

Programming Exercise

About TPTs

Since January 2016, EU-based insurance companies are obliged to report their asset and liability risks on a quarterly basis to regulators. According to the look-through principle propagated by Solvency II, numerous attributes and risk figures of constituents of collective investments need to be reported.

To support clients affected by Solvency II, the French, German and UK fund associations created a so-called Tripartite reporting template, widely accepted by market participants. Read more [here](#).

Task Description

SolvencyAnalytics provides Solvency II reports in TPT format. Find attached to this Programming Exercise the following files:

- **TPT Report description and definition:** 20160914-tptversion4.xls
- **Sample SolvencyAnalytics TPT Report:** Sample TPT V3 Report.xlsx

The tasks below are related to the data in the Sample SolvencyAnalytics TPT Report. Please provide your assumptions and description of the method you used to solve the below tasks preferably always using Python.

Task 1

Total net asset calculation

- a) The following columns of the report were deleted:

5_Portfolio-TotalNetAssets

8b_Portfolio-ShareClass-TotalNumberOfShares

Calculate the missing values.

Hint: Portfolio level results are usually the same for every holding in the portfolio

- b) Calculate the total portfolio value in CHF. Try to be as consistent as possible.

Task 2

Filtering cash positions

- a) What is the total value of the cash items in USD?
b) What is the currency distribution in the portfolio in percentage?
c) Please also fill the **9_Portfolio-CashPercentage** column!

Hint: Cash positions can be identified by their CIC code: XT71

Task 3

Ordering by date

- a) Create a list of the position id's (**14_Position-InstrumentCode-Code**) which is in descending order by maturity (**39_Position-IntRateInst-Redemption-MaturityDate**). If the maturity data is not filled, the position should be disregarded. Please list the first 10 elements.

- b) Create a list of the position id's (**14_Position-InstrumentCode-Code**) which is ordered by the following rule:

- 1) Suppose that we would like to compare date A and B. If the A's year value is larger than B's year value, then A is larger.

2016.11.30 < 2017.10.14

- 2) If the first rule does not apply, then if A's month value is smaller than B's month value, then A is larger.

2017.10.10 > 2017.11.14

- 3) If any of the previous rules does not apply then if A's day value is larger than B's day value, then A is larger.

2017.11.10 < 2017.11.14

If the maturity data is not filled, the position should be disregarded. Please add the last 10 elements of the list!

Task 4

Descriptive analysis

Please do a descriptive analysis on the following columns:

- **97_Position-ContributionToSCR-MktIntUp**
- **98_Position-ContributionToSCR-MktIntDown**

The analysis should contain the following:

- Mean
- Median
- Percentiles (5, 10, 25, 75, 90, 95)
- Standard deviation

Please note that the position SCR values cannot be compared directly. Try to transform the values first to percentage of the position value.

Task 5

Excel output

Fill the columns that has been determined in 1a) and 2c), and create an excel file with the missing data inserted.

Tips

- Install PyCharm IDE for a user-friendly development environment
- Anaconda is a Python version that contains the most popular Python modules. You are free to use any module to solve the problems. Here is a list of useful python packages we recommend to use for the sake of this Programming Exercise:
 - **Pandas** provides useful data structures and data handling functions. Pandas dataframe data type is very useful for reading, writing and manipulating excel files.
 - **Datetime** is a package for date manipulation.
 - **Numpy** is a scientific computing package, that efficiently handles vectors and arrays.