

# NDK\_GARCHM\_FORE

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- C/C++
- .Net

```
int __stdcall NDK_GARCHM_FORE(double *      pData,
                               size_t       nSize,
                               double *     sigmas,
                               size_t       nSigmaSize,
                               double       mu,
                               double       flambda,
                               const double * Alphas,
                               size_t       p,
                               const double * Betas,
                               size_t       q,
                               WORD         nInnovationType,
                               double       nu,
                               size_t       nStep,
                               WORD         retType,
                               double       alpha,
                               double *     retVal
                               )
```

Calculates the out-of-sample forecast statistics.

## Returns

status code of the operation

## Return values

**NDK\_SUCCESS** Operation successful

**NDK\_FAILED** Operation unsuccessful. See [Macros](#) for full list.

## Parameters

- |                        |   |
|------------------------|---|
| [in] <b>pData</b>      | is the univariate time series data (a one dimensional array).   |
| [in] <b>nSize</b>      | is the number of observations in pData.   |
| [in] <b>sigmas</b>     | is the univariate time series data (a one dimensional array of cells (e.g. rows or columns)) of the last q realized volatilities. |
| [in] <b>nSigmaSize</b> | is the number of elements in sigmas. Only the latest q observations are used.   |
| [in] <b>mu</b>         | is the GARCH model conditional mean (i.e. mu).  |
| [in] <b>flambda</b>    | is the volatility coefficient for the mean. In finance, lambda is referenced as the risk premium.                                 |
| [in] <b>Alphas</b>     | are the parameters of the ARCH(p) component model (starting with the lowest lag).   |

[in] <b>p</b>	is the number of elements in Alphas array
[in] <b>Betas</b>	are the parameters of the GARCH(q) component model (starting with the lowest lag).
[in] <b>q</b>	is the number of elements in Betas array
[in] <b>nInnovationType</b>	is the probability distribution function of the innovations/residuals (see <a href="#">INNOVATION_TYPE</a> ) <ul style="list-style-type: none"> <li>• INNOVATION_GAUSSIAN Gaussian or Normal Distribution</li> <li>• INNOVATION_TDIST Student's T-Distribution,</li> <li>• INNOVATION_GED Generalized Error Distribution (GED)</li> </ul>
[in] <b>nu</b>	is the shape factor (or degrees of freedom) of the innovations/residuals probability distribution function.
[in] <b>nStep</b>	is the forecast time/horizon (expressed in terms of steps beyond end of the time series).
[in] <b>retType</b>	is a switch to select the type of value returned <ol style="list-style-type: none"> <li>1. Mean forecast</li> <li>2. Forecast Error</li> <li>3. Volatility term structure</li> <li>4. Confidence interval lower limit</li> <li>5. Confidence interval upper limit (see <a href="#">FORECAST_RETVAL_FUNC</a>)</li> </ol>
[in] <b>alpha</b>	is the statistical significance level. If missing, a default of 5% is assumed.
[out] <b>retVal</b>	is the calculated forecast value

## Remarks

1. The data sample may include missing values (NaN).
2. The test hypothesis for the population standard deviation:  $\{H_0: \sigma = \sigma_o\}$   $\{H_1: \sigma \neq \sigma_o\}$  Where:
  - The underlying model is described [here](#).
  - The time series is homogeneous or equally spaced.
  - The time series may include missing values (e.g. #N/A) at either end.
  - The number of parameters in the input argument - alpha - determines the order of the ARCH component model.
  - The number of parameters in the input argument - beta - determines the order of the GARCH component model.

## Requirements

<b>Header</b>	SFSDK.H
<b>Library</b>	SFSDK.LIB
<b>DLL</b>	SFSDK.DLL

```

int NDK_GARCHM_FORE(double[] pData,
                    UIntPtr nSize,
                    double[] pVols,
                    UIntPtr npVolSize,
                    double mu,
                    double flambda,
                    double[] Alphas,
                    UIntPtr p,
                    double[] Betas,
                    UIntPtr q,
                    short nInnovationType,
                    double nu,
                    UIntPtr nStep,
                    short retType,
                    ref double retVal
)

```

<b>Namespace:</b> NumXLAPI
<b>Class:</b> SFSDK
<b>Scope:</b> Public
<b>Lifetime:</b> Static

Calculates the out-of-sample forecast statistics.

### Return Value

a value from [NDK\\_RETCODE](#) enumeration for the status of the call.

**NDK\_SUCCESS** operation successful  
 Error                      Error Code

### Parameters

- [in] **pData**                      is the univariate time series data (a one dimensional array).
- [in] **nSize**                        is the number of observations in pData.
- [in] **mu**                            is the GARCH model conditional mean (i.e. mu).
- [in] **flambda**                      is the volatility coefficient for the mean. In finance, lambda is referenced as the risk premium.
- [in] **Alphas**                        are the parameters of the ARCH(p) component model (starting with the lowest lag).
- [in] **p**                                is the number of elements in Alphas array
- [in] **Betas**                        are the parameters of the GARCH(q) component model (starting with the lowest lag).
- [in] **q**                                is the number of elements in Betas array
- [in] **nInnovationType** is the probability distribution function of the innovations/residuals (see [INNOVATION\\_TYPE](#))
  - INNOVATION\_GAUSSIAN Gaussian or Normal Distribution
  - INNOVATION\_TDIST Student's T-Distribution,
  - INNOVATION\_GED Generalized Error Distribution (GED)
- [in] **nu**                              is the shape factor (or degrees of freedom) of the

innovations/residuals probability distribution function.

[in] **nStep** is the forecast time/horizon (expressed in terms of steps beyond end of the time series).

[in] **retType** is a switch to select the type of value returned

1. Mean forecast
2. Forecast Error
3. Volatility term structure
4. Confidence interval lower limit
5. Confidence interval upper limit (see [FORECAST\\_RETVAL\\_FUNC](#))

[out] **retVal** is the calculated forecast value

## Remarks

1. The data sample may include missing values (NaN).
2. The test hypothesis for the population standard deviation:  $\{H_0: \sigma = \sigma_0\}$   $\{H_1: \sigma \neq \sigma_0\}$  Where:
  - The underlying model is described [here](#).
  - The time series is homogeneous or equally spaced.
  - The time series may include missing values (e.g. #N/A) at either end.
  - The number of parameters in the input argument - alpha - determines the order of the ARCH component model.
  - The number of parameters in the input argument - beta - determines the order of the GARCH component model.

## Exceptions

Exception Type	Condition
None	N/A

## Requirements

<b>Namespace</b>	NumXLAPI
<b>Class</b>	SFSDK
<b>Scope</b>	Public
<b>Lifetime</b>	Static
<b>Package</b>	NumXLAPI.DLL

## Examples

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## References

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

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## See Also

[template("related")]

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