

Assignment-FIN501-Term2-2020

Important Note: All Estimates should be done using **Gretl** and student will get a complete mark only if she/he provides an explanation of the obtained results. The assignment is not only about Gretl estimation, it is also about how student explains and communicates the obtained statistical results.

PartI: (Minimum Word count is 800 words) (40 points)

*On the blackboard BUiD there is a folder **PartI** that contains a worksheet with monthly stock prices from March 2004 through December 2018 for the following:*

- *S&P500 price index considered as Market price index*
- *Four individual company stocks: Target, CISCO, Amgen and Best Buy.*
- *A 13-weeks Treasury bill (Short-maturity Treasury bill), which is used a risk free asset.*

Capital Asset Pricing Model

First, we need to compute the **excess returns** of the S&P500, Target, CISCO, Amgen, and Best Buy.

- (a) Calculate the **excess** returns of S&P500 index and the four company stocks given in the **Folder PartI**.
- (b) Report and comment on summary statistics of the five excess returns calculated in (a) including correlations between all these excess returns.
- (c) Check for the existence of outliers. What can you conclude?
- (d) Check the stationarity of all excess returns.
- (e) Run a scatter plot between each company stock excess return and S&P500 excess, what can you say about linearity based on scatter plots.
- (f) Estimate betas for each asset by regressing each asset's excess return on the market's excess return assuming that the S&P500 index is the market index. Do these regressions give us reason to reject the assumptions of the Capital Asset Pricing Model? (An implication of the Capital Asset Pricing Model is that the Alpha coefficients (i.e., intercepts) should be zero. From the regression output, are the Alpha coefficients statistically different from zero?)
- (e) Suppose the risk free rate today is the mean short-maturity Treasury bill return from March 2004 through December 2018, and risk premiums are constant. Using the Capital Asset Pricing Model, what is the expected return of each risky asset today?
- (f) Which of the four assets has the greatest firm-specific risk? Which has the greatest market risk?

For which asset does market movement explain a greater fraction of return variability?

- (g) Verify that the squared correlation (from (c)) between market excess return and stock excess return is equal to R-square (from (d)).
- (h) Check the assumptions of all the regressions.

PartII: (Minimum Word count is 800 words)(35 points)

The data of this part is available in the excel file named ***“MutualFunds.xls”*** in the folder ***PartII***. the dataset includes the following five variables:

Fund Type: The type of fund, labeled DE (Domestic Equity), IE (International Equity), and FI (Fixed Income).

Net Asset Value (\$): The closing price per share on December 31, 2007.

5-Year Average Return (%): The average annual return for the fund over the past five years.

Expense Ratio (%): The percentage of assets deducted each fiscal year for fund expenses.

Morningstar Rank: The risk adjusted star rating for each fund; Morningstar ranks go from a low of 1-Star to a high of 5-Stars.

- a) Develop an estimated regression equation that can be used to predict the 5-year average return given the type of fund. At the 5% level of significance, test for a significant relationship.
- b) Did the estimated regression equation developed in part (a) provide a good fit to the data? Explain.
- c) Develop the estimated regression equation that can be used to predict the 5-year average return given the type of fund, the net asset value, and the expense ratio. At the 5% level of significance, test for a significant relationship. Do you think any variables should be deleted from the estimated regression equation? Explain.
- d) Morningstar Rank is a categorical variable. Because the data set contains only funds with four ranks (2-Star through 5-Star), use the following dummy variables: 3StarRank=1 for a 3-Star fund, 0 otherwise; 4StarRank=1 for a 4-Star fund, 0 otherwise; and 5StarRank=1 for a 5-Star fund, 0 otherwise. Develop an estimated equation that can be used to predict the 5-year average return given the type of fund, the expense ratio, and the Morningstar Rank. Using 5% significance level, remove any independent variables that are not significant.
- e) Use the estimated regression equation developed in part (d) to predict the 5-year average return for a domestic equity fund with an expense ratio of 1.05% and a 3-Star Morningstar Rank.

PartIII: (Minimum Word count is 500 words) (25 points)

Community Bank would like to increase the number of customers who use payroll direct deposit. Management is considering a new sales campaign that will require each branch manager to call each customer who does not currently use payroll direct deposit. As an incentive to sign up for payroll direct deposit, each customer contacted will be offered free checking for two years. Because of the time and cost associated with the new campaign, management would like to focus their efforts on customers who have the highest probability of signing up for payroll direct deposit. Management believes that the average monthly balance in customer's checking account may be a useful predictor of whether the customer will sign up for direct payroll deposit. To investigate the relationship between these two variables, Community Bank tried the new campaign using a sample of 50 checking account customers who do not currently use payroll direct deposit. The sample data show the average monthly checking account balance (in hundreds of dollars) and whether the customer contacted signed up for payroll direct deposit (coded 1 if the customer signed up for payroll direct deposit and 0 if not). The data are contained in the excel file named "**Bank.xls**" in the **Folder PartIII** and each variable is named as follow:

Variable "**Balance**" is the monthly checking account balance (in hundreds of dollars)

Variable "**Deposit**" is a dummy variable that is coded 1 if the customer contacted signed up for payroll direct deposit and 0 if not.

- a) Write the logistic regression equation relating *Balance* to *Deposit*.
- b) For the Community Bank data, use Gretl to compute the estimated logistic regression equation.
- c) Conduct a test of significance using the Chi-square test statistic. Use $\alpha=5\%$
- d) Estimate the probability that customers with an average monthly balance of \$1000 will signed up for direct deposit.
- e) Suppose Community Bank only wants to contact customers who have a .50 or higher probability of signing up for direct payroll deposit. What is the average monthly balance required to achieve this level of probability?
- f) What is the estimated odds ratio? What is its interpretation?