**Assignment #1: Statistically Equivalent Portfolios**

**Introduction**

This analysis explores the concept of statistically equivalent portfolios, aiming to find insights from returns data for multiple assets (AMZN,MSFT,XOM,BOKF) over 5 years.

**Data Collection**

The returns data for the selected assets were collected over a period of five years or more manually from WRDS. The dataset includes observations for each asset, allowing for a comprehensive analysis.

**Global Minimum Variance (GMV) Portfolio**

**Portfolio Weights**

GMV Portfolio Weights:

[‘AMZN’,[-0.10002596]

‘BOKF’,[ 0.03996612]

‘XOM’,[ 0.87923166]

‘MSFT’,[ 0.18082818]]

**Expected Return and Standard Deviation**

GMV Portfolio Expected Return: 0.02002443

GMV Portfolio Standard Deviation: 0.05483456

**Maximum Sharpe Ratio (MSR) Portfolio**

**Portfolio Weights**

MSR Portfolio Weights:

[‘AMZN’,[-0.34560028]

‘BOKF’,[ -0.10356513]

‘XOM’,[ 1.36597948]

‘MSFT’,[ 0. 08318593]]

**Expected Return and Standard Deviation**

MSR Portfolio Expected Return: 0.02429235

MSR Portfolio Standard Deviation: 0.06039612

**Multivariate Normal Distribution Assumption**

The analysis assumes that asset returns conform to a multivariate normal distribution with mean and covariance matrix equal to the sample ones estimated earlier.

**Simulations**

**A graph of standard deviation

Description automatically generated**

**GMV Portfolio Simulation**

**A diagram of a graph

Description automatically generated with medium confidence**

**MSR Portfolio Simulation**

**A green dotted line with a black dot

Description automatically generated**

**Summary Statistics Table for GMV Portfolio**

A table with numbers and a few different numbers

Description automatically generated with medium confidence

**Summary Statistics Table for MSR Portfolio**

A table with numbers and a few digits

Description automatically generated with medium confidence

**Summary Statistics Table for Sharpe Ratios**

A line of numbers and symbols

Description automatically generated