Time series plot



It is not stationary .

Autocorrelation function



|  |
| --- |
| **Lag ACF T LBQ** |
| 1 0.572279 6.57 44.22 |
| 2 0.220878 1.97 50.86 |
| 3 0.228981 1.99 58.05 |
| 4 0.360279 3.04 75.98 |
| 5 0.455037 3.59 104.82 |
| 6 0.401016 2.90 127.40 |
| 7 0.423951 2.88 152.83 |
| 8 0.304277 1.95 166.04 |
| 9 0.140086 0.87 168.86 |
| 10 0.088637 0.55 170.00 |
| 11 0.341369 2.11 187.03 |
| 12 0.652766 3.91 249.84 |
| 13 0.291664 1.57 262.49 |
| 14 -0.000732 -0.00 262.49 |
| 15 0.003957 0.02 262.49 |
| 16 0.130422 0.69 265.08 |
| 17 0.209700 1.11 271.85 |
| 18 0.143703 0.75 275.05 |
| 19 0.142870 0.74 278.24 |
| 20 0.015860 0.08 278.28 |
| 21 -0.105638 -0.55 280.06 |
| 22 -0.130465 -0.67 282.80 |
| 23 0.106662 0.55 284.65 |
| 24 0.384724 1.98 308.89 |
| 25 0.043059 0.22 309.19 |
| 26 -0.215298 -1.08 316.93 |
| 27 -0.186684 -0.92 322.80 |
| 28 -0.081912 -0.40 323.94 |
| 29 -0.020570 -0.10 324.01 |
| 30 -0.063426 -0.31 324.71 |
| 31 -0.033087 -0.16 324.90 |
| 32 -0.125955 -0.62 327.71 |
| 33 -0.238772 -1.17 337.89 |

Partial autocorrelation function



|  |
| --- |
| **Lag PACF T** |
| 1 0.572279 6.57 |
| 2 -0.158551 -1.82 |
| 3 0.264297 3.04 |
| 4 0.198985 2.29 |
| 5 0.238996 2.75 |
| 6 0.078790 0.91 |
| 7 0.292881 3.36 |
| 8 -0.155631 -1.79 |
| 9 -0.092796 -1.07 |
| 10 -0.175032 -2.01 |
| 11 0.350197 4.02 |
| 12 0.382939 4.40 |
| 13 -0.536605 -6.17 |
| 14 0.039127 0.45 |
| 15 -0.157573 -1.81 |
| 16 0.015384 0.18 |
| 17 -0.094868 -1.09 |
| 18 -0.023896 -0.27 |
| 19 -0.116049 -1.33 |
| 20 -0.064989 -0.75 |
| 21 0.083352 0.96 |
| 22 -0.002222 -0.03 |
| 23 0.145011 1.67 |
| 24 0.085521 0.98 |
| 25 -0.190020 -2.18 |
| 26 0.036459 0.42 |
| 27 -0.010052 -0.12 |
| 28 -0.176578 -2.03 |
| 29 -0.062900 -0.72 |
| 30 0.007060 0.08 |
| 31 0.038473 0.44 |
| 32 0.056811 0.65 |
| 33 -0.031717 -0.36 |

**Transformation :**



The value of λ (lamb da) is -0.5 , so we transform W9 to 1/

Time series plot after transformation



**Fitting model :**

ARIMA :

**Final Estimates of Parameters**

|  |
| --- |
| **Type Coef SE Coef T P** |
| AR 1 -0.2727 0.0945 -2.88 0.005 |
| AR 2 -0.2540 0.0959 -2.65 0.009 |
| SAR 12 -0.7988 0.0932 -8.57 0.000 |
| SAR 24 -0.4534 0.0979 -4.63 0.000 |

All parameters are significant , since p-value < 0.05 .

**Diagnosis checking :**

**Modified Box-Pierce (Ljung-Box) Chi-Square statistic**

|  |
| --- |
| **Lag 12 24 36 48** |
| Chi-Square 5.9 20.4 40.9 51.2 |
| DF 8 20 32 44 |
| P-Value 0.654 0.433 0.134 0.211 |

All p-values are greater than 0.05 .

Autocorrelation function



Partial autocorrelation function





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