An Example of Forecasting an Economic Series

The data are the daily closing values of the Dow-Jones Index from Jan. 28, 2002 up to Nov. 11, 2002.

The Question. What are forecasts, and associated uncertainties, for the next 7 days?

We see that worrying downward trend and the drop today, the 11th.

The series seems to be wandering suggesting working with its differences, i.e. the changes.

Transform>Difference
Enter lag 1
Looks more stationary.

INFO

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ITSM::(INFO)
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# of Data Points = 217

Sample Mean = -7.9007
Sample Variance = .207931E+05
Std.Error(Sample Mean) = 8.821715
(square root of (1/n)SUM((1-|h|/r)acvf(h)), |h|<r=[sqrt(n)])

MODEL:

ARMA Model:
X(t) = Z(t)

WN Variance = 1.000000

Garch Model for Z(t):

Z(t) = sqrt(h(t)) e(t)
h(t) = 1.000000
{e(t)} is IID N(0,1)

ITSM>PROJECT>OPEN>UNIVARIATE
A:dow.tsm

Model>Specify
d = 1

Model>Estimation>Autofit

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ITSM::(Maximum likelihood estimates)
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Method: Maximum Likelihood

ARMA Model:
(1-B)^(.1787)[X(t) - 1.521 X(t-1) + .5212 X(t-2)]
    = Z(t) - .7272 Z(t-1)

WN Variance = .342300E+05

AR Coefficients
    1.520837   -.521169

MA Coefficients
(Residual SS)/N = .87555E+08

AIC = .289312E+04

-2Log(Likelihood) (Whittle) = .288292E+04

Let's assess the fit.

Statistics>Residual Analysis>ACF/PACF

\[ -1.00 \quad -0.80 \quad -0.60 \quad -0.40 \quad -0.20 \quad 0.00 \quad 0.20 \quad 0.40 \quad 0.60 \quad 0.80 \quad 1.00 \]

0, 5, 10, 15, 20, 25, 30, 35, 40

Statistics>Residual Analysis>Tests of Randomness

Ljung - Box statistic = 14.177 Chi-Square ( 20 ), p-value = .82142

McLeod - Li statistic = 2.5450 Chi-Square ( 20 ), p-value = 1.00000

# Turning points = .14400E+03~AN(.14400E+03, sd = 6.1995), p-value = 1.00000

# Diff sign points = .11100E+03~AN(.10850E+03, sd = 4.2720), p-value = .55841

Rank test statistic = .10843E+05~AN(.11827E+05, sd = .53828E+03), p-value = .06768
Jarque-Bera test statistic (for normality) = 0.55813E+03 Chi-Square (2), p-value = 0.00000

Order of Min AICC YW Model for Residuals = 2
Forecasting>ARMA
Enter number 10
Plot 95 percent bounds

Conclusion. We have fit an ARIMA(2,1,1) to the series and have our predictions. Now we have to wait to see how well we do.