Compensation for CEOs – Performance Linked??

- A Statistical Analysis of Company Performance with respect to CEO Renumeration.

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PROJECT OBJECTIVE

DATA INTERPRETATION -

A DATA-SET CONTAINING 'COMPENSATION PAID TO CEOs ' IS COLLECTED WITH SIDE-BY-SIDE DATA OF RESPECTIVE COMPANIES YEARLY RETURNS FOR FOUR YEARS.

THE DATA IS COLLECTED FROM 194 ORGANIZATIONS.

TWO SETS/ FILES OF DATA IS AVAILABLE –

1. 'Sample 1' – FILE CONSISTS OF DATA WITHOUT GROUPING THE COMPANIES IN ANY MANNER.
2. 'Sample 2' – FILE CONSISTS OF DATA AFTER ELIMINATING THE EXTREME VALUES FROM 'Sample 1'[also termed as OUTLIERS].

PROJECT OBJECTIVE –

- ➤ TO PERFORM EXPLORATORY DATA ANALYSIS.
- ➤ CHECK OUTLIERS.
- ➤ UNIVARIATE AND MULTI-VARIATE ANALYSIS.
- ➤ CHECK THE CO-RELATION OF 'YEARLY RETURNS' TO THE 'COMPENSATION' OF CEOs.
- ➤ ESTIMATE OPTIMUM COMPENSATION FOR CEO @ DEFINED CONFIDENCE LEVELS.
- ➤ VALIDATE THE GROUP OF COMPANIES THAT CAN BE MERGED BASED 'YEARLY RETURN' PERFORMANCE.

WORKING ENVIORNMENT SETUP

I. SOFTWARE TOOL 'R STUDIO' IS ESTABLISHED .

II. WORKING DIRECTORY IS SET TO ACCESS WORKING FILE – 'Sample1.xlsx'.

     a. setwd (C:/Users/prade/OneDrive/Desktop/BABI/SMDM/ASSIGNMENT-2')

III. Working file imported using 'Import Dataset' option in Global Environment.

IV. The file is assigned as 'ceo1' in R Studio. Dimensions are verified -

     a. dim(ceo1) – gives a result of 194 Elements with 6 variables have been successfully imported.

V. The Structure of Data is checked for class of each variables. ALL 05 VARIABLES are found to be in 'NUMERIC' observations & 01 Variable is found to be in 'CHARACTER' observation; hence 'R' will recognize this data for calculations.

     a. str(ceo1)

NOW THE DATA FILE - 'ceo1' - IS READY FOR DATA MANUPULATIONS AND STATISTICAL ANALYSIS.

UNIVARIATE ANALYSIS – SUMMARY.

SUMMARY of data –

The SUMMARY of Data is called for and verified for any missing values.

Command - [summary(ceo1)]

NOTE – FOR SUMMARY TABLE , PLEASE REFER TO ANNEXURE -I ; TABLE-I

The FIVE Basic Statistical elements of analysis namely – Minimum Value (Min.)of the observed 194 Values, First Inter Quartile Range (1st Qu.), Median of the 194 Observations (Median), Average / Mean of the 194 Observations (Mean), Third Inter Quartile Range (3rd Qu.) and Maximum Value of the observed 194 Values – for EACH OF THE TWELVE VARIABLES is listed.

INSIGHTS -

   I. **No missing value is identified and listed. All data points are complete in nature.**
   II. **The vide GAP between the 3rd Quartile figure and the MAX. Value in all the FIVE Variables indicate clearly that OUTLIERS are present.**
   III. **Evaluating the Means position from the Median –**
   - a. **First Year Return'Y1 Return' – indicates a negative trend.**
   - b. **Second, Third- & Fifth-Year Returns – Mean is positioned ahead of Median indicating growth of figures.**

UNIVARIATE ANALYSIS – SAMPLE 1[ceo1] Data File.

CEO COMPENSATION [Compen] –

Graph -I
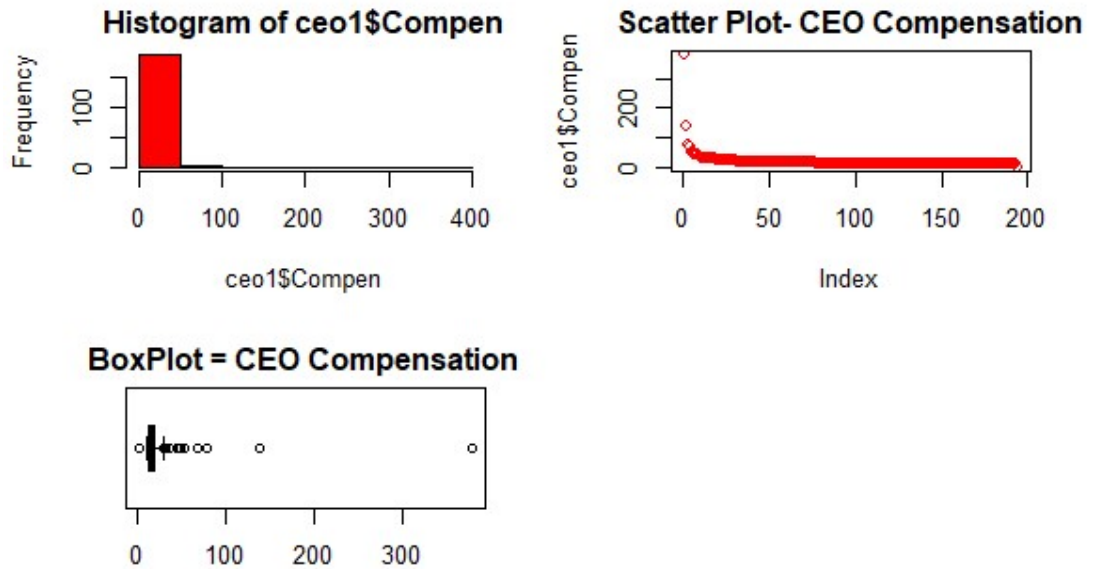
INFERENCES -

Data Distribution – Histogram [Graph I] shows data is LEFT Skewed.

Scatter Plot indicates NO LINEAR Relationship.

BOX PLOT Suggests the data is Left Skewed with significant presence of Outliers.

MAJORITY OF THE COMPANIES IN THE DATA BANK HAS 'CEO' RENUMERATION WITHIN THE RANGE OF '50'.

YEAR One Returns [Y1Return] –

Graph-2
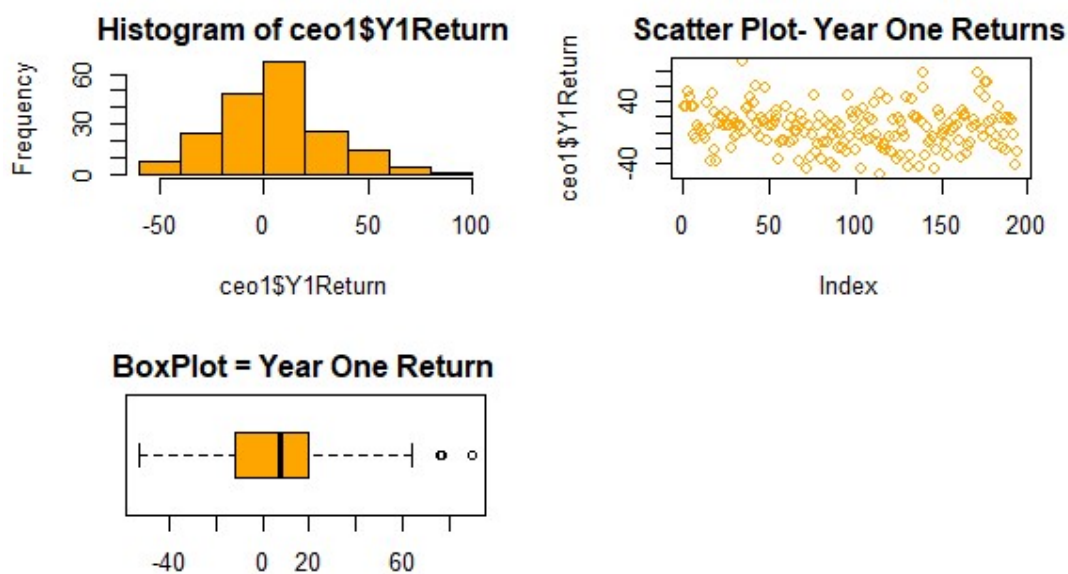
INFERENCES -

Data Distribution – Histogram[Graph 2] shows data is LEFT SKEWED. Frequency of NEGETIVE Returns is quite alarming – **MAJORITY COMPANIES are in the Negative Returns area**.

Scatter plot indicates data centralized around YEARELY RETURNS Figure of '-10 ~ +10'.

BOXPLOT - **OUTLIERS have been identified by the boxplot method, extreme values being found to be present beyond the 3rd Quartile value. This indicates certain companies with huge returns as compared to the majority, indicating out-of-the group ones.**
.

SECOND YEAR Returns[Y2Return] –

Graph 3-
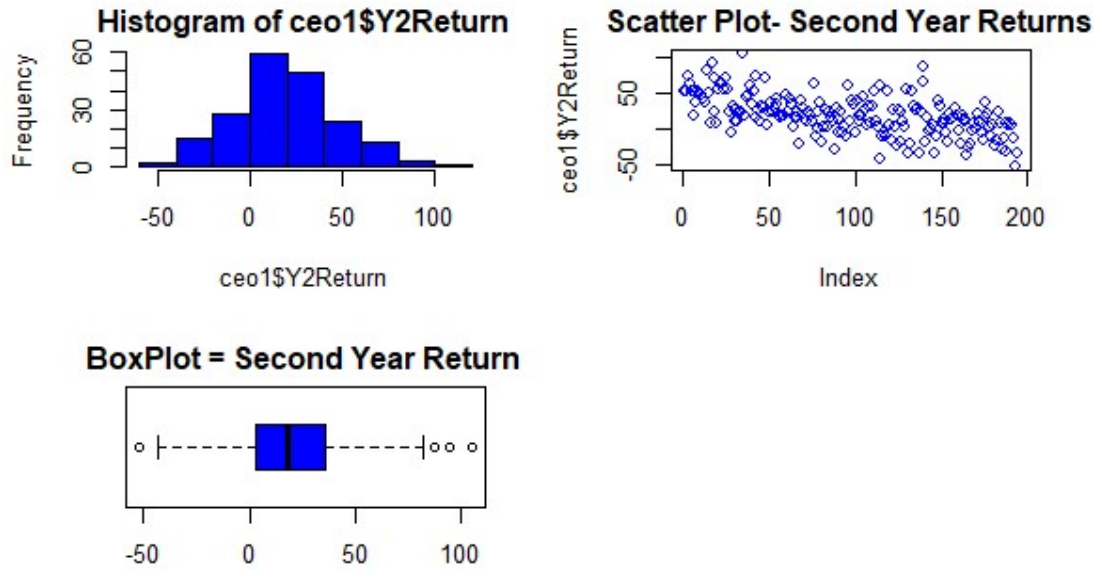
INFERENCES -

Data Distribution –Histogram[Graph 3] shows a RIGHT SKEWEDNESS of the data. Positive Returns shows an increase.

Scatter plot suggests high density of above the ZERO MARK.

BOXPLOT shows NO SKEWNESS of DATA**. Outliers are present , non-significant at the 'Below that 1.5IQR -Q1 range' and significant 'Above the 1.5IQR + Q3 range'**

THIRD YEAR Returns[Y3Return] –

Graph 4 -

Histogram of ceo1$Y3Return

Scatter Plot- Third Year Returns

BoxPlot = Third Year Return
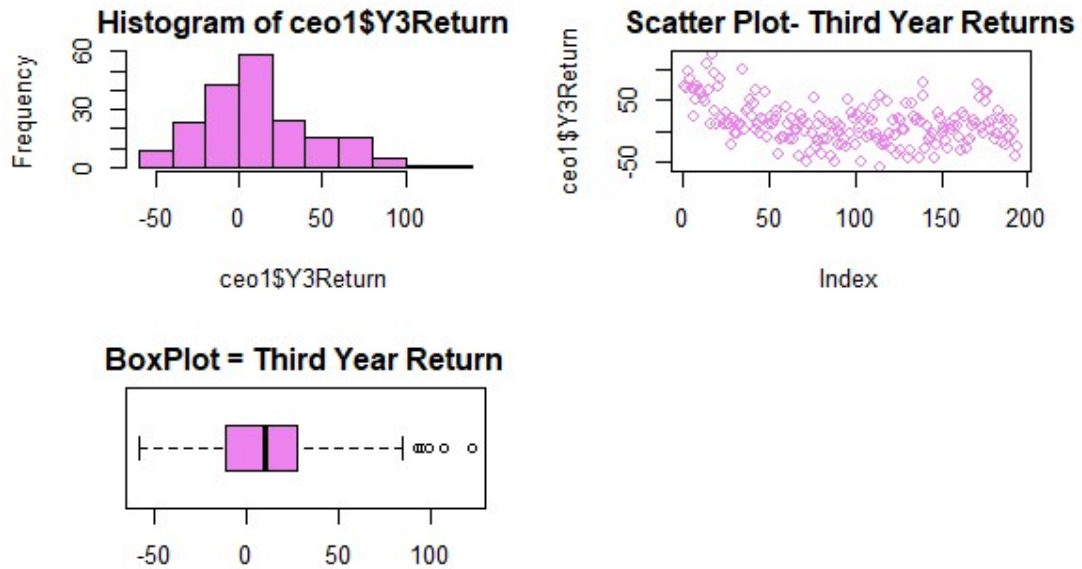
INFERENCES -

Data Distribution –Histogram[Graph 4] shows that data RIGHT SKEWED. POSITIVE Returns show a decline.

Scatter Plot evidences concentration of Number of Companies with Returns in the range '0 ~5 as the maximum.

BOXPLOT indicates presence of SIGNIFICANT OUTLIERS at the **'Above the 1.5IQR + Q3 range'**.

FIFTH YEAR Returns[Y5Return] –
Graph 5 -

Histogram of ceo1$Y5Return

Scatter Plot- FIFTH Year Returns

BoxPlot = FIFTH Year Return
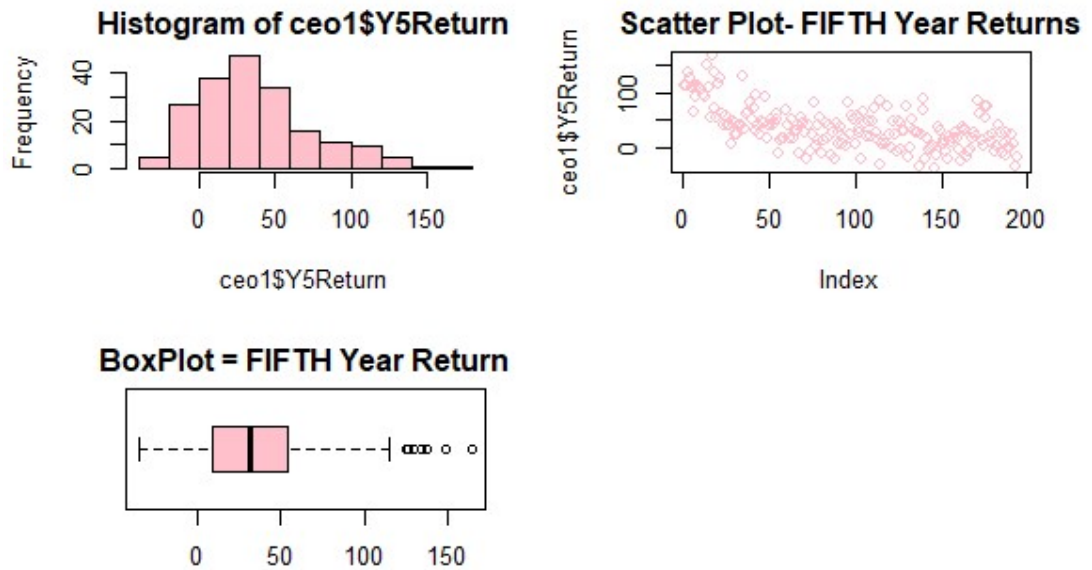
INFERENCES -
Data Distribution –Histogram[Graph 5] shows that data is completely RIGHT SKEWED.

Scatter Plot shows Distribution above the ZERO RETURNS mark – WITH MINUTE NEGETIVE RETURNS RECORDED, Suggesting **A PARADIM SHIFT IN THE PERFORMANCE OF COMPANIES**

BOXPLOT - shows presence **of SIGNIFICANT OUTLIERS** at the **'Above the 1.5IQR + Q3 range'**.

CORRELATION & VARIANCE MATRIX – SAMPLE 1[ceo1] Data File.

The correlation Matrix between 'Compensation for CEOs' and 'Year-on-Year returns' is plotted[Graph 6] and Correlation Value Matrix is derived[Table 1].

<u>Graph 6-</u>
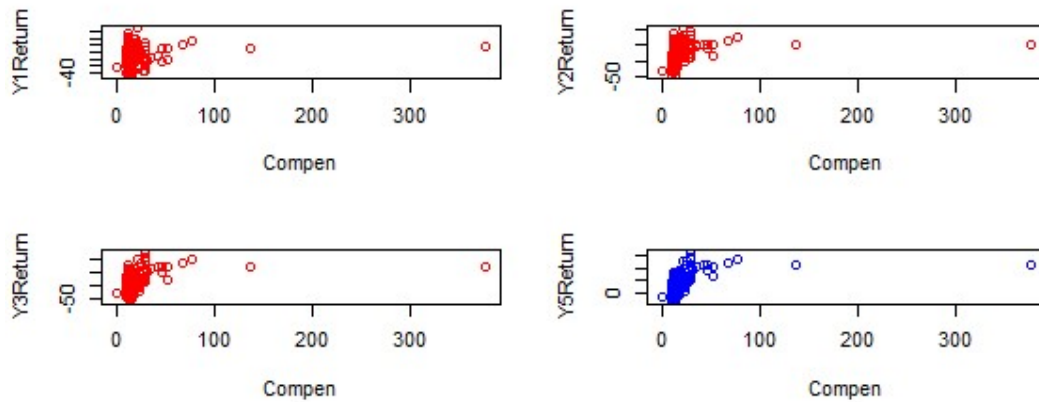
<u>Table 1</u>

Correlation between 'Compensation' & First Year Returns ➔14.57%
Correlation between 'Compensation' & Second Year Returns ➔25.51%
Correlation between 'Compensation' & Third Year Returns ➔30.59%
Correlation between 'Compensation' & Fifth Year Returns ➔36.55%

It is evident from the above data that a POSITIVE LINEAR Relation exists between the Compensation of CEO & Yearly Returns – The Longer the period the better the Yearly Returns the CEO can generate.

Coefficient of Variation Analysis – is tabled below [Table 2] ➔

Table 2 -

	Y1Return	Y2Return	Y3Return	Y5Return
MEAN	6.05	19.38	11.95	36.98
SD	26.08	27.92	33.37	37.97
COEFF. OF VARIANCE	4.31	1.44	2.79	1.03

Even though there is an influence of OUTLIERS in all FOUR Years of data, the 'Coefficient of Variance' = Standard Deviation ÷ Mean , is seen reducing as it approaches the FIFTH Year. This means there is a better consolidation of Returns, with POSITIVE TREND .

Year 1 ⇔ Year 3 ⇔ Year 5 – Variance Analysis of Company Returns

Table 3 -

	Y1Return	Y3Return	Y5Return
MEAN	6.05	11.95	36.98
SD	26.08	33.37	37.97
COEFF. OF VARIANCE	4.31	2.79	1.03

Year 1 Returns ➔ had the mean returns hovering @ 6.05, which is an effect of Majority of the companies having NEGETIVE RETURNS.

Year 3 Returns ➔ do show positive increment on the Returns figures, with companies in the 50th to 75th percentile increasing in numbers with POSITIVE RETURNS.

Year 5 Returns ➔ bought majority of the companies OUT OF THE Negative Returns cluster, all companies above the 25th Percentile mark being in the POSITIVE RETURNS CATEGORY.

THE ABOVE INTERPRETATION IS VALIDATED WITH THE FACT THAT THE COEFFIECIENT OF VARIATION FOR THE 5TH YEAR RETURNS IS 1/4TH OF THE 1ST YEAR RETURNS. THIS ALSO INDICATES THAT THE 05TH YEAR PERFORMANCE IS MORE STABLE THAT OTHER TWO YEARS.

CORRELATION & VARIANCE MATRIX – SAMPLE 2[ceo2] Data File.

For detailed data analysis, subsets of each group are created and saved in the Global Environment. Files are available as 'ceog1- for G1 Group'; 'ceog2- G2 Group'; 'ceog3- G3 Group'; 'ceog4- G4 Group'; 'ceog5- G5 Group' & 'ceog6- G6 Group'.

OUTLIER Analysis for SIX Groups –
Graph 7 -
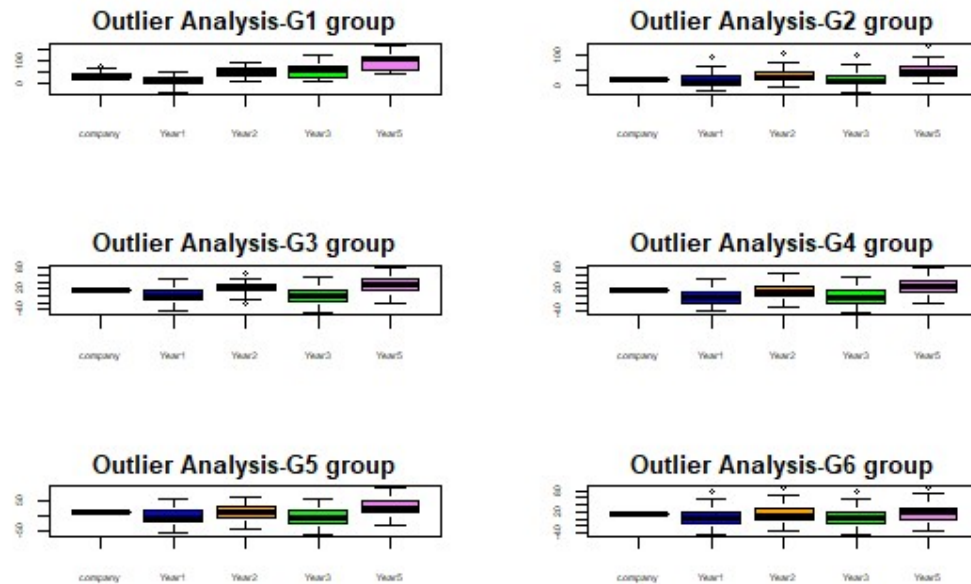
This grouping of the COMPANY w.r.t. the CEO Compensation data has much resulted in getting the Outliers avoided.
We can expect a better Co-Relation & Variance analysis with this data.

CORRELATION & VARIANCE Analysis – GROUP1 Companies ➜

Graph 8 -

Table 4

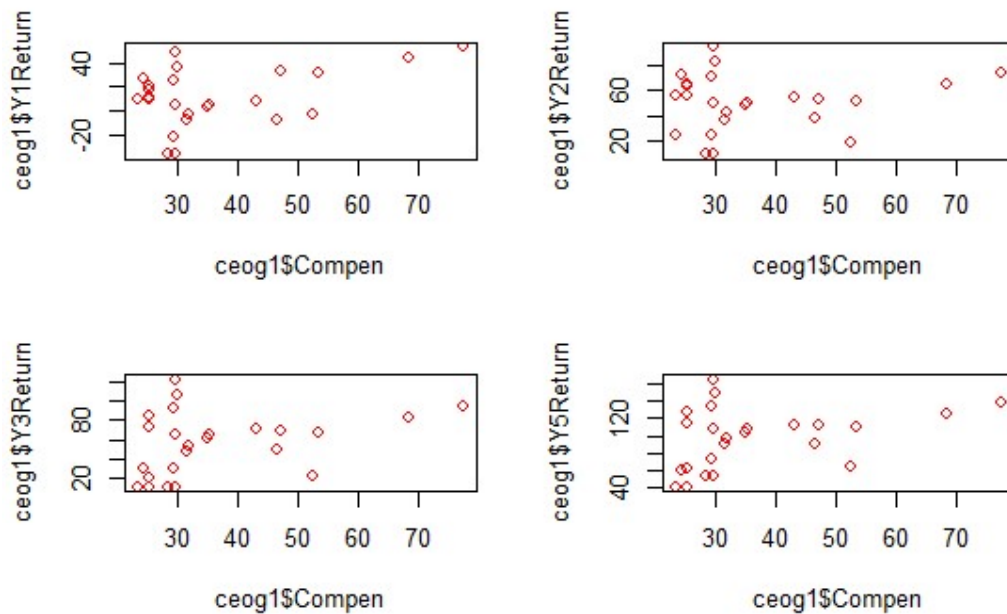|	
Correlation between 'Compensation' & First Year Returns	➜0.4042
Correlation between 'Compensation' & Second Year Returns	➜0.0881
Correlation between 'Compensation' & Third Year Returns	➜0.3499
Correlation between 'Compensation' & Fifth Year Returns	➜0.3716

The Correlation coefficient is observed as STABLE ACROSS the THREE YEARS with an exception in the second year – wherein the correlation is almost negligible.

The Coefficient of Variance is tabulated as follows –

Table 5 -

	Y1Return	Y2Return	Y3Return	Y5Return
MEAN	11.56	50.36	54.73	94.81
SD	22.92	21.15	32.29	34.81
COEFF. OF VARIANCE	1.98	0.42	0.59	0.37

The coefficient of variance is observed to decrease year-on-year , the least being in the 05th Year.
The Performance factor is STABLE across the period of FIVE Years with a given fixed Compensation – for GROUP 1 Companies. 05TH year Performance is best with least variance.

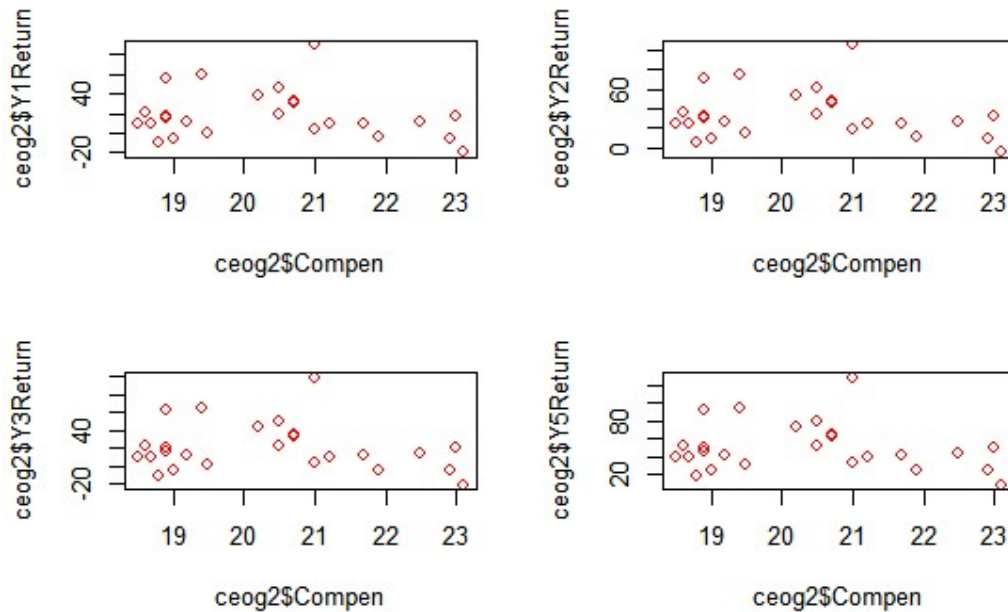**CORRELATION & VARIANCE Analysis – GROUP2 Companies ➔**

Graph 9 -

Table 6

Correlation between 'Compensation' & First Year Returns   ➔-0.1660
Correlation between 'Compensation' & Second Year Returns   ➔-0.1660
Correlation between 'Compensation' & Third Year Returns   ➔-0.1660
Correlation between 'Compensation' & Fifth Year Returns   ➔-0.1660

The Correlation coefficient is observed as STABLE ACROSS the FOUR YEARS. A negative correlation coefficient indicates that Increase of Compensation to CEOs will adversely affect the Company Returns

The Coefficient of Variance is tabulated as follows –

Table 7 -

	Y1Return	Y2Return	Y3Return	Y5Return
MEAN	18.56	33.56	20.42	50.42
SD	24.14	24.14	26.55	26.55
COEFF. OF VARIANCE	**0.77**	**1.39**	**0.77**	**1.90**

Coefficient of variance values indicates that performance of YEAR ONE & YEAR THREE is better as compared to YEAR TWO & YEAR FIVE.

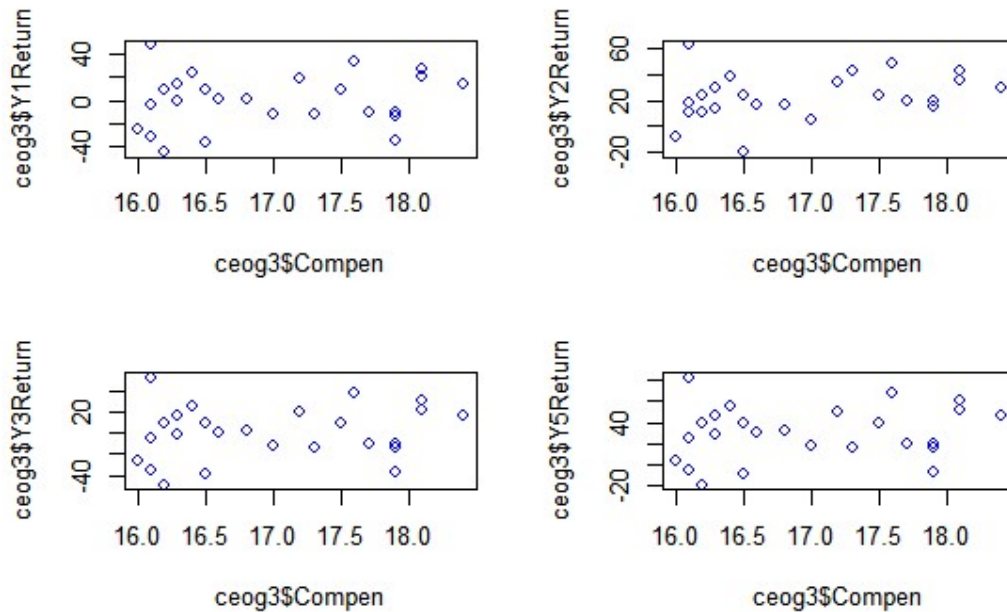**CORRELATION & VARIANCE Analysis – GROUP3 Companies ➔**

Graph 10-

Table 8

Correlation between 'Compensation' & First Year Returns ➔0.1622
Correlation between 'Compensation' & Second Year Returns ➔0.2736
Correlation between 'Compensation' & Third Year Returns ➔0.1622
Correlation between 'Compensation' & Fifth Year Returns ➔0.1622

The Positive Correlation coefficient observed, is STABLE ACROSS the THREE YEARS, with an exception in the SECOND Year. Second year correlation is higher than the other THREE Years, indicating a better performance.

The Coefficient of Variance is tabulated as follows –

Table 9 -

	Y1Return	Y2Return	Y3Return	Y5Return
MEAN	0.040	22.880	0.044	30.044
SD	22.810	17.459	25.091	25.091
COEFF. OF VARIANCE	0.002	1.310	0.002	1.197

Coefficient of variance values indicate that Performance of YEAR ONE and YEAR THREE and best as compared to YEAR TO & YEAR FIVE.

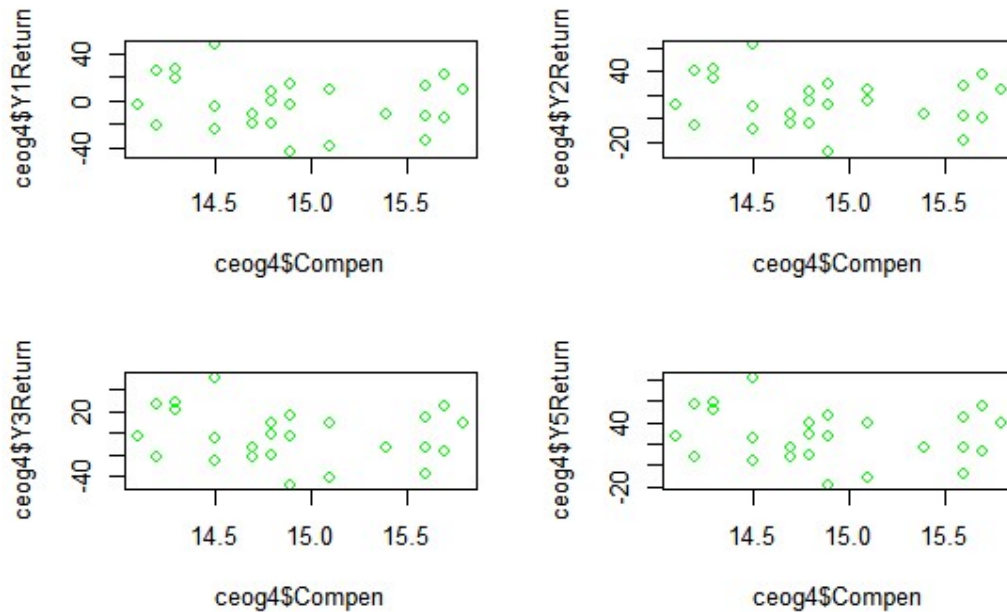**CORRELATION & VARIANCE Analysis – GROUP4 Companies ➔**

Graph 11-

Table 10

Correlation between 'Compensation' & First Year Returns   ➔-0.1705
Correlation between 'Compensation' & Second Year Returns   ➔-0.1534
Correlation between 'Compensation' & Third Year Returns   ➔-0.1705
Correlation between 'Compensation' & Fifth Year Returns   ➔-0.1705

The Negative Correlation coefficient observed, is STABLE ACROSS the FOUR YEARS. An increase of Compensation factor will affect the company adversely on its Returns Part. Group 4 Companies are at RISK Zone as far as CEO Compensation package is concerned.

 The Coefficient of Variance is tabulated as follows –

Table 11 -

	Y1Return	Y2Return	Y3Return	Y5Return
MEAN	-2.880	13.640	-3.168	26.832
SD	21.706	20.490	23.876	23.876
COEFF. OF VARIANCE(CV)	**-0.133**	**0.666**	**-0.133**	**1.124**

Negative CV is due to negative Mean. Else, Year One and Year Three performance are much better that Year TWO. Year FIVE has much unstable performance by showing high spread of Returns data.

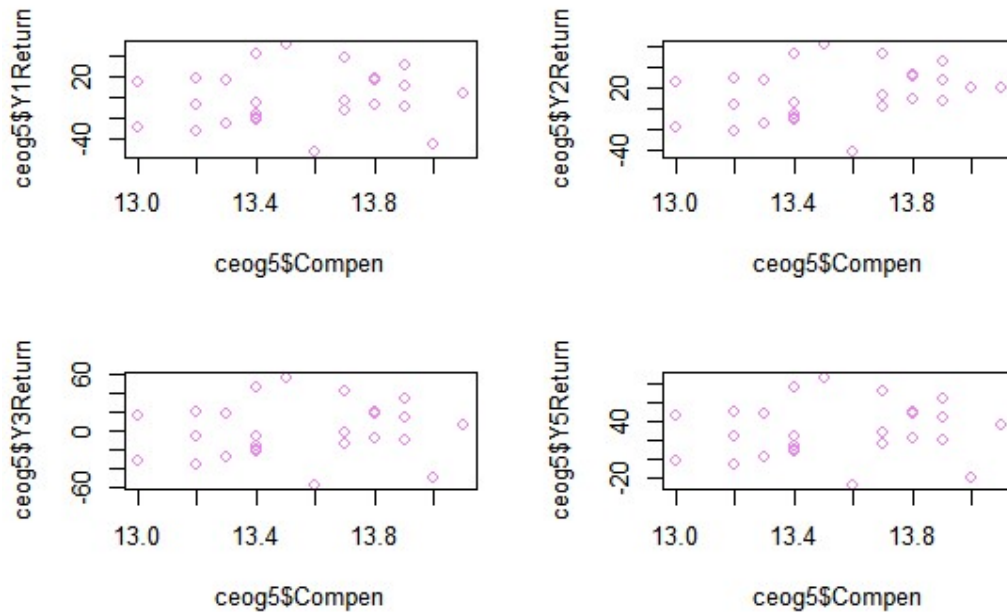**CORRELATION & VARIANCE Analysis – GROUP5 Companies ➔**

Graph 12 -

Table 12 -

Correlation between 'Compensation' & First Year Returns ➔0.0956
Correlation between 'Compensation' & Second Year Returns ➔0.3020
Correlation between 'Compensation' & Third Year Returns ➔0.0956
Correlation between 'Compensation' & Fifth Year Returns ➔0.0956

Positive Correlation coefficient observed, STABLE ACROSS the THREE YEARS. Second year performance is better, indicated by the best correlation coefficient.

The Coefficient of Variance is tabulated as follows –

Table 13 -

	Y1Return	Y2Return	Y3Return	Y5Return
MEAN	-0.840	13.360	-0.924	29.076
SD	26.147	25.323	28.761	28.761
COEFF. OF VARIANCE	**-0.032**	**0.528**	**-0.032**	**1.011**

Year One and Year Three performance are much better that Year TWO. Year FIVE has the most unstable performance by showing high spread of Returns data.

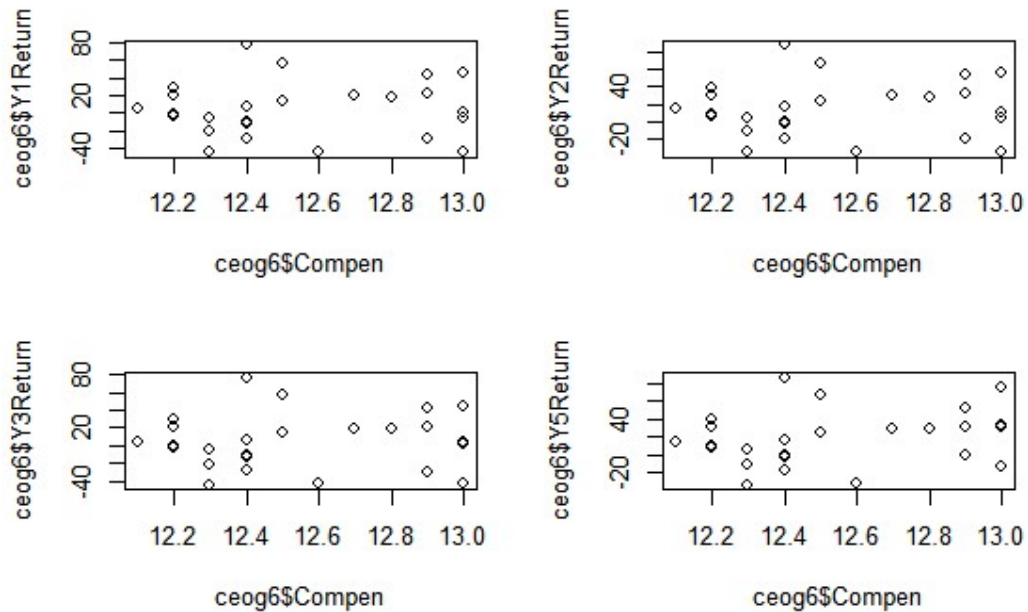**CORRELATION & VARIANCE Analysis – GROUP6 Companies** ➔
Graph 13 -

Table 14 -

Correlation between 'Compensation' & First Year Returns	➔0.0337
Correlation between 'Compensation' & Second Year Returns	➔0.0337
Correlation between 'Compensation' & Third Year Returns	➔0.0518
Correlation between 'Compensation' & Fifth Year Returns	➔0.2424

Positive Correlation coefficient observed, STABLE ACROSS the THREE YEARS. FIFTH Year performance is better, indicated by the best correlation coefficient.

The Coefficient of Variance is tabulated as follows –
Table 15 -

	Y1Return	Y2Return	Y3Return	Y5Return
MEAN	4.280	14.280	4.644	18.644
SD	30.750	30.750	30.680	30.467
COEFF. OF VARIANCE	0.139	0.464	0.151	0.612

Year One and Year Three performance are much better that Year TWO and Year FIVE.

CONFIDENCE LEVEL ANALYSIS – grouped companies.

The sample Size is 25. Being less that 30, we will go for a 't' Test.

The confidence level with detailed methodology is tabulated below –

Table 16 -

		GROUP 6	GROUP 5	GROUP 4	GROUP 3	GROUP 2	GROUP 1
a	CONFIDENCE Level	90%	90%	90%	90%	90%	90%
b	ALPHA Level [100% - a]	10%	10%	10%	10%	10%	10%
c	ALPHA Value - either side of Normal Distribution Curve'	5%	5%	5%	5%	5%	5%
d	SAMPLE Size 'n'	25	25	25	25	25	25
e	Degrees of Freedom ' n-1'	24	24	24	24	24	24
	t' value from T-Table for DF=24 & Alpha Level = 0.05	1.7109	1.7109	1.7109	1.7109	1.7109	1.7109
f	Standard Deviation 'SD'	0.30072	0.306046	0.522241	0.796062	1.47632	14.02543
g	STANDARD Error 'SE' = ' SD / Sq.Rt of [n]'	0.060144	0.061209	0.104448	0.159212	0.295264	2.805086
h	t-Value x SE	0.1029	0.104723	0.1787	0.272396	0.505167	4.799222
i	POPULATION Mean	12.544	13.544	13.544	16.988	20.372	35.96
j	**UPPER Confidence Level ' i + h'**	**12.65**	**13.65**	**13.72**	**17.26**	**20.88**	**40.76**
k	**LOWER Confidence Level ' i - h'**	**12.44**	**13.44**	**13.37**	**16.72**	**19.87**	**31.16**

CHOOSING BEST BENCHMARKS FOR PERFORMANCE

The confidence Level Intervals for the variable parameters – CEO Compensation, Year 1 ; Year 2 ; Year 3 & Year 5 RETURNS were evaluated at two Confidence levels – 90% & 95 %.

The results derived is tabulated as below for analysis –

FOR GROUP 6 ➔

Table 17 -

DESIRED BENCHMARKS -	90% CONFIDENCE LEVEL			95% CONFIDENCE LEVEL		
	MINIMUM	MAXIMUM	RANGE	MINIMUM	MAXIMUM	RANGE
CEO COMPENSATION	12.44	12.65	0.21	12.42	12.67	0.25
YEAR I RETURNS - MINIMUM LEVEL	(0.42)	14.53	14.95	-1.96	16.07	18.03
YEAR II RETURNS - MINIMUM LEVEL	42.63	58.15	15.52	41.03	59.75	18.72
YEAR III RETURNS - MINIMUM LEVEL	38.70	62.47	23.77	36.25	64.93	28.68
YEAR IV RETURNS - MINIMUM LEVEL	77.04	102.80	25.76	74.38	105.46	31.08

Analyzing the range of variations for each confidence level, the minimum range is effective with 90% Confidence Level performance parameters.

Thereby, as a recruiter, I would choose to set the CEO Compensations and the related YEARLY RETURNS performance achievable with 90% Confidence Level on the on the given data. This ensures minimum payout to CEO while ensuring optimum range of Returns to the company.

NOTE – Desired detailed calculation can be referred to ANNEXURE – I attached.

For GROUP 5 –

Table 18-

DESIRED BENCHMARKS -	90% CONFIDENCE LEVEL			95% CONFIDENCE LEVEL		
	MINIMUM	MAXIMUM	RANGE	MINIMUM	MAXIMUM	RANGE
CEO COMPENSATION	13.44	13.65	0.21	13.42	13.67	0.25
YEAR I RETURNS	(10.63)	7.27	17.90	-12.47	9.11	21.58
YEAR II RETURNS	3.85	21.19	17.34	2.07	22.97	20.9
YEAR III RETURNS	(11.61)	8.08	19.69	-13.64	10.11	23.75
YEAR IV RETURNS	18.39	38.08	19.69	16.36	40.11	23.75

Analyzing the range of variations for each confidence level, the minimum range is effective with 90% Confidence Level performance parameters.

Thereby, as a recruiter, I would choose to set the CEO Compensations and the related YEARLY RETURNS performance achievable with 90% Confidence Level on the on the given data. This ensures minimum payout to CEO while ensuring optimum range of Returns to the company.

NOTE – Desired detailed calculation can be referred to ANNEXURE – II attached.

FOR GROUP 4 –

Table 19-

DESIRED BENCHMARKS -	90% CONFIDENCE LEVEL			95% CONFIDENCE LEVEL		
	MINIMUM	MAXIMUM	RANGE	MINIMUM	MAXIMUM	RANGE
CEO COMPENSATION	13.37	13.72	0.35	13.33	13.76	0.43
YEAR I RETURNS	(13.19)	1.67	14.86	-14.72	3.2	17.92
YEAR II RETURNS	3.75	17.77	14.02	2.3	19.22	16.92
YEAR III RETURNS	(14.22)	2.12	16.34	-15.9	3.81	19.71
YEAR IV RETURNS	15.78	32.12	16.34	14.1	33.81	19.71

Analyzing the range of variations for each confidence level, the minimum range is effective with 90% Confidence Level performance parameters.

Thereby, as a recruiter, I would choose to set the CEO Compensations and the related YEARLY RETURNS performance achievable with 90% Confidence Level on the on the given data. This ensures minimum payout to CEO while ensuring optimum range of Returns to the company.

NOTE – Desired detailed calculation can be referred to ANNEXURE – III attached.

FOR GROUP 3 –
Table 20 -

DESIRED BENCHMARKS -	90% CONFIDENCE LEVEL			95% CONFIDENCE LEVEL		
	MINIMUM	MAXIMUM	RANGE	MINIMUM	MAXIMUM	RANGE
CEO COMPENSATION	16.72	17.26	0.54	16.66	17.32	0.66
YEAR I RETURNS	(7.76)	7.84	15.60	-9.38	9.46	18.84
YEAR II RETURNS	16.91	28.25	11.34	15.67	30.09	14.42
YEAR III RETURNS	(8.54)	8.63	17.17	-10.31	10.4	20.71
YEAR IV RETURNS	21.46	38.63	17.17	19.69	40.4	20.71

Analyzing the range of variations for each confidence level, the minimum range is effective with 90% Confidence Level performance parameters.

Thereby, as a recruiter, I would choose to set the CEO Compensations and the related YEARLY RETURNS performance achievable with 90% Confidence Level on the on the given data. This ensures minimum payout to CEO while ensuring optimum range of Returns to the company.

NOTE – Desired detailed calculation can be referred to ANNEXURE – IV attached.

FOR GROUP 2 ➜

Table 21 -

DESIRED BENCHMARKS -	90% CONFIDENCE LEVEL			95% CONFIDENCE LEVEL		
	MINIMUM	MAXIMUM	RANGE	MINIMUM	MAXIMUM	RANGE
CEO COMPENSATION	19.87	20.88	1.01	19.76	20.98	1.22
YEAR I RETURNS	10.30	26.82	16.52	8.6	28.52	19.92
YEAR II RETURNS	25.30	41.82	16.52	23.6	43.52	19.92
YEAR III RETURNS	11.33	29.50	18.17	9.46	31.38	21.92
YEAR IV RETURNS	41.33	59.50	18.17	39.46	61.38	21.92

Analyzing the range of variations for each confidence level, the minimum range is effective with 90% Confidence Level performance parameters.

Thereby, as a recruiter, I would choose to set the CEO Compensations and the related YEARLY RETURNS performance achievable with 90% Confidence Level on the on the given data. This ensures minimum payout to CEO while ensuring optimum range of Returns to the company.

NOTE – Desired detailed calculation can be referred to ANNEXURE – V attached

FOR GROUP 1 ➔

Table 22-

DESIRED BENCHMARKS -	90% CONFIDENCE LEVEL			95% CONFIDENCE LEVEL		
	MINIMUM	MAXIMUM	RANGE	MINIMUM	MAXIMUM	RANGE
CEO COMPENSATION	31.16	40.76	9.60	30.17	41.75	11.58
YEAR I RETURNS	3.72	19.40	15.68	2.1	21.02	18.92
YEAR II RETURNS	43.12	57.60	14.48	41.63	59.09	17.46
YEAR III RETURNS	43.68	65.78	22.10	41.4	68.06	26.66
YEAR IV RETURNS	82.90	106.72	23.82	80.44	109.18	28.74

Analyzing the range of variations for each confidence level, the minimum range is effective with 90% Confidence Level performance parameters.

Thereby, as a recruiter, I would choose to set the CEO Compensations and the related YEARLY RETURNS performance achievable with 90% Confidence Level on the on the given data. This ensures minimum payout to CEO while ensuring optimum range of Returns to the company.

NOTE – Desired detailed calculation can be referred to ANNEXURE – V attached

T – TEST ANALYSIS for MEAN of GROUPS

Table 23 -

t-Test ANALYSIS ==> CEO Compensation Factor

Group Combination	p - Value	µ' of First Group	µ' of Second Group	INFERENCE
GROUP 1 ~ GROUP 2	1.94E-10	35.96	20.372	P' Value LOW; MEAN Not SAME
GROUP 1 ~ GROUP 3	2.85E-08	35.96	16.988	P' Value LOW; MEAN Not SAME
GROUP 1 ~ GROUP 5	4.01E-10	35.96	13.544	P' Value LOW; MEAN Not SAME
GROUP 2 ~ GROUP 3	2.90E-13	20.372	16.988	P' Value LOW; MEAN Not SAME
GROUP 2 ~ GROUP 5	2.20E-15	20.372	13.544	P' Value LOW; MEAN Not SAME
GROUP 3 ~ GROUP 5	2.20E-16	16.988	13.544	P' Value LOW; MEAN Not SAME

REFER 'ANNEXURE – VII' FOR DETAILED EVALUATION .

Table 24 -

t-Test ANALYSIS ==> FIFTH Year Returns Factor

Group Combination	p - Value	µ' of First Group	µ' of Second Group	INFERENCE
GROUP 1 ~ GROUP 2	9.01E-06	94.808	50.416	P' Value LOW; MEAN Not SAME
GROUP 1 ~ GROUP 3	1.84E-09	94.808	30.044	P' Value LOW; MEAN Not SAME
GROUP 1 ~ GROUP 5	4.63E-09	94.808	29.076	P' Value LOW; MEAN Not SAME
GROUP 2 ~ GROUP 3	8.78E-03	50.416	30.044	P' Value LOW; MEAN Not SAME
GROUP 2 ~ GROUP 5	1.03E-02	50.416	29.076	P' Value LOW; MEAN Not SAME
GROUP 3 ~ GROUP 5	9.02E-01	30.044	29.076	P' Value HIGH; MEAN is SIGNIFICATLY SAME

REFER 'ANNEXURE – VIII' FOR DETAILED EVALUATION

Table 25 -

t-Test ANALYSIS ==> THIRD Year Returns Factor

Group Combination	p - Value	μ' of First Group	μ' of Second Group	INFERENCE
GROUP 1 ~ GROUP 2	2.04E-04	54.728	20.416	P' Value LOW; MEAN Not SAME
GROUP 1 ~ GROUP 3	3.58E-08	54.728	0.044	P' Value LOW; MEAN Not SAME
GROUP 1 ~ GROUP 5	8.55E-08	54.728	-0.924	P' Value LOW; MEAN Not SAME
GROUP 2 ~ GROUP 3	8.78E-03	20.416	0.044	P' Value LOW; MEAN Not SAME
GROUP 2 ~ GROUP 5	1.03E-02	20.416	-0.924	P' Value LOW; MEAN Not SAME
GROUP 3 ~ GROUP 5	9.02E-01	0.044	-0.924	**P' Value HIGH; MEAN is SIGNIFICATLY SAME**

INFERENCES ON GROUP MERGING –

FROM 'Table 24' & 'Table 25' – it is evident that GROUP 5 & GROUP 3 can be merged based on the YEARLY RETURNS Factor – the MEAN of the Performance criteria falling in the same region.

The CEO Compensation needs slight adjustment after MERGER.

MERGING GROUP 3 & GROUP 5 [GROUP35]

=> PREDICTION FOR CEO COMPENSATION & YEARLY RETURNS

Group 3(ceog3) & Group 5 (ceog5) is joined using the 'rbind' command in R.

New data frame – 'ceog35' is created in the environment, for analysis.

The confidence Intervals derived is tabulated below -

DESIRED BENCHMARKS -	90% CONFIDENCE LEVEL			95% CONFIDENCE LEVEL		
	MINIMUM	MAXIMUM	RANGE	MINIMUM	MAXIMUM	RANGE
CEO COMPENSATION	14.64	15.89	1.25	14.52	16.02	1.5
YEAR III RETURNS	(9.68)	8.80	18.48	-11.58	10.7	22.28
YEAR V RETURNS	20.32	38.80	18.48	18.42	40.7	22.28

Negotiations by the recruiter maybe conducted based on the above CEO Renumeration w.r.t. YEARLY RETURNS Performance benchmarks - for the desired GROUP CEO Appointment.

NOTE – Desired detailed calculation can be referred to ANNEXURE – X attached.

ANNEXURE – I

➔ **SUMMARY FOR 'ceo1' DATA FILE.**

```
  Company              Compen           Y1Return
Length:194         Min.   :  1.20    Min.   :-53.000
Class :character   1st Qu.: 12.30    1st Qu.:-11.750
Mode  :character   Median : 14.40    Median :  7.500
                   Mean   : 19.83    Mean   :  6.052
                   3rd Qu.: 18.77    3rd Qu.: 19.750
                   Max.   :378.00    Max.   : 90.000
    Y2Return            Y3Return          Y5Return
Min.   :-52.00     Min.   :-58.30    Min.   :-35.000
1st Qu.:  3.00     1st Qu.:-11.00    1st Qu.:  9.575
Median : 18.00     Median :  9.90    Median : 31.100
Mean   : 19.38     Mean   : 11.95    Mean   : 36.977
3rd Qu.: 35.75     3rd Qu.: 27.23    3rd Qu.: 54.075
Max.   :105.00     Max.   :122.20    Max.   :164.200
```

➔**SUMMARY FOR 'ceo2' DATA FILE.**

```
                      Company       Groups        Compen
3M                        :  1    G1:25    Min.   :12.10
Abbott Laboratories       :  1    G2:25    1st Qu.:13.53
Abercrombie & Fitch       :  1    G3:25    Median :15.90
Advanced Micro Devices    :  1    G4:25    Mean   :19.05
Affiliated Managers Group:  1     G5:25    3rd Qu.:20.43
Aflac                     :  1    G6:25    Max.   :77.60
(Other)                   :144
    Y1Return            Y2Return          Y3Return          Y5Return
Min.   :-53.00     Min.   :-43.00    Min.   :-58.30    Min.   :-35.00
1st Qu.:-11.75     1st Qu.:  8.25    1st Qu.:-11.00    1st Qu.: 16.80
Median :  6.00     Median : 24.00    Median : 10.45    Median : 39.90
Mean   :  5.12     Mean   : 24.68    Mean   : 12.62    Mean   : 41.64
3rd Qu.: 19.75     3rd Qu.: 41.75    3rd Qu.: 28.90    3rd Qu.: 59.42
Max.   : 90.00     Max.   :105.00    Max.   :122.20    Max.   :164.20
```

ANNEXURE – II

	GROUP 6 - CONFIDENCE INTERVAL Evaluations	COMPEN.	Y1	Y2	Y3	Y5		COMPEN.	Y1	Y2	Y3	Y5
a	CONFIDENCE Level [1- Alpha]	90%	90%	90%	90%	90%		95%	95%	95%	95%	95%
b	ALPHA Level [100% - a]	10%	10%	10%	10%	10%		5%	5%	5%	5%	5%
c	SAMPLE Size 'n'	25	25	25	25	25		25	25	25	25	25
d	Degrees of Freedom ' n-1'	24	24	24	24	24		24	24	24	24	24
e	t' value from T-Table for DF=24 & Alpha Level = 0.1	1.7109	1.7109	1.7109	1.7109	1.7109		2.0639	2.0639	2.0639	2.0639	2.0639
f	Standard Deviation 'SD'	0.30	21.84	22.68	34.73	37.65		0.30	21.84	22.68	34.73	37.65
g	STANDARD Error 'SE' = ' SD / Sq.Rt of [n]'	0.06	4.37	4.54	6.95	7.53		0.06	4.37	4.54	6.95	7.53
h	t-Value x SE	0.10	7.47	7.76	11.88	12.88		0.12	9.02	9.36	14.34	15.54
i	POPULATION Mean	12.544	7.05556	50.3889	50.5889	89.9222		12.54	7.06	50.39	50.59	89.92
j	UPPER Confidence Level ' i + h'	12.65	14.53	58.15	62.47	102.80		12.67	16.07	59.75	64.93	105.46
k	LOWER Confidence Level ' i - h'	12.44	(0.42)	42.63	38.70	77.04		12.42	(1.96)	41.03	36.25	74.38
l	MINIMUM Value observed	12.1	-36	9	11	41		12.1	-36	9	11	41
m	MAXIMUM Value observed	13	49	94	122.2	164.2		13	49	94	122.2	164.2

ANNEXURE – III

	GROUP 5 - CONFIDENCE INTERVAL Evaluations	COMPEN	Y1	Y2	Y3	Y5		COMPEN.	Y1	Y2	Y3	Y5
a	CONFIDENCE Level	90%	90%	90%	90%	90%		95%	95%	95%	95%	95%
b	ALPHA Level [100% - a]	10%	10%	10%	10%	10%		5%	5%	5%	5%	5%
c	SAMPLE Size 'n'	25	25	25	25	25		25	25	25	25	25
d	Degrees of Freedom ' n-1'	24	24	24	24	24		24	24	24	24	24
e	t' value from T-Table for DF=24 & Alpha Level = 0.05	1.71	1.71	1.71	1.71	1.71		2.06	2.06	2.06	2.06	2.06
f	Standard Deviation 'SD'	0.31	26.15	25.32	28.76	28.76		0.31	26.15	25.32	28.76	28.76
g	STANDARD Error 'SE' = ' SD / Sq.Rt of [n]'	0.06	5.23	5.06	5.75	5.75		0.06	5.23	5.06	5.75	5.75
h	t-Value x SE	0.10	8.95	8.67	9.84	9.84		0.13	10.79	10.45	11.87	11.87
i	POPULATION Mean	13.54	(1.68)	12.52	(1.76)	28.24		13.54	(1.68)	12.52	(1.76)	28.24
j	**UPPER Confidence Level ' i + j'**	**13.65**	**7.27**	**21.19**	**8.08**	**38.08**		**13.67**	**9.11**	**22.97**	**10.11**	**40.11**
k	**LOWER Confidence Level ' i - j'**	**13.44**	**(10.63)**	**3.85**	**(11.61)**	**18.39**		**13.42**	**(12.47)**	**2.07**	**(13.64)**	**16.36**
l	MINIMUM Value of CEO Compensation observed	13	-53	-43	-58.3	-28.3		13	-53	-43	-58.3	-28.3
m	MAXIMUM Value of CEO Compensation observed	14.1	51	61	56.1	86.1		14.1	51	61	56.1	86.1

ANNEXURE – IV

GROUP 4 - CONFIDENCE INTERVAL EVALUATIONS

		COMPEN	Y1	Y2	Y3	Y5	COMPEN.	Y1	Y2	Y3	Y5
a	CONFIDENCE Level	90%	90%	90%	90%	90%	95%	95%	95%	95%	95%
b	ALPHA Level [100% - a]	10%	10%	10%	10%	10%	5%	5%	5%	5%	5%
c	SAMPLE Size 'n'	25	25	25	25	25	25	25	25	25	25
d	Degrees of Freedom ' n-1'	24	24	24	24	24	24	24	24	24	24
e	t' value from T-Table for DF=24 & Alpha Level = 0.05	1.71	1.71	1.71	1.71	1.71	2.06	2.06	2.06	2.06	2.06
f	Standard Deviation 'SD'	0.52	21.71	20.49	23.88	23.88	0.52	21.71	20.49	23.88	23.88
g	STANDARD Error 'SE' = ' SD / Sq.Rt of [n]'	0.10	4.34	4.10	4.78	4.78	0.10	4.34	4.10	4.78	4.78
h	t-Value x SE	0.18	7.43	7.01	8.17	8.17	0.22	8.96	8.46	9.86	9.86
i	POPULATION Mean	13.54	(5.76)	10.76	(6.05)	23.95	13.54	(5.76)	10.76	(6.05)	23.95
j	**UPPER Confidence Level ' i + h'**	**13.72**	**1.67**	**17.77**	**2.12**	**32.12**	**13.76**	**3.20**	**19.22**	**3.81**	**33.81**
k	**LOWER Confidence Level ' i - h'**	**13.37**	**(13.19)**	**3.75**	**(14.22)**	**15.78**	**13.33**	**(14.72)**	**2.30**	**(15.90)**	**14.10**
l	MINIMUM Value of CEO Compensation observed	14.1	-44	-29	-48.4	-18.4	14.1	-44	-29	-48.4	-18.4
m	MAXIMUM Value of CEO Compensation observed	15.8	47	62	51.7	81.7	15.8	47	62	51.7	81.7

ANNEXURE – V

GROUP 3 - CONFIDENCE INTERVAL EVALUATIONS

		COMPEN	Y1	Y2	Y3	Y5		COMPEN.	Y1	Y2	Y3	Y5
a	CONFIDENCE Level	90%	90%	90%	90%	90%		95%	95%	95%	95%	95%
b	ALPHA Level [100% - a]	10%	10%	10%	10%	10%		5%	5%	5%	5%	5%
c	SAMPLE Size 'n'	25	25	25	25	25		25	25	25	25	25
d	Degrees of Freedom ' n-1'	24	24	24	24	24		24	24	24	24	24
e	t' value from T-Table for DF=24 & Alpha Level = 0.05	1.71	1.71	1.71	1.71	1.71		2.06	2.06	2.06	2.06	2.06
f	Standard Deviation 'SD'	0.80	22.81	17.46	25.09	25.09		0.80	22.81	17.46	25.09	25.09
g	STANDARD Error 'SE' = ' SD / Sq.Rt of [n]'	0.16	4.56	3.49	5.02	5.02		0.16	4.56	3.49	5.02	5.02
h	t-Value x SE	0.27	7.80	5.97	8.59	8.59		0.33	9.42	7.21	10.36	10.36
i	POPULATION Mean	16.99	0.04	22.88	0.04	30.04		16.99	0.04	22.88	0.04	30.04
j	**UPPER Confidence Level ' i + h'**	**17.26**	**7.84**	**28.85**	**8.63**	**38.63**		**17.32**	**9.46**	**30.09**	**10.40**	**40.40**
k	**LOWER Confidence Level ' i - h'**	**16.72**	**(7.76)**	**16.91**	**(8.54)**	**21.46**		**16.66**	**(9.38)**	**15.67**	**(10.31)**	**19.69**
l	MINIMUM Value of CEO Compensation observed	16	-45	-21	-49.5	-19.5		16	-45	-21	-49.5	-19.5
m	MAXIMUM Value of CEO Compensation observed	18.4	48	63	52.8	82.8		18.4	48	63	52.8	82.8

ANNEXURE – VI

GROUP 2 - CONFIDENCE INTERVAL EVALUATION

		COMPEN.	Y1	Y2	Y3	Y5		COMPEN.	Y1	Y2	Y3	Y5
a	CONFIDENCE Level	90%	90%	90%	90%	90%		95%	95%	95%	95%	95%
b	ALPHA Level [100% - a]	10%	10%	10%	10%	10%		5%	5%	5%	5%	5%
c	SAMPLE Size 'n'	25	25	25	25	25		25	25	25	25	25
d	Degrees of Freedom ' n-1'	24	24	24	24	24		24	24	24	24	24
e	t' value from T-Table for DF=24 & Alpha Level = 0.05	1.71	1.71	1.71	1.71	1.71		2.06	2.06	2.06	2.06	2.06
f	Standard Deviation 'SD'	1.48	24.14	24.14	26.55	26.55		1.48	24.14	24.14	26.55	26.55
g	STANDARD Error 'SE' = ' SD / Sq.Rt of [n]'	0.30	4.83	4.83	5.31	5.31		0.30	4.83	4.83	5.31	5.31
h	t-Value x SE	0.51	8.26	8.26	9.08	9.08		0.61	9.96	9.96	10.96	10.96
i	POPULATION Mean	20.37	18.56	33.56	20.42	50.42		20.37	18.56	33.56	20.42	50.42
j	**UPPER Confidence Level ' i + h'**	**20.88**	**26.82**	**41.82**	**29.50**	**59.50**		**20.98**	**28.52**	**43.52**	**31.38**	**61.38**
k	**LOWER Confidence Level ' i - h'**	**19.87**	**10.30**	**25.30**	**11.33**	**41.33**		**19.76**	**8.60**	**23.60**	**9.46**	**39.46**
l	MINIMUM Value observed	18.5	-20	-5	-22	8		18.5	-20	-5	-22	8
m	MAXIMUM Value observed	23.1	90	105	99	129		23.1	90	105	99	129

ANNEXURE – VII

GROUP 1 - CONFIDENCE INTERVAL EVALUATIONS

		COMPEN.	Y1	Y2	Y3	Y5		COMPEN.	Y1	Y2	Y3	Y5
a	CONFIDENCE Level	90%	90%	90%	90%	90%		95%	95%	95%	95%	95%
b	ALPHA Level [100% - a]	10%	10%	10%	10%	10%		5%	5%	5%	5%	5%
c	SAMPLE Size 'n'	25	25	25	25	25		25	25	25	25	25
d	Degrees of Freedom ' n-1'	24	24	24	24	24		24	24	24	24	24
e	t' value from T-Table for DF=24 & Alpha Level = 0.05	1.71	1.71	1.71	1.71	1.71		2.06	2.06	2.06	2.06	2.06
f	Standard Deviation 'SD'	14.03	22.92	21.15	32.29	34.81		14.03	22.92	21.15	32.29	34.81
g	STANDARD Error 'SE' = ' SD / Sq.Rt of [n]'	2.81	4.58	4.23	6.46	6.96		2.81	4.58	4.23	6.46	6.96
h	t-Value x SE	4.80	7.84	7.24	11.05	11.91		5.79	9.46	8.73	13.33	14.37
i	POPULATION Mean	35.96	11.56	50.36	54.73	94.81		35.96	11.56	50.36	54.73	94.81
j	**UPPER Confidence Level ' i + h'**	**40.76**	**19.40**	**57.60**	**65.78**	**106.72**		**41.75**	**21.02**	**59.09**	**68.06**	**109.18**
k	**LOWER Confidence Level ' i - h'**	**31.16**	**3.72**	**43.12**	**43.68**	**82.90**		**30.17**	**2.10**	**41.63**	**41.40**	**80.44**
l	MINIMUM Value of CEO Compensation observed	23.2	-36	9	11	41		23.2	-36	9	11	41
m	MAXIMUM Value of CEO Compensation observed	77.6	53	94	122.2	164.2		77.6	53	94	122.2	164.2

ANNEXURE – VIII

Group 1 Vs. GROUP 2 => CEO Compensation Analysis

```
data:   ceog1$Compen and ceog2$Compen
t = 5.4149, df = 48, p-value = 1.937e-06
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
  9.799891 21.376109
sample estimates:
mean of x mean of y
   35.960    20.372
```

Inferences – 'P' Value is significantly Low, Hence the Alternate Hypothesis as MEANS is NOT SAME is ACCEPTED.

The Mean of Group 1 is 35.960 & MEAN of Group 2 is 20.372

Group 1 Vs. GROUP 3=> CEO Compensation Analysis

```
data:   ceog1$Compen and ceog3$Compen
t = 6.6168, df = 48, p-value = 2.846e-08
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
 13.20705 24.73695
sample estimates:
mean of x mean of y
   35.960    16.988
```

Inferences – 'P' Value is significantly Low, Hence the Alternate Hypothesis as MEANS is NOT SAME is ACCEPTED.

The Mean of Group 1 is 35.960 & MEAN of Group 3 is 16.988

Group 1 Vs. GROUP 5=> CEO Compensation Analysis

```
data:   ceog1$Compen and ceog5$Compen
t = 7.8279, df = 48, p-value = 4.012e-10
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
 16.65832 28.17368
sample estimates:
mean of x mean of y
   35.960    13.544
```

Inferences – 'P' Value is significantly Low, Hence the Alternate Hypothesis as MEANS is NOT SAME is ACCEPTED.

The Mean of Group 1 is 35.960 & MEAN of Group 3 is 13.544

Group 2 Vs. GROUP 3=> CEO Compensation Analysis

```
data:   ceog2$Compen and ceog3$Compen
t = 9.9589, df = 48, p-value = 2.898e-13
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
 2.700794 4.067206
sample estimates:
mean of x mean of y
   20.372    16.988
```

Inferences – 'P' Value is significantly Low, Hence the Alternate Hypothesis as MEANS is NOT SAME is ACCEPTED.

The Mean of Group 2 is 20.372 & MEAN of Group 3 is 16.988

Group 2 Vs. GROUP 5=> CEO Compensation Analysis

```
data:   ceog2$Compen and ceog5$Compen
t = 22.186, df = 48, p-value < 2.2e-16
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
 6.209195 7.446805
sample estimates:
mean of x mean of y
   20.372    13.544
```

Inferences – 'P' Value is significantly Low, Hence the Alternate Hypothesis as MEANS is NOT SAME is ACCEPTED.

The Mean of Group 2 is 20.372 & MEAN of Group 5 is 13.544

Group 3 Vs. GROUP 5=> CEO Compensation Analysis

```
data:   ceog3$Compen and ceog5$Compen
t = 20.384, df = 48, p-value < 2.2e-16
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
 3.104288 3.783712
sample estimates:
mean of x mean of y
   16.988    13.544
```

Inferences – 'P' Value is significantly Low, Hence the Alternate Hypothesis as MEANS is NOT SAME is ACCEPTED.

The Mean of Group 3 is 16.988 & MEAN of Group 5 is 13.544

ANNEXURE – IX

Group 1 Vs. GROUP 2 => 05th YEAR Returns Analysis

```
        Two Sample t-test

data:  ceog1$Y5Return and ceog2$Y5Return
t = 4.9675, df = 48, p-value = 9.005e-06
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
 26.42398 62.36002
sample estimates:
mean of x mean of y
   94.808    50.416
```

Inferences – 'P' Value is significantly Low, Hence the Alternate Hypothesis as MEANS is NOT SAME is ACCEPTED.

Group 1 Vs. GROUP 3 => 05th YEAR Returns Analysis

```
Two Sample t-test

data:  ceog1$Y5Return and ceog3$Y5Return
t = 7.394, df = 48, p-value = 1.835e-09
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
 47.15279 82.37521
sample estimates:
mean of x mean of y
   94.808    30.044
```

Inferences – 'P' Value is significantly Low, Hence the Alternate Hypothesis as MEANS is NOT SAME is ACCEPTED

Group 1 Vs. GROUP 5 => 05th YEAR Returns Analysis

```
Two Sample t-test

data:  ceog1$Y5Return and ceog5$Y5Return
t = 7.1314, df = 48, p-value = 4.625e-09
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
 47.1995 84.2645
sample estimates:
mean of x mean of y
   94.808    29.076
```

Inferences – 'P' Value is significantly Low, Hence the Alternate Hypothesis as MEANS is NOT SAME is ACCEPTED

Group 2 Vs. GROUP 3 => 05th YEAR Returns Analysis

```
Two Sample t-test

data:  ceog2$Y5Return and ceog3$Y5Return
t = 2.7321, df = 48, p-value = 0.008782
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
  5.379383 35.364617
sample estimates:
mean of x mean of y
   50.416    30.044
```

Inferences – 'P' Value is significantly Low, Hence the Alternate Hypothesis as MEANS is NOT SAME is ACCEPTED

Group 2 Vs. GROUP 5 => 05th YEAR Returns Analysis

```
Two Sample t-test

data:  ceog2$Y5Return and ceog5$Y5Return
t = 2.6709, df = 48, p-value = 0.0103
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
  5.275213 37.404787
sample estimates:
mean of x mean of y
   50.416    29.076
```

Inferences – 'P' Value is significantly Low, Hence the Alternate Hypothesis as MEANS is NOT SAME is ACCEPTED

Group 3 Vs. GROUP 5 => 05th YEAR Returns Analysis

```
Two Sample t-test

data:  ceog3$Y5Return and ceog5$Y5Return
t = 0.12425, df = 48, p-value = 0.9016
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
 -14.69667  16.63267
sample estimates:
mean of x mean of y
   30.044    29.076
```

Inferences – 'P' Value is HIGH than Alpha level – 0.05, Hence the Alternate Hypothesis as MEANS is NOT SAME is REJECTED.

ANNEXURE – X

Group 1 Vs. GROUP 2 => 03rd YEAR Returns Analysis

```
        Two Sample t-test

data:  ceog1$Y3Return and ceog2$Y3Return
t = 4.0213, df = 48, p-value = 0.0002038
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
 17.15597 51.46803
sample estimates:
mean of x mean of y
   54.728    20.416
```

Inferences – 'P' Value is significantly Low, Hence the Alternate Hypothesis as MEANS is NOT SAME is ACCEPTED

Group 1 Vs. GROUP 3 => 03rd YEAR Returns Analysis

```
Two Sample t-test

data:  ceog1$Y3Return and ceog3$Y3Return
t = 6.5517, df = 48, p-value = 3.583e-08
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
 37.90204 71.46596
sample estimates:
mean of x mean of y
   54.728     0.044
```

Inferences – 'P' Value is significantly Low, Hence the Alternate Hypothesis as MEANS is NOT SAME is ACCEPTED

Group 1 Vs. GROUP 5 => 03rd YEAR Returns Analysis

```
Two Sample t-test

data:  ceog1$Y3Return and ceog5$Y3Return
t = 6.3053, df = 48, p-value = 8.553e-08
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
 37.90565 73.39835
sample estimates:
mean of x mean of y
   54.728    -0.924
```

Inferences – 'P' Value is significantly Low, Hence the Alternate Hypothesis as MEANS is NOT SAME is ACCEPTED

Group 2 Vs. GROUP 3 => 03rd YEAR Returns Analysis

```
        Two Sample t-test

data:  ceog2$Y3Return and ceog3$Y3Return
t = 2.7321, df = 48, p-value = 0.008782
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
  5.379383 35.364617
sample estimates:
mean of x mean of y
   20.416      0.044
```

Inferences – 'P' Value is significantly Low, Hence the Alternate Hypothesis as MEANS is NOT SAME is ACCEPTED

Group 2 Vs. GROUP 5 => 03rd YEAR Returns Analysis

```
        Two Sample t-test

data:  ceog2$Y3Return and ceog5$Y3Return
t = 2.6709, df = 48, p-value = 0.0103
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
  5.275213 37.404787
sample estimates:
mean of x mean of y
   20.416     -0.924
```

Inferences – 'P' Value is Low, Hence the Alternate Hypothesis as MEANS is NOT SAME is ACCEPTED

Group 3 Vs. GROUP 5 => 03rd YEAR Returns Analysis

```
Two Sample t-test

data:  ceog3$Y3Return and ceog5$Y3Return
t = 0.12425, df = 48, p-value = 0.9016
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
 -14.69667  16.63267
sample estimates:
mean of x mean of y
    0.044     -0.924
```

Inferences – 'P' Value is HIGH than Alpha level – 0.05, Hence the Alternate Hypothesis as MEANS is NOT SAME is REJECTED

ANNEXURE – XI

GROUP 35 - CONFIDENCE INTERVAL EVALUATIONS

		COMPEN.	Y3	Y5	COMPEN.	Y3	Y5
a	CONFIDENCE Level	90%	90%	90%	95%	95%	95%
b	ALPHA Level [100% - a]	10%	10%	10%	5%	5%	5%
c	SAMPLE Size 'n'	25	25	25	25	25	25
d	Degrees of Freedom ' n-1'	24	24	24	24	24	24
e	t' value from T-Table for DF=24 & Alpha Level = 0.05	1.71	1.71	1.71	2.06	2.06	2.06
f	Standard Diviation 'SD'	1.82	26.99	26.99	1.82	26.99	26.99
g	STANDARD Error 'SE' = ' SD / Sq.Rt of [n]'	0.36	5.40	5.40	0.36	5.40	5.40
h	t-Value x SE	0.62	9.24	9.24	0.75	11.14	11.14
i	POPULATION Mean	15.27	(0.44)	29.56	15.27	(0.44)	29.56
j	**UPPER Confidence Level ' i + h'**	**15.89**	**8.80**	**38.80**	**16.02**	**10.70**	**40.70**
k	**LOWER Confidence Level ' i - h'**	**14.64**	**(9.68)**	**20.32**	**14.52**	**(11.58)**	**18.42**
l	MINIMUM Value observed	13	-58.3	-28.3	13	-58.3	-28.3
m	MAXIMUM Value observed	18.4	56.1	86.1	18.4	56.1	86.1