

Standard Chartered



Enhanced Alpha Analysis

User Guide v1.0



About

The Enhanced Alpha Analysis application seeks to provide useful insights that will help users construct and optimize their portfolios. This document will provide a step-by-step walkthrough for the EAA application. It is important for first time users to read through the user guide for a detailed understanding of the application. For experienced users, you may refer to the [Table of Contents](#) for quick references to the listed sections.

This application will be hosted on Amazon Web Services and can be accessed through the following link:

<http://127.0.0.1:5000/>

Access to the EAA application is strictly limited to personnel authorized by Standard Chartered Portfolio Management Team.

System Requirements

The EAA application supports all desktop devices running Safari Web Browser, Google Chrome or Mozilla Firefox. The application is best viewed on a device with a screen resolution of 1920x1080. It is not advisable to access the application through mobile devices.

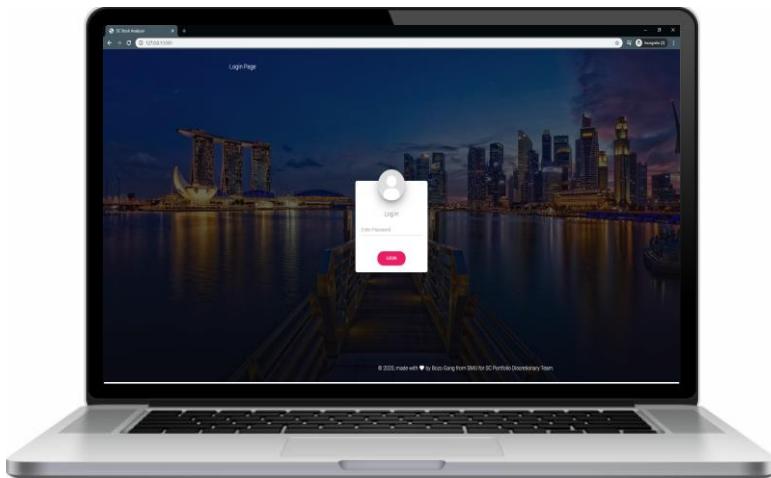


Table of Contents

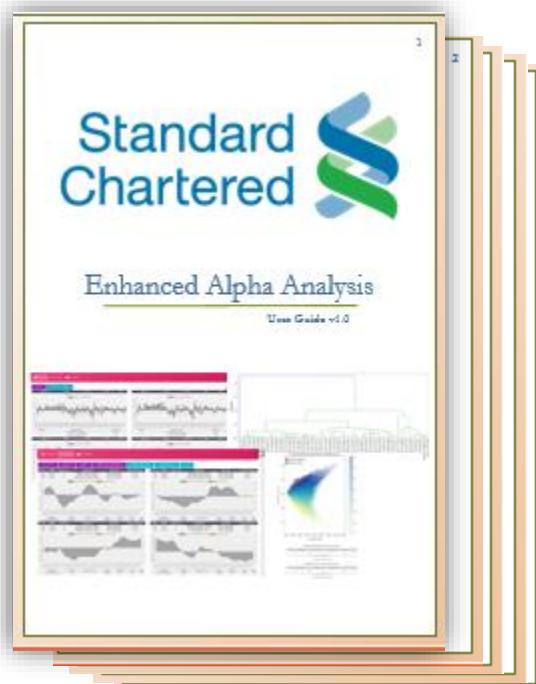
1. Introduction.....	4
i. <u>Scope and Purpose</u>	<u>4</u>
2. Application Features.....	5-29
i. <u>Left Panel Bar</u>	<u>5</u>
ii. <u>Home Page</u>	<u>6-7</u>
iii. <u>Dashboard 1 – Relative Returns Charts.....</u>	<u>8-13</u>
iv. <u>Dashboard 2 – Regression Charts.....</u>	<u>14-20</u>
v. <u>Charting Tools</u>	<u>21-22</u>
vi. <u>Dashboard 3 – Asset Network Diagrams</u>	<u>23-26</u>
vii. <u>Portfolio Optimization</u>	<u>27-29</u>
3. Workflows	30-33
i. <u>Analysis on Relative Returns</u>	<u>30</u>
ii. <u>Drawing Insights from Regression Charts</u>	<u>31</u>
iii. <u>Drawing Insights from Asset Network Diagrams</u>	<u>32</u>
iv. <u>Optimizing Portfolio</u>	<u>33</u>

1. Introduction

i. Scope and Purpose

This application will process and analyze the returns of assets obtained from Bloomberg. To help users in their construction and optimization of portfolios, 3 visual dashboards will be generated according to the input data.

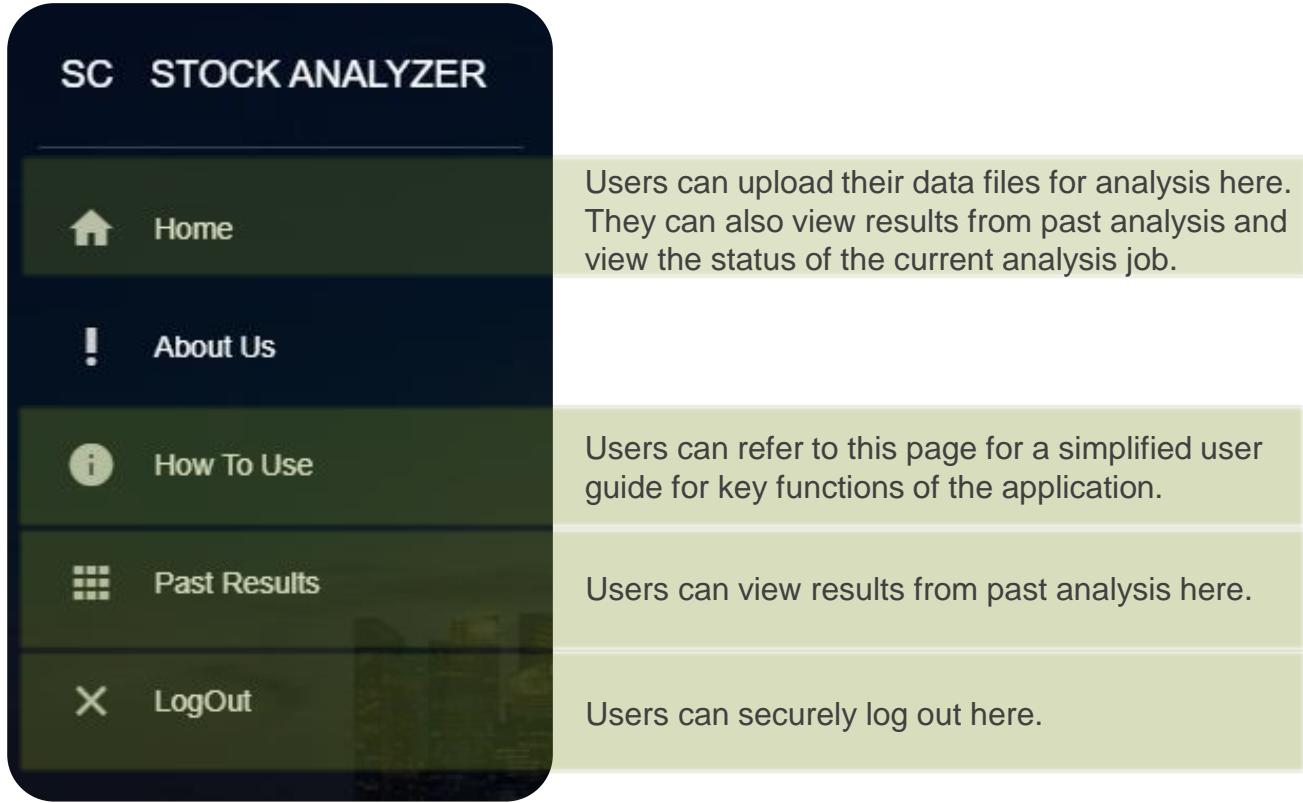
- a) **Relative Returns Charts** will be based off 4 rolling periods. Each chart plots rolling returns of an asset-pair over time for a specified rolling period. These charts help users visualize performances of selected assets over time.
- b) **Regression Charts** will be based off 4 rolling periods. Each chart shows the relationship between the selected asset-pair and indicator. Users can visualize the change in relationships between selected asset-pair and indicators over time according to a specified time period and time lag.
- c) **Asset Network Diagrams** help users cluster similar assets based on user's preferred dendrogram cut. Users can adjust their criteria for clusters. Through our Asset Network Diagrams, users can have a clearer picture of the relationship between assets.
- d) **Portfolio Optimization Tool** serves to help users determine the allocation of funds for assets within their portfolios. Recommended allocations are based on maximum Sharpe ratio and minimum volatility.



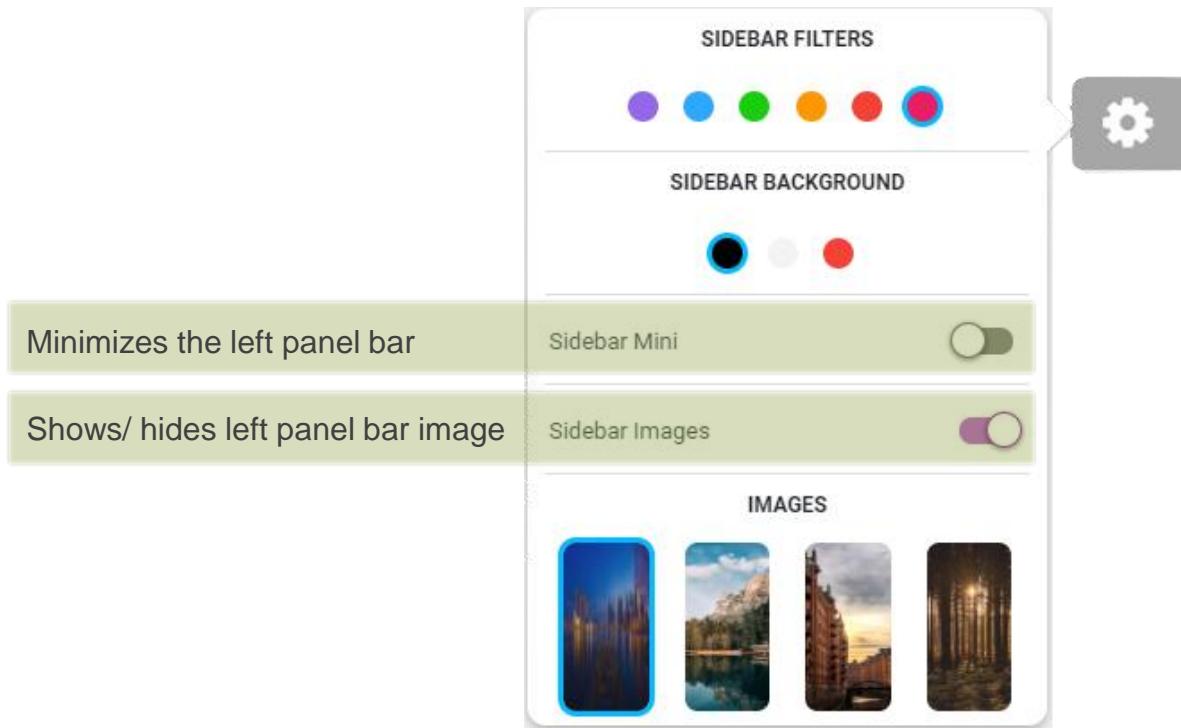
2. Application Features

i. Left Panel Bar

The left panel bar helps users navigate through different pages of the EAA application. This panel bar will be present through all pages of the application.



The option panel lets users change the display of the left panel bar.



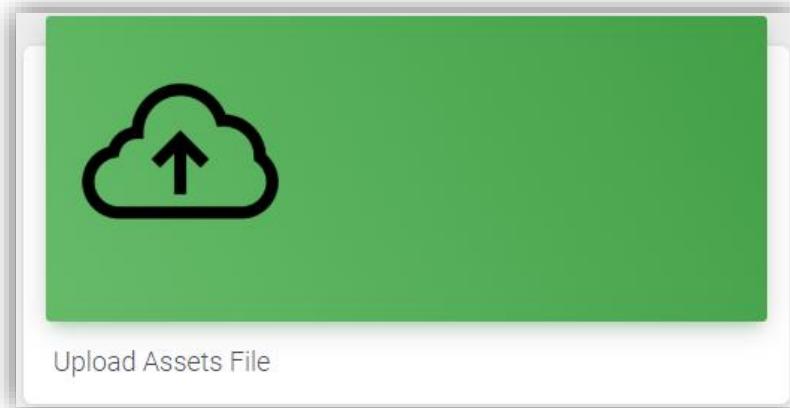
2. Application Features

ii. Home Page

The EAA application requires users to upload data files. Data files are processed on the backend server for the generation of visual dashboards.

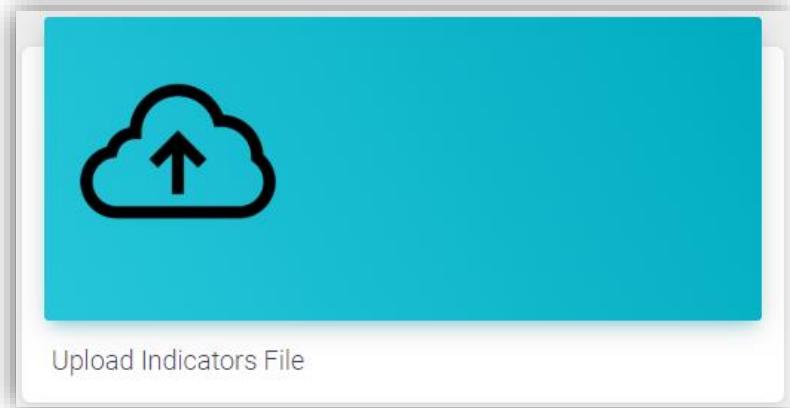
1. Uploading Assets File

Files containing data for **assets** must be uploaded using the **green** button for successful data processing.



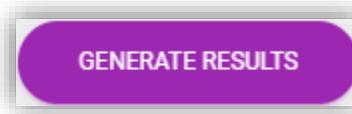
2. Uploading Indicators File

Files containing data for **indicators** must be uploaded using the **blue** button for successful data processing.



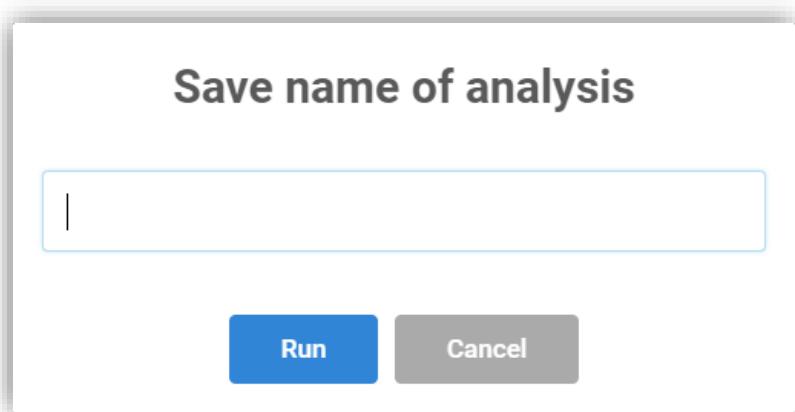
3. Generating Results

Once files have been uploaded, click this button to begin data processing.



4. Saving Name of Analysis

A prompt will appear for users to name their analysis for reference in the future.



2. Application Features

ii. Home Page

Users can also view the 3 most recent analysis that were previously generated. Past results will also be displayed on this page. Users can see the progress of the current analysis task.

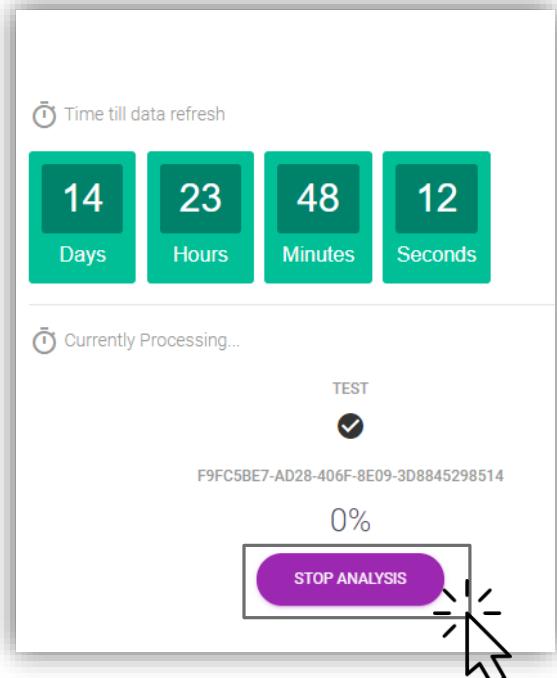
3 Most Recent Analysis

Users can view the 3 most recent analysis by clicking on the analysis name



Progress of Current Analysis

Users can view the progress of the current analysis task here. Clicking the blue button will stop the analysis.

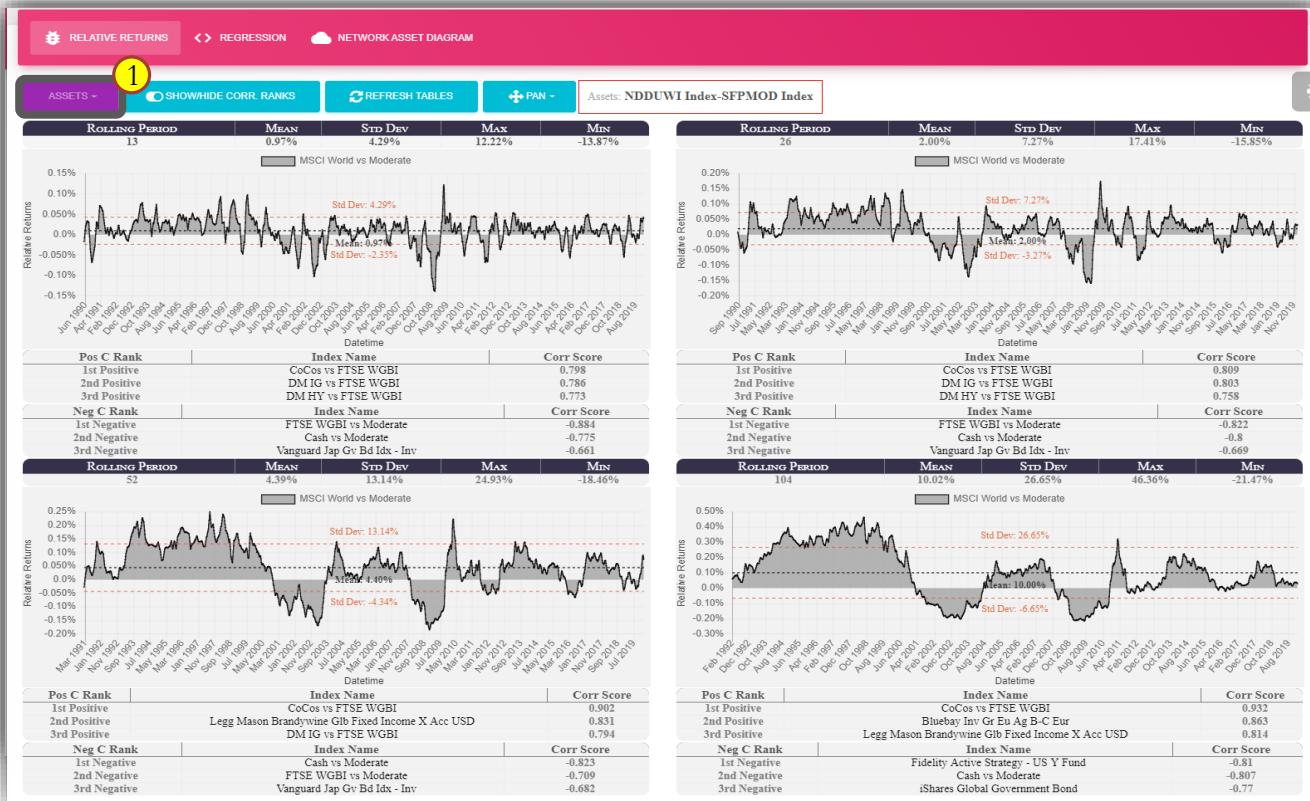


2. Application Features

iii. Dashboard 1 – Relative Returns Charts

The EAA generates 4 charts based on the following rolling periods:
13, 26, 52, 104

These charts plot the rolling returns of selected assets against time.



Users can filter and select assets of their interest by clicking on the blue button

1

ASSETS

Select an Asset

Select an Asset

Users can also filter assets by typing in the name of the asset

FTSE WGBI vs Moderate

DM IG vs FTSE WGBI

DM HY vs FTSE WGBI

EM Bond vs FTSE WGBI

Asia Credit vs FTSE WGBI

Asia HY vs FTSE WGBI

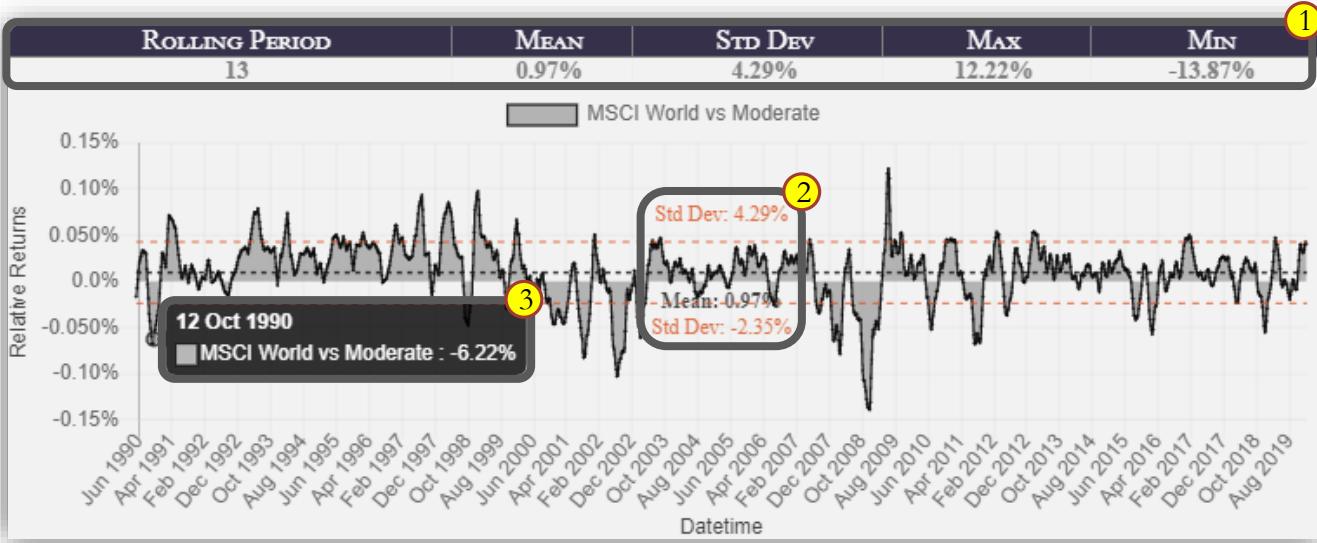
CoCos vs FTSE WGBI

2. Application Features

iii. Dashboard 1 - Relative Returns Charts

Charts are populated based on user's selected asset.

Chart Features



1

A table at the top of every chart will show the current rolling period as well as the mean, standard deviation, maximum and minimum values of the selected asset.

2

For every asset that the user selects, a mean, positive standard deviation and negative standard deviation line will be plotted.

3

Hovering over any points of the chart displays the tooltip, which shows the corresponding date and the value of rolling returns for the selected asset-pair.

2. Application Features

iii. Dashboard 1 - Relative Returns Charts

At the bottom of every chart, two correlation tables will be generated based on the user's selected asset.

Correlation Tables

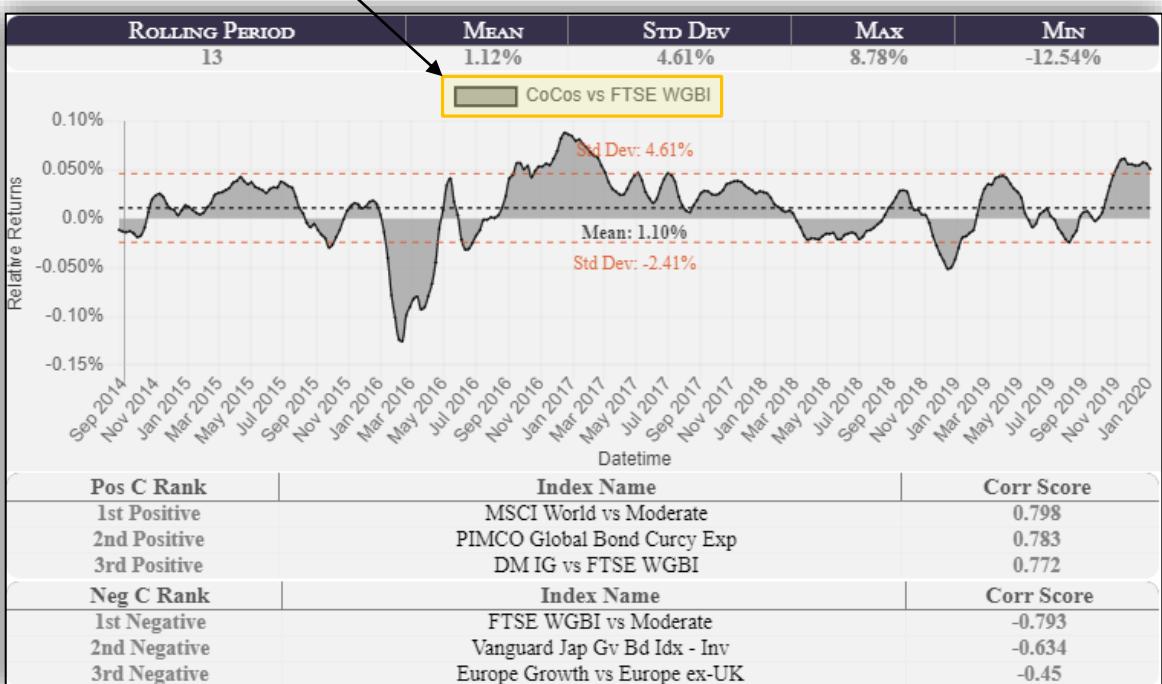
Pos C Rank	Index Name	Corr Score
1st Positive	CoCos vs FTSE WGBI	0.798
2nd Positive	DM IG vs FTSE WGBI	0.786
3rd Positive	DM HY vs FTSE WGBI	0.773
Neg C Rank	Index Name	Corr Score
1st Negative	FTSE WGBI vs Moderate	-0.884
2nd Negative	Cash vs Moderate	-0.775
3rd Negative	Vanguard Jap Gv Bd Idx - Inv	-0.661

1 The first correlation table will show the top 3 assets that are most **positively correlated** to the user's selected asset.

2 The second correlation table will show the top 3 assets that are most **negatively correlated** to the user's selected asset.

CoCos vs FTSE WGBI

Clicking on the names of the top 3 most positive or negative assets will repopulate the charts based on the clicked asset

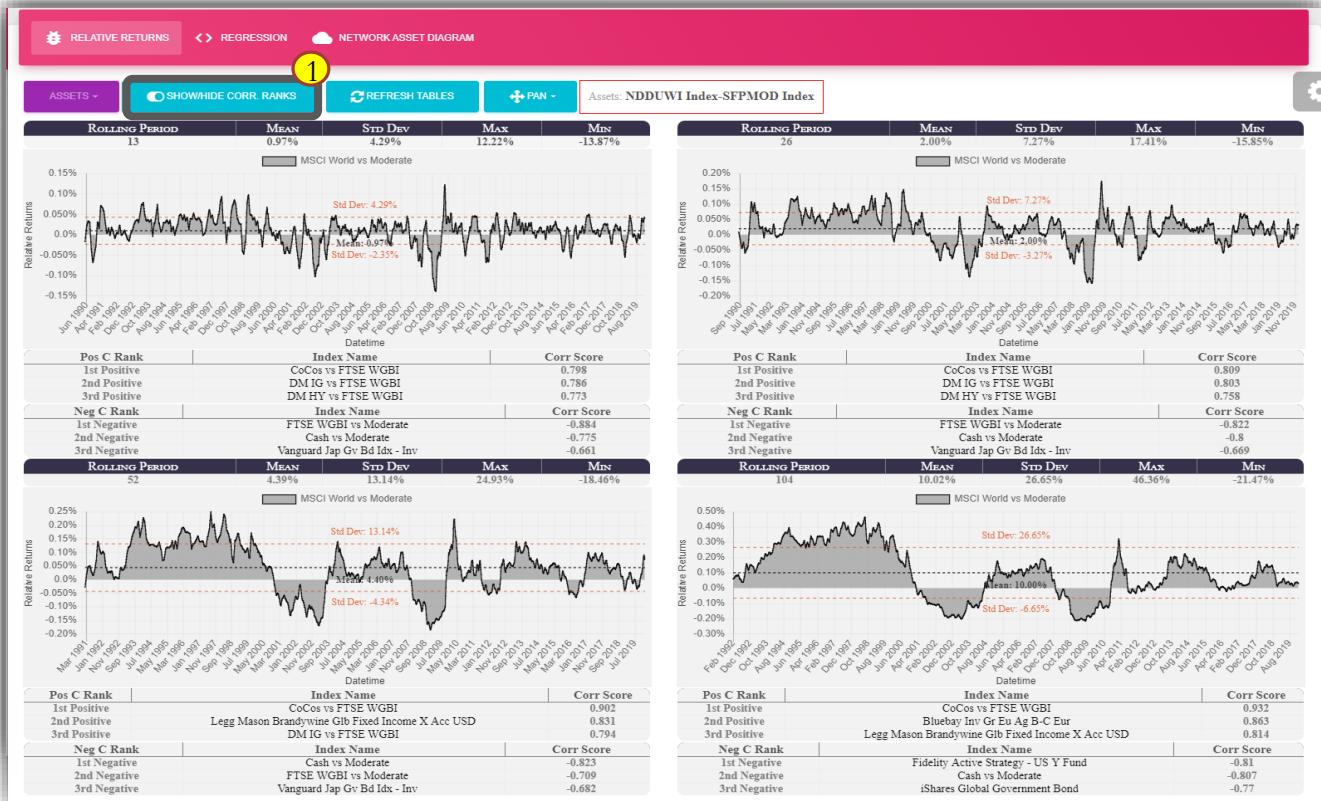


2. Application Features

iii. Dashboard 1 - Relative Returns Charts

11

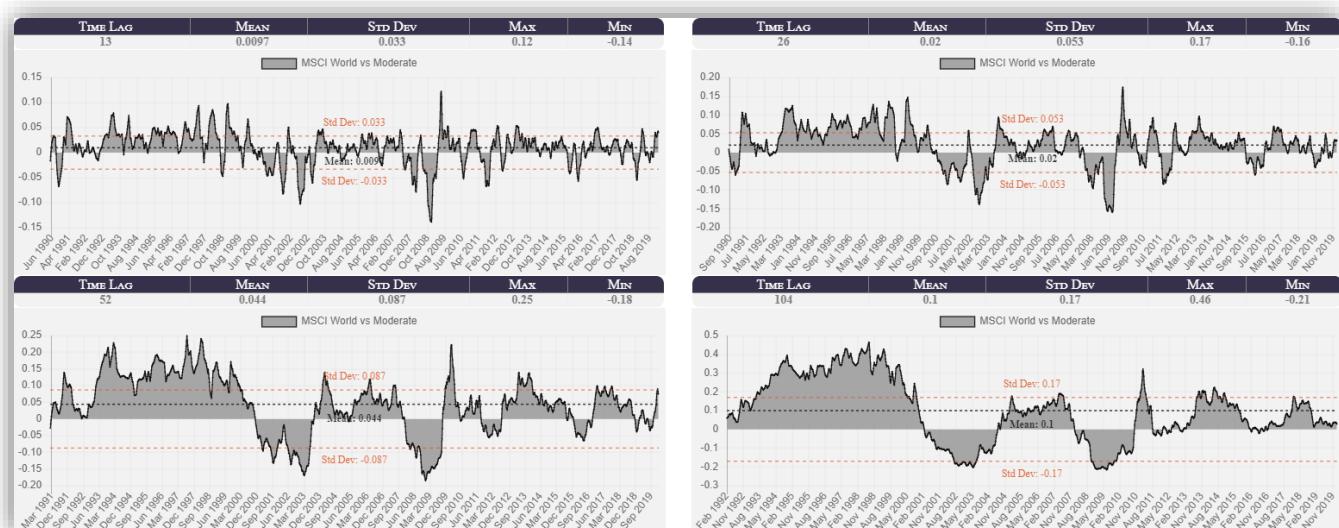
Additional Chart Features:



Clicking this button will show or hide the chart tables. Hiding chart tables will allow users to compare between rolling periods more effectively.

1

SHOW/HIDE CORR. RANKS

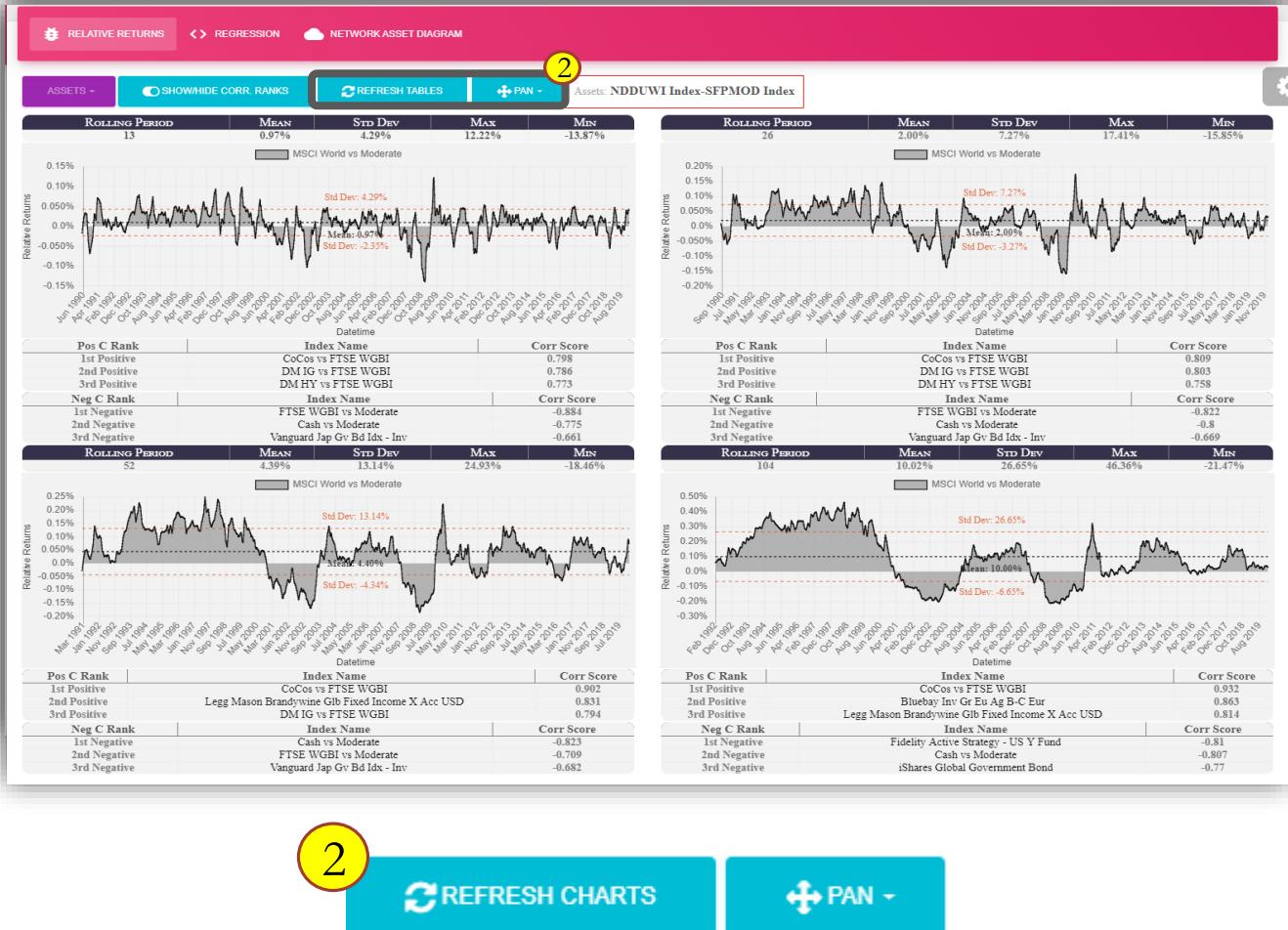


Dashboard with hidden tables

2. Application Features

iii. Dashboard 1 - Relative Returns Charts

Additional Chart Features:



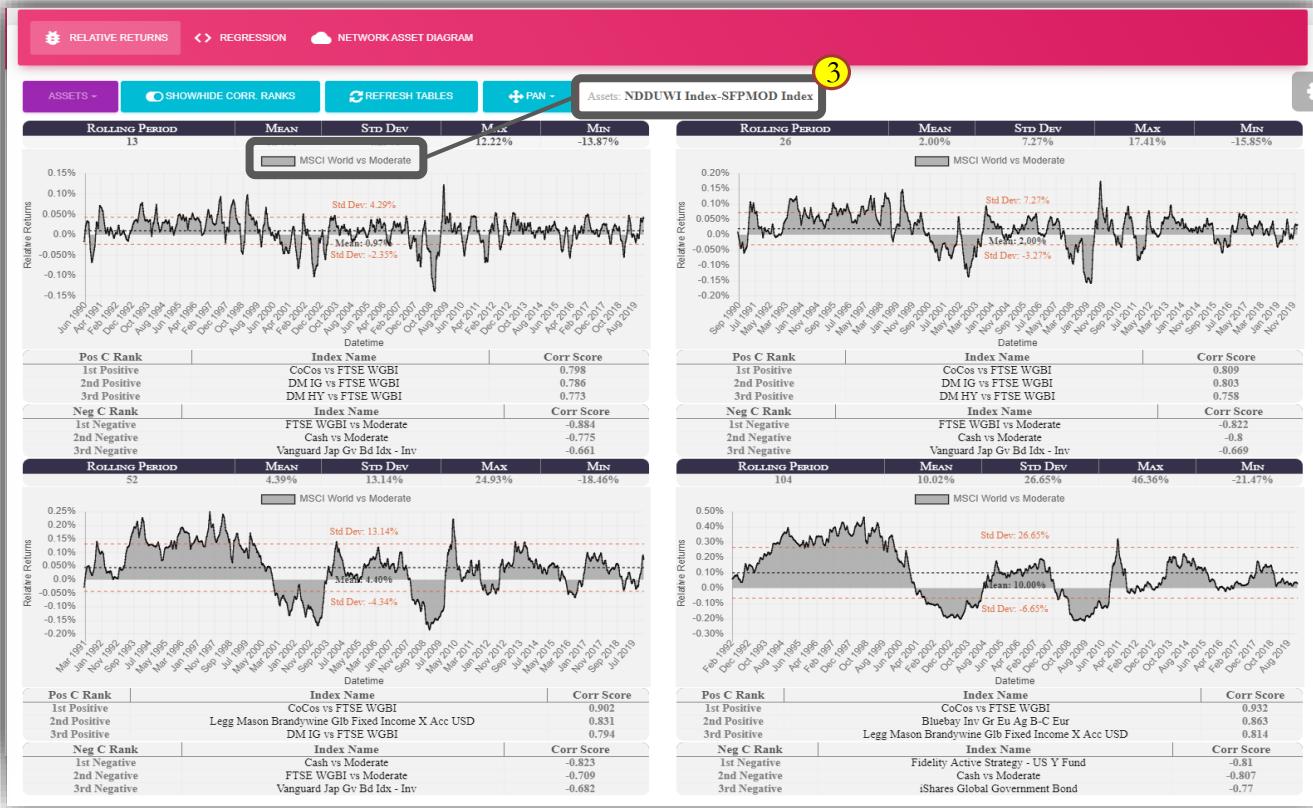
Charting tools are used to manipulate the view of each chart.

Charting tools are on pages 12-14.

2. Application Features

iii. Dashboard 1 - Relative Returns Charts

Additional Chart Features:



3

Actual Asset Names

Assets: NDDUWI Index-SFPMOD Index

User Defined Asset Names

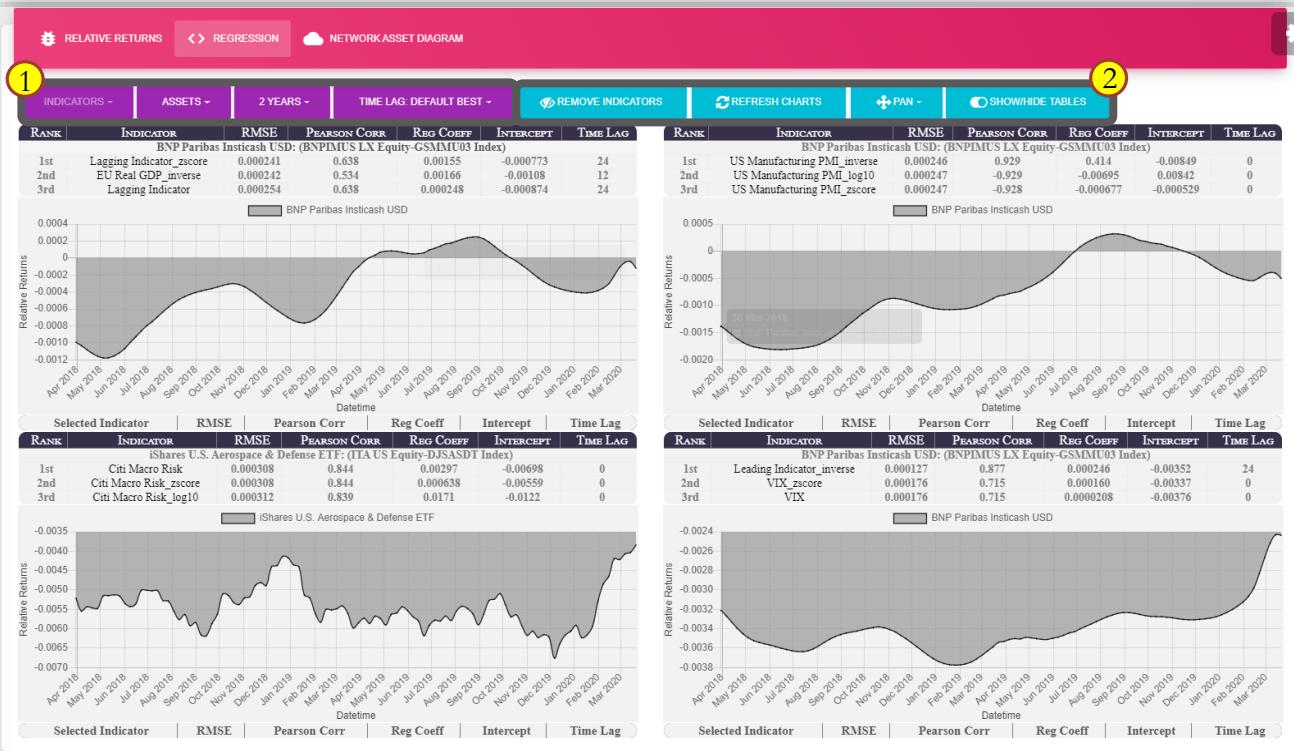
MSCI World vs Moderate

Actual asset names will be displayed here. The actual asset names correspond to user defined asset names.

2. Application Features

iv. Dashboard 2 – Regression Charts

The EAA also plots 4 charts showing the relationship between a user selected asset-pair and indicator.



1

INDICATORS -

ASSETS -

2 YEARS -

DEFAULT (BEST RMSE ONLY) -

Users have the ability to select different parameters such as indicators, assets, time period and time lag. Charts will be populated according to user selection.

2

REMOVE INDICATORS

REFRESH CHARTS

PAN -

SHOW/HIDE TABLES

These buttons allow users to toggle different aspects of the graphs, which will be explained in later pages.

2. Application Features

iv. Dashboard 2 - Regression Charts

Parameter Options

Indicators selector

INDICATORS ▾



Select an Indicator

VIX Index	✓
VIX Index_zscore	✓
VIX Index_difference	✓
VIX Index_2nd-order-derivative	✓
MOVE Index_difference	✓
MOVE Index_2nd-order-derivative	✓
DXY Curncy_difference	✓
DXY Curncy_2nd-order-derivative	✓
CO1 Comdty_difference	✓

Limit reached (5 items max)

Users can filter and select indicators of their interest.
Up to 5 indicators can be selected.

Asset selector

ASSETS ▾



Select an Asset

Best Asset-Pair and Indicator

MSCI World vs Moderate
FTSE WGBI vs Moderate
Cash vs Moderate
MSCI US vs World
MSCI Europe ex-UK vs World
MSCI UK vs World
MSCI Japan vs World
MSCI Asia ex-Japan vs World
MSCI EM ex-Asia vs World

Users can filter and select assets of their interest.

2. Application Features

iv. Dashboard 2 - Regression Charts

Parameter Options

Users can filter data according to the specified time periods

Time Period selector

2 YEARS ▾

2 Years

5 Years

10 Years

All Time

Users can shift data for indicators by selecting the different time lags.

Time Lag selector

TIME LAG: DEFAULT BEST ▾

No Shift

Time Lag: Default Best

Time Lag: 0 weeks

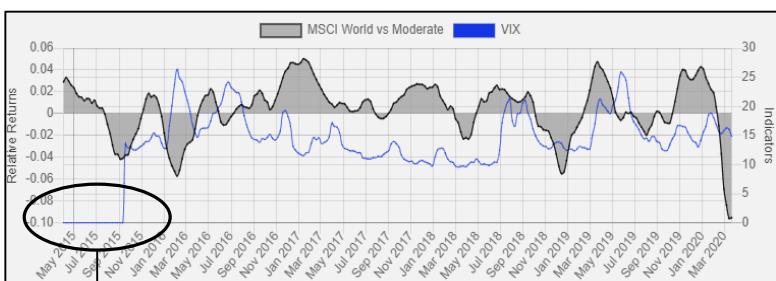
Shift Indicator Backwards by:

Time Lag: 4 weeks

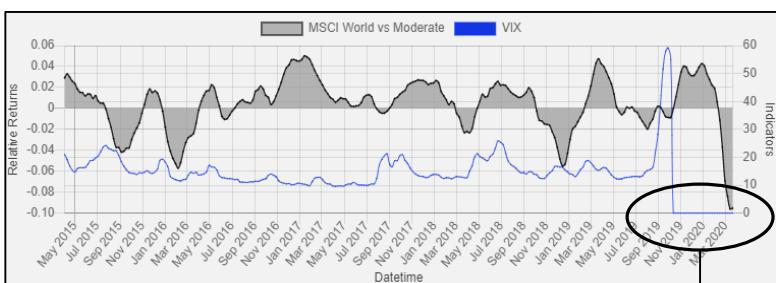
Time Lag: 8 weeks

Time Lag: 12 weeks

Time Lag: 24 weeks



Indicator is shifted backwards by 24 weeks



Indicator is shifted forward by 24 weeks

Shift Indicator Forward by:

Time Lag: -4 weeks

Time Lag: -8 weeks

Time Lag: -12 weeks

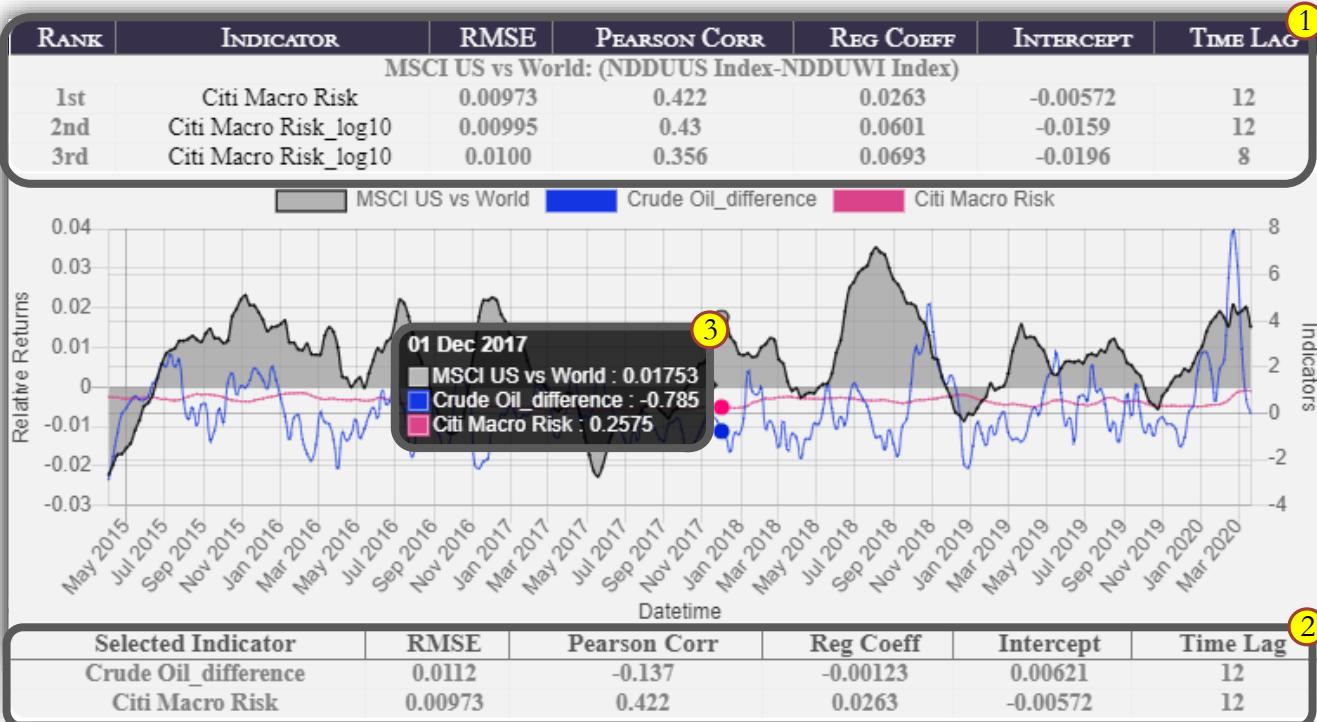
Time Lag: -24 weeks

2. Application Features

iv. Dashboard 2 - Regression Charts

By default, the asset-pair with the lowest RMSE score will be plotted for each rolling period.

Chart features are explained in the following table:



1

For every rolling period, a table at the top of the chart will show the top 3 indicators with the strongest relationship based on RMSE score.

2

A table at the bottom of every chart shows the user selected indicators that are plotted in the chart. RMSE, Pearson Correlation, Regression Coefficient and Intercept scores are calculated for every indicator and asset-pair.

3

Hovering on any point on the chart will display the corresponding date, relative return value of the selected asset-pair and the value of the selected indicator.

2. Application Features

iv. Dashboard 2 - Regression Charts

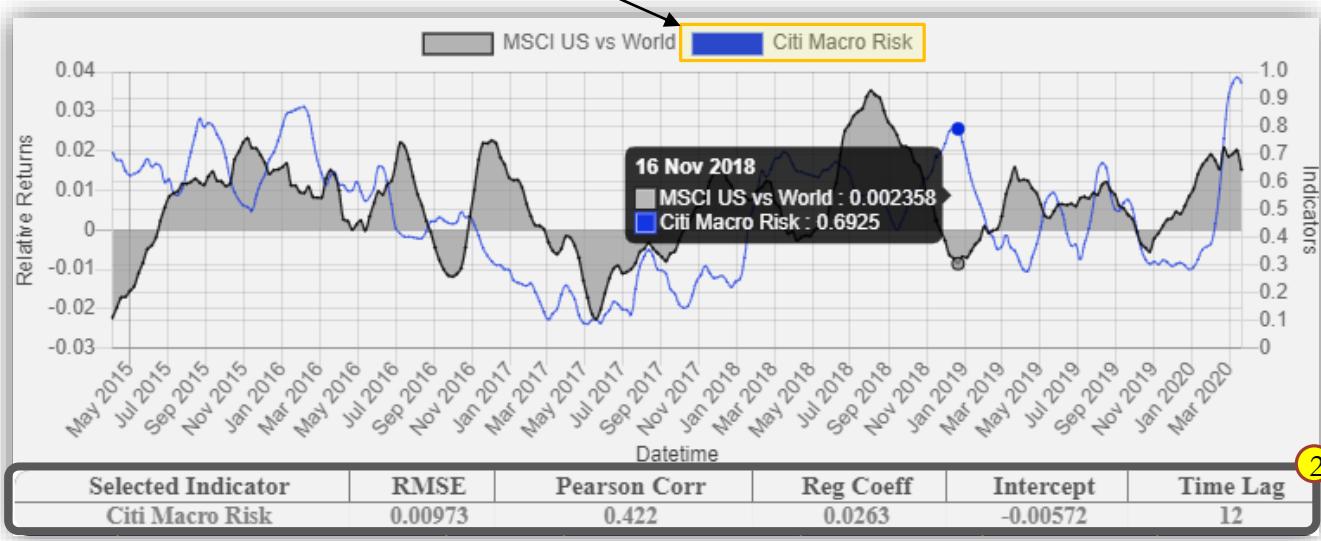
Table Features

RANK	INDICATOR	RMSE	PEARSON CORR	REG CORFF	INTERCEPT	TIME LAG
MSCI US vs World: (NDDUUS Index-NDDUWI Index)						
1st	Citi Macro Risk	0.00973	0.422	0.0263	-0.00572	12
2nd	Citi Macro Risk_log10	0.00995	0.43	0.0601	-0.0159	12
3rd	Citi Macro Risk_log10	0.0100	0.356	0.0693	-0.0196	8

1

The pair name of the currently selected asset-pair will be displayed here, alongside its actual asset-pair name.

Clicking on the names of the top 3 indicators will populate the charts with the selected indicators



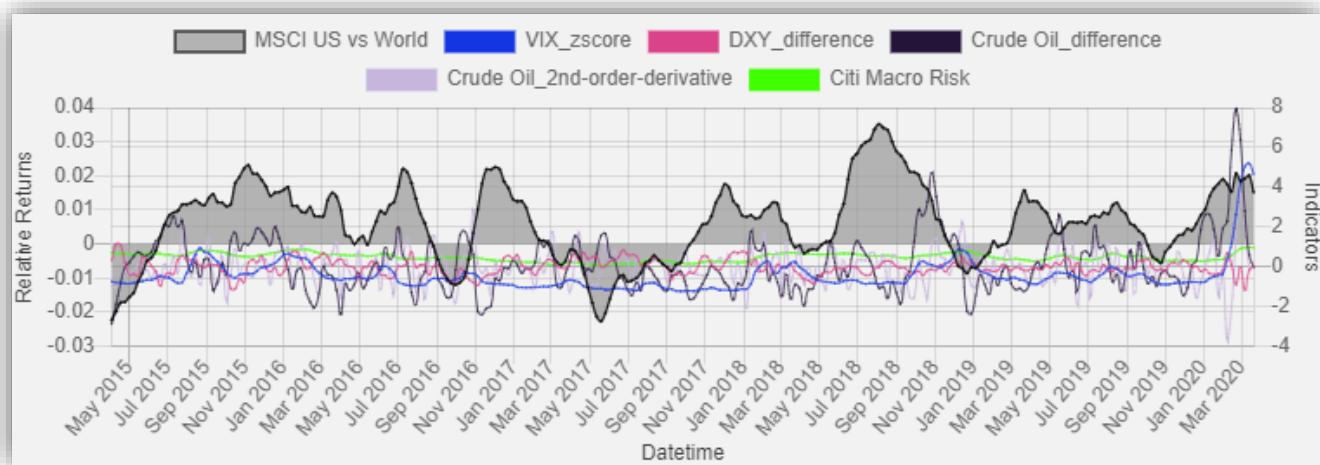
2

Statistical measures of selected indicators relative to selected assets will be displayed here.

2. Application Features

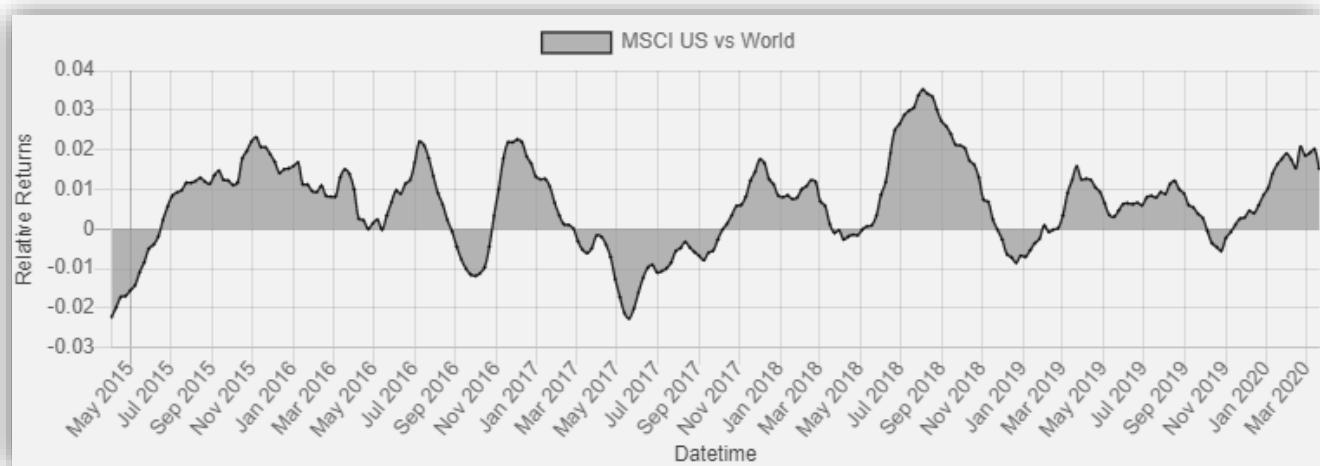
iv. Dashboard 2 - Regression Charts

Additional Chart Features:



REMOVE INDICATORS

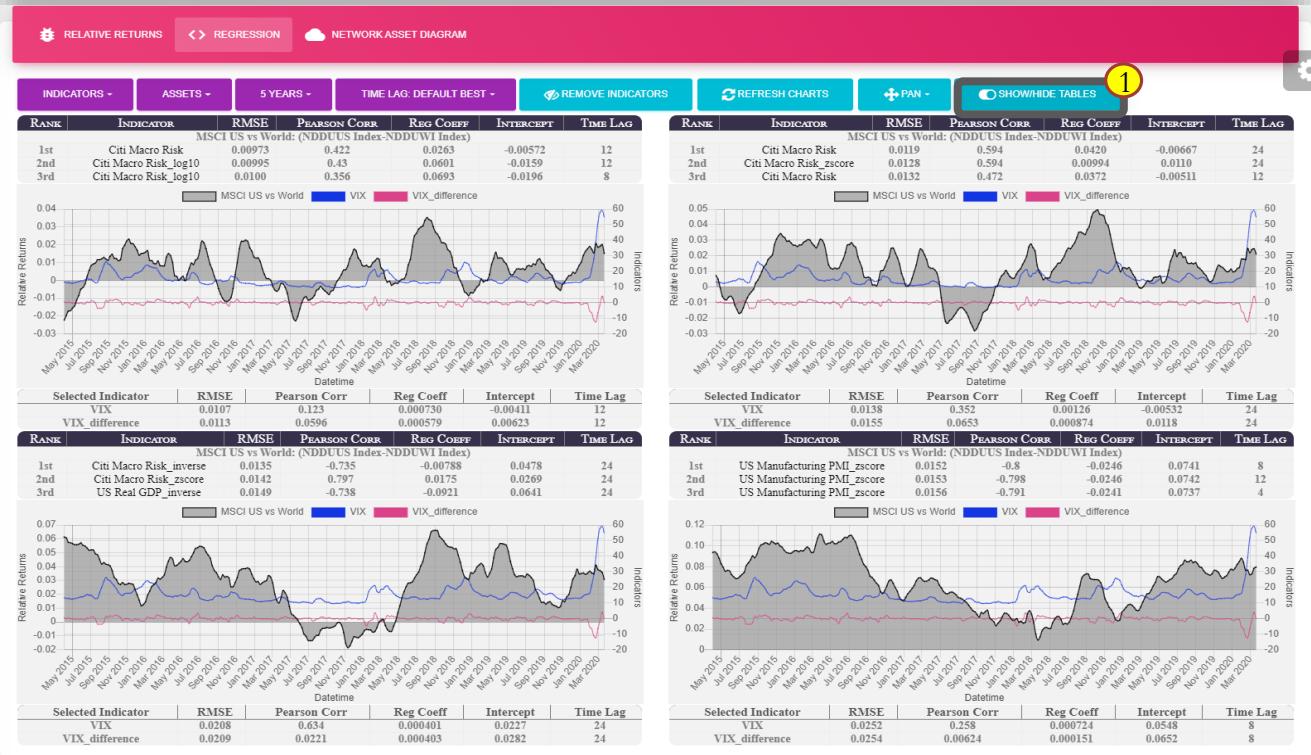
Too messy? Clicking the “Remove Indicators” button will clear the charts of all selected indicators.



2. Application Features

iv. Dashboard 2 - Regression Charts

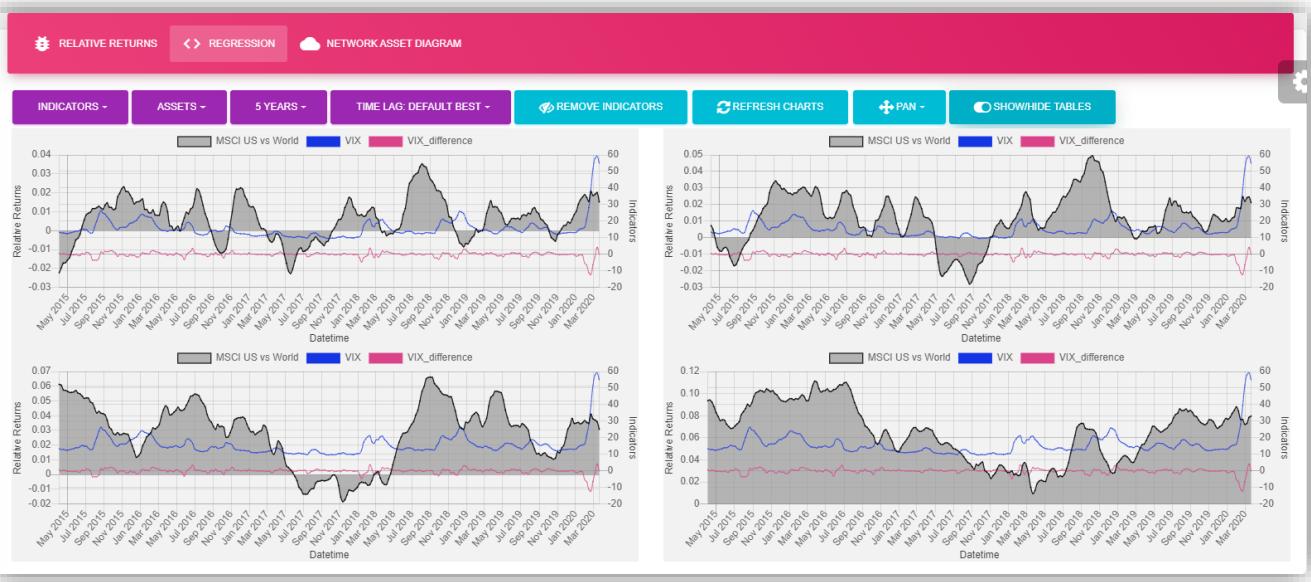
Additional Chart Features:



Clicking this button will show or hide the chart tables. Hiding chart tables will allow users to compare between rolling periods more effectively.

1

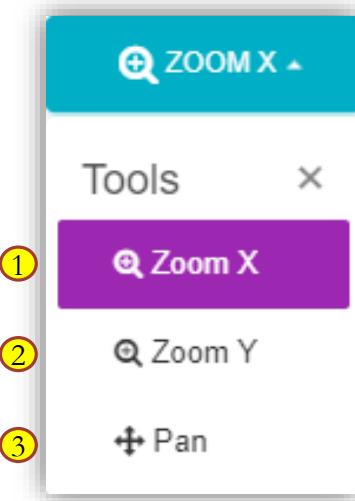
SHOW/HIDE TABLES



2. Application Features

v. Charting Tools

Users can make use of 3 provided charting tools to enhance their visualizations.



1

Zoom X allows users to draw a zoom box along the chart's X-axis

2

Zoom Y allows users to draw a zoom box along the chart's Y-axis

3

Pan allows users to move the charts along both X and Y axes

2. Application Features

v. Charting Tools

Examples of use:

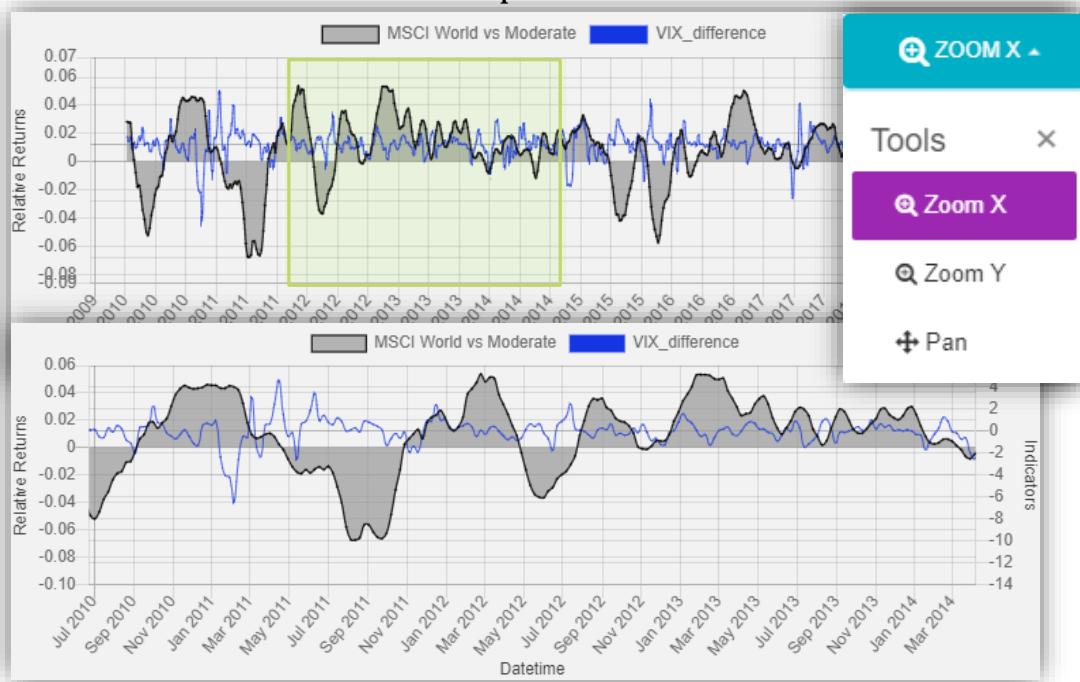


Chart is zoomed in for the selected time period of
2011-2014 using Zoom X

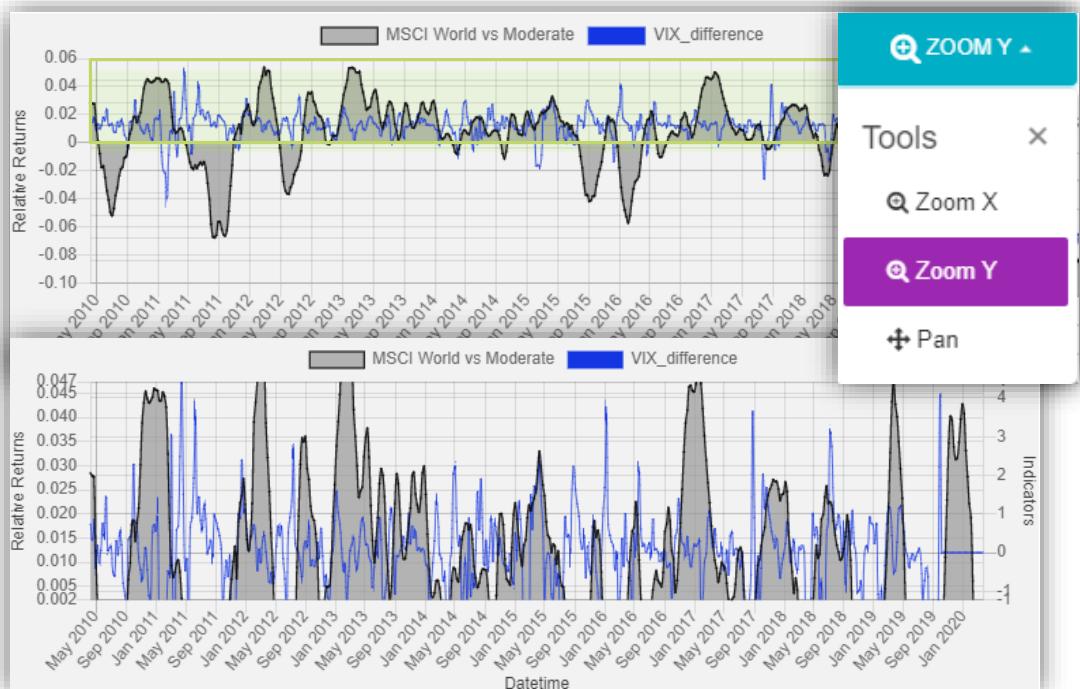


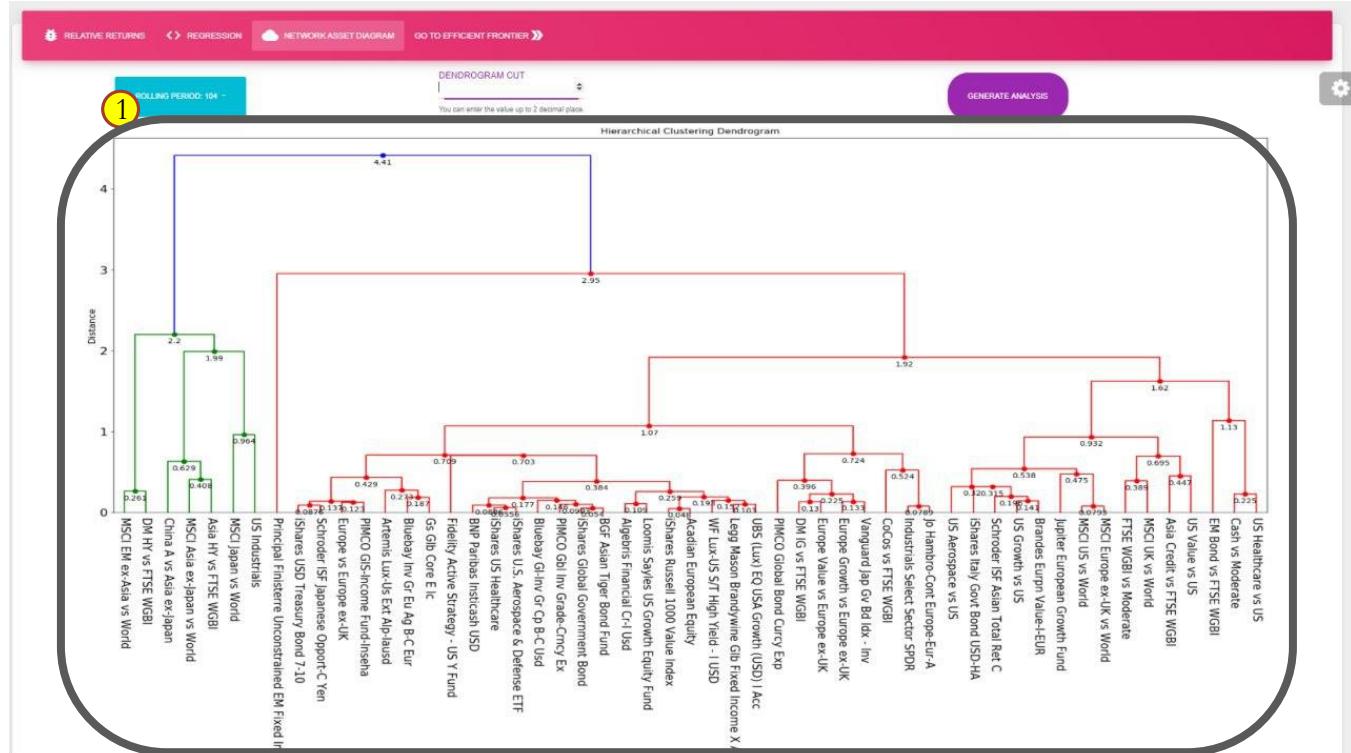
Chart is zoomed in for the selected relative returns
value of 0.047 to 0.002 using Zoom Y

2. Application Features

vi. Dashboard 3 – Asset Network Diagrams

The dendrogram displays the hierarchical clustering of the assets based on the Hausdorff distance from one asset to another.

Chart features are explained in the following table:



The Y axis is the Hausdorff distance and the X axis are the asset names.

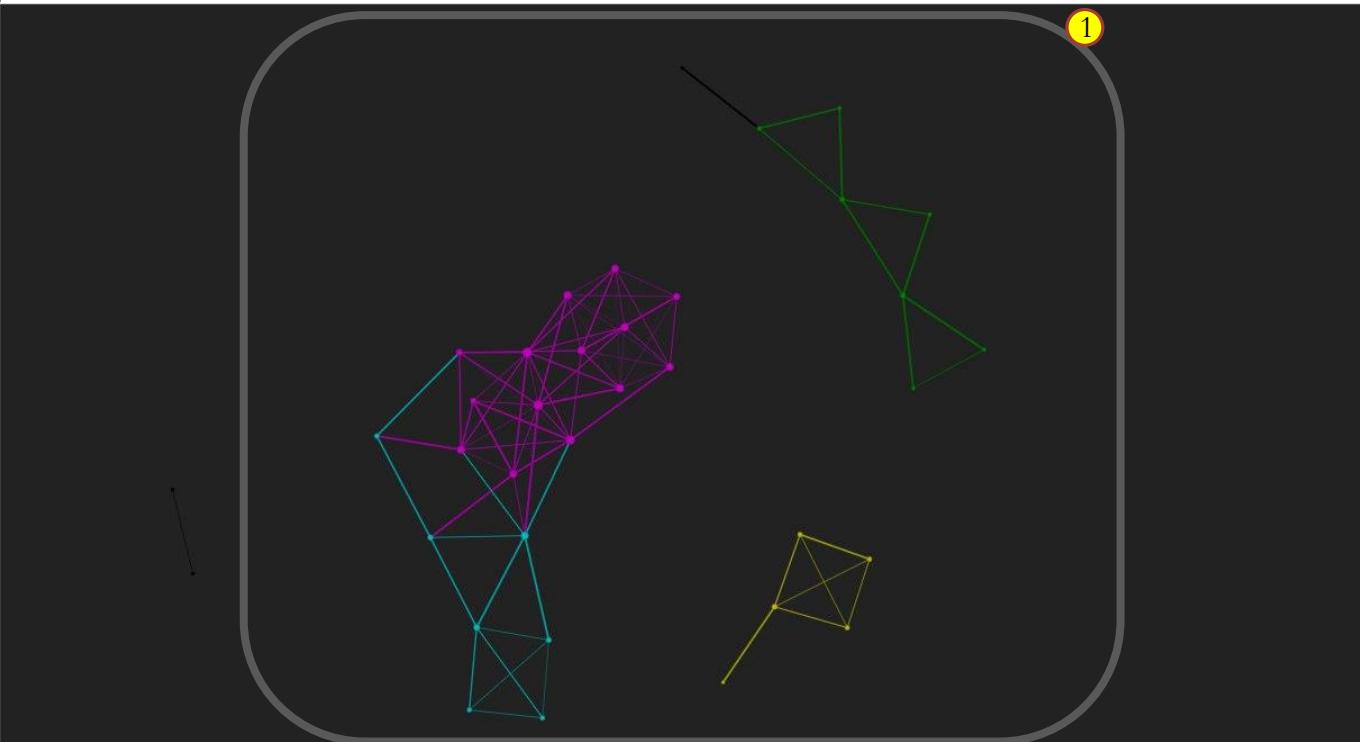
In the dendrogram, there is a new cluster being formed with the distance displayed at the joint. The nearer 2 assets/clusters are being joined together to form one cluster, the more similar they are to one another.

2. Application Features

vi. Dashboard 3 - Asset Network Diagrams

The chart below the hierarchical clustering dendrogram is the asset network node graph.

Chart features are explained in the following table:

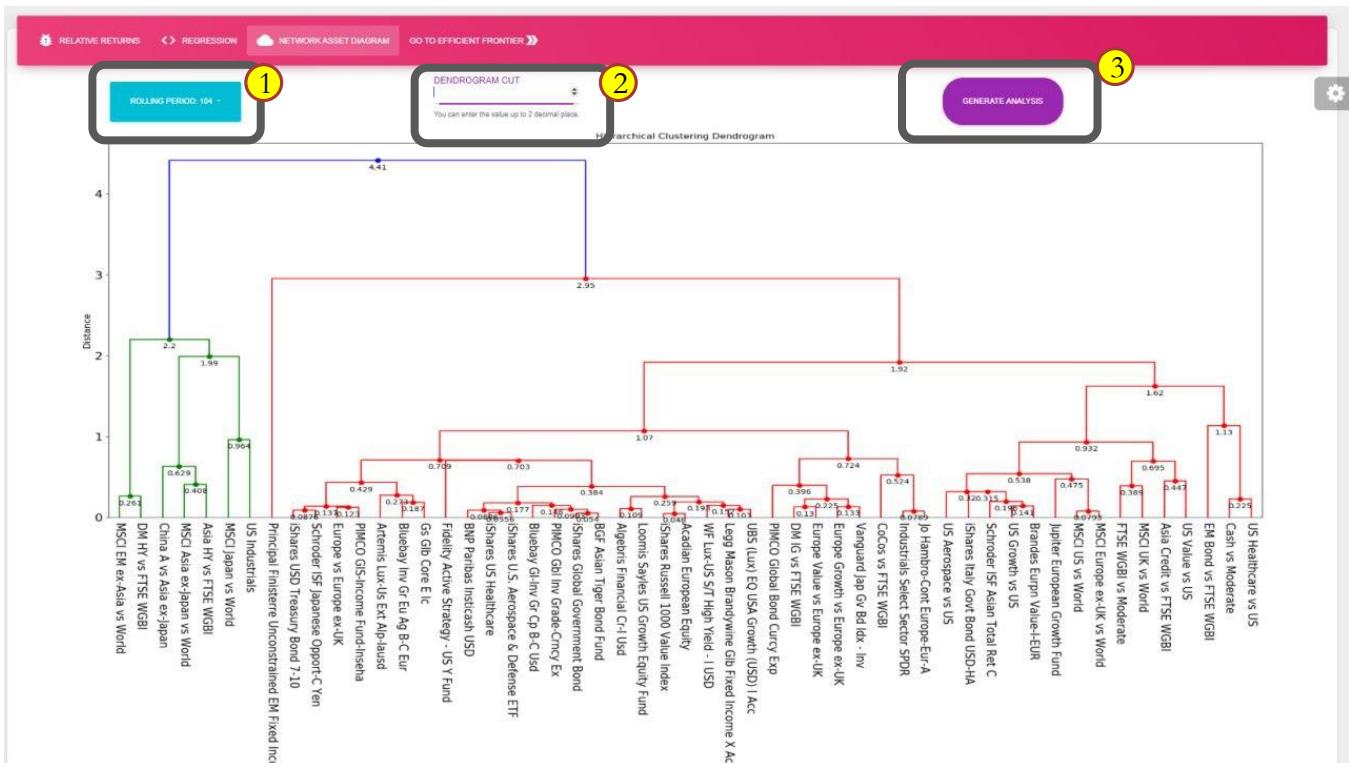


The asset network node graph shows the relationship (Hausdorff distance) from one asset to another individually. The colours of the nodes corresponds to the hierarchical clustering's clusters, indicating the cluster that the node belong to.

2. Application Features

vi. Dashboard 3 - Asset Network Diagrams

Additional Chart Features:



Users can filter and select the rolling period of their interest by selecting the respective rolling period in the drop-down list



User can select a distance to cut and obtain the respective clusters.



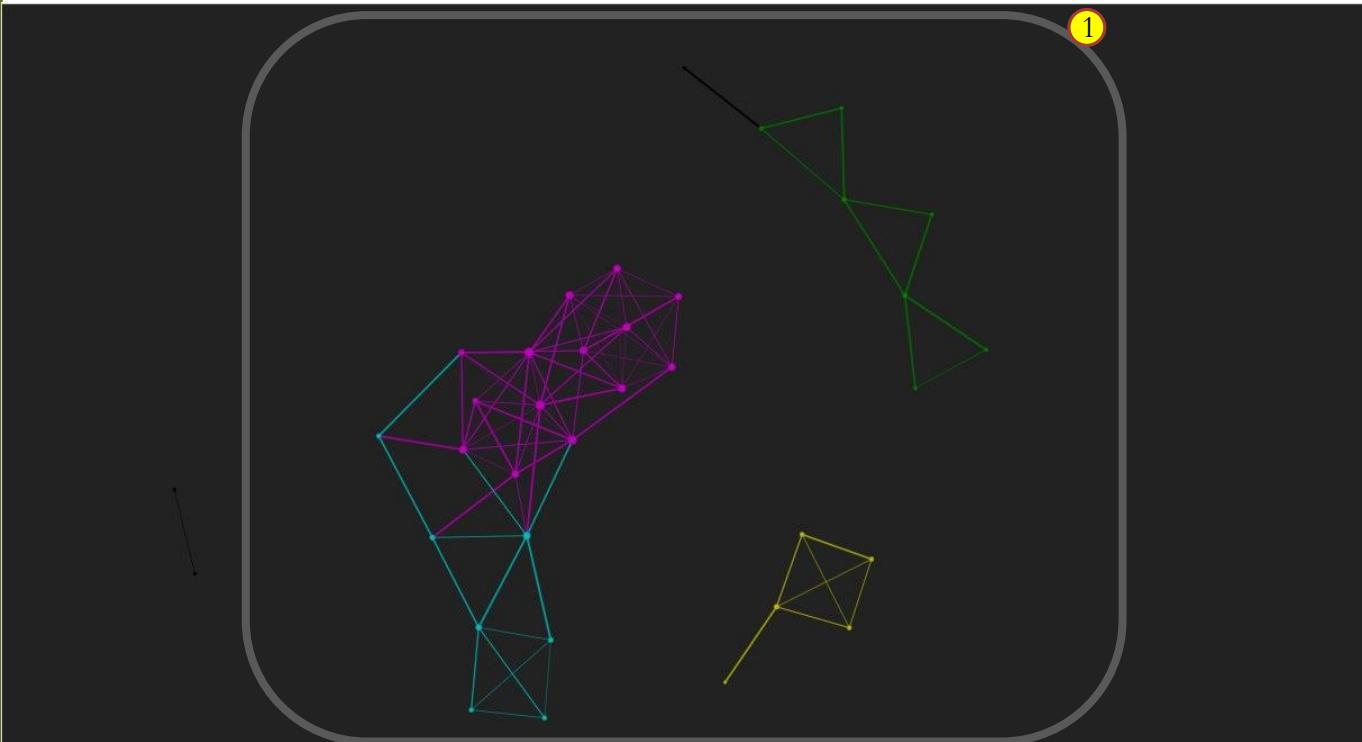
Once user have selected/entered the values for 1 and 2, users have to click on this button to generate a new analysis. A new dendrogram and asset network graph will be displayed.



2. Application Features

vi. Dashboard 3 - Asset Network Diagrams

Additional Chart Features:



Users can hover over each node to view the relationships of the respective node. The relationship is displayed in an ascending order, from the closest to the furthest.

Upon any changes in the dendrogram, the asset network graph will reflect the new clusters as well, changing the colours of the nodes accordingly.

<u>WF Lux-US S/T High Yield - I USD Neighbors:</u>		
UBS (Lux) EQ USA Growth (USD) I Acc	0.0186	1
Algebris Financial Cr-I Usd	0.0217	
Loomis Sayles US Growth Equity Fund	0.0280	
Legg Mason Brandywine Glb Fixed Income X Acc USD	0.0298	
iShares Russell 1000 Value Index	0.0339	
iShares Global Government Bond	0.0416	
Acadian European Equity	0.0429	
BGF Asian Tiger Bond Fund	0.0520	
Gs Glb Core E Ic	0.0579	
iShares US Healthcare	0.0579	

2. Application Features

vii. Portfolio Optimization

1 ROLLING PERIOD ▾ 2 ASSETS ▾ 3 Portfolio Asset Basket:

RISK FREE RATE
0.018

Input the risk free rate for your portfolio.
You can enter the value up to 3 decimal place.

GENERATE OPTIMIZATION **RESET SELECTIONS**

User will have a few fields to fill in before generating analysis

1 Users can select the rolling period of their relative returns to use for generating their portfolio optimization

2 Users can select the rolling period of their relative returns to use for generating their portfolio optimization

3 Portfolio Asset Basket:
Gold vs Moderate
MSCI US vs World
MSCI Europe ex-UK vs World
MSCI UK vs World

Portfolio Asset Basket:
Gold vs Moderate
World
JK vs World
World

Simple visualization for user to see what they have selected

2. Application Features

vii. Portfolio Optimization

The screenshot shows a user interface for portfolio optimization. At the top are two purple buttons labeled "ROLLING PERIOD" and "ASSETS". Below them is a field labeled "RISK FREE RATE" with the value "0.018". A note below the field says "Input the risk free rate for your portfolio. You can enter the value up to 3 decimal place." At the bottom are two buttons: a teal one labeled "GENERATE OPTIMIZATION" and an orange one labeled "RESET SELECTIONS".

4 Users can input their **risk-free rate** which represents the their expectation from a risk-free investment portfolio

5 Allowing the user to **deselect all** their selections by just clicking a button

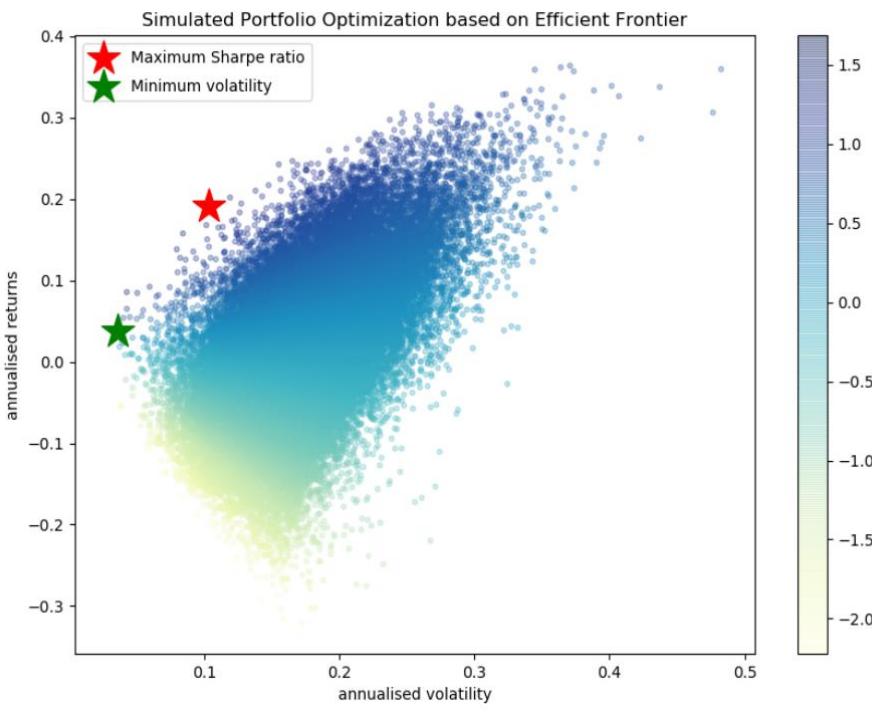
6 Button for submitting the filled up fields based on the input of the user to generate portfolio optimization analysis

2. Application Features

vii. Portfolio Optimization

The generated result will be populated based on the user's input.

7



Based on the user's input an **Efficient Frontier diagram** would be generated.

This algorithm is based on a **Monte Carlo simulations** of **50,000 runs** on the portfolio asset to return the best asset allocations of the selected portfolio asset basket.

8

MAXIMUM SHARPE RATIO PORTFOLIO ALLOCATION

Gold vs Moderate	MSCI US vs World	MSCI Europe ex-UK vs World	MSCI UK vs World	MSCI Japan vs World	MSCI Asia ex-Japan vs World
11.59	60.39	4.95	5.3	0.48	17.28

Annualised Return: 0.19

Annualised Volatility: 0.1

MINIMUM VOLATILITY PORTFOLIO ALLOCATION

Gold vs Moderate	MSCI US vs World	MSCI Europe ex-UK vs World	MSCI UK vs World	MSCI Japan vs World	MSCI Asia ex-Japan vs World
2.53	56.13	27.1	0.83	10.76	2.64

Annualised Return: 0.04

Annualised Volatility: 0.04

The two tables return the best portfolio allocation in percentage for

★(1) Maximum Sharpe Ratio portfolio allocation
&

★(2) Minimum Volatility portfolio allocation

Maximum Sharpe Ratio – measures highest risk-adjusted return on the portfolio

Minimum Volatility – measures lowest volatility of portfolio

3. Workflows

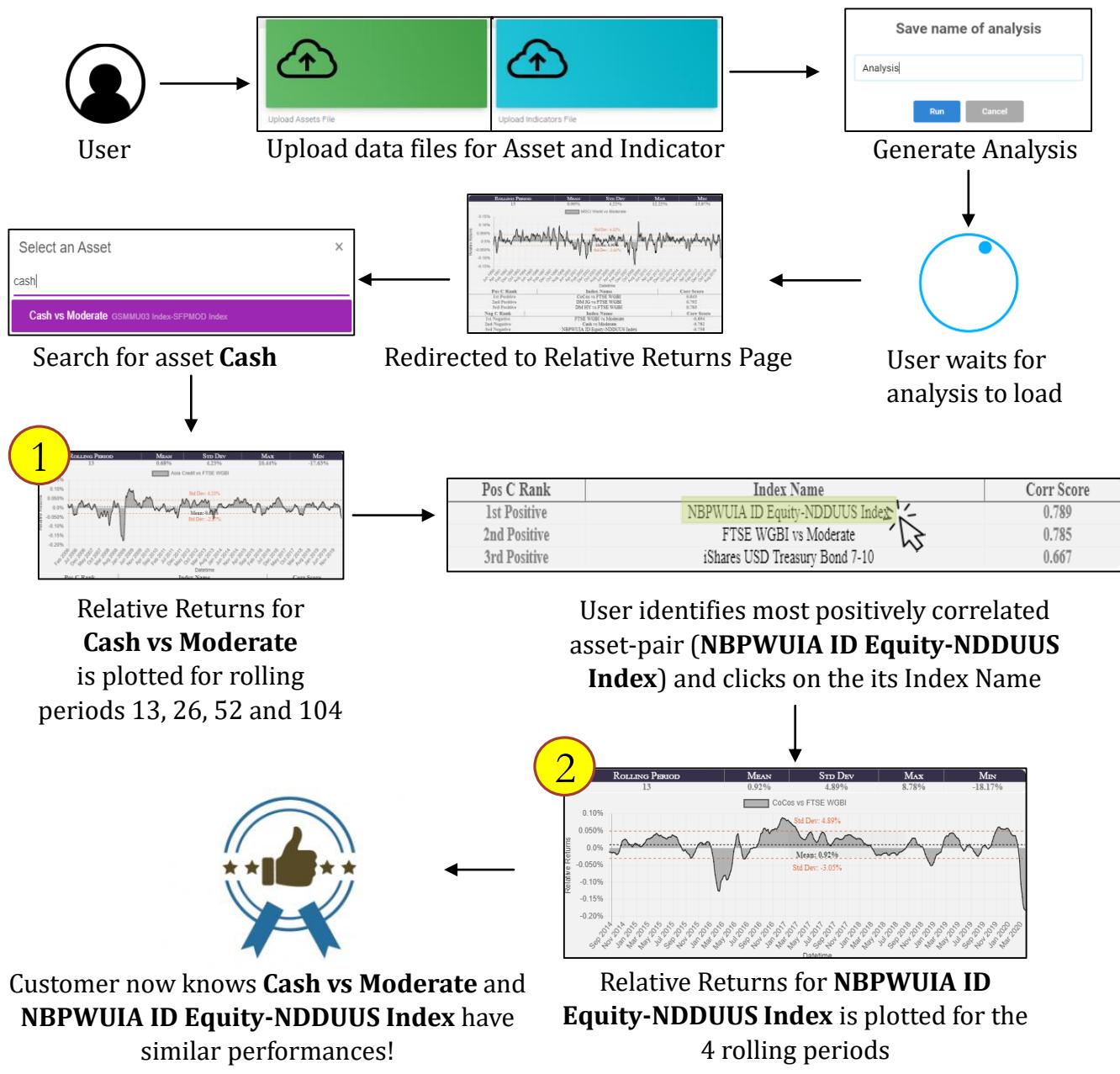
i. Analysis on Relative Returns

User wants to determine the relationship between two assets.



User

- 1 He is particularly interested in assets **Cash** and **Moderate** and wants to see their relationship for rolling periods 13, 26, 52 and 104.
- 2 He wants to know the most positively correlated asset-pair for **Cash** and **Moderate** and visualize this asset-pair's relationship.



3. Workflows

ii. Drawing Insights from Regression Charts



User

User wants to identify macroeconomic indicators that had the most influence on the performance of asset-pair **Cash vs Moderate** over the past **5 years**.

- 1 He wants to find out the indicator that has the best relationship with **Cash vs Moderate**.
- 2 He also wants to find out the time period between the indicator price movement to the changes in asset returns.



User



User uploads data files for Asset and Indicator

Save name of analysis

Analysis

Run

Cancel

Generate Analysis

Select an Asset
cash
Cash vs Moderate GSMMU03 Index-SFPMOD Index

Search for asset **Cash**

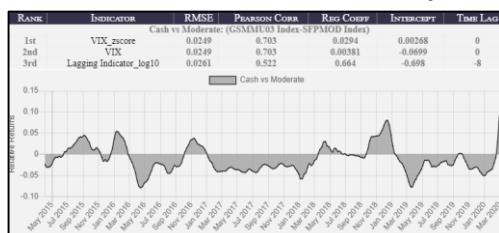
5 YEARS ▾
2 Years
5 Years
10 Years
All Time

Change the time period to 5 Years

Redirected to Regression Page

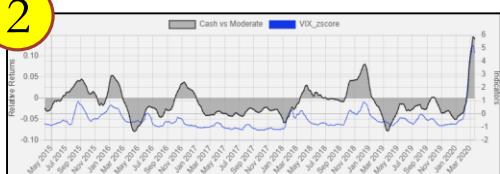


User waits for analysis to load



Relative Returns for **Cash vs Moderate** for the last **5 years** is plotted for the 4 rolling periods

2



1

User identifies the indicator with the most influence (**VIX_zscore**) and clicks the Indicator Name

RANK	INDICATOR	RMSE	PEARSON CORR	REG COEFF	INTERCEPT	TIME LAG
1st	VIX_zscore	0.0249	0.703	0.0294	0.00268	0
2nd	VIX	0.0249	0.703	0.00381	-0.0699	0
3rd	Lagging Indicator log10	0.0261	0.522	0.664	-0.698	-8

The indicator with the most influence is now populated on the chart. User can identify time periods between price movements and changes in asset returns.

User identifies the indicator with the most influence (**VIX_zscore**) and clicks the Indicator Name

3. Workflows

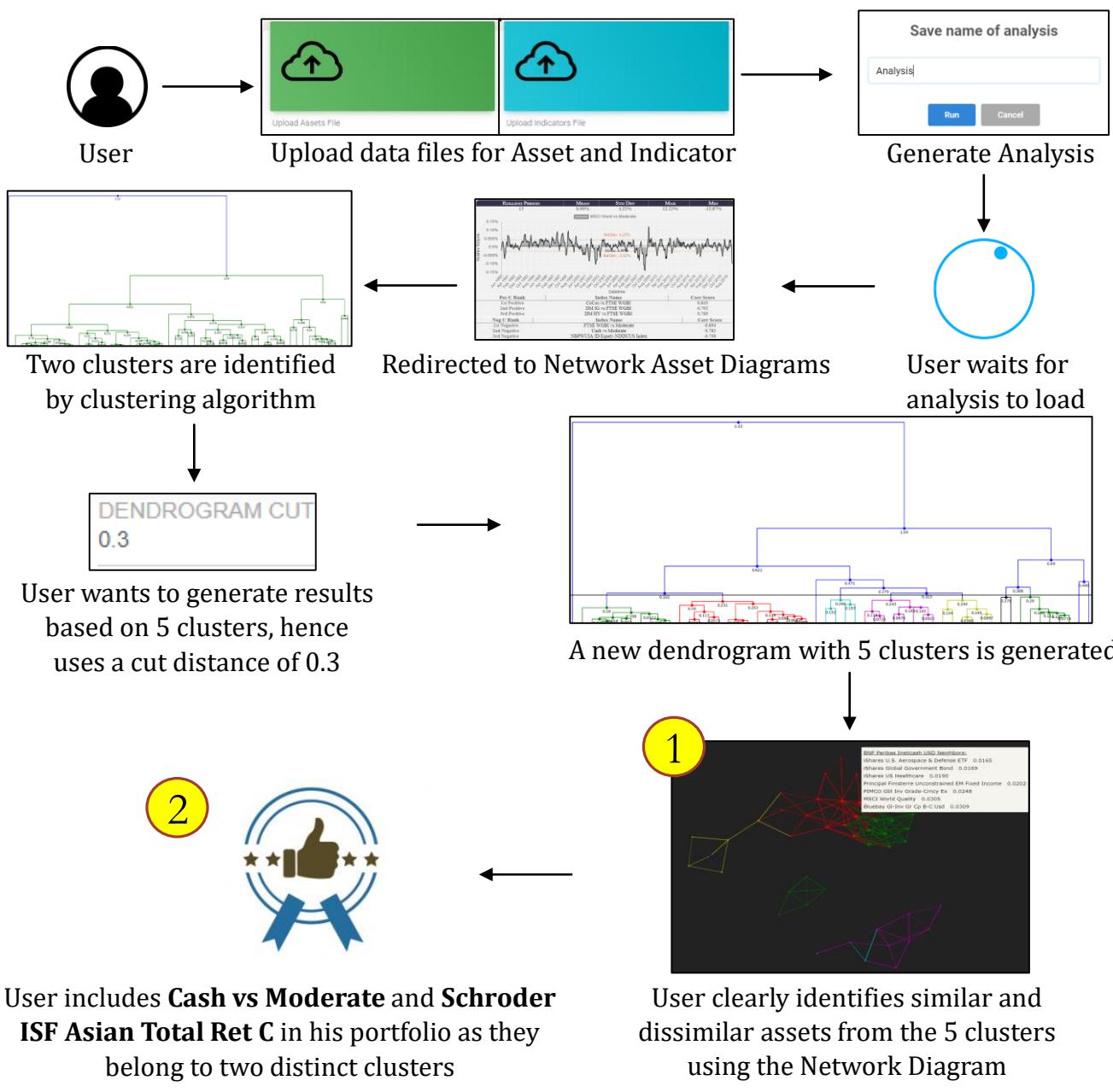
iii. Drawing Insights from Asset Network Diagrams

User wants to obtain selection of assets to construct a diversified portfolio.



User

- 1 He wants to identify whose performances are similar and assets whose performances are dissimilar.
- 2 He wants include assets that are very dissimilar into his portfolio.



3. Workflows

iv. Optimizing Portfolio

Users wants to obtain the best portfolio allocation based on his current portfolio of assets.



User

