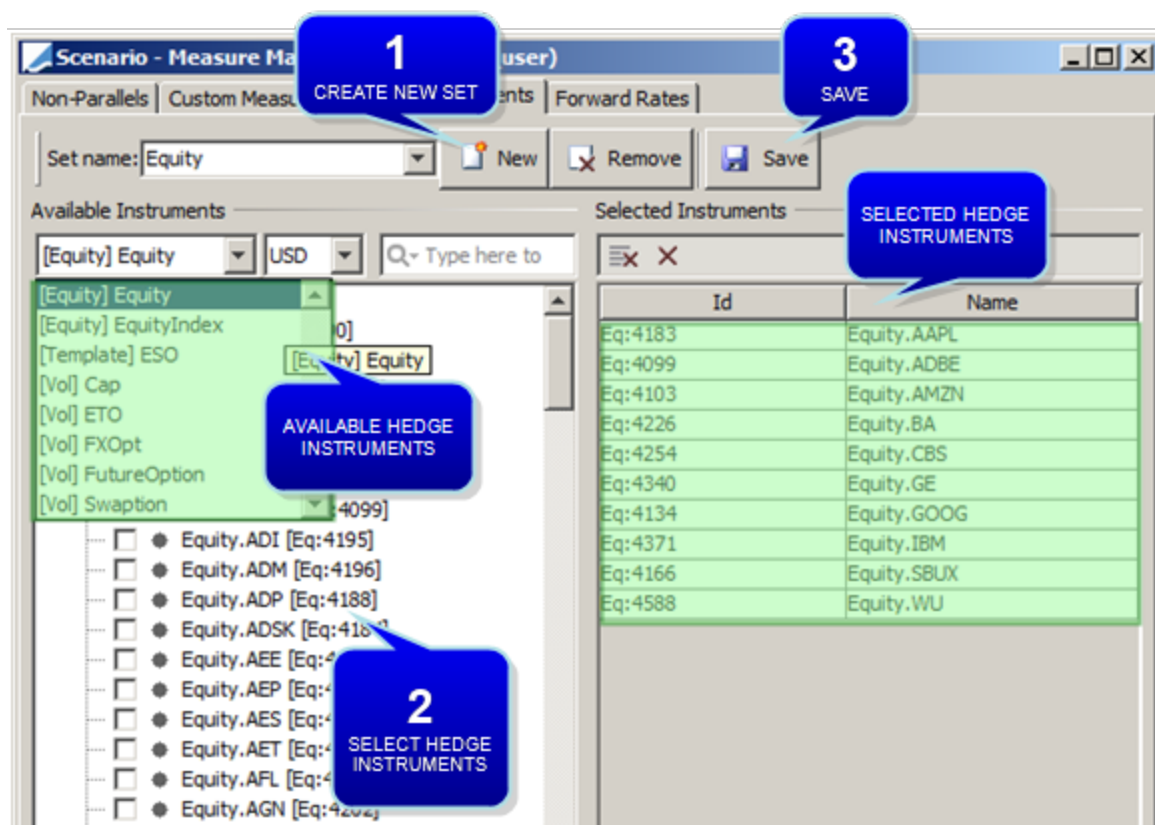
Multi Sensitivity analyses can be configured using [Configuration > Reporting & Risk > Analysis Designer](#).

#### Defining Hedge Instruments Sets

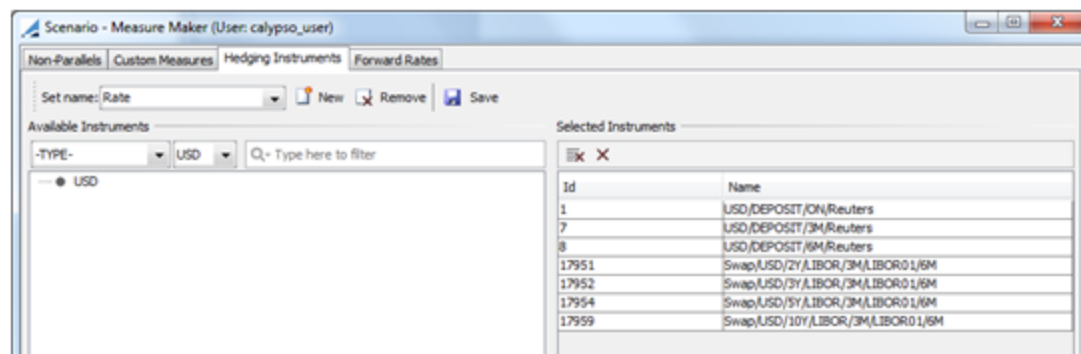
To hedge a portfolio's risk, desired hedging instruments must be defined as a Hedge Instrument Set. This set is then specified to the relevant Sensitivity analysis in the Multi Sensitivity analysis parameters.

Hedge Instrument Sets are defined in the "Hedging Instruments" tab of the Measure Maker window. Available Hedging Instrument Sets can be selected in the Sensitivity Parameter List.

Click **Designer** to bring up the Measure Maker window.

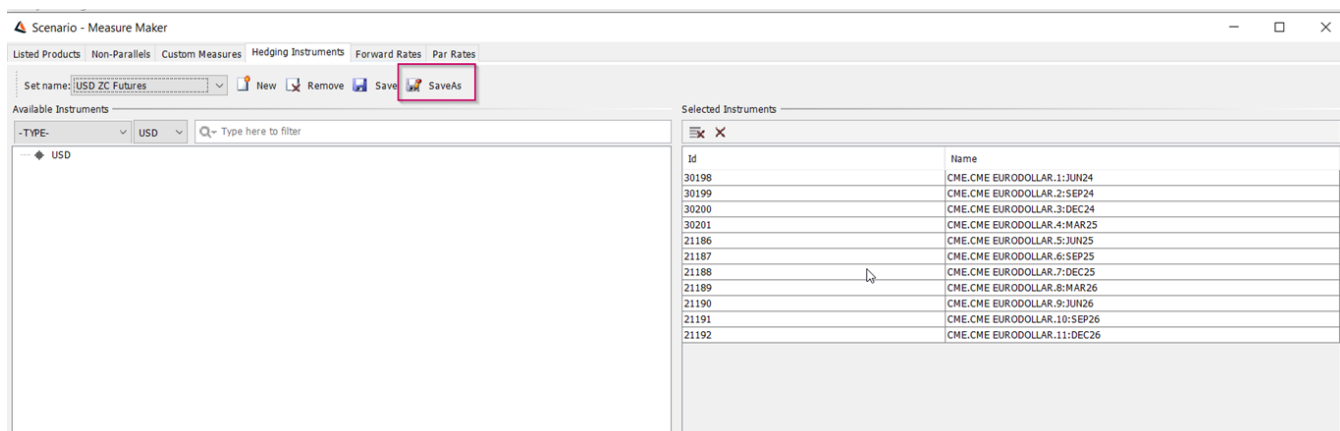


Sample Hedge Instruments Set for "Equity"



Sample Hedge Instruments Set for "Rate"

New feature "Save as New" has been introduced for the Hedging Instrument Set in Scenario - Measure Maker.



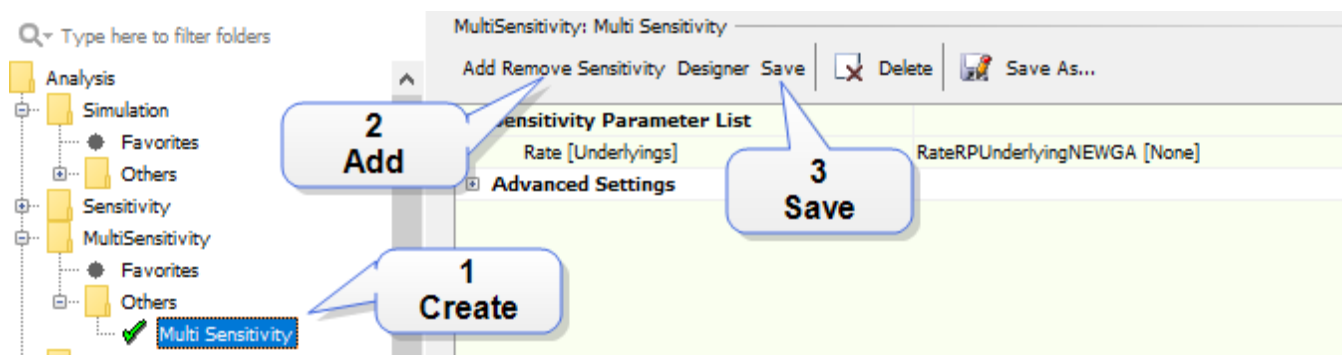
### Supported Hedge Instruments

Where to Define Desired Hedge Instruments	Product
Currency Definitions	FX
Curve Underlyings	Bond
Curve Underlyings	Bond Future
Curve Underlyings	Cash
Curve Underlyings	Equity Index Future
Curve Underlyings	FRA
Curve Underlyings	FX Forward
Curve Underlyings	Future Money Market
Curve Underlyings	Future FX
Curve Underlyings	Swap
Curve Underlyings	Basis Swap

 [NOTE: For all option instruments except FX options, only absolute strikes are supported]

Also, an API allows defining custom Hedge Instruments - Please contact Calypso Helpdesk for details.

### Defining Multi Sensitivity Parameters



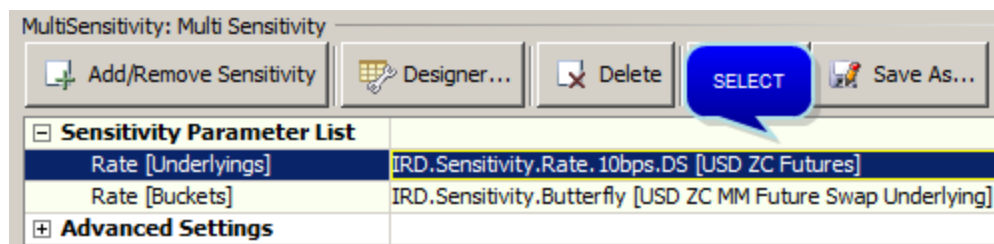
### Sample Multi Sensitivity Parameters

**Step 1** - Right-click a MultiSensitivity folder in Analysis Designer, and choose "New Analysis" to add a parameter configuration. You will be prompted to enter a configuration name.

**Step 2** - Click **Add/Remove Sensitivity** to add Sensitivity parameters as needed.

**[NOTE: You can only add Inflation Sensitivity parameters if environment property SHOW\_PARRATES\_IN\_MSA=true]**

You can add a Hedge Instrument Set for a particular Sensitivity analysis in the Sensitivity Parameter List by clicking on the analysis name. The Hedge Instrument Set is optional and unique to each analysis component.



### Sample Hedge Instrument Set Selection

» Click the Sensitivity parameters and select a Hedge Instrument Set.

► Refer to the Calypso Multi Sensitivity documentation for information on Multi Sensitivity parameters.

### NOTES:

- The Hedge Instrument Set is optional for each line.

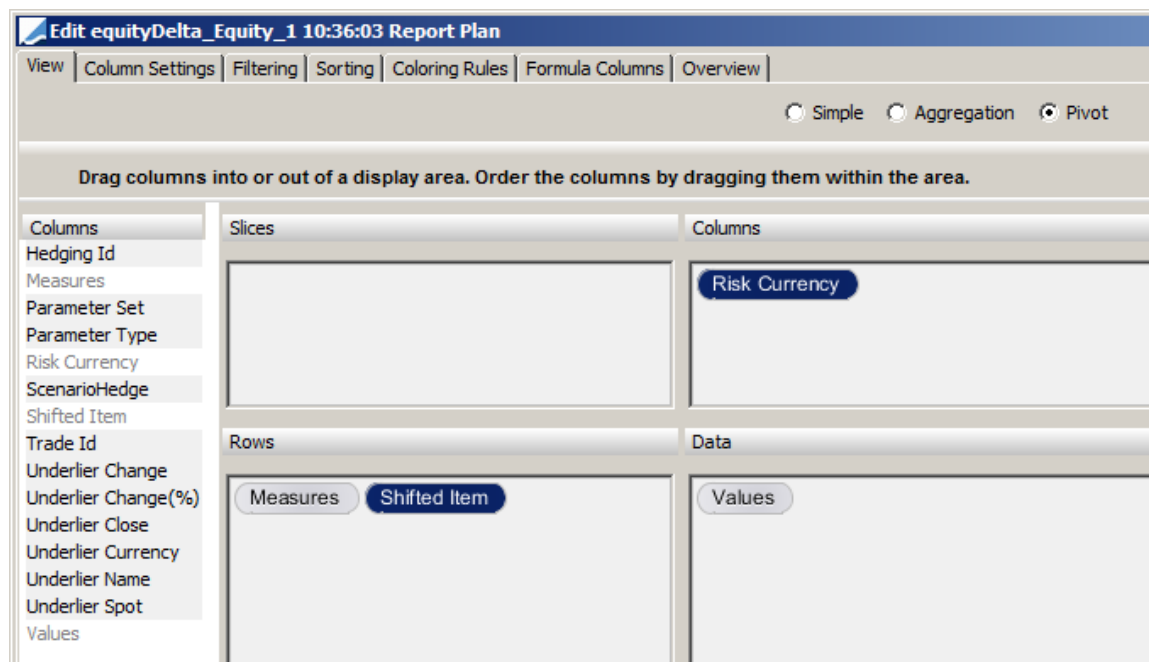
- You can reuse the same Hedge Instruments Set in two or more lines
- If there is no Hedge Instruments Set defined for a particular analysis, the risk factors calculated in that set will be considered as non-hedgeable.

**Step 3** - Save the parameters then add them to a calculation server so that the report can be displayed in the Calypso Workstation.

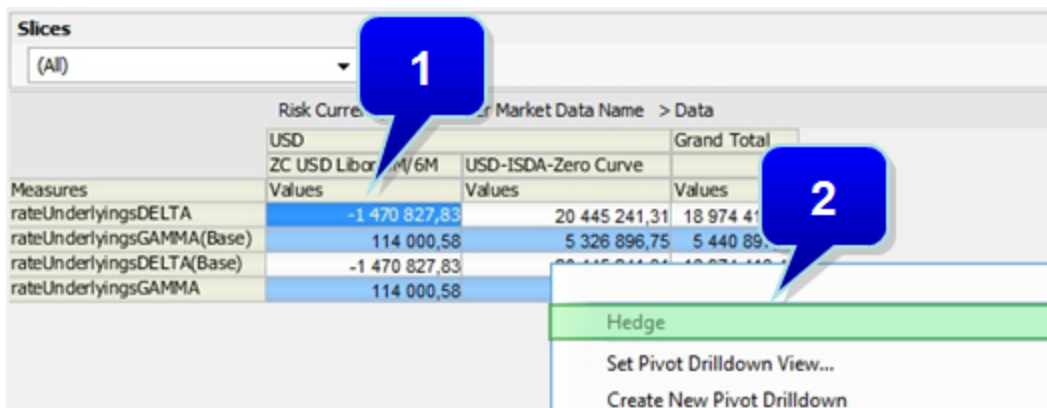
### 1.2.3 Calypso Workstation

The option to launch the Hedge Recommendation Window from Calypso Workstation is available only when the current view is a pivot (with lines and columns) as depicted below.

#### Pivot View



#### Launch Hedge Recommendation Window



Slices			
(All)			
	Risk Current	Market Data Name	Data
	USD		Grand Total
	ZC USD Libor 3M/6M	USD-ISDA-Zero Curve	
Measures	Values	Values	Values
rateUnderlyingsDELTA	-1 470 827,83	20 445 241,31	18 974 41
rateUnderlyingsGAMMA(Base)	114 000,58	5 326 896,75	5 440 89
rateUnderlyingsDELTA(Base)	-1 470 827,83		
rateUnderlyingsGAMMA	114 000,58		

Hedge  
Set Pivot Drilldown View...  
Create New Pivot Drilldown

**Step 1** - Right-click on any cell from Calypso Workstation.

**Step 2** - Choose "Hedge" from the popup menu.

A message will indicate "Building Hedging Application."



#### NOTES:

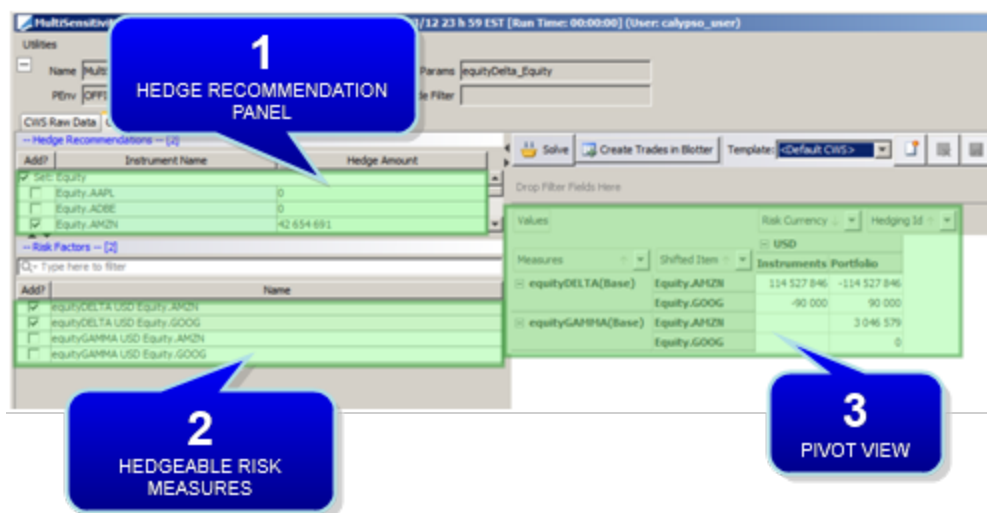
- The "Hedge" option is available in Calypso Workstation only when the current view is a pivot.
- A "Real Pivot" must be used (includes both lines and columns).
- The Hedge Recommendation Window will pull data from the Presentation Server.

## 1.3 Hedge Recommendation Window

You can produce the hedge recommendation on a cross-asset portfolio, fine tune the hedge recommendation, and create the trades in the Trade Blotter in one click.

### 1.3.1 Configuration

## Pivot view



- **Hedge Recommendation Panel:** This panel allows the selection of hedge instruments, which is an aggregation of all instruments defined in the underlying Hedge Instrument Sets.
- **Risk Factors Panel:** This allows the selection of the Risk Measures to be hedged by the Hedge Instruments.
- **Pivot Panel:** This allows the user to see the sensitivities of the portfolio.

All instruments for "Hedge Recommendations" and "Risk Factors" can now be "Select All" or "Unselect All."

MultiSensitivity PE: OFFICIAL Params: HR Date: 3/21/24 4:54:10 AM EDT [Run Time: 00:00:00]

Utilities

Name: MultiSensitivity Val Date: 3/21/24 4:54:10 AM Params: HR  
PEnv: OFFICIAL Base Coy: USD Trade Filter:

CWS Raw Data CWS View

-- Hedge Recommendations -- [1]

Solve Create Trades in Blotter Template: <Default CWS> Show Field List Auto Resize All

A... Instrument Name Hedge ...

Set: HR

Hedging Id

Book Shifted Item

Hedge

Trade Id	Product Description	ScenarioHedge	Risk Currency	Underlier Currency	Measures	Underlier Market Data Type	Values	Underlier Market Data Name
0	Hedge		USD	Hedge	rateUnderlyingsGAMMA(Base)	Hedge	80 USD-15DA-Zero Curve	

-- Risk Factors -- [40]

Type here to filter

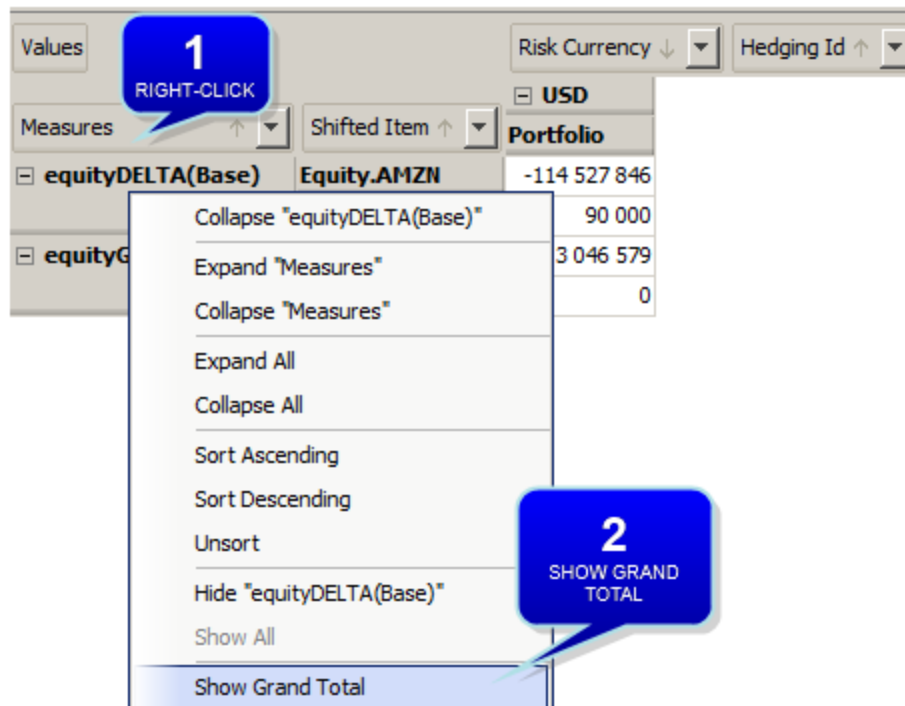
A... Name

rateUnderlyingsDELTA USD US...  
rateUnderlyingsDELTA USD US...  
rateUnderlyingsDELTA USD US...  
rateUnderlyingsDELTA USD US...  
rateUnderlyingsDELTA USD US...

Portfolio Risk: Total risk = 74.98 / Total risk(Hedged) = 136.31 [Sum of squares = 32,769.85]

## Show Grand Total

Right-click anywhere to add grand totals.



**1 RIGHT-CLICK**

**2 SHOW GRAND TOTAL**

Measures	Shifted Item	USD
equityDELTA(Base)	Equity.AMZN	-114 527 846
		90 000
		3 046 579
		0

Context Menu Options:

- Collapse "equityDELTA(Base)"
- Expand "Measures"
- Collapse "Measures"
- Expand All
- Collapse All
- Sort Ascending
- Sort Descending
- Unsort
- Hide "equityDELTA(Base)"
- Show All
- Show Grand Total

Solve Create Trades in Blotter Template: <Default CWS>

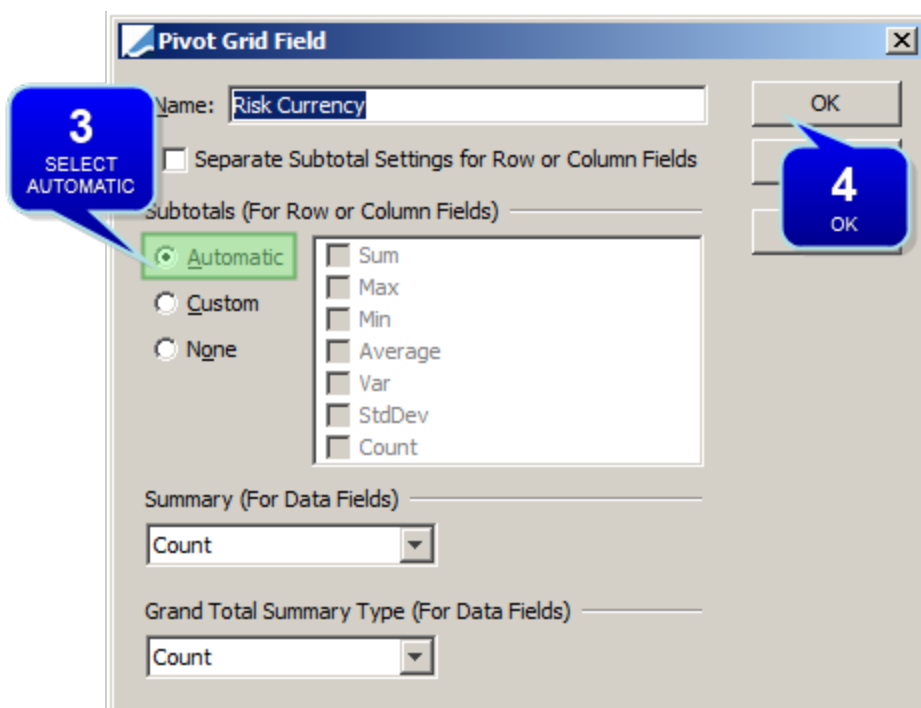
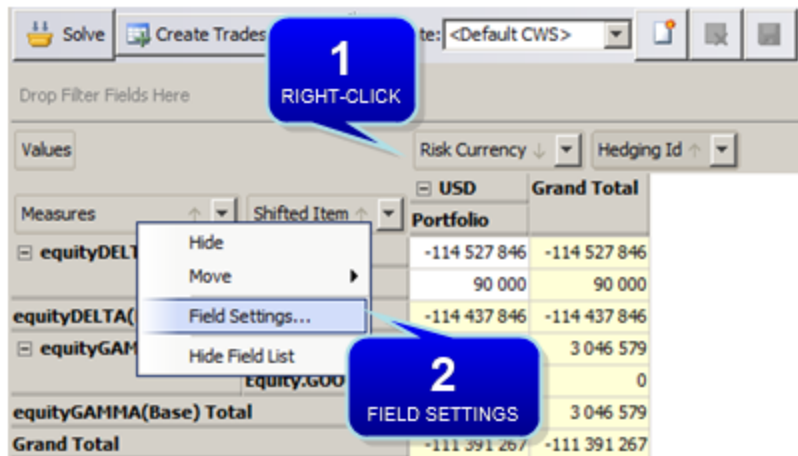
Drop Filter Fields Here

Values	Risk Currency	Hedging Id
Measures	USD	Grand Total
equityDELTA(Base)	Equity.AMZN	-114 527 846
	Equity.GOOG	90 000
equityGAMMA(Base)	Equity.AMZN	3 046 579
	Equity.GOOG	0
<b>Grand Total</b>		<b>-111 391 267</b>

Sample Grand Total in Pivot View

### Subtotals

Right-click the field to which you want to add subtotals (for example Risk Currency).



Solve		Create Trades in Blotter		Template: <Default CWS>		Show Field List		Auto Resize All	
Drop Filter Fields Here									
Values		Risk Currency		Hedging Id					
Measures		Shifted Item		USD		Grand Total			
equityDELTA(Base)		Equity.AMZN		-114 527 846		-114 527 846			
		Equity.GOOG		90 000		90 000			
equityDELTA(Base) Total				-114 437 846		-114 437 846			
equityGAMMA(Base)		Equity.AMZN		3 046 579		3 046 579			
		Equity.GOOG		0		0			
equityGAMMA(Base) Total				3 046 579		3 046 579			
Grand Total				-111 391 267		-111 391 267			

Sample Subtotals by Risk Currency


NOTE: In order to specify the number of decimal places to display in the Hedge Recommendation Window, you can set the following environment property to the number of decimal places:

**HRW\_NUMBER\_OF\_DECIMALS = 2**

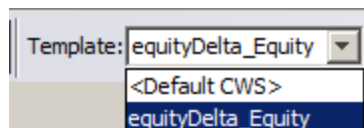
## Templates

Users can save a whole configuration layout consisting of:

- Hedge Instrument de-selection
- Risk factor de-selection
- Solver selection
- Pivot panel view

Click  to add/delete/save a template.

Click on the dropdown list to select a previously saved template.



## NOTES:

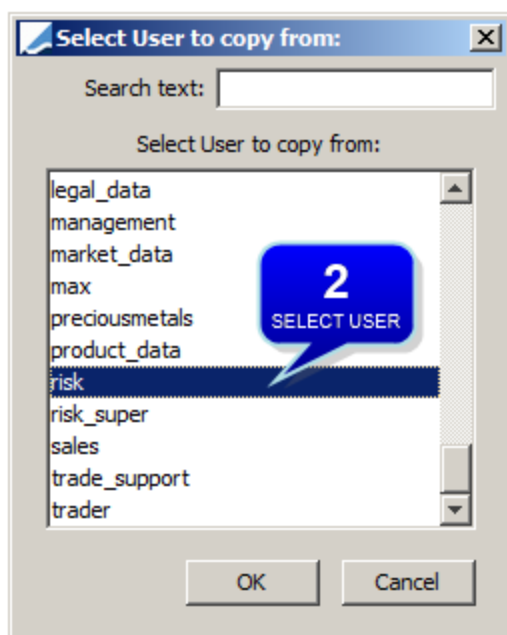
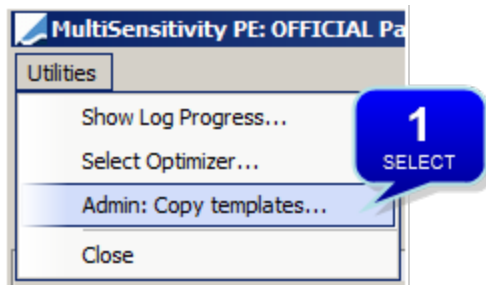
- The templates do not add/remove Hedge Instrument or Risk Factor selections. Rather, de-selections are applied to ensure that newly added variables (i.e. not a part of the initial template) are not mistakenly excluded.

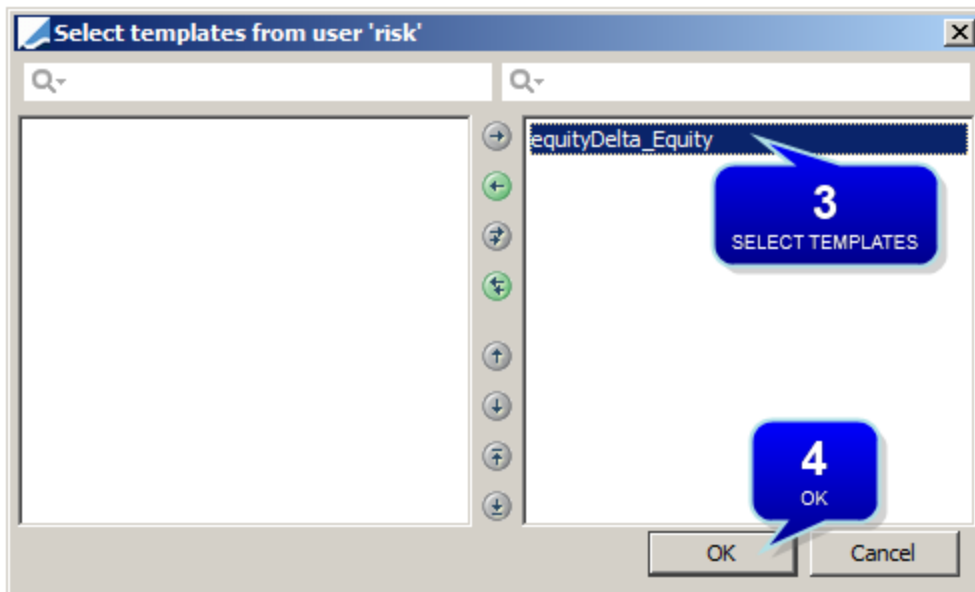
This is to ensure that if some instruments/risk measures that are not part of the template are added later, they will not be removed when the template is loaded.

- Hedge amounts and manually adjusted amounts of the Hedge Instruments are not saved as part of the template.

### Copy Template

Choose **Utilities > Admin: Copy templates**.





### Show Field List

Click **Show Field List** to show the list of item attribute fields as it exists in Calypso Workstation.

### Auto Resize All

Click **Auto Resize All** to automatically adjust the cells to fit the content of the pivot grid.

## 1.3.2 Solvers

Two Solvers are currently made available for solving the least squares problem to arrive at an optimal hedge: Levenberg-Marquardt (LM) and Singular Value Decomposition (SVD). The algorithm choice defaults to SVD since it is considered more stable and hence more suitable for solving the linear problem at hand compared to LM.

MultiSensitivity PE: default\_LivePL Params: SL\_HRW\_LivePL\_Rate Date: 3/19/25 3:29:52 PM EDT [Run Time: 00:00:00]

Utilities

Name: MultiSensitivity Val Date: 3/19/25 3:29:52 PM Params: SL\_HRW\_LivePL\_Rate

PEnv: default\_LivePL Base Ccy: USD Trade Filter:

CWS Raw Data CWS View

-- Hedge Recommendations -- [0]

A... Instrument Name Hedge ...

Set: HRW\_Mixed

USD/LIBOR/1Mx7M/LI... 0

Swap/USD/5Y/LIBOR/... 0

Swap/USD/10Y/LIBOR... 0

Solve Create Trades in Blotter Template: <Default CWS> Show Field List Auto Resize All Solver: SVD Select Attributes {}

SVD LevenbergMarquardt

Drop Filter Fields Here

Values

Measures Instrument Tenor Shifted Item Instrument Name Risk Currency Hedging Id

Measures	Instrument Tenor	Shifted Item	Instrument Name	Risk Currency	Hedging Id
rateUnderlyingsDELTA	3M	USD LIBOR 3M (13188[74119])	USD/LIBOR/3M/LIBOR01	USD	416
	H26	USD LIBOR 3M (14[74119])	CME.EURODOLLAR.4:MAR26	USD	127

With the SVD solver, we also offer the following control variables that sophisticated users could use to influence solver behavior and arrive at a hedging solution that is more reasonable from their perspective.

### 1.3.2.1 Solver Variables

$\iota$  : Number of significant eigen values to be retained in order to reduce the dimensionality of the problem. Unit is an integer; default is 0, i.e., no truncation.

$\epsilon$  : Epsilon, restrict eigenvalues by specifying the cutoff relative to the highest eigenvalue.

Unit is % (10 is 10%, or 0.1); default is 0; i.e., no cutoff.

Recommend:  $\iota=0$ ,  $\epsilon=10\%$ ,  $\lambda=0$ ,  $\theta=0$

$\lambda$  : Lambda, Tikhonov Regularization Threshold, reduce the complexity of a model by decreasing the importance of some variables; small regularization to avoid vastly uneven hedges.

Unit is bps (1 is 1 bps, or 0.0001); default is 0, i.e., no regularization.

Recommend:  $\iota=0$ ,  $\epsilon=0$ ,  $\lambda=1\text{bps}$ ,  $\theta=0$

$\theta$  : Theta, setting Preprocessing Tolerance on elements of the Risk matrix relative to the highest risk value, such that smaller values do not impact the solver.

Unit is bps (1 is 1 bps, or 0.0001); default is 0, i.e., no preprocessing

Recommend:  $\iota=0$ ,  $\epsilon=0$ ,  $\lambda=0$ ,  $\theta=10\text{bps}$

When SVD is chosen, variables  $\iota$ ,  $\epsilon$ ,  $\lambda$ , and  $\theta$  can be specified by pressing the “Select Attributes” button, which opens the “Solver Configuration” window. After the user makes the desired inputs and hits “Save”, the configuration window closes, and the specified parameter values are displayed next to the “Select Attributes” button for easy reference. These choices persisted for the current session, i.e., as long as the HR Window is open, and used in all subsequent solving activity till the user chooses to update them.

MultiSensitivity PE: default\_LivePL Params: SL\_HRW\_LivePL\_Rate Date: 1/16/25 6:28:12:571 PM EST [Run Time: 00:00:00]

Utilities

Name

MultiSensitivity

Val Date

1/16/25 6:28:12 PM

Params

SL\_HRW\_LivePL\_Rate

PEnv

default\_LivePL

Base Ccy

USD

Trade Filter

CWS Raw Data

CWS View

Hedge Recommendations -- [3]

Solve

Create Trades in Bliotter

Template: <Default CWS>

Show Field List

Auto Resize All

Solver: SVD

Select Attributes (E=10, B=, A=, I=)

Id?	Instrument Name	Hedge Amount
Set: HRW_Mixed		
<input checked="" type="checkbox"/>	USD/LIBOR/1Mx7M/LIBOR01	0
<input checked="" type="checkbox"/>	Swap/USD/5Y/LIBOR/3M/LIBOR01/1Y	1,280,000
<input checked="" type="checkbox"/>	Swap/USD/10Y/LIBOR/3M/LIBOR01/1Y	2,870,000

Drop Filter Fields Here

Values

Risk Currency USD Hedging Id

Measures	Instrument Tenor	Shifted Item	Instrument Name	Instruments	Portfolio
rateUnderlyingsDELTA	3M	USD LIBOR 3M (13188[74119])	USD/LIBOR/3M/LIBOR01	-65	412
	Z25	USD LIBOR 3M (14[74119])	CME.EURODOLLAR.4:DEC25	-17	113
	10Y	USD LIBOR 3M (41[74119])	Swap/USD/10Y/LIBOR/3M/LIBOR01/1Y	-3,160	3,151
rateUnderlyingsDELTA(Base)	3M	USD LIBOR 3M (13188[74119])	USD/LIBOR/3M/LIBOR01	-65	412
	Z25	USD LIBOR 3M (14[74119])	CME.EURODOLLAR.4:DEC25	-17	113
	10Y	USD LIBOR 3M (41[74119])	Swap/USD/10Y/LIBOR/3M/LIBOR01/1Y	-3,160	3,151

Risk Factors -- [5]

Type here to filter

Id?	Name
<input checked="" type="checkbox"/>	rateUnderlyingsDELTA USD YEAGER_USD_LIBOR 7M
<input checked="" type="checkbox"/>	rateUnderlyingsDELTA USD YEAGER_USD_LIBOR 16M
<input checked="" type="checkbox"/>	rateUnderlyingsDELTA USD ZC_USD_Libor_SL 3M
<input checked="" type="checkbox"/>	rateUnderlyingsDELTA USD ZC_USD_Libor_SL 225
<input checked="" type="checkbox"/>	rateUnderlyingsDELTA USD ZC_USD_Libor_SL 10Y

Solver Configuration

Solver

VariableValue

SVD

1

SVD

0

SVD

1

SVD

0

Save

MultiSensitivity PE: default\_LivePL Params: SL\_HRW\_LivePL\_Rate Date: 1/16/25 6:28:12:571 PM EST [Run Time: 00:00:00]

Utilities

Name

MultiSensitivity

Val Date

1/16/25 6:28:12 PM

Params

SL\_HRW\_LivePL\_Rate

PEnv

default\_LivePL

Base Ccy

USD

Trade Filter

CWS Raw Data

CWS View

Hedge Recommendations -- [2]

Solve

Create Trades in Bliotter

Template: <Default CWS>

Show Field List

Auto Resize All

Solver: SVD

Select Attributes (E=, B=, A=, I=)

Drop Filter Fields Here

### 1.3.2.2 Solver Mechanism and Limitations

The optimizers attempt to solve a mathematical problem of minimizing least squares of errors and refine the solution of hedge notionals down to machine precision to achieve this goal. As a result, the recommended results may not directly translate into actionable trades. For example, it would be hard to trade an interest rate swap with a precise notional of \$1026809.27 as recommended by the solver. More importantly, the optimization techniques employed are highly sensitive to the problem inputs (i.e., risk profiles of the portfolio and candidate hedge trades). Depending on the input conditions, the solver may not converge to a proper solution and hence may show a hedge recommendation that does not make financial sense. Hence the users are expected to review and test the recommended solutions, modify them appropriately before accepting the same.

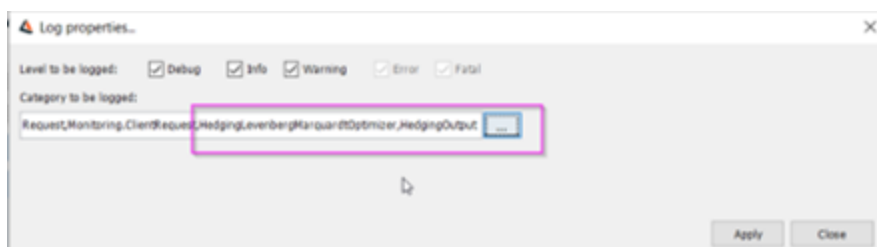
The solver is not optimized out of the box to take into consideration things such as trading fees, margin requirements. Also, if hedge instruments of the same type have the same, or relatively close expiry, the hedges will try to offset one another, and you can end up with unrealistic recommendations.

Please note it takes manual oversight, user calibration, or solver optimization to ensure recommendations make sense.

- By default, the number of risk factors is limited to 1000
- By default, the number of hedging instruments is limited to 1000

### 1.3.2.3 Logging for Troubleshooting

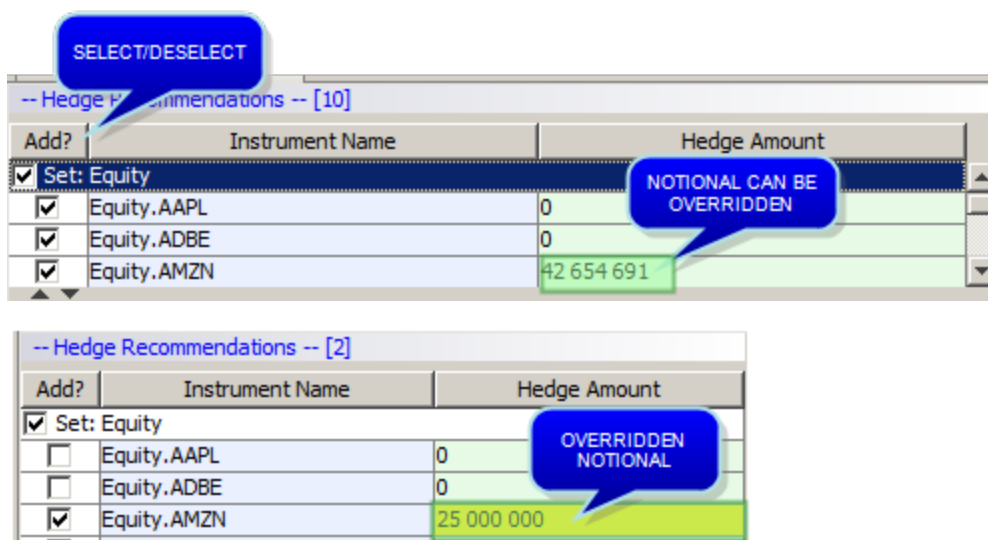
Use the HedgingSVDOptimizer, HedgingLevenbergMarquardtOptimizer & HedgingOutput log categories in debug mode (on Navigator) to get the details of solver input & output.



### 1.3.3 Request a Hedge Recommendation

#### Select Hedge Instruments

The Hedge Instruments panel displays all available hedge instruments. You can select / deselect hedge instruments individually or by group. The selected hedge instruments are used as inputs to the solver.



Sample overridden hedge notional

① [NOTE: An overridden hedge notional will serve as an input to the solver]

-- Hedge Recommendations -- [2]		
Add?	Instrument Name	Hedge Amount
<input checked="" type="checkbox"/>	Set: Equity	
<input type="checkbox"/>	Equity.AAPL	0
<input type="checkbox"/>	Equity.ADBE	0
<input checked="" type="checkbox"/>	Equity.AMZN	25 000 000

OVERIDDEN AND  
LOCKED NOTIONAL

Sample overridden hedge notional used as input

### Select Risk Measures

The Risk Factor panel allows users to view, and select from, all hedgeable risk measures. The selected risk measures are used as inputs to the solver. Users can use the feature to search for a risk measure.

-- Risk Factors -- [2]		
Q Type here to filter		
Add?	Name	
<input checked="" type="checkbox"/>	equityDELTA USD Equity.AMZN	
<input checked="" type="checkbox"/>	equityDELTA USD Equity.GOOG	
<input type="checkbox"/>	equityGAMMA USD Equity.AMZN	
<input type="checkbox"/>	equityGAMMA USD Equity.GOOG	

NUMBER RISK  
MEASURES

SEARCH FUNCTION

SELECT/DESELECT

### Launch the Solver

Click **Solve** to launch the solver in order to produce the hedge recommendation.

When COLLATERALIZED\_PRICING is "On", the transient hedging trades load the curves that correspond to the collateralized currency. This only applies to products defined in the domain "CollateralizedHedgingInstrument", typically CapFloor, Swap, Swaption. "CollateralizedHedgingInstrument" assumes that the collateral policy's collateral currency matches the trade currency; the Pricer Config must be configured to reflect this.

Click "Turn live update of report data on/off" (F2) to ensure the "Hedge" selection is consistently shown in CWS; after clicking "Solve".

### 1.3.4 Trade Blotter

#### Create Trades

Click **Create Trades in Blotter** to create the hedging trades in the Trade Blotter. The amounts used for creating these trades will come directly from the Hedge Amount field and include any changes that the user has made.

The Hedge Amount Units are dependent on the trade type and are denoted accordingly (i.e. Swaps are denoted as a notional amount, whereas Equities are shown as a rounded number of shares). The unit can be confirmed by hovering over this field.

-- Hedge Recommendations -- [10]

Add?	Instrument Name	Hedge Amount
Set: Equity		
<input type="checkbox"/>	Equity.AAPL	1 000 000
<input type="checkbox"/>	Equity.ADBE	3 500 000
<input checked="" type="checkbox"/>	Equity.AMZN	42 654 691
<input type="checkbox"/>	Equity.BA	1 000 000
<input type="checkbox"/>	Equity.CBS	800 000
<input type="checkbox"/>	Equity.GE	10 000
<input checked="" type="checkbox"/>	Equity.GOOG	(873 042)
<input type="checkbox"/>	Equity.IBM	(10 000)
<input type="checkbox"/>	Equity.SBUX	(258 000)
<input type="checkbox"/>	Equity.WU	850 400

Solve

Create

Drop Filter Fields Here

Values

Instrument Set Equity

Instrument Id Eq:4103

Unit Shares [USD]

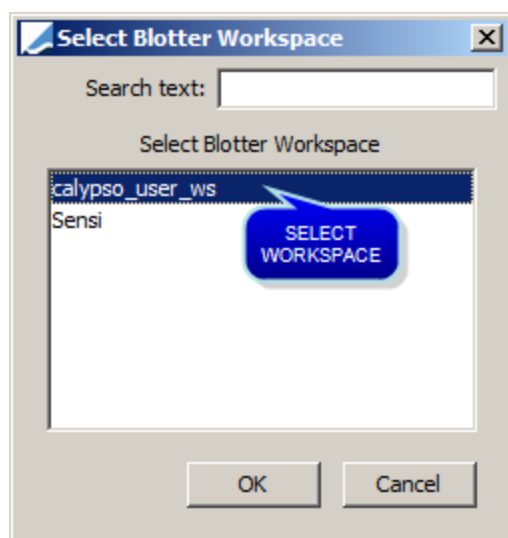
EQ.Sensitivity\_1.5

Grand Total

Sample Hedge Instrument sent to the solver

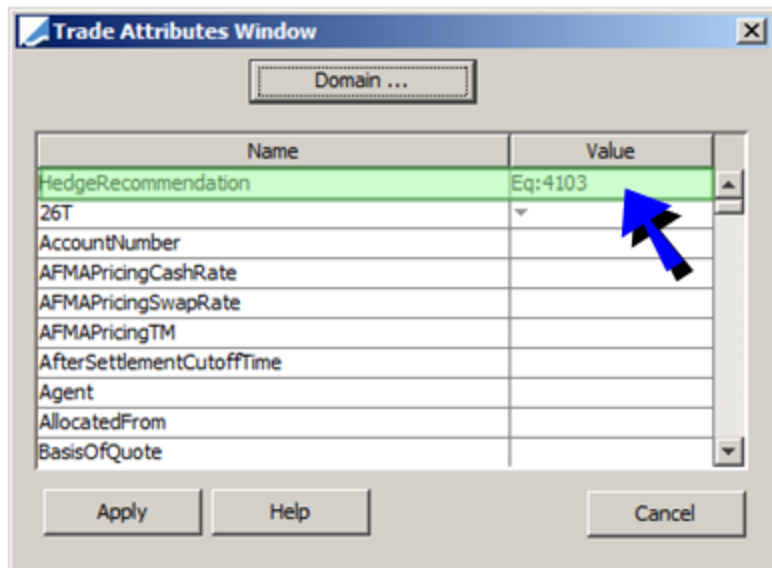
#### Add in Workspace

Users need to have a personal Blotter Workspace in order to directly create Hedging Trades from the Hedge Recommendation Window.



## HedgeRecommendation Trade Keyword

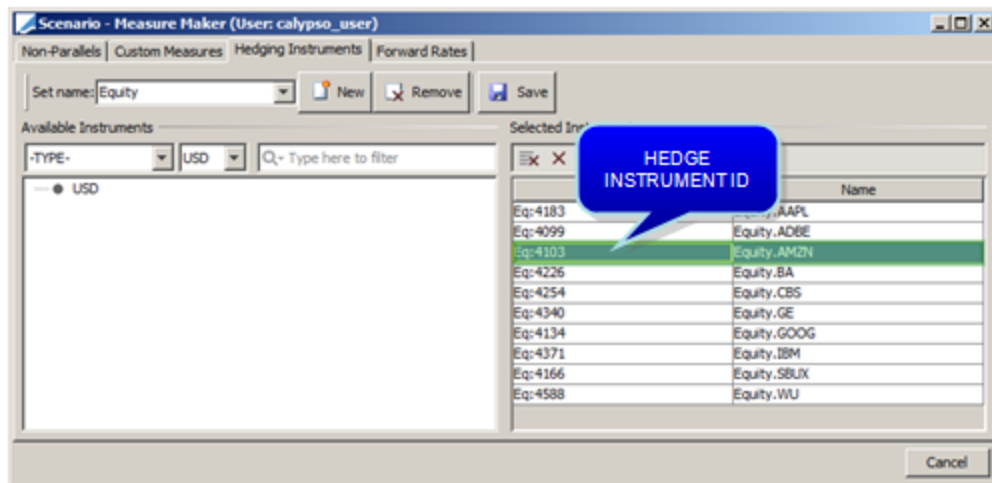
The hedging trades are created with the trade keyword HedgeRecommendation set to the ID of the corresponding hedge instrument.



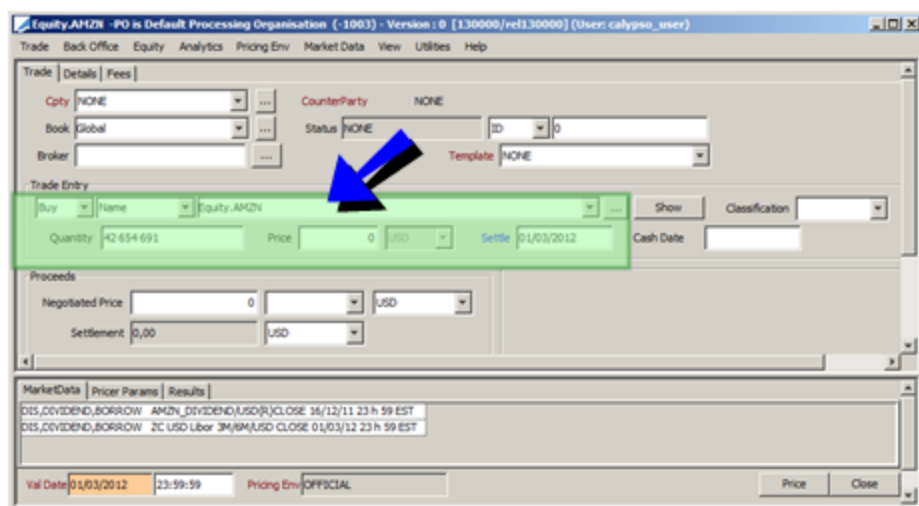
	Book	Product Type	Trade Id	Product Description	Product SubType	CounterParty	Trade Cur.	Price	Quantity	Nominal	HedgeR	IPV
>>	Global	Equity	-3012	Equity.ADBE	Standard	NONE	USD	0,0000000	3 500 000	3 500 000,00	Eq:4099	118 055 000,00
>>	Global	Equity	-3013	Equity.AMZN	Standard	NONE	USD	0,0000000	42 654 691	42 654 691,00	Eq:4103	7 635 189 600,00
>>	Global	Equity	-3017	Equity.GOOG	Standard	NONE	USD	0,0000000	-873 042	(873 042,00)	Eq:4134	-523 825 200,00
>>	Global	Equity	-3019	Equity.SBUX	Standard	NONE	USD	0,0000000	-258 000	(258 000,00)	Eq:4166	-13 416 000,00
>>	Global	Equity	-3011	Equity.AAPL	Standard	NONE	USD	0,0000000	1 000 000	1 000 000,00	Eq:4183	530 000 000,00
>>	Global	Equity	-3014	Equity.BA	Standard	NONE	USD	0,0000000	1 000 000	1 000 000,00	Eq:4226	71 000 000,00
>>	Global	Equity	-3015	Equity.CBS	Standard	NONE	USD	0,0000000	800 000	800 000,00	Eq:4254	24 800 000,00
>>	Global	Equity	-3016	Equity.GE	Standard	NONE	USD	0,0000000	10 000	10 000,00	Eq:4340	188 500,00
>>	Global	Equity	-3018	Equity.IBM	Standard	NONE	USD	0,0000000	-10 000	(10 000,00)	Eq:4371	-1 950 000,00
>>	Global	Equity	-3020	Equity.WU	Standard	NONE	USD	0,0000000	850 400	850 400,00	Eq:4588	13 606 400,00

**HEDGE  
INSTRUMENT ID**

Sample hedge instruments created in Trade Blotter



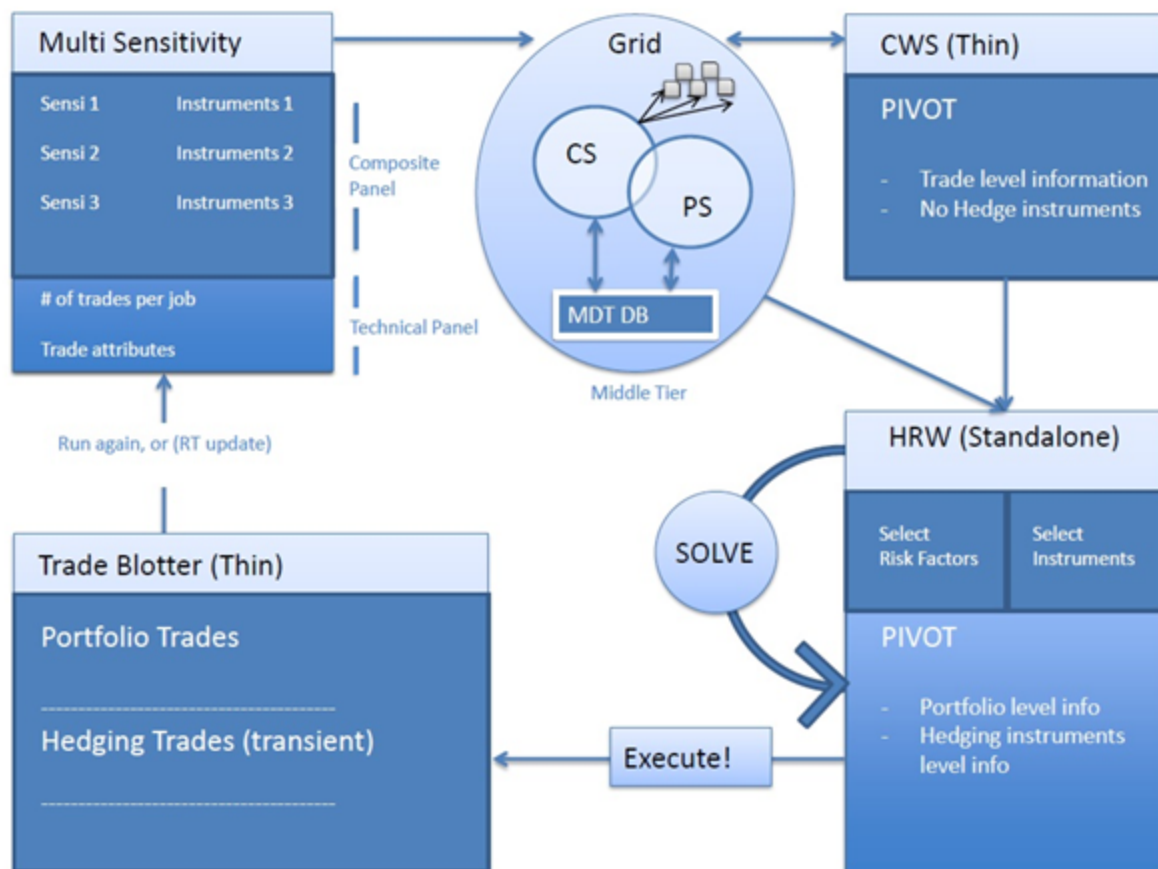
Sample Hedge Instrument Set



Sample hedge trade launched from Trade Blotter

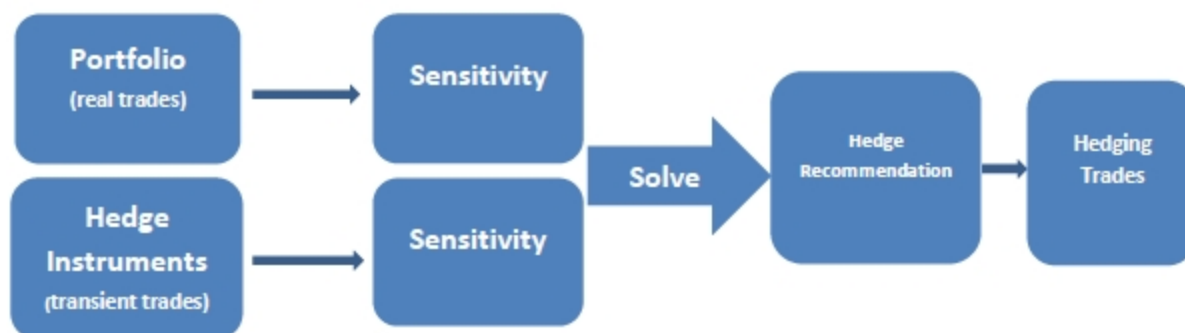
## 1.4 Hedge Analysis Process

### 1.4.1 Process



The hedge analysis will be executed as the illustration above describes:

- Same risk report on portfolio and hedging trades
- Simulate hedging trades
- Run risk reports on hedging trades
- Solve
- Show the expected risk after hedge
- Create the hedging trades in one click



### 1.4.2 Supported Risk Measures in Multi Sensitivity

- All Risk Measures are denoted in the Risk Currency
- Hedgeable first order measures - Delta
- Only spot risk is considered

## 1.5 Output

You can output the Hedge Recommendation from:

- Ad-Hoc Reports
- Real-Time Reports

### NOTES:

When launching the Hedge Recommendation Window, live updating is meant to automatically turn off so that users can compare Calypso Workstation values against those seen in the Hedge Recommendation Window.

Hedge Recommendation Window is not available from these frozen Real-Time Reports. Reactivating the Live Market Data Updating will also re-enable the ability to launch the Hedge Recommendation Window.

### 1.5.1 Calypso Workstation Raw Data Tab

The unformatted risk results remain available in Hedge Recommendation Window for investigation if needed. These values are pulled directly from Calypso Workstation when the report is launched.

**MultiSensitivity PE: OFFICIAL** Params: equityDelta\_Equity Date: 01/03/12 23 h 59 EST [Run Time: 00:00:00] (User: ...)

Utilities

Name: MultiSensitivity Val Date: 01/03/12 23:59:00 Params: equityDelta\_Equity

PEnv: OFFICIAL Base Ccy: USD Trade Filter:

CWS Raw Data CWS View

Hedging Id	Measures	Parameter Set	Risk Currency	Underlier Name	Values
Portfolio	equityDELTA	EQD.Sensitivity_1.5bps.ds	USD	Equity.AMZN	-117 212 731,48
Portfolio	equityDELTA(Base)	EQD.Sensitivity_1.5bps.ds	USD	Equity.AMZN	-117 212 731,48
Portfolio	equityGAMMA	EQD.Sensitivity_1.5bps.ds	USD	Equity.AMZN	3 046 578,03
Portfolio	equityGAMMA(Base)	EQD.Sensitivity_1.5bps.ds	USD	Equity.AMZN	3 046 578,03
Instruments	equityDELTA(Base)	EQD.Sensitivity_1.5bps.ds	USD	Equity.AMZN	117 212 731,49
Instruments	equityDELTA	EQD.Sensitivity_1.5bps.ds	USD	Equity.AMZN	117 212 731,49

Sample Hedge Recommendation window - Calypso Workstation Raw Data

## 1.5.2 Calypso Workstation View Tab

**MultiSensitivity PE: OFFICIAL** Params: equityDelta\_Equity Date: 01/03/12 23 h 59 EST [Run Time: 00:00:00] (User: calypso\_user)

Utilities

Name: MultiSensitivity Val Date: 01/03/12 23:59:00 Params: equityDelta\_Equity

PEnv: OFFICIAL Base Ccy: USD Trade Filter:

CWS Raw Data CWS View

--Hedge Recommendations -- [0]

Add	Instrument Name	Hedge Amount
<input type="checkbox"/>	Equity.AAPL	0
<input type="checkbox"/>	Equity.ADBE	0
<input type="checkbox"/>	Equity.AMZN	0
<input type="checkbox"/>	Equity.BA	0
<input type="checkbox"/>	Equity.CRS	0
<input type="checkbox"/>	Equity.GE	0
<input type="checkbox"/>	Equity.GOOG	0
<input type="checkbox"/>	Equity.IBM	0
<input type="checkbox"/>	Equity.SBUX	0
<input type="checkbox"/>	Equity.WU	0

--Risk Factors -- [2]

Q: Type here to filter

Add	Name
<input checked="" type="checkbox"/>	equityDELTA USD Equity.AMZN
<input checked="" type="checkbox"/>	equityGAMMA USD Equity.AMZN

Solve Create Trades in Blietter Template: <Default CWS> Show Field List Auto Resize All

Hedging Id: Values Risk Currency: USD Underlier Name: Equity.AMZN

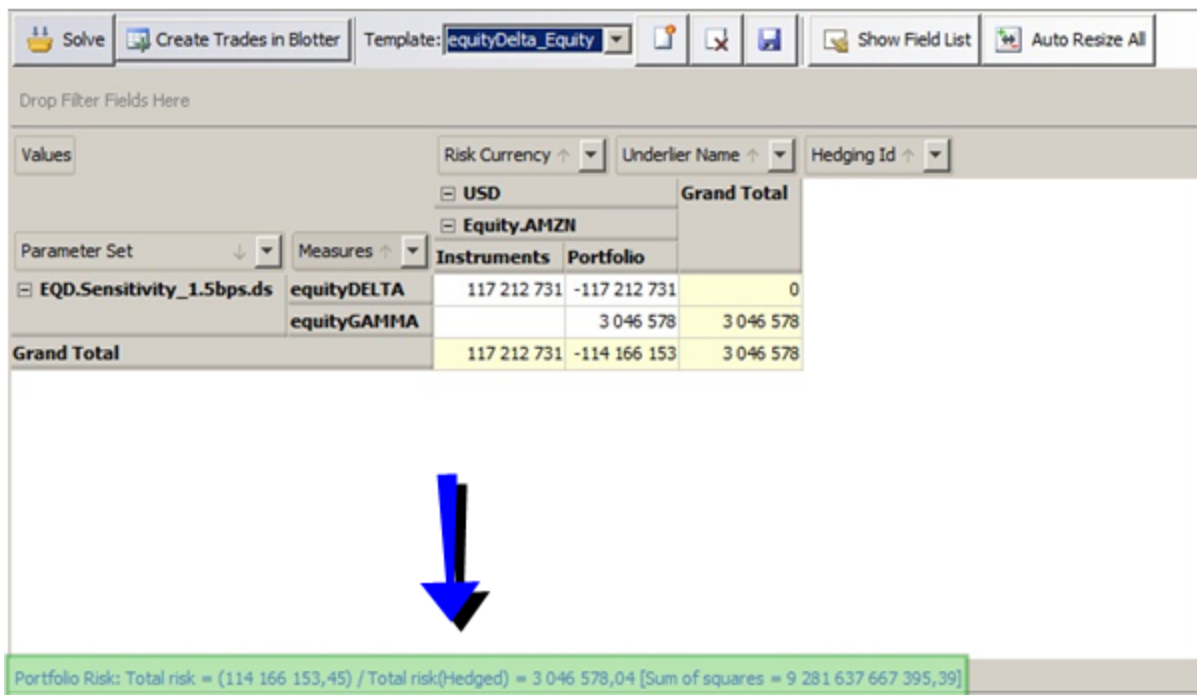
Measures: equityDELTA -117 212 731 equityDELTA(Base) -117 212 731 equityGAMMA 3 046 578 equityGAMMA(Base) 3 046 578

Sample Hedge Recommendation window - Calypso Workstation View

## Information Strings

The information strings will appear in the bottom of the pivot view after a user has requested a recommendation from a solver by clicking **Solve**. It will be displayed as:

- Total portfolio risk
- Total portfolio risk hedged
- Sum of squares



Drop Filter Fields Here

Values: Risk Currency ↑ Underlier Name ↑ Hedging Id ↑

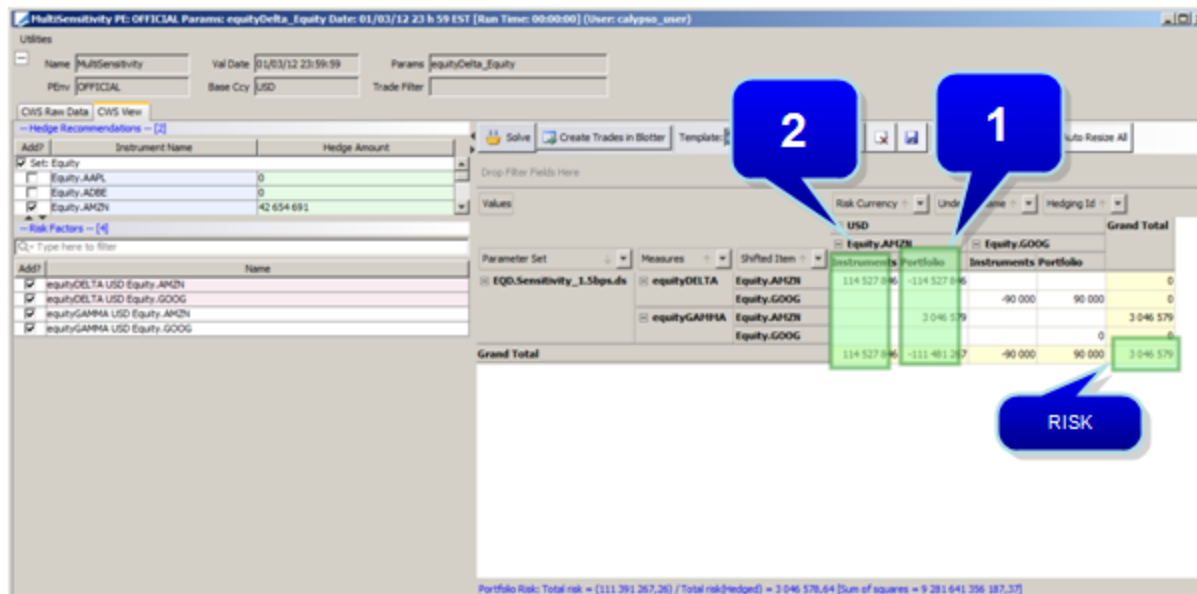
Parameter Set: EQD.Sensitivity\_1.5bps.ds Measures: equityDELTA, equityGAMMA

	Instruments	Portfolio	Grand Total
equityDELTA	117 212 731	-117 212 731	0
equityGAMMA		3 046 578	3 046 578
<b>Grand Total</b>	117 212 731	-114 166 153	3 046 578

Portfolio Risk: Total risk = (114 166 153,45) / Total risk(Hedged) = 3 046 578,04 [Sum of squares = 9 281 637 667 395,39]

## Hedging Id





The result is exploded in two parts:

- Portfolio: Risk of the entire portfolio, which represents the real risk.
- Instruments: Risk of the recommended trades - Based on the Hedge Instruments selected and the respective notionals defined in the Hedge Recommendation Panel.