

Project 1: Investment Science

Guideline: The uploaded dataset(.xlsx) provides 10 years (from 2011.01 to 2020.12) of monthly returns on financial assets as summarized below. Based on the dataset and any software (Python recommended), compute and answer the questions. Note that you must use the sample mean and covariance matrix of monthly *logarithmic return* for computation. Please remember that KOR10Y in dataset is only returns; otherwise, the format of data is price. In the end, you must submit (1) Project Report(.pdf) and (2) Programming codes(.pdf) as deliverable.

Stocks (10)			
SAMSUNG ELECTRONICS	삼성전자	KAKAO	카카오
NAVER	네이버	KB FINANCIAL GROUP	KB금융
LG CHEM	LG화학	LG HHC	LG생활건강
HYUNDAI MOTOR	현대자동차	SK TELECOM	SK텔레콤
SAMSUNG SDI	삼성SDI	SK INNOVATION	SK이노베이션
Market Indices (1)		Risk-free rate (1)	
KOSPI	코스피 지수	KOR10Y	한국 재무부 채권 10년물

[Modern Portfolio Theory]

Compute the portfolio return, standard deviation, and weights for

1. Minimum variance point when short-selling is allowed.
2. Target portfolio return to be 1% per month when short-selling is allowed.
3. Minimum variance point when short-selling is NOT allowed.
4. Target portfolio return to be 1% per month when short-selling is NOT allowed.
5. Target portfolio return to be 2% per month when short-selling is NOT allowed.

(Hint: Recommend to use matrix multiplication for short-selling allowed and cvxopt package for no-short selling condition as provided in supplementary PDF files)

[CAPM & Factor Model]

Summarize the result of each model (see page 17 of Ch.5) and describe the model's adequacy in representing the stock returns (see page 18 of Ch.5).

1. Apply the CAPM (see page 19 of Ch.5) for SAMSUNG ELECTRONICS & NAVER.
2. Apply the single-factor model for KAKAO & SK TELECOM (risk-free rate factor excluded).