



Asset model 2.05

User Guide

for MS Office 2007 or later

CONTENT

1	Introduction	3
2	Installation	3
3	Demo Version and Activation	5
4	Using the application	7
4.1	Using the Help	8
4.2	Input parameters for the Current Portfolio	8
4.3	Input parameters for Yield Curve	12
4.4	Input parameters for Foreign Exchange Rate	14
4.5	Input parameters for Cash Interest	14
4.6	Input parameters for Share Return	15
4.7	Input parameters for Share Dividend	16
5	Import	16
5.1	Current Portfolio Sheet	16
5.2	Yield Curve Sheet	17
5.3	Foreign Exchange Rate Sheet	18
5.4	Cash Interest, Share Return and Share Dividend Sheets	19
6	Calculation	21
7	Outcomes	24
8	Export	26
9	Technical documentation	28
9.1	FIXED BONDS	29
9.2	FLOATING BONDS	31
9.3	CASH (TREASURY BILLS, CURRENT ACCOUNT, SAVING ACCOUNT, DEPOSIT)	34
9.4	INTEREST RATE SWAPS (IRS)	35
9.5	EQUITY	35
9.6	VARIABLE – CHANGE and OTHER	36
10	Literature	39

1 INTRODUCTION

The **Asset model** application calculates projection of monthly future cash flow, market values, amortized values, modified duration, accounting values and yield indicators for the entered portfolio of financial instruments.

This application is a complex program usable for different areas, especially for:

- ALM risk management- projection of cash flows, market values, durations, investment returns, etc., risk limits monitoring, stress / sensitivity testing
- Solvency II calculations - esp. standard formula
- Planning - projection of accounting figures (amortized values, accrued interests, unrealized capital gains/losses, P&L and BS impacts, etc.)
- Investment strategy testing

The application of Asset model is a small and lightweight application with minimal memory consumption in the form of an add-in to Microsoft Excel.

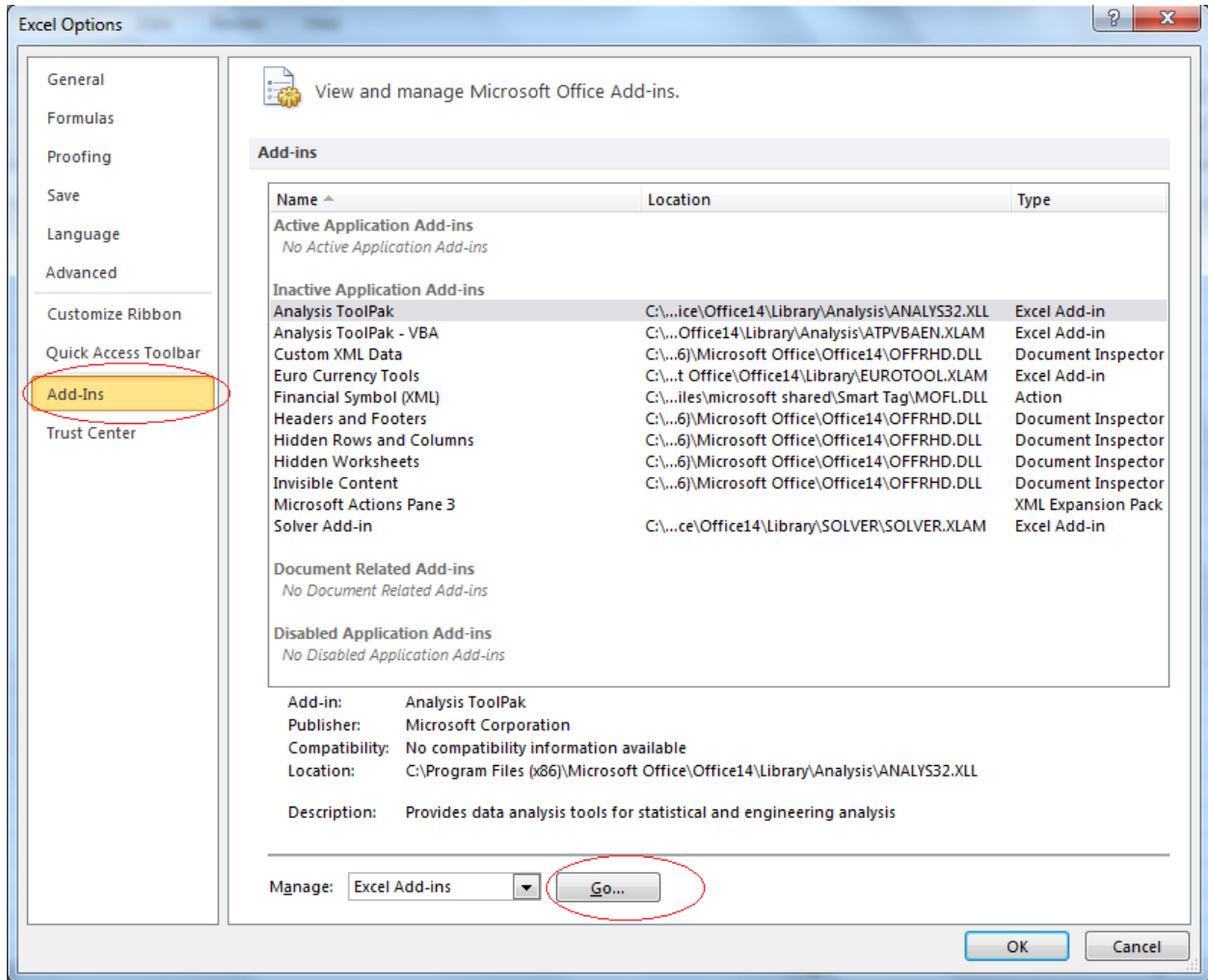
NOTE: Only **Microsoft Excel 2007 or later** runs this application successfully.

2 INSTALLATION

To run the application, you need to download the *.xlam file and save it on your disc.

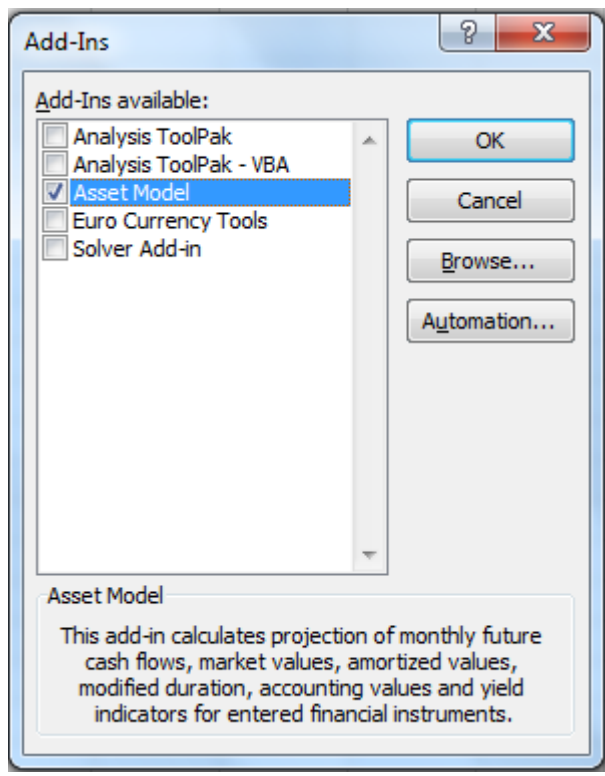
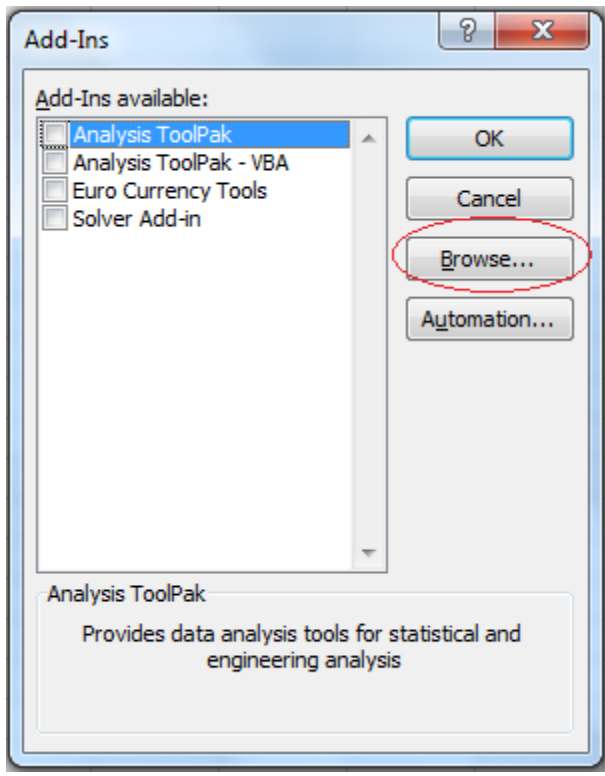
NOTE: *.xlam files do not work without opening through MS Excel. It is necessary to open MS Excel first and through the File → Open find the *.xlam file.

If you want to add Asset model to MS Excel and have these functions available whenever your MS Excel is opened, click on *File* → *Option* and choose Add-Ins. Click on the “Go...” button at the bottom of the form shown below.



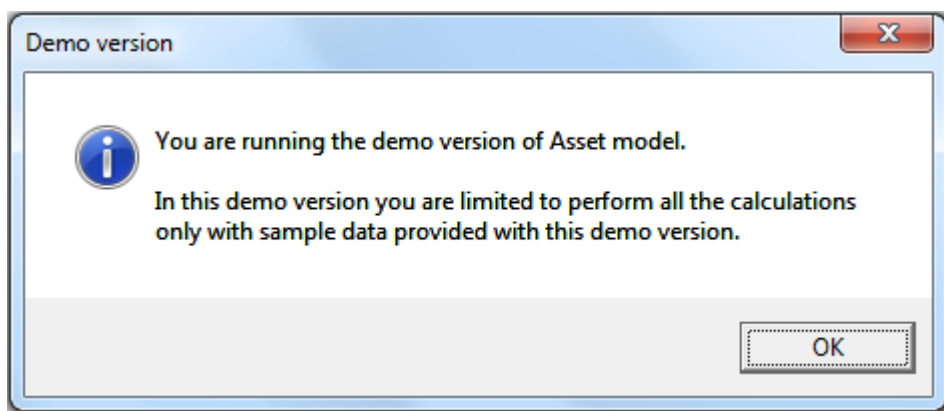
To run the application correctly, click on the “Browse...” button and select the *.xlam file on your disc and click on “OK”. Then the Asset model is available in the list of the Add-Ins. Check the box and click on “OK”.

You only need to take this step once when first opening the application.

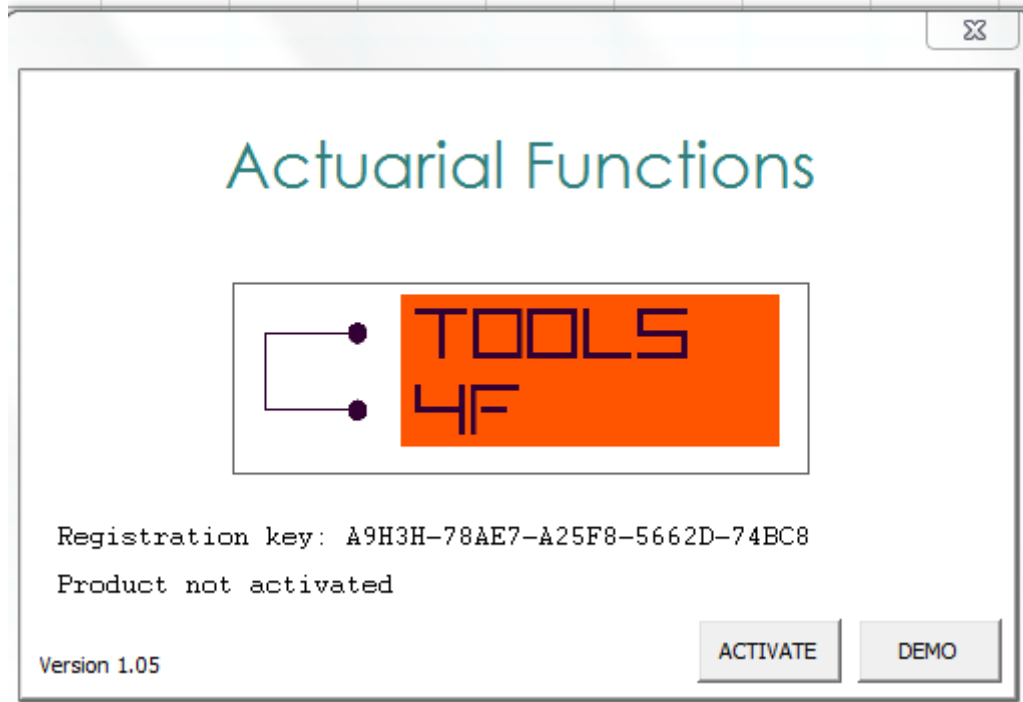


3 DEMO VERSION AND ACTIVATION

After opening the application, you will be informed about the demo version running. Now you can only run the demo version until you insert the valid activation key. In the demo version you can only use the sample data provided within the demo. Click "OK" to continue.

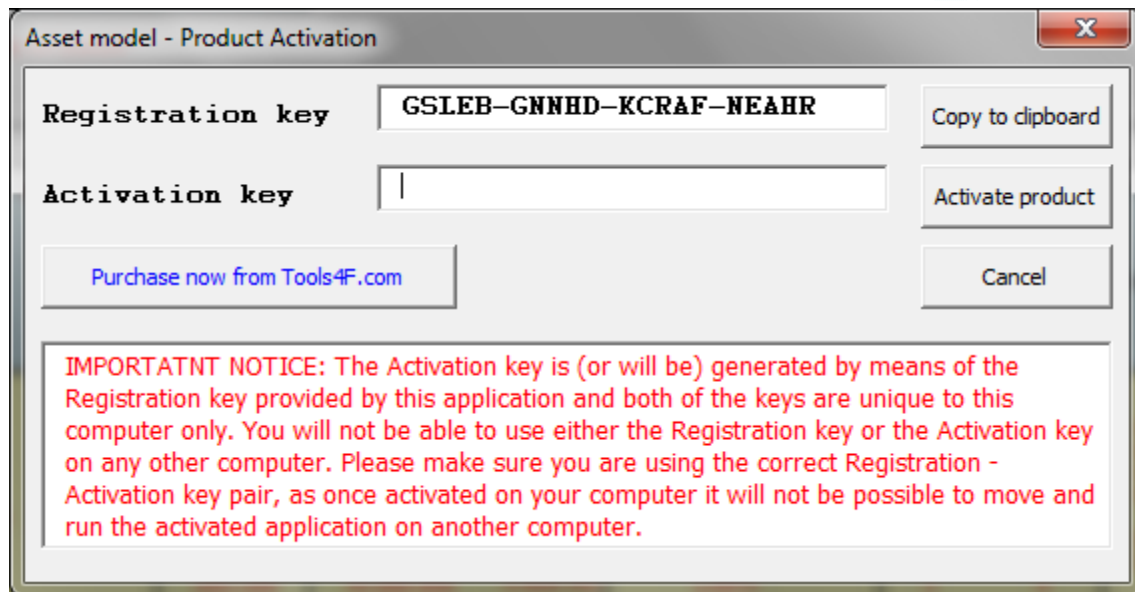


Now only the demo version is active. If you want to run the full version of the application, click on the "Activate" button, otherwise continue in the demo version by clicking on the "Demo" button.



To get the Activation key, go to the www.tools4f.com web site and purchase the application. Once the license is ordered and paid, to your e-mail you will be sent the Activation key. After receiving the Activation key, copy it to the "Activation key" box and you can activate the full version of this application with the "Activate product" button.

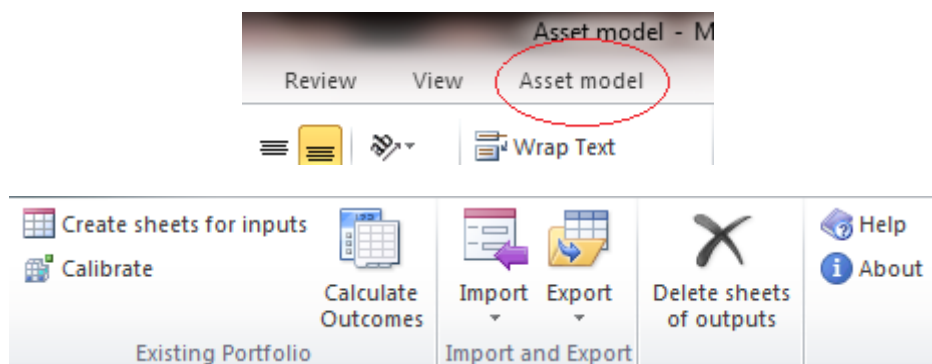
NOTE: The Activation key is generated by means of the Registration key provided by this application and both of the keys are unique to this computer only. You will not be able to use either the Registration key or the Activation key on any other computer. Please make sure you are using the correct Registration - Activation key pair, as once activated on your computer it will not be possible to move and run the activated application on another computer.



From now on, you can use all the functions of the application.

4 USING THE APPLICATION

The Ribbon provides you with the “Asset model” tab that is located after the standard tabs which MS Excel provides. When you click on it, the contextual tabs appear on the Ribbon. It contains Create sheets for inputs, Delete sheets of outputs, Calibrate instruments and calculate spreads, Calculate Outcomes, Help and About (as shown in the picture below).

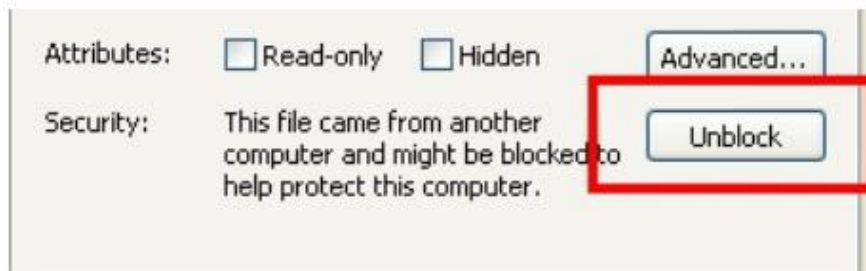


At the beginning, only the *Help*, *About* and *Create sheets for inputs* are available. After clicking on the other contextual tabs, the informative window “Sheets for inputs do not exist!” appears. The Create sheets for inputs allow you to insert a list of financial instruments (current portfolio,

yield curves, foreign exchange rates, cash interest, share return and share dividend). These lists are the inputs into the calculation.

4.1 USING THE HELP

Before you start using the Help, you need to unblock the file *Help.chm*. Click on the *.chm file by the right button and choose “Properties”. Click on the “Unblock” button as shown in the figure below. From now on, the Help is fully active.



NOTE: The file *.chm and *.xlam must be saved in the same folder to work with the Help properly.

4.2 INPUT PARAMETERS FOR THE CURRENT PORTFOLIO

The Current_Portfolio sheet is specially designed to fill in the general inputs as easy as possible.

Input data - List of Financial Instruments of Current Portfolio

Valuation Date	30.6.2011	<i>Fill in the last day of month</i>
Basic Currency for the Outcomes	EUR	

LIST OF FINANCIAL INSTRUMENTS - Current portfolio						
1	2	3	4	5	6	7
ID	Name	ISIN	Type of the Instrument	Fix or float for bonds or swaps	Day Count Convention	Face Value (FV)
1	Fix bond GBP	111	Bond	Fix	30E/360	3 400 000
2	Fix bond EUR	112	Bond	Fix	30E/360	4 107 620
3	Float bond USD	113	Bond	Float	30E/360	300 000 000
4	Float bond EUR	114	Bond	Float	30E/360	24 645 718
5	Deposit EUR	115	Deposit		30E/360	1 000 000
6	Savings account EUR	116	Savings account		30E/360	82 152
7	Government T-bills EUR	117	Government T-bills		30E/360	3 000 000
8	Current account USD	118	Current account		30E/360	5 000 000
9	Deposit EUR	119	Deposit		30E/360	246 457
10	Share USD	120	Share		30E/360	10 000 000

Valuation date

The Valuation date means the date to which the values of the Cash Flow should be calculated. It must be the last day of a month. If the date is not filled in, the application automatically fills in the last day of the current month. Also, if the date is not the last day of the month, the program automatically changes it to the last day of the month.

Base currency for the outcomes

This is the currency into which all results are converted. Just before listing of all the results, they are converted into the currency set in the “Base Currency for the Outcomes”. However, during the calculation, all the values are calculated in the currency of the financial instrument set in column 17 (Currency). The values for foreign exchange rates are in the “FXrate” sheet (described below).

List of the allowed currencies of the outcomes:

Currency	State	Currency	State
AUD	Australia	NOK	Norway
CAD	Canada	PLN	Poland
CZK	Czech Republic	RON	Romania
DKK	Denmark	RUB	Russia
EUR	Euro	SEK	Sweden
GBP	Great Britain	TRY	Turkey
HRK	Croatia	USD	U.S.
HUF	Hungary	Other	Other
CHF	Switzerland		

If the currency is not filled in, the program automatically uses Euro as the default currency for outcomes.

List of Financial instruments for the current portfolio

The yellow fields only should be filled in (column 2 – 20). The pink fields (column 21 – 23) are filled in automatically by the running program after clicking on “Calibrate *instruments and calculate spread*” and the white fields (column 24 and 25) are filled in automatically using the Excel formulas.

1. **ID** – is an identification of the financial instrument. The ID is filled in automatically by the application.
2. **Name** – is the name of the financial instrument. It does not need to be filled in.

3. **ISIN** – It does not need to be filled in.
4. **Type of the instrument**-There are these types of financial instruments predefined:

- a. Bond
- b. Deposit
- c. Current account
- d. Saving account
- e. Government T-bills
- f. Share
- g. IRS Pay leg
- h. IRS Receive leg

If the Type of the instrument is not filled in, the outputs for the instrument are not calculated.

5. **Fix or float** – It needs to be filled in for bonds and swaps only.
6. **Day count convention** - The type of day count basis to use can be chosen from five types of day count convention:

- a. 30US/360
- b. Actual/Actual
- c. Actual/360
- d. Actual/365
- e. 30E/360

If the Day count convention is not filled in, the outputs for the instrument are not calculated.

7. **Face value (Nominal value)** – Face Value = Face Value of 1 piece * number of pieces.

If the Face value is not filled in, the outputs for the instrument are not calculated.

8. **Initial exchange differences** – It has to be filled in only for the instruments which are in the same currency as the outcomes currency.

9. **Income % (p. a.)** – If the Income for Current Account, Savings Account, Government T-Bills, Deposits is not filled in, the value is taken from the Cash Interest sheet. If the Income for Share is not filled in, the value is taken from the Share Dividend sheet. If the Income for other instruments is not set, the outputs for these instruments are not calculated.

10. **Coupon spread % (p. a.) for float** – This column has to be filled in for float instruments only (bonds and swaps).

11. **Income frequency** – It means the number of income payments per year. It attains the values:

- a. 1 – for annual payments
- b. 2 – for semi-annual
- c. 4 – for quarterly

12. **Income month** – This marks the month in which the interest or dividend will be paid. It must be filled in for share and cash (Deposit, Current account, Savings account, Government T-bills)
13. **Maturity** – The maturity date is the date when the security expires. The maturity cannot be filled in for the share and may or may not be filled in for Savings account and Current account. If the Maturity of other instruments is not filled in, the outputs for these instruments are not calculated
14. **Clean market price – on valuation date** - The clean market price is the price of an instrument excluding any interest that has accrued since the issue or the most recent coupon payment. It is in percent of the face value. If clean market price value is not filled in, the outputs for the instrument are not calculated.
15. **Purchased yield to maturity** - Yield to maturity of the security on the purchase date. It must be filled in for Bonds and swaps.
16. **Clean amortized price – on valuation date** - Value of amortized price on the valuation date. It must be filled in for Bonds and swaps.
17. **Currency** – The Currency of the financial instrument can be chosen from these types of currencies: AUD, CAD, CZK, EUR, GBP, HRK, HUF, CHF, NOK, PLN, RON, RUB, SEK, TRY, USD, OTHER. If the Currency is not filled in, the outputs for the instrument are not calculated.
18. **Sector** – It determines the origin of the Instruments. It does not need to be specified.
19. **Portfolio** – Any value can be filled in and it does not need to be specified.
20. **Accounting classification**–There are 6 types of the Accounting classifications predefined:
 - a. FVTPL - Fair Value Through P&L
 - b. AFS - Available for Sale
 - c. HTM - Held to Maturity
 - d. LAR - Loans and Receivables
 - e. HFT – Held for Trading – for IRS
 - f. HEDGE – Hedge Accounting (HA) – for IRS

If the Accounting classification is not filled in, the outputs for the instrument are not calculated!

The values below are filled in automatically by the application.

21. **Type of the spread** – The type of the Spread is calculated for flat instruments only. It is a method how the spread was calculated.
22. **Spread** – The Spread is calculated for bonds and swaps only, zero is set automatically for the rest of instruments. It is a correction of the yield curve so that the difference between the calculated market value using this corrected yield curve and the entered market price is less than the entered precision.

- 23. Clean market price – on valuation date
- 24. Clean yield to maturity
- 25. Day count convention index – The value is set according to the value in column 6. It means the Day convention is transformed to that number.

NOTE: **1000** is the maximal number of the Financial instruments.

4.3 INPUT PARAMETERS FOR YIELD CURVE

In the “YC” sheet the application requires information about Yield curve (YC) which is the monthly development of 1Y forward rates.

In the sheet, the application offers 16 types of currency plus one according to your choice. Fill in the table of Yield curves for outcomes currency. Once you click on the currency in the menu at the top of the sheet, you will automatically be directed to the table of the chosen currency.

Input Yield curve

Fill in the Yield Curves for the Currency you need. Fill in the date at which the Yield Curves
You can add up to 20 columns for each currency.

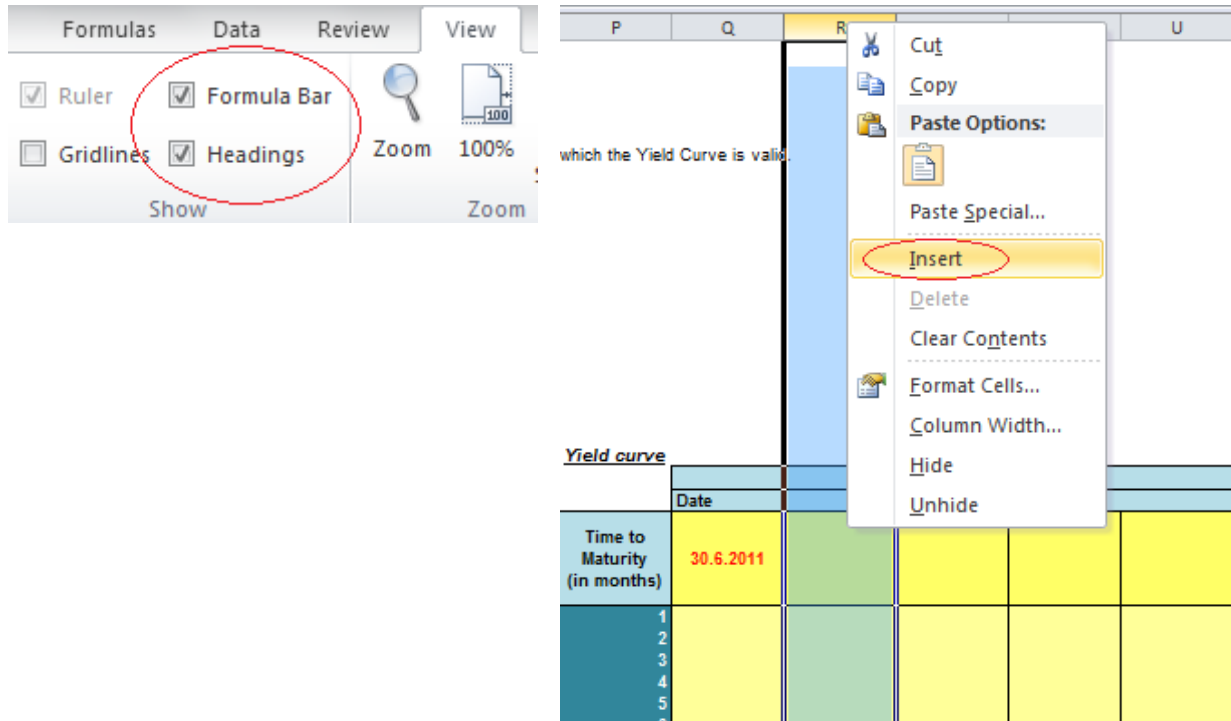
AUD	Australia	NOK	Norway
CAD	Canada	PLN	Poland
CZK	Czech Republic	RON	Romania
DKK	Denmark	RUB	Russia
EUR	Euro	SEK	Sweden
GBP	Great Britain	TRY	Turkey
HRK	Croatia	USD	U.S.
HUF	Hungary	Other	Other
CHF	Switzerland		

Yield curve

		AUD				
		Date				
Time to Maturity (in months)		30.6.2011				
	1					
	2					
	3					
	4					

Each table has 5 columns in the beginning but it can be expanded up to 20 columns. Once you want to add a column, go to the “View” tab in the Ribbon and check the “Formula Bar” and “Headings” checkboxes. Now select the entire column and choose “Insert”, the new column will

be added. The tables for currencies EUR, GBP, USD and Other are automatically set for 20 columns.



The first yellow cell in the table cannot be changed. It is automatically filled in with the Valuation date from the Current portfolio sheet. The last day of a month must be filled in the other yellow cells. The data about YC have to be valid on the last day of each month.

Yield curve		EUR									
Date											
Time to Maturity (in months)	30.6.2011	31.12.2011	31.1.2012	29.2.2012	31.3.2012	31.1.2013					
1	0,45%	1,37%	1,49%	1,80%	1,70%	2,39%					
2	0,84%	1,49%	1,60%	1,70%	1,79%	2,44%					
3	0,81%	1,60%	1,70%	1,79%	1,88%	2,49%					
4	0,97%	1,70%	1,79%	1,88%	1,96%	2,53%					
5	1,11%	1,79%	1,88%	1,96%	2,03%	2,57%					
6	1,25%	1,88%	1,96%	2,03%	2,10%	2,61%					
7	1,37%	1,96%	2,03%	2,10%	2,17%	2,65%					
8	1,49%	2,03%	2,10%	2,17%	2,23%	2,69%					
9	1,60%	2,10%	2,17%	2,23%	2,29%	2,72%					
10	1,70%	2,17%	2,23%	2,29%	2,34%	2,76%					
11	1,79%	2,23%	2,29%	2,34%	2,39%	2,79%					
12	1,88%	2,29%	2,34%	2,39%	2,44%	2,82%					
13	1,96%	2,34%	2,39%	2,44%	2,49%	2,85%					
14	2,03%	2,39%	2,44%	2,49%	2,53%	2,88%					
15	2,10%	2,44%	2,49%	2,53%	2,57%	2,91%					
16	2,17%	2,49%	2,53%	2,57%	2,61%	2,94%					
17	2,23%	2,53%	2,57%	2,61%	2,65%	2,97%					

NOTE: You can use our application *Yield curve fitting* to set the parameters in sheet "YC". For more information, see www.tools4f.com.

4.4 INPUT PARAMETERS FOR FOREIGN EXCHANGE RATE

The conversion from different currencies to the base currency (the currency of outcomes specified in the Current Portfolio sheet) is specified in the FX rate sheet.

Monthly development must be filled. In the first row there is a foreign exchange rate valid on the valuation date, in the second row there is a foreign exchange rate valid at the end of the next month, and so on. The application allows you to enter the foreign exchange rate for up to 50 years from the valuation date. The minimum which has to be filled in is till the longest maturity.

Input FX rate

FX Rate Base currency for the Outcomes: EUR (Currency for the Outcomes from the list "Curre")
Fill in all foreign exchange rates in relation to the base currency.

Date	Currency								
	AUD	CAD	CZK	DKK	EUR	GBP	HRK	HUF	CHF
30.6.2011	1,000	1,000	1,000	1,000	1,000	1,157	1,000	1,000	1,000
31.7.2011	1,000	1,000	1,000	1,000	1,000	1,157	1,000	1,000	1,000
31.8.2011	1,000	1,000	1,000	1,000	1,000	1,157	1,000	1,000	1,000
30.9.2011	1,000	1,000	1,000	1,000	1,000	1,157	1,000	1,000	1,000
31.10.2011	1,000	1,000	1,000	1,000	1,000	1,157	1,000	1,000	1,000
30.11.2011	1,000	1,000	1,000	1,000	1,000	1,157	1,000	1,000	1,000
31.12.2011	1,000	1,000	1,000	1,000	1,000	1,157	1,000	1,000	1,000
31.1.2012	1,000	1,000	1,000	1,000	1,000	1,157	1,000	1,000	1,000
29.2.2012	1,000	1,000	1,000	1,000	1,000	1,157	1,000	1,000	1,000
31.3.2012	1,000	1,000	1,000	1,000	1,000	1,157	1,000	1,000	1,000
30.4.2012	1,000	1,000	1,000	1,000	1,000	1,157	1,000	1,000	1,000
31.5.2012	1,000	1,000	1,000	1,000	1,000	1,157	1,000	1,000	1,000
30.6.2012	1,000	1,000	1,000	1,000	1,000	1,157	1,000	1,000	1,000
31.7.2012	1,000	1,000	1,000	1,000	1,000	1,157	1,000	1,000	1,000
31.8.2012	1,000	1,000	1,000	1,000	1,000	1,157	1,000	1,000	1,000

4.5 INPUT PARAMETERS FOR CASH INTEREST

The Cash Interest sheet must be filled in for Current Account, Savings Account, Government T-Bills and Deposit if zero is in column 9 – Income % (p. a.) in the Current Portfolio sheet. It signifies the rate variability and in such a case the values from the Cash Interest sheet are taken as the inputs for the calculation.

The data must also be filled in for the currencies of the instruments mentioned above which are written in column 17 in the Current Portfolio sheet.

Cash Interest

AUD	Australia	NOK	Norway
CAD	Canada	PLN	Poland
CZK	Czech Republ	RON	Romania
DKK	Denmark	RUB	Russia
EUR	Euro	SEK	Sweden
GBP	Great Britain	TRY	Turkey
HRK	Croatia	USD	U.S.
HUF	Hungary	Other	Other
CHF	Switzerland		

AUD		CAD		CZK		DKK		EUR	
Time to Maturity (in months)	Cash Interest %	Time to Maturity (in months)	Cash Interest %	Time to Maturity (in months)	Cash Interest %	Time to Maturity (in months)	Cash Interest %	Time to Maturity (in months)	Cash Interest %
1		1		1		1		1	0,825%
2		2		2		2		2	0,825%
3		3		3		3		3	0,825%
4		4		4		4		4	0,825%
5		5		5		5		5	0,825%
6		6		6		6		6	0,825%
7		7		7		7		7	0,825%
8		8		8		8		8	1,914%

4.6 INPUT PARAMETERS FOR SHARE RETURN

The information about Share Return is written in the Share Return sheet. All the data must be filled in for the currencies of the Shares which are written in column 17 in the Current Portfolio sheet.

Share Return

AUD	Australia	NOK	Norway
CAD	Canada	PLN	Poland
CZK	Czech Republ	RON	Romania
DKK	Denmark	RUB	Russia
EUR	Euro	SEK	Sweden
GBP	Great Britain	TRY	Turkey
HRK	Croatia	USD	U.S.
HUF	Hungary	Other	Other
CHF	Switzerland		

AUD		CAD		CZK		DKK		EUR	
Time to Maturity (in months)	Share Return %	Time to Maturity (in months)	Share Return %	Time to Maturity (in months)	Share Return %	Time to Maturity (in months)	Share Return %	Time to Maturity (in months)	Share Return %
1		1		1		1		1	0,110%
2		2		2		2		2	0,110%
3		3		3		3		3	0,110%
4		4		4		4		4	0,110%
5		5		5		5		5	0,110%
6		6		6		6		6	0,110%

4.7 INPUT PARAMETERS FOR SHARE DIVIDEND

If there is zero in column 9 – Income % (p. a.) for the Share in the Current Portfolio sheet, the values from the Share Dividend sheet are taken as the inputs for the calculation.

The data must be filled in for the currencies of the Shares which are written in column 17 in the Current Portfolio sheet.

Share Dividend

AUD	Australia	NOK	Norway
CAD	Canada	PLN	Poland
CZK	Czech Republ	RON	Romania
DKK	Denmark	RUB	Russia
EUR	Euro	SEK	Sweden
GBP	Great Britain	TRY	Turkey
HRK	Croatia	USD	U.S.
HUF	Hungary	Other	Other
CHF	Switzerland		

AUD		CAD		CZK		DKK		EUR	
Time to Maturity (in months)	Share Dividend %	Time to Maturity (in months)	Share Dividend %	Time to Maturity (in months)	Share Dividend %	Time to Maturity (in months)	Share Dividend %	Time to Maturity (in months)	Share Dividend %
1		1		1		1		1	1,100%
2		2		2		2		2	1,100%
3		3		3		3		3	1,100%
4		4		4		4		4	1,100%
5		5		5		5		5	1,100%
6		6		6		6		6	1,100%

5 IMPORT

To fill in the data tables you can import the data from a text file (*.csv or *.txt) or fill in the data table directly in MS Excel. If you choose to import the data from a file, firstly, the file browser is opened to let you choose the file. (In this case, the file has to have a structure with the **semi-colon** as a separator. Secondly, you are asked to specify the number of the row where the actual data starts. This ensures that only the data are imported, without any header or other information.

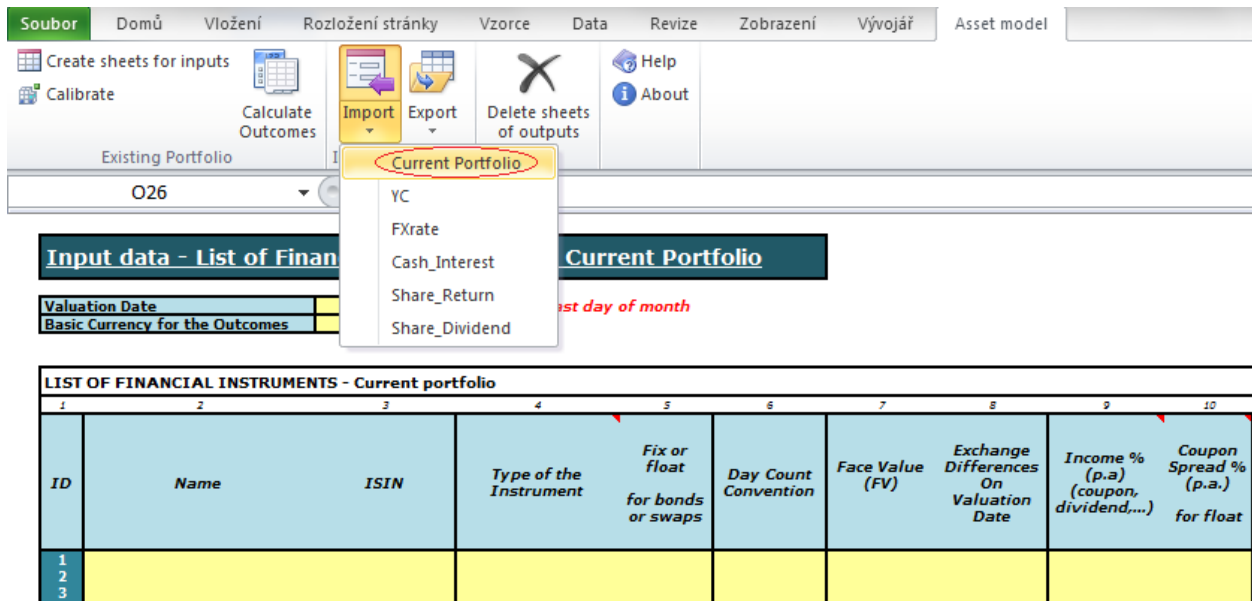
5.1 CURRENT PORTFOLIO SHEET

You have to respect the pre-specified structure of columns. The complete data table would be comprised of these categories: *Name, ISIN, Type of the Instrument, Fix or Float, Day Count Convention, Face Value, Initial Exchange Differences, Income, Coupon Spread, Income frequency,*

Income month, Maturity, Clean Market Price, Purchased Yield to Maturity, Clean Amortized Price, Currency, Sector, Portfolio, Accounting Classification:

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
1	NAME	ISIN	TYPE	FIX_FLOAT	CONV	FV	EXCHDIFF	INCOME	COUP_SPR	FREQ	INC_MONTH	MATURITY	CMV	YTM_PP	CAP	CURRENCY	SECTOR	PORT	AC
2	Fix bond EUR	111	Bond	Fix	30E/360	16 384 000	0	3,00%		1		2.5.2017	101,76%	2,46%	102,00%	EUR	Govern	A	HTM
3	Fix bond EUR	112	Bond	Fix	30E/360	2 048 000	0	3,00%		1		2.5.2017	101,76%	2,46%	102,00%	EUR	Govern	B	AFS
4	Float bond EUR	113	Bond	Float	30E/360	1 024 000	0	2,50%	3,00%	2		26.9.2016	112,72%	3,46%	97,00%	EUR	Govern	C	FVTPL
5	Deposit EUR	115	Deposit		30E/360	512 000	0	1,70%		1	12	12.1.2015	100,00%			EUR	Govern	D	LAR
6	Savings account EUR	116	Savings account		30E/360	64 000	0	2,30%		1	8	16.2.2017	100,00%			EUR	Govern	E	LAR
7	Government T-bills EUR	117	Government T-bills		30E/360	400 000	0	1,50%		2	2	1.3.2020	100,00%			USD	Govern	F	LAR
8	Current account USD	118	Current account		Act/Act	256 000	-59 000	0,00%		1	11	26.5.2014	100,00%			USD	Govern	G	LAR
9	Deposit EUR	119	Deposit		30E/360	128 000	0	0,00%		2	4	21.6.2013	100,00%			EUR	Govern	H	LAR
10	Share USD	120	Share		30E/360	32 768 000	28 000	1,00%		1	4		100,00%			USD	Govern	I	FVTPL
11	Share EUR	121	Share		Act/365	8 192 000	0	0,00%		4	3		100,00%			EUR	Govern	J	AFS

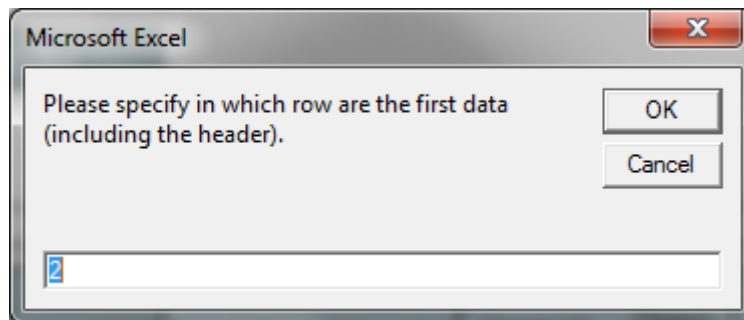
To import of the data, click on the “Current Portfolio” tab in “Import” tab.



The screenshot shows the 'Import' menu with 'Current Portfolio' selected. Below the menu is a table titled 'LIST OF FINANCIAL INSTRUMENTS - Current portfolio' with the following columns:

ID	Name	ISIN	Type of the Instrument	Day Count Convention	Face Value (FV)	Exchange Differences On Valuation Date	Income % (p.a.) (coupon, dividend,...)	Coupon Spread % (p.a.) for float
1								
2								
3								

You specify the number of the row where the actual data starts.

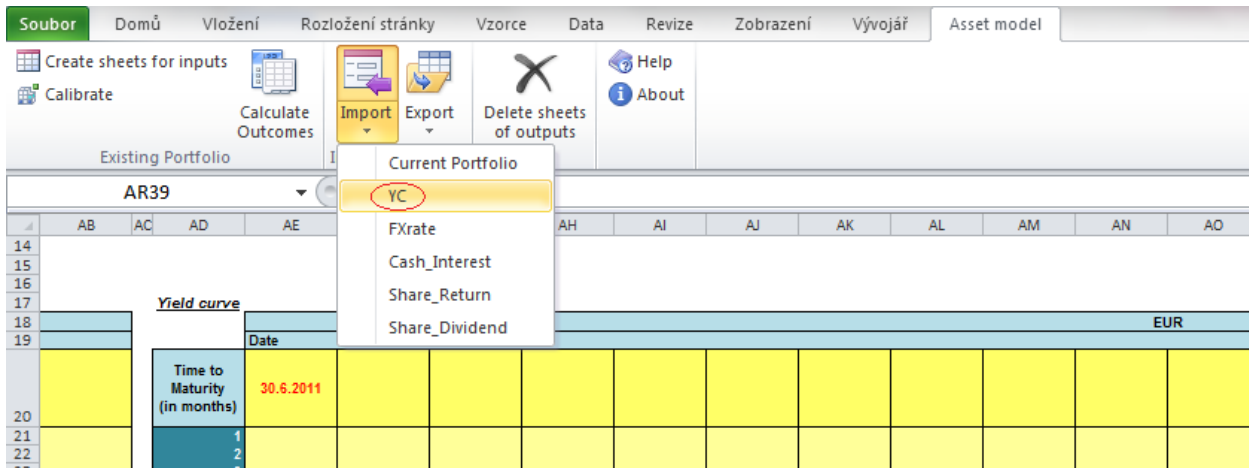


5.2 YIELD CURVE SHEET

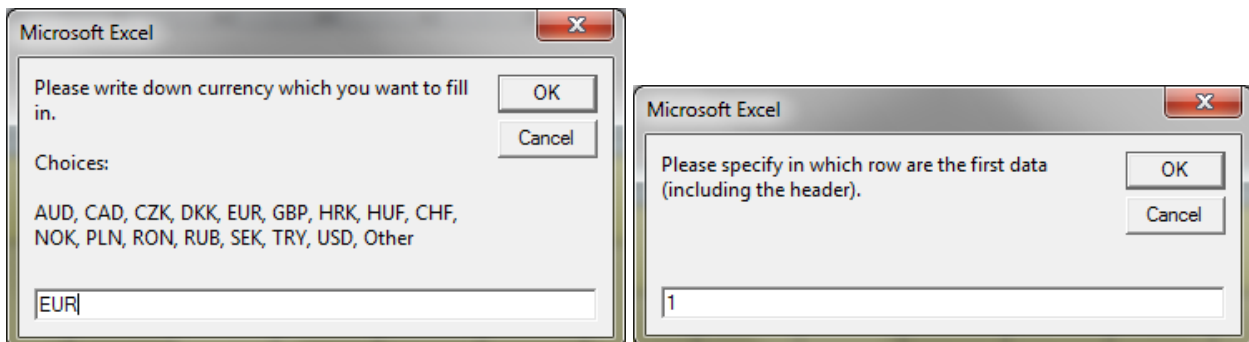
You have to respect the pre-specified structure of columns. The complete data table would be comprised of these categories: *Particular dates*. Date in the first column is the same as the valuation date on the “*Current_Portfolio*” sheet. You can use structure with header (e.g. EUR in first row) or you can use structure without header, it means the first row contains particular dates.

	A	B	C	D	E		A	B	C	D	E
1	31.5.2013	30.6.2013	31.7.2013	31.8.2013	30.9.2013	1	EUR				
2	0,004529	0,006384	0,008097	0,009678	0,011139	2	31.5.2013	30.6.2013	31.7.2013	31.8.2013	30.9.2013
3	0,006384	0,008097	0,009678	0,011139	0,01249	3	0,004529	0,006384	0,008097	0,009678	0,011139
4	0,008097	0,009678	0,011139	0,01249	0,01374	4	0,006384	0,008097	0,009678	0,011139	0,01249
5	0,009678	0,011139	0,01249	0,01374	0,014898	5	0,008097	0,009678	0,011139	0,01249	0,01374
6	0,011139	0,01249	0,01374	0,014898	0,015972	6	0,009678	0,011139	0,01249	0,01374	0,014898
7	0,01249	0,01374	0,014898	0,015972	0,016858	7	0,011139	0,01249	0,01374	0,014898	0,015972

To import of the data, click on the “YC” tab in “Import” tab.



You have to specify the name of the currency which you want to fill in and you specify the number of the row where the actual data starts.



5.3 FOREIGN EXCHANGE RATE SHEET

You have to respect the pre-specified structure of columns. The complete data table would be comprised of these categories: *AUD, CAD, CZK, DKK, EUR, GBP, HRK, HUF, CHF, NOK, PLN, RON, RUB, SEK, TRY, USD, Other*:

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1	AUD	CAD	CZK	DKK	EUR	GBP	HRK	HUF	CHF	NOK	PLN	RON	RUB	SEK	TRY	USD	Other
2	1	1	0,039	1	1	1,178	1	1	1	1	1	1	1	1	1	0,753	1
3	1	1	0,039	1	1	1,178	1	1	1	1	1	1	1	1	1	0,753	1
4	1	1	0,039	1	1	1,178	1	1	1	1	1	1	1	1	1	0,753	1
5	1	1	0,039	1	1	1,178	1	1	1	1	1	1	1	1	1	0,753	1
6	1	1	0,039	1	1	1,178	1	1	1	1	1	1	1	1	1	0,753	1
7	1	1	0,039	1	1	1,178	1	1	1	1	1	1	1	1	1	0,753	1

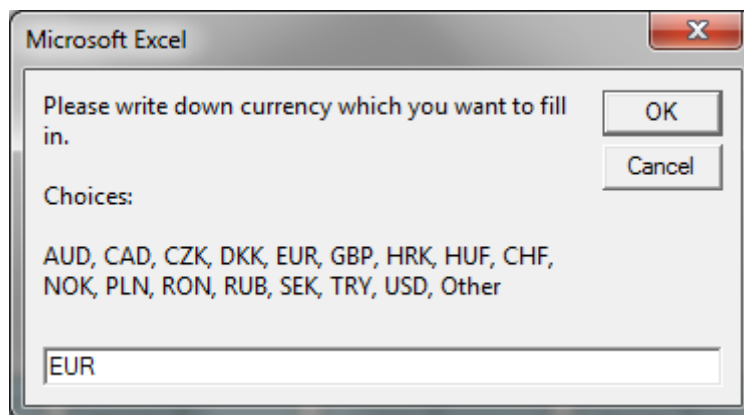
The import of the data is the same as the import of the Current Portfolio sheet.

5.4 CASH INTEREST, SHARE RETURN AND SHARE DIVIDEND SHEETS

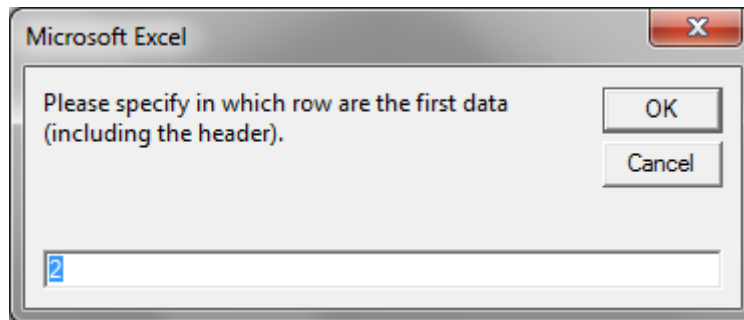
You have to respect the following pre-specified structure of column. The same structure is for Cash Interest, Share Return and Share Dividend sheet.

	A
1	EUR
2	0,83%
3	0,83%
4	0,83%
5	0,83%
6	0,83%

The import of the data is the same as the import of the previous sheets. You have to specify the name of the currency which you want to fill in.

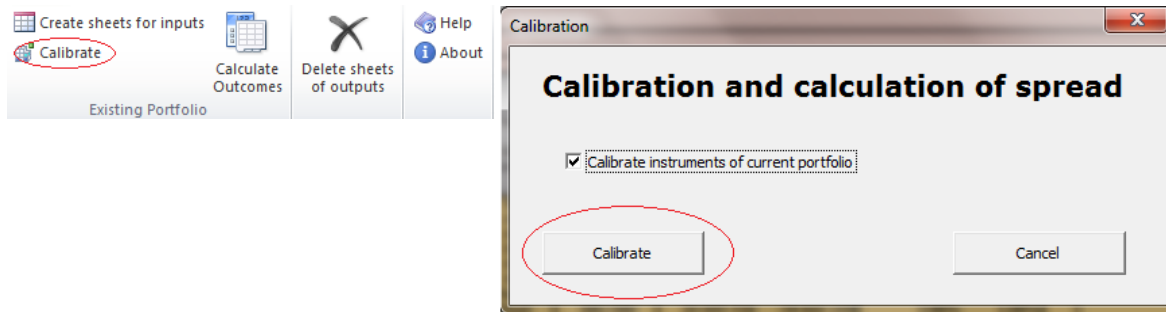


And you specify the number of the row where the actual data starts.



6 CALCULATION

Before the calculation, you have the option to calibrate the instruments and calculate the spread.

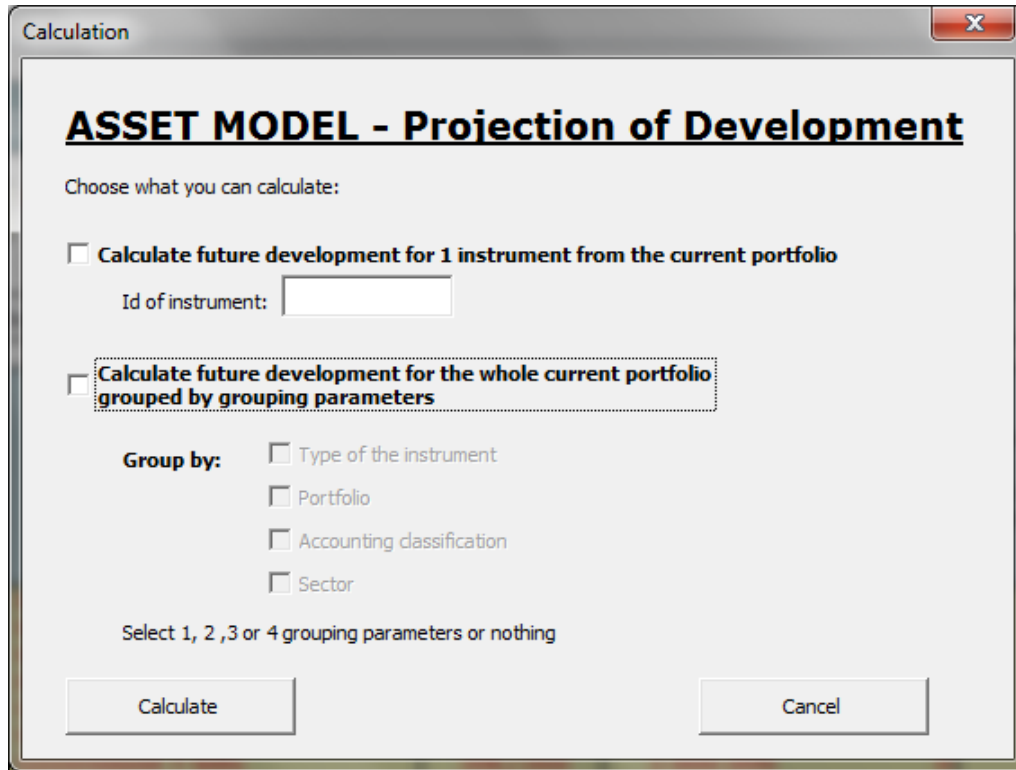


Once the calibration is done, columns 21 – Type of Spread, 22 - Spread and 23 – Clean Market Price – On Valuation Day are filled in automatically.

Calculated variables		
21	22	23
Type of the Spread	Spread	Clean Market Price - At Valuation Date - calculated
Flat	1,2006%	101,7581%
Flat	3,8358%	104,8917%
Flat	2,3199%	104,6636%
Flat	0,9742%	103,9307%
Flat	0,9742%	0,0000%
Flat	1,2006%	101,7581%
Flat	-1,9682%	112,7167%
Flat	-1,9682%	112,7167%
Flat	-1,4750%	109,0486%

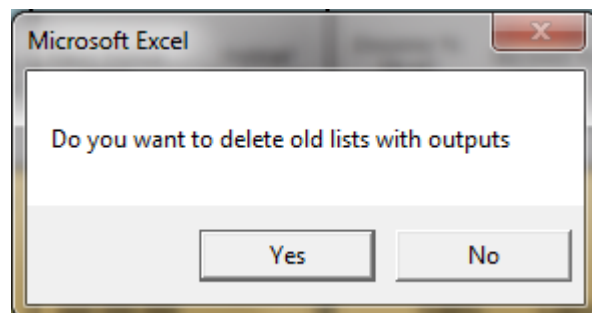
To calculate the Outcomes, click on the “Calculate Outcomes” tab. The application offers two options what to calculate:

1. Calculate future cash flow for 1 instrument from the current portfolio
2. Calculate future cash flow for the whole current portfolio grouped by grouping parameters



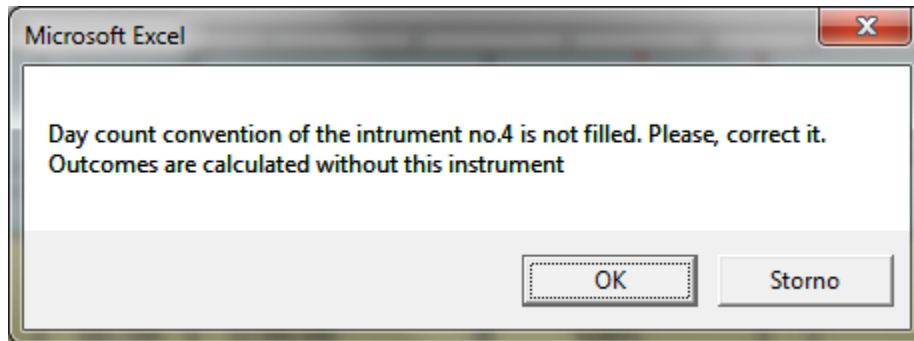
If you want to calculate 1 instrument only, check the checkbox and insert the ID of the instrument and click on the “Calculate” button. The application will ask you if you want to delete old lists with previous outputs. Click on “Yes” or “No” to continue.

In case you want to calculate the whole current portfolio, check the second checkbox and click on the “Calculate” button. Now you have 4 options to group the outcomes. Check the group which you are interested in and click on the “Calculate” button. If you do not check any checkbox, the application will calculate the whole portfolio as one group.

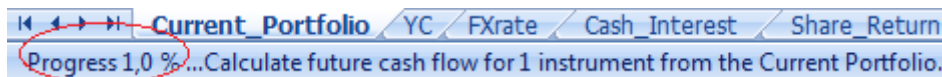


NOTE: You can calculate both variants (one instrument only and the whole portfolio) at the same time. Just check the checkboxes and click on the “Calculate” button.

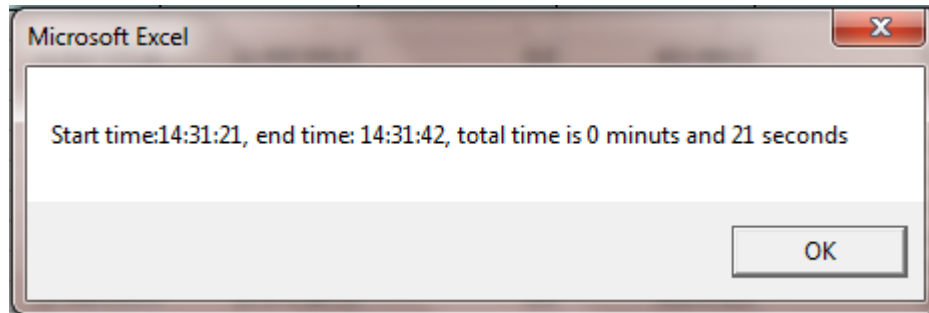
Once entering a wrong value in any cell in the list of instruments, the information window is displayed and you will be informed about the cell which contains the error. In case of a wrong value in the instrument line, the application calculates without this instrument and you will see zeros in the outcome. Click “OK” to continue or click “Storno”/”Cancel” to cancel the calculation and update the information in the list of instruments.



During the calculation, the progress is displayed in the bottom right corner of the screen. Once the calculation is done, the progress bar shows 100 %. The first 3 % usually take longer time to be done, the whole calculation usually takes a few minutes. But please, be aware of the fact that the calculation speed depends on the parameters of your computer.



After the calculation, the application informs you how long the whole process took. The calculation for one instrument takes less time than the calculation for the whole portfolio or for all groups.



7 OUTCOMES

The number of Outcome sheets depends on the setting during the calculation.

Outcomes for one instrument

In case of the calculation just for one instrument, there is only one outcome sheet. The sheet is of the following structure:

1. **At the beginning of the month** – Dirty Market Value, Accrued Interest, Clean Market Value Calculated, Dirty Amortized Price, Clean Amortized Price, FX Differences, Appraisal Differences, Unrealized Capital Gains/Losses Booked, Modified Duration
2. **At the end of the month** – Dirty Market Value, Accrued Interest, Clean Market Value Calculated, Dirty Amortized Price, Clean Amortized Price, FX Differences, Appraisal Differences, Unrealized Capital Gains/Losses Booked, Modified Duration
3. **Cash flow** – Income Cash Flow, Face Value Cash Flow, Realization of FX Differences,
4. **Change** – Change of Dirty Market Value, Change of Accrued Interest, Change of Clean Market Value Calculated, Change of Dirty Amortized Price, Change of Clean Amortized Price, Change of FX Differences, Change of Appraisal Differences, Change of Unrealized Capital Gains/Losses Booked
5. **Other** – Interest Income, P&L without FX Differences

Outcomes for the whole portfolio

In case of the calculation for the whole portfolio (none of the checkboxes is checked), there are 3 input sheets.

The sheets “1_Total” and “2_Whole_Portfolio” have the same structure as in the previous case above. These two sheets are identical.

The third sheet “3_Summary” contains cumulative sums. This sheet includes the sums of:

1. Dirty Market Value Calculated
2. Accrued Interest

3. Clean Market Value Calculated
4. Dirty Amortized Price
5. Clean Amortized Price
6. FX Differences
7. Appraisal Differences
8. Unrealized Capital Gains/Losses Booked
9. Modified Duration

Summary at Valuation Date									
Total to 30.6.2011									
Group	Dirty Market Value Calculated	Accrued Interest	Clean Market Value Calculated	Dirty Amortized Price	Clean Amortized Price	FX Differences	Appraisal Differences	Unrealized Capital Gains/Losses Booked	Modified Duration
Whole Portfolio	182 331 400,8	894 979,3	181 436 421,5	165 890 508,5	164 995 529,2	0,0	16 440 892,4	3 828 529,9	3,6
Total	182 331 400,8	894 979,3	181 436 421,5	165 890 508,5	164 995 529,2	0,0	16 440 892,4	3 828 529,9	3,6

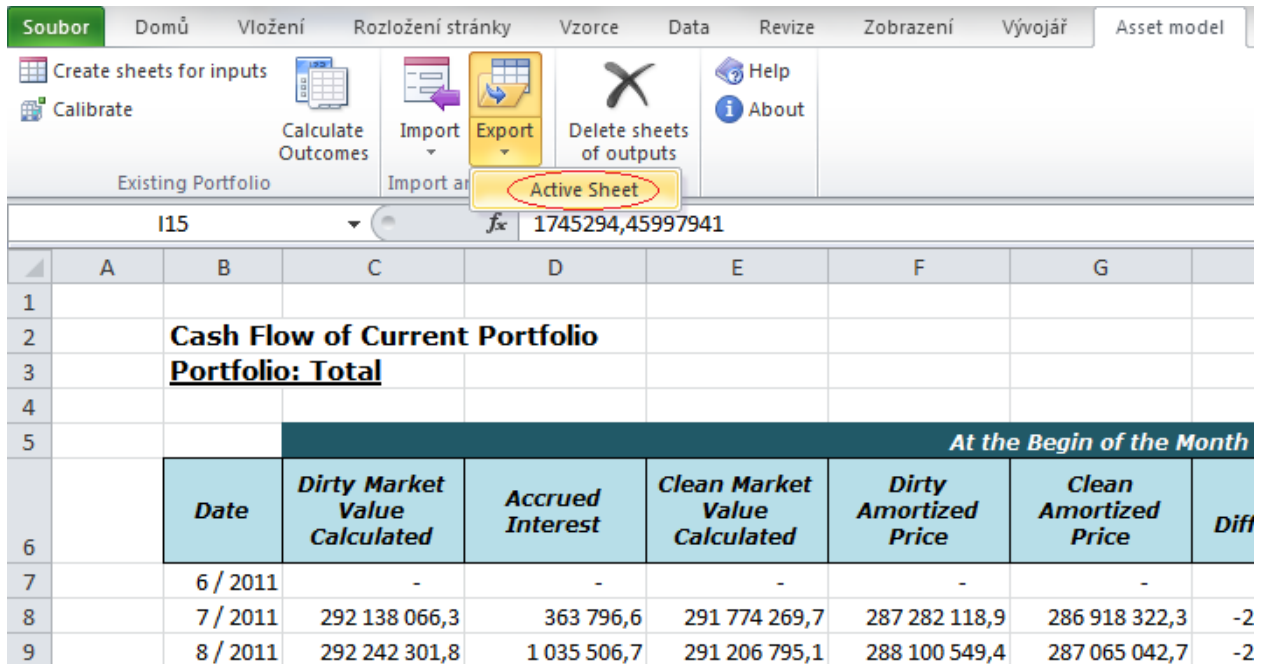
Outcomes for groups

The number of sheets depends on how many groups you want to calculate and how many groups you have in each category (e. g. how many portfolios you have, how many Accounting classifications etc.). The outcome also contains the sheet with the cumulative sums.

Summary at Valuation Date									
Total to 30.6.2011									
Group	Dirty Market Value Calculated	Accrued Interest	Clean Market Value Calculated	Dirty Amortized Price	Clean Amortized Price	FX Differences	Appraisal Differences	Unrealized Capital Gains/Losses Booked	Modified Duration
Whole Portfolio	182 331 400,8	894 979,3	181 436 421,5	165 890 508,5	164 995 529,2	0,0	16 440 892,4	3 828 529,9	3,6
Bond_Govern_B_HTM	420 630,6	2 647,1	417 983,5	421 624,3	418 977,2	0,0	-993,7	0,0	3,5
Bond_Govern_B_FVTPL	21 006 113,3	27 777,8	20 978 335,5	21 627 777,8	21 600 000,0	0,0	-621 664,5	0,0	3,9
Bond_Govern_A_AFS	63 060 583,8	306 386,8	62 754 197,0	58 509 590,7	58 203 203,9	0,0	4 550 993,1	953 196,2	3,6
Bond_Govern_A_HTM	36 924 206,7	168 184,2	36 756 022,5	36 266 239,6	36 098 055,4	0,0	657 967,2	0,0	3,2
Bond_Govern_A_FVTPL	55 945 779,4	386 116,2	55 559 663,2	48 198 808,8	47 812 692,5	0,0	7 746 970,6	0,0	4,0
Deposit_Govern_A_FVTPL	41 425,3	349,1	41 076,2	41 425,3	41 076,2	0,0	0,0	0,0	0,0
Saving account_Govern_A_HTM	83 727,0	1 574,6	82 152,4	83 727,0	82 152,4	0,0	0,0	0,0	0,0
Government T-bills_Govern_C_HTM	123 844,7	616,1	123 228,6	123 844,7	123 228,6	0,0	0,0	0,0	0,0
Deposit_Govern_A_HTM	411 100,8	338,9	410 762,0	411 100,8	410 762,0	0,0	0,0	0,0	0,0
Current account_Govern_A_HTM	206 369,4	988,4	205 381,0	206 369,4	205 381,0	0,0	0,0	0,0	0,0
Share_Govern_A_FVTPL	1 232 285,9	0,0	1 232 285,9	0,0	0,0	0,0	1 232 285,9	0,0	0,0
Share_Govern_A_AFS	2 875 333,7	0,0	2 875 333,7	0,0	0,0	0,0	2 875 333,7	2 875 333,7	0,0

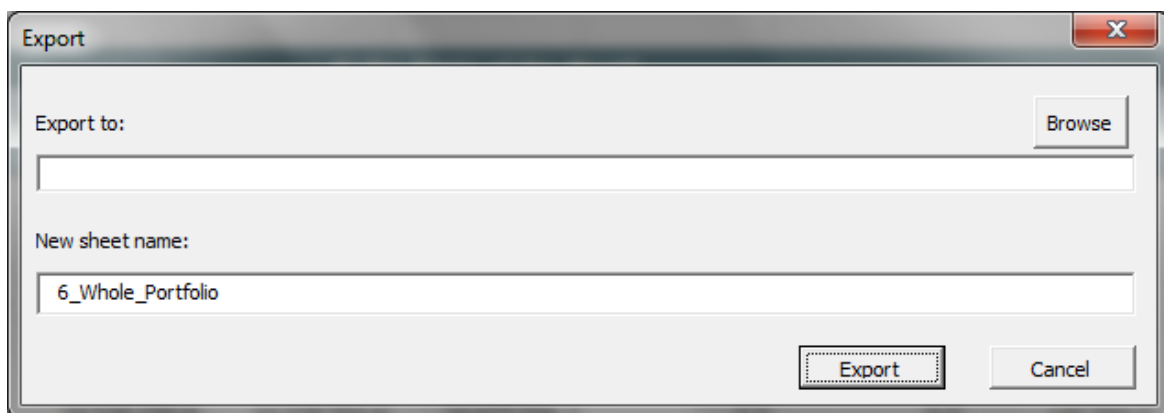
8 EXPORT

The possibility of output export is provided through the “Active Sheet” tab in “Export” tab that you can find next to the “Import” tab.

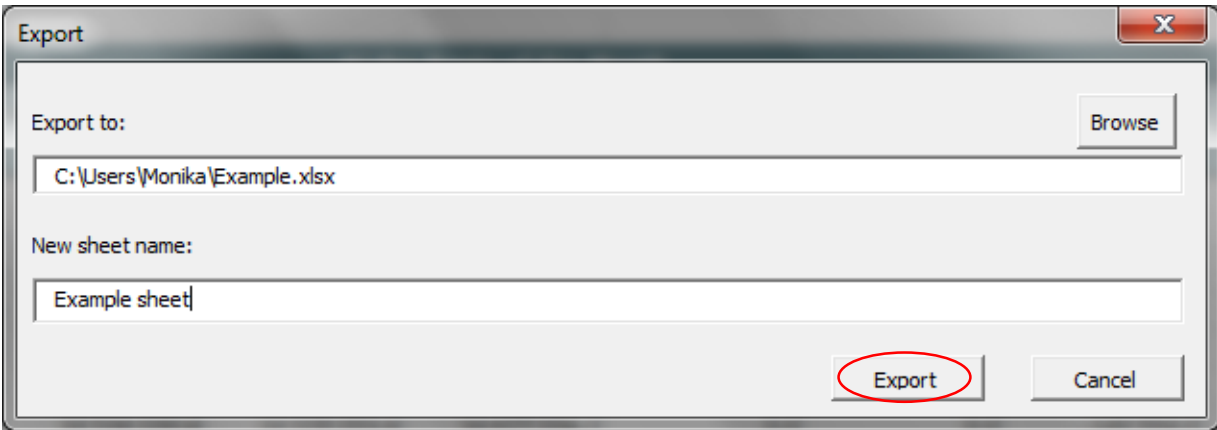
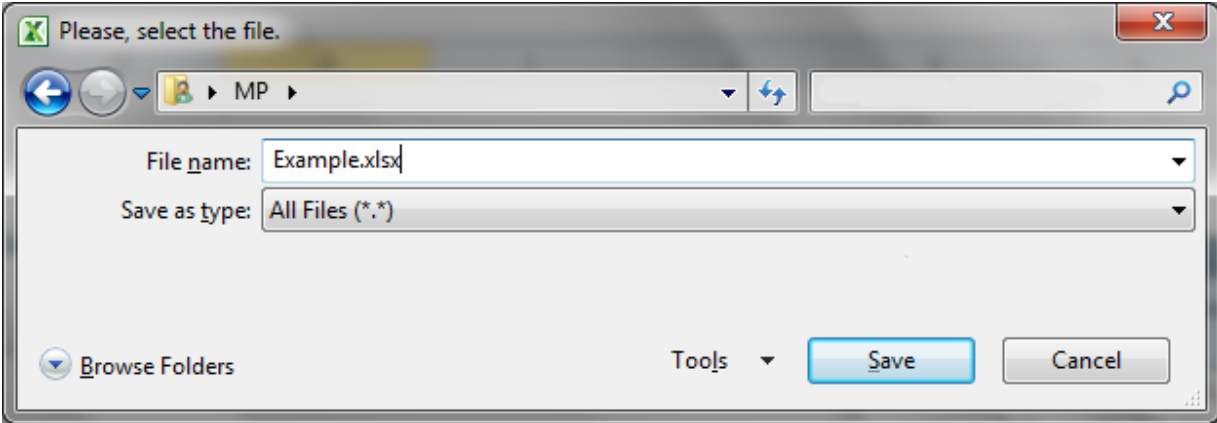


At the Begin of the Month							
Date	Dirty Market Value Calculated	Accrued Interest	Clean Market Value Calculated	Dirty Amortized Price	Clean Amortized Price	Diff	
6 / 2011	-	-	-	-	-	-	
7 / 2011	292 138 066,3	363 796,6	291 774 269,7	287 282 118,9	286 918 322,3	-2	
8 / 2011	292 242 301,8	1 035 506,7	291 206 795,1	288 100 549,4	287 065 042,7	-2	

The *output export setting* form is opened after the click on this button. In “New sheet name” field is the name of the active sheet, but it can be overwritten.



Here you can choose the folder, where you want to export the results to format *.xls or *.xlsx. Using the file browser you can either choose the existing file or create a new one.



9 TECHNICAL DOCUMENTATION

Spread

Spread is value of the calculated spread. It is correction of yield curve so that difference between calculated market value using this corrected yield curve and entered market price would be equal. It is filled after running program “Calibrate instruments and calculate spreads”.

Flat spread:

$$YC_t^{modify} = YC_t \pm spread$$

Spread is calculated for bonds and IRS

Spread is not calculated for treasury bills, current account, saving account, deposits and shares.

Clean Yield to Maturity on Valuation Date

The Input is Clean Market Price on Valuation Date from model point (*CMP*) then *YtM* is calculated from *CMP* by the excel formula. The function “YIELD” is used from MS Excel for calculation. *YtM* in this function is used iteration Newton method for calculation.

Clean Yield to Maturity on Valuation Date is calculated only for instruments with filled in maturity.

Time to maturity (TtM)

The time remaining until a financial contract expires (also called time until expiration). Time to maturity is in years. It depends on day count convention.

30US/360:

$$TtM = \frac{(360 * (Y_{mat} - Y_{val}) + 30 * (M_{mat} - M_{val}) + D_{mat} - D_{val})}{360},$$

where

Y_{mat} is year of maturity date, M_{mat} is month of maturity date, D_{mat} is day of maturity date,
 Y_{val} is year of valuation date, M_{val} is month of valuation date, D_{val} is day of valuation date.

Actual/Actual:

$$TtM = \frac{n_N}{365} + \frac{n_L}{366},$$

where: n_N is number of days between valuation date and maturity in a normal year,
 n_L is number of days between valuation date and maturity in a leap year.

Actual/360:

$$TtM = \frac{n}{360},$$

where: n is number of days between valuation date and maturity.

Actual/365:

$$TtM = \frac{n}{365},$$

where n is number of days between valuation date and maturity.

30E/360:

$$TtM = \frac{(360 * (Y_{mat} - Y_{val}) + 30 * (M_{mat} - M_{val}) + \min(D_{mat}, 30) - \min(D_{val}, 30))}{360},$$

where

Y_{mat} is year of maturity date, M_{mat} is month of maturity date, D_{mat} is day of maturity date,
 Y_{val} is year of valuation date, M_{val} is month of valuation date, D_{val} is day of valuation date.

9.1 FIXED BONDS

Dirty Market Value Calculated (DMV)

The dirty market price of a bond is the present value of all expected future interest and principal payments of the bond discounted at the bond's redemption yield. That relationship defines the redemption yield on the bond, which represents the current market interest rate for bonds plus spread.

$$DMV_t = \sum_{t=1}^n \frac{CF_t}{\prod_{i=1}^t (1 + f_{i,1})^{1/12}}$$

where CF_t is monthly cash flow (coupon + nominal value) in the month t ,
 $f_{t,1}$ is annualized forward rate between term t and $t + 1$,
 n is number of periods,
 t is time.

Accrued Interest (AI)

Accrued Interest is the interest that has accumulated since the principal investment or since the previous interest payment if there has been one already. Accrued income is an income which has been accumulated or accrued irrespective to actual Receipt, which means event occurred but cash not yet received.

The function "ACCRINT" from MS Excel is used for calculation. The formula is:

For coupon rate $C_t > 0$:

$$AI_t = NV \cdot \frac{C}{freq} \cdot \sum_{i=1}^{NC} \frac{A_i}{NL_i}$$

For coupon rate $C_t = 0$:

$$AI_t = 0,$$

where NV is nominal value,
 C is coupon, rate (p.a.),
 $freq$ is frequency,
 A_i is number of accrued days for the i th quasi-coupon period within odd period,
 NC is number of quasi-coupon periods that fit in odd period. If this number contains a fraction, raise it to the next whole number,
 NL_i is normal length in days of the i th quasi-coupon period within odd period,

t is time.

Clean Market Value Calculated (CMV)

$$CMV_t = DMV_t - AI_t$$

Dirty Amortized Price (AP)

Present value of future cash flows (coupons and paid the face value) with a purchased Yield to maturity. Purchased YtM is entered in Model Point file.

$$AP_t = AP_t^{clean} + AI_t$$

AP at the end of the month equals to AP at the beginning of the next month.

Clean Amortized Price (AP^{clean})

Amortized price (AP^{clean}) is calculated using function from MS Excel "PRICE". The formula is:

$$AP_t^{clean} = F * \sum_{t=1}^n \frac{\frac{C_t}{freq}}{\left(1 + \frac{YtM_{PD}}{freq}\right)^{t - \frac{a}{R}}} + \frac{1}{\left(1 + \frac{YtM_{PD}}{freq}\right)^{n - \frac{a}{R}}} - F \cdot \frac{C_t}{freq} \cdot \frac{a}{R}$$

where

C_t is coupon rate (p. a.),

F is face value,

YtM_{PD} is annual yield to maturity at purchase date,

$freq$ is number of coupon payments per year,

n is number of coupons payable between valuation date and maturity date,

a is number of days from the beginning of the coupon period to the valuation date,

R is number of days in coupon period in which the settlement date falls,

t is time.

AP^{clean} at the end of the month equals to AP^{clean} at the beginning of the next month.

FX Differences

$$FX\ Differences_t = (FX\ rate_t - FX\ rate_{t-1}) \cdot Face\ Value_t$$

Appraisal Differences

Appraisal differences are calculated as:

$$Appraisal\ differences_t = CMV_t - AP_t^{clean}$$

Unrealized Capital Gains/Losses Booked (UCGL)

Calculation depends on accounting classification:

FVTPL (Fair Value Through P&L): $UCGL_t = 0$

AFS (Available for Sale): $UCGL_t = Appraisal\ differences_t$

HTM (Held to Maturity): $UCGL_t = 0$

LAR (Loans and Receivables): $UCGL_t = 0$

HFT (Held for Trading): $UCGL_t = 0$

HEDGE (Hedge Accounting (HA)): $UCGL_t = Appraisal\ differences_t$

Modified Duration (MD)

Modified duration is a formula that expresses the measurable change in the market value of a security in response to a change in interest rates. The definition is:

For coupon rate $C_t > 0$

$$MD_t = -\frac{dDMV}{di} = -\frac{DMV(YC + \Delta i) - DMV(YC - \Delta i)}{DMV(YC)} \cdot \frac{1 + \Delta i}{2\Delta i},$$

where $DMV(YC + \Delta i)$ is dirty market value calculated using yield curve shifted $+\Delta i$,
 $DMV(YC - \Delta i)$ is dirty market value calculated using yield curve shifted $-\Delta i$,
 Δi is equal 0,0001.

For coupon rate $C_t = 0$

$$MD_t = \frac{TtM_t}{1 + \frac{YtM}{freq}}$$

where $freq$ is number of coupon payments per year,
 YtM is the bond's yield to maturity,
 TtM is time to maturity,
 t is time.

Income Cash Flow

Coupon is specified in a model point as an annual rate of investment income. Coupon remains constant throughout the life of the bond.

For zero-coupon bonds the coupon is zero.

Face Value Cash Flow

For each month program calculates value of paid face value during this month. It should be zero for all month except the month when the security expires.

Realization of FX Differences

For each month program calculates value of FX Differences during this month. It should be zero for all month except the month when the security expires.

9.2 FLOATING BONDS

Dirty Market Value Calculated (DMV)

The dirty market price of a bond is the present value of all expected future interest and principal payments of the bond discounted at the bond's redemption yield. That relationship defines the redemption yield on the bond, which represents the current market interest rate for bonds plus spread.

$$DMV_t = \sum_{t=1}^n \frac{CF_t}{\prod_{i=1}^t (1 + f_{i,1})^{1/12}},$$

where CF_t is monthly cash flow (coupon + nominal value) in the month t ,

$f_{t,1}$ is annualized forward rate between term t and $t + 1$,
 n is number of periods,
 t is time.

Accrued Interest (AI)

Accrued Interest is the interest that has accumulated since the principal investment or since the previous interest payment if there has been one already. Accrued income is an income which has been accumulated or accrued irrespective to actual Receipt, which means event occurred but cash not yet received.

The function “ACCRINT” from MS Excel is used for calculation. The formula is:

For coupon rate $C_t > 0$:

$$AI_t = NV \cdot \frac{C}{freq} \cdot \sum_{i=1}^{NC} \frac{A_i}{NL_i}$$

For coupon rate $C_t = 0$:

$$AI_t = 0,$$

where NV is nominal value,
 C is coupon, rate (p.a.),
 $freq$ is frequency,
 A_i is number of accrued days for the i th quasi-coupon period within odd period,
 NC is number of quasi-coupon periods that fit in odd period. If this number contains a fraction, raise it to the next whole number,
 NL_i is normal length in days of the i th quasi-coupon period within odd period,
 t is time.

Clean Market Value Calculated (CMV)

$$CMV_t = DMV_t - AI_t$$

Dirty Amortized Price (AP)

Present value of future cash flows (coupons and paid the face value) with a purchased Yield to maturity. Purchased YtM is entered in model point.

$$AP_t = AP_t^{clean} + AI_t$$

AP at the end of the month equals to AP at the beginning of the next month.

Clean Amortized Price (AP^{clean})

Linear amortization of initial amortized value – it is calculated as straight line from initial amortized value to redemption.

AP^{clean} at the end of the month equals to AP^{clean} at the beginning of the next month.

FX Differences

$$FX\ Differences_t = (FX\ rate_t - FX\ rate_{t-1}) \cdot Face\ Value_t$$

Appraisal Differences

Appraisal differences are calculated as:

$$Appraisal\ differences_t = CMV_t - AP_t^{clean}$$

Unrealized Capital Gains/Losses Booked (UCGL)

Calculation depends on accounting classification:

FVTPL (Fair Value Through P&L):	$UCGL_t = 0$
AFS (Available for Sale):	$UCGL_t = Appraisal\ differences_t$
HTM (Held to Maturity):	$UCGL_t = 0$
LAR (Loans and Receivables):	$UCGL_t = 0$
HFT (Held for Trading):	$UCGL_t = 0$
HEDGE (Hedge Accounting (HA)):	$UCGL_t = Appraisal\ differences_t$

Modified Duration (MD)

Modified duration is a formula that expresses the measurable change in the market value of a security in response to a change in interest rates. The definition is:

For coupon rate $C_t > 0$

$$MD_t = -\frac{dDMV}{di} = -\frac{DMV(YC + \Delta i) - DMV(YC - \Delta i)}{DMV(YC)} \cdot \frac{1 + \Delta i}{2 \cdot \Delta i},$$

where $DMV(YC + \Delta i)$ is dirty market value calculated using yield curve shifted $+\Delta i$,
 $DMV(YC - \Delta i)$ is dirty market value calculated using yield curve shifted $-\Delta i$,
 Δi is equal 0,0001.

For coupon rate $C_t = 0$

$$MD_t = \frac{TtM_t}{1 + \frac{YtM}{freq}}$$

Where $freq$ is number of coupon payments per year,
 YtM is the bond's yield to maturity,
 TtM is time to maturity,
 t is time.

Income Cash Flow

First coupon is specified in a Model Point as an annual rate of investment income.

Amount of the coupon is taken from the forward curve valid at the start date. If coupon frequency is less than 1 year, then the amount is equal to

$$CF_t = \left(\prod_{i=1}^k (1 + f_{i,1}) \right)^{freq/12} - 1 + Coupon\ spread,$$

where $k = 12/freq$,

$Coupon\ spread$ is in model point, only float,
 $f_{t,1}$ is annualized forward rate between term t and $t+1$,
 $freq$ is frequency,
 t is time.

Coupons are calculate at the start of the projection before calculation of spread and are the same for all projected months.

Face Value Cash Flow

For each month program calculates value of paid face value during this month. It should be zero for all month except the month when the security expires.

Realization of FX Differences

For each month program calculates value of FX Differences during this month. It should be zero for all month except the month when the security expires.

9.3 CASH (TREASURY BILLS, CURRENT ACCOUNT, SAVING ACCOUNT, DEPOSIT)

Dirty Market Value Calculated (DMV)

$$DMV_t = CMV_t + AI_t$$

Accrued Interest (AI)

Accrued Interest is the interest that has accumulated since the principal investment or since the previous interest payment if there has been one already. Accrued income is an income which has been accumulated or accrued irrespective to actual receipt, which means event occurred but cash not yet received.

The function "ACCRINT" from MS Excel is used for calculation.

Clean Market Value Calculated (CMV)

Initial Clean Market Value (*Clean Market Price on Valuation Date*) entered at the model point.

For Current account, Saving account and deposit:

$$CMV_t = CMV_{t-1} + CF_t.$$

For Treasury bills:

$$CMV_t = CMV_{t-1},$$

where CMV_0 is Clean Market Price on Valuation Date (from model point).

Dirty Amortized Price (AP)

$$AP_t = DMV_t$$

Clean Amortized Price (AP^{clean})

$$AP_t^{clean} = AP_t - AI_t$$

FX Differences

$$FX\ Differences_t = (FX\ rate_t - FX\ rate_{t-1}) \cdot Face\ Value_t$$

Appraisal Differences

Appraisal differences are calculated as:

$$Appraisal\ differences_t = CMV_t - AP_t^{clean}$$

Unrealized Capital Gains/Losses Booked (UCGL)

Calculation depends on accounting classification:

FVTPL (Fair Value Through P&L): $UCGL_t = 0$

AFS (Available for Sale): $UCGL_t = Appraisal\ differences_t$

HTM (Held to Maturity):	$UCGL_t = 0$
LAR (Loans and Receivables):	$UCGL_t = 0$
HFT (Held for Trading):	$UCGL_t = 0$
HEDGE (Hedge Accounting (HA)):	$UCGL_t = Appraisal\ differences_t$

Modified Duration (MD)

Modified duration is not calculated.

Income Cash Flow

There are two possibilities to enter investment income. There is identifier that decides if investment income is fixed rate (and is defined in model point) or variable rate (and sourced from special table). In the case of variable rate, investment income is specified by month in the model point

Face Value Cash Flow

For each month program calculates value of paid face value during this month. It should be zero for all month except the month when the security expires.

Realization of FX Differences

For each month program calculates value of FX Differences during this month. It should be zero for all month except the month when the security expires.

9.4 INTEREST RATE SWAPS (IRS)

IRS is modelled so that receive leg and pay leg are modelled separately. Each leg is modelled like a fixed or float bond (according to the character of the leg). Pay leg is with negative sign. Outputs for the whole IRS are obtained by adding both legs.

9.5 EQUITY

Market Value (variable Dirty Market Value (DMV) = Clean Market Value (CMV))

$$DMV_t = MV_{t-1} \cdot (1 + growth_t)^{\frac{1}{12}},$$

where

$$growth_t = \frac{1 + return_t}{1 + dividend_t} - 1,$$

MV_0 = Clean Market Price on Valuation Date (from input)

Accrued Interest (AI)

$$AI_t = 0$$

Dirty Amortized Price (AP)

$$AP_t = 0$$

Clean Amortized Price (AP^{clean})

$$AP_t^{clean} = 0$$

FX Differences

$$FX\ Differences_t = (FX\ rate_t - FX\ rate_{t-1}) \cdot Face\ Value_t$$

Appraisal Differences

Appraisal differences are calculated as:

$$Appraisal\ differences_t = CMV_t - AP_t^{clean}$$

Unrealized Capital Gains/Losses Booked (UCGL)

Calculation depends on accounting classification:

FVTPL (Fair Value Through P&L):	$UCGL_t = 0$
AFS (Available for Sale):	$UCGL_t = Appraisal\ differences_t$
HTM (Held to Maturity):	$UCGL_t = 0$
LAR (Loans and Receivables):	$UCGL_t = 0$
HFT (Held for Trading):	$UCGL_t = 0$
HEDGE (Hedge Accounting (HA)):	$UCGL_t = Appraisal\ differences_t$

Modified Duration (MD)

Modified duration is not calculated.

Income Cash Flow

There are two possibilities to enter investment income. There is identifier that decides if investment income is fixed rate (and is defined in model point) or variable rate (and sourced from special table). In the case of variable rate, investment income is specified by month in the model point

Face Value Cash Flow

For each month program calculates value of paid face value during this month. It should be zero for all month except the month when the security expires.

Realization of FX Differences

For each month program calculates value of FX Differences during this month. It should be zero for all month except the month when the security expires.

9.6 VARIABLE – CHANGE AND OTHER

Change of Dirty Market Value (ΔDMV)

Change of DMV (ΔDMV) is calculated as:

$$\Delta DMV_t = DMV_t - DMV_{t-1},$$

where DMV_t is dirty market value valid at the end of the month m ,
 DMV_{t-1} is dirty market value valid at the end of the previous month.

Change of Accrued Interest (ΔAI)

Change of *AI* (ΔAI) is calculated as:

$$\Delta AI = AI_t - AI_{t-1},$$

where AI_t is accrued interest valid at the end of the month m ,

AI_{t-1} is accrued interest valid at the end of the previous month.

Change of Clean Market Value (ΔCMV)

Change of *CMV* (ΔCMV) is calculated as:

$$\Delta CMV_t = CMV_t - CMV_{t-1},$$

where CMV_t is clean market value valid at the end of the month m ,

CMV_{t-1} is clean market value valid at the end of the previous month.

Change of Dirty Amortized Price (ΔAP)

Change of *AP* (ΔAP) is calculated as:

$$\Delta AP_t = AP_t - AP_{t-1},$$

where AP_t is dirty amortized price valid at the end of the month m ,

AP_{t-1} is dirty amortized price valid at the end of the previous month.

Change of Clean Amortized Price (ΔAP^{clean})

Change of *AP* (ΔAP^{clean}) is calculated as:

$$\Delta AP_t^{clean} = AP_t^{clean} - AP_{t-1}^{clean},$$

where AP_t^{clean} is clean amortized price valid at the end of the month m ,

AP_{t-1}^{clean} is clean amortized price valid at the end of the previous month.

Change of FX Differences

Change of *FX Diff* ($\Delta FX Diff$) is calculated as:

$$\Delta FX Diff_t = FX Diff_t - FX Diff_{t-1},$$

where $FX Diff_t$ is FX differences valid at the end of the month m ,

$FX Diff_{t-1}$ is FX differences valid at the end of the previous month.

Change of Appraisal Differences

Change of *App Diff* ($\Delta App Diff$) is calculated as:

$$\Delta App Diff_t = App Diff_t - App Diff_{t-1},$$

where $App Diff_t$ is appraisal differences valid at the end of the month m ,

$App Diff_{t-1}$ is appraisal differences valid at the end of the previous month.

Change of Unrealized Capital Gains/Losses Booked

Change of *UCGL Booked* ($\Delta UCGL Booked$) is calculated as:

$$\Delta UCGL Booked_t = UCGL Booked_t - UCGL Booked_{t-1},$$

where $UCGL Booked_t$ is UCGL booked valid at the end of the month m ,

$UCGL Booked_{t-1}$ is UCGL booked valid at the end of the previous month.

Interest income without FX Differences

$$Interest\ income_t = \Delta AI_t + CF_t - \Delta AP_t^{clean}$$

P&L without FX Differences

Calculation depends on accounting classification:

FVTPL (Fair Value Through P&L): $P\&L_t = \Delta CMV_t + CF_t$

AFS (Available for Sale): $P\&L_t = Interest\ income_t$

HTM (Held to Maturity): $P\&L_t = Interest\ income_t$

LAR (Loans and Receivables): $P\&L_t = Interest\ income_t$

HFT (Held for Trading):

$$P\&L_t = \Delta CMV_t + CF_t$$

HEDGE (Hedge Accounting (HA)):

$$P\&L_t = \textit{Interest income}_t$$

10 LITERATURE

- [1] CIPRA, Tomáš. *Finanční a pojistné vzorce*. Praha: Grada Publishing, a. s., 2006. ISBN 80-247-1633-X.