

# NDK\_GARCHM\_SIM

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- C/C++
- .Net

```
int __stdcall NDK_GARCHM_SIM(double      mu,
                               double      flambda,
                               const double * Alphas,
                               size_t      p,
                               const double * Betas,
                               size_t      q,
                               WORD        nInnovationType,
                               double      nu,
                               double *    pData,
                               size_t      nSize,
                               double *    sigmas,
                               size_t      nSigmaSize,
                               UINT        nSeed,
                               double *    retArray,
                               size_t      nSteps
                               )
```

Returns a simulated data series the underlying GARCH process.

## Returns

status code of the operation

## Return values

**NDK\_SUCCESS** Operation successful

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

## Parameters

- |                             |  |
|-----------------------------|--|
| [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> ) |
| [in] <b>nu</b>              | is the shape factor (or degrees of freedom) of the   |

	innovations/residuals probability distribution function.
[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>nSeed</b>	is an unsigned integer for setting up the random number generators
[out] <b>retArray</b>	is the calculated simulation value
[in] <b>nSteps</b>	is the number of future steps to simulate for.

## Remarks

1. The underlying model is described [here](#).
2. The time series is homogeneous or equally spaced.
3. The time series may include missing values (e.g. #N/A) at either end.
4. The number of parameters in the input argument - alpha - determines the order of the ARCH component model.
5. The number of parameters in the input argument - beta - determines the order of the GARCH component model.
6. The function GARCHM\_SIM was added in version 1.63 SHAMROCK.

## Requirements

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

```
int NDK_GARCHM_SIM(double    mu,
                   double    flambda,
                   double[]   Alphas,
                   UIntPtr   p,
                   double[]   Betas,
                   UIntPtr   q,
                   short      nInnovationType,
                   double     nu,
                   double[]   pData,
                   UIntPtr   nSize,
                   UIntPtr   nSeed,
                   ref double retVal,
                   UIntPtr   nSteps
```

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

)

Returns a simulated data series the underlying GARCH process.

### Return Value

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

**NDK\_SUCCESS** operation successful

Error Error Code

### Parameters

- [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](#))
- [in] **nu** is the shape factor (or degrees of freedom) of the innovations/residuals probability distribution function.
- [in] **pData** is the univariate time series data (a one dimensional array).
- [in] **nSize** is the number of observations in X.
- [in] **sigmas** is the univariate time series data (a one dimensional array of cells (e.g. rows or columns)) of the last  $q$  realized volatilities.
- [in] **nSigmaSize** is the number of elements in sigmas. Only the latest  $q$  observations are used.
- [in] **nSeed** is an unsigned integer for setting up the random number generators
- [out] **retArray** is the calculated simulation value
- [in] **nSteps** is the number of future steps to simulate for.

### Remarks

1. The underlying model is described [here](#).
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4. The number of parameters in the input argument - alpha - determines the order of the ARCH component model.
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### 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

### See Also

[template("related")]

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