

# J:r JSON risk portfolio pricing app

Tutorial: valuation and stress testing



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# Introduction



Dr. Tilman Wolff-Siemssen  
Risk Management | Consulting

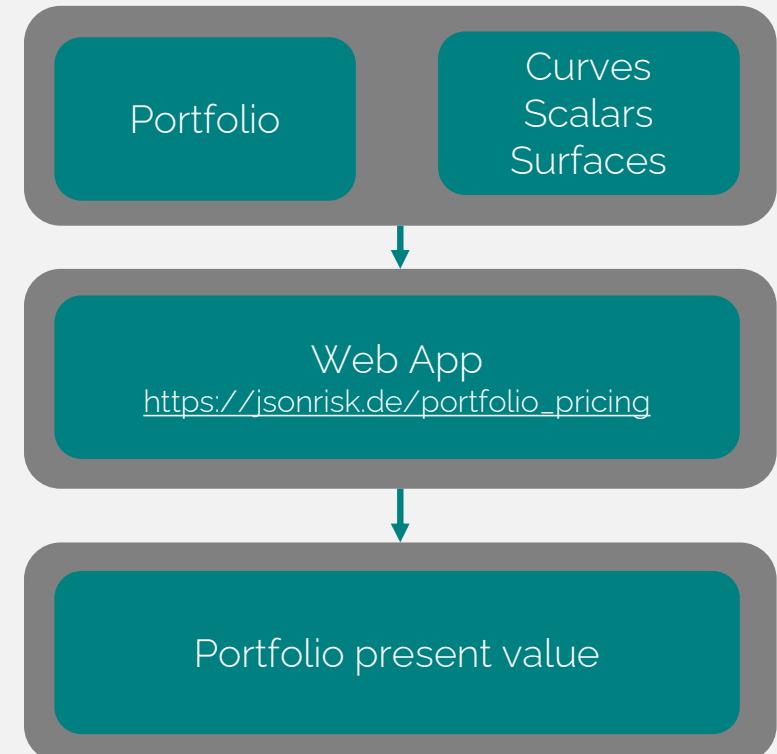
# JSON risk portfolio pricing

## Introduction

In a market risk context, EVE stress testing essentially boils down to evaluating a portfolio under different scenarios, i.e., different sets of parameters. Parameters are typically based on market observations like yield curves or fx prices.

JSON risk portfolio pricing supports this in an easy manner.:

1. Prepare csv or json files\* for
  - your portfolio and
  - your parameters (curves, scalars, surfaces).
2. Upload csv or json files, run the calculation and check warnings and errors.
3. Check and export the results .



\*for more information see appendix and [https://jsonrisk.de/o1\\_Documentation.html](https://jsonrisk.de/o1_Documentation.html)

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First look and feel – three tabs

This screenshot shows the 'Portfolio' tab interface. At the top, there are three tabs: 'Portfolio 100' (selected), 'Parameters 10', and 'Results'. Below the tabs, the word 'Portfolio' is displayed. A horizontal row of buttons includes 'Create instrument', 'Import more (csv)', 'Import more (json)', 'Clear', 'Export json', and 'Export csv'. To the right of these buttons is a search bar labeled 'filter portfolio'.

This screenshot shows the 'Parameters' tab interface. At the top, there are three tabs: 'Portfolio 100', 'Parameters 10' (selected), and 'Results'. Below the tabs, the word 'Parameters' is displayed. A horizontal row of buttons includes 'Clear all', 'Clear and load test params', 'Import (json)', and 'Export'. To the right of these buttons is a dropdown menu showing '2020-12-02\_IR\_SENSITIVITIES.json'.

This screenshot shows the 'Results' tab interface. At the top, there are three tabs: 'Portfolio 100', 'Parameters 10', and 'Results' (selected). Below the tabs, the message 'No Results yet.' is displayed, followed by the instruction 'Perform calculations to obtain results.' A horizontal row of buttons at the bottom includes 'Calculate', 'Calculate Lambda', and 'API-key'.

When visiting the website, test portfolio (100 instruments) and test parameters (10 curves, scalars and surfaces) load automatically.

# Portfolio tab



Dr. Tilman Wolff-Siemssen  
Risk Management | Consulting

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## Portfolio (1) – Import a portfolio

1. Press **Clear**.

Portfolio

---

Create instrument Import more (csv) Import more (json) Clear Export json Export csv filter portfolio

2. Press **Import (json)** or **Import (csv)** choose file in file explorer.

No Portfolio present.

Import portfolio from file or load test portfolio.

---

Create instrument Import (csv) Import (json) Load test portfolio

3. The portfolio is displayed in the portfolio tab.

Remark: The page never uploads anything to our servers. All data is stored in the local browser online. Exception: the optional AWS pricing feature.

Actions			Index	ID	Type	Sub portfolio	Notional	Quantity	Market value	Currency	Maturity	Tenor	Fixed rate
<a href="#">View</a> <a href="#">Edit</a> <a href="#">Remove</a>			0	1	bond	bonds	100,000.00		100,000.00	EUR	30.11.2021	1	1.0000%
<a href="#">View</a> <a href="#">Edit</a> <a href="#">Remove</a>			1	2	bond	bonds	100,000.00		100,000.00	USD	30.11.2026	3	1.0000%

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## Portfolio (2) – create, view, edit, delete instruments

1. Press **Create instrument** to add a new instrument to the portfolio.
2. Press **View** to view an existing instrument. The button **Add as new item** allows you to create copies of instruments or similar instruments with modifications.
3. Press **Edit** for changing fields.
4. Press **Remove** to delete an item from the portfolio.

The screenshot shows a user interface for managing a portfolio of financial instruments. At the top, there is a navigation bar with buttons for 'Create instrument', 'Import more (csv)', 'Import more (json)', 'Clear', 'Export json', 'Export csv', and a 'filter portfolio' input field. Below the navigation bar, there is a table with columns for View, Edit, Remove, quantity (0), type (bond), sub\_portfolio (bonds), notional value (100,000.00), market value (100,000.00), currency (EUR), maturity date (30.11.2021), tenor (1), fixed rate (0.01), float current rate (null), and float spread (null). A modal dialog titled 'View and edit' is open, displaying a JSON object representing a new item:

```
{  
  "id": "new_item",  
  "type": "bond",  
  "sub_portfolio": "bonds",  
  "notional": 10000,  
  "quantity": null,  
  "market_value": null,  
  "currency": "EUR",  
  "maturity": "2030-01-01",  
  "tenor": 1,  
  "fixed_rate": 0.01,  
  "float_current_rate": null,  
  "float_spread": null.  
}
```

At the bottom of the modal, there are 'Add as new item' and 'Cancel' buttons.

You can always store a modified portfolio permanently on your disk by using the export functionality.

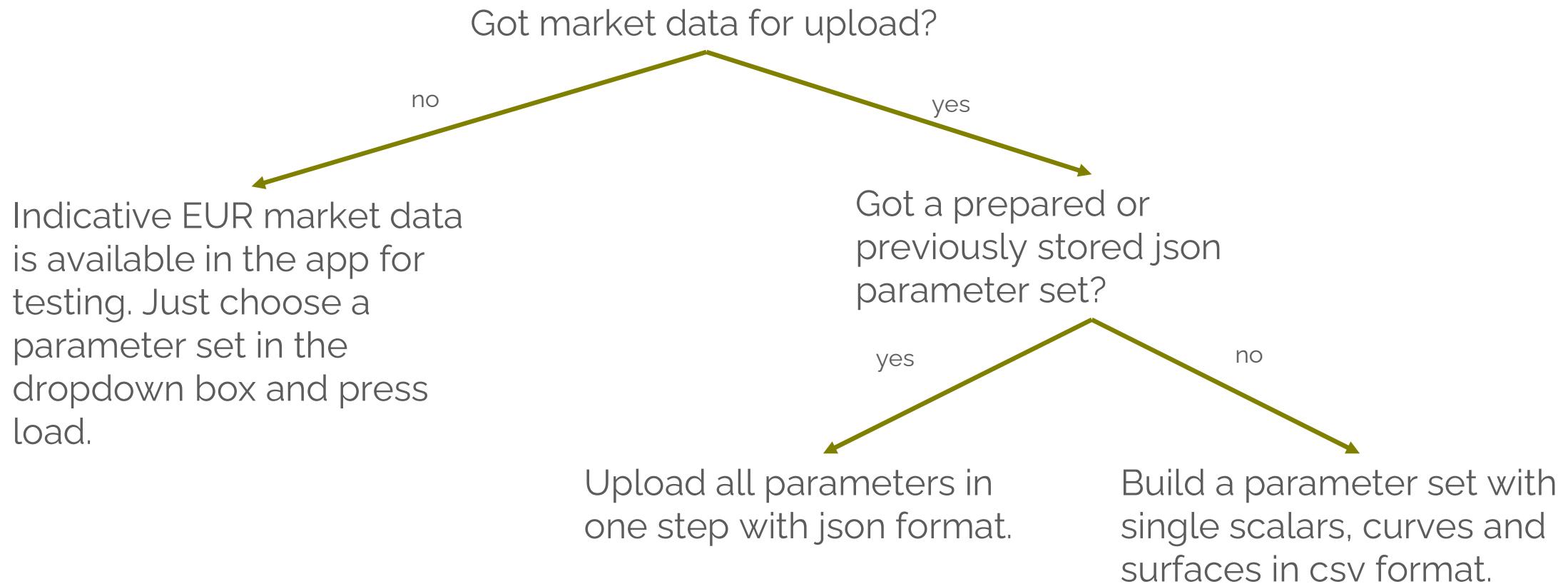
\*the buttons 'create instrument' and 'view' and 'edit' will open a dialog with an editable json representation of the instrument \*\*detailed information how to fill fields is available on [https://jsonrisk.de/01\\_Documentation.html](https://jsonrisk.de/01_Documentation.html)

# Parameters tab



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## Parameters (1)



A description of the csv format for scalars, curves and surfaces is in the appendix.

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## Parameters (2) – uploading csv parameters

1. Press **clear all** and enter a valuation date.

2. Press **Import new** and choose csv file in file explorer. There is a separate button for each of scalars, curves and surfaces. After uploading the parameters are displayed.

Parameters

Clear all Clear and load test params Import (json) Export 2021-01-11\_BCBS368\_SCENARIOS.json

Valuation date 2019-12-31

Scalars Import new Clear all

Name	Type	Scenarios
------	------	-----------

Curves Import new Clear all

Name	Type	Support Points	Scenarios
------	------	----------------	-----------

Surfaces Import new Clear all

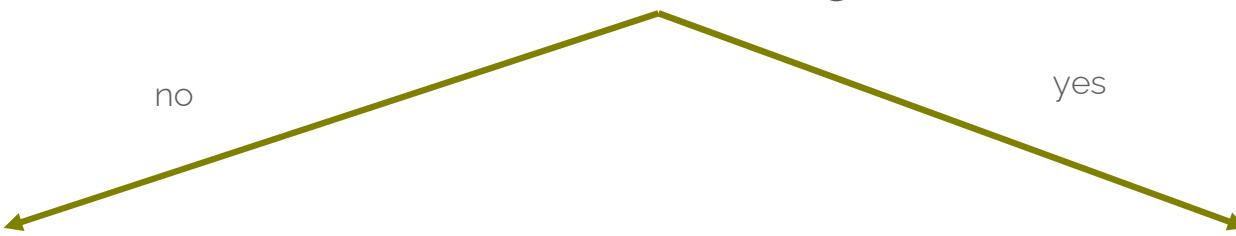
Name	Type	Expires	Terms	Scenarios
------	------	---------	-------	-----------

After uploading all needed scalars, curves and surfaces, we recommend to export the complete parameter set as a json file.

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## Parameter (3) - curve and surface assignment

Built-in automatic curve and surface assignment for an instrument?

- 
- no
- yes
1. Choose the names for discount, forward and spread curves and/or surfaces.
  2. Fill for each instrument in the corresponding portfolio upload file the fields if applicable:
    - disc\_curve,
    - fwd\_curve,
    - spread\_curve,
    - surface.
  3. Make sure that the names for all relevant instruments and curves match.
1. You have to name the parameters according to the name convention below:
    - disc\_curve: instrument.currency + \_OIS\_DISCOUNT\* (e.g. EUR\_OIS\_DISCOUNT),
    - fwd\_curve= instrument.currency + \_ + (instrument.float\_tenor or instrument.tenor) + \_FWD\* (e.g. EUR\_6M\_FWD),
    - spread\_curve: left empty,
    - surface = CONST\_10BP.
  2. Make sure you have all relevant parameters for each instrument.

If a corresponding field in the portfolio upload file is empty for an instrument then the program assigns default parameters automatically, if available.

\* EUR is the default currency \*\* 6M is the default tenor

# Results tab

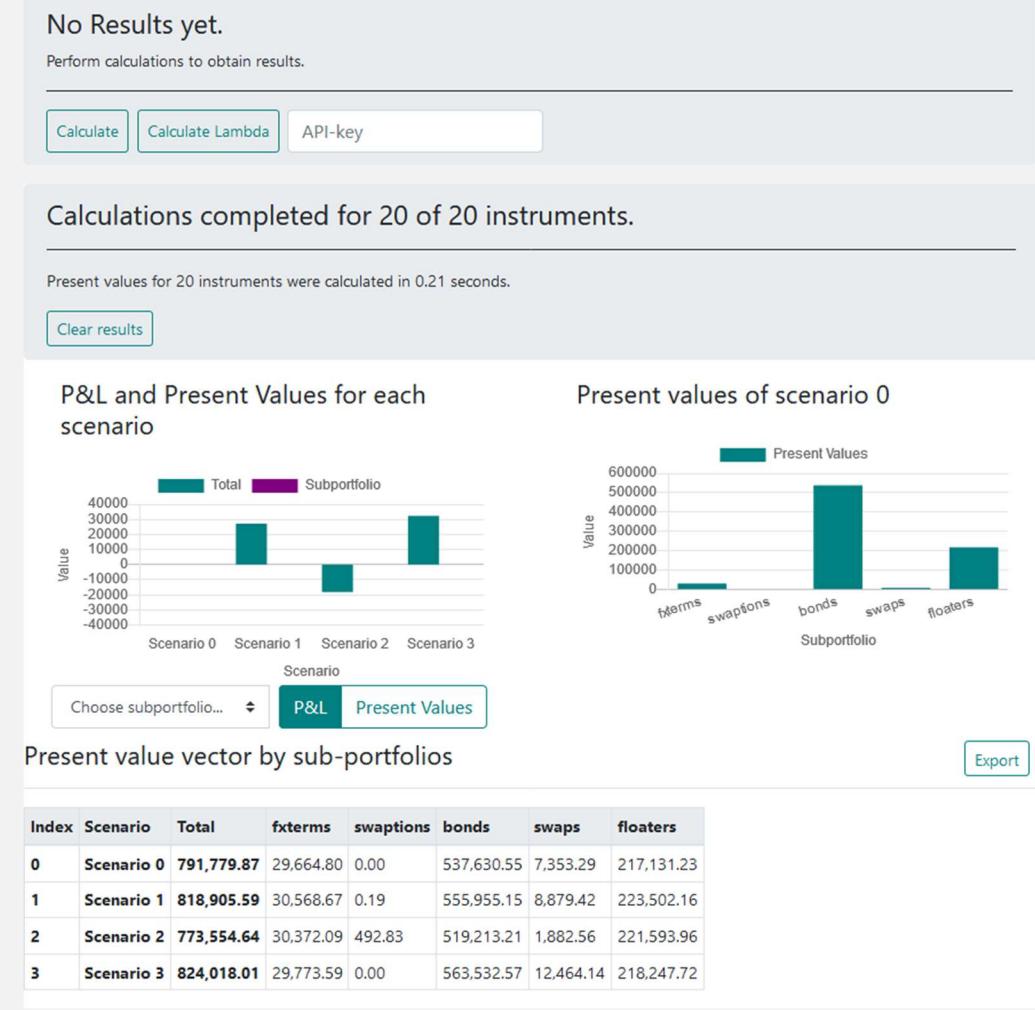


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## Results

1. Press **Calculate** to start the calculation\* and wait for calculations to finish.
2. As soon as calculations complete, the application displays present values in tabular and graphical format.
3. Inspect the boxes with warnings and errors, if any.
4. Press **Export** to store results in csv format.



\*For more details about the buttons calculate lambda and API-key see appendix.

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## Example (1) – successful calculation for test portfolio and test parameters

Calculations completed for 100 of 100 instruments.

Present values for 100 instruments were calculated in 7.81 seconds.

[Clear results](#)

### Warnings 190

Warning on instrument 100: Assigning default surface CONST\_10BP. [repeats 24 times]

Warning on instrument 100: Assigning default forward curve USD\_3M\_FWD. [repeats 3 times]

Warning on instrument 100: Assigning default discount curve USD\_OIS\_DISCOUNT. [repeats 15 times]

Warning on instrument 96: Assigning default forward curve EUR\_3M\_FWD. [repeats 14 times]

Warning on instrument 98: Assigning default discount curve EUR\_OIS\_DISCOUNT. [repeats 85 times]

Warning on instrument 94: Assigning default forward curve EUR\_1M\_FWD. [repeats 10 times]

Warning on instrument 87: Assigning default forward curve EUR\_6M\_FWD. [repeats 39 times]

- Present value were calculated sucessfully for each instrument.
- The warnings box merely informs that default curves and surfaces were assigned automatically.

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Example (2) – calculation fails when there are no parameters for one or more instruments

Calculations completed for 0 of 100 instruments.

Present values for 0 instruments were calculated in 0.11 seconds.

Could not price 100 instruments due to errors. For more details, see errors box below.

[Clear results](#)

Warnings **190**

Warning on instrument 96: Could not find default surface CONST\_10BP in parameters. [repeats 24 times]  
Warning on instrument 96: Could not find default forward curve EUR\_3M\_FWD in parameters. [repeats 14 times]  
Warning on instrument 94: Could not find default forward curve EUR\_1M\_FWD in parameters. [repeats 10 times]  
Warning on instrument 96: Could not find default discount curve EUR\_OIS\_DISCOUNT in parameters. [repeats 85 times]  
Warning on instrument 95: Could not find default forward curve EUR\_6M\_FWD in parameters. [repeats 39 times]  
Warning on instrument 100: Could not find default forward curve USD\_3M\_FWD in parameters. [repeats 3 times]  
Warning on instrument 100: Could not find default discount curve USD\_OIS\_DISCOUNT in parameters. [repeats 15 times]

Errors **100**

Error pricing instrument 96: fixed\_income.present\_value: Must provide discount curve when evaluating interest stream [repeats 90 times]  
Error pricing instrument 87: callable\_fixed\_income.present\_value: must provide forward curve for calibration [repeats 10 times]

IDs with Errors **100**

96, 95, 92, 94, 98, 91, 93, 97, 89, 90, 87, 77, 88, 86, 79, 73, 100, 69, 75, 85, 99, 84, 78, 83, 82, 71, 81, 67, 80, 64, 76, 61, 58, 56, 72, 66, 74, 54, 70, 63, 68, 60, 37, 65, 47, 33, 62, 46, 29, 59, 45, 57, 44, 25, 55, 38, 21, 18, 53, 34, 30, 51, 50, 26, 49, 22, 48, 40, 15, 36, 32, 52, 28, 13, 24, 20, 17, 14, 11, 43, 42, 9, 41, 39, 12, 35, 7, 31, 27, 23, 19, 16, 4, 2, 10, 8, 6, 5, 3, 1

- No instruments were priced.
- Default USD discount curve is missing for 15 instruments in USD.
- Default EUR discount curve is missing for 85 instruments in EUR.
- Default forward curves for different tenors and currencies are missing.
- A volatility surface is needed and none found for 24 instruments.
- As default discount and forward curves as well as surfaces couldn't be assigned, pricing obviously fails for the whole portfolio.

# Appendix



Dr. Tilman Wolff-Siemssen  
Risk Management | Consulting

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## Appendix (1) – parameter examples for multi scenario calculations – csv format\*

### Scalars (4 scenarios)

FX rate scalars represent the value of 1 EUR in the foreign currency.

Multiple scalars per file supported.

### Curve (4 scenarios, 6 terms)

Interest rate curves represent zero coupon rates in the convention Act/365 with annual compounding.

### Surface (4 scenarios, 2 expiries, 5 terms)

Volatility surfaces represent bachelier volatilities in basis points (so-called basis point volatilities).

- Comma, semicolon or tab separated formats supported
- Must use points as decimal separator
- Time labels may be (d)ays, (m)onths or (y)ears, uppercase or lowercase

name,USD,GBP  
Scenario 1,1.31,1.20  
Scenario 2,1.33,1.19  
Scenario 3,1.34,1.22  
Scenario 4,1.35,1.21

Comma separated example

EUR\_OIS\_DISCOUNT;30D;60D;180D;1Y;3Y;5Y  
Scenario 1;-0.00383;-0.00358;-0.00325;-0.00389;-0.00325;-0.00377  
Scenario 2;-0.00388;-0.00378;-0.00370;-0.00378;-0.00381;-0.00390  
Scenario 3;-0.00387;-0.00319;-0.00308;-0.00355;-0.00323;-0.00332  
Scenario 4;-0.00374;-0.00395;-0.00347;-0.00334;-0.00324;-0.00311

Semicolon separated example

SURF	30D	60D	180D	1Y	3Y
3M	0.00300	0.00348	0.00422	0.00435	0.00478
3M	0.00383	0.00422	0.00497	0.00472	0.00481
3M	0.00428	0.00450	0.00523	0.00570	0.00580
3M	0.00451	0.00548	0.00608	0.00666	0.00624
1Y	0.00478	0.00561	0.00627	0.00761	0.00693
1Y	0.00537	0.00580	0.00688	0.00841	0.00734
1Y	0.00566	0.00659	0.00712	0.00867	0.00775
1Y	0.00630	0.00697	0.00781	0.00931	0.00860

Tab separated example

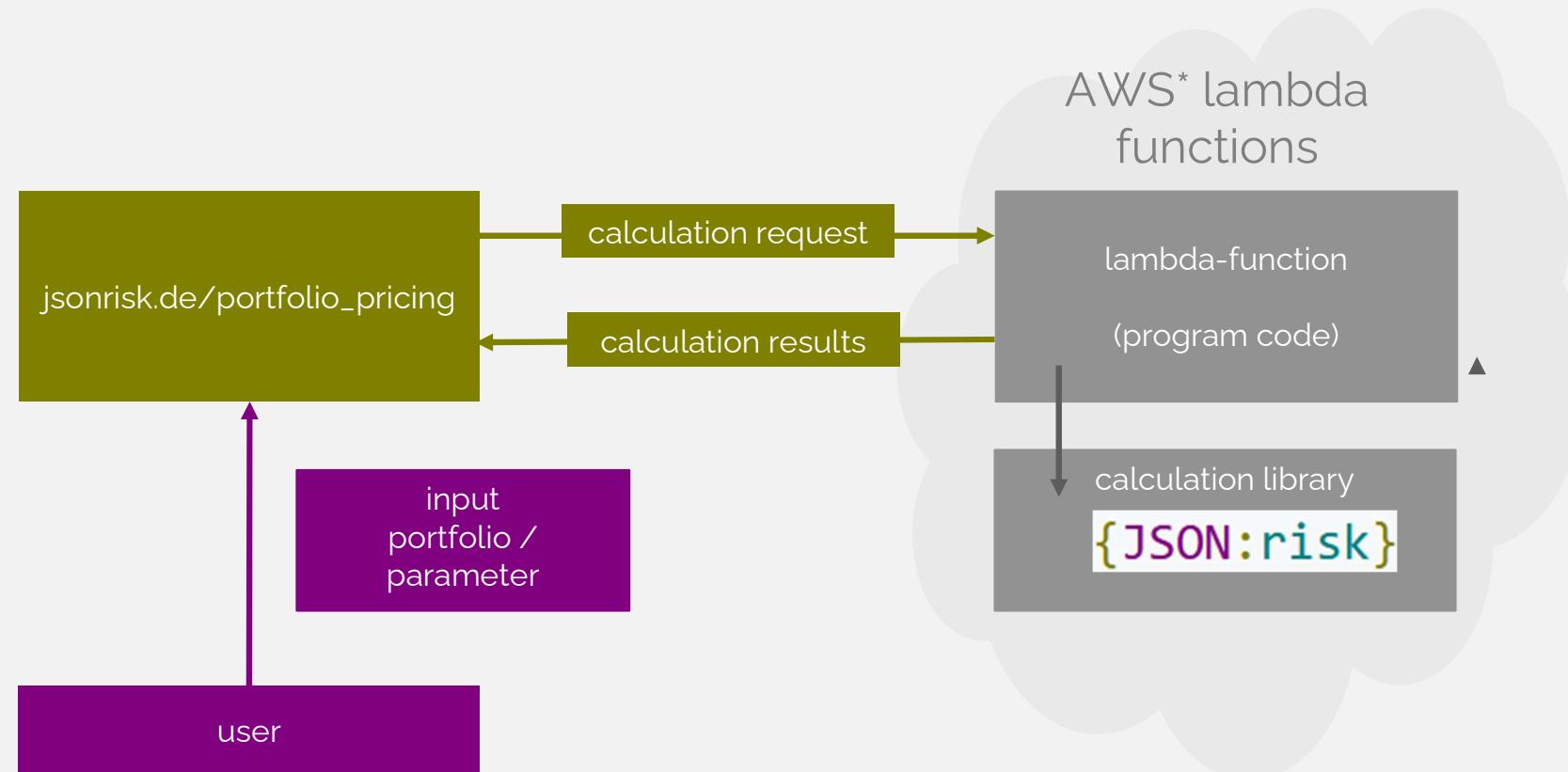
Each parameter in a set must have the same count of scenarios or only one scenario.

\*To get examples for json format, just download a parameter set on the parameters tab.

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## Appendix (2) – calculation with AWS lambda

- Without AWS lambda, all calculations happen in the browser and performance depends on the power of your local machine.
- With AWS lambda, users can leverage the computing power of up to 1,000 computing instances in the cloud.
- Calculation with AWS lambda requires an API key. If you are interested in the AWS lambda calculation feature, feel free to contact us.



Here, the calculation is performed in the cloud and not locally on your computer.

\*amazon web services

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## Appendix (3) – more information

More info on JSON risk instruments, parameters and methodology is available on the documentation site under  
[https://jsonrisk.de/01\\_Documentation.html](https://jsonrisk.de/01_Documentation.html)

- The Instruments guide ([https://jsonrisk.de/01\\_Documentation/01\\_Instruments.html](https://jsonrisk.de/01_Documentation/01_Instruments.html)) summarizes supported instruments and features
- The Instrument fields guide ([https://jsonrisk.de/01\\_Documentation/02\\_Instrument\\_fields.html](https://jsonrisk.de/01_Documentation/02_Instrument_fields.html)) contains a complete list of JSON fields for describing instrument terms and conditions
- The Data types guide ([https://jsonrisk.de/01\\_Documentation/03\\_Data\\_types.html](https://jsonrisk.de/01_Documentation/03_Data_types.html)) explains the data types used in the JSON fields
- The Parameters guide ([https://jsonrisk.de/01\\_Documentation/04\\_Parameters.html](https://jsonrisk.de/01_Documentation/04_Parameters.html)) explains how to represent parameters for valuation, e.g., yield curves and surfaces
- The Schedule generation ([https://jsonrisk.de/01\\_Documentation/05\\_Schedule\\_generation.html](https://jsonrisk.de/01_Documentation/05_Schedule_generation.html)) guide explains how JSON risk generates schedules for interest rate instruments.

# JSON risk portfolio pricing

## Contact



Kerstin Steinberg

Managing Consultant

[kerstin.steinberg@wolffsiemssen.de](mailto:kerstin.steinberg@wolffsiemssen.de)



Dr. Tilman Wolff-Siemssen

Founder

[tws@wolffsiemssen.de](mailto:tws@wolffsiemssen.de)

Dr. Tilman Wolff-Siemssen  
Risk Management | Consulting  
[www.wolffsiemssen.de](http://www.wolffsiemssen.de)



Dr. Tilman Wolff-Siemssen  
Risk Management | Consulting