

Importing the dataset

Glimpse of Data

Out[624]:

	Co_Code	Co_Name	Networth Next Year	Equity Paid Up	Networth	Capital Employed	Total Debt	Gross Block	Net Working Capital	Current Assets	...
0	16974	Hind.Cables	-8021.60	419.36	-7027.48	-1007.24	5936.03	474.30	-1076.34	40.50	...
1	21214	Tata Tele. Mah.	-3986.19	1954.93	-2968.08	4458.20	7410.18	9070.86	-1098.88	486.86	...
2	14852	ABG Shipyards	-3192.58	53.84	506.86	7714.68	6944.54	1281.54	4496.25	9097.64	...
3	2439	GTL	-3054.51	157.30	-623.49	2353.88	2326.05	1033.69	-2612.42	1034.12	...
4	23505	Bharati Defence	-2967.36	50.30	-1070.83	4675.33	5740.90	1084.20	1836.23	4685.81	...

5 rows × 67 columns

dropping the Co_code column

Checking the top records of the dataset

Out[626]:

	Co_Name	Networth Next Year	Equity Paid Up	Networth	Capital Employed	Total Debt	Gross Block	Net Working Capital	Current Assets	Current Liabilities and Provisions	...
0	Hind.Cables	-8021.60	419.36	-7027.48	-1007.24	5936.03	474.30	-1076.34	40.50	1116.85	...
1	Tata Tele. Mah.	-3986.19	1954.93	-2968.08	4458.20	7410.18	9070.86	-1098.88	486.86	1585.74	...
2	ABG Shipyards	-3192.58	53.84	506.86	7714.68	6944.54	1281.54	4496.25	9097.64	4601.39	...
3	GTL	-3054.51	157.30	-623.49	2353.88	2326.05	1033.69	-2612.42	1034.12	3646.54	...
4	Bharati Defence	-2967.36	50.30	-1070.83	4675.33	5740.90	1084.20	1836.23	4685.81	2849.58	...

5 rows × 66 columns

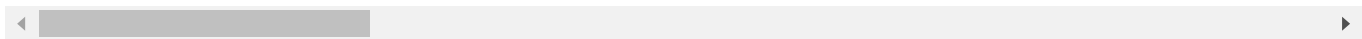
Fixing messy column names (containing spaces) for ease of use

Checking the top records of the dataset

Out[9]:

	Co_Name	Networth_Next_Year	Equity_Paid_Up	Networth	Capital_Employed	Total_Debt	Gross_Block
0	Hind.Cables	-8021.60	419.36	-7027.48	-1007.24	5936.03	474.30
1	Tata Tele. Mah.	-3986.19	1954.93	-2968.08	4458.20	7410.18	9070.86
2	ABG Shipyards	-3192.58	53.84	506.86	7714.68	6944.54	1281.54
3	GTL	-3054.51	157.30	-623.49	2353.88	2326.05	1033.69
4	Bharati Defence	-2967.36	50.30	-1070.83	4675.33	5740.90	1084.20

5 rows × 66 columns



let us check the number of rows (observations) and the number of columns (variables)

The number of rows (observations) is 3586
The number of columns (variables) is 66

Checking datatype of all columns

```

<class 'pandas.core.frame.DataFrame'>
RangeIndex: 3586 entries, 0 to 3585
Data columns (total 66 columns):
Co_Name                                3586 non-null object
Networth_Next_Year                     3586 non-null float64
Equity_Paid_Up                         3586 non-null float64
Networth                              3586 non-null float64
Capital_Employed                      3586 non-null float64
Total_Debt                            3586 non-null float64
Gross_Block                           3586 non-null float64
Net_Working_Capital                   3586 non-null float64
Current_Assets                        3586 non-null float64
Current_Liabilities_and_Provisions    3586 non-null float64
Total_Assets_by_Liabilities           3586 non-null float64
Gross_Sales                           3586 non-null float64
Net_Sales                             3586 non-null float64
Other_Income                          3586 non-null float64
Value_Of_Output                       3586 non-null float64
Cost_of_Production                    3586 non-null float64
Selling_Cost                          3586 non-null float64
PBIDT                                 3586 non-null float64
PBDT                                  3586 non-null float64
PBIT                                  3586 non-null float64
PBT                                   3586 non-null float64
PAT                                   3586 non-null float64
Adjusted_PAT                          3586 non-null float64
CP                                    3586 non-null float64
Revenue_earnings_in_forex             3586 non-null float64
Revenue_expenses_in_forex             3586 non-null float64
Capital_expenses_in_forex             3586 non-null float64
Book_Value_Unit_Curr                  3586 non-null float64
Book_Value_Adj._Unit_Curr             3582 non-null float64
Market_Capitalisation                 3586 non-null float64
CEPS_annualised_Unit_Curr             3586 non-null float64
Cash_Flow_From_Operating_Activities    3586 non-null float64
Cash_Flow_From_Investing_Activities    3586 non-null float64
Cash_Flow_From_Financing_Activities    3586 non-null float64
ROG-Net_Worth_perc                    3586 non-null float64
ROG-Capital_Employed_perc             3586 non-null float64
ROG-Gross_Block_perc                  3586 non-null float64
ROG-Gross_Sales_perc                  3586 non-null float64
ROG-Net_Sales_perc                    3586 non-null float64
ROG-Cost_of_Production_perc           3586 non-null float64
ROG-Total_Assets_perc                 3586 non-null float64
ROG-PBIDT_perc                       3586 non-null float64
ROG-PBDT_perc                        3586 non-null float64
ROG-PBIT_perc                        3586 non-null float64
ROG-PBT_perc                         3586 non-null float64
ROG-PAT_perc                         3586 non-null float64
ROG-CP_perc                          3586 non-null float64
ROG-Revenue_earnings_in_forex_perc    3586 non-null float64
ROG-Revenue_expenses_in_forex_perc    3586 non-null float64
ROG-Market_Capitalisation_perc        3586 non-null float64
Current_Ratio[Latest]                 3585 non-null float64
Fixed_Assets_Ratio[Latest]            3585 non-null float64
Inventory_Ratio[Latest]               3585 non-null float64
Debtors_Ratio[Latest]                 3585 non-null float64
Total_Asset_Turnover_Ratio[Latest]     3585 non-null float64
Interest_Cover_Ratio[Latest]          3585 non-null float64
PBIDTM_perc[Latest]                  3585 non-null float64
PBITM_perc[Latest]                   3585 non-null float64
PBDTM_perc[Latest]                   3585 non-null float64

```

```

CPM_perc[Latest]          3585 non-null float64
APATM_perc[Latest]        3585 non-null float64
Debtors_Velocity_Days     3586 non-null int64
Creditors_Velocity_Days  3586 non-null int64
Inventory_Velocity_Days   3483 non-null float64
Value_of_Output_by_Total_Assets 3586 non-null float64
Value_of_Output_by_Gross_Block 3586 non-null float64
dtypes: float64(63), int64(2), object(1)
memory usage: 1.8+ MB

```

let us check the basic measures of descriptive statistics for the continuous variables

Out[631]:

	Networth_Next_Year	Equity_Paid_Up	Networth	Capital_Employed	Total_Debt	Gross_Block
count	3586.000000	3586.000000	3586.000000	3586.000000	3586.000000	3586.000000
mean	725.045251	62.966584	649.746299	2799.611054	1994.823779	594.178829
std	4769.681004	778.761744	4091.988792	26975.135385	23652.842746	4871.547802
min	-8021.600000	0.000000	-7027.480000	-1824.750000	-0.720000	-41.190000
25%	3.985000	3.750000	3.892500	7.602500	0.030000	0.570000
50%	19.015000	8.290000	18.580000	39.090000	7.490000	15.870000
75%	123.802500	19.517500	117.297500	226.605000	72.350000	131.895000
max	111729.100000	42263.460000	81657.350000	714001.250000	652823.810000	128477.590000

8 rows × 65 columns

Checking the Columns of the dataset

Out[632]:

```

Index(['Co_Name', 'Networth_Next_Year', 'Equity_Paid_Up', 'Networth',
      'Capital_Employed', 'Total_Debt', 'Gross_Block', 'Net_Working_Capital',
      'Current_Assets', 'Current_Liabilities_and_Provisions',
      'Total_Assets_by_Liabilities', 'Gross_Sales', 'Net_Sales',
      'Other_Income', 'Value_Of_Output', 'Cost_of_Production', 'Selling_Cost',
      'PBDT', 'PBDT', 'PBIT', 'PBT', 'PAT', 'Adjusted_PAT', 'CP',
      'Revenue_earnings_in_forex', 'Revenue_expenses_in_forex',
      'Capital_expenses_in_forex', 'Book_Value_Unit_Curr',
      'Book_Value_Adj._Unit_Curr', 'Market_Capitalisation',
      'CEPS_annualised_Unit_Curr', 'Cash_Flow_From_Operating_Activities',
      'Cash_Flow_From_Investing_Activities',
      'Cash_Flow_From_Financing_Activities', 'ROG-Net_Worth_perc',
      'ROG-Capital_Employed_perc', 'ROG-Gross_Block_perc',
      'ROG-Gross_Sales_perc', 'ROG-Net_Sales_perc',
      'ROG-Cost_of_Production_perc', 'ROG-Total_Assets_perc',
      'ROG-PBDT_perc', 'ROG-PBDT_perc', 'ROG-PBIT_perc', 'ROG-PBT_perc',
      'ROG-PAT_perc', 'ROG-CP_perc', 'ROG-Revenue_earnings_in_forex_perc',
      'ROG-Revenue_expenses_in_forex_perc', 'ROG-Market_Capitalisation_perc',
      'Current_Ratio[Latest]', 'Fixed_Assets_Ratio[Latest]',
      'Inventory_Ratio[Latest]', 'Debtors_Ratio[Latest]',
      'Total_Asset_Turnover_Ratio[Latest]', 'Interest_Cover_Ratio[Latest]',
      'PBDTM_perc[Latest]', 'PBITM_perc[Latest]', 'PBDTM_perc[Latest]',
      'CPM_perc[Latest]', 'APATM_perc[Latest]', 'Debtors_Velocity_Days',
      'Creditors_Velocity_Days', 'Inventory_Velocity_Days',
      'Value_of_Output_by_Total_Assets', 'Value_of_Output_by_Gross_Block'],
      dtype='object')

```

1.2 Missing Value Treatment

Checking the dataset missing values?

Out[633]:

	Total	Percent
Inventory_Velocity_Days	103	0.028723
Book_Value_Adj._Unit_Curr	4	0.001115
Debtors_Ratio[Latest]	1	0.000279
Interest_Cover_Ratio[Latest]	1	0.000279
Current_Ratio[Latest]	1	0.000279
...
Value_of_Output_by_Total_Assets	0	0.000000
Cash_Flow_From_Operating_Activities	0	0.000000
CEPS_annualised_Unit_Curr	0	0.000000
Market_Capitalisation	0	0.000000
Co_Name	0	0.000000

66 rows × 2 columns

Lets treat these missing values with median (replacement with median eliminates impact of outliers in the treatment)

Checking the dataset after missing values imputaion

Out[635]:

	Total	Percent
Value_of_Output_by_Gross_Block	0	0.0
Selling_Cost	0	0.0
CEPS_annualised_Unit_Curr	0	0.0
Market_Capitalisation	0	0.0
Book_Value_Adj._Unit_Curr	0	0.0
...
ROG-Net_Sales_perc	0	0.0
ROG-Gross_Sales_perc	0	0.0
ROG-Gross_Block_perc	0	0.0
ROG-Capital_Employed_perc	0	0.0
Co_Name	0	0.0

66 rows × 2 columns

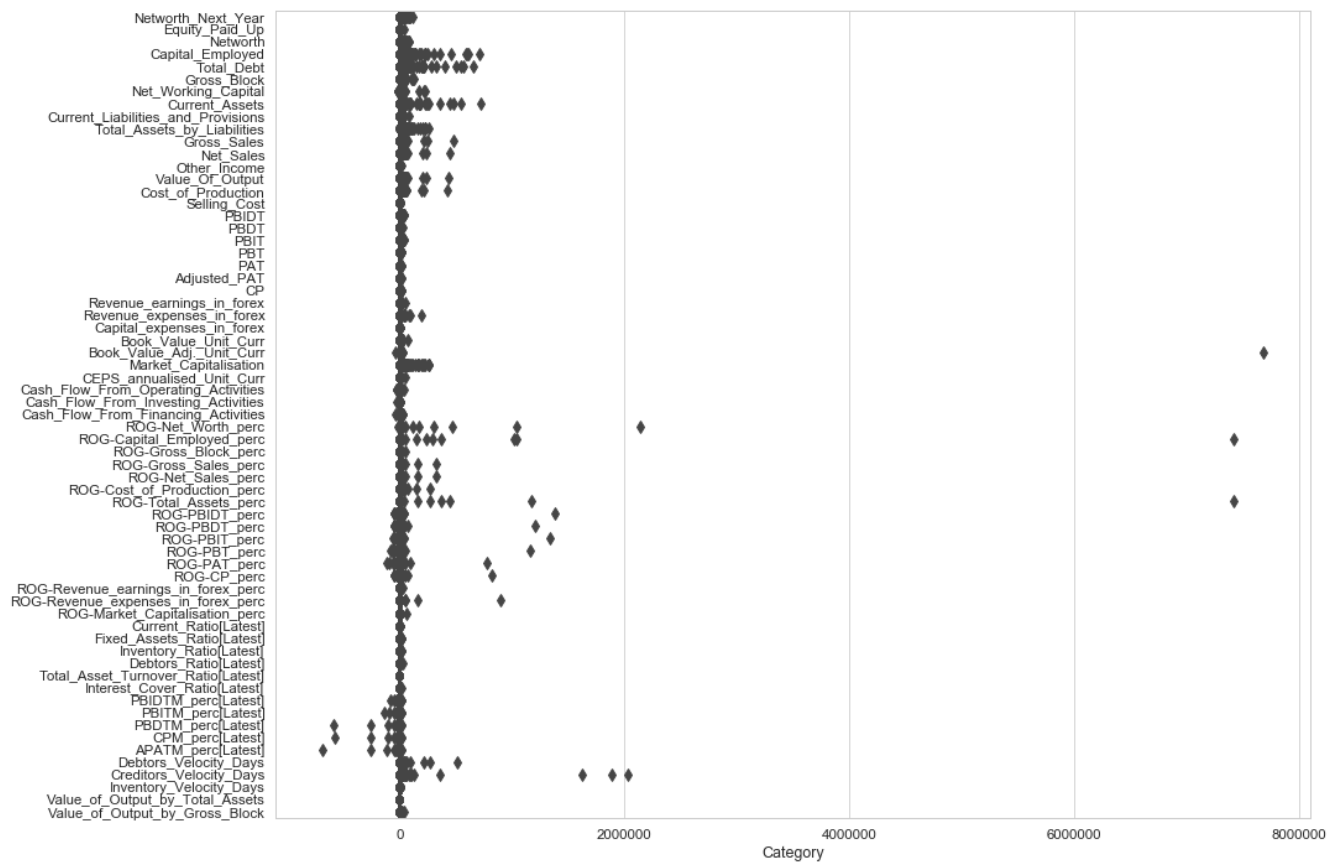
Checking the duplicate values

Out[636]: 0

1.1Outlier Treatment

Checking the outliers

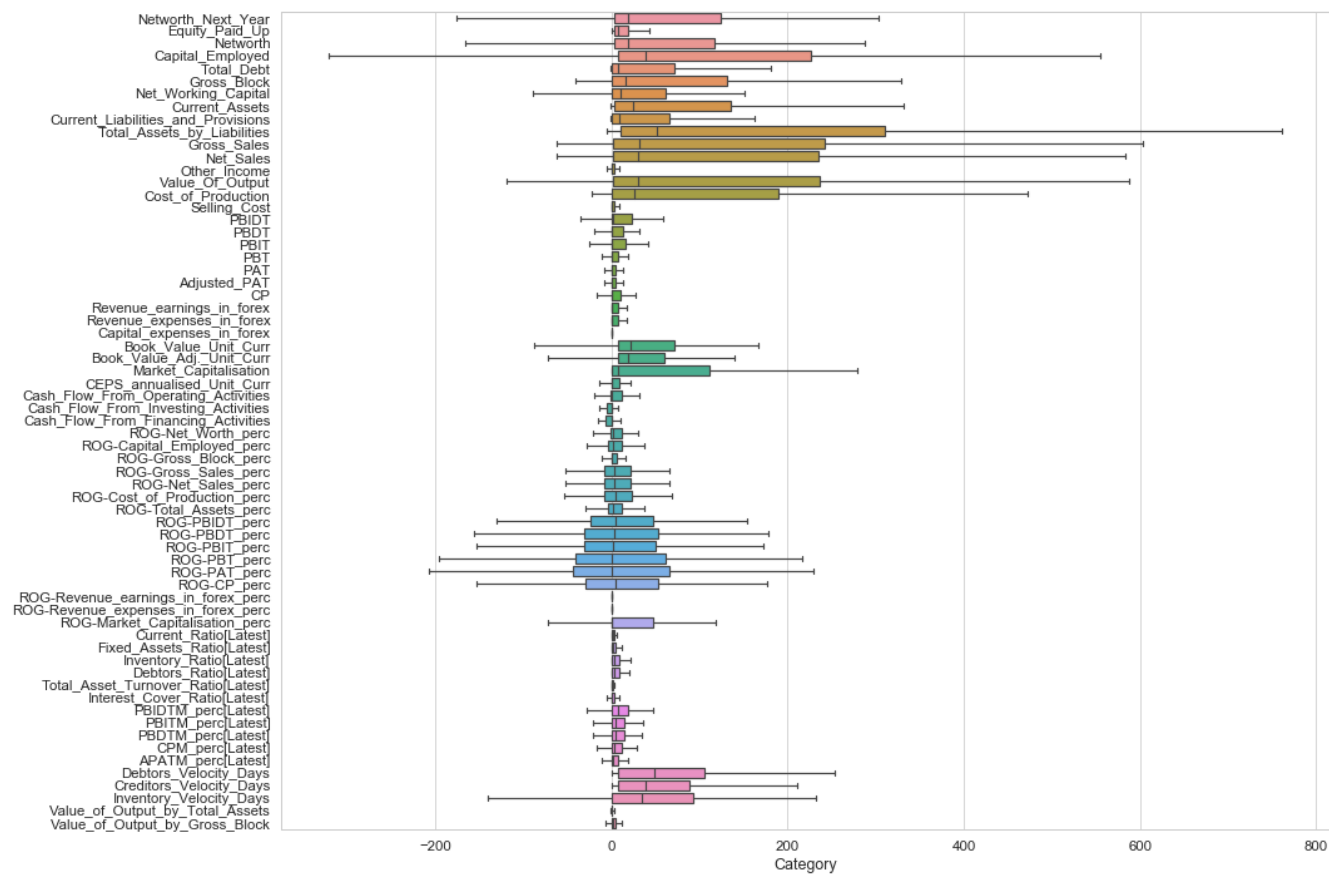
Boxplot has been drawn for finding out the outliers



Imputing the outliers

Checking the outlier after outliers treatment

Boxplot has been drawn for finding out the outliers



Checking the NextYearworth of the companies

Out[641]:

	Co_Name	Networth_Next_Year
0	Hind.Cables	-175.74125
1	Tata Tele. Mah.	-175.74125
2	ABG Shipyard	-175.74125
3	GTL	-175.74125
4	Bharati Defence	-175.74125
...
95	Dewan Tyres	-82.40000
96	Unimers India	-81.69000
97	Ashima	-77.29000
98	Maha Rashtra Apx	-74.76000
99	Zenith Computers	-73.89000

100 rows × 2 columns

1.3 Transform Target variable into 0 and 1

checkig the default values after 0 and 1 transformation

Out[643]:

	default	Co_Name	Networth_Next_Year
0	1	Hind.Cables	-175.74125
1	1	Tata Tele. Mah.	-175.74125
2	1	ABG Shipyard	-175.74125
3	1	GTL	-175.74125
4	1	Bharati Defence	-175.74125
...
95	1	Dewan Tyres	-82.40000
96	1	Unimers India	-81.69000
97	1	Ashima	-77.29000
98	1	Maha Rashtra Apx	-74.76000
99	1	Zenith Computers	-73.89000

100 rows × 3 columns

1.4 Univariate & bivariate analysis(including Heatmap)

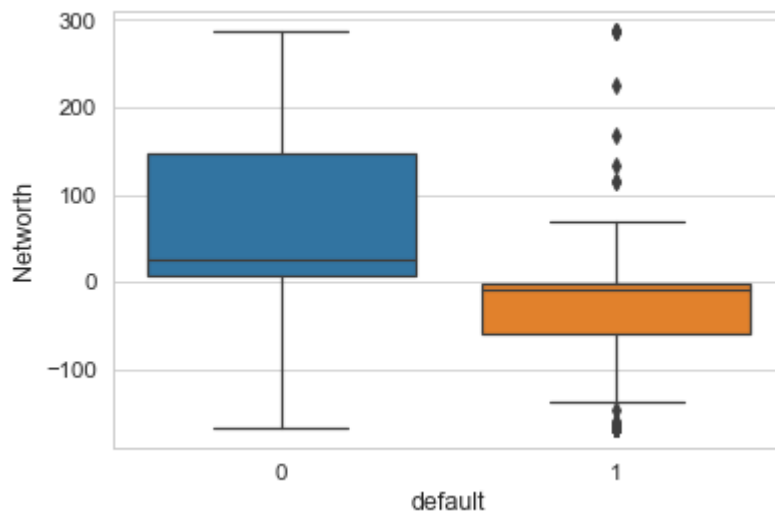
checking the default and non default in the dataset


```
Out[644]: 0    3198  
          1     388  
          Name: default, dtype: int64
```

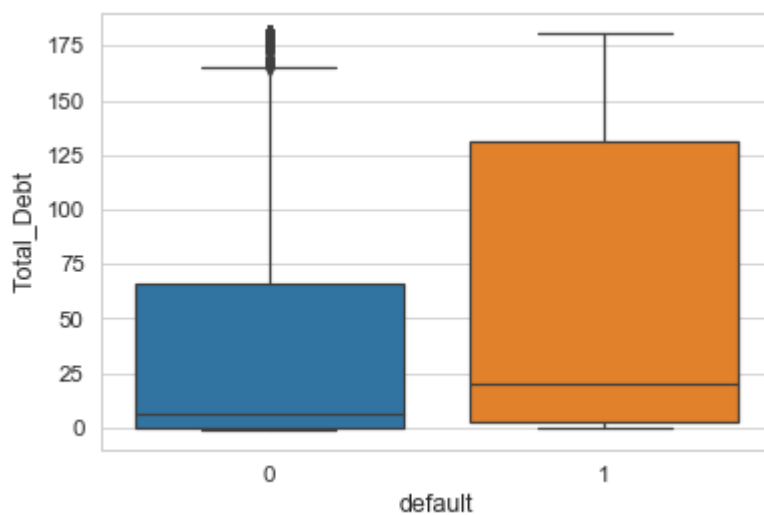
checking the percentage of the class

```
Out[645]: 0.10819854991634133
```

Checking the Networth of default and Non default company



Checking the Total debt of default and Non default company



Checking the Co-relation Matrix

Out[648]:

	Networth_Next_Year	Equity_Paid_Up	Networth	Capital_Employed	Total_Det
Networth_Next_Year	1.000000	0.556018	0.963325	0.844535	0.50999
Equity_Paid_Up	0.556018	1.000000	0.575311	0.678049	0.57382
Networth	0.963325	0.575311	1.000000	0.873306	0.53501
Capital_Employed	0.844535	0.678049	0.873306	1.000000	0.78139
Total_Debt	0.509998	0.573822	0.535012	0.781394	1.00000
...
Creditors_Velocity_Days	-0.049295	0.105388	-0.032158	0.034255	0.10073
Inventory_Velocity_Days	0.042480	0.049688	0.058424	0.101223	0.14861
Value_of_Output_by_Total_Assets	0.080851	-0.083063	0.057532	0.045412	0.06939
Value_of_Output_by_Gross_Block	0.061208	-0.037049	0.050899	0.003880	-0.05845
default	-0.373509	0.025170	-0.335681	-0.138860	0.07104

66 rows × 66 columns



Checking the Heatgraph

Heat Graph has been drawn among various variables which is self explanatory
 Note: Yellow Color is showing highest correlation and Vilot color is showing week correlation



Checking Descriptive statistics of the variable PBIDT

```
Out[650]: count    3586.000000
mean      14.161569
std       23.752052
min       -35.187500
25%       0.040000
50%       2.045000
75%      23.525000
max       58.752500
Name: PBIDT, dtype: float64
```

Checking Descriptive statistics of the variable PAT in totality

```
Out[651]: count    3586.000000
mean      2.583009
std       6.563022
min       -8.460000
25%      -0.060000
50%       0.255000
75%       5.540000
max      13.940000
Name: PAT, dtype: float64
```

#Checking Descriptive statistics of the variable PAT for non defaulters

```
Out[652]: count      3198.000000
mean         3.271792
std          6.426159
min          -8.460000
25%          0.000000
50%          0.460000
75%          7.697500
max          13.940000
Name: PAT, dtype: float64
```

#Checking Descriptive statistics of the variable PAT for defaulters

```
Out[653]: count      388.000000
mean         -3.094124
std          4.651546
min          -8.460000
25%          -8.460000
50%          -1.680000
75%          -0.060000
max          13.940000
Name: PAT, dtype: float64
```

Checking Descriptive statistics of default Companies

Out[1166]:

	Networth_Next_Year	Equity_Paid_Up	Networth	Capital_Employed	Total_Debt	Gross_Block	Net_V
count	388.000000	388.000000	388.000000	388.000000	388.000000	388.000000	
mean	-51.770802	15.006285	-35.133660	69.632751	61.351727	83.724098	
std	67.456959	14.083088	73.513318	172.397043	72.024703	114.394872	
min	-175.741250	0.010000	-166.215000	-320.901250	0.000000	-6.080000	
25%	-78.390000	4.525000	-58.355000	0.000000	2.417500	0.667500	
50%	-12.705000	9.510000	-8.355000	4.230000	20.020000	20.880000	
75%	-2.977500	21.452500	-1.065000	57.885000	130.912500	133.495000	
max	0.000000	43.168750	287.405000	555.108750	180.830000	328.882500	

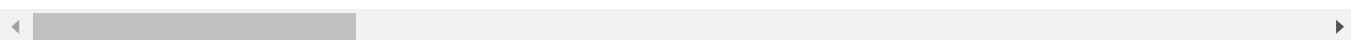
8 rows × 66 columns

Checking Descriptive statistics of Non default Companies

Out[1167]:

	Networth_Next_Year	Equity_Paid_Up	Networth	Capital_Employed	Total_Debt	Gross_Block	Net
count	3198.000000	3198.000000	3198.000000	3198.000000	3198.000000	3198.000000	
mean	93.071600	13.871914	86.894378	162.542235	45.751198	85.266779	
std	115.993612	13.988740	109.713154	209.573809	67.558006	122.049326	
min	0.010000	0.000000	-166.215000	-103.330000	-0.720000	-41.190000	
25%	6.870000	3.662500	6.350000	10.135000	0.000000	0.560000	
50%	26.505000	8.170000	25.520000	44.235000	6.100000	15.040000	
75%	160.090000	19.150000	147.892500	275.040000	66.047500	131.547500	
max	303.528750	43.168750	287.405000	555.108750	180.830000	328.882500	

8 rows × 66 columns



EDA

- Companies which are defaulted having average worth next year is -51 and Average network is -35 while average debt around 61 means companies having more debt as compare to network
- while average debt on non default company is 45 and average network is 87 and average Nextyearworth is 93 means companies having more Network as compare to debt
- for running the Business having Average working capital is 6 of default companies while average working capital of Non default companies is 40
- Average profit before income Tax is -4 . It means they are not earning much so there are not position to pay their debt
- while non default companies have average profit is +8.

Now, Importing statsmodels modules

Building the First Model

```
Optimization terminated successfully.  
Current function value: 0.193391  
Iterations 11
```

Summary of Model 1

Out[660]:

Logit Regression Results

Dep. Variable:	default	No. Observations:	3586				
Model:	Logit	Df Residuals:	3561				
Method:	MLE	Df Model:	24				
Date:	Sun, 20 Dec 2020	Pseudo R-squ.:	0.4357				
Time:	01:46:23	Log-Likelihood:	-693.50				
converged:	True	LL-Null:	-1229.0				
Covariance Type:	nonrobust	LLR p-value:	6.974e-211				
		coef	std err	z	P> z 	[0.025	0.975]
	Intercept	-2.0558	0.102	-20.131	0.000	-2.256	-1.856
	Equity_Paid_Up	0.0331	0.010	3.478	0.001	0.014	0.052
	Networth	-0.0377	0.004	-9.339	0.000	-0.046	-0.030
	Capital_Employed	-0.0187	0.005	-3.707	0.000	-0.029	-0.009
	Total_Debt	0.0271	0.005	5.125	0.000	0.017	0.037
	Gross_Block	0.0003	0.003	0.099	0.921	-0.006	0.007
	Net_Working_Capital	0.0023	0.008	0.279	0.780	-0.014	0.019
	Current_Assets	-0.0081	0.008	-1.023	0.306	-0.024	0.007
Current_Liabilities_and_Provisions		0.0066	0.008	0.792	0.428	-0.010	0.023
	Total_Assets_by_Liabilities	0.0085	0.005	1.815	0.070	-0.001	0.018
	Gross_Sales	-0.0120	0.008	-1.530	0.126	-0.027	0.003
	Net_Sales	0.0288	0.014	2.000	0.045	0.001	0.057
	Other_Income	0.1347	0.047	2.838	0.005	0.042	0.228
	Value_Of_Output	-0.0078	0.010	-0.808	0.419	-0.027	0.011
	Cost_of_Production	-0.0133	0.006	-2.252	0.024	-0.025	-0.002
	Selling_Cost	-0.0202	0.068	-0.297	0.767	-0.153	0.113
	PBIDT	0.0169	0.030	0.556	0.578	-0.043	0.076
	PBDT	-0.1459	0.117	-1.242	0.214	-0.376	0.084
	PBIT	-0.0034	0.038	-0.090	0.929	-0.078	0.071
	PBT	0.0655	0.170	0.385	0.700	-0.268	0.399
	PAT	-0.1539	0.192	-0.800	0.423	-0.531	0.223
	Adjusted_PAT	-0.0123	0.050	-0.243	0.808	-0.111	0.087
	CP	0.0452	0.120	0.377	0.706	-0.190	0.280
Revenue_earnings_in_forex		-0.0421	0.025	-1.713	0.087	-0.090	0.006
Market_Capitalisation		-0.0032	0.002	-1.350	0.177	-0.008	0.001

Possibly complete quasi-separation: A fraction 0.25 of observations can be perfectly predicted. This might indicate that there is complete quasi-separation. In this case some parameters will not be identified.

Checking the Multicollinearity of the variables before building the Model

drop the variables one by one having VIF greater than 5

drop the variable Net_Sales

Out[664]:

	variables	VIF
34	ROG-Gross_Sales_perc	526.242189
35	ROG-Net_Sales_perc	525.303835
9	Gross_Sales	416.009591
11	Value_Of_Output	405.139980
15	PBDT	117.782416
...
46	ROG-Market_Capitalisation_perc	1.671860
33	ROG-Gross_Block_perc	1.581064
23	Capital_expenses_in_forex	NaN
44	ROG-Revenue_earnings_in_forex_perc	NaN
45	ROG-Revenue_expenses_in_forex_perc	NaN

63 rows × 2 columns

drop the variable ROG-Gross_Sales_perc

Out[665]:

	variables	VIF
9	Gross_Sales	410.973119
11	Value_Of_Output	400.554769
15	PBDT	117.320199
8	Total_Assets_by_Liabilities	104.961225
20	CP	103.862638
...
45	ROG-Market_Capitalisation_perc	1.671704
33	ROG-Gross_Block_perc	1.579143
23	Capital_expenses_in_forex	NaN
43	ROG-Revenue_earnings_in_forex_perc	NaN
44	ROG-Revenue_expenses_in_forex_perc	NaN

62 rows × 2 columns

drop the variable Gross_Sales

Out[666]:

	variables	VIF
14	PBDT	117.300110
8	Total_Assets_by_Liabilities	104.935695
19	CP	103.841239
17	PAT	76.512157
16	PBT	75.215480
...
44	ROG-Market_Capitalisation_perc	1.670986
32	ROG-Gross_Block_perc	1.579031
22	Capital_expenses_in_forex	NaN
42	ROG-Revenue_earnings_in_forex_perc	NaN
43	ROG-Revenue_expenses_in_forex_perc	NaN

61 rows × 2 columns

drop the variable PBDT

Out[667]:

	variables	VIF
8	Total_Assets_by_Liabilities	104.841310
2	Capital_Employed	73.115779
16	PAT	67.336508
10	Value_Of_Output	58.385813
15	PBT	55.265615
11	Cost_of_Production	47.255518
6	Current_Assets	33.138225
53	CPM_perc[Latest]	32.933069
50	PBIDTM_perc[Latest]	32.579341
13	PBIDT	32.049526
51	PBITM_perc[Latest]	30.228015
14	PBIT	29.288260
52	PBDTM_perc[Latest]	27.606097
36	ROG-PBDT_perc	24.374994
7	Current_Liabilities_and_Provisions	23.284790
18	CP	19.993842
54	APATM_perc[Latest]	19.389594
38	ROG-PBT_perc	19.382358
40	ROG-CP_perc	17.912392
22	Book_Value_Unit_Curr	17.492829
17	Adjusted_PAT	17.235806
35	ROG-PBIDT_perc	15.066754
39	ROG-PAT_perc	14.722557
23	Book_Value_Adj._Unit_Curr	13.892180
1	Networth	12.697954
58	Value_of_Output_by_Total_Assets	12.606512
37	ROG-PBIT_perc	12.452170
4	Gross_Block	12.302216
48	Total_Asset_Turnover_Ratio[Latest]	11.036576
59	Value_of_Output_by_Gross_Block	8.873951
45	Fixed_Assets_Ratio[Latest]	8.653794
3	Total_Debt	7.323507
25	CEPS_annualised_Unit_Curr	6.691934
5	Net_Working_Capital	5.331642
0	Equity_Paid_Up	4.601690
24	Market_Capitalisation	4.571804
12	Selling_Cost	4.528611
9	Other_Income	4.497166
30	ROG-Capital_Employed_perc	4.017280

	variables	VIF
20	Revenue_expenses_in_forex	3.843133
26	Cash_Flow_From_Operating_Activities	3.760003
34	ROG-Total_Assets_perc	3.370132
19	Revenue_earnings_in_forex	3.102618
29	ROG-Net_Worth_perc	2.950823
28	Cash_Flow_From_Financing_Activities	2.914048
49	Interest_Cover_Ratio[Latest]	2.544452
47	Debtors_Ratio[Latest]	2.535953
55	Debtors_Velocity_Days	2.479835
27	Cash_Flow_From_Investing_Activities	2.475131
44	Current_Ratio[Latest]	2.403809
46	Inventory_Ratio[Latest]	2.376327
56	Creditors_Velocity_Days	2.322065
32	ROG-Net_Sales_perc	2.149929
33	ROG-Cost_of_Production_perc	2.028744
57	Inventory_Velocity_Days	1.934672
43	ROG-Market_Capitalisation_perc	1.670946
31	ROG-Gross_Block_perc	1.578786
21	Capital_expenses_in_forex	NaN
41	ROG-Revenue_earnings_in_forex_perc	NaN
42	ROG-Revenue_expenses_in_forex_perc	NaN

drop the variable totalAssets_by_Liabilities

Out[668]:

	variables	VIF
15	PAT	67.314124
9	Value_Of_Output	58.303429
14	PBT	55.236101
10	Cost_of_Production	47.058545
52	CPM_perc[Latest]	32.929232
49	PBIDTM_perc[Latest]	32.488107
12	PBIDT	31.624378
6	Current_Assets	31.158335
50	PBITM_perc[Latest]	30.165630
13	PBIT	29.219958
51	PBDTM_perc[Latest]	27.600537
35	ROG-PBDT_perc	24.374755
2	Capital_Employed	24.093768
17	CP	19.987574
37	ROG-PBT_perc	19.382357
53	APATM_perc[Latest]	19.374870
7	Current_Liabilities_and_Provisions	18.125134
39	ROG-CP_perc	17.911486
21	Book_Value_Unit_Curr	17.492450
16	Adjusted_PAT	17.227564
34	ROG-PBIDT_perc	15.066017
38	ROG-PAT_perc	14.720962
22	Book_Value_Adj._Unit_Curr	13.887532
1	Networth	12.671248
57	Value_of_Output_by_Total_Assets	12.585884
36	ROG-PBIT_perc	12.448367
4	Gross_Block	12.187727
47	Total_Asset_Turnover_Ratio[Latest]	11.035322
58	Value_of_Output_by_Gross_Block	8.862195
44	Fixed_Assets_Ratio[Latest]	8.619434
3	Total_Debt	7.309299
24	CEPS_annualised_Unit_Curr	6.687026
5	Net_Working_Capital	5.136886
0	Equity_Paid_Up	4.601059
23	Market_Capitalisation	4.564658
11	Selling_Cost	4.517066
8	Other_Income	4.492579
29	ROG-Capital_Employed_perc	4.014366
19	Revenue_expenses_in_forex	3.838303

	variables	VIF
25	Cash_Flow_From_Operating_Activities	3.758863
33	ROG-Total_Assets_perc	3.367008
18	Revenue_earnings_in_forex	3.102598
28	ROG-Net_Worth_perc	2.950800
27	Cash_Flow_From_Financing_Activities	2.913999
48	Interest_Cover_Ratio[Latest]	2.542520
46	Debtors_Ratio[Latest]	2.535932
54	Debtors_Velocity_Days	2.479425
26	Cash_Flow_From_Investing_Activities	2.474885
43	Current_Ratio[Latest]	2.403809
45	Inventory_Ratio[Latest]	2.374326
55	Creditors_Velocity_Days	2.322015
31	ROG-Net_Sales_perc	2.149684
32	ROG-Cost_of_Production_perc	2.028515
56	Inventory_Velocity_Days	1.933877
42	ROG-Market_Capitalisation_perc	1.670936
30	ROG-Gross_Block_perc	1.578223
20	Capital_expenses_in_forex	NaN
40	ROG-Revenue_earnings_in_forex_perc	NaN
41	ROG-Revenue_expenses_in_forex_perc	NaN

drop the variable PAT

Out[669]:

	variables	VIF
9	Value_Of_Output	58.174046
10	Cost_of_Production	47.037758
51	CPM_perc[Latest]	32.928848
48	PBIDTM_perc[Latest]	32.487948
12	PBIDT	31.491209
6	Current_Assets	31.157447
49	PBITM_perc[Latest]	30.159518
13	PBIT	29.219639
50	PBDTM_perc[Latest]	27.596368
34	ROG-PBDT_perc	24.371615
2	Capital_Employed	23.996840
14	PBT	21.740788
52	APATM_perc[Latest]	19.362200
36	ROG-PBT_perc	18.976011
16	CP	18.558311
7	Current_Liabilities_and_Provisions	18.106723
38	ROG-CP_perc	17.899282
20	Book_Value_Unit_Curr	17.473041
33	ROG-PBIDT_perc	15.058654
15	Adjusted_PAT	14.851860
37	ROG-PAT_perc	14.143902
21	Book_Value_Adj._Unit_Curr	13.876148
1	Networth	12.635198
56	Value_of_Output_by_Total_Assets	12.582707
35	ROG-PBIT_perc	12.445134
4	Gross_Block	12.152500
46	Total_Asset_Turnover_Ratio[Latest]	11.034951
57	Value_of_Output_by_Gross_Block	8.860877
43	Fixed_Assets_Ratio[Latest]	8.616138
3	Total_Debt	7.303618
23	CEPS_annualised_Unit_Curr	6.679670
5	Net_Working_Capital	5.136754
0	Equity_Paid_Up	4.594640
22	Market_Capitalisation	4.563163
11	Selling_Cost	4.517046
8	Other_Income	4.445325
28	ROG-Capital_Employed_perc	4.014360
18	Revenue_expenses_in_forex	3.837798
24	Cash_Flow_From_Operating_Activities	3.758863

	variables	VIF
32	ROG-Total_Assets_perc	3.367003
17	Revenue_earnings_in_forex	3.097869
27	ROG-Net_Worth_perc	2.927030
26	Cash_Flow_From_Financing_Activities	2.913904
47	Interest_Cover_Ratio[Latest]	2.541022
45	Debtors_Ratio[Latest]	2.534209
53	Debtors_Velocity_Days	2.478554
25	Cash_Flow_From_Investing_Activities	2.474883
42	Current_Ratio[Latest]	2.402808
44	Inventory_Ratio[Latest]	2.373754
54	Creditors_Velocity_Days	2.319938
30	ROG-Net_Sales_perc	2.147966
31	ROG-Cost_of_Production_perc	2.028032
55	Inventory_Velocity_Days	1.933340
41	ROG-Market_Capitalisation_perc	1.670671
29	ROG-Gross_Block_perc	1.577881
19	Capital_expenses_in_forex	NaN
39	ROG-Revenue_earnings_in_forex_perc	NaN
40	ROG-Revenue_expenses_in_forex_perc	NaN

drop the variable Value_Of_Output

Out[670]:

	variables	VIF
50	CPM_perc[Latest]	32.733747
47	PBIDTM_perc[Latest]	32.203659
6	Current_Assets	31.115619
11	PBIDT	30.465613
48	PBITM_perc[Latest]	29.990273
12	PBIT	29.214573
49	PBDTM_perc[Latest]	27.587193
33	ROG-PBDT_perc	24.367253
2	Capital_Employed	23.931252
13	PBT	21.702576
51	APATM_perc[Latest]	19.249269
35	ROG-PBT_perc	18.973514
15	CP	18.555010
37	ROG-CP_perc	17.897254
7	Current_Liabilities_and_Provisions	17.618818
19	Book_Value_Unit_Curr	17.472876
32	ROG-PBIDT_perc	15.043532
14	Adjusted_PAT	14.790329
36	ROG-PAT_perc	14.141737
20	Book_Value_Adj._Unit_Curr	13.873750
1	Networth	12.611060
55	Value_of_Output_by_Total_Assets	12.582707
34	ROG-PBIT_perc	12.443148
9	Cost_of_Production	11.986899
4	Gross_Block	11.935629
45	Total_Asset_Turnover_Ratio[Latest]	11.028940
56	Value_of_Output_by_Gross_Block	8.810166
42	Fixed_Assets_Ratio[Latest]	8.576166
3	Total_Debt	7.301466
22	CEPS_annualised_Unit_Curr	6.679039
5	Net_Working_Capital	5.136449
0	Equity_Paid_Up	4.579581
21	Market_Capitalisation	4.560962
10	Selling_Cost	4.421052
8	Other_Income	4.393539
27	ROG-Capital_Employed_perc	4.014353
17	Revenue_expenses_in_forex	3.836449
23	Cash_Flow_From_Operating_Activities	3.739225
31	ROG-Total_Assets_perc	3.366715

	variables	VIF
16	Revenue_earnings_in_forex	3.088235
26	ROG-Net_Worth_perc	2.927030
25	Cash_Flow_From_Financing_Activities	2.913794
46	Interest_Cover_Ratio[Latest]	2.534038
44	Debtors_Ratio[Latest]	2.533039
24	Cash_Flow_From_Investing_Activities	2.472301
52	Debtors_Velocity_Days	2.464306
41	Current_Ratio[Latest]	2.402183
43	Inventory_Ratio[Latest]	2.373736
53	Creditors_Velocity_Days	2.315137
29	ROG-Net_Sales_perc	2.145690
30	ROG-Cost_of_Production_perc	2.027422
54	Inventory_Velocity_Days	1.925351
40	ROG-Market_Capitalisation_perc	1.670253
28	ROG-Gross_Block_perc	1.577669
18	Capital_expenses_in_forex	NaN
38	ROG-Revenue_earnings_in_forex_perc	NaN
39	ROG-Revenue_expenses_in_forex_perc	NaN

drop the variable CPM_perc[Latest]

Out[671]:

	variables	VIF
6	Current_Assets	31.039107
11	PBIDT	30.459467
12	PBIT	29.213469
47	PBIDTM_perc[Latest]	25.406171
33	ROG-PBDT_perc	24.364341
2	Capital_Employed	23.928263
48	PBITM_perc[Latest]	21.971582
13	PBT	21.649069
35	ROG-PBT_perc	18.966120
15	CP	18.512541
37	ROG-CP_perc	17.894722
49	PBDTM_perc[Latest]	17.705163
7	Current_Liabilities_and_Provisions	17.618810
19	Book_Value_Unit_Curr	17.464498
32	ROG-PBIDT_perc	15.042938
14	Adjusted_PAT	14.788422
36	ROG-PAT_perc	14.140348
20	Book_Value_Adj._Unit_Curr	13.873161
1	Networth	12.608818
54	Value_of_Output_by_Total_Assets	12.575141
34	ROG-PBIT_perc	12.439004
9	Cost_of_Production	11.986810
4	Gross_Block	11.935595
45	Total_Asset_Turnover_Ratio[Latest]	11.028504
50	APATM_perc[Latest]	10.598914
55	Value_of_Output_by_Gross_Block	8.800131
42	Fixed_Assets_Ratio[Latest]	8.575330
3	Total_Debt	7.296598
22	CEPS_annualised_Unit_Curr	6.657851
5	Net_Working_Capital	5.136273
0	Equity_Paid_Up	4.578807
21	Market_Capitalisation	4.557215
10	Selling_Cost	4.417300
8	Other_Income	4.391190
27	ROG-Capital_Employed_perc	4.013829
17	Revenue_expenses_in_forex	3.833340
23	Cash_Flow_From_Operating_Activities	3.733128
31	ROG-Total_Assets_perc	3.364863
16	Revenue_earnings_in_forex	3.088143

	variables	VIF
26	ROG-Net_Worth_perc	2.926953
25	Cash_Flow_From_Financing_Activities	2.913644
44	Debtors_Ratio[Latest]	2.532999
46	Interest_Cover_Ratio[Latest]	2.495357
24	Cash_Flow_From_Investing_Activities	2.471446
51	Debtors_Velocity_Days	2.454554
41	Current_Ratio[Latest]	2.393323
43	Inventory_Ratio[Latest]	2.371195
52	Creditors_Velocity_Days	2.314971
29	ROG-Net_Sales_perc	2.145690
30	ROG-Cost_of_Production_perc	2.027406
53	Inventory_Velocity_Days	1.922416
40	ROG-Market_Capitalisation_perc	1.670243
28	ROG-Gross_Block_perc	1.577623
18	Capital_expenses_in_forex	NaN
38	ROG-Revenue_earnings_in_forex_perc	NaN
39	ROG-Revenue_expenses_in_forex_perc	NaN

drop the variable Current_Assets

Out[672]:

	variables	VIF
10	PBIDT	30.438338
11	PBIT	29.185222
46	PBIDTM_perc[Latest]	25.391723
32	ROG-PBDT_perc	24.355951
47	PBITM_perc[Latest]	21.957907
12	PBT	21.597342
2	Capital_Employed	21.346290
34	ROG-PBT_perc	18.948520
14	CP	18.511384
36	ROG-CP_perc	17.894675
48	PBDTM_perc[Latest]	17.703504
18	Book_Value_Unit_Curr	17.460066
31	ROG-PBIDT_perc	15.041325
13	Adjusted_PAT	14.618335
35	ROG-PAT_perc	14.136882
19	Book_Value_Adj._Unit_Curr	13.859059
53	Value_of_Output_by_Total_Assets	12.555356
1	Networth	12.477170
33	ROG-PBIT_perc	12.435182
4	Gross_Block	11.712839
8	Cost_of_Production	11.451253
44	Total_Asset_Turnover_Ratio[Latest]	11.018610
6	Current_Liabilities_and_Provisions	10.985898
49	APATM_perc[Latest]	10.588645
54	Value_of_Output_by_Gross_Block	8.755146
41	Fixed_Assets_Ratio[Latest]	8.539032
3	Total_Debt	7.224772
21	CEPS_annualised_Unit_Curr	6.654478
0	Equity_Paid_Up	4.578618
20	Market_Capitalisation	4.553082
9	Selling_Cost	4.416240
7	Other_Income	4.361474
26	ROG-Capital_Employed_perc	4.013559
16	Revenue_expenses_in_forex	3.832611
22	Cash_Flow_From_Operating_Activities	3.722346
5	Net_Working_Capital	3.541872
30	ROG-Total_Assets_perc	3.360841
15	Revenue_earnings_in_forex	3.087657
25	ROG-Net_Worth_perc	2.926464

	variables	VIF
24	Cash_Flow_From_Financing_Activities	2.913480
43	Debtors_Ratio[Latest]	2.529376
45	Interest_Cover_Ratio[Latest]	2.492575
23	Cash_Flow_From_Investing_Activities	2.470158
50	Debtors_Velocity_Days	2.448716
40	Current_Ratio[Latest]	2.390046
42	Inventory_Ratio[Latest]	2.362155
51	Creditors_Velocity_Days	2.314381
28	ROG-Net_Sales_perc	2.145593
29	ROG-Cost_of_Production_perc	2.027067
52	Inventory_Velocity_Days	1.922140
39	ROG-Market_Capitalisation_perc	1.668756
27	ROG-Gross_Block_perc	1.577180
17	Capital_expenses_in_forex	NaN
37	ROG-Revenue_earnings_in_forex_perc	NaN
38	ROG-Revenue_expenses_in_forex_perc	NaN

drop the variable PBIDT

Out[674]:

	variables	VIF
45	PBIDTM_perc[Latest]	25.060606
31	ROG-PBDT_perc	24.242373
46	PBITM_perc[Latest]	21.808625
2	Capital_Employed	21.330457
11	PBT	21.159005
33	ROG-PBT_perc	18.874842
35	ROG-CP_perc	17.861256
47	PBDTM_perc[Latest]	17.667496
17	Book_Value_Unit_Curr	17.435117
13	CP	17.308340
30	ROG-PBIDT_perc	14.565834
12	Adjusted_PAT	14.552306
34	ROG-PAT_perc	14.136621
18	Book_Value_Adj._Unit_Curr	13.857155
10	PBIT	12.818997
52	Value_of_Output_by_Total_Assets	12.555330
32	ROG-PBIT_perc	12.288406
1	Networth	12.260769
4	Gross_Block	11.530219
8	Cost_of_Production	11.436390
43	Total_Asset_Turnover_Ratio[Latest]	11.018575
6	Current_Liabilities_and_Provisions	10.961753
48	APATM_perc[Latest]	10.587290
53	Value_of_Output_by_Gross_Block	8.752573
40	Fixed_Assets_Ratio[Latest]	8.533217
3	Total_Debt	7.224585
20	CEPS_annualised_Unit_Curr	6.632282
0	Equity_Paid_Up	4.571274
19	Market_Capitalisation	4.553080
9	Selling_Cost	4.410569
7	Other_Income	4.360712
25	ROG-Capital_Employed_perc	4.008656
15	Revenue_expenses_in_forex	3.832116
21	Cash_Flow_From_Operating_Activities	3.704454
5	Net_Working_Capital	3.541541
29	ROG-Total_Assets_perc	3.360769
14	Revenue_earnings_in_forex	3.086825
24	ROG-Net_Worth_perc	2.926043
23	Cash_Flow_From_Financing_Activities	2.910967

	variables	VIF
42	Debtors_Ratio[Latest]	2.529240
44	Interest_Cover_Ratio[Latest]	2.492360
22	Cash_Flow_From_Investing_Activities	2.469382
49	Debtors_Velocity_Days	2.448441
39	Current_Ratio[Latest]	2.389968
41	Inventory_Ratio[Latest]	2.362125
50	Creditors_Velocity_Days	2.313460
27	ROG-Net_Sales_perc	2.145309
28	ROG-Cost_of_Production_perc	2.026761
51	Inventory_Velocity_Days	1.922089
38	ROG-Market_Capitalisation_perc	1.666974
26	ROG-Gross_Block_perc	1.577171
16	Capital_expenses_in_forex	NaN
36	ROG-Revenue_earnings_in_forex_perc	NaN
37	ROG-Revenue_expenses_in_forex_perc	NaN

drop the variable PBIDTM_perc[Latest]

Out[675]:

	variables	VIF
31	ROG-PBDT_perc	24.240548
2	Capital_Employed	21.275247
11	PBT	21.158389
33	ROG-PBT_perc	18.854311
35	ROG-CP_perc	17.860307
17	Book_Value_Unit_Curr	17.435043
13	CP	17.307393
30	ROG-PBIDT_perc	14.524784
12	Adjusted_PAT	14.518531
34	ROG-PAT_perc	14.130740
18	Book_Value_Adj._Unit_Curr	13.851091
10	PBIT	12.812764
51	Value_of_Output_by_Total_Assets	12.550052
32	ROG-PBIT_perc	12.281324
1	Networth	12.240317
4	Gross_Block	11.523622
8	Cost_of_Production	11.428887
43	Total_Asset_Turnover_Ratio[Latest]	11.013205
6	Current_Liabilities_and_Provisions	10.936069
46	PBDTM_perc[Latest]	10.458303
52	Value_of_Output_by_Gross_Block	8.746741
40	Fixed_Assets_Ratio[Latest]	8.525112
47	APATM_perc[Latest]	7.979089
45	PBITM_perc[Latest]	7.839868
3	Total_Debt	7.155819
20	CEPS_annualised_Unit_Curr	6.624617
0	Equity_Paid_Up	4.558511
19	Market_Capitalisation	4.552239
9	Selling_Cost	4.403565
7	Other_Income	4.360452
25	ROG-Capital_Employed_perc	4.006599
15	Revenue_expenses_in_forex	3.831981
21	Cash_Flow_From_Operating_Activities	3.697638
5	Net_Working_Capital	3.534407
29	ROG-Total_Assets_perc	3.358235
14	Revenue_earnings_in_forex	3.086442
24	ROG-Net_Worth_perc	2.925739
23	Cash_Flow_From_Financing_Activities	2.909022
42	Debtors_Ratio[Latest]	2.517342

	variables	VIF
44	Interest_Cover_Ratio[Latest]	2.482463
22	Cash_Flow_From_Investing_Activities	2.466229
48	Debtors_Velocity_Days	2.440189
39	Current_Ratio[Latest]	2.389912
41	Inventory_Ratio[Latest]	2.358459
49	Creditors_Velocity_Days	2.312135
27	ROG-Net_Sales_perc	2.144391
28	ROG-Cost_of_Production_perc	2.024372
50	Inventory_Velocity_Days	1.921671
38	ROG-Market_Capitalisation_perc	1.666190
26	ROG-Gross_Block_perc	1.573133
16	Capital_expenses_in_forex	NaN
36	ROG-Revenue_earnings_in_forex_perc	NaN
37	ROG-Revenue_expenses_in_forex_perc	NaN

drop the variable ROG-PBDT_perc

Out[676]:

	variables	VIF
2	Capital_Employed	21.275247
11	PBT	21.155622
17	Book_Value_Unit_Curr	17.434270
13	CP	17.176835
12	Adjusted_PAT	14.509716
18	Book_Value_Adj._Unit_Curr	13.850731
10	PBIT	12.808176
50	Value_of_Output_by_Total_Assets	12.546924
1	Networth	12.229035
30	ROG-PBIDT_perc	11.885681
31	ROG-PBIT_perc	11.635502
4	Gross_Block	11.521095
8	Cost_of_Production	11.428472
33	ROG-PAT_perc	11.248689
42	Total_Asset_Turnover_Ratio[Latest]	11.006503
6	Current_Liabilities_and_Provisions	10.930577
45	PBDTM_perc[Latest]	10.458245
32	ROG-PBT_perc	10.434871
34	ROG-CP_perc	9.345485
51	Value_of_Output_by_Gross_Block	8.746661
39	Fixed_Assets_Ratio[Latest]	8.524302
46	APATM_perc[Latest]	7.968544
44	PBITM_perc[Latest]	7.836583
3	Total_Debt	7.154940
20	CEPS_annualised_Unit_Curr	6.623849
0	Equity_Paid_Up	4.557954
19	Market_Capitalisation	4.552194
9	Selling_Cost	4.402610
7	Other_Income	4.359448
25	ROG-Capital_Employed_perc	4.001240
15	Revenue_expenses_in_forex	3.831580
21	Cash_Flow_From_Operating_Activities	3.697430
5	Net_Working_Capital	3.533161
29	ROG-Total_Assets_perc	3.358176
14	Revenue_earnings_in_forex	3.086419
24	ROG-Net_Worth_perc	2.922753
23	Cash_Flow_From_Financing_Activities	2.908104
41	Debtors_Ratio[Latest]	2.517339
43	Interest_Cover_Ratio[Latest]	2.482224

	variables	VIF
22	Cash_Flow_From_Investing_Activities	2.465932
47	Debtors_Velocity_Days	2.439817
38	Current_Ratio[Latest]	2.389724
40	Inventory_Ratio[Latest]	2.357794
48	Creditors_Velocity_Days	2.309724
27	ROG-Net_Sales_perc	2.143515
28	ROG-Cost_of_Production_perc	2.023166
49	Inventory_Velocity_Days	1.920689
37	ROG-Market_Capitalisation_perc	1.666190
26	ROG-Gross_Block_perc	1.573120
16	Capital_expenses_in_forex	NaN
35	ROG-Revenue_earnings_in_forex_perc	NaN
36	ROG-Revenue_expenses_in_forex_perc	NaN

drop the variable Capital_Employed

Out[677]:

	variables	VIF
10	PBT	21.148773
16	Book_Value_Unit_Curr	17.407031
12	CP	17.096375
11	Adjusted_PAT	14.493900
17	Book_Value_Adj._Unit_Curr	13.823709
9	PBIT	12.770666
49	Value_of_Output_by_Total_Assets	12.474705
29	ROG-PBIDT_perc	11.881054
30	ROG-PBIT_perc	11.632550
7	Cost_of_Production	11.419655
32	ROG-PAT_perc	11.248336
3	Gross_Block	11.017110
41	Total_Asset_Turnover_Ratio[Latest]	11.005748
5	Current_Liabilities_and_Provisions	10.782578
44	PBDTM_perc[Latest]	10.458237
31	ROG-PBT_perc	10.434175
33	ROG-CP_perc	9.342960
50	Value_of_Output_by_Gross_Block	8.727369
38	Fixed_Assets_Ratio[Latest]	8.523012
45	APATM_perc[Latest]	7.968084
43	PBITM_perc[Latest]	7.831837
1	Networth	7.784171
19	CEPS_annualised_Unit_Curr	6.622633
2	Total_Debt	6.159248
18	Market_Capitalisation	4.543214
0	Equity_Paid_Up	4.465429
8	Selling_Cost	4.398648
6	Other_Income	4.337236
24	ROG-Capital_Employed_perc	3.987973
14	Revenue_expenses_in_forex	3.831004
20	Cash_Flow_From_Operating_Activities	3.695622
28	ROG-Total_Assets_perc	3.358161
4	Net_Working_Capital	3.354388
13	Revenue_earnings_in_forex	3.085306
22	Cash_Flow_From_Financing_Activities	2.908093
23	ROG-Net_Worth_perc	2.904999
40	Debtors_Ratio[Latest]	2.513440
42	Interest_Cover_Ratio[Latest]	2.482144
21	Cash_Flow_From_Investing_Activities	2.464435

	variables	VIF
46	Debtors_Velocity_Days	2.439354
37	Current_Ratio[Latest]	2.385795
39	Inventory_Ratio[Latest]	2.357697
47	Creditors_Velocity_Days	2.305211
26	ROG-Net_Sales_perc	2.140589
27	ROG-Cost_of_Production_perc	2.022731
48	Inventory_Velocity_Days	1.913501
36	ROG-Market_Capitalisation_perc	1.663719
25	ROG-Gross_Block_perc	1.573111
15	Capital_expenses_in_forex	NaN
34	ROG-Revenue_earnings_in_forex_perc	NaN
35	ROG-Revenue_expenses_in_forex_perc	NaN

drop the variable PBT

Out[678]:

	variables	VIF
15	Book_Value_Unit_Curr	17.394642
11	CP	15.732257
16	Book_Value_Adj._Unit_Curr	13.815980
48	Value_of_Output_by_Total_Assets	12.470534
9	PBIT	12.059913
28	ROG-PBIDT_perc	11.800723
29	ROG-PBIT_perc	11.489665
7	Cost_of_Production	11.414906
31	ROG-PAT_perc	11.248093
40	Total_Asset_Turnover_Ratio[Latest]	11.000453
3	Gross_Block	10.977796
5	Current_Liabilities_and_Provisions	10.779769
43	PBDTM_perc[Latest]	10.449622
30	ROG-PBT_perc	10.136539
32	ROG-CP_perc	9.205919
49	Value_of_Output_by_Gross_Block	8.727357
37	Fixed_Assets_Ratio[Latest]	8.522454
44	APATM_perc[Latest]	7.962923
42	PBITM_perc[Latest]	7.796846
1	Networth	7.739073
10	Adjusted_PAT	7.035036
18	CEPS_annualised_Unit_Curr	6.606165
2	Total_Debt	6.132921
17	Market_Capitalisation	4.539898
0	Equity_Paid_Up	4.465208
8	Selling_Cost	4.397078
6	Other_Income	4.271788
23	ROG-Capital_Employed_perc	3.984506
13	Revenue_expenses_in_forex	3.827875
19	Cash_Flow_From_Operating_Activities	3.684637
27	ROG-Total_Assets_perc	3.357162
4	Net_Working_Capital	3.352810
12	Revenue_earnings_in_forex	3.083111
21	Cash_Flow_From_Financing_Activities	2.906893
22	ROG-Net_Worth_perc	2.885727
39	Debtors_Ratio[Latest]	2.512986
41	Interest_Cover_Ratio[Latest]	2.479914
20	Cash_Flow_From_Investing_Activities	2.462337
45	Debtors_Velocity_Days	2.439086

	variables	VIF
36	Current_Ratio[Latest]	2.385732
38	Inventory_Ratio[Latest]	2.357658
46	Creditors_Velocity_Days	2.305030
25	ROG-Net_Sales_perc	2.139323
26	ROG-Cost_of_Production_perc	2.022052
47	Inventory_Velocity_Days	1.913340
35	ROG-Market_Capitalisation_perc	1.663717
24	ROG-Gross_Block_perc	1.571613
14	Capital_expenses_in_forex	NaN
33	ROG-Revenue_earnings_in_forex_perc	NaN
34	ROG-Revenue_expenses_in_forex_perc	NaN

drop the variable Book_Value_Unit_Curr

Out[679]:

	variables	VIF
11	CP	15.378321
47	Value_of_Output_by_Total_Assets	12.470301
9	PBIT	12.050348
27	ROG-PBIDT_perc	11.800416
28	ROG-PBIT_perc	11.489526
7	Cost_of_Production	11.414844
30	ROG-PAT_perc	11.244538
39	Total_Asset_Turnover_Ratio[Latest]	10.999949
3	Gross_Block	10.975142
5	Current_Liabilities_and_Provisions	10.768333
42	PBDTM_perc[Latest]	10.448082
29	ROG-PBT_perc	10.136498
31	ROG-CP_perc	9.205526
48	Value_of_Output_by_Gross_Block	8.703956
36	Fixed_Assets_Ratio[Latest]	8.522185
43	APATM_perc[Latest]	7.962920
41	PBITM_perc[Latest]	7.793519
1	Networth	7.498496
10	Adjusted_PAT	7.034936
2	Total_Debt	6.113656
17	CEPS_annualised_Unit_Curr	5.405212
16	Market_Capitalisation	4.539842
0	Equity_Paid_Up	4.406813
8	Selling_Cost	4.391393
6	Other_Income	4.269863
15	Book_Value_Adj._Unit_Curr	4.211866
22	ROG-Capital_Employed_perc	3.983866
13	Revenue_expenses_in_forex	3.826645
18	Cash_Flow_From_Operating_Activities	3.684181
26	ROG-Total_Assets_perc	3.357162
4	Net_Working_Capital	3.352782
12	Revenue_earnings_in_forex	3.082943
20	Cash_Flow_From_Financing_Activities	2.906865
21	ROG-Net_Worth_perc	2.884642
38	Debtors_Ratio[Latest]	2.512549
40	Interest_Cover_Ratio[Latest]	2.478227
19	Cash_Flow_From_Investing_Activities	2.462184
44	Debtors_Velocity_Days	2.439056
35	Current_Ratio[Latest]	2.379983

	variables	VIF
37	Inventory_Ratio[Latest]	2.356490
45	Creditors_Velocity_Days	2.304737
24	ROG-Net_Sales_perc	2.139275
25	ROG-Cost_of_Production_perc	2.021768
46	Inventory_Velocity_Days	1.912983
34	ROG-Market_Capitalisation_perc	1.663634
23	ROG-Gross_Block_perc	1.569176
14	Capital_expenses_in_forex	NaN
32	ROG-Revenue_earnings_in_forex_perc	NaN
33	ROG-Revenue_expenses_in_forex_perc	NaN

drop the variable CP

Out[680]:

	variables	VIF
46	Value_of_Output_by_Total_Assets	12.466237
26	ROG-PBIDT_perc	11.671186
27	ROG-PBIT_perc	11.488472
7	Cost_of_Production	11.412583
29	ROG-PAT_perc	11.215800
38	Total_Asset_Turnover_Ratio[Latest]	10.989249
5	Current_Liabilities_and_Provisions	10.613868
3	Gross_Block	10.440483
41	PBDTM_perc[Latest]	10.248131
28	ROG-PBT_perc	10.136085
30	ROG-CP_perc	8.922329
47	Value_of_Output_by_Gross_Block	8.702085
35	Fixed_Assets_Ratio[Latest]	8.514864
42	APATM_perc[Latest]	7.960032
9	PBIT	7.857669
40	PBITM_perc[Latest]	7.663367
1	Networth	7.315646
2	Total_Debt	6.042465
10	Adjusted_PAT	5.717689
16	CEPS_annualised_Unit_Curr	4.965648
15	Market_Capitalisation	4.539129
0	Equity_Paid_Up	4.406153
8	Selling_Cost	4.391353
6	Other_Income	4.268671
14	Book_Value_Adj._Unit_Curr	4.084727
21	ROG-Capital_Employed_perc	3.983681
12	Revenue_expenses_in_forex	3.825561
17	Cash_Flow_From_Operating_Activities	3.683270
25	ROG-Total_Assets_perc	3.356157
4	Net_Working_Capital	3.352547
11	Revenue_earnings_in_forex	3.081193
19	Cash_Flow_From_Financing_Activities	2.901814
20	ROG-Net_Worth_perc	2.884374
37	Debtors_Ratio[Latest]	2.511382
39	Interest_Cover_Ratio[Latest]	2.464203
18	Cash_Flow_From_Investing_Activities	2.461697
43	Debtors_Velocity_Days	2.439025
34	Current_Ratio[Latest]	2.378685
36	Inventory_Ratio[Latest]	2.356414

	variables	VIF
44	Creditors_Velocity_Days	2.303850
23	ROG-Net_Sales_perc	2.139094
24	ROG-Cost_of_Production_perc	2.021038
45	Inventory_Velocity_Days	1.912948
33	ROG-Market_Capitalisation_perc	1.662903
22	ROG-Gross_Block_perc	1.566671
13	Capital_expenses_in_forex	NaN
31	ROG-Revenue_earnings_in_forex_perc	NaN
32	ROG-Revenue_expenses_in_forex_perc	NaN

drop the variable valueofOutputbyTotalAssets

Out[681]:

	variables	VIF
26	ROG-PBIDT_perc	11.668916
27	ROG-PBIT_perc	11.485466
7	Cost_of_Production	11.325752
29	ROG-PAT_perc	11.215756
5	Current_Liabilities_and_Provisions	10.474797
3	Gross_Block	10.440477
41	PBDTM_perc[Latest]	10.245106
28	ROG-PBT_perc	10.135704
30	ROG-CP_perc	8.910614
35	Fixed_Assets_Ratio[Latest]	8.019001
42	APATM_perc[Latest]	7.954354
9	PBIT	7.854212
46	Value_of_Output_by_Gross_Block	7.847299
40	PBITM_perc[Latest]	7.657843
1	Networth	7.291267
2	Total_Debt	6.029877
10	Adjusted_PAT	5.717432
16	CEPS_annualised_Unit_Curr	4.938067
15	Market_Capitalisation	4.538368
0	Equity_Paid_Up	4.404940
8	Selling_Cost	4.387255
6	Other_Income	4.268047
14	Book_Value_Adj._Unit_Curr	4.082491
21	ROG-Capital_Employed_perc	3.983600
12	Revenue_expenses_in_forex	3.824814
17	Cash_Flow_From_Operating_Activities	3.681162
38	Total_Asset_Turnover_Ratio[Latest]	3.672403
4	Net_Working_Capital	3.351557
25	ROG-Total_Assets_perc	3.316520
11	Revenue_earnings_in_forex	3.077766
19	Cash_Flow_From_Financing_Activities	2.900196
20	ROG-Net_Worth_perc	2.877487
37	Debtors_Ratio[Latest]	2.475532
18	Cash_Flow_From_Investing_Activities	2.460497
39	Interest_Cover_Ratio[Latest]	2.452221
43	Debtors_Velocity_Days	2.438995
34	Current_Ratio[Latest]	2.376319
36	Inventory_Ratio[Latest]	2.339454
44	Creditors_Velocity_Days	2.294396

	variables	VIF
23	ROG-Net_Sales_perc	2.138547
24	ROG-Cost_of_Production_perc	2.018733
45	Inventory_Velocity_Days	1.903552
33	ROG-Market_Capitalisation_perc	1.662391
22	ROG-Gross_Block_perc	1.565909
13	Capital_expenses_in_forex	NaN
31	ROG-Revenue_earnings_in_forex_perc	NaN
32	ROG-Revenue_expenses_in_forex_perc	NaN

drop the variable ROG-PBIDT_perc

Out[682]:

	variables	VIF
7	Cost_of_Production	11.325526
5	Current_Liabilities_and_Provisions	10.474560
3	Gross_Block	10.440469
40	PBDTM_perc[Latest]	10.243743
27	ROG-PBT_perc	10.113222
28	ROG-PAT_perc	9.578632
34	Fixed_Assets_Ratio[Latest]	8.018722
41	APATM_perc[Latest]	7.954270
45	Value_of_Output_by_Gross_Block	7.846096
9	PBIT	7.845054
39	PBITM_perc[Latest]	7.657192
1	Networth	7.281119
2	Total_Debt	6.029555
10	Adjusted_PAT	5.716032
26	ROG-PBIT_perc	5.652249
29	ROG-CP_perc	4.988479
16	CEPS_annualised_Unit_Curr	4.938016
15	Market_Capitalisation	4.536810
0	Equity_Paid_Up	4.404931
8	Selling_Cost	4.384702
6	Other_Income	4.267367
14	Book_Value_Adj._Unit_Curr	4.082403
21	ROG-Capital_Employed_perc	3.979410
12	Revenue_expenses_in_forex	3.824112
17	Cash_Flow_From_Operating_Activities	3.681105
37	Total_Asset_Turnover_Ratio[Latest]	3.671010
4	Net_Working_Capital	3.351377
25	ROG-Total_Assets_perc	3.315245
11	Revenue_earnings_in_forex	3.077582
19	Cash_Flow_From_Financing_Activities	2.898433
20	ROG-Net_Worth_perc	2.876502
36	Debtors_Ratio[Latest]	2.475325
18	Cash_Flow_From_Investing_Activities	2.460431
38	Interest_Cover_Ratio[Latest]	2.452115
42	Debtors_Velocity_Days	2.436489
33	Current_Ratio[Latest]	2.376164
35	Inventory_Ratio[Latest]	2.339175
43	Creditors_Velocity_Days	2.293266
23	ROG-Net_Sales_perc	2.133446

	variables	VIF
24	ROG-Cost_of_Production_perc	2.013631
44	Inventory_Velocity_Days	1.903424
32	ROG-Market_Capitalisation_perc	1.661284
22	ROG-Gross_Block_perc	1.561992
13	Capital_expenses_in_forex	NaN
30	ROG-Revenue_earnings_in_forex_perc	NaN
31	ROG-Revenue_expenses_in_forex_perc	NaN

drop the variable PBDTM_perc[Latest

Out[683]:

	variables	VIF
39	PBDTM_perc[Latest]	10.240974
26	ROG-PBT_perc	10.113016
3	Gross_Block	9.614844
27	ROG-PAT_perc	9.576733
5	Current_Liabilities_and_Provisions	9.257239
33	Fixed_Assets_Ratio[Latest]	8.008736
40	APATM_perc[Latest]	7.954236
8	PBIT	7.837219
44	Value_of_Output_by_Gross_Block	7.832092
38	PBITM_perc[Latest]	7.595130
1	Networth	7.274674
2	Total_Debt	6.026522
9	Adjusted_PAT	5.705556
25	ROG-PBIT_perc	5.650564
28	ROG-CP_perc	4.983795
15	CEPS_annualised_Unit_Curr	4.935962
14	Market_Capitalisation	4.536805
0	Equity_Paid_Up	4.402274
7	Selling_Cost	4.270787
6	Other_Income	4.203781
13	Book_Value_Adj._Unit_Curr	4.082107
20	ROG-Capital_Employed_perc	3.969886
11	Revenue_expenses_in_forex	3.774714
16	Cash_Flow_From_Operating_Activities	3.678942
36	Total_Asset_Turnover_Ratio[Latest]	3.442227
24	ROG-Total_Assets_perc	3.309428
4	Net_Working_Capital	3.122839
10	Revenue_earnings_in_forex	3.077571
18	Cash_Flow_From_Financing_Activities	2.895519
19	ROG-Net_Worth_perc	2.874955
35	Debtors_Ratio[Latest]	2.470275
17	Cash_Flow_From_Investing_Activities	2.453809
37	Interest_Cover_Ratio[Latest]	2.449745
41	Debtors_Velocity_Days	2.424233
32	Current_Ratio[Latest]	2.376055
34	Inventory_Ratio[Latest]	2.338844
42	Creditors_Velocity_Days	2.228797
22	ROG-Net_Sales_perc	2.132260
23	ROG-Cost_of_Production_perc	2.013594

	variables	VIF
43	Inventory_Velocity_Days	1.895416
31	ROG-Market_Capitalisation_perc	1.656542
21	ROG-Gross_Block_perc	1.561780
12	Capital_expenses_in_forex	NaN
29	ROG-Revenue_earnings_in_forex_perc	NaN
30	ROG-Revenue_expenses_in_forex_perc	NaN

drop the variable ROG-PBT_perc

Out[684]:

	variables	VIF
26	ROG-PBT_perc	10.085337
27	ROG-PAT_perc	9.540490
3	Gross_Block	9.530391
5	Current_Liabilities_and_Provisions	9.223845
33	Fixed_Assets_Ratio[Latest]	7.987615
43	Value_of_Output_by_Gross_Block	7.813715
8	PBIT	7.790741
1	Networth	7.271825
2	Total_Debt	5.989310
9	Adjusted_PAT	5.690398
25	ROG-PBIT_perc	5.629155
39	APATM_perc[Latest]	5.566789
38	PBITM_perc[Latest]	5.429092
28	ROG-CP_perc	4.953783
15	CEPS_annualised_Unit_Curr	4.901882
14	Market_Capitalisation	4.536400
0	Equity_Paid_Up	4.395688
7	Selling_Cost	4.270219
6	Other_Income	4.203632
13	Book_Value_Adj_Unit_Curr	4.075813
20	ROG-Capital_Employed_perc	3.966296
11	Revenue_expenses_in_forex	3.774579
16	Cash_Flow_From_Operating_Activities	3.676735
36	Total_Asset_Turnover_Ratio[Latest]	3.441026
24	ROG-Total_Assets_perc	3.307225
4	Net_Working_Capital	3.118489
10	Revenue_earnings_in_forex	3.076446
18	Cash_Flow_From_Financing_Activities	2.894901
19	ROG-Net_Worth_perc	2.874937
35	Debtors_Ratio[Latest]	2.465550
17	Cash_Flow_From_Investing_Activities	2.453659
37	Interest_Cover_Ratio[Latest]	2.448203
40	Debtors_Velocity_Days	2.419999
32	Current_Ratio[Latest]	2.332542
34	Inventory_Ratio[Latest]	2.329624
41	Creditors_Velocity_Days	2.227238
22	ROG-Net_Sales_perc	2.131167
23	ROG-Cost_of_Production_perc	2.013076
42	Inventory_Velocity_Days	1.894278

	variables	VIF
31	ROG-Market_Capitalisation_perc	1.656464
21	ROG-Gross_Block_perc	1.558288
12	Capital_expenses_in_forex	NaN
29	ROG-Revenue_earnings_in_forex_perc	NaN
30	ROG-Revenue_expenses_in_forex_perc	NaN

drop the variable ROG-PBT_perc

Out[685]:

	variables	VIF
3	Gross_Block	9.528333
5	Current_Liabilities_and_Provisions	9.221870
32	Fixed_Assets_Ratio[Latest]	7.983098
42	Value_of_Output_by_Gross_Block	7.813696
8	PBIT	7.756023
1	Networth	7.270201
2	Total_Debt	5.988751
9	Adjusted_PAT	5.668406
38	APATM_perc[Latest]	5.560447
37	PBITM_perc[Latest]	5.421134
26	ROG-PAT_perc	5.374928
27	ROG-CP_perc	4.904173
15	CEPS_annualised_Unit_Curr	4.900134
14	Market_Capitalisation	4.536372
0	Equity_Paid_Up	4.394776
7	Selling_Cost	4.269391
6	Other_Income	4.203450
25	ROG-PBIT_perc	4.081593
13	Book_Value_Adj._Unit_Curr	4.073611
20	ROG-Capital_Employed_perc	3.933752
11	Revenue_expenses_in_forex	3.774578
16	Cash_Flow_From_Operating_Activities	3.676503
35	Total_Asset_Turnover_Ratio[Latest]	3.437644
24	ROG-Total_Assets_perc	3.305436
4	Net_Working_Capital	3.118478
10	Revenue_earnings_in_forex	3.075889
18	Cash_Flow_From_Financing_Activities	2.894396
19	ROG-Net_Worth_perc	2.852187
34	Debtors_Ratio[Latest]	2.455102
17	Cash_Flow_From_Investing_Activities	2.452944
36	Interest_Cover_Ratio[Latest]	2.445832
39	Debtors_Velocity_Days	2.417299
31	Current_Ratio[Latest]	2.332498
33	Inventory_Ratio[Latest]	2.329153
40	Creditors_Velocity_Days	2.226829
22	ROG-Net_Sales_perc	2.130720
23	ROG-Cost_of_Production_perc	2.012987
41	Inventory_Velocity_Days	1.894152
30	ROG-Market_Capitalisation_perc	1.655460

	variables	VIF
21	ROG-Gross_Block_perc	1.558287
12	Capital_expenses_in_forex	NaN
28	ROG-Revenue_earnings_in_forex_perc	NaN
29	ROG-Revenue_expenses_in_forex_perc	NaN

drop the variable Gross_Block

Out[686]:

	variables	VIF
4	Current_Liabilities_and_Provisions	8.121595
31	Fixed_Assets_Ratio[Latest]	7.934285
41	Value_of_Output_by_Gross_Block	7.753226
7	PBIT	7.732373
1	Networth	7.205987
8	Adjusted_PAT	5.659457
37	APATM_perc[Latest]	5.537061
36	PBITM_perc[Latest]	5.383845
25	ROG-PAT_perc	5.374206
2	Total_Debt	5.260632
26	ROG-CP_perc	4.901024
14	CEPS_annualised_Unit_Curr	4.869880
13	Market_Capitalisation	4.519517
0	Equity_Paid_Up	4.348238
6	Selling_Cost	4.222856
5	Other_Income	4.142635
24	ROG-PBIT_perc	4.080801
12	Book_Value_Adj._Unit_Curr	4.071592
19	ROG-Capital_Employed_perc	3.918553
10	Revenue_expenses_in_forex	3.743277
15	Cash_Flow_From_Operating_Activities	3.665711
34	Total_Asset_Turnover_Ratio[Latest]	3.437391
23	ROG-Total_Assets_perc	3.291658
3	Net_Working_Capital	3.105330
9	Revenue_earnings_in_forex	3.062202
17	Cash_Flow_From_Financing_Activities	2.876692
18	ROG-Net_Worth_perc	2.848061
35	Interest_Cover_Ratio[Latest]	2.441461
16	Cash_Flow_From_Investing_Activities	2.435477
33	Debtors_Ratio[Latest]	2.428202
38	Debtors_Velocity_Days	2.416141
30	Current_Ratio[Latest]	2.328849
32	Inventory_Ratio[Latest]	2.309088
39	Creditors_Velocity_Days	2.214555
21	ROG-Net_Sales_perc	2.129763
22	ROG-Cost_of_Production_perc	2.012851
40	Inventory_Velocity_Days	1.890620
29	ROG-Market_Capitalisation_perc	1.653923
20	ROG-Gross_Block_perc	1.558051

	variables	VIF
11	Capital_expenses_in_forex	NaN
27	ROG-Revenue_earnings_in_forex_perc	NaN
28	ROG-Revenue_expenses_in_forex_perc	NaN

drop the variable Current_Liabilities_and_Provisions

Out[687]:

	variables	VIF
30	Fixed_Assets_Ratio[Latest]	7.933054
40	Value_of_Output_by_Gross_Block	7.752848
6	PBIT	7.685071
1	Networth	7.157280
7	Adjusted_PAT	5.659278
36	APATM_perc[Latest]	5.531704
24	ROG-PAT_perc	5.374017
35	PBITM_perc[Latest]	5.371305
25	ROG-CP_perc	4.899593
13	CEPS_annualised_Unit_Curr	4.869797
12	Market_Capitalisation	4.465033
2	Total_Debt	4.338164
0	Equity_Paid_Up	4.200615
5	Selling_Cost	4.106711
23	ROG-PBIT_perc	4.080764
11	Book_Value_Adj._Unit_Curr	4.071137
18	ROG-Capital_Employed_perc	3.892051
4	Other_Income	3.849308
9	Revenue_expenses_in_forex	3.668610
14	Cash_Flow_From_Operating_Activities	3.660067
33	Total_Asset_Turnover_Ratio[Latest]	3.426756
22	ROG-Total_Assets_perc	3.229754
3	Net_Working_Capital	3.093495
8	Revenue_earnings_in_forex	3.052391
16	Cash_Flow_From_Financing_Activities	2.858624
17	ROG-Net_Worth_perc	2.846572
34	Interest_Cover_Ratio[Latest]	2.440623
15	Cash_Flow_From_Investing_Activities	2.435477
32	Debtors_Ratio[Latest]	2.424998
37	Debtors_Velocity_Days	2.415517
31	Inventory_Ratio[Latest]	2.293100
29	Current_Ratio[Latest]	2.290674
38	Creditors_Velocity_Days	2.146822
20	ROG-Net_Sales_perc	2.126632
21	ROG-Cost_of_Production_perc	2.010872
39	Inventory_Velocity_Days	1.888731
28	ROG-Market_Capitalisation_perc	1.646315
19	ROG-Gross_Block_perc	1.557825
10	Capital_expenses_in_forex	NaN

	variables	VIF
26	ROG-Revenue_earnings_in_forex_perc	NaN
27	ROG-Revenue_expenses_in_forex_perc	NaN

drop the variable Fixed_Assets_Ratio[Latest]

Out[688]:

	variables	VIF
6	PBIT	7.684873
1	Networth	7.156494
7	Adjusted_PAT	5.656328
35	APATM_perc[Latest]	5.529459
24	ROG-PAT_perc	5.373987
34	PBITM_perc[Latest]	5.369211
25	ROG-CP_perc	4.899084
13	CEPS_annualised_Unit_Curr	4.863790
12	Market_Capitalisation	4.461912
2	Total_Debt	4.311670
0	Equity_Paid_Up	4.198307
5	Selling_Cost	4.091491
23	ROG-PBIT_perc	4.079369
11	Book_Value_Adj._Unit_Curr	4.070772
18	ROG-Capital_Employed_perc	3.892039
4	Other_Income	3.848045
9	Revenue_expenses_in_forex	3.663402
14	Cash_Flow_From_Operating_Activities	3.652602
32	Total_Asset_Turnover_Ratio[Latest]	3.347902
22	ROG-Total_Assets_perc	3.229184
3	Net_Working_Capital	3.076140
8	Revenue_earnings_in_forex	3.051428
16	Cash_Flow_From_Financing_Activities	2.858533
17	ROG-Net_Worth_perc	2.846353
33	Interest_Cover_Ratio[Latest]	2.437304
15	Cash_Flow_From_Investing_Activities	2.432825
31	Debtors_Ratio[Latest]	2.415818
36	Debtors_Velocity_Days	2.413900
39	Value_of_Output_by_Gross_Block	2.368575
30	Inventory_Ratio[Latest]	2.289665
29	Current_Ratio[Latest]	2.282229
37	Creditors_Velocity_Days	2.145831
20	ROG-Net_Sales_perc	2.125559
21	ROG-Cost_of_Production_perc	2.010788
38	Inventory_Velocity_Days	1.885761
28	ROG-Market_Capitalisation_perc	1.641688
19	ROG-Gross_Block_perc	1.545196
10	Capital_expenses_in_forex	NaN
26	ROG-Revenue_earnings_in_forex_perc	NaN

	variables	VIF
27	ROG-Revenue_expenses_in_forex_perc	NaN

drop the variable PBIT

Out[689]:

	variables	VIF
1	Networth	6.796468
34	APATM_perc[Latest]	5.455153
23	ROG-PAT_perc	5.289660
33	PBITM_perc[Latest]	5.262784
24	ROG-CP_perc	4.898790
12	CEPS_annualised_Unit_Curr	4.704866
11	Market_Capitalisation	4.455853
0	Equity_Paid_Up	4.183242
2	Total_Debt	4.132495
5	Selling_Cost	4.083236
10	Book_Value_Adj._Unit_Curr	4.036142
6	Adjusted_PAT	4.026714
22	ROG-PBIT_perc	3.909729
17	ROG-Capital_Employed_perc	3.883035
4	Other_Income	3.799582
8	Revenue_expenses_in_forex	3.660963
13	Cash_Flow_From_Operating_Activities	3.633984
31	Total_Asset_Turnover_Ratio[Latest]	3.344421
21	ROG-Total_Assets_perc	3.229027
3	Net_Working_Capital	3.072566
7	Revenue_earnings_in_forex	3.051192
15	Cash_Flow_From_Financing_Activities	2.846111
16	ROG-Net_Worth_perc	2.845233
14	Cash_Flow_From_Investing_Activities	2.432744
32	Interest_Cover_Ratio[Latest]	2.431514
30	Debtors_Ratio[Latest]	2.413509
35	Debtors_Velocity_Days	2.408424
38	Value_of_Output_by_Gross_Block	2.368484
29	Inventory_Ratio[Latest]	2.287032
28	Current_Ratio[Latest]	2.281956
36	Creditors_Velocity_Days	2.144215
19	ROG-Net_Sales_perc	2.121571
20	ROG-Cost_of_Production_perc	2.009970
37	Inventory_Velocity_Days	1.885761
27	ROG-Market_Capitalisation_perc	1.641656
18	ROG-Gross_Block_perc	1.543516
9	Capital_expenses_in_forex	NaN
25	ROG-Revenue_earnings_in_forex_perc	NaN
26	ROG-Revenue_expenses_in_forex_perc	NaN

drop the variable Networth

Out[690]:

	variables	VIF
33	APATM_perc[Latest]	5.446430
22	ROG-PAT_perc	5.280594
32	PBITM_perc[Latest]	5.255564
23	ROG-CP_perc	4.897313
11	CEPS_annualised_Unit_Curr	4.597843
1	Total_Debt	4.125140
10	Market_Capitalisation	4.113707
4	Selling_Cost	4.080922
21	ROG-PBIT_perc	3.909695
16	ROG-Capital_Employed_perc	3.871881
0	Equity_Paid_Up	3.825034
5	Adjusted_PAT	3.765777
3	Other_Income	3.672564
7	Revenue_expenses_in_forex	3.660960
12	Cash_Flow_From_Operating_Activities	3.601539
9	Book_Value_Adj_Unit_Curr	3.320020
30	Total_Asset_Turnover_Ratio[Latest]	3.300762
20	ROG-Total_Assets_perc	3.228378
6	Revenue_earnings_in_forex	3.047719
2	Net_Working_Capital	2.862647
14	Cash_Flow_From_Financing_Activities	2.846111
15	ROG-Net_Worth_perc	2.844685
13	Cash_Flow_From_Investing_Activities	2.424683
31	Interest_Cover_Ratio[Latest]	2.423764
29	Debtors_Ratio[Latest]	2.413369
34	Debtors_Velocity_Days	2.406311
37	Value_of_Output_by_Gross_Block	2.367604
28	Inventory_Ratio[Latest]	2.286739
27	Current_Ratio[Latest]	2.257718
35	Creditors_Velocity_Days	2.143528
18	ROG-Net_Sales_perc	2.121483
19	ROG-Cost_of_Production_perc	2.009912
36	Inventory_Velocity_Days	1.879890
26	ROG-Market_Capitalisation_perc	1.628975
17	ROG-Gross_Block_perc	1.543321
8	Capital_expenses_in_forex	NaN
24	ROG-Revenue_earnings_in_forex_perc	NaN
25	ROG-Revenue_expenses_in_forex_perc	NaN

drop the variable APATM_perc[Latest]

Out[691]:

	variables	VIF
22	ROG-PAT_perc	5.280593
23	ROG-CP_perc	4.889454
11	CEPS_annualised_Unit_Curr	4.593354
10	Market_Capitalisation	4.113438
4	Selling_Cost	4.078795
1	Total_Debt	4.060836
21	ROG-PBIT_perc	3.904608
16	ROG-Capital_Employed_perc	3.859789
0	Equity_Paid_Up	3.824498
5	Adjusted_PAT	3.699815
3	Other_Income	3.671837
7	Revenue_expenses_in_forex	3.660517
12	Cash_Flow_From_Operating_Activities	3.601521
9	Book_Value_Adj._Unit_Curr	3.315627
30	Total_Asset_Turnover_Ratio[Latest]	3.300533
20	ROG-Total_Assets_perc	3.228312
6	Revenue_earnings_in_forex	3.044218
2	Net_Working_Capital	2.862606
14	Cash_Flow_From_Financing_Activities	2.844582
15	ROG-Net_Worth_perc	2.841728
13	Cash_Flow_From_Investing_Activities	2.423766
29	Debtors_Ratio[Latest]	2.407995
33	Debtors_Velocity_Days	2.403403
36	Value_of_Output_by_Gross_Block	2.365303
28	Inventory_Ratio[Latest]	2.284743
31	Interest_Cover_Ratio[Latest]	2.280240
27	Current_Ratio[Latest]	2.244315
34	Creditors_Velocity_Days	2.139631
18	ROG-Net_Sales_perc	2.121483
19	ROG-Cost_of_Production_perc	2.008703
35	Inventory_Velocity_Days	1.873674
32	PBITM_perc[Latest]	1.827641
26	ROG-Market_Capitalisation_perc	1.628454
17	ROG-Gross_Block_perc	1.543309
8	Capital_expenses_in_forex	NaN
24	ROG-Revenue_earnings_in_forex_perc	NaN
25	ROG-Revenue_expenses_in_forex_perc	NaN

drop the variable ROG-PAT_perc

Out[692]:

	variables	VIF
11	CEPS_annualised_Unit_Curr	4.593327
10	Market_Capitalisation	4.109778
4	Selling_Cost	4.078746
1	Total_Debt	4.057324
16	ROG-Capital_Employed_perc	3.856903
0	Equity_Paid_Up	3.824478
3	Other_Income	3.669870
7	Revenue_expenses_in_forex	3.660217
5	Adjusted_PAT	3.637103
12	Cash_Flow_From_Operating_Activities	3.598581
9	Book_Value_Adj._Unit_Curr	3.313009
29	Total_Asset_Turnover_Ratio[Latest]	3.298963
22	ROG-CP_perc	3.256478
21	ROG-PBIT_perc	3.232875
20	ROG-Total_Assets_perc	3.228281
6	Revenue_earnings_in_forex	3.043071
2	Net_Working_Capital	2.862496
14	Cash_Flow_From_Financing_Activities	2.842731
15	ROG-Net_Worth_perc	2.828995
13	Cash_Flow_From_Investing_Activities	2.423009
28	Debtors_Ratio[Latest]	2.407526
32	Debtors_Velocity_Days	2.401838
35	Value_of_Output_by_Gross_Block	2.358272
27	Inventory_Ratio[Latest]	2.281934
30	Interest_Cover_Ratio[Latest]	2.280098
26	Current_Ratio[Latest]	2.244299
33	Creditors_Velocity_Days	2.139581
18	ROG-Net_Sales_perc	2.121467
19	ROG-Cost_of_Production_perc	2.005044
34	Inventory_Velocity_Days	1.872426
31	PBITM_perc[Latest]	1.827586
25	ROG-Market_Capitalisation_perc	1.626339
17	ROG-Gross_Block_perc	1.534480
8	Capital_expenses_in_forex	NaN
23	ROG-Revenue_earnings_in_forex_perc	NaN
24	ROG-Revenue_expenses_in_forex_perc	NaN

1.5 Train Test Split

Preparing the Model 2 after removing the Multicollinearity

Optimization terminated successfully.
Current function value: 0.221791
Iterations 9

Summary of Model 2

Out[699]:

Logit Regression Results

Dep. Variable:	default	No. Observations:	2402				
Model:	Logit	Df Residuals:	2384				
Method:	MLE	Df Model:	17				
Date:	Sun, 20 Dec 2020	Pseudo R-squ.:	0.3531				
Time:	01:50:56	Log-Likelihood:	-532.74				
converged:	True	LL-Null:	-823.47				
Covariance Type:	nonrobust	LLR p-value:	1.200e-112				
		coef	std err	z	P> z 	[0.025	0.975]
	Intercept	-1.5873	0.146	-10.853	0.000	-1.874	-1.301
	Equity_Paid_Up	0.0053	0.008	0.620	0.535	-0.011	0.022
	Total_Debt	0.0173	0.003	6.620	0.000	0.012	0.022
	Net_Working_Capital	-0.0160	0.002	-6.588	0.000	-0.021	-0.011
	Other_Income	-0.0578	0.046	-1.255	0.210	-0.148	0.032
	Selling_Cost	-0.0545	0.050	-1.096	0.273	-0.152	0.043
	Adjusted_PAT	-0.1007	0.034	-2.922	0.003	-0.168	-0.033
	Revenue_earnings_in_forex	-0.0391	0.022	-1.776	0.076	-0.082	0.004
	Revenue_expenses_in_forex	0.0404	0.022	1.826	0.068	-0.003	0.084
	Market_Capitalisation	-0.0131	0.002	-5.822	0.000	-0.017	-0.009
	CEPS_annualised_Unit_Curr	-0.1081	0.021	-5.253	0.000	-0.148	-0.068
Cash_Flow_From_Operating_Activities		-0.0159	0.014	-1.127	0.260	-0.044	0.012
Cash_Flow_From_Investing_Activities		0.0142	0.027	0.533	0.594	-0.038	0.067
Cash_Flow_From_Financing_Activities		-0.0174	0.023	-0.745	0.457	-0.063	0.028
	Debtors_Velocity_Days	-0.0029	0.001	-2.954	0.003	-0.005	-0.001
	Creditors_Velocity_Days	0.0036	0.001	3.347	0.001	0.001	0.006
	Inventory_Velocity_Days	-0.0013	0.001	-1.165	0.244	-0.004	0.001
	Value_of_Output_by_Gross_Block	-0.1582	0.031	-5.119	0.000	-0.219	-0.098

Preparing the Model 3 after removing the variables which are insignificant having p values more than .05

Optimization terminated successfully.
Current function value: 0.224948
Iterations 9

1.6 Build Logistic Regression Model on most important variables on Train Dataset

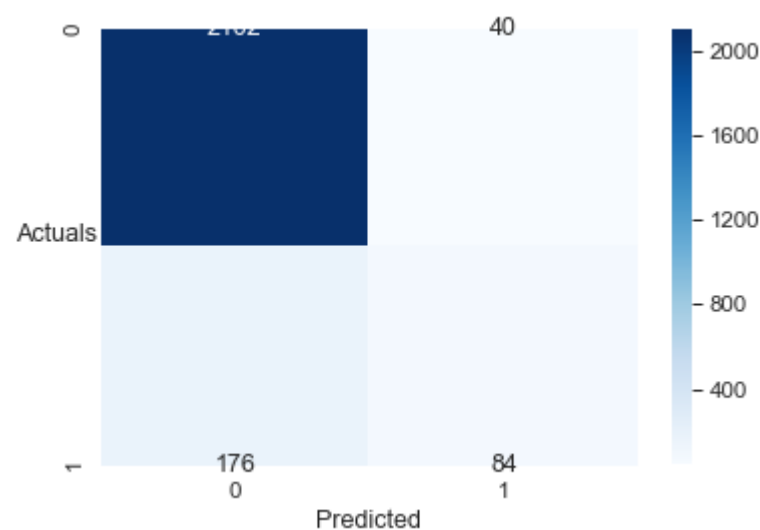
Model 3 Summary

Out[702]: Logit Regression Results

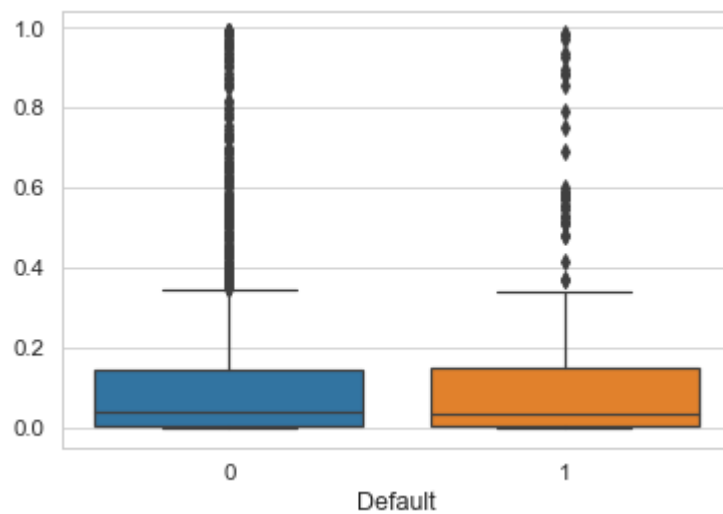
Dep. Variable:	default	No. Observations:	2402
Model:	Logit	Df Residuals:	2393
Method:	MLE	Df Model:	8
Date:	Sun, 20 Dec 2020	Pseudo R-squ.:	0.3438
Time:	01:51:30	Log-Likelihood:	-540.33
converged:	True	LL-Null:	-823.47
Covariance Type:	nonrobust	LLR p-value:	4.118e-117

	coef	std err	z	P> z	[0.025	0.975]
Intercept	-1.6481	0.129	-12.737	0.000	-1.902	-1.394
Total_Debt	0.0148	0.002	7.164	0.000	0.011	0.019
Net_Working_Capital	-0.0165	0.002	-7.148	0.000	-0.021	-0.012
Adjusted_PAT	-0.0975	0.032	-3.080	0.002	-0.159	-0.035
Market_Capitalisation	-0.0140	0.002	-6.752	0.000	-0.018	-0.010
CEPS_annualised_Unit_Curr	-0.1168	0.020	-5.971	0.000	-0.155	-0.078
Debtors_Velocity_Days	-0.0029	0.001	-3.064	0.002	-0.005	-0.001
Creditors_Velocity_Days	0.0038	0.001	3.615	0.000	0.002	0.006
Value_of_Output_by_Gross_Block	-0.1586	0.031	-5.087	0.000	-0.220	-0.097

Checking the probabilitites at 50 percent



Checking the boxplot of Default variable

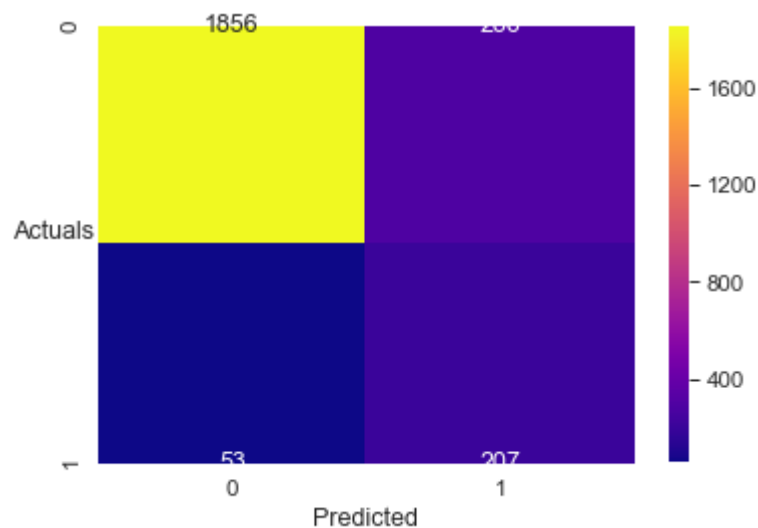


Choosing the optimal threshold

Out[1050]: 0.16111914008224526

Validating on the train set with revised threshold

Checking the confusion matrix for training set



Checking the true postive ,True Negative ,false postive, false negative of train data(Logical Regression)

True Negative: 1856
 False Positives: 286
 False Negatives: 53
 True Positives: 207

Classification Report Training data (Logical Regression)

	precision	recall	f1-score	support
0	0.972	0.866	0.916	2142
1	0.420	0.796	0.550	260
accuracy			0.859	2402
macro avg	0.696	0.831	0.733	2402
weighted avg	0.912	0.859	0.877	2402

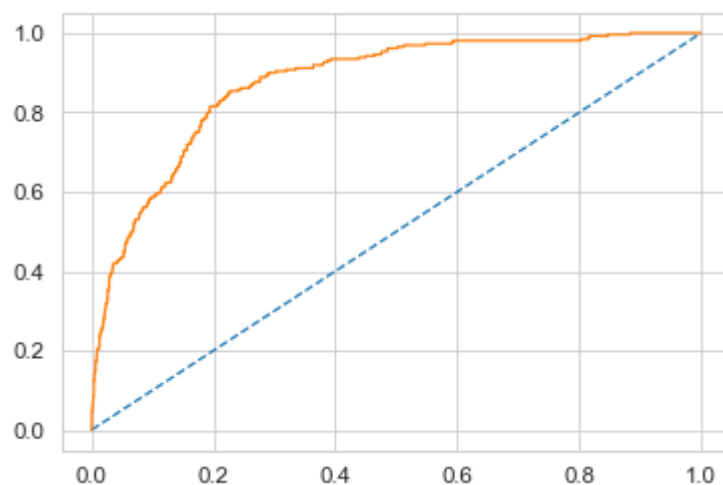
Logical Regression Training Matrices

```
logit_train_precision 0.42
logit_train_recall 0.8
logit_train_f1 0.55
logit_train_Accuracy 0.86
```

AUC and ROC of Train Data(LogicalRegression)

AUC: 0.875

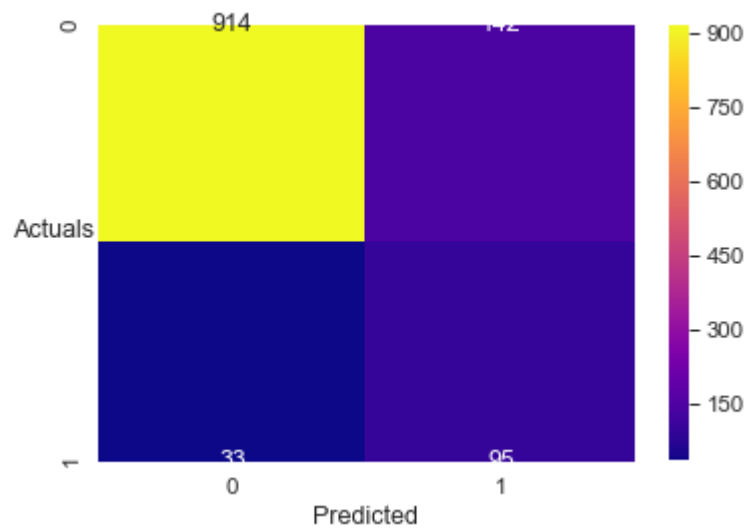
Out[1142]: [<matplotlib.lines.Line2D at 0x20d92fefb88>]



1.7 Validate the Model on Test Dataset and state the performance matrices

Validating on the test set

confusion matrix for Test data(Logical Regression)



Checking the true postive ,True Negative ,false postive, false negative of test data

Classification of Test Data((Logical Regression)

	precision	recall	f1-score	support
0	0.965	0.866	0.913	1056
1	0.401	0.742	0.521	128
accuracy			0.852	1184
macro avg	0.683	0.804	0.717	1184
weighted avg	0.904	0.852	0.870	1184

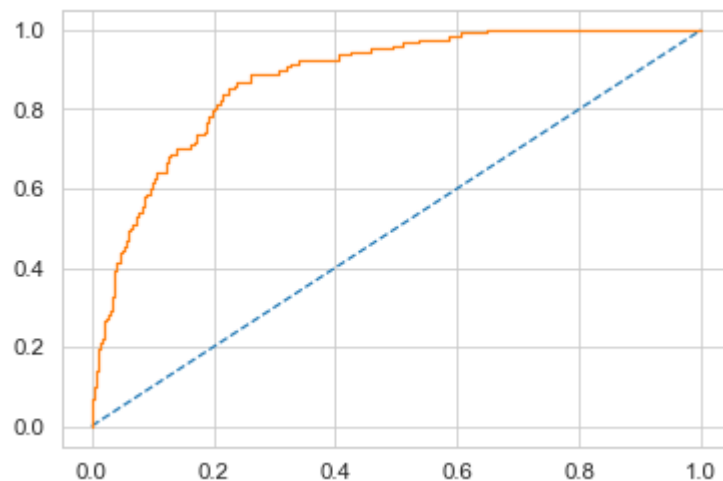
Metrics report of Test data (logical Regression)

```
logit_test_precision 0.4
logit_test_recall 0.74
logit_test_f1 0.52
logit_test_Accuracy 0.85
```

AUC and ROC of Test Data(LogicalRegression)

AUC: 0.879

Out[1071]: [



1.8 Build a Random Forest Model on Train Dataset

We will take the variables of Model 3 Since we have already removed the Multicollinearity as well as insignificant variables

taking the datatypes of Selected variables

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 3586 entries, 0 to 3585
Data columns (total 10 columns):
default                3586 non-null int32
Total_Debt             3586 non-null float64
Net_Working_Capital    3586 non-null float64
Adjusted_PAT           3586 non-null float64
Market_Capitalisation  3586 non-null float64
CEPS_annualised_Unit_Curr  3586 non-null float64
Debtors_Velocity_Days  3586 non-null float64
Creditors_Velocity_Days 3586 non-null float64
Inventory_Velocity_Days 3586 non-null float64
Value_of_Output_by_Gross_Block 3586 non-null float64
dtypes: float64(9), int32(1)
memory usage: 266.3 KB
```

checking the few top records of selected variables

Out[1074]:

	default	Total_Debt	Net_Working_Capital	Adjusted_PAT	Market_Capitalisation	CEPS_annualised_Unit_Cur
0	1	180.83	-89.40625	-8.23875	0.00000	-13.1587
1	1	180.83	-89.40625	-8.23875	278.64375	-0.0200
2	1	180.83	151.52375	-8.23875	278.64375	-13.1587
3	1	180.83	-89.40625	-8.23875	194.27000	-13.1587
4	1	180.83	151.52375	-8.23875	113.68000	-13.1587

Building the Random Forest Base Model

Out[1077]: RandomForestClassifier()

Basic Model Score (Random Forest)

Training 0.9995836802664446
Testing 0.9206081081081081

HyperTuning parameter (Random Forest)

```
{'max_depth': 30, 'max_features': 6, 'min_samples_leaf': 25, 'min_samples_split': 25, 'n_estimators': 20}
```

Out[1080]: RandomForestClassifier(max_depth=30, max_features=6, min_samples_leaf=25, min_samples_split=25, n_estimators=20)

Predicting the Training and Testing data(RF)

Performance Evaluation on Training data(RF)

Confusion Matrix of Training Data(RF)

Out[1082]: array([[2108, 34],
[127, 133]], dtype=int64)

Accuracy Score of Training Data(RF)

Out[1083]: 0.9329725228975854

Classification Report of Training Data(RF)

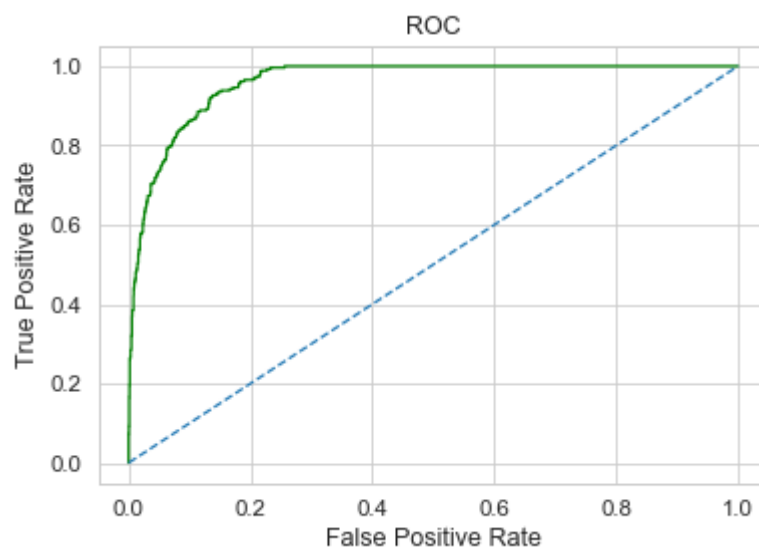
	precision	recall	f1-score	support
0	0.94	0.98	0.96	2142
1	0.80	0.51	0.62	260
accuracy			0.93	2402
macro avg	0.87	0.75	0.79	2402
weighted avg	0.93	0.93	0.93	2402

Classification Report of training data (RF)

```
rf_train_precision 0.8
rf_train_recall 0.51
rf_train_f1 0.62
```

AUC and ROC of Training Data(RF MODEL)

Area under Curve is 0.7478327228327228



1.9 Validate the Random Forest Model on test Dataset and state the performance matrices

Performance Evaluation on Test data(RF Model)

	precision	recall	f1-score	support
0	0.94	0.97	0.95	1056
1	0.63	0.45	0.52	128
accuracy			0.91	1184
macro avg	0.78	0.71	0.74	1184
weighted avg	0.90	0.91	0.91	1184

Confusion Matrix Test Data(RF Model)


```
Out[1088]: array([[1023, 33],
                  [ 71, 57]], dtype=int64)
```

Accuracy Score of Test Data(RF)

```
Out[1089]: 0.9121621621621622
```

Classification Report of Test Data(RF Model)

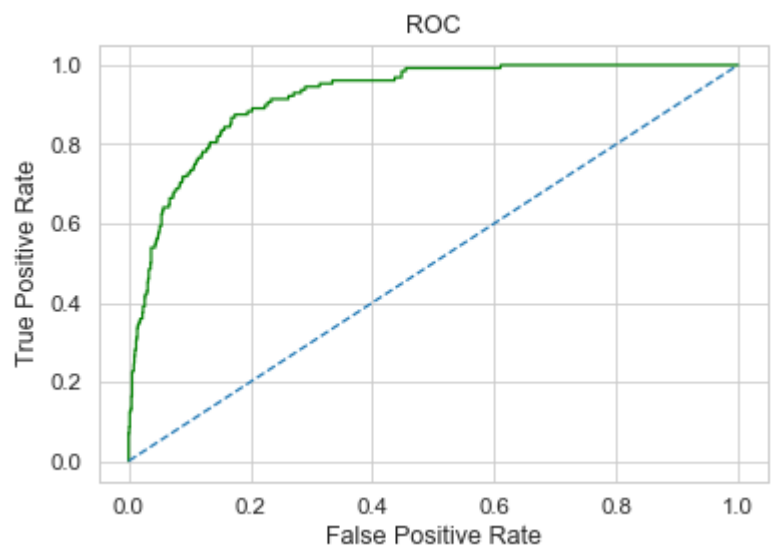
	precision	recall	f1-score	support
0	0.94	0.97	0.95	1056
1	0.63	0.45	0.52	128
accuracy			0.91	1184
macro avg	0.78	0.71	0.74	1184
weighted avg	0.90	0.91	0.91	1184

Classification Report of Test data (RF)

```
rf_test_precision 0.63
rf_test_recall 0.45
rf_test_f1 0.52
```

AUC and ROC for the Test data(RF MODEL)

Area under Curve is 0.70703125



Variable Importance(RF Model)

	Imp
CEPS_annualised_Unit_Curr	0.363060
Net_Working_Capital	0.283017
Adjusted_PAT	0.128906
Total_Debt	0.079423
Value_of_Output_by_Gross_Block	0.070065
Market_Capitalisation	0.047128
Debtors_Velocity_Days	0.013070
Inventory_Velocity_Days	0.007668
Creditors_Velocity_Days	0.007663

Train and Test Performance of RF Model

Out[1094]:

	Random Forest Train	Random Forest Test
Accuracy	0.93	0.91
AUC	0.75	0.71
Recall	0.51	0.45
Precision	0.80	0.63
F1 Score	0.62	0.52

1.10 Build an LDA Model on Train Dataset

LDA Model

Out[1095]: LinearDiscriminantAnalysis()

Predicting on Training and Test dataset(LDA)

Getting the Predicted Classes and Probs(LDA)

Out[1097]:

	0	1
0	0.957984	0.042016
1	0.989585	0.010415
2	0.945289	0.054711
3	0.968255	0.031745
4	0.958550	0.041450

LDA Model Evaluation

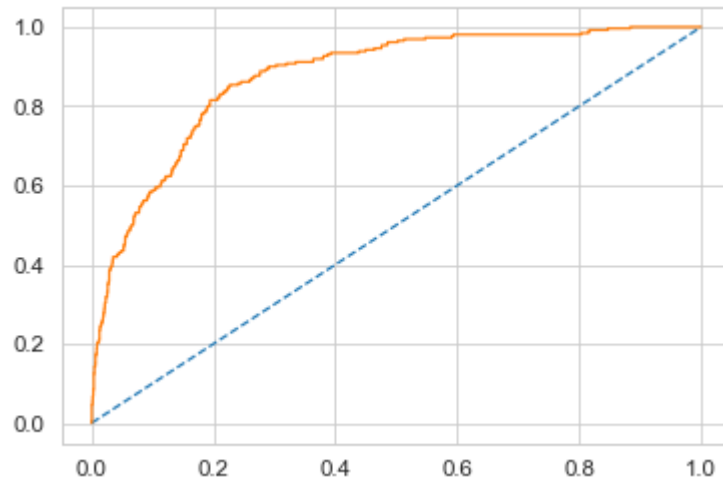
Training Data Accuracy (LDA)

Out[1098]: 0.9050791007493755

AUC and ROC for the training data(LDA)

AUC: 0.875

Out[1099]: [



1.11 Validate the LDA Model on test Dataset and state the performance matrices

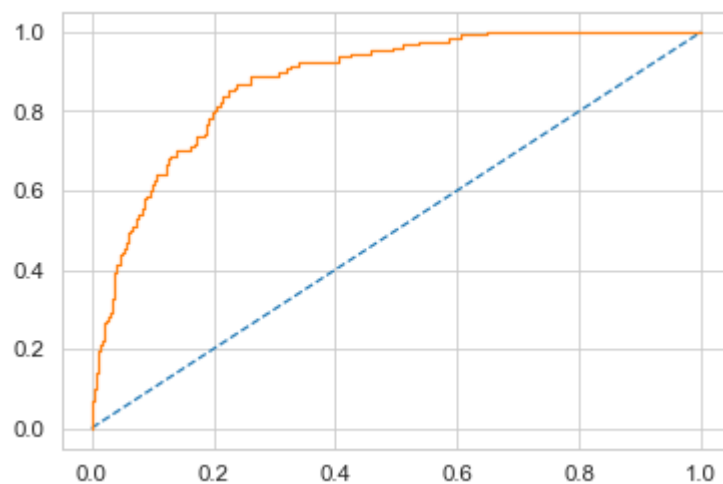
Test Data Accuracy (LDA)

Out[1100]: 0.9011824324324325

AUC and ROC for the test data (LDA)

AUC: 0.879

Out[1101]: [



Confusion Matrix for the training data(LDA)

Out[1102]: array([[2110, 32],
[196, 64]], dtype=int64)

Classification Report of training data (LDA)

	precision	recall	f1-score	support
0	0.92	0.99	0.95	2142
1	0.67	0.25	0.36	260
accuracy			0.91	2402
macro avg	0.79	0.62	0.65	2402
weighted avg	0.89	0.91	0.88	2402

Classification Report of training data (LDA)

```
LDA_train_precision 0.67
LDA_train_recall 0.25
LDA_train_f1 0.36
```

Confusion Matrix for Test Data(LDA)

```
Out[1105]: array([[1033, 23],
                  [ 94, 34]], dtype=int64)
```

Test Data Accuracy(LDA)

```
Out[1106]: 0.9011824324324325
```

Classification Report of Test Data (LDA)

	precision	recall	f1-score	support
0	0.92	0.98	0.95	1056
1	0.60	0.27	0.37	128
accuracy			0.90	1184
macro avg	0.76	0.62	0.66	1184
weighted avg	0.88	0.90	0.88	1184

LDA Test metrics

```
LDA_test_precision 0.6
LDA_test_recall 0.27
LDA_test_f1 0.37
```

Train and Test Performance (LDA)

Out[1109]:

	LDA Train	LDA Test
Accuracy	0.91	0.90
AUC	0.88	0.88
Recall	0.25	0.27
Precision	0.67	0.60
F1 Score	0.36	0.37

1.12 Compare the performances of all the three models

Out[1135]:

	logit Train	logit Test	rf Train	rf Test	LDA Train	LDA Test
Accuracy	0.86	0.85	0.93	0.91	0.91	0.90
AUC	0.88	0.88	0.75	0.71	0.88	0.88
Recall	0.80	0.74	0.51	0.45	0.25	0.27
Precision	0.42	0.40	0.80	0.63	0.67	0.60
F1 Score	0.55	0.52	0.62	0.52	0.36	0.37

Comparison Comments

- Accuracy is not the good measure in this scenario since class of proportion is not equal while it has huge difference
- Since We are evaluating the Credit risk of the company , Since Sensitivity will play the major role .
- We need to opt the model in this scenario which having high Sensitivity that is logical regression

1.13 Recommendation

Business Insights and Recommendations.

- If company having more debt than their worth ,credit should not be given .
- If company working capital that is the difference of current assets and current liabilities is less than 6 ,to provide the credit is risky
- If companies pay after 95 days of materials purchased , it is recommended to avoid credit to such companies
- Companies which are not registering the profit, to provide credit is risky
- Companies which are registering the profit and companies worth is greater than their debt , safely credit can be given to such companies

Loading the stock files

Out[1111]:

	Date	Infosys	Indian Hotel	Mahindra & Mahindra	Axis Bank	SAIL	Shree Cement	Sun Pharma	Jindal Steel	Idea Vodafone	Jet Airways
0	31-03-2014	264	69	455	263	68	5543	555	298	83	278
1	07-04-2014	257	68	458	276	70	5728	610	279	84	303
2	14-04-2014	254	68	454	270	68	5649	607	279	83	280
3	21-04-2014	253	68	488	283	68	5692	604	274	83	282
4	28-04-2014	256	65	482	282	63	5582	611	238	79	243
...
309	02-03-2020	729	120	469	658	33	23110	401	146	3	22
310	09-03-2020	634	114	427	569	30	21308	384	121	6	18
311	16-03-2020	577	90	321	428	27	18904	365	105	3	16
312	23-03-2020	644	75	293	360	21	17666	338	89	3	14
313	30-03-2020	633	75	284	379	23	17546	352	82	3	14

314 rows × 11 columns

Fixing messy column names (containing spaces) for ease of use

Checking top 5 rows again

Out[1113]:

	Date	Infosys	Indian_Hotel	Mahindra_&_Mahindra	Axis_Bank	SAIL	Shree_Cement	Sun_Pharma	Jinda
0	31-03-2014	264	69	455	263	68	5543	555	
1	07-04-2014	257	68	458	276	70	5728	610	
2	14-04-2014	254	68	454	270	68	5649	607	
3	21-04-2014	253	68	488	283	68	5692	604	
4	28-04-2014	256	65	482	282	63	5582	611	

First, let us check the number of rows (observations) and the number of columns (variables)

The number of rows (observations) is 314
The number of columns (variables) is 11

Checking data types of all columns

```
<class 'pandas.core.frame.DataFrame'>  
RangeIndex: 314 entries, 0 to 313  
Data columns (total 11 columns):  
Date                314 non-null object  
Infosys              314 non-null int64  
Indian_Hotel         314 non-null int64  
Mahindra_&_Mahindra  314 non-null int64  
Axis_Bank            314 non-null int64  
SAIL                 314 non-null int64  
Shree_Cement         314 non-null int64  
Sun_Pharma           314 non-null int64  
Jindal_Steel         314 non-null int64  
Idea_Vodafone        314 non-null int64  
Jet_Airways          314 non-null int64  
dtypes: int64(10), object(1)  
memory usage: 27.1+ KB
```

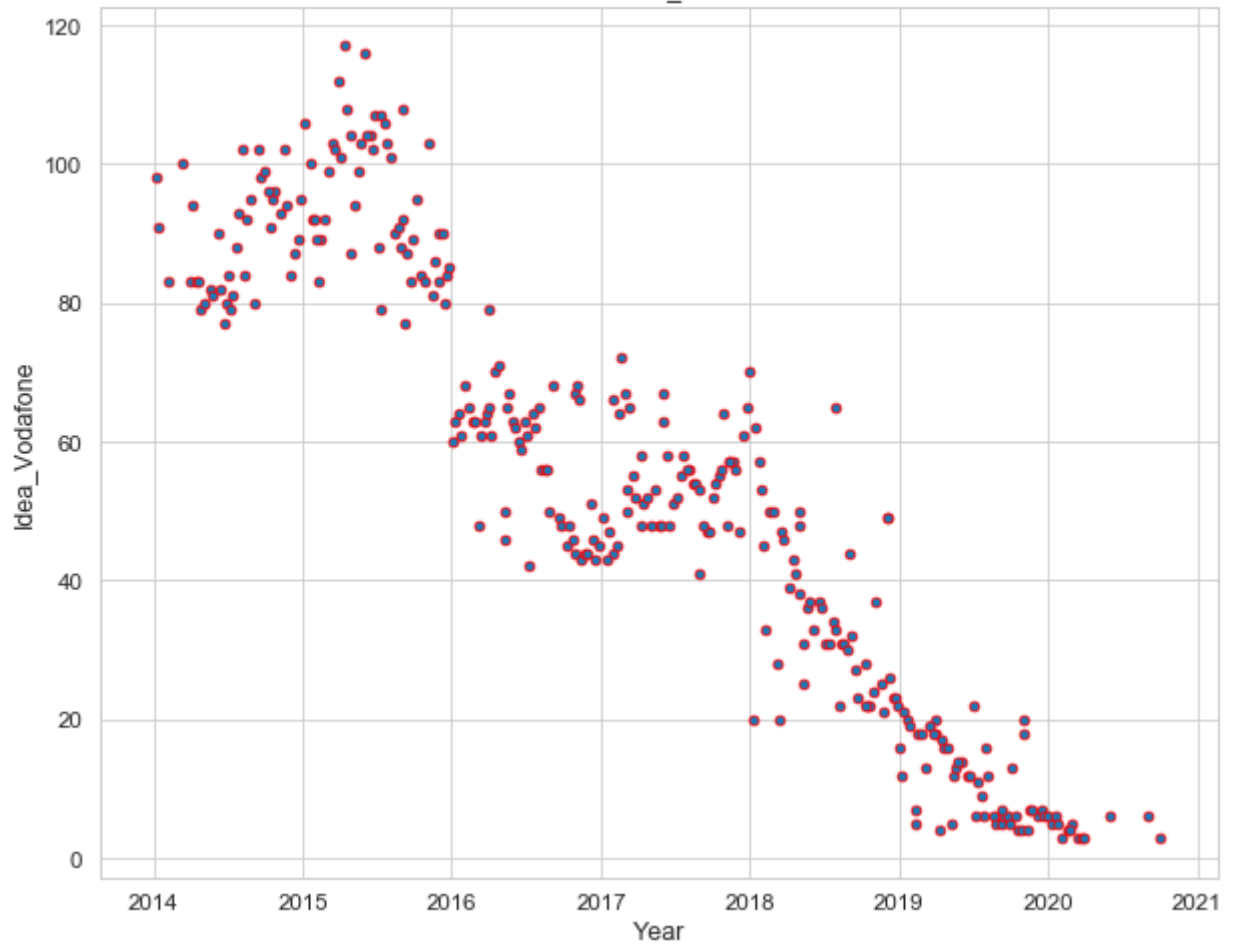
Now, let us check the basic measures of descriptive statistics for the continuous variables

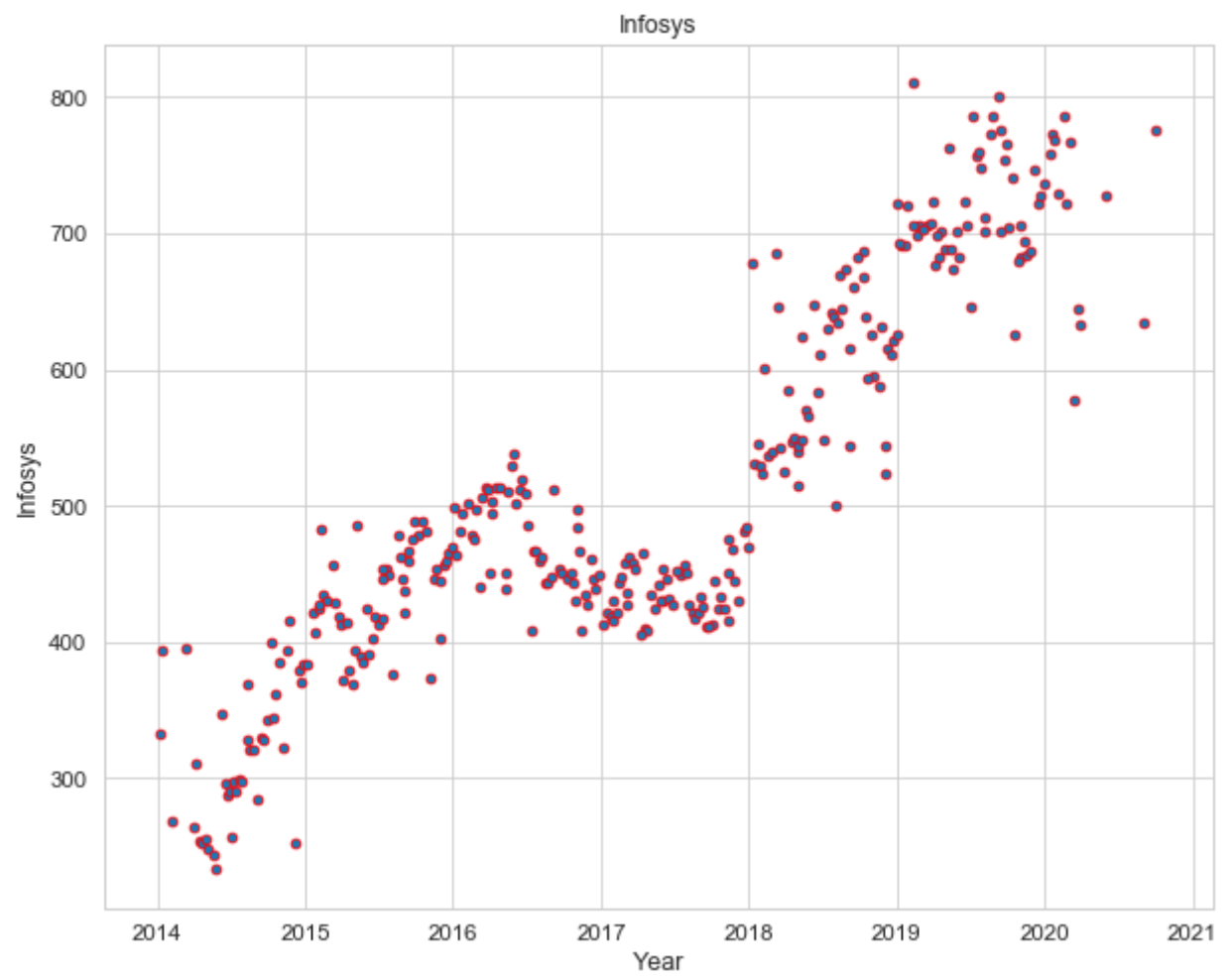
Out[1117]:

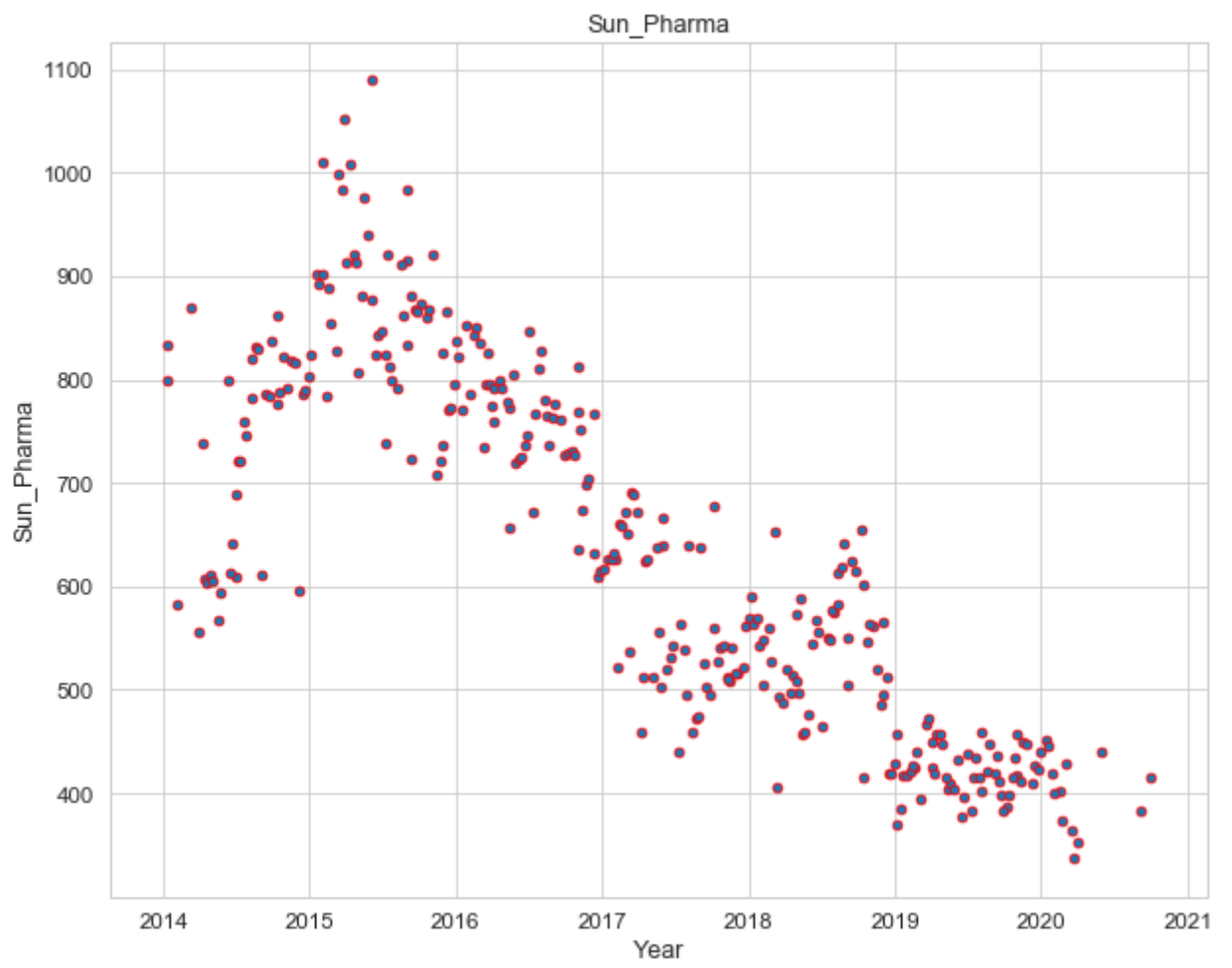
	Infosys	Indian_Hotel	Mahindra_&_Mahindra	Axis_Bank	SAIL	Shree_Cement	Sun_Pharma
count	314.000000	314.000000	314.000000	314.000000	314.000000	314.000000	314.000000
mean	511.340764	114.560510	636.678344	540.742038	59.095541	14806.410828	633.468153
std	135.952051	22.509732	102.879975	115.835569	15.810493	4288.275085	171.855893
min	234.000000	64.000000	284.000000	263.000000	21.000000	5543.000000	338.000000
25%	424.000000	96.000000	572.000000	470.500000	47.000000	10952.250000	478.500000
50%	466.500000	115.000000	625.000000	528.000000	57.000000	16018.500000	614.000000
75%	630.750000	134.000000	678.000000	605.250000	71.750000	17773.250000	785.000000
max	810.000000	157.000000	956.000000	808.000000	104.000000	24806.000000	1089.000000

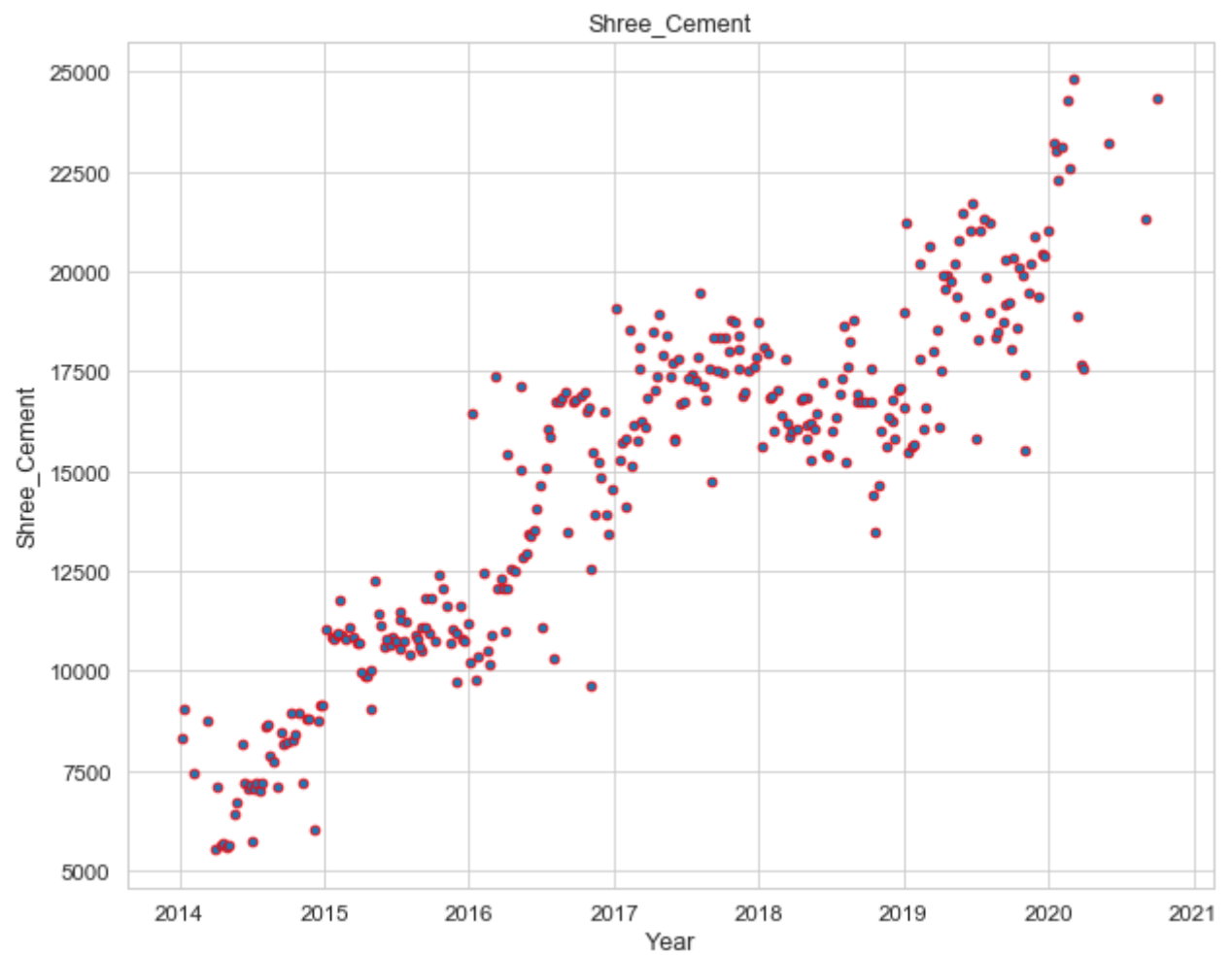
2.1 Draw Stock Price Chart for any 2 variables

Year vs Idea_Vodafone









2.2 Calculate Returns

Checking the rows & columns of dataset

Out[1123]: (314, 10)

Checking top 5 rows

Out[1124]:

	Infosys	Indian_Hotel	Mahindra_&_Mahindra	Axis_Bank	SAIL	Shree_Cement	Sun_Pharma	Jir
0	NaN	NaN	NaN	NaN	NaN	NaN	NaN	
1	-0.026873	-0.014599	0.006572	0.048247	0.028988	0.032831	0.094491	
2	-0.011742	0.000000	-0.008772	-0.021979	-0.028988	-0.013888	-0.004930	
3	-0.003945	0.000000	0.072218	0.047025	0.000000	0.007583	-0.004955	
4	0.011788	-0.045120	-0.012371	-0.003540	-0.076373	-0.019515	0.011523	

2.3 Calculate Stock Means and Standard Deviation

Calculating stock means

```
Out[1125]: Infosys          0.002794
Indian_Hotel  0.000266
Mahindra_&_Mahindra -0.001506
Axis_Bank     0.001167
SAIL          -0.003463
Shree_Cement  0.003681
Sun_Pharma    -0.001455
Jindal_Steel  -0.004123
Idea_Vodafone -0.010608
Jet_Airways   -0.009548
dtype: float64
```

stocks means in the sorting order

```
Out[1126]: Shree_Cement    0.003681
Infosys          0.002794
Axis_Bank        0.001167
Indian_Hotel     0.000266
Sun_Pharma       -0.001455
Mahindra_&_Mahindra -0.001506
SAIL             -0.003463
Jindal_Steel     -0.004123
Jet_Airways      -0.009548
Idea_Vodafone    -0.010608
dtype: float64
```

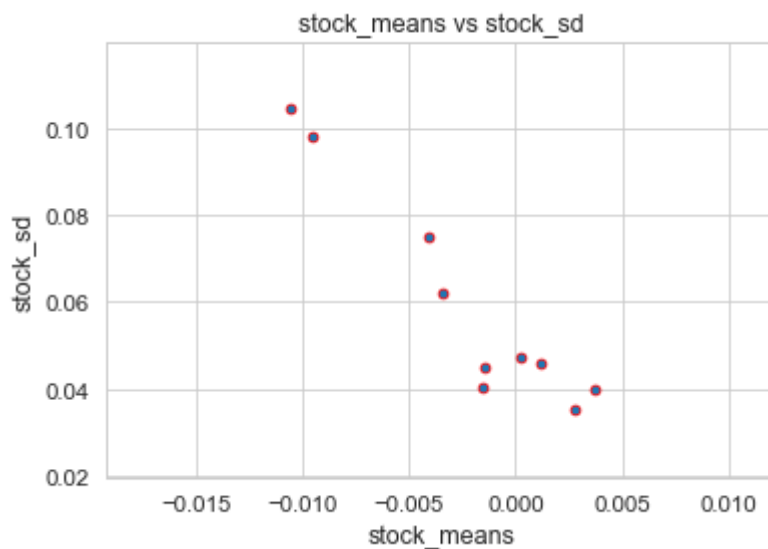
Calculating stock standard deviation

```
Out[1127]: Infosys          0.035070
Indian_Hotel  0.047131
Mahindra_&_Mahindra 0.040169
Axis_Bank     0.045828
SAIL          0.062188
Shree_Cement  0.039917
Sun_Pharma    0.045033
Jindal_Steel  0.075108
Idea_Vodafone 0.104315
Jet_Airways   0.097972
dtype: float64
```

standard deviation of stocks in the sorting order

```
Out[1128]: Infosys                0.035070
Shree_Cement          0.039917
Mahindra_&_Mahindra    0.040169
Sun_Pharma            0.045033
Axis_Bank              0.045828
Indian_Hotel           0.047131
SAIL                   0.062188
Jindal_Steel           0.075108
Jet_Airways            0.097972
Idea_Vodafone          0.104315
dtype: float64
```

2.4 Draw a plot of Stock Means vs Standard Deviation and share insights



Insights

- Stock with a lower mean & higher standard deviation do not play a role in a portfolio that has competing stock with more returns & less risk.
- Thus for the data we have here, we are only left few stocks: *One with highest return and lowest risk & * One with lowest risk and highest return
- Therefore from pure Returns perspective, Shree Cement, Infosys looks good in this dataset & from pure Risk perspective (as measured by standard deviation), infosys followed by shree cement & Mahindra and Mahindra looks good in this dataset