Project 1

Due date: 10/11/2020

Capital Asset Pricing Model (CAPM):

$$\text{CAPM:} \qquad r_{jt} = \alpha_j + \beta_{j1} r_{mt} + \varepsilon_{jt} \tag{1}$$

where: r_{jt} = risk premium of stock j at time t.
r_{mt} = risk premium of market portfolio at time t.

According to the Capital Asset Pricing Model (CAPM) of Sharpe (1964) and Lintner (1965), the model has attempted to understand the determination of risk premium on financial securities. The central theme of several literatures is that the risk premium should depend on a security's market beta or other measure(s) of systematic risk. In a classic test of the CAPM, Black, Jensen and Scholes (1972), building on the earlier insight of Jensen (1968), examine the intercepts in time-series regressions of excess test-portfolio returns on market excess returns. Given the CAPM implication that the market portfolio is efficient, these intercepts or "alphas" should be zero.

Accordingly, based on CAPM, there should be no intercept term (or Jensen Alpha $\alpha_j = 0 \quad \forall j = 1, 2, \ldots, n$). If risk premium of market portfolio can fully explain risk premium of all stocks in the market, then, Jensen Alphas of the stocks in the market should all be equal to zero. A joint F-test of this hypothesis has been developed by Gibbons, Ross and Shanken (1989), who also explore the relation of the test statistic to standard portfolio geometry.

Therefore, in order to test $H_0 : \alpha_1 = \alpha_2 = \cdots = \alpha_n = 0$, Gibbons, Ross, Shanken (1989) GRS test can be applied. However, since risk premium of individual stock is mostly prone to various noises, the test should be performed using risk premium of portfolio instead.

Data Set:

The data set of monthly stock prices of 610 stocks (`project1.dta`) contains sample of all stocks traded on the Stock Exchange of Thailand (SET) during the period July 2015 through July 2020.

Variable Description:

`time` = month/date/year
`year` = year
`month` = month
`set` = SET Index
`set100` = SET100
`pricej`= Price of stock j, where j=1, 2, …, 610
`t` = 0, 1, …, 60 period
`rf` = Monthly rate of return of risk-free asset

Requirements:

Part I

(a) Determine beta coefficients of all 610 stocks based on CAPM using SET as market portfolio.
(b) Rank the stocks on the bases of beta by sorting the estimated beta coefficients of all 610 stocks ascendingly, form 10 portfolios using centile, then, compute equally weighted portfolio risk premium of all 10 portfolios.
(c) Perform GRS test of these ten portfolios using grstest and grstest2 ado-file command. Make interpretation of the test and draw the conclusion.

Part II

(d) Determine beta coefficients of all 610 stocks based on CAPM using SET as market portfolio.
(e) Rank the stocks on the bases of beta by sorting the estimated beta coefficients of all 610 stocks ascendingly, form 5 portfolios using quintile, then, compute equally weighted portfolio risk premium of all 5 portfolios.
(f) Perform GRS test of these ten portfolios using grstest and grstest2 ado-file command. Make interpretation of the test and draw the conclusion.

Part III

(g) Determine beta coefficients of all 610 stocks based on CAPM using SET100 as market portfolio.
(h) Rank the stocks on the bases of beta by sorting the estimated beta coefficients of all 610 stocks ascendingly, form 5 portfolios using quintile, then, compute equally weighted portfolio risk premium of all 5 portfolios.
(i) Perform GRS test of these ten portfolios using grstest and grstest2 ado-file command. Make interpretation of the test and draw the conclusion.