**Case Study Data:**

**Tab:** HUC0 – BAML HY INDEX

**Columns:**

**Index**: Index Ticker

**Description**: Full index description

**Date**: As of date (EOD)

**OAS**: Total Index Option Adjusted Spread (value is a weighted average)

**Total Return Index Value** – **LOC**: Total return index in local currency

**Tab**: G202 - BAML 3-5Year UST Index

**Columns**:

**Index**: Index Ticker

**Description**: Full index description

**Date**: As of date (EOD)

**Total Return Index Value** **– LOC**: Total return index in local currency

**Tab**: Test Portfolio

**Columns**:

Portfolio: Name of the portfolio

Primary\_Asset\_ID: 8 character cusip

Asset\_Type: Describes whether the asset is a bond or a loan

Coupon\_Type: Describes whether the asset has a fixed or floating coupon

Rating: S&P Rating

Industry: Describes the issuer’s industry

Market\_Value: Current value of each asset

OAS: Option-adjusted spread of each asset

Yield: yield of each asset

Duration: Interest duration of each asset

**Case Study #1**

Using the HUC0 - BAML HY INDEX and G202 - BAML 3-5Year UST Index case study data, answer the following questions in a Jupyter Notebook. When finished please save the notebook in HTML and email back.

1. Using pandas join the G202 - BAML 3-5Year UST Total Return Index to the HUC0 – BAML HY INDEX data.
2. Using pandas and the data provided compute deciles on HUC0 OAS (option adjusted spread)
3. Compute 1YR forward HUC0 returns using the total return index provided
4. Show descriptive statistics on 1YR forward returns by OAS decile
5. Produce a bar chart of the median forward 1YR HUC0 returns by OAS decile
6. Produce a bar chart of the median OAS by OAS decile
7. Using the daily returns from HUC0 compute a rolling 6-month Sharpe ratio (assume no risk free rate)
8. What is the median, 25th and 75th percentile of the rolling distribution?
9. Compute .05/.95 confidence intervals on the mean Sharpe ratio from the rolling distribution
10. In pandas compute and plot EWM daily volatility on the HUC0 total return series. Use span=100.
11. Using the volatility series in #10 compute the current daily VaR of the HUC0 at alpha=.05.

**Case Study # 2**

Using the Test Portfolio case study data (as of 12/31/XX), create a Jupyter Notebook that completes the below tasks. You may use any resource, Google, friends, etc., to complete this case study. When finished please save the notebook in HTML. Email back both the HTML notebook and the filled-out analytics template.

1. Create function(s) that calculate the market value weighted average yield, OAS, and duration for the entire portfolio, bonds only, and loans only. Also create function(s) that calculate the market value percentages for each rating and industry breakdown (entire portfolio only). Think about how to build for scale. There are only 3 analytics and 2 breakdowns now but what if we added 20 more analytics and 10 more breakdowns? How will that impact maintenance of the code? Keep a balance among flexibility, readability, and conciseness. Be prepared to present your approach and be tested on your understanding of the script.
2. Use OpenPyxl to print the data to the analytics template.

**Bonus Question:** Assuming that the observed 3M SOFR rates for the next 4 quarters are as provided. Create function(s) to estimate total interest payments earned by the Test Portfolio over the course of year XX + 1. Clearly state any assumptions applied in your calculation.