Part. One

1.. I selected two companies, the 1st being 'Continental Illinois' (CONTIL) from the banking industry which at one time was one of the 7th largest commercial bank in the history of the United States. In 1984, Continental Illinois became the largest ever bank failure in U.S. history. The second company I chose was 'BOISE'(BOISE) which is part of the forestry industry. All the uploaded data 'Data_For_Analysis' is in (IN[2]), the index of the newly uploaded data frame to the date column, using the command 'set index' is in (IN[3]), Cleaned data by removing Nan in the selected series(IN[6]).

2. Data is plotted on (In [11]) for both of my selected stocks 'CONTIL' and 'BOISE'. Scatter graph for 'BOISE' is on (IN [24]). Scatter graph for 'CONTIL' is on [IN [43]). From the plotted data graph of both stocks i.e. (IN [11]) we can see during the month of October 1981 both stocks had their lowest return on their stocks within the selected time period. A negative return can be interpreted to mean many things, but it often occurs when a company or business has a financial loss or significant lacklustre returns on an investment. In addition to this a rate of return can be negative when an investor puts money into a company that, due to poor management or factors beyond its control, struggles during the period of investment. It acts as a signal for outside investors that it is not a very wise to invest in the 'BOISE' and 'CONTIL' stocks during that month. From the plotted graph we can work out from both stocks 'BOISE' and 'CONTIL' there is no correlation between the Market returns and the returns on both the selected individual stocks. The trends differ no matter the selected time period. Comparing 'BOISE' stock with the forestry company Weyerhaeuser 'we can see that both companies follow very similar trends in their stock returns, the is exemplified in (IN[109]) where during the selected time period they both experienced one of their highest return in stock at 1982-08-02(0.379 – BOISE) and Weyerhaeuser(0.221 – WEYER). Returns are arguably similar between these two companies because they are in the same industry i.e. Forestry. Comparing 'BOISE' stock with the banking company Citicorp we can see similar trends in their sock returns as shown in (IN [108]). However, there is fluctuations in 1984 stock returns for Continental Illinois. CONTIL experienced a fall in expected return due to its insolvency due to its participation in bad loans purchased from failed banks and risky loans for oil and gas producers.

3. OLS estimate on (IN [47]) For 'CONTIL', estimate on (IN [48]) for 'BOISE'.
P value for 'CONTIL' is 0.302 which is greater than the level of significance 0.05. So, we accept the null hypothesis when testing beta=0 with a 95% confidence level. We also reject the null hypothesis when beta is greater than 1. We can Reject the hypothesis if 0 is not included in the confidence interval for beta. With the CAPM, alpha is the rate of return that exceeds the OLS model's prediction. Investors generally prefer investments with high alpha. For example, if the CAPM analysis indicates that the return should have earned 7%, based on risk, but instead the return earned just 4 % it is considered as discouraging for investors.

When alpha is = 0 we accept the null hypothesis, when alpha is not equal to zero, we reject the null hypothesis. (IN [122]). Comparing 'CONTIL' stock with the stock of 'Citicorp' which is within the same industry it is very similar to 'CONTIL' hypotheses. We accept the null hypothesis when testing for beta=0 and reject it when beta is larger than 1. (IN [128-130]).

4.The standard deviation of the 'CONTIL' stock (IN [52]). The standard deviation on the 'Boise' stock (IN [53]). The standard deviation is often used by investors to measure the risk of a stock. The basic idea is that the standard deviation is a measure of volatility: the more a stock's returns vary from the stock's average return, the more volatile the stock. To illustrate we can check the mean and variance of one of the stocks such as 'CONTIL'. In finance, the coefficient of variation allows investors to determine how much volatility, or risk, is assumed in comparison to the amount of return expected from investments. The lower the ratio of standard deviation to mean return, the better risk-return trade-off. ([IN (90)]. Therefore, we can say the better risk return trade of is the 'BOISE' stock compared to 'CONTIL' stock.

5.Economists believe that R-squared cannot determine whether estimates and predictions are biased, which is why it is imperative to assess the residual plots by the proportion of the risk attributable to the market. R-squared does not indicate whether the OLS regression model is adequate which is why economist believe in risk attributed to the market rather than individual factors. You can have a low R-squared value for a good model, or a high R-squared value for a model that does not fit the data. A high R-squared does not necessarily indicate that the model has a good fit. Economists believe that R squared is the percentage of total risk explained by systematic risk. The selected stock I have chosen shows than values show Boise stock is more correlated the 'CONTIL' stock shown in (IN[46]- ),(IN[47]) i.e. values of R squared vales for 'BOISE' stock is much higher than the Squared value of 'CONTIL 'stock. Moreover, the more variance that is accounted for by the regression model the closer the data points will fall to the fitted regression line. If a model could explain 100% of the variance, the fitted values would always equal the observed values and, therefore, all the data points would fall on the fitted regression line and r squared will equal to one.

6. Chow test for both stocks (BOISE and CONTIL) is (IN128-130]). P Value for both stocks are greater than the level of significance 0.05, therefore so we accept the null hypothesis. 'CONTIL' data contained a structural break, due to a change in policy or sudden shock to the economy. According to the New York Times 'market *perceptions of Continental's condition deteriorated abruptly in July 1982 with the failure of Penn Square, a relatively small bank in Oklahoma. The late 1970s saw a sharp upward spike in oil prices, which led to rapid growth in opportunities to lend in the oil-producing states, including Oklahoma'.* The is exemplified by the chow test illustrating the structural break during this specific time period of 1984. As a result, continental bank lost more than any other bank having participated in careless oil and gas loan and had to declare $1.3 billion in bankruptcy. The company then had to borrow $3.6 billion from the government, however this was still not enough to make it solvent. However, the Chow test may suggest splitting the data. This may mean fewer degrees of freedom. But

there is the potential for structural instability across the whole data range. It is possible to test every observation for a structural break for both the 'BOISE' and 'CONTIL' stocks to make sure its stable of over the full time period.

7. Computed data with Na dropped. (IN [76]).

Wald test /F Test– [IN (104}.

AIC and BIC describe goodness of fit of a model, the lower the value the better the goodness of fit. For example, using the Continental Illinois 'CONTIL; stock, if the CAPM AIC of. -122.9 [IN (142)], and APM has AIC of -117.8 [IN (103)], the CAPM has greater goodness of fit. CAPM was better at modelling the returns on this stock. CAPM is criticized because of the difficulties in selecting a substitution for the market returns and having an appropriate benchmark and target. Using models like the Arbitrage Pricing Model seeks to resolve these issues and is less restrictive than CAPM. The APM is based on assumptions such markets are perfectly competitive, which from the previous analysis shows that companies like 'Boise' and 'Weyerhaeuser' are in a competitive forestry industry. Another assumption APM make is that investors always prefer more wealth to less wealth. CAPM uses the expected market return whereas, APM uses the expected rate of return and the risk of a number of (macroeconomic) factors. The CAPM lets investors calculate the expected return on investment given the risk, risk-free rate of return, expected market return. The arbitrage pricing model is paired to the CAPM that uses fewer expectations and can be harder to implement than the CAPM. It can be concluded that many investors prefer to use the CAPM, a one-factor model, over the more convoluted APM, which requires users to quantify numerous factors of a model. Evidence suggests APM is not resilient for all stocks. It can be argued that the APM results may not be favourable on stock such as 'Gerber' and 'General Mills' in the food industry. APM uses the expected stock return as the dependent variable in the same way as CAPM, but a variety of independent variables and can be included, including the market return. Macroeconomic variables such as inflation and exchange rates can also be included. The Wald test is one approach to perform hypothesis testing. It is a way to find out if variables in a model are significant. An advantage of the Wald test over the others is that it only requires the estimation of the OLS model as shown through the results on the table. Wald test /F Test– [IN (104}]. For the 'Contil' stock the F test was more than 0.05 so it means all are jointly insignificant and assumes the intercept model is better at explaining variations stock returns. This was also the case for the 'Boise' stock.

8. A CAPM approach is useful as it allows us to determine the required return on a risky asset. In equilibrium, all assets should generate the same risk-to-reward ratio. Assets with poor risk-to-reward ratio would be avoided by investors. Without a risk-free rate, we have no tangency that is best for all investors, so portfolio choice will be based on the tangency of risky assets in relation to their degree of risk aversion

PART 2

1.In my sample I decided to conduct a test of normality, the Jarque– Bera test shows a large J-B value indicates that errors are not normally distributed. This is the case 'CONTIL', so it hints towards abnormal distribution. The p value for the Contil stock is less than the 5% significance level therefore we can reject the null hypothesis and conclude that the stock is not normally distributed. The Kolmogorov-Smirnov test generally can't be used for discrete distributions and normality. So, I reject the null hypothesis if $p < 0.05$. So, if $p < 0.05$, we don't believe that the residuals follows a normal distribution. With the 'Contil' stock we have a very small deviation and a very large P value greater than 0.05% hinting normal distribution. I used the Anderson-Darling statistic to determine whether the residuals are significant are not. The P value is greater than 0.05. This means that the data might originate from normal distribution at a 5% significance level using the Anderson-Darling test. The shapiro- wilk test shows that if the p-value is less than 0.05, then the null hypothesis which states whether the data is normally distributed is rejected. If the p-value is greater than 0.05, then the null hypothesis is not rejected. The p value is greater than the level of significance, so we accept the shapiro wilk test for the Contil stock. For the Boise stock we have a very small deviation and a large P value hinting normal distribution. Overall, we should be worried if they do not result in normal distribution due to the fact that normality tests are only needed for small sample sizes. Most of the residuals tested tend to be selected with a smaller sample size. It can be argued that small sample sizes results in low significance power for normality tests. But it also means that significant deviations from normality will not result in significance. Tests can say there's no deviation from normality while it could theoretically be huge.

2. For naive forecasts, we set all forecasts to be the value of the last observation. This method works well for many economic and financial models. Normally the higher the number, the worse it affects a company because a widely inaccurate forecast makes it impossible to plan for firms and companies. This was not the case for my selected stocks. The problem with this method is that it expects the future to be like the last. This is not a good approach as it is unsophisticated and an ingenious way of plotting data. The simple moving average is calculated as the arithmetic average of a stock returns price over a specific period. It is thereby simpler to calculate; however, it relies on more historic data. Moving Average can be an effective method of forecasting in some instances, you can get better accuracy by combining forecasting method, not taking all the data, and taking specific observations. Simple Exponential Smoothing - the exponential smoothing method is going to use historical data to forecast. One of the benefits of this model is that it takes the most current observations into account and weights them appropriately. Another benefit is that spikes in the data aren't quite as unfavourable to the forecast as previous methods such as the simple average method or the moving average method. The most recent forecast has the highest weight and therefore should be the most precise in calculating requirements, contrasting to the moving averages method where the weight for each period is stable. However, the exponential smoothing method limits our ability to forecast demand using seasonality. The

Holt's Linear Trend method extends the simple exponential smoothing method to allow the forecasting of data with a trend. This method implicates a forecast equation and two more equations. However, the difficulty with this method is that, sometimes different accuracy measures will suggest different forecasting methods, and then a decision will them have to be required as to which forecasting method to use. Holt's forecasting method can vary by many proportions. ARIMA forecasts are usually more accurate and reliable. ARIMA is a univariate model (working with one variable only). However, if other variables are important, then a multivariate model a better choice. A distinct disadvantage of The ARIMA model is that it tends to be unstable, both with respect to changes in observations and changes in model requirements. Relating to the MSE - lower the value the better is the forecasting (as it is closer to the actual mean value observed). shows that the moving average forecast was a better forecasting method than the simple average forecasting method.

3. The Breusch–Godfrey Test shows us that the null hypothesis for a test means the error variances are all equal. The alternate hypothesis is that the error variances are not equal. The test is important because it shows heteroskedasticity could still be present at any given time in my regression model. It is more appropriate for a general regression model such as the OLS regression model which I have been using for my selected stock 'BOISE' and 'CONTIL', so this is a strong econometric technique to use. The Durbin-Watson statistic will always have a value between 0 and 4. A value of 2.0 means that there is no autocorrelation detected in the sample. Values from 0 to less than 2 indicate positive autocorrelation and values from 2 to 4 indicate negative autocorrelation. This is a good econometric technique because the Autocorrelation can be useful in technical analysis, which is most concerned with the certain trends of stocks and in certain instances a company's financial performance. [IN66] In my coursework a Durbin Watson statistical test was done the Continental Illinois' stock and it showed no auto correlation. The Watson test gave us may give conclusive results compared to other techniques such as the Jarque Bera test. The White test is explicitly intended to test for forms of heteroskedasticity. One of the main benefits of using the white test for heteroskedasticity is it does not rely on the normality assumptions and it is also easy to implement. This test is not perceptive to normality disruptions, which means it is ideal to use for my selected stocks.

4. My stocks showed me how useful it is testing certain econometric theories in finance and stock returns. It also taught the importance of testing hypotheses regarding the relationships between variables. I saw the effect on stock markets of changes in economic conditions. Furthermore, I learned that Econometric forecasters have a history of neglecting future crises for example the in 1984 Continental Illinois became the largest ever bank failure in U.S. history. Consequently, I saw the effect it had on the stock returns. Moreover, the most important thing I learned is that the better the forecast the more you are able to oversee the potential of returns and understandably how that could potentially generate more money and success for a company.