СЕКЦІЯ 3. ЕКОНОМІКА ПІДПРИЄМСТВА: СУЧАСНІ ПРОБЛЕМИ ТЕОРІЇ ТА ПРАКТИКИ

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USING GARCH MODEL FOR ANALYSIS OF STOCKS IN R

ARCH and GARCH models have become important tools in the analysis of time series data, particularly in financial applications. These models are especially useful when the goal of the study is to analyze and forecast volatility. This paper gives the motivation behind the simplest GARCH model and illustrates its usefulness in examining portfolio risk. Extensions are briefly discussed. In this article we will see what is ARCH and GARCH, how it's helpful for analyzing economic and financial data and how to use it in R-Studio.

The first step to build our Garch model is we need to install the "quantmod" package by using the command → install.packages ("quantmod") after pressing enter the package will be installed.

This command is so important to build the model to check how it work we use the command → library ("quantmod") and we press enter we get the result:

Now we need to use the getSymbols command to bring the data that we will use in Garch model and it will be Facebook stock data and we will store it (MS) by using this command → MS<-getSymbols("MSFT",auto.assign =F) and press enter and the result will be the stock data of Microsoft Corporation of the year 2007 and it will be stored in the (MS):

'getSymbols' currently uses auto.assign=TRUE by default, but will use auto.assign=FALSE in 0.5-0. You will still be able to use 'loadSymbols' to automatically load data. getOption("getSymbols.env") and getOption("getSymbols.auto.assign") will still be checked for alternate defaults.
This message is shown once per session and may be disabled by setting options("getSymbols.warning4.0"=FALSE). See ?getSymbols for details.

If we want to see what is this data we use the command → head (MS) the result will be:

	MSFT.Open	MSFT.High	MSFT.Low	MSFT.Close	MSFT.Volume	MSFT.Adjusted
2007-01-03	29.91	30.25	29.40	29.86	76935100	22.47883
2007-01-04	29.70	29.97	29.44	29.81	45774500	22.44119
2007-01-05	29.63	29.75	29.45	29.64	44607200	22.31321
2007-01-08	29.65	30.10	29.53	29.93	50220200	22.53152
2007-01-09	30.00	30.18	29.73	29.96	44636600	22.55411
2007-01-10	29.80	29.89	29.43	29.66	55017400	22.32826

Now we have the stock data of Microsoft Corporation if we want to see the chart of this data we can do it by using the command → chart_Series (MS) it will open the chart for this data and it will be from 2007 until 2019 in the chart we see the stock market for Microsoft Corporation is growing since 2007 we can see it clearly in the Figure A:

Figure A – Microsoft Corporation stocks price

Now we take the MSFT.Close to do the Garch model on it the way to do it by using the command → MSClose<-MS$MSFT.Close the $ means that we need to take the MSFT.Close data and by the way we store it in MSClose to see the data we use the command → head(MSClose) and we will receive the result:

	MSFT.Close
2007-01-03	29.86
2007-01-04	29.81
2007-01-05	29.64
2007-01-08	29.93
2007-01-09	29.96
2007-01-10	29.66

Now we need to install the Garch package and the name of this package in R-language is "rugarch" and we can install it by using the command → install.packages("rugarch") and it will be installed in R-Studio package system.

And if we want to check the package we use the command → library("rugarch").

Now it's the time to build the Garch model and we need to build it by using several commands: The first command will be → MS0<-ugarchspec(variance.model = list(model="sGARCH",garchOrder=c(1,1)),mean.model = list(armaOrder=c(0,0)), distribution.model = "std").What we did we put the variance , mean and the distribution in the model and we use (0,0) as the mean because if we used larger number there will be no result at all because the model use the minimum value and we store it in (MS0). And the second command will be → MSGarch0<-ugarchfit(spec = MS0,data = MSClose).

This command will activate the model and give use some results by the way we store it in MSGarch0 after that we see the results by using the command → MSGarch0 and we will get a lot of results but we take just one result and it's Akaike

it tell us if the model good or not.

<div align="center">

Information Criteria

Akaike	6.6790
Bayes	6.6888
Shibata	6.6790
Hannan-Quinn	6.6825

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In this case we have good model because the result is 6.6790 and the less it is the batter the model will be and that's how to build Garch model and how it works.