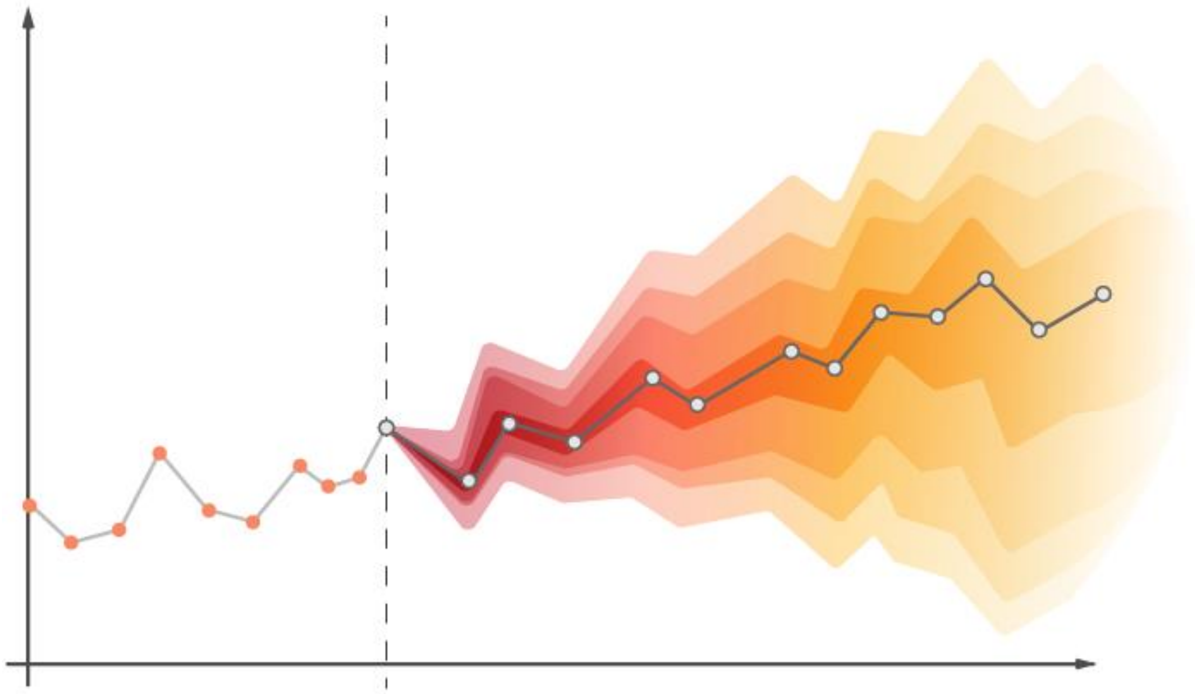
Time Series Forecasting

&

Trend Analysis



Report for AR 1 Model

Source: -

Year	TL	CL	NCL
Mar-23	28040.6	6987.94	3138.49
Mar-22	25864.75	4180.97	4566.44
Mar-21	24093.32	6756.58	1412.13
Mar-20	19563.61	6372.25	138.86
Mar-19	18140.72	6736.46	53.64
Mar-18	15793.84	5754.18	57.08
Mar-17	13022.84	4446.97	139.69
Mar-16	12558.7	5343.69	349.16
Mar-15	10225.88	3946.19	920.15
Mar-14	8575.53	3317.28	1245.86
Mar-13	6824.57	2767.96	1117.5
Mar-12	5991.21	2656.38	841.66
Mar-11	5841.17	2671.7	599.86
Mar-10	4594.08	639.87	2039.85
Mar-09	4097.04	583.13	2193.08
Mar-08	3494.44	445.73	1828.11
Mar-07	3319.36	346.48	2043.56
Mar-06	2480.74	298.21	1277.08
Mar-05	1914.83	206.14	885.1
Mar-04	1637.21	175.34	670.49
Mar-03	1322.97	226.01	561.42
Mar-02	886.31	154.51	369.38
Mar-01	639.23	136.71	225.9
Mar-00	448.54	87.92	140.9
Mar-99	345.7	110.01	110.96
Mar-98	196.92	56	70.86
Mar-97	143.61	42.62	52.7
Mar-96	89.84	20.77	32.08
Mar-95	48.07	11.43	5.6
Mar-94	11.82	3.32	2.78

Table 1:

Y= f (x1, x2)

Total Liabilities = f (Non-Current Liabilities, Current-Liabilities)

Data and Source

Variable	**Variable Code**	**Description & Measurement**
Total Liabilities	TL	AMOUNT(CR)
Non-Current Liabilities	NCL	AMOUNT(CR)
Current-Liabilities	CL	AMOUNT(CR)

Interpretation:

The provided information displays Aurobindo Pharma's financial structure, including total liabilities (TL), non-current liabilities (NCL), and current liabilities (CL) together with their respective currency amounts (CR). The following is a description of the data:

Total Liabilities (TL): All of a company's or organization's financial obligations, including both current and non-current liabilities, are referred to as total liabilities (TL).

Non-Current Liabilities (NCL): These are debts that are not anticipated to be settled during the company's or organization's current operational cycle or fiscal term. Long-term debts, such bonds or long-term loans, are usually included in non-current liabilities.

Current Liabilities (CL): These are the debts that the business or organization expects to pay off during its current fiscal year or operational cycle. Accounts payable, wages, and taxes are examples of short-term debts that are typically included in current liabilities.

Table 2:

Descriptive statistics

	CL	NCL	TL
Mean	2182.758	903.0123	7340.248
Median	514.4300	580.6400	3795.740
Maximum	6987.940	4566.440	28040.60
Minimum	3.320000	2.780000	11.82000
Std. Dev.	2534.172	1066.943	8468.209
Skewness	0.742118	1.715185	1.153445
Kurtosis	1.986602	5.995215	3.119139
Jarque-Bera	4.037417	25.92345	6.669925
Probability	0.132827	0.000002	0.035616
Sum	65482.75	27090.37	220207.5
Sum Sq. Dev.	1.86E+08	33012683	2.08E+09
Observations	30	30	30

Hypothesis testing:

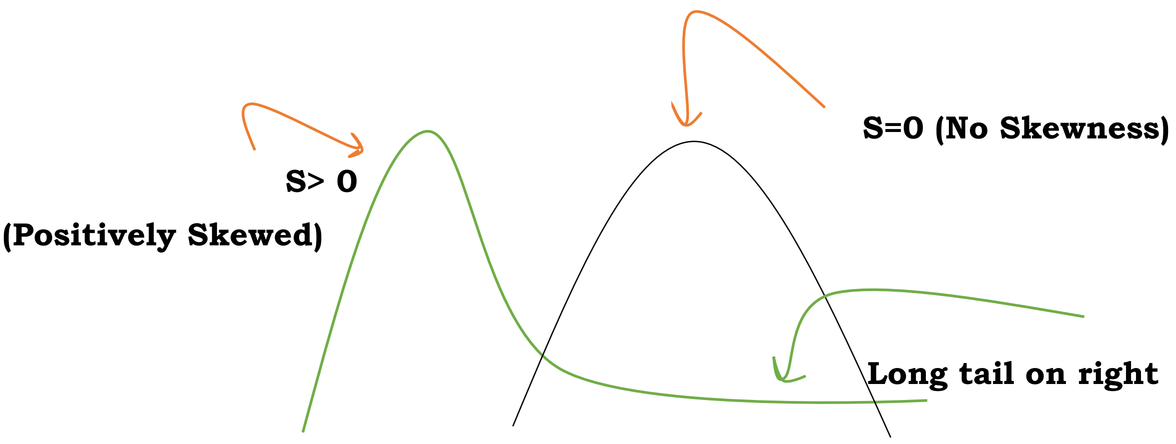
H0: Data is normally distributed (p-value >0.05)

H1: Data is not normally distributed (p-value< 0.05)

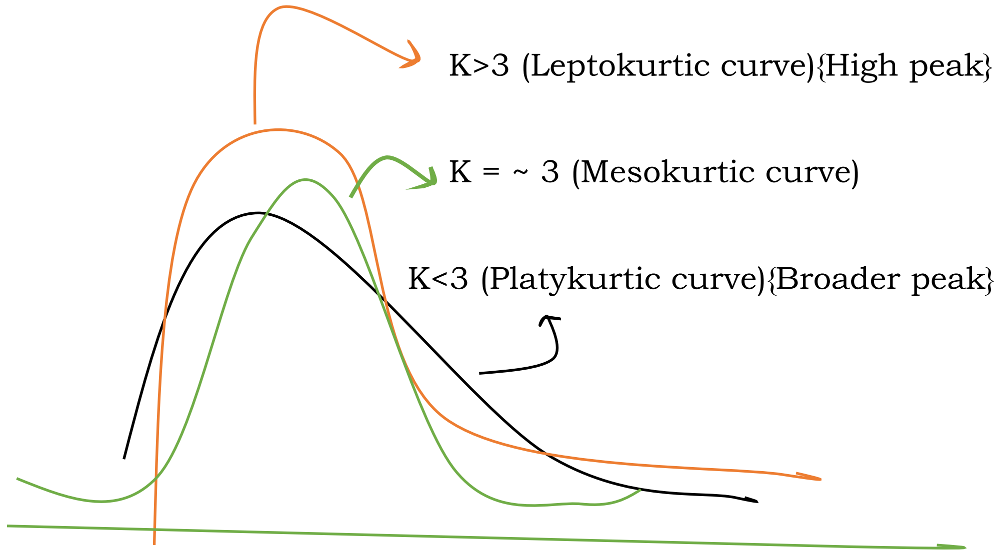
Interpretation for Skewness for Current Liabilities , Non-Current Liabilities and Total Liabilities:-

Positive skewness shows “Higher Mean” than “Median”

Valued of my dataset clustered at “Left” which shows “Positive Skewness” with tail of my dataset toward right.



Interpretation for Kurtosis:-



Interpretation for Current Liability:-

Kurtosis is 1.986602. It is lesser than 3. Thus it is platykurtic. Thus it shows broader peak and thinner tail. It shows value spread more from mean. Thus fewer extreme values in tail's. Thus it shows lower potential risk or lower probability of extreme events.

Interpretation for Non Current Liability:-

Kurtosis is 5.995215. It is greater than 3. Thus it is leptokurtic. Thus it shows high peak and heavy tail. It shows values are clustered around mean. It also shows more extreme values in the tail. We may called it outlier in our dataset. It shows higher potential risk. Or higher probability of extreme events.

Interpretation:

From the above table, we can observe that the variable CL has skewness of 0.74 with kurtosis of 1.99 which means that it is positively skewed data.

The variable NCL has skewness of 1.71 and kurtosis of 5.99 which means the data is positively skewed.

The variable of TL has skewness of 1.15 and kurtosis of 3.11 which means the data is positively skewed.

Jarque Bera :-

$$JB = n\left\{ \frac{S^2}{6} - \frac{(K-3)^2}{24} \right\}$$

Assumptions from probability of Jarque-Bera probability values:-

For Current Liability:- Probability value is 0.132827. It is greater than 0.05. Thus statistically insignificant. Thus we will accept H_0 (Null Hypothesis). It shows that current liability is "Normal".

For Non Current Liability:- Probability value is 0.000002. It is lesser than 0.05. Thus statistically significant. Thus we will reject "H_0 (Null Hypothesis)" , Thus we have to accept "H_1 Hypothesis". It shows that non current liability is "not Normal".

For Total Liability:- Probability value is 0.035616. It is lesser than 0.05. Thus statistically significant. Thus we will reject "H_0 (Null Hypothesis)" , Thus we have to accept "H_1 Hypothesis". It shows that non current liability is "not Normal".

Correlation Matrix:

	CL	NCL	TL
CL	1.000000	0.194165	0.929200
NCL	0.194165	1.000000	0.485382
TL	0.929200	0.485382	1.000000

Interpretation:

- Ideal Correlation value exists between –1 to 1.
- From the above data correlation between CL and TL is 0.9292 which is positive correlation. Thus current liability increases will result in increase in total liabilities.
- The correlation between the NCL and TL is 0.4853 which is positively correlated. Thus increase in non current liabilities will result in increase in total liabilities.

Table 3:

Unit root test

Total Liabilities:

- Level:

Null Hypothesis: TL has a unit root
Exogenous: Constant
Lag Length: 6 (Automatic - based on SIC, maxlag=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.691617	0.4220
Test critical values:	1% level	-3.752946	
	5% level	-2.998064	
	10% level	-2.638752	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TL)
Method: Least Squares
Date: 01/03/24 Time: 11:36
Sample (adjusted): 8 30
Included observations: 23 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TL(-1)	-0.195999	0.115865	-1.691617	0.1114
D(TL(-1))	-0.316630	0.201287	-1.573030	0.1366
D(TL(-2))	-0.283708	0.198834	-1.426854	0.1741
D(TL(-3))	-0.142338	0.212350	-0.670300	0.5129
D(TL(-4))	-0.084755	0.207848	-0.407773	0.6892
D(TL(-5))	0.249319	0.179116	1.391942	0.1842
D(TL(-6))	0.031330	0.140409	0.223137	0.8264
C	-143.2869	168.0892	-0.852446	0.4074

R-squared	0.781471	Mean dependent var	-565.6965
Adjusted R-squared	0.679491	S.D. dependent var	622.6304
S.E. of regression	352.4932	Akaike info criterion	14.83615
Sum squared resid	1863772.	Schwarz criterion	15.23110
Log likelihood	-162.6157	Hannan-Quinn criter.	14.93548
F-statistic	7.662961	Durbin-Watson stat	1.297256
Prob(F-statistic)	0.000507		

- **1st Difference:**

Null Hypothesis: D(TL) has a unit root
Exogenous: Constant
Lag Length: 6 (Automatic - based on SIC, maxlag=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.757669	0.3902
Test critical values:	1% level	-3.769597	
	5% level	-3.004861	
	10% level	-2.642242	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TL,2)
Method: Least Squares
Date: 01/03/24 Time: 11:39
Sample (adjusted): 9 30
Included observations: 22 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(TL(-1))	-0.295495	0.168117	-1.757669	0.1006
D(TL(-1),2)	-0.672141	0.152246	-4.414837	0.0006
D(TL(-2),2)	-0.739316	0.212841	-3.473560	0.0037
D(TL(-3),2)	-0.612511	0.262892	-2.329897	0.0353
D(TL(-4),2)	-0.320166	0.286676	-1.116820	0.2829
D(TL(-5),2)	0.031948	0.222692	0.143464	0.8880
D(TL(-6),2)	-0.061755	0.123008	-0.502042	0.6234
C	110.6575	116.2558	0.951845	0.3573

R-squared	0.822388	Mean dependent var	19.44955
Adjusted R-squared	0.733581	S.D. dependent var	613.3743
S.E. of regression	316.5978	Akaike info criterion	14.62843
Sum squared resid	1403278.	Schwarz criterion	15.02517
Log likelihood	-152.9127	Hannan-Quinn criter.	14.72189
F-statistic	9.260474	Durbin-Watson stat	1.136337
Prob(F-statistic)	0.000248		

Non-Current Liabilities:

- **Level**:

Null Hypothesis: NCL has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.666011	0.0921
Test critical values:	1% level	-3.679322	
	5% level	-2.967767	
	10% level	-2.622989	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(NCL)
Method: Least Squares
Date: 01/03/24 Time: 11:46
Sample (adjusted): 2 30
Included observations: 29 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
NCL(-1)	-0.332373	0.124670	-2.666011	0.0128
C	202.3265	175.5118	1.152780	0.2591

R-squared	0.208388	Mean dependent var	-108.1279
Adjusted R-squared	0.179069	S.D. dependent var	780.4857
S.E. of regression	707.1610	Akaike info criterion	16.02687
Sum squared resid	13502069	Schwarz criterion	16.12116
Log likelihood	-230.3896	Hannan-Quinn criter.	16.05640
F-statistic	7.107615	Durbin-Watson stat	1.706582
Prob(F-statistic)	0.012804		

1st Difference:

Null Hypothesis: D(NCL) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.658074	0.0001
Test critical values:	1% level	-3.689194	
	5% level	-2.971853	
	10% level	-2.625121	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(NCL,2)
Method: Least Squares
Date: 01/03/24 Time: 11:46
Sample (adjusted): 3 30
Included observations: 28 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(NCL(-1))	-1.026984	0.181508	-5.658074	0.0000
C	-166.0071	143.0653	-1.160359	0.2564

R-squared	0.551831	Mean dependent var	-51.09893
Adjusted R-squared	0.534594	S.D. dependent var	1098.441
S.E. of regression	749.3640	Akaike info criterion	16.14508
Sum squared resid	14600205	Schwarz criterion	16.24023
Log likelihood	-224.0311	Hannan-Quinn criter.	16.17417
F-statistic	32.01381	Durbin-Watson stat	0.767518
Prob(F-statistic)	0.000006		

Current Liabilities:

- **Level**:

Null Hypothesis: CL has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.787382	0.3790
Test critical values:	1% level	-3.679322	
	5% level	-2.967767	
	10% level	-2.622989	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(CL)
Method: Least Squares
Date: 01/03/24 Time: 11:41
Sample (adjusted): 2 30
Included observations: 29 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CL(-1)	-0.116946	0.065429	-1.787382	0.0851
C	23.20524	220.4354	0.105270	0.9169

R-squared	0.105804	Mean dependent var	-240.8490
Adjusted R-squared	0.072686	S.D. dependent var	914.9228
S.E. of regression	881.0446	Akaike info criterion	16.46657
Sum squared resid	20958468	Schwarz criterion	16.56086
Log likelihood	-236.7652	Hannan-Quinn criter.	16.49610
F-statistic	3.194733	Durbin-Watson stat	2.470272
Prob(F-statistic)	0.085108		

- **1st Difference**:

Null Hypothesis: D(CL) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-9.708631	0.0000
Test critical values:	1% level	-3.689194	
	5% level	-2.971853	
	10% level	-2.625121	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(CL,2)
Method: Least Squares
Date: 01/03/24 Time: 11:42
Sample (adjusted): 3 30
Included observations: 28 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(CL(-1))	-1.406373	0.144858	-9.708631	0.0000
C	-250.4540	137.2075	-1.825367	0.0795

R-squared	0.783797	Mean dependent var	99.95929
Adjusted R-squared	0.775482	S.D. dependent var	1478.290
S.E. of regression	700.4635	Akaike info criterion	16.01011
Sum squared resid	12756878	Schwarz criterion	16.10527
Log likelihood	-222.1416	Hannan-Quinn criter.	16.03920
F-statistic	94.25751	Durbin-Watson stat	1.194332
Prob(F-statistic)	0.000000		

Unit Root Test	**Level**	**1st Difference**
Total Liabilities	-1.691617 (0.4220)	-1.757669 (0.3902)
Non-Current Liabilities	-2.666011 (0.0921)	-5.658074 (0.0001)
Current-Liabilities	-1.787382 (0.3790)	-9.708631 (0.0000)

Interpretation:

- **Total Liabilities: The test statistics, assuming a significance threshold of 0.05, are not statistically significant in either levels or first differences because values are greater than 0.05. Thus we will accept H_0 "Null Hypothesis". This implies that there is insufficient data to rule out the null hypothesis that a unit root exists. The sequence might not be stationary. Thus not normally distributed.**
- **Non-Current Liabilities: At a 0.10 significance level (p-value = 0.0921), the test statistic is marginally significant in the level but not statistically significant at a 0.05 significance level. The test statistic for the first difference is very significant (p-value = 0.0001), providing evidence against the unit root null hypothesis. Following differentiation, the series might be stationary. Because it not acceptable at 1% or 5% but at 10%. Thus we will reject "Null Hypothesis" and we will accept H_1 hypothesis which tells us that data do not have unit root . thus it is stationary and Thus "Normally distributed".**
- **Current Liabilities: At a significance level of 0.05, the test statistic in the level is not statistically significant. The test statistic for the first difference is very significant (p-value = 0.0000), providing evidence against the unit root null hypothesis. Following differentiation, the series might be stationary. Thus we will reject H_0 "Null Hypothesis" and will accept H_1 Hypothesis. Thus our data do not have unit root. Thus stationary. Thus we can say that normally distributed.**

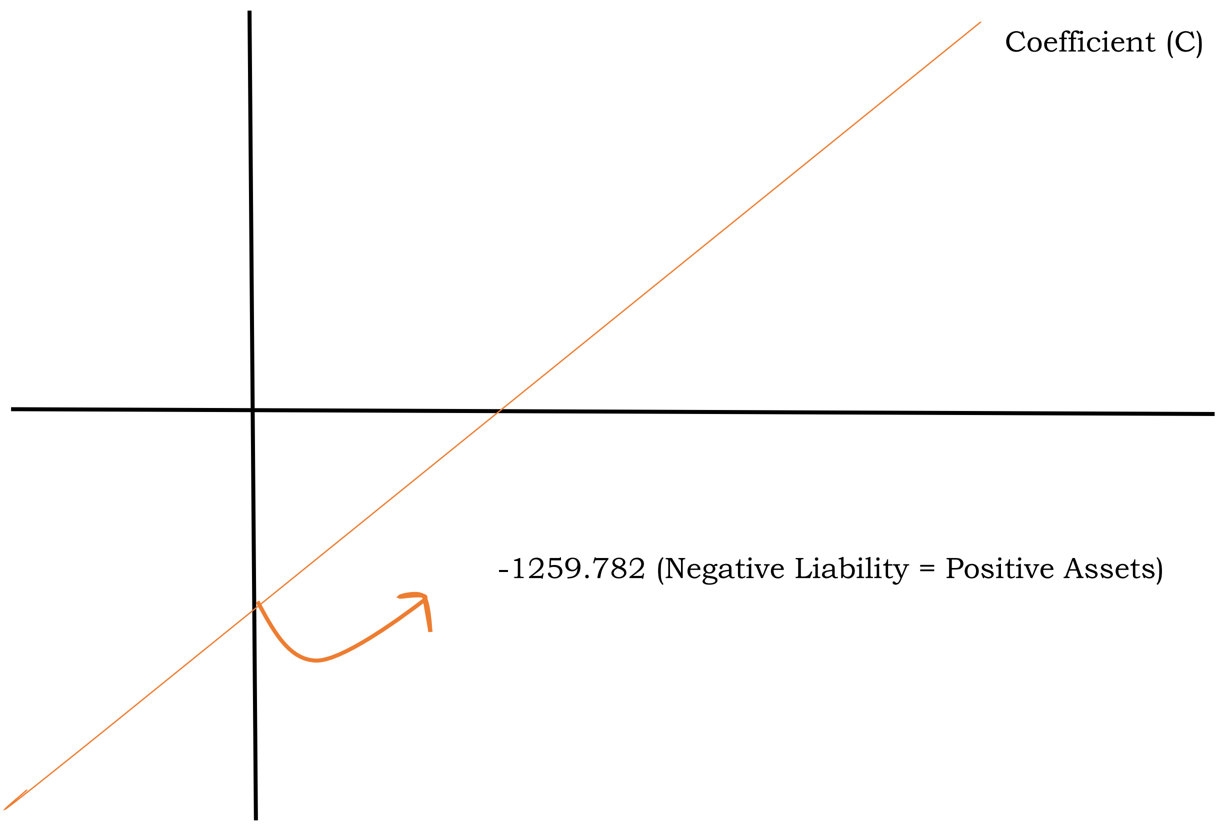
Table 4:

Regression model:

Dependent Variable: TL
Method: Least Squares
Date: 01/03/24 Time: 11:54
Sample: 1 30
Included observations: 30

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1259.782	481.7540	-2.614990	0.0144
NCL	2.515288	0.311188	8.082858	0.0000
CL	2.899402	0.131017	22.12995	0.0000

R-squared	0.960059	Mean dependent var	7340.248
Adjusted R-squared	0.957100	S.D. dependent var	8468.209
S.E. of regression	1753.955	Akaike info criterion	17.87177
Sum squared resid	83061683	Schwarz criterion	18.01189
Log likelihood	-265.0766	Hannan-Quinn criter.	17.91660
F-statistic	324.4980	Durbin-Watson stat	0.380024
Prob(F-statistic)	0.000000		



	Co-efficient Value	**P. Value**
Non-Current Liabilities	2.515288	0.0000
Current-Liabilities	2.899402	0.0000
C	-1259.782	0.0144
R^2	0.960059	-
Adjusted R^2	0.957100	-
f-stats	324.4980	0.000000
DWT	0.380024	-

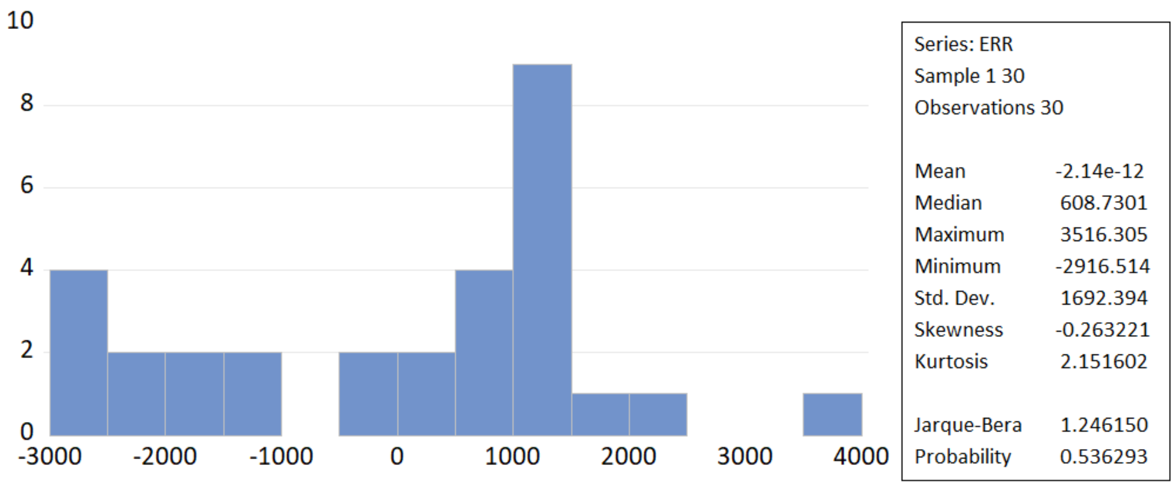
Interpretation:

- **Here in the above given table we can see that the Probability value if t-Statistics of NCL and CL both have values under 0.05. Thus we will reject H_0 "Null Hypothesis". Thus we will accept H_1 Hypothesis. Thus Data not normally distributed.**
- **The R-squared value of 0.960059 shows us that the variance in dependent variable is 96% explained by independent variable the given regression model. It shows 96% fitness of the model.**
- **The Adjusted R-squared value of 0.957100 shows that the dependent variable is explained 95.71% when we take predictors into consideration.**
- **The probability value of F-statistic is 0.0000 shows that the model is of high significance.**
- **The DWT which is Darwin Watson test which is 0.380024 which is nearer to 0 thus we can say that there is positive autocorrelation in errors. This might imply that there's some pattern or systematic variation in the errors that the model hasn't captured.**
- **The F-statistics measures regression analysis to determine whether the overall regression model is significant or not. In our model F-statistics is very high thus we will reject Null Hypothesis . It suggest that at least one of our independent variable significantly influence dependent variable. Thus our model is statistically significant. Overall, we can conclude that the model is robust.**

Table 5:

Error testing:

1. **Jarque-Bera testing:**



Interpretation:

H0: Error is normal distributed.

H1: Error is not normal distributed.

From the above graph we can observe that the probability value of Jarque-Bera is 0.536293 which is > 0.05 so we accept the H0 and reject H1 that the error is normally distributed.

2. Correlogram testing:

Date: 01/03/24 Time: 12:03
Sample: 1 30
Included observations: 30

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.793	0.793	20.797	0.000
		2	0.646	0.049	35.117	0.000
		3	0.480	-0.123	43.313	0.000
		4	0.317	-0.114	47.021	0.000
		5	0.182	-0.045	48.287	0.000
		6	-0.062	-0.400	48.440	0.000
		7	-0.176	0.075	49.733	0.000
		8	-0.302	-0.109	53.702	0.000
		9	-0.360	0.013	59.619	0.000
		10	-0.400	-0.080	67.308	0.000
		11	-0.414	0.058	75.964	0.000
		12	-0.386	-0.130	83.895	0.000
		13	-0.401	-0.146	92.961	0.000
		14	-0.363	-0.079	100.88	0.000
		15	-0.317	0.010	107.30	0.000
		16	-0.223	0.038	110.72	0.000

Interpretation:

H0: There is no Auto correlation (AC or PAC)

H1: There is Auto correlation (AC or PAC)

All p-value are less than 0.05 (threshold), which reject null hypothesis (H0) and accept Alternate Hypothesis (H1) which says Error is Auto correlated. (Not Normally Distributed)

3. ADF testing:

Null Hypothesis: ERR has a unit root
Exogenous: Constant
Lag Length: 2 (Automatic - based on SIC, maxlag=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.810490	0.3676
Test critical values:	1% level	-3.699871	
	5% level	-2.976263	
	10% level	-2.627420	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(ERR)
Method: Least Squares
Date: 01/03/24 Time: 12:04
Sample (adjusted): 4 30
Included observations: 27 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ERR(-1)	-0.217895	0.120351	-1.810490	0.0833
D(ERR(-1))	-0.084284	0.197909	-0.425874	0.6742
D(ERR(-2))	0.136686	0.178936	0.763884	0.4527
C	-90.52382	182.9880	-0.494698	0.6255

R-squared	0.160679	Mean dependent var	-35.41342
Adjusted R-squared	0.051202	S.D. dependent var	964.8956
S.E. of regression	939.8687	Akaike info criterion	16.66531
Sum squared resid	20317121	Schwarz criterion	16.85729
Log likelihood	-220.9817	Hannan-Quinn criter.	16.72240
F-statistic	1.467700	Durbin-Watson stat	2.047171
Prob(F-statistic)	0.249469		

Interpretation:

Hypothesis testing:

H0: Error has unit roots

H1: Error does not have Unit roots

Here, P. value of t-statistic is 0.3676 which is greater than 0.05, which leads to accept of Null Hypothesis (H0) which says Error have unit roots or trend or Auto-correlation or Not Normally distributed.

4. BG-LM testing:

Breusch-Godfrey Serial Correlation LM Test:
Null hypothesis: No serial correlation at up to 2 lags

F-statistic	42.60020	Prob. F(2,25)	0.0000
Obs*R-squared	23.19422	Prob. Chi-Square(2)	0.0000

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 01/03/24 Time: 12:08
Sample: 1 30
Included observations: 30
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-82.94382	238.8248	-0.347300	0.7313
CL	-0.194614	0.071112	-2.736705	0.0113
NCL	0.630204	0.182204	3.458778	0.0020
RESID(-1)	0.638777	0.162203	3.938146	0.0006
RESID(-2)	0.412879	0.185389	2.227093	0.0352

R-squared	0.773141	Mean dependent var	-1.97E-12
Adjusted R-squared	0.736843	S.D. dependent var	1692.394
S.E. of regression	868.1780	Akaike info criterion	16.52168
Sum squared resid	18843326	Schwarz criterion	16.75522
Log likelihood	-242.8252	Hannan-Quinn criter.	16.59639
F-statistic	21.30010	Durbin-Watson stat	1.985730
Prob(F-statistic)	0.000000		

Interpretation:

H0: P value is 0(Error is not correlated

H1: p value is not zero (Error is correlated)

Since my P. value of F-statistics is 0.0000 which is less than 0.05, In which we will reject Null hypothesis (H0) and accept Alternate hypothesis (H1) which says Error is not correlated or not normally distributed.

5. Durbin-Watson Stats

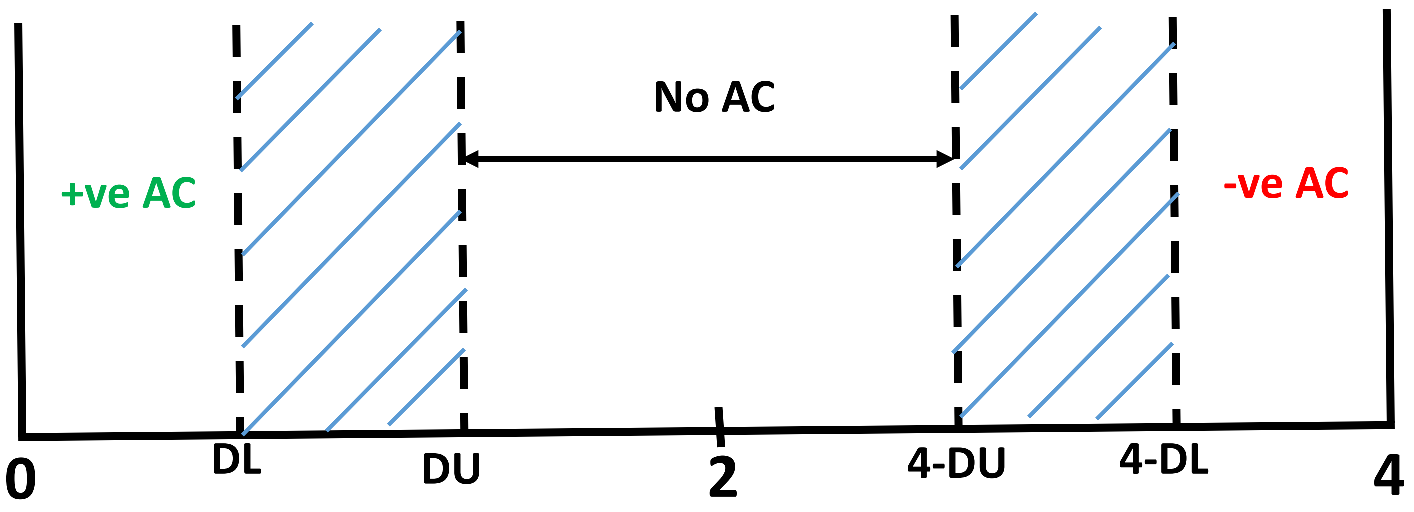
Dependent Variable: TL
Method: Least Squares
Date: 01/03/24 Time: 11:54
Sample: 1 30
Included observations: 30

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1259.782	481.7540	-2.614990	0.0144
NCL	2.515288	0.311188	8.082858	0.0000
CL	2.899402	0.131017	22.12995	0.0000

R-squared	0.960059	Mean dependent var	7340.248
Adjusted R-squared	0.957100	S.D. dependent var	8468.209
S.E. of regression	1753.955	Akaike info criterion	17.87177
Sum squared resid	83061683	Schwarz criterion	18.01189
Log likelihood	-265.0766	Hannan-Quinn criter.	17.91660
F-statistic	324.4980	Durbin-Watson stat	0.380024
Prob(F-statistic)	0.000000		

K (Independent Variable): 2

N (Observations): 30



Durbin-Watson Stat. value is .380024 which lies in above diagram between 0 and DL, which says Error are positively Auto correlated. Thus Not Normally distributed.

If these tests collectively suggest that errors are not normally distributed and show patterns of autocorrelation or non-stationarity, it indicates that the assumptions of the linear regression model might not hold. Violations of assumptions like normality, independence, and homoscedasticity could lead to biased parameter estimates, inefficient predictions, and unreliable hypothesis testing.

Overall:

	Stat. Value	P. Value
Jarque-Bera	1.246150	0.536293
Correlogram	20.797	0.000
ADF	-1.810490	0.3676
BG-LM	42.60020	0.0000
Durbin-Watson	0.380024	-

Model Limitations: Non-normality in errors, along with other issues, suggests that the assumptions of the regression model might not hold. It doesn't mean your model is fundamentally flawed, but rather that it may have limitations in explaining the variation in the data.

Potential Issues: Violations of assumptions like normality, independence, and homoscedasticity can lead to biased estimates, unreliable inference, or inefficiency in predicting outcomes. Autocorrelation, for instance, might indicate that the model doesn't account for some underlying patterns in the data.

Room for Improvement: Addressing these issues can improve your model. It might involve reassessing the variables, using different techniques, considering transformations, or exploring alternative models that are more suitable for your data's characteristics (e.g., time series models for time-dependent data).

Context Matters: Whether the model is "good" or "bad" also depends on the context, the purpose of the model, and the extent to which its predictions are accurate and reliable for your specific needs.

Remember, no model is perfect, and identifying limitations through diagnostic tests is a crucial step in refining and improving your modelling approach. It's an opportunity to explore further, adjust the model, and potentially uncover additional insights about the data generating process.

Data source:

Year	TL	CL	NCL
Mar-23	28040.6	6987.94	3138.49
Mar-22	25864.75	4180.97	4566.44
Mar-21	24093.32	6756.58	1412.13
Mar-20	19563.61	6372.25	138.86
Mar-19	18140.72	6736.46	53.64
Mar-18	15793.84	5754.18	57.08
Mar-17	13022.84	4446.97	139.69
Mar-16	12558.7	5343.69	349.16
Mar-15	10225.88	3946.19	920.15
Mar-14	8575.53	3317.28	1245.86
Mar-13	6824.57	2767.96	1117.5
Mar-12	5991.21	2656.38	841.66
Mar-11	5841.17	2671.7	599.86
Mar-10	4594.08	639.87	2039.85
Mar-09	4097.04	583.13	2193.08
Mar-08	3494.44	445.73	1828.11
Mar-07	3319.36	346.48	2043.56
Mar-06	2480.74	298.21	1277.08
Mar-05	1914.83	206.14	885.1
Mar-04	1637.21	175.34	670.49
Mar-03	1322.97	226.01	561.42
Mar-02	886.31	154.51	369.38
Mar-01	639.23	136.71	225.9
Mar-00	448.54	87.92	140.9
Mar-99	345.7	110.01	110.96
Mar-98	196.92	56	70.86
Mar-97	143.61	42.62	52.7
Mar-96	89.84	20.77	32.08
Mar-95	48.07	11.43	5.6
Mar-94	11.82	3.32	2.78