WORLDQUANT UNIVERSITY

Group Work Project

MScFE 640

Portfolio Theory and Asset Pricing

Revision Date: 09/09/2019

Overview

This document describes the requirements for the three Group Work Project assignments which must be submitted at the end of week 3, 5, and 7 respectively. Within a week of each submission, your group will receive feedback from the WQU Instructional Team, enabling you to use the feedback to revise your assignment ahead of the second and third submissions. You will use the Group Work Forum to communicate with your peers throughout the course.

Please make use of the **LIRN Library** located on the left pane of your screen as the primary resource for your research.

Your research should favor authoritative, scholarly sources, and you must cite all sources where relevant. The task is not to reproduce the research of others, but instead to develop your own systematic narrative that addresses the research topic and is informed by the research of others. Not only are you required to cite accurate and relevant facts, but you must also present your own clear logic when linking and contextualizing these facts.

Visit the **Student Resource Center (SRC)** where you can find resources on **how to conduct research**, how to use different sources of information, how to **cite references to** a**void plagiarism**, and how to use the **MLA citation style.**

For all 3 submissions, use the data in the "GWP_PTAP_Data.xlsx" spreadsheet provided in the course room.

Introduction and Background

The S&P 500 index is comprised of 500 large[1] U.S. public companies traded on an eligible U.S. stock exchange. Its objective is to measure the performance of the large- cap U.S. equity market. These 500 companies are classified into 11 sectors:

- Energy
- Materials
- Industrials
- Consumer discretionary
- Consumer staples
- Health care
- Financials
- Information technology
- Communication services
- Utilities
- Real estate

State Street Global Advisors and Merrill Lynch created and manage 11 exchange-traded funds (ETFs) that are indexed to these 11 sectors of the S&P 500.

This group of 11 ETFs are known as the SPDR (pronounced "spider") family of funds. The following table provides the ticker symbol on the NYSE Arca for each of these 11 ETFs.

S&P Sector	SPDR ETF Ticker	S&P Sector	SPDR ETF Ticker
Energy	XLE	Health care	XLV
Materials	XLB	Financials	XLF
Industrials	XLI	Information technology	XLK
Consumer discretionary	XLY	Communication services	XLC
Consumer staples	XLP	Utilities	XLU
		Real estate	XLRE

The performance of the S&P 500 index in a period will be equal to the weighted-average of each sector's performance.

[1] A committee of S&P employees chooses the constituents of the S&P 500 index. Although market capitalization is one of the factors they consider, it is not the only determinant of a company's inclusion in the index.

Submission 1

For this submission, complete the following tasks (use the data in the "**GWP_PTAP_Data.xlsx**" spreadsheet provided in the course room):

a) Calculate the expected return in the upcoming year. Use the Capital Asset Pricing Model and the following information:

	XLE	XLI
Beta	1.07	1.06

- Risk-free rate of return (R_f): 2.25%
- Market return (R_m): 9%
- Market standard deviation: 15%

Calculate the daily and annualized standard deviation of returns for the prior year. Use the MS Excel spreadsheet provided titled "GWP_PTAP_Data.xlsx". When annualizing daily standard deviation, assume there are 252 trading days in a year.

b) Calculate the correlation (to two (2) decimal places) between each sector's return.

Explain the calculations required to accomplish each task.

Submission 2

Using the data that you calculated in Submission 1, compete the following tasks (use the data in the "**GWP_PTAP_Data.xlsx**" spreadsheet provided in the course room):

a) Calculate and draw a scatter plot graph of the efficient frontier based on 11 combinations of XLE and XLI:
   - Portfolio 1 = 100% XLE + 0% XLI
   - Portfolio 2 = 90% XLE + 10% XLI
   - ..
   - ..
   - ..
   - Portfolio 11 = 0% XLE + 100% XLI

b) Select a portfolio from portfolios 1-11 on the efficient frontier that satisfies the following constraints:
   - The return is greater than 9.43%
   - The volatility is not greater than 16.8%

c) Comment on how the portfolio selected in Submission 2(b) is expected to perform relative to the S&P 500 in terms of the following:
   - Return
   - Risk
   - Risk-adjusted return, including the Sharpe Ratio

d) Comment on the appropriateness of the S&P 500 as a benchmark for the portfolio.

Explain the calculations required to accomplish each task.

Make sure to use the feedback your group received for your previous submission.

Submission 3

For this submission, use the data in the "GWP_PTAP_Data.xlsx" spreadsheet, which includes the month-end closing prices for 10[2] SPDR funds and the S&P 500 in 2017.

Complete the following tasks:

a) Compute the price return for each SPDR and the S&P 500 for each month of 2017.

b) Compute the active return (relative to the S&P 500) for each SPDR for each month of 2017.

c) Calculate the monthly tracking error for each SPDR in 2017.

Identify the SPDR that best tracks the S&P 500 and explain how you came to this conclusion.

Explain the calculations required to accomplish each task.

[2] Note that the XLC SPDR did not exist at this time.