Peramalam Indeks Saham Syariah Menggunakan Model Bayesian Markov Switching ARCH

(Studi kasus : *Index* Saham *Jakarta Islamic Index* periode September 2015 – Desember 2018)

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Program Studi Matematika

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Setelah membaca, meneliti, memberikan petunjuk dan mengoreksi serta mengadakan perbaikan seperlunya, maka kami selaku pembimbing berpendapat bahwa skripsi Saudara:

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DAFTAR LAMBANG

R_t : *log return* pada periode t

r_t : *simple net return* pada periode t

P_t : nilai *asset* pada periode t

P_{t-1} : nilai *asset* pada periode t-1

$\widehat{\emptyset}$: estimasi kuadrat terkecil

$SE(\widehat{\emptyset})$: estimasi standar *error*

r_k : koefisien autokorelasi sampai *lag* k

N : jumlah data

X_t : nilai *X* orde t

$\bar{X}$: nilai rata-rata

$\emptyset$: koefisien parameter *Autoregressive*

Θ : koefisien parameter *Moving Average*

$\sigma_t{}^2$: varian dari residual pada waktu *t*

α_0 : konstanta model MS-ARCH (k,m)

α : parameter model MS-GARCH (k,m)

β : parameter model MS-ARCH (k,m)

k : koefisien regime (state)

m : koefisien ARCH

N : ukuran sampel

e_t : nilai residual pada waktu ke t

z_t : nilai *return* pada waktu ke t

Peramalam Saham Syariah Menggunakan Model Bayesian Markov Switching ARCH

(Studi kasus : Saham *Jakarta Islamic Index* periode September 2015 –Desember 2018)

Oleh: Nurul Saputro

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ABSTRAK

Saat ini investasi sangat diminati oleh para pelaku ekonom. Investasi adalah sebuah kegiatan mengalokasikan maupun menanamkan sumber dana atau uang yang dimiliki saat ini, dengan harapan untuk mendapatkan manfaat atau keuntungan dikemudian hari. Salah satu bentuk investasi adalah penanaman atau pembelian saham.

Saham merupakan sebuah bukti pernyataan akan kepemilikian modal seseorang pada suatu perusahaan, dan dengan tanda bukti tersebut pemilik modal mempunyai untuk memperoleh bagi hasil yang telah ditentukan oleh perusahaan berdasarkan besaran modal yang telah ditenamkan. Dengan seiring berkembangnya ekonomi syariah maka saham syariah pun ikut bermunculan. Saham syariah ini menjadi solusi bagi kaum muslim apabila ingin berinvestasi secara syariah.

Dalam berinvestasi terdapat dua hal yang menyertai yakni *return* dan risiko. Setiap investor pasti berharap mendapatkan keuntungan maksimal dan meminimalkan risiko. Karena ketidak pastian harga saham maka investor memerlukan sebuah alat atau metode untuk meramalkan harga saham tersebut. Salah satu metode yang dapat digunakan adalah Bayesian Markov Switching ARCH.

Hasil penelitian ini menunjukkan bahwa model ARIMA (2,1,3) dan Bayesian Markov Switching ARCH (3,1) adalah model terbaik untuk meramalkan indeks harga saham syraiah periode September 2015 sampai Desember 2018. Dengan model ARIMA (2,1,3) tanpa konstanta

$z_t = -0{,}064012 z_{t-2} - 0{,}095849 e_{t-3}$ dan model Bayesian Markov Switching ARCH :

$\sigma_t^2 = 0{,}0001 + 0{,}0001 e_{t-1}^2 \; untuk \; state \; 1$,

$\sigma_t^2 = 0{,}00040{,}0000 e_{t-1}^2 \; untuk \; state \; 2$

dan $\sigma_t^2 = 0{,}0003 + 0{,}2861 e_{t-1}^2 \; untuk \; state \; 3$.

Kata kunci : Risiko, *Jakarta Islamic Index*, ARIMA, Bayesian, Markov Switching

Forecasting Stocks Syariah Using Models *Bayesian Markov Switching ARCH*

(Case study: Jakarta Islamic Index period September 2015 –Desember 2018)

by
Nurul Saputro
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ABSTRACT

Currently, investment is very attractive to economists. Investment is an activity to allocate or invest sources of funds or money that are currently owned, with the hope of getting benefits or profits in the future. One form of investment is the investment or purchase of shares.

Stock is a proof of a statement of ownership of a person's capital in a company, and with this evidence the owner of the capital has to obtain the profit sharing that has been determined by the company based on the amount of capital that has been embedded. With the development of the sharia economy, sharia shares have also emerged. Islamic stocks are a solution for Muslims if they want to invest in sharia.

In investing there are two things that accompany the return and risk. Every investor must expect to get the maximum profit and minimize risk. Because of uncertainty in stock prices, investors need a tool or method to predict the stock price. One method that can be used is Bayesian Markov Switching ARCH.

The results of this study indicate that the ARIMA model (2,1,3) and Bayesian Markov Switching ARCH (3.1) are the best models for forecasting the syra'a stock price index for the period September 2015 to December 2018. With the ARIMA model (2,1,3) without constants

$z_t = -0{,}064012 z_{t-2} - 0{,}095849 e_{t-3}$ and the Bayesian Markov Switching ARCH model.

$\sigma_t^2 = 0{,}0001 + 0{,}0001 e_{t-1}^2 \ to \ state$ 1 ,

$\sigma_t^2 = 0{,}00040{,}0000 e_{t-1}^2 \ to \ state$ 2

and $\sigma_t^2 = 0{,}0003 + 0{,}2861 e_{t-1}^2 \ to \ state$ 3.

Keyword : Risk, *Jakarta Islamic Index*, ARIMA, Bayesian, Markov Switching

BAB I
PENDAHULUAN

1.1 Latar Belakang

Bidang ekonomi menjadi salah satu bahasan yang cukup menarik untuk dibahas. Karena ekonomi selalu terdapat permasalahan yang cukup kompleks sehingga saat membahas ekonomi ini tak akan ada habisnya. Salah bahasan yang menarik dalam bidang ekonomi adalah investasi. Investasi adalah sebuah kegiatan untuk menempatkan sejumlah dana maupun sumber daya lain yang dimiliki dengan tujuan agar mendapatkan keuntungan dimasa depan. Tetapi bila berbicara tentang keuntungan maka bukan hanya soal uang semata, karena bisa jadi berwujud barang maupun jasa. Mungkin saja ada yang merasa bahwa investasi mirip dengan menabung, akan tetapi keduanya sangat mempunyai perbedaan. Perbedaan tersebut terletak pada tujuan, dimana tujuan investasi adalah untuk mendapatkan keuntungan dimasa mendatang sedangkan menabung tujuan utamanya hanya untuk menyimpan dana (Husnan, 2008).

Apabila berbicara tentang bisnis maka terdapat dihubungkan dengan agama Islam. Apabila berbicara soal investasi merupakan sebuah kegiatan muamalah yang sangat dianjurkan oleh Islam. Hal ini karena saat melakukan investasi, harta maupun aset yang dimiliki seseorang akan menjadi produktif sehingga akan mendatangkan manfaat bagi pemilik dana maupun juga orang lain. Walaupun sangat dianjurkan oleh Islam, kegiatan investasi ini tentu haruslah perpedoman kepada prinsip-prinsip syariah yang ada. Jadi boleh dikatakan bahwa investasi ini dianjurkan oleh Islam dengan prinsip-prinsip yang telah diajarkan atau dengan perpedoman dengan syariat Islam.

Untuk sekarang orang yang ingin berinventasi (investor) dapat memilih sendiri akan melakukan investasi dimana. Tetapi umumnya para investor akan menggunakan dan memanfaatkan fasilitas yang telah ada, seperti halnya yang telah tersedia di pasar modal. Pasar modal adalah suatu tempat ataupun fasilitas yang mempertemukan antara pihak yang mempunyai dana berlebih (investor) dengan pihak yang sedang membutuhkan dana dengan cara memperjualbelikan surat berharga (sekuritas). Salah satu surat berharga yang sering diperjualbelikan adalah surat kepemilikan (saham). Dimana untuk masing-masing lembar saham ini biasa mewakili suara tentang segala hal yang ada di pengurusan perusahaan dan dapat menggunakan suara tersebut dalam rapat tahunan perusahaan dan pembagian keuntungan. (Fahmi dan Lavianti Hadi, 2009).

Sementara itu saham dapat dibagi menjadi dua, yaitu pertama adalah saham konvensional dan kedua adalah saham syariah. Sebenarnya saham syariah ini seperti halnya saham konvensional, hanya saja saham ini sudah memenuhi syarat-syarat syariah yang berlaku. Jadi perbedaan yang mencolok antara saham syariah dengan saham konvensional adalah pada saham syariah telah memenuhi syarat-syarat syariah. Maka saham syariah ini juga bisa menjadi salah satu alternatif untuk kaum muslimin yang ingin melakukan investasi dananya secara syariah, karena telah sesuai dengan ajaran agama Islam. Hal tersebut menjadi salah satu alasan mengapa pada tahun 2000 di Indonesia telah membuka sebuah pasar modal syariah yang bernama *Jakarta Islamic Index* (JII). Yang mana dalam *Jakarta Islamic Index* (JII) ini terdapat sebanyak 30 saham perusahaan yang telah memenuhi kriteria serta prinsip syariah. Saham perusahaan ini akan secara rutin diperbarui, karena akan ada evaluasi dari badan syariah yang mengurusi hal tersebut.

Apabila berbicara mengenai investasi maka tidak akan lepas dari dari dua hal, yakni risiko (*risk*) dan keuntungan (*return*). Dimana keuntungan (*return*) merupakan selisih antara dana yang diinvestasikan dengan dana yang didapatkan, tetapi dana yang didapatkan lebih besar dibandingkan dengan dana yang diinvestasikan.

Sedangkan untuk risiko sendiri kebalikan dari keuntungan, yang mana dana yang didapatkan lebih kecil dibandingkan dengan dana yang diinvestasikan. Maka dari itu para investor maupun calon investor dituntut untuk paham akan segala risiko yang mungkin terjadi, sehingga mampu untuk dapat meminimalkan segala risiko yang mungkin saja terjadi saat melakukan investasi. Akan tetapi investor juga perlu paham bahwa *return* dan risiko ini punya hubungan yang linier atau berbanding lurus, hal ini dikarenakan apabila *return* yang akan didapat semakin tinggi maka semakin tinggi pula risiko yang akan dihadapi begitu pula dengan sebaliknya. Yang jelas seorang investor tak bisa menduga dengan pasti kapan mendapat keuntuntungan besar maupun akan terkena risiko. Seorang invesor hanya dapat menebak dengan ilmu-ilmu yang telah ada, untuk dapat memperkirakan keuntungan maupun risiko yang ada.

Maka keputusan untuk melakukan investasi selalu beringan dengan probabilitas antara untung dan rugi, dimana tak ada seorang pun yang dapat memperkirakan apa yang terjadi dikemudian hari. Maka dalam ilmu statiska mempelajari suatu alat (metode) yang digunakan untuk memprediksi masa depan berdasarkan data-data pada masa lampau yang disebut dengan *forecasting* (peramalan).

Pada ilmu statistika tersebut terdapat dua metode saat melakukan peramalan diantaranya yakni *cross-section* atau sebab-akibat (*Casual Method*) yang merupakan sebuah analisis variabel yang dicari dengan variabel bebas atau yang mempengaruhinya, dan analisis runtun waktu (*time series*) adalah analisis antar variabel yang dicari variabel waktu.

Analisis *time series* atau runtun waktu dapat diklasifikasikan menjadi dua yakni model univariat dan model multivariat. Model univariat hanya dapat mengamati satu variabel/individu runtun waktu, sedangkan model multivariat mengamati lebih dari satu variabel/individu runtun waktu. Model *time series* yang paling terkenal dan banyak digunakan adalah model *Autoregressive Integrated Moving* atau sering disebut dengan model ARIMA (Makridakis, 1998).

Kenyataannya model ARIMA yang digunakan dalam data-data ekonomi akan memberikan residual dengan variansi yang tak konstan (*heterogen*) atau heterokedasitas. Engle (1982) memperkenalkan sebuah model *Autoregressive Conditional Heteroscedasticity* (ARCH) untuk dapat memodelkan inflasi yang terjadi di Inggris yang mengandung variansi yang tak konstan. Model ARCH ini ataupun lain seperti *Threshold Auto Regresivve* (TAR) mempunyai kelemahan yakni tak dapat untuk mendapatkan perubahan antar volatilitas yang terjadi.

Sebagai salah satu model yang dapat mengatasi heterokedasitas sekaligus untuk mengetahui peluang transisi antar regime volatilitas adalah model Markov Switching ARCH (Kauffman dan Fruhwirth Schanatter, 2000); (Kauffman dan Scheider, 2006); (Chen dan Lin , 2000). Dalam perkembangannya seiring dengan perkembangan teknologi, motode Bayesian mulai berkembang dalam banyak bidang. Tak terkecuali penerapan metode Bayesian dalam bidang keuangan, yang mana lebih mudah untuk menangkap fenomena dunia keungan yang penuh ketidakpastian.

Metode Bayesian sendiri dikembangkan oleh Thomas Bayes (1702-1761). Perbedaan mendasar antara metode Bayesian dengan statistik pada umumnya adalah dalam metode Bayesian ini parameter dianggap sebagai variabel random, sedangkan untuk statistik klasik parameter dianggap tidak diketahui atau tetap.

Pada penelitian ini akan menerapkan peramalam indeks harga saham syariah menggunakan metode *Bayesian Markov switching Autoregressive Conditional Heterokedasticity* pada saham *Jakarta Islamic Index* (JII) yang diambil dari www.yahoofinance.com.

1.2 Batasan Masalah

Pembatasan masalah ini diperlukan dalam sebuah penelitian agar pokok permasalahan yang diteliti tidak terlalu lebar dari yang telah ditentukan sebelumnya. Dalam penelitian ini batasan masalahnya adalah Peramalan Indeks Saham Syariah Menggunakan Model Bayesian Markov Switching ARCH. Dan saham yang akan digunakan diambil dari saham yang tergabung kedalam *Jakarta Islamic Index* (JII). Sedangkan alat bantu yang digunakan adalah software Ms. Excel, , Eviws dan software R.

1.3 Rumusan Masalah

Berdasarkan uraian diatas, maka masalah yang akan dikaji dalam penelitian ini adalah :

1. Bagaimana langkah-langkah peralaman indeks harga saham syariah JII menggunakan model Bayesian Markov Switching ARCH?
2. Bagaimana bentuk model Bayesian Markov Switching ARCH yang terbaik untuk meramalkan indeks harga saham syariah JII?
3. Bagimana hasil peramalan indeks harga saham syariah JII dengan metode Bayesian Markov Switching ARCH untuk meramalkan harga saham syariah JII?

1.4 Tujuan Penelitian

Berdasarkan rumusan masalah tadi, maka tujuan dari penelitian ini adalah :

1. Mengetahui langkah-langkah peramalan indeks harga saham syariah JII menggunakan model Bayesian Markov switching ARCH.
2. Mengetahui bentuk model Bayesian Markov switching ARCH yang terbaik untuk meramalkan indeks harga saham syariah JII.
3. Mengetahui bagaimana hasil peralaman indeks harga saham syariah JII dengan metode Bayesian Markov Switching.

1.5 Manfaat Penelitian

1. Bagi penulis :
   a. Sebagai salah satu syarat kelulusan mencapai derajat S1.
   b. Menambah pengetahuan tentang aplikasi matetatika khusunya pada bidang statistika.
   c. Menambah wawasan mengenai peramalan indeks saham syariah menggunakan model Bayesian Markov Switching ARCH.
2. Bagi Prodi Matematika

   Hasil penelitian ini diharapkan dapat dijadikan sebagai bahan tinjaun pustaka yang berguna bagi setiap pihak yang memerlukannya.

3. Bagi Investor

Dapat memberikan informasi maupun masukkan kepada investor tentang gambaran indeks harga saham dalam beberapa waktu mendatang, sehingga dapat dijadikan sebagai bahan pertimbangan dalam investasi.

1.6 Tinjauan Pustaka

Tabel 1.1 : Tinjauan Pustaka

No.	Nama Peneliti	Metode	Model	Objek
1.	Sylvia Kaufman (University of Vienna)	*Bayesian Analysis of Switching ARCH Models*	Maximum Likelihood, MCMC Estimation, GARCH	Data CRISP dan Saham di New York Stock
2.	Laely Uswatun Nur Khasanah (UIN)	Bayesian Markov Chain Monte Carlo, Value at Risk (VaR)	*Mixture of Mixture*	Indeks Harga Saham Syari'ah JII
3.	Nurul Saputro	*Bayesian Markov*	MCMC Estimation	Indeks Harga

	(UIN)	*Switching ARCH*		Saham Syari'ah JII

Berdasarkan tabel 1.1 diatas maka terdapat beberapa persamaan maupun perbedaan dalam model penelitian maupun objeknya. Seperti pada penelitian yang dilakukan oleh Sylvia Kaufman, untuk meodel yang digunakan sama yakni dengan Model Bayesian Markov Switching ARCH. Akan tetapi objek yang dipergunakan berbeda, pada penelitian Sylvia Kaufman menngunakan objek CRISP dan saham di New York Stock. Sedangkan untuk penelitian dari Laely Uswatun Nur Khasanah dengan model Bayesian Markov Chain Monte Carlo dengan pendekatan *Mixture,* tetapi menggunakan obejek penelitian yang sama yakni indeks harga saham syariah.

1.7 Sistematika Penulisan

Secara garis besar gambaran sistematika penulisan pada tugas akhir ini terdiri dari enam bab, dengan rincian sebagai berikut :

BAB I PENDAHULUAN

Bab I ini berisikan latar belakang masalah, batasan masalah, rumusan masalah, tujuan penelitian, manfaat penelitian, tinjauan pustaka, dan sistematika penulisan.

BAB II LANDASAN TEORI

Bab II ini membahas tentang teori-teori yang mendukung pembahasan penelitian ini, yakni peramalan indeks harga saham syariah menggunakan model *Bayesian Markov Switching ARCH.*

BAB III METODE PENELITIAN

Dalam Bab III ini akan memberikan penjelasan tentang proses pelaksanaan penelitian ini, mulai dari jenis dan sumber data penelitian, metode pengumpulan data, variabel penelitian, metode penelitian, alat pengolahan data, dan metode analisis.

BAB IV PEMBAHASAN

Pada bab ini akan membahas tentang metode dan rumus-rumus yang digunakan dalam peralaman indeks harga saham syariah menggunakan metode *Bayesian Markov Switching ARCH*.

BAB V STUDI KASUS

Pada Bab V membahas tentang peramalan indeks harga saham dengan model *Bayesian Markov Switching ARCH* pada data indeks saham syariah *Jakarta Islamic Index* (JII) dan memberikan interpretasi terdahap hasil yang didapatkan.

BAB VI PENUTUP

Bab ini berisikan tentang kesimpulan yang diambil dari pembahasan permasalahan dan pemeracahan masalah serta saran untuk penelitian berikutnya.

BAB VI

PENUTUP

6.1 Kesimpulan

Berdasarkan pada permasalahan yang dikemukakan dalam penelitian ini, dapat diambil kesimpulan sebagai berikut:

1. Terdapat beberapa langkah dalam melakukan peramalan indeks harga saham dengan menggunakan metode Bayesian Markov Switching ARCH pada indeks harga saham JII sebagai berikut:
   a. Mengumpulkan data saham
   b. Menguji kenormalan data
   c. Menguji kestasioneran data, apabila belum stasioner maka perlu distasionerkan dengan cara tranformasi *log* (menghitung nilai *return*)
   d. Menentukan model ARIMA yang sesuai
   e. Menguji ada tidaknya efek ARCH
   f. Menentukan koefisien dari ARCH dan regime

g. Membuat model Bayesian Markov Switching ARCH yang terbaik.

h. Melakukan peramalan dengan model terbaik dari Bayesian Markov Switching ARCH.

2. Model yang terbaik yang diperoleh dalam penelitian ini adalah ARIMA (2,1,3) dengan model Bayesian Markov Switching ARCH (3,1) dan persamaannya sebagai berikut :

   a. Model ARIMA (2,1,3) :

$$z_t = -0{,}064012 z_{t-2} - 0{,}095849 e_{t-3}$$

   b. Model Bayesian Markov Switching ARCH :

$$\sigma_t^2 \begin{cases} 0{,}0001 + 0{,}0001 e_{t-1}^2, state\ 1 \\ 0{,}0004 + 0{,}0000 e_{t-1}^2, state\ 2 \\ 0{,}0003 + 0{,}2861 e_{t-1}^2, state\ 3 \end{cases}$$

dan matrik probabilitasnya

$$\eta = \begin{bmatrix} 0{,}8231 & 0{,}1765 & 0{,}0004 \\ 0{,}3649 & 0{,}6282 & 0{,}0069 \\ 0{,}0053 & 0{,}0003 & 0{,}99444 \end{bmatrix}$$

Dari matrik probabilitas tersebut dapat diketahui bahwa

:

- Probalitas untuk bertahan dalam state volatilitas rendah sebesar 82,31%,
- Probabilitas perubahan state dari volatilitas rendah ke volatilitas sedang sebesar 36,49%.
- Probabilitas perubahan state dari volatilitas rendah ke volatilitas tinggi sebesar 0,52%.
- Probabilitas perubahan state dari volatilitas sedang ke volatilitas rendah sebesar 17,65%.
- Probabilitas untuk bertahan dalam state volatilitas sedang sebesar 62,82%.
- Probabilitas perubahan state dari volatilitas sedang ke volatilitas tinggi sebesar 0,03%.
- Probabilitas perubahan state dari volatilitas tinggi ke volatilitas rendah sebesar 0,04%.
- Probabilitas perubahan state dari volatilitas tinggi ke volatilitas sedang sebesar 0,69%.
- Probalitas untuk bertahan dalam state volatilitas tinggi sebesar 99,44%.

3. Peramalan data runtun waktu dengan model terbaik yaitu model ARIMA(2,1,3) dan Bayesian Markov Switching ARCH (3,1). Dan hasil peramalan menunjukkan bahwa nilai indeks harga saham JII untuk periode 2 Januari sampai 11 Maret 2019 telah mendekati dengan data aktualnya. Demikian pula dengan model tersebut dapat digunakan untuk meramalkan indeks harga saham JII dengan nilai MAPE 1,44%.

6.2 Saran

Berdasarkan pengalaman dan pertimbangan dalam studi literatur, saran-saran yang dapat disampaikan peneliti adalah :

1. Model yang didapat pada pembahasan penelitian ini, diharapkan dapat menjadi bahan pertimbangan bagi para investor.
2. Untuk peneliti selanjutnya dapat dilakukan dengan model lain yang munkin lebih baik dari pada model Bayesian Markov Switching ARCH.

Demikian saran dari peneliti semoga dapat menjadi masukan bagi para peneliti selanjutnya khususnya dalam bidang statistik.

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Lampiran 1 Data Indeks Saham *Jakarta Islamic Index*

No	Tanggal	Close	Return
1	9-Sep-15	574,99	
2	10-Sep-15	577,06	0,003594
3	11-Sep-15	584,9	0,013495
4	14-Sep-15	591,68	0,011525
5	15-Sep-15	580,28	-0,01946
6	16-Sep-15	577,07	-0,00555
7	17-Sep-15	584,43	0,012673
8	18-Sep-15	584,84	0,000701
9	21-Sep-15	583,28	-0,00267
10	22-Sep-15	576,16	-0,01228
11	23-Sep-15	561,53	-0,02572
12	24-Sep-15	557,23	-0,00769
13	28-Sep-15	542	-0,02771
14	29-Sep-15	554,43	0,022675
15	30-Sep-15	556,09	0,00299
16	1-Oct-15	563,06	0,012456
17	2-Oct-15	553,87	-0,01646
18	5-Oct-15	576,34	0,039768
19	6-Oct-15	596,68	0,034683
20	7-Oct-15	602,55	0,00979
21	8-Oct-15	601,15	-0,00233
22	9-Oct-15	615,43	0,023477

23	12-Oct-15	619,08	0,005913
24	13-Oct-15	592,98	-0,04307
25	15-Oct-15	599,48	0,010902
26	16-Oct-15	602,01	0,004211
27	19-Oct-15	612,11	0,016638
28	20-Oct-15	612,84	0,001192
29	21-Oct-15	616,93	0,006652
30	22-Oct-15	611,34	-0,0091
31	23-Oct-15	620,24	0,014453
32	26-Oct-15	623,61	0,005419
33	27-Oct-15	620,94	-0,00429
34	28-Oct-15	610,9	-0,0163
35	29-Oct-15	586,97	-0,03996
36	30-Oct-15	586,1	-0,00148
37	2-Nov-15	593,58	0,012682
38	3-Nov-15	599,47	0,009874
39	4-Nov-15	610,47	0,018183
40	5-Nov-15	605,23	-0,00862
41	6-Nov-15	603,79	-0,00238
42	9-Nov-15	591,37	-0,02078
43	10-Nov-15	582,21	-0,01561
44	11-Nov-15	584,88	0,004575
45	12-Nov-15	582,48	-0,00411
46	13-Nov-15	587,55	0,008666

47	16-Nov-15	581,53	-0,0103
48	17-Nov-15	589,3	0,013273
49	18-Nov-15	593,79	0,00759
50	19-Nov-15	596,86	0,005157
51	20-Nov-15	604,54	0,012785
52	23-Nov-15	595,6	-0,0149
53	24-Nov-15	594,88	-0,00121
54	25-Nov-15	599,28	0,007369
55	26-Nov-15	601,79	0,00418
56	27-Nov-15	601,04	-0,00125
57	30-Nov-15	579,8	-0,03598
58	1-Dec-15	598,03	0,030958
59	2-Dec-15	596,9	-0,00189
60	3-Dec-15	596,57	-0,00055
61	4-Dec-15	592,9	-0,00617
62	7-Dec-15	595,72	0,004745
63	8-Dec-15	582,21	-0,02294
64	10-Dec-15	578,3	-0,00674
65	11-Dec-15	565,09	-0,02311
66	14-Dec-15	565,63	0,000955
67	15-Dec-15	573,18	0,01326
68	16-Dec-15	583,17	0,017279
69	17-Dec-15	600,52	0,029317
70	18-Dec-15	588,22	-0,02069

71	21-Dec-15	591,69	0,005882
72	22-Dec-15	595,6	0,006586
73	23-Dec-15	593,25	-0,00395
74	28-Dec-15	597,28	0,00677
75	29-Dec-15	599,44	0,00361
76	30-Dec-15	603,35	0,006502
77	4-Jan-16	592,11	-0,01881
78	5-Jan-16	597,26	0,00866
79	6-Jan-16	612,22	0,024739
80	7-Jan-16	599,38	-0,0212
81	8-Jan-16	600,48	0,001834
82	11-Jan-16	586,71	-0,0232
83	12-Jan-16	596,04	0,015777
84	13-Jan-16	601,86	0,009717
85	14-Jan-16	594,12	-0,01294
86	15-Jan-16	594,64	0,000875
87	18-Jan-16	587,5	-0,01208
88	19-Jan-16	592,4	0,008306
89	20-Jan-16	582,8	-0,01634
90	21-Jan-16	581,78	-0,00175
91	22-Jan-16	590,67	0,015165
92	25-Jan-16	595,41	0,007993
93	26-Jan-16	594,95	-0,00077
94	27-Jan-16	605,23	0,017131

95	28-Jan-16	607,75	0,004155
96	29-Jan-16	612,75	0,008193
97	1-Feb-16	611,1	-0,0027
98	2-Feb-16	603,72	-0,01215
99	3-Feb-16	610,23	0,010725
100	4-Feb-16	621,98	0,019072
101	5-Feb-16	642,55	0,032537
102	9-Feb-16	636,13	-0,01004
103	10-Feb-16	634,17	-0,00309
104	11-Feb-16	643,98	0,015351
105	12-Feb-16	630,49	-0,02117
106	15-Feb-16	633,97	0,005504
107	16-Feb-16	635,29	0,00208
108	17-Feb-16	638,29	0,004711
109	18-Feb-16	641,42	0,004892
110	19-Feb-16	631,06	-0,01628
111	22-Feb-16	631,76	0,001109
112	23-Feb-16	623,53	-0,01311
113	24-Feb-16	620,82	-0,00436
114	25-Feb-16	623,93	0,004997
115	26-Feb-16	636,62	0,020135
116	29-Feb-16	641,86	0,008197
117	1-Mar-16	648,92	0,010939
118	2-Mar-16	660	0,01693

119	3-Mar-16	657,37	-0,00399
120	4-Mar-16	654,52	-0,00434
121	7-Mar-16	650,56	-0,00607
122	8-Mar-16	648,36	-0,00339
123	10-Mar-16	649,18	0,001264
124	11-Mar-16	653,01	0,005882
125	14-Mar-16	665,47	0,018901
126	15-Mar-16	658,03	-0,01124
127	16-Mar-16	661,67	0,005516
128	17-Mar-16	668,14	0,009731
129	18-Mar-16	669,3	0,001735
130	21-Mar-16	668,26	-0,00156
131	22-Mar-16	664,19	-0,00611
132	23-Mar-16	656,99	-0,0109
133	24-Mar-16	653,18	-0,00582
134	28-Mar-16	646,07	-0,01094
135	29-Mar-16	645	-0,00166
136	30-Mar-16	650,67	0,008752
137	31-Mar-16	652,69	0,0031
138	1-Apr-16	657,01	0,006597
139	4-Apr-16	662,13	0,007763
140	5-Apr-16	658,55	-0,00542
141	6-Apr-16	660,39	0,00279
142	7-Apr-16	661,06	0,001014

143	8-Apr-16	660,43	-0,00095
144	11-Apr-16	650,17	-0,01566
145	12-Apr-16	658,74	0,013095
146	13-Apr-16	661,89	0,00477
147	14-Apr-16	654,91	-0,0106
148	15-Apr-16	667,81	0,019506
149	18-Apr-16	673,35	0,008262
150	19-Apr-16	679,51	0,009107
151	20-Apr-16	678,59	-0,00135
152	21-Apr-16	682,56	0,005833
153	22-Apr-16	683,12	0,00082
154	25-Apr-16	678,81	-0,00633
155	26-Apr-16	666,42	-0,01842
156	27-Apr-16	663,19	-0,00486
157	28-Apr-16	656,41	-0,01028
158	29-Apr-16	653,26	-0,00481
159	2-May-16	645,6	-0,0118
160	3-May-16	645,72	0,000186
161	4-May-16	650,48	0,007345
162	9-May-16	640,73	-0,0151
163	10-May-16	643,79	0,004764
164	11-May-16	651,07	0,011245
165	12-May-16	648,97	-0,00323
166	13-May-16	640,13	-0,01372

167	16-May-16	634,32	-0,00912
168	17-May-16	636,48	0,003399
169	18-May-16	639,12	0,004139
170	19-May-16	632,16	-0,01095
171	20-May-16	632,91	0,001186
172	23-May-16	638,89	0,009404
173	24-May-16	635,26	-0,0057
174	25-May-16	648,49	0,020612
175	26-May-16	649,36	0,001341
176	27-May-16	655,65	0,00964
177	30-May-16	653,94	-0,00261
178	31-May-16	648,85	-0,00781
179	1-Jun-16	654,67	0,00893
180	2-Jun-16	653,49	-0,0018
181	3-Jun-16	658	0,006878
182	6-Jun-16	667,53	0,014379
183	7-Jun-16	674,03	0,00969
184	8-Jun-16	669,12	-0,00731
185	9-Jun-16	663,7	-0,00813
186	10-Jun-16	657,7	-0,00908
187	13-Jun-16	652,91	-0,00731
188	14-Jun-16	655,59	0,004096
189	15-Jun-16	660,36	0,00725
190	16-Jun-16	657,04	-0,00504

191	17-Jun-16	662,55	0,008351
192	20-Jun-16	666,91	0,006559
193	21-Jun-16	668,64	0,002591
194	22-Jun-16	672,99	0,006485
195	23-Jun-16	670	-0,00445
196	24-Jun-16	663,94	-0,00909
197	27-Jun-16	665,57	0,002452
198	28-Jun-16	671,02	0,008155
199	29-Jun-16	688,85	0,026225
200	30-Jun-16	694,34	0,007938
201	1-Jul-16	686,84	-0,01086
202	11-Jul-16	701,66	0,021348
203	12-Jul-16	703,06	0,001993
204	13-Jul-16	714,39	0,015987
205	14-Jul-16	700,16	-0,02012
206	15-Jul-16	704,66	0,006407
207	18-Jul-16	708,56	0,005519
208	19-Jul-16	712,44	0,005461
209	20-Jul-16	717,96	0,007718
210	21-Jul-16	709,81	-0,01142
211	22-Jul-16	709,44	-0,00052
212	25-Jul-16	719,86	0,014581
213	26-Jul-16	722,49	0,003647
214	27-Jul-16	733,73	0,015438

215	28-Jul-16	740,45	0,009117
216	29-Jul-16	726,61	-0,01887
217	1-Aug-16	750,98	0,032989
218	2-Aug-16	744,84	-0,00821
219	3-Aug-16	741,19	-0,00491
220	4-Aug-16	744,54	0,00451
221	5-Aug-16	749,96	0,007253
222	8-Aug-16	758,16	0,010875
223	9-Aug-16	757,25	-0,0012
224	10-Aug-16	754,83	-0,0032
225	11-Aug-16	751,88	-0,00392
226	12-Aug-16	744,16	-0,01032
227	15-Aug-16	731,14	-0,01765
228	16-Aug-16	739,07	0,010788
229	18-Aug-16	756,73	0,023614
230	19-Aug-16	742,46	-0,01904
231	22-Aug-16	749,42	0,009331
232	23-Aug-16	750,37	0,001267
233	24-Aug-16	746,09	-0,00572
234	25-Aug-16	757,02	0,014543
235	26-Aug-16	755,72	-0,00172
236	29-Aug-16	741,44	-0,01908
237	30-Aug-16	743,02	0,002129
238	31-Aug-16	746,87	0,005168

239	1-Sep-16	737,05	-0,01324
240	2-Sep-16	742,07	0,006788
241	5-Sep-16	743,66	0,00214
242	6-Sep-16	748,95	0,007088
243	7-Sep-16	750,22	0,001694
244	8-Sep-16	744,87	-0,00716
245	9-Sep-16	730,49	-0,01949
246	13-Sep-16	720,09	-0,01434
247	14-Sep-16	705,66	-0,02024
248	15-Sep-16	729,52	0,033253
249	16-Sep-16	723,16	-0,00876
250	19-Sep-16	736,45	0,018211
251	20-Sep-16	734,25	-0,00299
252	21-Sep-16	741,46	0,009772
253	22-Sep-16	747,07	0,007538
254	23-Sep-16	748,91	0,00246
255	26-Sep-16	741,33	-0,01017
256	27-Sep-16	752,5	0,014955
257	28-Sep-16	752,69	0,000252
258	29-Sep-16	757,07	0,005802
259	30-Sep-16	739,69	-0,02322
260	3-Oct-16	756,6	0,022604
261	4-Oct-16	756,69	0,000119
262	5-Oct-16	747,01	-0,01288

263	6-Oct-16	743,63	-0,00453
264	7-Oct-16	738,33	-0,00715
265	10-Oct-16	736,63	-0,00231
266	11-Oct-16	740,79	0,005631
267	12-Oct-16	738,19	-0,00352
268	13-Oct-16	733,88	-0,00586
269	14-Oct-16	742,25	0,011341
270	17-Oct-16	740,56	-0,00228
271	18-Oct-16	746,06	0,007399
272	19-Oct-16	741,96	-0,00551
273	20-Oct-16	741,07	-0,0012
274	21-Oct-16	739,42	-0,00223
275	24-Oct-16	742,18	0,003726
276	25-Oct-16	740,11	-0,00279
277	26-Oct-16	739,84	-0,00036
278	27-Oct-16	742,21	0,003198
279	28-Oct-16	739,38	-0,00382
280	31-Oct-16	739,91	0,000717
281	1-Nov-16	737,21	-0,00366
282	2-Nov-16	734,39	-0,00383
283	3-Nov-16	720,67	-0,01886
284	4-Nov-16	724,67	0,005535
285	7-Nov-16	728,29	0,004983
286	8-Nov-16	740,9	0,017166

287	9-Nov-16	730,09	-0,0147
288	10-Nov-16	737,34	0,009881
289	11-Nov-16	698,77	-0,05373
290	14-Nov-16	680,93	-0,02586
291	15-Nov-16	673,76	-0,01059
292	16-Nov-16	694,27	0,029987
293	17-Nov-16	693,04	-0,00177
294	18-Nov-16	687,79	-0,0076
295	21-Nov-16	683,48	-0,00629
296	22-Nov-16	684,15	0,00098
297	23-Nov-16	689,93	0,008413
298	24-Nov-16	674,4	-0,02277
299	25-Nov-16	677,97	0,00528
300	28-Nov-16	680,87	0,004268
301	29-Nov-16	685,62	0,006952
302	30-Nov-16	682,71	-0,00425
303	1-Dec-16	695,97	0,019236
304	2-Dec-16	703,4	0,010619
305	5-Dec-16	708,42	0,007111
306	6-Dec-16	705,69	-0,00386
307	7-Dec-16	700,74	-0,00704
308	8-Dec-16	706,43	0,008087
309	9-Dec-16	707,6	0,001655
310	13-Dec-16	705,69	-0,0027

311	14-Dec-16	697,35	-0,01189
312	15-Dec-16	694,25	-0,00446
313	16-Dec-16	685,81	-0,01223
314	19-Dec-16	679,4	-0,00939
315	20-Dec-16	670,01	-0,01392
316	21-Dec-16	666,57	-0,00515
317	22-Dec-16	655,7	-0,01644
318	23-Dec-16	648,1	-0,01166
319	27-Dec-16	660,96	0,019648
320	28-Dec-16	680,22	0,028723
321	29-Dec-16	696,13	0,02312
322	30-Dec-16	694,13	-0,00288
323	3-Jan-17	691,52	-0,00377
324	4-Jan-17	696,36	0,006975
325	5-Jan-17	700,44	0,005842
326	6-Jan-17	703,87	0,004885
327	9-Jan-17	700,61	-0,00464
328	10-Jan-17	701,11	0,000713
329	11-Jan-17	696,37	-0,00678
330	12-Jan-17	692,49	-0,00559
331	13-Jan-17	691,27	-0,00176
332	16-Jan-17	688,18	-0,00448
333	17-Jan-17	688,9	0,001046
334	18-Jan-17	696,12	0,010426

335	19-Jan-17	697,33	0,001737
336	20-Jan-17	687,24	-0,01458
337	23-Jan-17	687,73	0,000713
338	24-Jan-17	694,63	0,009983
339	25-Jan-17	695,89	0,001812
340	26-Jan-17	699,37	0,004988
341	27-Jan-17	696,44	-0,0042
342	30-Jan-17	690,59	-0,00844
343	31-Jan-17	689,32	-0,00184
344	1-Feb-17	696,28	0,010046
345	2-Feb-17	701,1	0,006899
346	3-Feb-17	702,44	0,001909
347	6-Feb-17	705,04	0,003695
348	7-Feb-17	700,31	-0,00673
349	8-Feb-17	698,84	-0,0021
350	9-Feb-17	698,6	-0,00034
351	10-Feb-17	701,58	0,004257
352	13-Feb-17	705,13	0,005047
353	14-Feb-17	698,58	-0,00933
354	16-Feb-17	701,57	0,004271
355	17-Feb-17	695,54	-0,00863
356	20-Feb-17	694,66	-0,00127
357	21-Feb-17	696,57	0,002746
358	22-Feb-17	697,56	0,00142

359	23-Feb-17	698,01	0,000645
360	24-Feb-17	699,87	0,002661
361	27-Feb-17	698,02	-0,00265
362	28-Feb-17	698,08	8,6E-05
363	1-Mar-17	694,04	-0,0058
364	2-Mar-17	698,02	0,005718
365	3-Mar-17	696,57	-0,00208
366	6-Mar-17	705,44	0,012653
367	7-Mar-17	704,36	-0,00153
368	8-Mar-17	698,66	-0,00813
369	9-Mar-17	699,25	0,000844
370	10-Mar-17	695	-0,0061
371	13-Mar-17	697,27	0,003261
372	14-Mar-17	700,22	0,004222
373	15-Mar-17	698,33	-0,0027
374	16-Mar-17	717,57	0,027179
375	17-Mar-17	718,88	0,001824
376	20-Mar-17	717,3	-0,0022
377	21-Mar-17	717,68	0,00053
378	22-Mar-17	714,85	-0,00395
379	23-Mar-17	715,36	0,000713
380	24-Mar-17	716,14	0,00109
381	27-Mar-17	712,58	-0,00498
382	29-Mar-17	724,27	0,016272

383	30-Mar-17	722,5	-0,00245
384	31-Mar-17	718,35	-0,00576
385	3-Apr-17	726,59	0,011405
386	4-Apr-17	735,07	0,011603
387	5-Apr-17	734,74	-0,00045
388	6-Apr-17	729,4	-0,00729
389	7-Apr-17	723,82	-0,00768
390	10-Apr-17	721,06	-0,00382
391	11-Apr-17	720,43	-0,00087
392	12-Apr-17	726,57	0,008487
393	13-Apr-17	721,7	-0,00673
394	17-Apr-17	713,85	-0,01094
395	18-Apr-17	717,37	0,004919
396	20-Apr-17	718,42	0,001463
397	21-Apr-17	739,8	0,029326
398	25-Apr-17	740,17	0,0005
399	26-Apr-17	744,76	0,006182
400	27-Apr-17	744,21	-0,00074
401	28-Apr-17	738,19	-0,00812
402	2-May-17	736,19	-0,00271
403	3-May-17	727,66	-0,01165
404	4-May-17	727,99	0,000453
405	5-May-17	726,82	-0,00161
406	8-May-17	731,83	0,006869

407	9-May-17	728,33	-0,00479
408	10-May-17	723,03	-0,0073
409	12-May-17	726,12	0,004265
410	15-May-17	729,36	0,004452
411	16-May-17	726,61	-0,00378
412	17-May-17	719,06	-0,01045
413	18-May-17	720,16	0,001529
414	19-May-17	742,56	0,03063
415	22-May-17	738,15	-0,00596
416	23-May-17	738,36	0,000284
417	24-May-17	733,25	-0,00694
418	16-May-17	737,51	0,005793
419	29-May-17	734,95	-0,00348
420	30-May-17	727,7	-0,00991
421	31-May-17	733,69	0,008198
422	2-Jun-17	737,01	0,004515
423	5-Jun-17	738,12	0,001505
424	6-Jun-17	733,05	-0,00689
425	7-Jun-17	735,43	0,003241
426	8-Jun-17	731,14	-0,00585
427	9-Jun-17	727,89	-0,00446
428	12-Jun-17	729,05	0,001592
429	13-Jun-17	734,8	0,007856
430	14-Jun-17	748,27	0,018166

431	15-Jun-17	744,04	-0,00567
432	16-Jun-17	733,67	-0,01404
433	19-Jun-17	734,02	0,000477
434	20-Jun-17	744,63	0,014351
435	21-Jun-17	748,59	0,005304
436	22-Jun-17	749,6	0,001348
437	3-Jul-17	764,64	0,019865
438	4-Jul-17	754,87	-0,01286
439	5-Jul-17	751,06	-0,00506
440	6-Jul-17	755,24	0,00555
441	7-Jul-17	749,02	-0,00827
442	10-Jul-17	740,79	-0,01105
443	11-Jul-17	743,32	0,003409
444	12-Jul-17	747,72	0,005902
445	13-Jul-17	748,01	0,000388
446	14-Jul-17	750,05	0,002724
447	17-Jul-17	751,73	0,002237
448	18-Jul-17	747,49	-0,00566
449	19-Jul-17	744,37	-0,00418
450	20-Jul-17	749,28	0,006575
451	21-Jul-17	739,03	-0,01377
452	24-Jul-17	745,63	0,008891
453	25-Jul-17	747,72	0,002799
454	26-Jul-17	745,09	-0,00352

455	27-Jul-17	743,72	-0,00184
456	28-Jul-17	746,57	0,003825
457	31-Jul-17	748,37	0,002408
458	1-Aug-17	746,62	-0,00234
459	2-Aug-17	749,01	0,003196
460	3-Aug-17	739,92	-0,01221
461	4-Aug-17	737,79	-0,00288
462	7-Aug-17	735,5	-0,00311
463	8-Aug-17	743,42	0,010711
464	9-Aug-17	748,72	0,007104
465	10-Aug-17	748,74	2,67E-05
466	11-Aug-17	738,26	-0,0141
467	14-Aug-17	744,78	0,008793
468	15-Aug-17	747,29	0,003364
469	16-Aug-17	751,75	0,00595
470	18-Aug-17	751,14	-0,00081
471	21-Aug-17	746,18	-0,00663
472	22-Aug-17	751,99	0,007756
473	23-Aug-17	755,48	0,00463
474	24-Aug-17	753,73	-0,00232
475	25-Aug-17	756,39	0,003523
476	28-Aug-17	754,33	-0,00273
477	29-Aug-17	751,92	-0,0032
478	30-Aug-17	751,1	-0,00109

479	31-Aug-17	746,26	-0,00646
480	4-Sep-17	740,25	-0,00809
481	5-Sep-17	740,19	-8,1E-05
482	6-Sep-17	741,89	0,002294
483	7-Sep-17	741,19	-0,00094
484	8-Sep-17	746,39	0,006991
485	11-Sep-17	746,94	0,000737
486	12-Sep-17	744,97	-0,00264
487	13-Sep-17	740,23	-0,00638
488	14-Sep-17	739,89	-0,00046
489	15-Sep-17	741,84	0,002632
490	18-Sep-17	742,64	0,001078
491	19-Sep-17	744,85	0,002971
492	20-Sep-17	744,4	-0,0006
493	22-Sep-17	735,65	-0,01182
494	25-Sep-17	733,45	-0,003
495	26-Sep-17	731,83	-0,00221
496	27-Sep-17	732,09	0,000355
497	28-Sep-17	728,32	-0,00516
498	29-Sep-17	733,3	0,006814
499	2-Oct-17	738,22	0,006687
500	3-Oct-17	743,25	0,006791
501	4-Oct-17	747,17	0,00526
502	5-Oct-17	738,25	-0,01201

503	6-Oct-17	739,54	0,001746
504	9-Oct-17	738,96	-0,00078
505	10-Oct-17	736,07	-0,00392
506	11-Oct-17	729,56	-0,00888
507	12-Oct-17	736,26	0,009142
508	13-Oct-17	741,04	0,006471
509	16-Oct-17	741,66	0,000836
510	17-Oct-17	739,75	-0,00258
511	18-Oct-17	734,67	-0,00689
512	19-Oct-17	729,76	-0,00671
513	20-Oct-17	731,62	0,002546
514	23-Oct-17	731,85	0,000314
515	24-Oct-17	732,88	0,001406
516	25-Oct-17	735,12	0,003052
517	26-Oct-17	731,14	-0,00543
518	27-Oct-17	724,72	-0,00882
519	30-Oct-17	726,03	0,001806
520	31-Oct-17	728,69	0,003657
521	1-Nov-17	729,95	0,001728
522	2-Nov-17	730,32	0,000507
523	3-Nov-17	735,38	0,006905
524	6-Nov-17	737,82	0,003313
525	7-Nov-17	740,9	0,004166
526	8-Nov-17	736,19	-0,00638

527	9-Nov-17	734,87	-0,00179
528	10-Nov-17	731,75	-0,00425
529	13-Nov-17	730,8	-0,0013
530	14-Nov-17	728,12	-0,00367
531	15-Nov-17	723,49	-0,00638
532	16-Nov-17	728,83	0,007354
533	17-Nov-17	730,84	0,002754
534	20-Nov-17	726,96	-0,00532
535	21-Nov-17	724,52	-0,00336
536	22-Nov-17	731,68	0,009834
537	23-Nov-17	733,11	0,001952
538	24-Nov-17	735,72	0,003554
539	27-Nov-17	734,84	-0,0012
540	28-Nov-17	730,03	-0,00657
541	29-Nov-17	730,56	0,000726
542	30-Nov-17	713,66	-0,0234
543	1-Dec-17	713,66	0
544	4-Dec-17	717,53	0,005408
545	5-Dec-17	715,62	-0,00267
546	6-Dec-17	718,5	0,004016
547	7-Dec-17	720,76	0,003141
548	8-Dec-17	721,25	0,00068
549	11-Dec-17	720,16	-0,00151
550	12-Dec-17	721,67	0,002095

551	13-Dec-17	725,24	0,004935
552	14-Dec-17	735,03	0,013409
553	15-Dec-17	735,29	0,000354
554	18-Dec-17	737,03	0,002364
555	19-Dec-17	739,62	0,003508
556	20-Dec-17	728,55	-0,01508
557	21-Dec-17	738,1	0,013023
558	22-Dec-17	743,84	0,007747
559	27-Dec-17	745,82	0,002658
560	28-Dec-17	748,49	0,003574
561	29-Dec-17	759,07	0,014036
562	2-Jan-18	757,11	-0,00259
563	3-Jan-18	740,2	-0,02259
564	4-Jan-18	745,75	0,00747
565	5-Jan-18	756,75	0,014643
566	8-Jan-18	762,85	0,008028
567	9-Jan-18	758,11	-0,00623
568	10-Jan-18	758,77	0,00087
569	11-Jan-18	758,33	-0,00058
570	12-Jan-18	754,68	-0,00482
571	15-Jan-18	756,44	0,002329
572	16-Jan-18	765,44	0,011828
573	17-Jan-18	769,73	0,005589
574	18-Jan-18	766,95	-0,00362

575	19-Jan-18	768,51	0,002032
576	22-Jan-18	768,38	-0,00017
577	23-Jan-18	782,62	0,018363
578	24-Jan-18	783,48	0,001098
579	25-Jan-18	789,34	0,007452
580	26-Jan-18	793,96	0,005836
581	29-Jan-18	798,77	0,00604
582	30-Jan-18	782,89	-0,02008
583	31-Jan-18	787,12	0,005389
584	1-Feb-18	785,51	-0,00205
585	2-Feb-18	790,09	0,005814
586	5-Feb-18	780,6	-0,01208
587	6-Feb-18	767,01	-0,01756
588	7-Feb-18	774,47	0,009679
589	8-Feb-18	775,1	0,000813
590	9-Feb-18	771,18	-0,00507
591	12-Feb-18	768,23	-0,00383
592	13-Feb-18	775,46	0,009367
593	14-Feb-18	778,78	0,004272
594	15-Feb-18	779,63	0,001091
595	19-Feb-18	791,23	0,014769
596	20-Feb-18	782,46	-0,01115
597	21-Feb-18	780,38	-0,00266
598	22-Feb-18	772,26	-0,01046

599	23-Feb-18	776,12	0,004986
600	26-Feb-18	770,33	-0,00749
601	27-Feb-18	774,41	0,005282
602	28-Feb-18	771,85	-0,00331
603	1-Mar-18	773,88	0,002627
604	2-Mar-18	770,4	-0,00451
605	5-Mar-18	765,91	-0,00585
606	6-Mar-18	757,73	-0,01074
607	7-Mar-18	739,75	-0,02401
608	8-Mar-18	746,14	0,008601
609	9-Mar-18	748,11	0,002637
610	12-Mar-18	756,26	0,010835
611	13-Mar-18	742,59	-0,01824
612	14-Mar-18	732,08	-0,01425
613	15-Mar-18	724,37	-0,01059
614	16-Mar-18	716,72	-0,01062
615	19-Mar-18	715,47	-0,00175
616	20-Mar-18	706,15	-0,01311
617	21-Mar-18	716,52	0,014578
618	22-Mar-18	712,54	-0,00557
619	23-Mar-18	706,24	-0,00888
620	26-Mar-18	703,63	-0,0037
621	27-Mar-18	702,65	-0,00139
622	28-Mar-18	695,98	-0,00954

623	29-Mar-18	704,28	0,011855
624	2-Apr-18	714,07	0,013805
625	3-Apr-18	714,31	0,000336
626	4-Apr-18	708,16	-0,00865
627	5-Apr-18	715,42	0,0102
628	6-Apr-18	714,15	-0,00178
629	9-Apr-18	728,64	0,020087
630	10-Apr-18	737,19	0,011666
631	11-Apr-18	742,05	0,006571
632	12-Apr-18	732,19	-0,01338
633	13-Apr-18	721,13	-0,01522
634	16-Apr-18	725,98	0,006703
635	17-Apr-18	728,03	0,00282
636	18-Apr-18	729,48	0,00199
637	19-Apr-18	737,08	0,010364
638	20-Apr-18	733,48	-0,0049
639	23-Apr-18	729,64	-0,00525
640	24-Apr-18	719,53	-0,01395
641	25-Apr-18	704,07	-0,02172
642	26-Apr-18	683,64	-0,02945
643	27-Apr-18	686,47	0,004131
644	30-Apr-18	693,22	0,009785
645	2-May-18	695,69	0,003557
646	3-May-18	675,12	-0,03001

647	4-May-18	670,37	-0,00706
648	7-May-18	681,26	0,016114
649	8-May-18	661,86	-0,02889
650	9-May-18	677,84	0,023857
651	11-May-18	683,14	0,007789
652	14-May-18	679,11	-0,00592
653	15-May-18	661,97	-0,02556
654	16-May-18	659,67	-0,00348
655	17-May-18	661,05	0,00209
656	18-May-18	658,3	-0,00417
657	21-May-18	654,93	-0,00513
658	22-May-18	665,47	0,015965
659	23-May-18	666,79	0,001982
660	24-May-18	687,58	0,030703
661	25-May-18	685,39	-0,00319
662	28-May-18	692,7	0,010609
663	30-May-18	682,16	-0,01533
664	31-May-18	675,48	-0,00984
665	4-Jun-18	683,01	0,011086
666	5-Jun-18	699,72	0,024171
667	6-Jun-18	693,55	-0,00886
668	7-Jun-18	695,12	0,002261
669	8-Jun-18	680,82	-0,02079
670	20-Jun-18	670,19	-0,01574

671	21-Jun-18	655,49	-0,02218
672	22-Jun-18	652,69	-0,00428
673	25-Jun-18	658,91	0,009485
674	26-Jun-18	658,29	-0,00094
675	27-Jun-18	647,8	-0,01606
676	28-Jun-18	632,94	-0,02321
677	29-Jun-18	654,77	0,033908
678	2-Jul-18	646	-0,01348
679	3-Jul-18	630,62	-0,0241
680	4-Jul-18	643,11	0,019612
681	5-Jul-18	646	0,004484
682	6-Jul-18	644,75	-0,00194
683	9-Jul-18	655,91	0,017161
684	10-Jul-18	664,32	0,01274
685	11-Jul-18	668,58	0,006392
686	12-Jul-18	668,63	7,48E-05
687	13-Jul-18	669,69	0,001584
688	16-Jul-18	661,14	-0,01285
689	17-Jul-18	657,72	-0,00519
690	18-Jul-18	662,96	0,007935
691	19-Jul-18	656,52	-0,00976
692	20-Jul-18	655,54	-0,00149
693	23-Jul-18	662,12	0,009987
694	24-Jul-18	664,06	0,002926

695	25-Jul-18	665,04	0,001475
696	26-Jul-18	663,99	-0,00158
697	27-Jul-18	671,78	0,011664
698	30-Jul-18	676,97	0,007696
699	31-Jul-18	655,04	-0,03293
700	1-Aug-18	670,58	0,023447
701	2-Aug-18	662,42	-0,01224
702	3-Aug-18	657,97	-0,00674
703	6-Aug-18	672,6	0,021991
704	7-Aug-18	669,07	-0,00526
705	8-Aug-18	666,53	-0,0038
706	9-Aug-18	664,09	-0,00367
707	10-Aug-18	664,88	0,001189
708	13-Aug-18	640,52	-0,03733
709	14-Aug-18	620,68	-0,03146
710	15-Aug-18	628,11	0,0119
711	16-Aug-18	629,87	0,002798
712	20-Aug-18	643,84	0,021937
713	21-Aug-18	648,47	0,007165
714	23-Aug-18	652,6	0,006349
715	24-Aug-18	646,6	-0,00924
716	27-Aug-18	660,39	0,021103
717	28-Aug-18	662,06	0,002526
718	29-Aug-18	668,61	0,009845

719	30-Aug-18	664,17	-0,00666
720	31-Aug-18	659,92	-0,00642
721	3-Sep-18	651,62	-0,01266
722	4-Sep-18	642,45	-0,01417
723	5-Sep-18	612,56	-0,04764
724	6-Sep-18	621,85	0,015052
725	7-Sep-18	636,44	0,023191
726	10-Sep-18	637,84	0,002197
727	12-Sep-18	634,1	-0,00588
728	13-Sep-18	639,79	0,008933
729	14-Sep-18	652,35	0,019441
730	17-Sep-18	636,06	-0,02529
731	18-Sep-18	638,44	0,003735
732	19-Sep-18	646,57	0,012654
733	20-Sep-18	655,77	0,014129
734	21-Sep-18	657,7	0,002939
735	24-Sep-18	648,69	-0,01379
736	25-Sep-18	647,66	-0,00159
737	26-Sep-18	648,06	0,000617
738	27-Sep-18	658,45	0,015905
739	28-Sep-18	664,92	0,009778
740	1-Oct-18	662,27	-0,00399
741	2-Oct-18	653,74	-0,01296
742	3-Oct-18	650,29	-0,00529

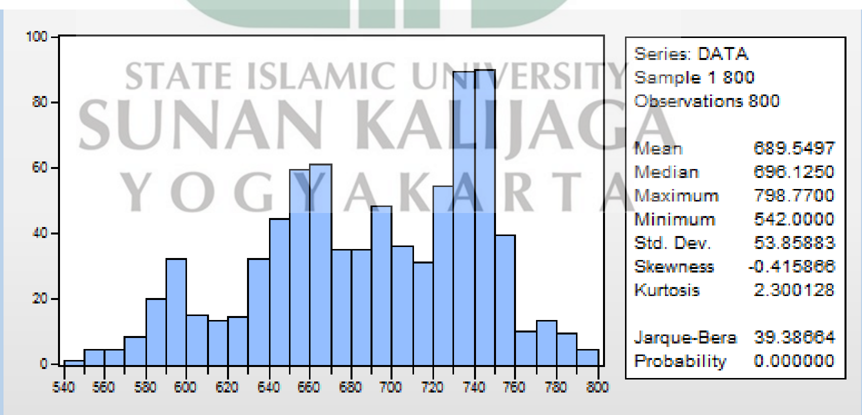
743	4-Oct-18	636,46	-0,0215
744	5-Oct-18	630,97	-0,00866
745	8-Oct-18	633,55	0,004081
746	9-Oct-18	637,26	0,005839
747	10-Oct-18	640,3	0,004759
748	11-Oct-18	627,17	-0,02072
749	12-Oct-18	634,97	0,01236
750	15-Oct-18	629,09	-0,0093
751	16-Oct-18	643,5	0,022648
752	17-Oct-18	651,72	0,012693
753	18-Oct-18	644,36	-0,01136
754	19-Oct-18	647,31	0,004568
755	22-Oct-18	648,42	0,001713
756	23-Oct-18	643,29	-0,00794
757	24-Oct-18	629,19	-0,02216
758	25-Oct-18	636,48	0,01152
759	26-Oct-18	640,09	0,005656
760	29-Oct-18	636,98	-0,00487
761	30-Oct-18	644,77	0,012155
762	31-Oct-18	651,27	0,010031
763	1-Nov-18	650,33	-0,00144
764	2-Nov-18	655	0,007155
765	5-Nov-18	655,21	0,000321
766	6-Nov-18	655,75	0,000824

767	7-Nov-18	659,69	0,00599
768	8-Nov-18	665,71	0,009084
769	9-Nov-18	655	-0,01622
770	12-Nov-18	637,58	-0,02696
771	13-Nov-18	645,38	0,01216
772	14-Nov-18	649,92	0,00701
773	15-Nov-18	666,53	0,025236
774	16-Nov-18	676,09	0,014241
775	19-Nov-18	670,09	-0,00891
776	21-Nov-18	663,61	-0,00972
777	22-Nov-18	668,03	0,006638
778	23-Nov-18	670,13	0,003139
779	26-Nov-18	667,8	-0,00348
780	27-Nov-18	661,08	-0,01011
781	28-Nov-18	648,8	-0,01875
782	29-Nov-18	665,06	0,024753
783	30-Nov-18	662,59	-0,00372
784	3-Dec-18	672,9	0,01544
785	4-Dec-18	678,36	0,008081
786	5-Dec-18	675,85	-0,00371
787	6-Dec-18	673,63	-0,00329
788	7-Dec-18	676,32	0,003985
789	10-Dec-18	674,45	-0,00277
790	11-Dec-18	666,31	-0,01214

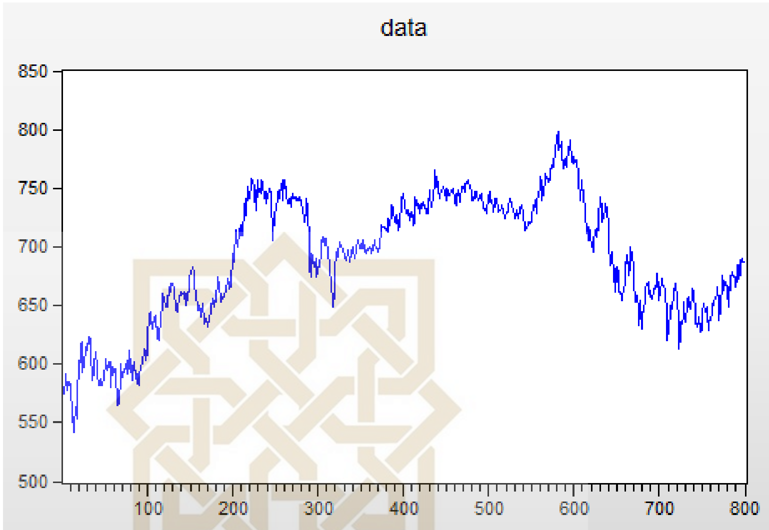
791	12-Dec-18	672,56	0,009336
792	13-Dec-18	684,41	0,017466
793	14-Dec-18	684,19	-0,00032
794	17-Dec-18	673,09	-0,01636
795	18-Dec-18	675,18	0,0031
796	19-Dec-18	688,28	0,019216
797	20-Dec-18	686,65	-0,00237
798	21-Dec-18	689,37	0,003953
799	27-Dec-18	687,69	-0,00244
800	28-Dec-18	685,22	-0,0036

Lampiran 2 : Deskriptif, Uji Normalitas dan Stasioneritas Data

1. Deskriptif data indeks saham JII



2. Grafik Indeks JII



3. Uji ADF JII

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.597601	0.0938
Test critical values:	1% level	-3.438309	
	5% level	-2.864943	
	10% level	-2.568637	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(DATA)
Method: Least Squares
Date: 11/28/19 Time: 14:54
Sample (adjusted): 2 800
Included observations: 799 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DATA(-1)	-0.013186	0.005076	-2.597601	0.0096
C	9.230158	3.510889	2.629008	0.0087

R-squared	0.008395	Mean dependent var	0.137960
Adjusted R-squared	0.007151	S.D. dependent var	7.755583
S.E. of regression	7.727803	Akaike info criterion	6.930026
Sum squared resid	47596.00	Schwarz criterion	6.941749
Log likelihood	-2766.546	Hannan-Quinn criter.	6.934530
F-statistic	6.747531	Durbin-Watson stat	2.001488
Prob(F-statistic)	0.009561		

4. UJI ADF *Return* JII

Null Hypothesis: DATA has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=20)

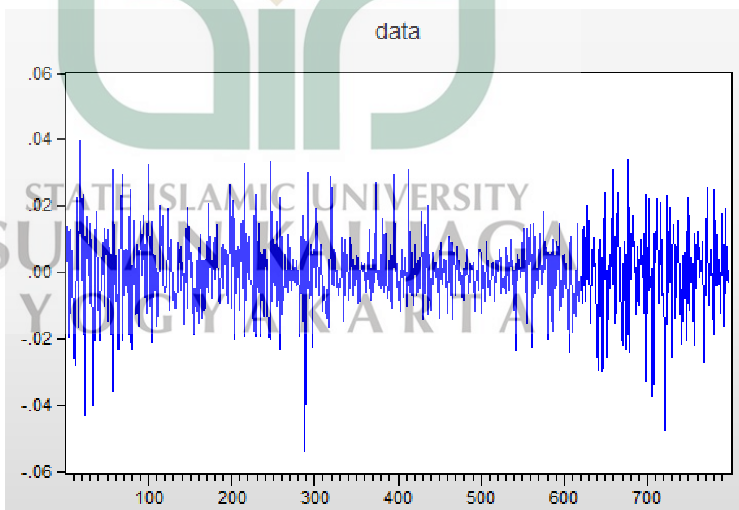
		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-28.27358	0.0000
Test critical values:	1% level	-3.438319	
	5% level	-2.864947	
	10% level	-2.568639	

*MacKinnon (1996) one-sided p-values.

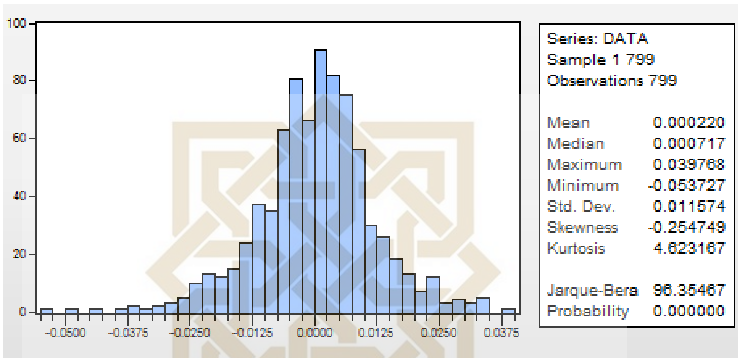
Augmented Dickey-Fuller Test Equation
Dependent Variable: D(DATA)
Method: Least Squares
Date: 11/28/19 Time: 15:04
Sample (adjusted): 2 799
Included observations: 798 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DATA(-1)	-1.002143	0.035445	-28.27358	0.0000
C	0.000216	0.000410	0.525866	0.5991

5. Grafik *Return* Indeks JII



6. Deskriptif *Return* Indeks JII



Lampiran 3 : Estimasi Model ARIMA

1. Kolegram Return Saham Syariah Harian Jakarta Islamic Index (JII)

Date: 11/28/19 Time: 15:07
Sample: 1 799
Included observations: 799

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	-0.002	-0.002	0.0037	0.952
		2	-0.058	-0.058	2.6849	0.261
		3	-0.077	-0.078	7.4949	0.058
		4	-0.021	-0.025	7.8444	0.097
		5	-0.053	-0.063	10.120	0.072
		6	-0.065	-0.076	13.522	0.035
		7	0.074	0.063	18.006	0.012
		8	-0.008	-0.025	18.054	0.021
		9	-0.043	-0.051	19.584	0.021
		10	-0.017	-0.016	19.828	0.031
		11	-0.020	-0.035	20.156	0.043
		12	-0.008	-0.017	20.204	0.063
		13	0.015	0.015	20.388	0.086
		14	-0.025	-0.045	20.899	0.104
		15	0.008	-0.000	20.957	0.138
		16	-0.055	-0.059	23.464	0.102
		17	-0.003	-0.014	23.470	0.135
		18	-0.012	-0.021	23.595	0.169
		19	-0.024	-0.040	24.080	0.193

2. ARIMA (1,1,0) Tanpa Konstanta

Dependent Variable: DATA
Method: ARMA Maximum Likelihood (OPG - BHHH)
Date: 11/28/19 Time: 15:26
Sample: 1 799
Included observations: 799
Convergence achieved after 4 iterations
Coefficient covariance computed using outer product of gradients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
AR(1)	-0.001780	0.027806	-0.064019	0.9490
SIGMASQ	0.000134	4.99E-06	26.82451	0.0000

R-squared	-0.000357	Mean dependent var	0.000220
Adjusted R-squared	-0.001612	S.D. dependent var	0.011574
S.E. of regression	0.011584	Akaike info criterion	-6.075937
Sum squared resid	0.106943	Schwarz criterion	-6.064214
Log likelihood	2429.337	Hannan-Quinn criter.	-6.071433
Durbin-Watson stat	1.999966		

Inverted AR Roots	-.00

3. ARIMA (1,1,0) dengan Konstanta

Dependent Variable: DATA
Method: ARMA Maximum Likelihood (OPG - BHHH)
Date: 11/28/19 Time: 16:00
Sample: 1 799
Included observations: 799
Failure to improve objective (non-zero gradients) after 3 iterations
Coefficient covariance computed using outer product of gradients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.000220	0.000416	0.528081	0.5976
AR(1)	-0.002141	0.028021	-0.076401	0.9391
SIGMASQ	0.000134	5.02E-06	26.65955	0.0000

R-squared	0.000005	Mean dependent var	0.000220
Adjusted R-squared	-0.002508	S.D. dependent var	0.011574
S.E. of regression	0.011589	Akaike info criterion	-6.073795
Sum squared resid	0.106904	Schwarz criterion	-6.056210
Log likelihood	2429.481	Hannan-Quinn criter.	-6.067039
F-statistic	0.001828	Durbin-Watson stat	2.000009
Prob(F-statistic)	0.998173		

Inverted AR Roots	-.00

4. ARIMA (1,1,1) Tanpa Konstanta

Dependent Variable: DATA
Method: ARMA Maximum Likelihood (OPG - BHHH)
Date: 11/28/19 Time: 16:01
Sample: 1 799
Included observations: 799
Convergence achieved after 33 iterations
Coefficient covariance computed using outer product of gradients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
AR(1)	0.819094	0.080952	10.11829	0.0000
MA(1)	-0.881424	0.068443	-12.87825	0.0000
SIGMASQ	0.000132	4.93E-06	26.81158	0.0000

R-squared	0.011382	Mean dependent var	0.000220
Adjusted R-squared	0.008898	S.D. dependent var	0.011574
S.E. of regression	0.011523	Akaike info criterion	-6.085173
Sum squared resid	0.105688	Schwarz criterion	-6.067589
Log likelihood	2434.027	Hannan-Quinn criter.	-6.078418
Durbin-Watson stat	1.905370		

Inverted AR Roots	.82
Inverted MA Roots	.88

5. ARIMA (1,1,1) dengan Konstanta

Dependent Variable: DATA
Method: ARMA Maximum Likelihood (OPG - BHHH)
Date: 11/28/19 Time: 16:01
Sample: 1 799
Included observations: 799
Convergence achieved after 34 iterations
Coefficient covariance computed using outer product of gradients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.000213	0.000273	0.781156	0.4349
AR(1)	0.820580	0.078910	10.39892	0.0000
MA(1)	-0.883836	0.066163	-13.35848	0.0000
SIGMASQ	0.000132	4.97E-06	26.58975	0.0000

R-squared	0.012181	Mean dependent var	0.000220
Adjusted R-squared	0.008453	S.D. dependent var	0.011574
S.E. of regression	0.011525	Akaike info criterion	-6.083475
Sum squared resid	0.105603	Schwarz criterion	-6.060028
Log likelihood	2434.348	Hannan-Quinn criter.	-6.074467
F-statistic	3.267669	Durbin-Watson stat	1.905144
Prob(F-statistic)	0.020823		

Inverted AR Roots	.82
Inverted MA Roots	.88

6. ARIMA (1,1,2) Tanpa Konstanta

Dependent Variable: DATA
Method: ARMA Maximum Likelihood (OPG - BHHH)
Date: 11/28/19 Time: 16:02
Sample: 1 799
Included observations: 799
Convergence achieved after 16 iterations
Coefficient covariance computed using outer product of gradients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
AR(1)	-0.007201	0.027735	-0.259631	0.7952
MA(2)	-0.061541	0.032125	-1.915650	0.0558
SIGMASQ	0.000133	4.96E-06	26.88458	0.0000

R-squared	0.003179	Mean dependent var	0.000220
Adjusted R-squared	0.000674	S.D. dependent var	0.011574
S.E. of regression	0.011570	Akaike info criterion	-6.076965
Sum squared resid	0.106565	Schwarz criterion	-6.059380
Log likelihood	2430.747	Hannan-Quinn criter.	-6.070209
Durbin-Watson stat	1.999701		

Inverted AR Roots	-.01	
Inverted MA Roots	.25	-.25

7. ARIMA (1,1,2) dengan Konstanta

Dependent Variable: DATA
Method: ARMA Maximum Likelihood (OPG - BHHH)
Date: 11/28/19 Time: 16:02
Sample: 1 799
Included observations: 799
Convergence achieved after 16 iterations
Coefficient covariance computed using outer product of gradients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.000219	0.000388	0.563834	0.5730
AR(1)	-0.007657	0.027959	-0.273873	0.7843
MA(2)	-0.062033	0.032171	-1.928213	0.0542
SIGMASQ	0.000133	4.99E-06	26.71046	0.0000

R-squared	0.003591	Mean dependent var	0.000220
Adjusted R-squared	-0.000169	S.D. dependent var	0.011574
S.E. of regression	0.011575	Akaike info criterion	-6.074875
Sum squared resid	0.106521	Schwarz criterion	-6.051429
Log likelihood	2430.913	Hannan-Quinn criter.	-6.065868
F-statistic	0.955095	Durbin-Watson stat	1.999702
Prob(F-statistic)	0.413406		

Inverted AR Roots	-.01	
Inverted MA Roots	.25	-.25

8. ARIMA (1,1,3) Tanpa Konstanta

Dependent Variable: DATA
Method: ARMA Maximum Likelihood (OPG - BHHH)
Date: 11/28/19 Time: 16:03
Sample: 1 799
Included observations: 799
Convergence achieved after 15 iterations
Coefficient covariance computed using outer product of gradients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
AR(1)	-0.008865	0.027519	-0.322147	0.7474
MA(3)	-0.091170	0.031998	-2.849240	0.0045
SIGMASQ	0.000133	4.99E-06	26.65845	0.0000

R-squared	0.006677	Mean dependent var	0.000220
Adjusted R-squared	0.004182	S.D. dependent var	0.011574
S.E. of regression	0.011550	Akaike info criterion	-6.080459
Sum squared resid	0.106191	Schwarz criterion	-6.062874
Log likelihood	2432.143	Hannan-Quinn criter.	-6.073703
Durbin-Watson stat	2.000826		

Inverted AR Roots	-.01		
Inverted MA Roots	.45	-.23-.39i	-.23+.39i

9. ARIMA (1,1,3) dengan Konstanta

Dependent Variable: DATA
Method: ARMA Maximum Likelihood (OPG - BHHH)
Date: 11/28/19 Time: 16:03
Sample: 1 799
Included observations: 799
Convergence achieved after 14 iterations
Coefficient covariance computed using outer product of gradients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.000217	0.000375	0.578078	0.5634
AR(1)	-0.009342	0.027759	-0.336549	0.7365
MA(3)	-0.091698	0.032083	-2.858176	0.0044
SIGMASQ	0.000133	5.02E-06	26.48191	0.0000

R-squared	0.007110	Mean dependent var	0.000220
Adjusted R-squared	0.003363	S.D. dependent var	0.011574
S.E. of regression	0.011555	Akaike info criterion	-6.078391
Sum squared resid	0.106145	Schwarz criterion	-6.054945
Log likelihood	2432.317	Hannan-Quinn criter.	-6.069383
F-statistic	1.897624	Durbin-Watson stat	2.000898
Prob(F-statistic)	0.128474		

Inverted AR Roots	-.01		
Inverted MA Roots	.45	-.23-.39i	-.23+.39i

10. ARIMA (2,1,0) Tanpa Konstanta

Dependent Variable: DATA
Method: ARMA Maximum Likelihood (OPG - BHHH)
Date: 11/28/19 Time: 16:04
Sample: 1 799
Included observations: 799
Convergence achieved after 4 iterations
Coefficient covariance computed using outer product of gradients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
AR(2)	-0.057395	0.032197	-1.782660	0.0750
SIGMASQ	0.000133	4.97E-06	26.86853	0.0000

R-squared	0.002945	Mean dependent var	0.000220
Adjusted R-squared	0.001694	S.D. dependent var	0.011574
S.E. of regression	0.011565	Akaike info criterion	-6.079235
Sum squared resid	0.106590	Schwarz criterion	-6.067512
Log likelihood	2430.654	Hannan-Quinn criter.	-6.074731
Durbin-Watson stat	2.012452		

Inverted AR Roots	-.00+.24i	-.00-.24i

11. ARIMA (2,1,0) dengan Konstanta

Dependent Variable: DATA
Method: ARMA Maximum Likelihood (OPG - BHHH)
Date: 11/28/19 Time: 16:04
Sample: 1 799
Included observations: 799
Convergence achieved after 4 iterations
Coefficient covariance computed using outer product of gradients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.000219	0.000390	0.560753	0.5751
AR(2)	-0.057752	0.032248	-1.790890	0.0737
SIGMASQ	0.000133	4.99E-06	26.69804	0.0000

R-squared	0.003345	Mean dependent var	0.000220
Adjusted R-squared	0.000841	S.D. dependent var	0.011574
S.E. of regression	0.011569	Akaike info criterion	-6.077133
Sum squared resid	0.106547	Schwarz criterion	-6.059549
Log likelihood	2430.815	Hannan-Quinn criter.	-6.070378
F-statistic	1.335952	Durbin-Watson stat	2.013317
Prob(F-statistic)	0.263497		

Inverted AR Roots	-.00+.24i	-.00-.24i

12. ARIMA (2,1,1) Tanpa Konstanta

Dependent Variable: DATA
Method: ARMA Maximum Likelihood (OPG - BHHH)
Date: 11/28/19 Time: 16:05
Sample: 1 799
Included observations: 799
Convergence achieved after 18 iterations
Coefficient covariance computed using outer product of gradients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
AR(2)	-0.057867	0.032251	-1.794287	0.0731
MA(1)	-0.006422	0.027758	-0.231377	0.8171
SIGMASQ	0.000133	4.96E-06	26.87158	0.0000

R-squared	0.002986	Mean dependent var	0.000220
Adjusted R-squared	0.000481	S.D. dependent var	0.011574
S.E. of regression	0.011572	Akaike info criterion	-6.076773
Sum squared resid	0.106586	Schwarz criterion	-6.059188
Log likelihood	2430.671	Hannan-Quinn criter.	-6.070017
Durbin-Watson stat	1.999702		

Inverted AR Roots	-.00+.24i	-.00-.24i
Inverted MA Roots	.01	

13. ARIMA (2,1,1) dengan Konstanta

Dependent Variable: DATA
Method: ARMA Maximum Likelihood (OPG - BHHH)
Date: 11/28/19 Time: 16:05
Sample: 1 799
Included observations: 799
Convergence achieved after 16 iterations
Coefficient covariance computed using outer product of gradients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.000219	0.000391	0.559516	0.5760
AR(2)	-0.058258	0.032303	-1.803463	0.0717
MA(1)	-0.006859	0.027982	-0.245110	0.8064
SIGMASQ	0.000133	4.99E-06	26.69801	0.0000

R-squared	0.003392	Mean dependent var	0.000220
Adjusted R-squared	-0.000369	S.D. dependent var	0.011574
S.E. of regression	0.011577	Akaike info criterion	-6.074677
Sum squared resid	0.106542	Schwarz criterion	-6.051231
Log likelihood	2430.833	Hannan-Quinn criter.	-6.065669
F-statistic	0.901972	Durbin-Watson stat	1.999703
Prob(F-statistic)	0.439715		

Inverted AR Roots	-.00+.24i	-.00-.24i
Inverted MA Roots	.01	

14. ARIMA (2,1,2) Tanpa Konstanta

Dependent Variable: DATA
Method: ARMA Maximum Likelihood (OPG - BHHH)
Date: 11/28/19 Time: 16:26
Sample: 1 799
Included observations: 799
Convergence achieved after 29 iterations
Coefficient covariance computed using outer product of gradients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
AR(2)	0.726907	0.161433	4.502844	0.0000
MA(2)	-0.792065	0.143309	-5.526971	0.0000
SIGMASQ	0.000133	4.91E-06	26.98876	0.0000

R-squared	0.008619	Mean dependent var	0.000220
Adjusted R-squared	0.006128	S.D. dependent var	0.011574
S.E. of regression	0.011539	Akaike info criterion	-6.082387
Sum squared resid	0.105983	Schwarz criterion	-6.064802
Log likelihood	2432.913	Hannan-Quinn criter.	-6.075631
Durbin-Watson stat	2.026869		

Inverted AR Roots	.85	-.85
Inverted MA Roots	.89	-.89

15. ARIMA (2,1,2) dengan Konstanta

Dependent Variable: DATA
Method: ARMA Maximum Likelihood (OPG - BHHH)
Date: 11/28/19 Time: 16:27
Sample: 1 799
Included observations: 799
Convergence achieved after 31 iterations
Coefficient covariance computed using outer product of gradients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.000215	0.000315	0.683454	0.4945
AR(2)	0.729068	0.157921	4.616672	0.0000
MA(2)	-0.794881	0.139767	-5.687182	0.0000
SIGMASQ	0.000133	4.94E-06	26.81178	0.0000

R-squared	0.009218	Mean dependent var	0.000220
Adjusted R-squared	0.005479	S.D. dependent var	0.011574
S.E. of regression	0.011543	Akaike info criterion	-6.080486
Sum squared resid	0.105919	Schwarz criterion	-6.057040
Log likelihood	2433.154	Hannan-Quinn criter.	-6.071479
F-statistic	2.465525	Durbin-Watson stat	2.028372
Prob(F-statistic)	0.061076		

Inverted AR Roots	.85	-.85
Inverted MA Roots	.89	-.89

16. ARIMA (2,1,3) Tanpa Konstanta

Dependent Variable: DATA
Method: ARMA Maximum Likelihood (OPG - BHHH)
Date: 11/28/19 Time: 16:27
Sample: 1 799
Included observations: 799
Convergence achieved after 12 iterations
Coefficient covariance computed using outer product of gradients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
AR(2)	-0.064012	0.032454	-1.972386	0.0489
MA(3)	-0.095849	0.032111	-2.984922	0.0029
SIGMASQ	0.000132	4.95E-06	26.71769	0.0000

R-squared	0.010661	Mean dependent var	0.000220
Adjusted R-squared	0.008176	S.D. dependent var	0.011574
S.E. of regression	0.011527	Akaike info criterion	-6.084464
Sum squared resid	0.105765	Schwarz criterion	-6.066880
Log likelihood	2433.743	Hannan-Quinn criter.	-6.077708
Durbin-Watson stat	2.018016		

Inverted AR Roots	-.00+.25i	-.00-.25i	
Inverted MA Roots	.46	-.23-.40i	-.23+.40i

17. ARIMA (2,1,3) dengan Konstanta

Dependent Variable: DATA
Method: ARMA Maximum Likelihood (OPG - BHHH)
Date: 11/28/19 Time: 16:27
Sample: 1 799
Included observations: 799
Convergence achieved after 10 iterations
Coefficient covariance computed using outer product of gradients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.000216	0.000349	0.617597	0.5370
AR(2)	-0.064490	0.032499	-1.984394	0.0476
MA(3)	-0.096442	0.032205	-2.994584	0.0028
SIGMASQ	0.000132	4.99E-06	26.53721	0.0000

R-squared	0.011144	Mean dependent var	0.000220
Adjusted R-squared	0.007412	S.D. dependent var	0.011574
S.E. of regression	0.011531	Akaike info criterion	-6.082448
Sum squared resid	0.105714	Schwarz criterion	-6.059002
Log likelihood	2433.938	Hannan-Quinn criter.	-6.073441
F-statistic	2.986425	Durbin-Watson stat	2.019041
Prob(F-statistic)	0.030446		

Inverted AR Roots	-.00+.25i	-.00-.25i	
Inverted MA Roots	.46	-.23-.40i	-.23+.40i

18. ARIMA (3,1,0) Tanpa Konstanta

Dependent Variable: DATA
Method: ARMA Maximum Likelihood (OPG - BHHH)
Date: 11/28/19 Time: 16:28
Sample: 1 799
Included observations: 799
Convergence achieved after 6 iterations
Coefficient covariance computed using outer product of gradients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
AR(3)	-0.076984	0.031460	-2.446994	0.0146
SIGMASQ	0.000133	4.98E-06	26.73056	0.0000

R-squared	0.005593	Mean dependent var	0.000220
Adjusted R-squared	0.004345	S.D. dependent var	0.011574
S.E. of regression	0.011549	Akaike info criterion	-6.081880
Sum squared resid	0.106307	Schwarz criterion	-6.070157
Log likelihood	2431.711	Hannan-Quinn criter.	-6.077376
Durbin-Watson stat	2.015406		

Inverted AR Roots	.21+.37i	.21-.37i	-.43

19. ARIMA (3,1,0) dengan Konstanta

Dependent Variable: DATA
Method: ARMA Maximum Likelihood (OPG - BHHH)
Date: 11/28/19 Time: 16:28
Sample: 1 799
Included observations: 799
Convergence achieved after 6 iterations
Coefficient covariance computed using outer product of gradients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.000217	0.000383	0.567796	0.5703
AR(3)	-0.077311	0.031533	-2.451727	0.0144
SIGMASQ	0.000133	5.01E-06	26.55429	0.0000

R-squared	0.006002	Mean dependent var	0.000220
Adjusted R-squared	0.003505	S.D. dependent var	0.011574
S.E. of regression	0.011554	Akaike info criterion	-6.079788
Sum squared resid	0.106263	Schwarz criterion	-6.062204
Log likelihood	2431.875	Hannan-Quinn criter.	-6.073033
F-statistic	2.403276	Durbin-Watson stat	2.016297
Prob(F-statistic)	0.091077		

Inverted AR Roots	.21+.37i	.21-.37i	-.43

20. ARIMA (3,1,1) Tanpa Konstanta

Dependent Variable: DATA
Method: ARMA Maximum Likelihood (OPG - BHHH)
Date: 11/28/19 Time: 16:29
Sample: 1 799
Included observations: 799
Convergence achieved after 19 iterations
Coefficient covariance computed using outer product of gradients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
AR(3)	-0.077696	0.031485	-2.467674	0.0138
MA(1)	-0.009032	0.027520	-0.328196	0.7428
SIGMASQ	0.000133	4.98E-06	26.72827	0.0000

R-squared	0.005664	Mean dependent var	0.000220
Adjusted R-squared	0.003166	S.D. dependent var	0.011574
S.E. of regression	0.011556	Akaike info criterion	-6.079448
Sum squared resid	0.106299	Schwarz criterion	-6.061863
Log likelihood	2431.739	Hannan-Quinn criter.	-6.072692
Durbin-Watson stat	1.998584		

Inverted AR Roots	.21-.37i	.21+.37i	-.43
Inverted MA Roots	.01		

21. ARIMA (3,1,1) dengan Konstanta

Dependent Variable: DATA
Method: ARMA Maximum Likelihood (OPG - BHHH)
Date: 11/28/19 Time: 16:29
Sample: 1 799
Included observations: 799
Convergence achieved after 19 iterations
Coefficient covariance computed using outer product of gradients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.000217	0.000382	0.567993	0.5702
AR(3)	-0.078071	0.031562	-2.473586	0.0136
MA(1)	-0.009555	0.027751	-0.344306	0.7307
SIGMASQ	0.000133	5.01E-06	26.55234	0.0000

R-squared	0.006082	Mean dependent var	0.000220
Adjusted R-squared	0.002331	S.D. dependent var	0.011574
S.E. of regression	0.011561	Akaike info criterion	-6.077364
Sum squared resid	0.106255	Schwarz criterion	-6.053918
Log likelihood	2431.907	Hannan-Quinn criter.	-6.068357
F-statistic	1.621461	Durbin-Watson stat	1.998513
Prob(F-statistic)	0.182914		

Inverted AR Roots	.21+.37i	.21-.37i	-.43
Inverted MA Roots	.01		

22. ARIMA (3,1,2) Tanpa Konstanta

Dependent Variable: DATA
Method: ARMA Maximum Likelihood (OPG - BHHH)
Date: 11/28/19 Time: 16:29
Sample: 1 799
Included observations: 799
Convergence achieved after 11 iterations
Coefficient covariance computed using outer product of gradients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
AR(3)	-0.081026	0.031704	-2.555713	0.0108
MA(2)	-0.065875	0.032305	-2.039155	0.0418
SIGMASQ	0.000133	4.94E-06	26.80485	0.0000

R-squared	0.009678	Mean dependent var	0.000220
Adjusted R-squared	0.007190	S.D. dependent var	0.011574
S.E. of regression	0.011533	Akaike info criterion	-6.083480
Sum squared resid	0.105870	Schwarz criterion	-6.065895
Log likelihood	2433.350	Hannan-Quinn criter.	-6.076724
Durbin-Watson stat	2.018056		

Inverted AR Roots	.22-.37i	.22+.37i	-.43
Inverted MA Roots	.26	-.26	

23. ARIMA (3,1,2) dengan Konstanta

Dependent Variable: DATA
Method: ARMA Maximum Likelihood (OPG - BHHH)
Date: 11/28/19 Time: 16:30
Sample: 1 799
Included observations: 799
Convergence achieved after 11 iterations
Coefficient covariance computed using outer product of gradients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.000216	0.000356	0.608705	0.5429
AR(3)	-0.081435	0.031790	-2.561611	0.0106
MA(2)	-0.066412	0.032345	-2.053264	0.0404
SIGMASQ	0.000132	4.97E-06	26.62271	0.0000

R-squared	0.010147	Mean dependent var	0.000220
Adjusted R-squared	0.006412	S.D. dependent var	0.011574
S.E. of regression	0.011537	Akaike info criterion	-6.081450
Sum squared resid	0.105820	Schwarz criterion	-6.058004
Log likelihood	2433.539	Hannan-Quinn criter.	-6.072443
F-statistic	2.716617	Durbin-Watson stat	2.019060
Prob(F-statistic)	0.043724		

Inverted AR Roots	.22+.38i	.22-.38i	-.43
Inverted MA Roots	.26	-.26	

24. ARIMA (3,1,3) TanpaKonstanta

Dependent Variable: DATA
Method: ARMA Maximum Likelihood (OPG - BHHH)
Date: 11/28/19 Time: 16:30
Sample: 1 799
Included observations: 799
Convergence achieved after 19 iterations
Coefficient covariance computed using outer product of gradients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
AR(3)	0.543009	0.185688	2.924313	0.0036
MA(3)	-0.640541	0.170844	-3.749268	0.0002
SIGMASQ	0.000132	4.99E-06	26.43887	0.0000

R-squared	0.013008	Mean dependent var	0.000220
Adjusted R-squared	0.010528	S.D. dependent var	0.011574
S.E. of regression	0.011513	Akaike info criterion	-6.086799
Sum squared resid	0.105514	Schwarz criterion	-6.069214
Log likelihood	2434.676	Hannan-Quinn criter.	-6.080043
Durbin-Watson stat	2.021077		

Inverted AR Roots	.82	-.41+.71i	-.41-.71i
Inverted MA Roots	.86	-.43+.75i	-.43-.75i

25. ARIMA (3,1,3) dengan Konstanta

Dependent Variable: DATA
Method: ARMA Maximum Likelihood (OPG - BHHH)
Date: 11/28/19 Time: 16:30
Sample: 1 799
Included observations: 799
Convergence achieved after 19 iterations
Coefficient covariance computed using outer product of gradients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.000214	0.000325	0.658315	0.5105
AR(3)	0.545563	0.183684	2.970113	0.0031
MA(3)	-0.643621	0.168662	-3.816037	0.0001
SIGMASQ	0.000132	5.03E-06	26.25370	0.0000

R-squared	0.013562	Mean dependent var	0.000220
Adjusted R-squared	0.009839	S.D. dependent var	0.011574
S.E. of regression	0.011517	Akaike info criterion	-6.084855
Sum squared resid	0.105455	Schwarz criterion	-6.061409
Log likelihood	2434.900	Hannan-Quinn criter.	-6.075848
F-statistic	3.643272	Durbin-Watson stat	2.022370
Prob(F-statistic)	0.012495		

Inverted AR Roots	.82	-.41+.71i	-.41-.71i
Inverted MA Roots	.86	-.43+.75i	-.43-.75i

26. ARIMA (0,1,1) Tanpa Konstanta

Dependent Variable: DATA
Method: ARMA Maximum Likelihood (OPG - BHHH)
Date: 11/29/19 Time: 14:12
Sample: 1 799
Included observations: 799
Convergence achieved after 20 iterations
Coefficient covariance computed using outer product of gradients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
MA(1)	-0.002012	0.027801	-0.072362	0.9423
SIGMASQ	0.000134	4.99E-06	26.82445	0.0000

R-squared	-0.000357	Mean dependent var	0.000220
Adjusted R-squared	-0.001612	S.D. dependent var	0.011574
S.E. of regression	0.011584	Akaike info criterion	-6.075937
Sum squared resid	0.106943	Schwarz criterion	-6.064214
Log likelihood	2429.337	Hannan-Quinn criter.	-6.071433
Durbin-Watson stat	1.999530		

Inverted MA Roots	.00

27. ARIMA (0,1,1) dengan Konstanta

Dependent Variable: DATA
Method: ARMA Maximum Likelihood (OPG - BHHH)
Date: 11/29/19 Time: 14:13
Sample: 1 799
Included observations: 799
Convergence achieved after 15 iterations
Coefficient covariance computed using outer product of gradients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.000220	0.000416	0.528220	0.5975
MA(1)	-0.002422	0.028015	-0.086450	0.9311
SIGMASQ	0.000134	5.02E-06	26.65947	0.0000

R-squared	0.000005	Mean dependent var	0.000220
Adjusted R-squared	-0.002507	S.D. dependent var	0.011574
S.E. of regression	0.011589	Akaike info criterion	-6.073796
Sum squared resid	0.106904	Schwarz criterion	-6.056211
Log likelihood	2429.481	Hannan-Quinn criter.	-6.067040
F-statistic	0.002068	Durbin-Watson stat	1.999480
Prob(F-statistic)	0.997934		

Inverted MA Roots	.00

28. ARIMA (0,1,2) Tanpa Konstanta

Dependent Variable: DATA
Method: ARMA Maximum Likelihood (OPG - BHHH)
Date: 11/29/19 Time: 14:14
Sample: 1 799
Included observations: 799
Convergence achieved after 10 iterations
Coefficient covariance computed using outer product of gradients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
MA(2)	-0.060799	0.032116	-1.893134	0.0587
SIGMASQ	0.000133	4.96E-06	26.88020	0.0000

R-squared	0.003127	Mean dependent var	0.000220
Adjusted R-squared	0.001877	S.D. dependent var	0.011574
S.E. of regression	0.011564	Akaike info criterion	-6.079417
Sum squared resid	0.106571	Schwarz criterion	-6.067693
Log likelihood	2430.727	Hannan-Quinn criter.	-6.074913
Durbin-Watson stat	2.013993		
Inverted MA Roots	.25	-.25	

29. ARIMA (0,1,2) dengan Konstanta

Dependent Variable: DATA
Method: ARMA Maximum Likelihood (OPG - BHHH)
Date: 11/29/19 Time: 14:14
Sample: 1 799
Included observations: 799
Convergence achieved after 9 iterations
Coefficient covariance computed using outer product of gradients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.000219	0.000388	0.564508	0.5726
MA(2)	-0.061236	0.032163	-1.903943	0.0573
SIGMASQ	0.000133	4.99E-06	26.70928	0.0000

R-squared	0.003533	Mean dependent var	0.000220
Adjusted R-squared	0.001029	S.D. dependent var	0.011574
S.E. of regression	0.011568	Akaike info criterion	-6.077320
Sum squared resid	0.106527	Schwarz criterion	-6.059736
Log likelihood	2430.889	Hannan-Quinn criter.	-6.070565
F-statistic	1.411120	Durbin-Watson stat	2.014897
Prob(F-statistic)	0.244479		
Inverted MA Roots	.25	-.25	

30. ARIMA (0,1,3) Tanpa Konstanta

Dependent Variable: DATA
Method: ARMA Maximum Likelihood (OPG - BHHH)
Date: 11/28/19 Time: 16:31
Sample: 1 799
Included observations: 799
Convergence achieved after 12 iterations
Coefficient covariance computed using outer product of gradients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
MA(3)	-0.090365	0.031966	-2.826939	0.0048
SIGMASQ	0.000133	4.99E-06	26.65962	0.0000

R-squared	0.006599	Mean dependent var	0.000220
Adjusted R-squared	0.005353	S.D. dependent var	0.011574
S.E. of regression	0.011543	Akaike info criterion	-6.082884
Sum squared resid	0.106199	Schwarz criterion	-6.071161
Log likelihood	2432.112	Hannan-Quinn criter.	-6.078380
Durbin-Watson stat	2.017302		

Inverted MA Roots	.45	-.22+.39i	-.22-.39i

31. ARIMA (0,1,3) dengan Konstanta

Dependent Variable: DATA
Method: ARMA Maximum Likelihood (OPG - BHHH)
Date: 11/28/19 Time: 16:31
Sample: 1 799
Included observations: 799
Convergence achieved after 11 iterations
Coefficient covariance computed using outer product of gradients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.000217	0.000375	0.578173	0.5633
MA(3)	-0.090839	0.032048	-2.834486	0.0047
SIGMASQ	0.000133	5.02E-06	26.48405	0.0000

R-squared	0.007023	Mean dependent var	0.000220
Adjusted R-squared	0.004528	S.D. dependent var	0.011574
S.E. of regression	0.011548	Akaike info criterion	-6.080807
Sum squared resid	0.106154	Schwarz criterion	-6.063223
Log likelihood	2432.282	Hannan-Quinn criter.	-6.074052
F-statistic	2.814964	Durbin-Watson stat	2.018248
Prob(F-statistic)	0.060503		

Inverted MA Roots	.45	-.22-.39i	-.22+.39i

Lampiran 4 : Uji Heterokedasitas

Heteroskedasticity Test: ARCH

F-statistic	27.35966	Prob. F(1,796)	0.0000
Obs*R-squared	26.51698	Prob. Chi-Square(1)	0.0000

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 11/29/19 Time: 15:14
Sample (adjusted): 2 799
Included observations: 798 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.000108	9.94E-06	10.90108	0.0000
RESID^2(-1)	0.182289	0.034850	5.230646	0.0000

R-squared	0.033229	Mean dependent var	0.000133
Adjusted R-squared	0.032015	S.D. dependent var	0.000253
S.E. of regression	0.000249	Akaike info criterion	-13.75840
Sum squared resid	4.92E-05	Schwarz criterion	-13.74666
Log likelihood	5491.600	Hannan-Quinn criter.	-13.75389
F-statistic	27.35966	Durbin-Watson stat	2.007564
Prob(F-statistic)	0.000000		

Lampiran 5 : Pengujian Koefisien ARCH

1. Pengujian Koefisien ARCH 1

Dependent Variable: DATA
Method: ML ARCH - Normal distribution (BFGS / Marquardt steps)
Date: 11/29/19 Time: 23:22
Sample: 1 799
Included observations: 799
Convergence achieved after 11 iterations
Coefficient covariance computed using outer product of gradients
Presample variance: backcast (parameter = 0.7)
GARCH = C(3) + C(4)*RESID(-1)^2

Variable	Coefficient	Std. Error	z-Statistic	Prob.
AR(2)	-0.074961	0.032030	-2.340327	0.0193
MA(3)	-0.115287	0.031278	-3.685885	0.0002
Variance Equation				
C	0.000101	5.70E-06	17.70376	0.0000
RESID(-1)^2	0.255202	0.051905	4.916682	0.0000

R-squared	0.010274	Mean dependent var	0.000220
Adjusted R-squared	0.009032	S.D. dependent var	0.011574
S.E. of regression	0.011522	Akaike info criterion	-6.127050
Sum squared resid	0.105806	Schwarz criterion	-6.103604
Log likelihood	2451.756	Hannan-Quinn criter.	-6.118042
Durbin-Watson stat	2.018537		

2. Pengujian Koefisien ARCH 2

Variable	Coefficient	Std. Error	z-Statistic	Prob.
AR(2)	-0.052287	0.038349	-1.363477	0.1727
MA(3)	-0.096891	0.030781	-3.147735	0.0016
Variance Equation				
C	9.02E-05	5.80E-06	15.54963	0.0000
RESID(-1)^2	0.236697	0.052212	4.533354	0.0000
RESID(-2)^2	0.105963	0.039965	2.651373	0.0080

R-squared	0.010519	Mean dependent var	0.000220
Adjusted R-squared	0.009278	S.D. dependent var	0.011574
S.E. of regression	0.011521	Akaike info criterion	-6.131865
Sum squared resid	0.105780	Schwarz criterion	-6.102557
Log likelihood	2454.680	Hannan-Quinn criter.	-6.120605
Durbin-Watson stat	2.018107		

3. Pengujian Koefisien ARCH 3

Variable	Coefficient	Std. Error	z-Statistic	Prob.
AR(2)	-0.050749	0.039631	-1.280533	0.2004
MA(3)	-0.090737	0.035633	-2.546416	0.0109
Variance Equation				
C	8.46E-05	5.74E-06	14.74269	0.0000
RESID(-1)^2	0.233416	0.050988	4.577840	0.0000
RESID(-2)^2	0.098198	0.037961	2.586826	0.0097
RESID(-3)^2	0.053983	0.033633	1.605072	0.1085

R-squared	0.010467	Mean dependent var	0.000220
Adjusted R-squared	0.009225	S.D. dependent var	0.011574
S.E. of regression	0.011521	Akaike info criterion	-6.133766
Sum squared resid	0.105786	Schwarz criterion	-6.098597
Log likelihood	2456.440	Hannan-Quinn criter.	-6.120255

4. Pengujian Koefisien ARCH 4

Variable	Coefficient	Std. Error	z-Statistic	Prob.
AR(2)	-0.056279	0.039504	-1.424650	0.1543
MA(3)	-0.096357	0.035769	-2.693882	0.0071
Variance Equation				
C	8.14E-05	5.83E-06	13.96643	0.0000
RESID(-1)^2	0.231854	0.051333	4.516669	0.0000
RESID(-2)^2	0.099809	0.037910	2.632803	0.0085
RESID(-3)^2	0.038626	0.034436	1.121684	0.2620
RESID(-4)^2	0.038812	0.028485	1.362519	0.1730

R-squared	0.010599	Mean dependent var	0.000220
Adjusted R-squared	0.009358	S.D. dependent var	0.011574
S.E. of regression	0.011520	Akaike info criterion	-6.133678
Sum squared resid	0.105772	Schwarz criterion	-6.092647
Log likelihood	2457.404	Hannan-Quinn criter.	-6.117915

Lampiran 6 : Uji Model Bayesian Markov Switching ARCH (k,m)

1. Pengujian Model Bayesian Markov Switching ARCH (1,1)

```
Specification type: Single-regime
Specification name: sARCH_norm
Number of parameters in variance model: 2
Number of parameters in distribution: 0
-------------------------------------------
Fitted parameters:
         Estimate Std. Error t value  Pr(>|t|)
alpha0_1  0.0002     0.0000 13.1708    <1e-16
alpha1_1  0.3594     0.0746  4.8163 7.314e-07
-------------------------------------------
LL: 1952.533
AIC: -3901.066
BIC: -3891.9158
```

2. Pengujian Model Bayesian Markov Switching ARCH (2,1)

```
Across regime constrained parameters:
None
-------------------------------------------
Fitted parameters:
       Estimate Std. Error t value  Pr(>|t|)
alpha0_1  0.0001    0.0000  5.0508 2.199e-07
alpha1_1  0.0664    0.0968  0.6862 2.463e-01
alpha0_2  0.0004    0.0001  6.2606 1.917e-10
alpha1_2  0.1752    0.0933  1.8773 3.024e-02
P_1_1     0.8814    0.0504 17.4775   <1e-16
P_2_1     0.1296    0.0449  2.8875 1.942e-03
-------------------------------------------
Transition matrix:
     t+1|k=1 t+1|k=2
t|k=1  0.8814  0.1186
t|k=2  0.1296  0.8704
-------------------------------------------
Stable probabilities:
State 1 State 2
 0.5221  0.4779
-------------------------------------------
LL: 1988.0467
AIC: -3964.0935
BIC: -3936.643
```

3. Pengujian Model Bayesian Markov Switching ARCH (3,1)

```
Across regime constrained parameters:
None
------------------------------------------
Fitted parameters:
        Estimate Std. Error   t value  Pr(>|t|)
alpha0_1  0.0001     0.0000    4.9452 3.804e-07
alpha1_1  0.0001     0.0014    0.0636 4.746e-01
alpha0_2  0.0004     0.0001    4.5439 2.761e-06
alpha1_2  0.0000     0.0001    0.0617 4.754e-01
alpha0_3  0.0003     0.0000    7.9095 1.332e-15
alpha1_3  0.2861     0.1087    2.6329 4.233e-03
P_1_1     0.8231    12.3033    0.0669 4.733e-01
P_1_2     0.1765     0.0558    3.1655 7.741e-04
P_2_1     0.3649     0.4500    0.8110 2.087e-01
P_2_2     0.6282     0.0005 1281.0165   <1e-16
P_3_1     0.0053     0.0003   18.9930   <1e-16
P_3_2     0.0003     0.2321    0.0012 4.995e-01
------------------------------------------
Transition matrix:
      t+1|k=1 t+1|k=2 t+1|k=3
t|k=1  0.8231  0.1765  0.0004
t|k=2  0.3649  0.6282  0.0069
t|k=3  0.0053  0.0003  0.9944
------------------------------------------
Stable probabilities:
State 1 State 2 State 3
 0.4692  0.2230  0.3078
------------------------------------------
LL: 1994.837
AIC: -3965.6739
BIC: -3910.773
```

4. Pengujian Model Bayesian Markov Switching ARCH (4,1)

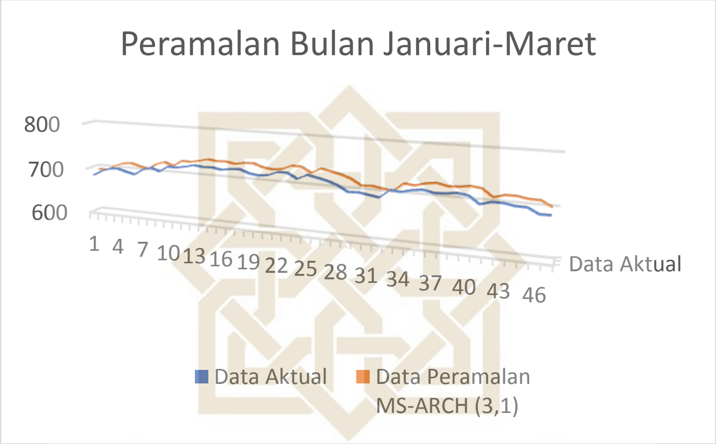
```
Across regime constrained parameters:
None
------------------------------------------
Fitted parameters:
       Estimate Std. Error      t value Pr(>|t|)
alpha0_1  0.0000          0 5.000000e+07  <1e-16
alpha1_1  0.0002          0 3.068236e+22  <1e-16
alpha0_2  0.0001          0 1.206820e+19  <1e-16
alpha1_2  0.0090          0 1.712165e+21  <1e-16
alpha0_3  0.0003          0 6.341056e+19  <1e-16
alpha1_3  0.2992          0 2.799790e+20  <1e-16
alpha0_4  0.0002          0 1.661807e+19  <1e-16
alpha1_4  0.7794          0 4.922176e+20  <1e-16
P_1_1     0.9977          0 9.662697e+23  <1e-16
P_1_2     0.0017          0 3.118771e+19  <1e-16
P_1_3     0.0006          0 6.881083e+30  <1e-16
P_2_1     0.0003          0 1.547577e+20  <1e-16
P_2_2     0.5679          0 7.524156e+19  <1e-16
P_2_3     0.0035          0 2.802338e+27  <1e-16
P_3_1     0.0049          0 2.123270e+22  <1e-16
P_3_2     0.5857          0 9.415671e+22  <1e-16
P_3_3     0.4093          0 6.131210e+24  <1e-16
P_4_1     0.0000          0 5.778668e+22  <1e-16
P_4_2     0.0000          0 1.045901e+11  <1e-16
P_4_3     0.2140          0 1.453653e+24  <1e-16
------------------------------------------
Transition matrix:
      t+1|k=1 t+1|k=2 t+1|k=3 t+1|k=4
t|k=1  0.9977  0.0017  0.0006  0.0000
t|k=2  0.0003  0.5679  0.0035  0.4283
t|k=3  0.0049  0.5857  0.4093  0.0000
t|k=4  0.0000  0.0000  0.2140  0.7860
------------------------------------------
Stable probabilities:
State 1 State 2 State 3 State 4
 0.3076  0.1854  0.1359  0.3711
------------------------------------------
LL: 2010.2017
AIC: -3963.4034
BIC: -3888.9019
```

Lampiran 7 : Data Indeks Saham JII dan Hasil Peramalan Indeks Saham JII

Tanggal	Data Aktual	Data Peramalan MS-ARCH (3,1)
02-Jan-19	684,92	693,8473743
03-Jan-19	695,3	693,5931179
04-Jan-19	701,74	704,3815383
07-Jan-19	704,11	711,0395578
08-Jan-19	698,65	713,3893783
09-Jan-19	694,4	707,9368123
10-Jan-19	706,57	703,5901782
11-Jan-19	712,76	715,8615893
14-Jan-19	706,15	722,1878664
15-Jan-19	718,29	715,3613141
16-Jan-19	717,67	727,9452266
17-Jan-19	721,43	727,312376
18-Jan-19	726,08	731,1460857
21-Jan-19	723,8	735,9877699
22-Jan-19	724,76	733,5753076
23-Jan-19	721,31	734,3893706
24-Jan-19	724,57	730,9177112
25-Jan-19	725,82	734,3083277
28-Jan-19	718,89	735,4808185
29-Jan-19	716,12	728,5746752

30-Jan-19	718,75	725,7409919
31-Jan-19	727,01	728,2935916
01-Feb-19	726,81	736,9124867
04-Feb-19	716,08	736,7275912
06-Feb-19	726,18	725,6147834
07-Feb-19	722,05	736,0847253
08-Feb-19	717,52	731,8848322
11-Feb-19	710,37	727,2948614
12-Feb-19	698,58	720,1910911
13-Feb-19	699,92	708,2664419
14-Feb-19	696,63	709,6530033
15-Feb-19	693,43	706,2105223
18-Feb-19	710,32	702,9019704
19-Feb-19	708,12	720,2081682
20-Feb-19	713,63	717,731864
21-Feb-19	716,45	723,580736
22-Feb-19	712,01	726,5240898
25-Feb-19	712,9	721,7336148
26-Feb-19	716,03	722,6615388
27-Feb-19	713,24	726,0565
28-Feb-19	698,32	723,2149925
01-Mar-19	704,48	708,0921145
04-Mar-19	704,67	714,3389446
05-Mar-19	700,88	714,5550978

06-Mar-19	700,67	710,7622306
08-Mar-19	689,8	710,474062
11-Mar-19	690,09	699,5535672



Lampiran 8 :Coding Pada Software R

1. Syntax/ Coding Bayesian Markov Switching ARCH pada Software *R* untuk Model MS-ARCH (1,1)

   # Data input

   data <- c(0.003593598, 0.013494645, 0.011525056, -0.019455203, -0.005547169, 0.012673437, 0.000701292, -0.00267096, -0.012281946, -0.025720199, -0.00768712, -0.02771208, 0.022674558, 0.002989593, 0.012456043, -0.016456192, 0.039767762, 0.034683192, 0.009789693, -0.002326162, 0.023476723, 0.005913295, -0.043073833, 0.010901941, 0.004211444, 0.016637948, 0.001191886, 0.006651675, -0.009102296,

0.014453231, 0.005418673, -0.004290714, -
0.016301179, -0.039959568, -0.001483288,
0.012681575, 0.009873933, 0.018183221, -
0.008620601, -0.002382096, -0.020784576, -
0.015610672, 0.004575491, -0.004111848,
0.008666499, -0.010298787, 0.013272831, 0.00759033,
0.005156859, 0.012785258, -0.014898537, -
0.001209596, 0.00736923, 0.004179613, -0.001247059,
-0.035978272, 0.030957703, -0.001891325, -
0.000553009, -0.006170835, 0.004745007, -
0.022939551, -0.006738442, -0.023107755,
0.000955144, 0.013259649, 0.017278936, 0.029317208,
-0.020694919, 0.005881822, 0.006586452, -
0.003953405, 0.00677012, 0.003609871, 0.006501573, -
0.018805031, 0.008660101, 0.024739166, -
0.021195907, 0.001833548, -0.023198675,
0.015777119, 0.009717081, -0.012943541,
0.000874861, -0.012079934, 0.008305836, -
0.016338008, -0.001751705, 0.015165116,
0.007992758, -0.000772875, 0.017131183,
0.004155062, 0.008193409, -0.002696411, -
0.012150098, 0.010725421, 0.019072003, 0.032536697,
-0.01004169, -0.003085888, 0.015350612, -0.021170375
0.00550434, 0.002079953, 0.004711138, 0.004891743, -
0.016283523, 0.00110863, -0.013112696, -0.004355695,

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Model

spec <- CreateSpec(variance.spec = list(model = c("sARCH")),

distribution.spec = list(distribution = c("norm")),

switch.spec = list(do.mix = FALSE, K = 1))

Fitting dan output

fit <- FitML(spec = spec, data = data)

summary(fit)

2. Syntax/ Coding Bayesian Markov Switching ARCH pada Software *R* untuk Model MS-ARCH (2,1)

Data input

data <- c(0.003593598, 0.013494645, 0.011525056, -0.019455203, -0.005547169, 0.012673437, 0.000701292, -0.00267096, -0.012281946, -0.025720199, -0.00768712, -0.02771208, 0.022674558, 0.002989593, 0.012456043, -0.016456192, 0.039767762, 0.034683192, 0.009789693, -0.002326162, 0.023476723, 0.005913295, -0.043073833, 0.010901941, 0.004211444, 0.016637948, 0.001191886, 0.006651675, -0.009102296, 0.014453231, 0.005418673, -0.004290714, -0.016301179, -0.039959568, -0.001483288, 0.012681575, 0.009873933, 0.018183221, -0.008620601, -0.002382096, -0.020784576, -0.015610672, 0.004575491, -0.004111848, 0.008666499, -0.010298787, 0.013272831, 0.00759033, 0.005156859, 0.012785258, -0.014898537, -0.001209596, 0.00736923, 0.004179613, -0.001247059, -0.035978272, 0.030957703, -0.001891325, -0.000553009, -0.006170835, 0.004745007, -0.022939551, -0.006738442, -0.023107755, 0.000955144, 0.013259649, 0.017278936, 0.029317208, -0.020694919, 0.005881822, 0.006586452, -0.003953405, 0.00677012, 0.003609871, 0.006501573, -0.018805031, 0.008660101, 0.024739166, -0.021195907, 0.001833548, -0.023198675, 0.015777119, 0.009717081, -0.012943541, 0.000874861, -0.012079934, 0.008305836, -0.016338008, -0.001751705, 0.015165116, 0.007992758, -0.000772875, 0.017131183, 0.004155062, 0.008193409, -0.002696411, -0.012150098, 0.010725421, 0.019072003, 0.032536697, -0.01004169, -0.003085888, 0.015350612, -0.021170375 0.00550434, 0.002079953, 0.004711138, 0.004891743, -0.016283523, 0.00110863, -0.013112696, -0.004355695, 0.004996998, 0.020134749, 0.00819728, 0.010939231, 0.016930392, -0.003992809, -0.004344883, -

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```
0.016356607, 0.003100272, 0.01921641, -0.002371031,
0.003953436, -0.002439982, -0.0035982, )
Model
spec <- CreateSpec(variance.spec = list(model =
c("sARCH")),
distribution.spec = list(distribution = c("norm")),
switch.spec = list(do.mix = FALSE, K = 2))
# Fitting dan output
fit <- FitML(spec = spec, data = data)
summary(fit)
```

3. Syntax/ Coding Bayesian Markov Switching ARCH pada Software *R* untuk Model MS-ARCH (3,1)

```
# Data input
data <- c(0.003593598, 0.013494645, 0.011525056, -
0.019455203, -0.005547169, 0.012673437,
0.000701292, -0.00267096, -0.012281946, -
0.025720199, -0.00768712, -0.02771208, 0.022674558,
0.002989593, 0.012456043, -0.016456192,
0.039767762, 0.034683192, 0.009789693, -
0.002326162, 0.023476723, 0.005913295, -
0.043073833, 0.010901941, 0.004211444, 0.016637948,
0.001191886, 0.006651675, -0.009102296,
0.014453231, 0.005418673, -0.004290714, -
0.016301179, -0.039959568, -0.001483288,
0.012681575, 0.009873933, 0.018183221, -
```

0.008620601, -0.002382096, -0.020784576, -0.015610672, 0.004575491, -0.004111848, 0.008666499, -0.010298787, 0.013272831, 0.00759033, 0.005156859, 0.012785258, -0.014898537, -0.001209596, 0.00736923, 0.004179613, -0.001247059, -0.035978272, 0.030957703, -0.001891325, -0.000553009, -0.006170835, 0.004745007, -0.022939551, -0.006738442, -0.023107755, 0.000955144, 0.013259649, 0.017278936, 0.029317208, -0.020694919, 0.005881822, 0.006586452, -0.003953405, 0.00677012, 0.003609871, 0.006501573, -0.018805031, 0.008660101, 0.024739166, -0.021195907, 0.001833548, -0.023198675, 0.015777119, 0.009717081, -0.012943541, 0.000874861, -0.012079934, 0.008305836, -0.016338008, -0.001751705, 0.015165116, 0.007992758, -0.000772875, 0.017131183, 0.004155062, 0.008193409, -0.002696411, -0.012150098, 0.010725421, 0.019072003, 0.032536697, -0.01004169, -0.003085888, 0.015350612, -0.021170375 0.00550434, 0.002079953, 0.004711138, 0.004891743, -0.016283523, 0.00110863, -0.013112696, -0.004355695, 0.004996998, 0.020134749, 0.00819728, 0.010939231, 0.016930392, -0.003992809, -0.004344883, -0.006068612, -0.003387433, 0.00126393, 0.005882415, 0.018901115, -0.011243035, 0.005516419, 0.00973079, 0.001734658, -0.001555071, -0.006109066, -0.010899455, -0.005816056, -0.010944885, -0.00165754, 0.008752284, 0.003099683, 0.006596955, 0.007762672, -0.005421463, 0.002790121, 0.001014038, -0.000953469, -0.015657271, 0.013095052, 0.00477046, -0.010601557, 0.01950588, 0.008261552, 0.009106696, -0.001354834, 0.005833319, 0.000820104, -0.006329274, -0.018421163, -0.004858577, -0.010275932, -0.004810381, -0.011795095, 0.000185856, 0.007344579, -0.015102401, 0.004764435, 0.011244577, -0.003230673, -0.01371521, -0.009117722, 0.003399437, 0.004139235, -0.010949704, 0.001185705, 0.009404064, -0.005697932, 0.02061222, 0.001340679, 0.009639848, -0.002611506, -0.007814039, 0.008929727, -0.001804061, 0.006877701, 0.014379402, 0.009690287, -0.007311204, -0.008133176, -0.00908134, -0.007309606, 0.004096299, 0.007249547, -0.005040241, 0.008351127, 0.006559078, 0.002590694, 0.006484672, -0.004452758, -0.009085928, 0.002452032, 0.008155126, 0.026224598, 0.007938214, -0.010860386, 0.021347588, 0.00199328, 0.015986795, -0.020120151, 0.006406537, 0.005519325, 0.005460957, 0.007718159, -0.011416529, -0.000521402, 0.014580822, 0.00364683, 0.015437534, 0.009116996, -0.018868227, 0.032989138, -0.00820959, -0.004912428, 0.004509575, 0.007253294, 0.010874573, -0.001200995, -0.003200892, -0.003915822, -0.010320671, - 0.017651106, 0.010787679, 0.02361388, -0.019037522, 0.009330577, 0.001266844, -0.005720182, 0.014543437, -0.001718736, -0.019076696, 0.002128721, 0.005168178, -0.013235408, 0.006787846, 0.002140363, 0.007088284, 0.001694271, -0.00715679, -0.019494165, -0.014339338, -0.020242669, 0.033253249, -0.008756286, 0.018210847, -0.002991775, 0.009771645, 0.007537673, 0.002459927, -0.010172946, 0.014955126, 0.00025246, 0.005802263, -0.02322454, 0.022603533, 0.000118946, -0.012875086, -0.004534973, -0.00715272, -0.002305148, 0.005631453, -0.00351594, -0.005855717, 0.011340586, -0.002279457, 0.007399369, -0.005510693, -0.001200246, -0.002228993, 0.003725706, -0.002792978, -0.000364877, 0.003198275, -0.003820225, 0.00071656, -0.003655767, -0.003832568, -0.018858888, 0.005535044, 0.004982942, 0.017166343, -0.014697849, 0.009881301, -0.053727469, -0.025862136, -0.010585546, 0.029986969, -0.001773216, -0.007604159, -0.006286164, 0.000979797, 0.008412951, -0.022766736, 0.005279632, 0.004268353, 0.006952146, -0.004253366, 0.019236384, 0.010619164, 0.007111418, -0.003861091, -0.007039128, 0.008087198, 0.001654845, -0.002702915, -0.011888611, -0.004455311, -0.012231505, -0.009390566, -0.013917418, -0.005147477, -0.016441793, -0.011658362, 0.019648318, 0.028722952, 0.023120149, -0.002877162, -0.00376719, 0.006974695, 0.005841941, 0.004884971, -0.004642296, 0.000713409, -0.006783665, -0.005587331, -0.001763312, -0.004480054, 0.001045691, 0.010425937, 0.001736697, -0.01457518, 0.000712743, 0.009983011, 0.001812272, 0.004988328, -0.004198285, -0.00843534, -0.0018407, 0.010046274, 0.006898652, 0.001909458, 0.00369455, -0.006731445, -0.002101277, -0.000343485, 0.004256602, 0.005047249, -0.00933248, 0.004270977, -0.008632158, -0.001266005, 0.002745773, 0.001420241, 0.000644898, 0.002661174, -0.002646848, 8.59537E-05, -0.005804114, 0.00571816, -0.002079465, 0.012653431, -0.001532133, -0.008125374, 0.000844117, -0.006096487, 0.003260865, 0.004221861, -0.002702801, 0.027178733, 0.001823941, -

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```
Model
spec <- CreateSpec(variance.spec = list(model =
c("sARCH")),
distribution.spec = list(distribution = c("norm")),
switch.spec = list(do.mix = FALSE, K = 3))
# Fitting dan output
fit <- FitML(spec = spec, data = data)
summary(fit)
```

4. Syntax/ Coding Bayesian Markov Switching ARCH pada Software *R* untuk Model MS-ARCH (4,1)

```
# Data input
data <- c(0.003593598, 0.013494645, 0.011525056, -
0.019455203, -0.005547169, 0.012673437,
0.000701292, -0.00267096, -0.012281946, -
0.025720199, -0.00768712, -0.02771208, 0.022674558,
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0.016301179, -0.039959568, -0.001483288,
0.012681575, 0.009873933, 0.018183221, -
0.008620601, -0.002382096, -0.020784576, -
0.015610672, 0.004575491, -0.004111848,
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Model

```
spec <- CreateSpec(variance.spec = list(model =
c("sARCH")),
distribution.spec = list(distribution = c("norm")),
switch.spec = list(do.mix = FALSE, K = 4))

# Fitting dan output
fit <- FitML(spec = spec, data = data)
summary(fit)
```

Lampiran 9 : Tabel Chi-Kuadrat

Tabel Chi-Kuadrat								
db	**0.25**	**0.2**	**0.15**	**0.1**	**0.05**	**0.025**	**0.02**	**0.01**
1	1.3233	1.6424	2.0723	2.7055	3.8415	5.0239	5.4119	6.6349
2	2.7726	3.2189	3.7942	4.6052	5.9915	7.3778	7.824	9.2103
3	4.1083	4.6416	5.317	6.2514	7.8147	9.3484	9.8374	11.345
4	5.3853	5.9886	6.7449	7.7794	9.4877	11.143	11.668	13.277
5	6.6257	7.2893	8.1152	9.2364	11.07	12.833	13.388	15.086
6	7.8408	8.5581	9.4461	10.645	12.592	14.449	15.033	16.812
7	9.0371	9.8032	10.748	12.017	14.067	16.013	16.622	18.475
8	10.219	11.03	12.027	13.362	15.507	17.535	18.168	20.09
9	11.389	12.242	13.288	14.648	16.919	19.023	19.679	21.666
10	12.549	13.442	14.543	15.987	18.307	20.482	21.161	23.209
11	13.701	14.631	15.767	17.275	19.675	21.92	22.618	24.725
12	14.845	15.812	16.989	18.549	21.026	23.337	24.054	26.217
13	15.984	16.985	18.202	19.812	22.362	24.736	25.472	27.688
14	17.117	18.151	19.406	21.064	23.685	26.119	26.873	29.141
15	18.245	19.311	20.603	22.307	24.996	27.488	28.259	30.578
16	19.369	20.465	21.793	23.542	26.296	28.845	29.633	32
17	20.489	21.615	22.977	24.769	27.587	30.191	30.995	33.409
18	21.605	22.76	24.155	25.989	28.869	31.526	32.346	34.805
19	22.718	23.9	25.329	27.204	30.144	32.852	33.687	36.191
20	23.828	25.038	26.498	28.412	31.41	34.17	35.02	37.566

21	24.241	29.171	27.662	29.615	32.671	35.479	36.343	38.932
22	26.039	27.301	28.822	30.813	33.924	36.781	37.659	40.289
23	27.141	28.429	29.979	32.007	35.172	38.076	38.968	41.638
24	28.241	29.553	31.132	33.196	36.415	39.364	40.27	42.98
25	29.339	30.675	32.282	34.382	37.652	40.646	41.566	44.314
26	30.435	31.795	33.429	35.563	38.885	41.923	42.856	45.642
27	31.528	32.912	34.547	36.741	40.113	43.195	44.14	46.963
28	32.62	34.027	35.715	37.916	41.337	44.461	45.419	48.278
29	33.711	35.359	36.854	39.087	42.557	45.722	46.693	49.588
30	34.8	36.25	37.99	40.256	43.773	46.979	47.962	50.892
31	35.887	37.359	39.124	41.422	44.985	48.232	49.226	52.191
32	36.973	38.466	40.256	42.585	46.194	49.48	50.487	53.486
33	38.058	39.572	41.386	43.745	47.4	50.725	51.743	54.776
34	39.141	40.676	42.514	44.903	48.602	51.966	52.995	56.061
35	40.223	41.778	43.64	46.059	49.802	53.203	54.224	57.342
36	41.304	42.479	44.764	47.212	50.998	54.437	55.489	58.619
37	42.383	43.978	45.886	48.363	52.192	55.668	56.73	59.893
38	43.462	45.076	47.007	49.513	53.384	56.896	57.969	61.162
39	44.539	46.173	48.126	50.66	54.572	58.12	59.204	62.248
db	**0.25**	**0.2**	**0.15**	**0.1**	**0.05**	**0.025**	**0.02**	**0.01**
40	45.616	47.269	49.244	51.805	59.342	60.436	63.436	63.691
41	46.692	48.363	50.36	52.949	56.942	60.561	61.665	64.95
42	47.766	49.456	51.457	54.09	58.124	61.777	62.892	66.206
43	48.84	50.548	52.588	55.23	59.304	62.99	64.116	67.459
44	49.913	51.639	53.7	56.369	60.481	64.201	65.337	68.71
45	50.985	52.729	54.81	57.505	61.656	65.41	66.555	69.957
46	52.056	53.818	55.92	58.641	62.83	66.617	67.771	71.201
47	53.127	54.906	57.028	59.774	64.001	67.821	68.985	72.443
48	54.196	55.993	58.135	60.907	65.171	69.023	70.197	73.683
49	55.265	57.079	59.241	62.038	66.339	70.222	71.406	74.919
50	56.334	58.164	60.346	63.167	67.505	71.42	72.613	76.154
51	57.401	59.248	61.45	64.295	68.669	72.616	73.818	77.386
52	58.468	60.332	62.553	65.422	69.832	73.81	75.021	78.616
53	59.534	61.414	63.654	66.548	70.993	75.002	76.223	79.843
54	60.6	62.496	64.755	67.673	72.153	76.192	77.442	81.069
55	61.665	63.577	65.855	68.796	73.311	77.38	78.619	82.292

56	62.729	64.658	66.954	69.919	74.468	74.567	79.815	83.513
57	63.793	65.737	68.052	71.04	75.624	79.752	81.009	84.733
58	64.857	66.816	69.149	72.16	76.778	80.936	82.201	85.95
59	65.919	67.894	70.246	73.279	77.931	82.117	83.391	87.166
60	66.981	68.972	71.341	74.397	79.082	82.298	84.58	88.379
61	68.043	70.049	72.436	75.514	80.232	84.476	85.767	89.591
62	69.104	71.125	73.53	76.63	81.381	85.654	86.953	90.802
63	70.165	72.201	74.623	77.745	82.529	86.83	88.137	91.01
64	71.225	73.276	75.715	78.86	83.675	88.004	89.32	93.217
65	72.285	74.351	76.807	79.973	84.821	89.177	90.501	94.422
66	73.344	75.424	77.898	81.085	85.965	90.349	91.681	95.626
67	74.403	76.498	78.988	82.197	87.108	91.519	92.86	96.828
68	75.461	77.571	80.087	83.308	88.25	92.689	94.037	98.028
69	76.519	78.643	81.167	84.418	89.391	93.856	95.213	99.228
70	77.577	79.715	82.255	85.527	90.531	95.023	96.388	100.43
71	78.634	80.786	83.343	86.635	91.67	96.189	97.561	101.62
72	79.69	81.857	84.43	87.743	92.808	97.353	98.733	102.82
73	80.747	82.927	85.517	88.85	93.945	98.516	99.904	104.01
74	81.803	83.997	86.602	89.956	95.081	99.678	101.07	105.2
75	82.858	85.066	87.688	91.061	96.217	100.84	102.24	106.39
76	83.913	86.135	88.772	92.166	97.351	102	103.41	107.58
77	84.968	87.203	89.857	93.27	98.484	103.16	104.58	108.77
78	86.022	88.271	90.94	94.374	99.617	104.32	105.74	109.96
79	87.077	89.338	92.023	95.476	100.75	105.47	106.91	111.14
80	88.13	90.405	93.106	96.578	101.88	106.63	108.07	112.33
81	89.184	91.472	94.188	97.68	103.01	107.78	109.23	113.51
db	**0.25**	**0.2**	**0.15**	**0.1**	**0.05**	**0.025**	**0.02**	**0.01**
82	90.237	92.538	95.269	98.78	104.14	108.94	110.39	114.69
83	91.289	93.604	96.35	99.88	105.27	110.09	111.55	115.88
84	92.342	94.669	97.431	100.98	106.39	111.24	112.71	117.06
85	93.394	95.734	98.511	102.08	107.52	112.39	113.87	118.24
86	94.446	96.799	99.59	103.18	108.65	113.54	115.03	119.41
87	95.497	97.863	100.67	104.28	109.77	114.69	116.18	120.59
88	96.548	98.927	101.75	105.37	110.9	115.84	117.34	121.77
89	97.599	99.991	102.83	106.47	112.02	116.99	118.49	122.94
90	98.65	101.05	103.9	107.57	113.15	118.14	119.65	124.12

91	99.7	102.12	104.98	108.66	114.27	119.28	120.8	125.29
92	100.75	103.18	106.06	109.76	115.39	120.43	121.95	126.46
93	101.8	104.24	107.13	110.85	116.51	121.57	123.1	127.63
94	102.85	105.3	108.21	111.94	117.63	122.72	124.26	128.8
95	103.9	106.36	109.29	113.04	118.75	123.86	125.4	129.97
96	104.95	107.43	110.36	114.13	119.87	125	126.55	131.14
97	106	108.49	111.44	115.22	120.99	126.14	127.7	132.31
98	107.05	109.55	112.51	116.32	122.11	127.28	128.85	133.48
99	108.09	110.61	113.59	117.41	123.23	128.42	130	134.64
100	109.14	111.67	114.66	118.5	124.34	129.56	131.14	135.81
101	110.19	112.73	115.73	119.59	125.46	130.7	132.29	136.97
102	111.24	113.79	116.81	120.68	126.57	131.84	133.43	138.13
103	112.28	114.84	117.88	121.77	127.69	132.97	134.57	139.3
104	113.33	115.9	118.95	122.86	128.8	134.11	135.72	140.46
105	114.38	116.96	120.02	123.95	129.92	135.25	136.86	141.62
106	115.42	118.02	121.09	125.04	131.03	136.38	138	142.78
107	116.47	119.08	122.16	126.12	132.14	137.52	139.14	143.94
108	117.52	120.14	123.24	127.21	133.26	138.65	140.28	145.1
109	118.56	121.19	124.31	128.3	134.37	139.78	141.42	146.26
110	119.61	122.25	125.38	129.39	135.48	140.92	142.56	147.41
111	120.65	123.31	126.45	130.47	136.59	142.05	143.7	148.57
112	121.7	124.36	127.52	131.56	137.7	143.18	144.84	149.73
113	122.74	125.42	128.59	132.64	138.81	144.31	145.97	150.88
114	123.79	126.48	129.65	133.73	139.92	145.44	147.11	152.04
115	124.83	127.53	130.72	134.81	141.03	146.57	148.25	153.19
116	125.88	128.59	131.79	135.9	142.14	147.7	149.38	154.34
117	126.92	129.64	132.86	136.98	143.25	148.83	150.52	155.5
118	127.97	130.7	133.93	138.07	144.35	149.96	151.65	156.65
119	129.01	131.75	134.99	139.15	145.46	151.08	152.79	157.8
120	130.05	132.81	136.06	140.23	146.57	152.21	153.92	158.95
121	131.1	133.86	137.13	141.32	147.67	153.34	155.05	160.1
122	132.14	134.91	138.2	142.2	148.78	154.46	156.18	161.25
123	133.18	135.97	139.26	143.48	149.88	155.59	157.31	161.4
db	**0.25**	**0.2**	**0.15**	**0.1**	**0.05**	**0.025**	**0.02**	**0.01**
124	134.23	137.02	140.33	144.56	150.99	156.71	158.44	163.55
125	135.27	138.08	141.39	145.64	152.09	157.84	159.58	164.69

126	136.31	139.13	142.46	146.72	153.2	158.96	160.71	165.84
127	137.36	140.18	143.52	147.8	154.3	160.09	161.83	166.99
128	138.4	141.24	144.59	148.89	155.4	161.21	162.96	168.13
129	139.44	142.29	145.65	149.97	156.51	162.33	164.09	169.28
130	140.48	143.34	146.72	151.05	157.61	163.45	165.22	170.42
131	141.52	144.39	147.78	152.12	158.71	164.57	166.35	171.57
132	142.57	145.55	148.85	153.2	159.81	165.7	167.47	172.71
133	143.61	146.5	149.91	154.28	160.91	166.82	168.6	173.85
134	144.65	147.55	150.98	155.36	162.02	167.94	169.73	175
135	145.69	148.6	152.04	156.44	163.12	169.06	170.85	176.14
136	146.73	149.65	153.1	157.52	164.22	170.18	171.98	177.28
137	147.77	150.7	154.16	158.6	165.32	171.29	173.1	178.42
138	148.81	151.75	155.23	159.67	166.42	171.41	174.22	179.56
139	149.85	153.8	156.29	160.75	167.51	173.53	176.35	180.7
140	150.89	153.85	157.35	161.83	168.61	174.65	176.47	181.84
141	151.93	154.9	158.41	162.9	169.71	175.76	177.59	182.98
142	152.97	155.95	159.48	163.98	170.81	176.88	178.72	184.12
143	154.01	157	160.54	165.06	171.91	178	179.84	185.26
144	155.05	158.05	161.6	166.13	173	179.11	180.96	186.39
145	156.09	159.1	162.66	167.21	174.1	180.23	182.08	187.53
146	157.13	160.15	163.72	168.28	175.2	181.34	183.2	188.67
147	185.17	161.2	164.78	169.36	176.29	182.46	184.32	189.8
148	159.21	162.25	165.84	170.43	177.39	183.57	185.44	190.94
149	160.25	163.3	166.9	171.49	178.49	184.69	186.56	192.07
150	161.29	165.35	167.96	172.58	179.58	185.8	187.68	193.21
151	162.33	165.4	169.02	173.66	180.68	186.91	188.8	194.34
152	163.37	166.45	170.08	174.73	181.77	188.03	189.92	195.48
153	164.41	167.49	171.14	175.8	182.86	189.14	191.03	196.61
154	165.45	168.54	172.2	176.88	183.96	190.25	192.15	197.74
155	166.48	169.59	173.26	177.95	185.05	191.36	193.27	198.87
156	167.52	170.64	174.32	179.02	186.15	192.47	194.38	200.01
157	168.56	171.38	175.38	180.09	187.24	193.58	195.5	201.14
158	169.6	172.73	176.44	181.17	188.33	194.7	196.62	202.27
159	170.64	173.78	177.49	182.24	189.42	195.81	197.73	203.4
160	171.68	174.83	178.55	183.31	190.52	196.92	198.85	204.53
161	172.71	175.88	179.61	184.38	191.61	198.02	199.96	204.53

162	173.75	176.92	180.67	185.45	192.7	199.13	201.08	206.79
163	174.79	177.97	181.73	186.52	193.79	200.24	202.19	207.92
164	175.83	179.02	182.78	187.6	194.88	201.35	203.3	209.05
165	176.86	180.06	183.84	188.67	195l97	202.46	204.42	210.18
db	**0.25**	**0.2**	**0.15**	**0.1**	**0.05**	**0.025**	**0.02**	**0.01**
166	177.9	181.11	184.9	189.74	197.06	203.57	205.53	211.3
167	178.94	182.15	185.95	190.81	198.15	204.67	206.64	22.43
168	179.97	183.2	187.01	191.88	199.24	205.78	207.75	213.56
169	181.01	184.25	188.07	192.95	200.33	206.89	208.87	214.69
170	182.05	185.29	189.12	194.02	201.42	208	209.98	215.81
171	183.08	186.34	190.18	195.09	202.51	209.1	211.09	216.94
172	184.12	187.38	191.24	196.16	203.6	210.21	212.2	218.06
173	185.16	188.43	192.29	197.23	204.69	211.31	213.31	219.19
174	186.19	189.47	193.35	198.29	205.78	212.42	214.42	220.31
175	187.23	190.52	194.4	199.36	206.87	213.52	215.53	221.44
176	188.27	191.56	195.46	200.43	207.95	214.63	216.64	222.56
177	189.3	192.61	196.61	201.5	209.04	215.73	217.75	223.69
178	190.34	193.65	197.57	202.57	210.13	216.84	218.86	224.81
179	191.37	194.7	198.62	203.64	211.22	217.94	219.97	225.93
180	192.41	195.74	199.68	204.7	212.3	219.04	221.08	227.06
181	193.44	196.79	200.73	205.77	213.39	220.15	222.19	228.18
182	194.48	197.83	201.79	206.86	214.48	221.25	223.29	229.3
183	195.52	198.88	202.84	207.91	215.56	222.35	224.4	230.42
184	196.55	199.92	203.9	208.97	216.65	223.46	225.51	231.54
185	197.59	200.96	204.95	210.04	217.73	224.56	226.62	231.67
186	198.62	202.01	206	211.11	218.82	225.66	227.72	233.79
187	199.66	203.05	207.06	212.91	219.91	226.76	198.15	234.91
188	200.69	204.1	208.11	213.24	220.99	227.86	229.93	236.03
189	201.73	205.14	209.17	214.31	222.08	228.96	231.04	237.15
190	202.76	206.18	210.22	215.37	223.16	230.06	232.15	238.27
191	203.79	207.23	211.27	216.44	224.24	231.16	233.25	239.39
192	204.83	208.27	212.32	217.5	225.33	232.27	234.36	240.5
193	205.86	209.31	213.38	218.57	226.41	233.37	235.46	241.62
194	206.9	210.35	214.43	219.63	227.5	234.46	236.57	242.74
195	207.93	211.4	215.48	220.7	228.58	235.56	237.67	243.86
196	208.97	212.44	216.54	221.76	229.66	236.66	238.77	244.98

197	210	213.48	217.59	222.83	230.75	237.76	239.88	246.09
198	211.03	214.52	218.64	223.89	231.83	238.86	240.98	247.21
199	212.07	215.57	219.69	224.96	232.91	239.96	242.08	248.33
200	213.1	216.61	220.74	226.02	233.99	241.06	243.19	249.45

CURRICULUM VITAE

A. Biodata Pribadi

Nama	: Nurul Saputro
Tempat, tanggal lahir	: Kulon Progo, 11 Maret 1995
Jenis Kelamin	: Laki-laki
Agama	: Islam
Alamat Asal	: Jogahan RT 27 RW 13, Bumirejo, Lendah, Kulon Progo,Yogyakarta
CP	: 08975101227
E-mail	: nurulsap03@gmail.com

B. Riwayat Pendidikan

Jenjang	Nama Sekolah	Tahun
TK	Masyitoh Bulu	2000-2001
SD	Muhammadiyah Maesan	2001-2007
SMP	SMP Negeri 1 Lendah	2007-2010
SMA	SMA Negeri 1 Pengasih	2010-2013

S1	UIN Sunan Kalijaga Yogyakarta	2013-2019