NDK_ARCHTEST

Last Modified on 07/06/2016 12:12 pm CDT

- C/C++
- .Net

```
int __stdcall NDK_ARCHTEST(double * X,
                           size_t   N,
                           size_t   K,
                           double   alpha,
                           WORD     method,
                           WORD     retType,
                           double * retVal
                          )
```

Calculates the p-value of the ARCH effect test (i.e. the white-noise test for the squared time series).

Returns

status code of the operation

Return values

NDK_SUCCESS Operation successful
NDK_FAILED Operation unsuccessful. See **Macros** for full list.

Parameters

[in] **X** is the univariate time series data (a one dimensional array).
[in] **N** is the number of observations in X.
[in] **K** is the lag order (e.g. k=0 (no lag), k=1 (1st lag), etc.).
[in] **alpha** is the statistical significance level. If missing, a default of 5% is assumed.
[in] **method** is the statistical test to perform (1=Ljung-Box).
[in] **retType** is a switch to select the return output:

Method	Value	Description
TEST_PVALUE	1	P-Value
TEST_SCORE	2	Test statistics (aka score)
TEST_CRITICALVALUE	3	Critical value.

[out] **retVal** is the calculated test statistics.

Remarks

- The time series is homogeneous or equally spaced.
- The time series may include missing values (e.g. NaN) at either end.
- The lag order (k) must be less than the time series size, or an error value (#VALUE!) is returned.
- The test hypothesis for the population autocorrelation:
  \[H_{o}: \rho_{k}=\rho_o\] \[H_{1}: \rho_{k}\neq a\] Where:

- H_{o} is the null hypothesis.
- H_{1} is the alternate hypothesis.
- $\hat \rho_o$ is the assumed population autocorrelation function for lag k.
- k is the lag order.

- Assuming a normal distributed population, the sample autocorrelation has a normal distribution: $$\hat \rho_k \sim N(\rho_k,\sigma_{\rho_k}^2)$$ Where:
  - $\hat \rho_k$ is the sample autocorrelation for lag k.
  - ρ_k is the population autocorrelation for lag k.
  - σ_{ρ_k} is the standard deviation of the sample autocorrelation function for lag k.
- The variance of the sample autocorrelation is computed as: $$ \sigma_{\rho_k}^2 = \frac{1+\sum_{j=1}^{k-1}\hat\rho_j^2}{T} $$ Where:
  - σ_{ρ_k} is the standard error of the sample autocorrelation for lag k.
  - T is the sample data size.
  - $\hat\rho_j$ is the sample autocorrelation function for lag j.
  - k is the lag order.
- This is a two-sides (i.e. two-tails) test, so the computed p-value should be compared with half of the significance level ($\alpha/2$).

Requirements

Header	SFSDK.H
Library	SFSDK.LIB
DLL	SFSDK.DLL

Examples

```
int NDK_ARCHTEST(double[]   pData,
                 UInPtr     nSize,
                 int        nLag,
                 double     alpha,
                 UInt16     argMethod,
                 UInt16     retType,
                 out double retVal
```

Namespace: NumXLAPI
Class: SFSDK
Scope: Public
Lifetime: Static

)

Calculates the p-value of the ARCH effect test (i.e. the white-noise test for the squared time series).

Returns

status code of the operation

Return values

NDK_SUCCESS Operation successful
NDK_FAILED Operation unsuccessful. See **Macros** for full list.

Parameters

[in] **pData** is the univariate time series data (a one dimensional array).
[in] **nSize** is the number of observations in pData.
[in] **nLag** is the lag order (e.g. k=0 (no lag), k=1 (1st lag), etc.).
[in] **alpha** is the statistical significance level. If missing, a default of 5% is assumed.
[in] **argMethod** is the statistical test to perform (1=Ljung-Box).
[in] **retType** is a switch to select the return output:

Method	Value	Description
TEST_PVALUE	1	P-Value
TEST_SCORE	2	Test statistics (aka score)
TEST_CRITICALVALUE	3	Critical value.

[out] **retVal** is the calculated test statistics.

Remarks

- The time series is homogeneous or equally spaced.
- The time series may include missing values (e.g. NaN) at either end.
- The lag order (k) must be less than the time series size, or an error value (#VALUE!) is returned.
- The test hypothesis for the population autocorrelation: \[H_{o}: \rho_{k}=\rho_o\] \[H_{1}: \rho_{k}\neq a\] Where:
  - \(H_{o}\) is the null hypothesis.
  - \(H_{1}\) is the alternate hypothesis.
  - \(\hat \rho_o\) is the assumed population autocorrelation function for lag k.
  - \(k\) is the lag order.
- Assuming a normal distributed population, the sample autocorrelation has a normal distribution: \[\hat \rho_k \sim N(\rho_k,\sigma_{\rho_k}^2)\] Where:
  - \(\hat \rho_k \) is the sample autocorrelation for lag k.
  - \(\rho_k \) is the population autocorrelation for lag k.
  - \(\sigma_{\rho_k}\) is the standard deviation of the sample autocorrelation function for lag k.
- The variance of the sample autocorrelation is computed as: \[\sigma_{\rho_k}^2 = \frac{1+\sum_{j=1}^{k-1}\hat\rho_j^2}{T} \] Where:

- σ_{ρ_k} is the standard error of the sample autocorrelation for lag k.
- T is the sample data size.
- $\hat\rho_j$ is the sample autocorrelation function for lag j.
- k is the lag order.

- This is a two-sides (i.e. two-tails) test, so the computed p-value should be compared with half of the significance level ($\alpha/2$).

Exceptions

Exception Type	Condition
None	N/A

Requirements

Namespace	NumXLAPI
Class	SFSDK
Scope	Public
Lifetime	Static
Package	NumXLAPI.DLL

Examples

References

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Hans-Peter Deutsch; , Derivatives and Internal Models, Palgrave Macmillan (2002), ISBN 0333977068

Hamilton, J .D.; Time Series Analysis , Princeton University Press (1994), ISBN 0-691-04289-6

Tsay, Ruey S.; Analysis of Financial Time Series John Wiley & SONS. (2005), ISBN 0-471-690740

See Also

[template("related")]