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LAMPIRAN



Lampiran 1. Data Nilai Tukar (Kurs) Rupiah terhadap Dolar AS dan Inflasi

Tahun	Bulan	Kurs	Inflasi	Tahun	Bulan	Kurs	Inflasi
2010	1	9321,95	3,72	2013	1	9735,57	4,57
	2	9395,10	3,81		2	9735,05	5,31
	3	9219,68	3,43		3	9758,10	5,90
	4	9072,33	3,91		4	9772,95	5,57
	5	9229,15	4,16		5	9809,90	5,47
	6	9194,00	5,05		6	9931,00	5,90
	7	9094,45	6,22		7	10123,69	8,61
	8	9016,76	6,44		8	10625,27	8,79
	9	9020,84	5,80		9	11402,95	8,40
	10	8972,90	5,67		10	11423,85	8,32
	11	8983,28	6,33		11	11671,25	8,37
	12	9067,61	6,96		12	12147,55	8,38
2011	1	9082,38	7,02	2014	1	12240,55	8,22
	2	8957,11	6,84		2	11994,75	7,75
	3	8805,47	6,65		3	11484,15	7,32
	4	8694,30	6,16		4	11492,95	7,25
	5	8598,80	5,98		5	11583,72	7,32
	6	8607,00	5,54		6	11952,09	6,70
	7	8576,19	4,61		7	11747,50	4,53
	8	8574,78	4,79		8	11765,23	3,99
	9	8809,45	4,61		9	11950,36	4,53
	10	8939,66	4,42		10	12205,56	4,83
	11	9060,22	4,15		11	12219,25	6,23
	12	9133,76	3,79		12	12500,47	8,36
2012	1	9154,76	3,65	2015	1	12641,95	6,96
	2	9070,80	3,56		2	12813,52	6,29
	3	9211,28	3,97		3	13132,09	6,38
	4	9221,50	4,50		4	13012,61	6,79
	5	9336,57	4,45		5	13206,26	7,15
	6	9498,14	4,53		6	13379,95	7,26
	7	9503,59	4,56		7	13441,78	7,26
	8	9547,15	4,58		8	13850,70	7,18
	9	9614,25	4,31		9	14468,00	6,83
	10	9645,13	4,61		10	13864,76	6,25
	11	9675,95	4,32		11	13740,95	4,89
	12	9693,94	4,30		12	13923,75	3,35

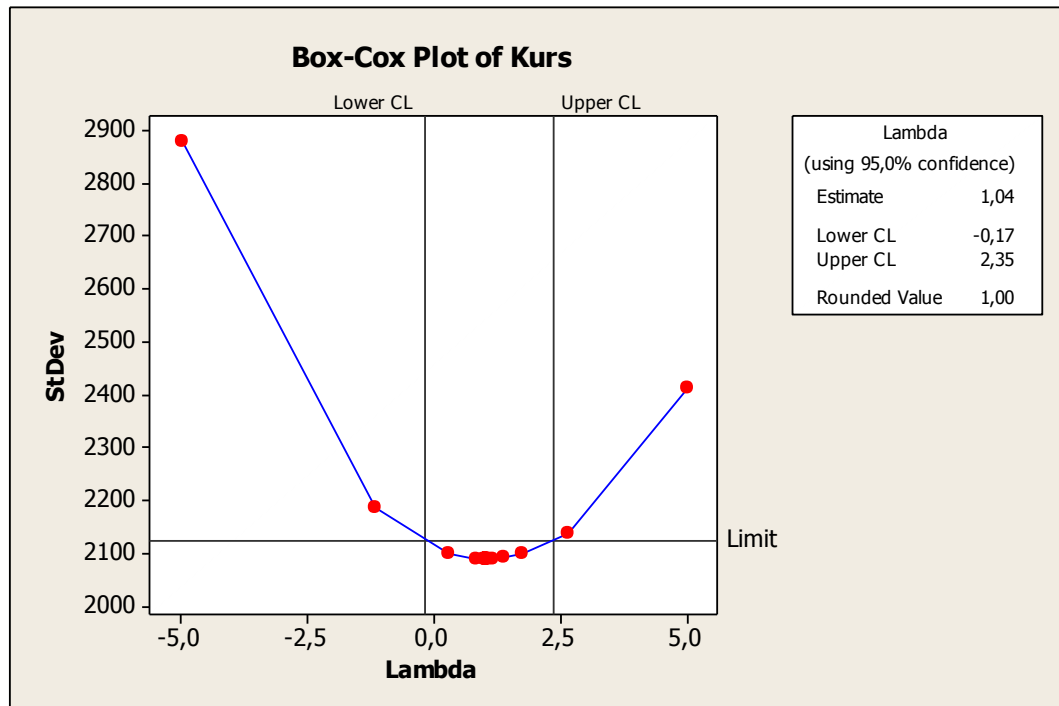


Lampiran 1. Data Nilai Tukar (Kurs) Rupiah terhadap Dolar AS dan Inflasi (lanjutan)

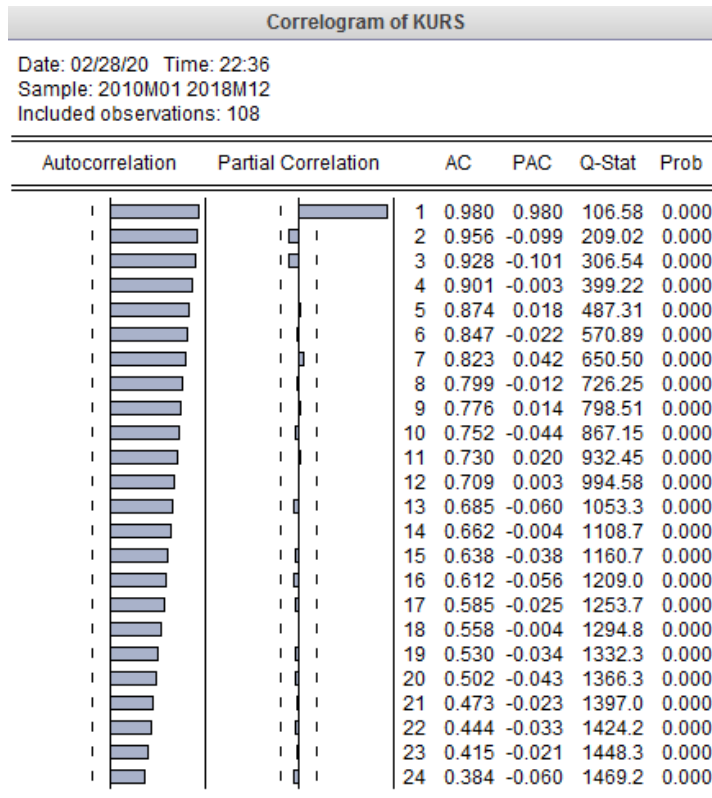
Tahun	Bulan	Kurs	Inflasi	Tahun	Bulan	Kurs	Inflasi
2016	1	13958,35	4,14	2018	1	13447,36	3,25
	2	13583,20	4,42		2	13657,94	3,18
	3	13259,14	4,45		3	13827,28	3,40
	4	13245,80	3,60		4	13872,04	3,41
	5	13486,70	3,33		5	14130,00	3,23
	6	13421,68	3,45		6	14106,35	3,12
	7	13184,52	3,21		7	14486,63	3,18
	8	13230,90	2,79		8	14632,57	3,20
	9	13183,76	3,07		9	14943,00	2,88
	10	13082,23	3,31		10	15254,73	3,16
	11	13377,04	3,58		11	14770,38	3,23
	12	13484,76	3,02		12	14569,47	3,13
2017	1	13425,66	3,49	2019	1	14233,90	2,82
	2	13407,84	3,83		2	14105,36	2,57
	3	13412,50	3,61		3	14282,10	2,48
	4	13372,88	4,17		4	14213,31	2,83
	5	13390,10	4,33		5	14464,76	3,32
	6	13364,62	4,37		6	14297,73	3,28
	7	13409,09	3,88		7	14114,26	3,32
	8	13408,81	3,82		8	14313,04	3,49
	9	13370,00	3,72		9	14181,57	3,39
	10	13593,68	3,58		10	14188,21	3,13
	11	13595,36	3,30		11	14139,06	3,00
	12	13624,21	3,61		12	14087,53	2,72



Lampiran 2. Plot Box-Cox Data Kurs



Lampiran 3. Plot FAK dan FAKP Data Kurs



Lampiran 4. Data Nilai Tukar (Kurs) Rupiah terhadap Dolar AS dan Inflasi Hasil *Differencing*

Tahun	Bulan	Kurs	Inflasi	Tahun	Bulan	Kurs	Inflasi
2010	1	-	-	2013	1	41.63	0.27
	2	73.15	0.09		2	-0.52	0.74
	3	-175.42	-0.38		3	23.05	0.59
	4	-147.35	0.48		4	14.85	-0.33
	5	156.82	0.25		5	36.95	-0.10
	6	-35.15	0.89		6	121.10	0.43
	7	-99.55	1.17		7	192.69	2.71
	8	-77.69	0.22		8	501.58	0.18
	9	4.08	-0.64		9	777.68	-0.39
	10	-47.94	-0.13		10	20.90	-0.08
	11	10.38	0.66		11	247.40	0.05
	12	84.33	0.63		12	476.30	0.01
2011	1	14.77	0.06	2014	1	93.00	-0.16
	2	-125.27	-0.18		2	-245.80	-0.47
	3	-151.64	-0.19		3	-510.60	-0.43
	4	-111.17	-0.49		4	8.80	-0.07
	5	-95.50	-0.18		5	90.77	0.07
	6	8.20	-0.44		6	368.37	-0.62
	7	-30.81	-0.93		7	-204.59	-2.17
	8	-1.41	0.18		8	17.73	-0.54
	9	234.67	-0.18		9	185.13	0.54
	10	130.21	-0.19		10	255.20	0.30
	11	120.56	-0.27		11	13.69	1.40
	12	73.54	-0.36		12	281.22	2.13
2012	1	21.00	-0.14	2015	1	141.48	-1.40
	2	-83.96	-0.09		2	171.57	-0.67
	3	140.48	0.41		3	318.57	0.09
	4	10.22	0.53		4	-119.48	0.41
	5	115.07	-0.05		5	193.65	0.36
	6	161.57	0.08		6	173.69	0.11
	7	5.45	0.03		7	61.83	0.00
	8	43.56	0.02		8	408.92	-0.08
	9	67.10	-0.27		9	617.30	-0.35
	10	30.88	0.30		10	-603.24	-0.58
	11	30.82	-0.29		11	-123.81	-1.36
	12	17.99	-0.02		12	182.80	-1.54



Lampiran 4. Data Nilai Tukar (Kurs) Rupiah terhadap Dolar AS dan Inflasi
Hasil *Differencing* (lanjutan)

Tahun	Bulan	Kurs	Inflasi	Tahun	Bulan	Kurs	Inflasi
2016	1	34.60	0.79	2018	1	-176.85	-0.36
	2	-375.15	0.28		2	210.58	-0.07
	3	-324.06	0.03		3	169.34	0.22
	4	-13.34	-0.85		4	44.76	0.01
	5	240.90	-0.27		5	257.96	-0.18
	6	-65.02	0.12		6	-23.65	-0.11
	7	-237.16	-0.24		7	380.28	0.06
	8	46.38	-0.42		8	145.94	0.02
	9	-47.14	0.28		9	310.43	-0.32
	10	-101.53	0.24		10	311.73	0.28
	11	294.81	0.27		11	-484.35	0.07
	12	107.72	-0.56		12	-200.91	-0.10
2017	1	-59.10	0.47	2019	1	-335.57	-0.31
	2	-17.82	0.34		2	-128.54	-0.25
	3	4.66	-0.22		3	176.74	-0.09
	4	-39.62	0.56		4	-68.79	0.35
	5	17.22	0.16		5	251.45	0.49
	6	-25.48	0.04		6	-167.03	-0.04
	7	44.47	-0.49		7	-183.47	0.04
	8	-0.28	-0.06		8	198.78	0.17
	9	-38.81	-0.10		9	-131.47	-0.10
	10	223.68	-0.14		10	6.64	-0.26
	11	1.68	-0.28		11	-49.15	-0.13
	12	28.85	0.31		12	-51.53	-0.28



Lampiran 5. Estimasi Parameter Model ARIMAX

- ARIMAX(1,1,0)

Dependent Variable: D(KURS)				
Method: ARMA Maximum Likelihood (OPG - BHHH)				
Date: 03/01/20 Time: 05:04				
Sample: 2010M02 2018M12				
Included observations: 107				
Convergence achieved after 20 iterations				
Coefficient covariance computed using outer product of gradients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
INFLASI	11.30256	4.419233	2.557585	0.0120
AR(1)	0.190494	0.072135	2.640819	0.0095
SIGMASQ	39575.75	3701.266	10.69249	0.0000
R-squared	0.063269	Mean dependent var		49.04224
Adjusted R-squared	0.045255	S.D. dependent var		206.5124
S.E. of regression	201.7854	Akaike info criterion		13.48027
Sum squared resid	4234605.	Schwarz criterion		13.55521
Log likelihood	-718.1944	Hannan-Quinn criter.		13.51065
Durbin-Watson stat	1.937898			
Inverted AR Roots	.19			

- ARIMAX(1,1,1)

Dependent Variable: D(KURS)				
Method: ARMA Maximum Likelihood (OPG - BHHH)				
Date: 03/01/20 Time: 05:24				
Sample: 2010M02 2018M12				
Included observations: 107				
Convergence achieved after 18 iterations				
Coefficient covariance computed using outer product of gradients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
INFLASI	11.44799	3.992926	2.867068	0.0050
AR(1)	-0.352403	0.267006	-1.319832	0.1898
MA(1)	0.592229	0.246689	2.400709	0.0182
SIGMASQ	38500.47	3619.407	10.63723	0.0000
R-squared	0.088720	Mean dependent var		49.04224
Adjusted R-squared	0.062178	S.D. dependent var		206.5124
S.E. of regression	199.9891	Akaike info criterion		13.47197
Sum squared resid	4119550.	Schwarz criterion		13.57189
Log likelihood	-716.7504	Hannan-Quinn criter.		13.51248
Durbin-Watson stat	2.013409			
AR Roots	-.35			
MA Roots	-.59			



Lampiran 5. Estimasi Parameter Model ARIMAX (lanjutan)

- ARIMAX(0,1,1)

Dependent Variable: D(KURS)				
Method: ARMA Maximum Likelihood (OPG - BHHH)				
Date: 02/29/20 Time: 15:56				
Sample: 2010M02 2018M12				
Included observations: 107				
Convergence achieved after 20 iterations				
Coefficient covariance computed using outer product of gradients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
INFLASI	11.37294	4.370364	2.602286	0.0106
MA(1)	0.262799	0.082957	3.167881	0.0020
SIGMASQ	39005.12	3579.625	10.89643	0.0000
R-squared	0.076775	Mean dependent var		49.04224
Adjusted R-squared	0.059021	S.D. dependent var		206.5124
S.E. of regression	200.3254	Akaike info criterion		13.46607
Sum squared resid	4173548.	Schwarz criterion		13.54101
Log likelihood	-717.4347	Hannan-Quinn criter.		13.49645
Durbin-Watson stat	2.058769			
Inverted MA Roots	-0.26			



Lampiran 6. Hasil Uji *Ljung-Box* Model ARIMAX

- ARIMAX(1,1,0)

Date: 10/02/20 Time: 10:19

Sample: 2010M01 2018M12

Included observations: 107

Q-statistic probabilities adjusted for 1 ARMA term and 1 dynamic regressor

Autocorrelation	Partial Correlation	AC	PAC	Q-Stat	Prob*
		1 0.028	0.028	0.0850	
		2 -0.158	-0.159	2.8610	0.091
		3 0.070	0.081	3.4046	0.182
		4 0.106	0.077	4.6691	0.198
		5 0.017	0.035	4.7022	0.319
		6 -0.104	-0.087	5.9485	0.311
		7 -0.142	-0.148	8.3128	0.216
		8 -0.030	-0.065	8.4185	0.297
		9 0.069	0.044	8.9852	0.344
		10 -0.098	-0.078	10.133	0.340
		11 0.080	0.149	10.905	0.365
		12 0.026	-0.011	10.990	0.444
		13 -0.151	-0.154	13.806	0.313
		14 -0.003	-0.031	13.807	0.388
		15 0.213	0.170	19.547	0.145
		16 -0.088	-0.097	20.532	0.152
		17 -0.073	0.020	21.219	0.170
		18 0.019	-0.006	21.268	0.215
		19 -0.005	-0.048	21.271	0.266
		20 0.078	0.033	22.097	0.279
		21 0.040	0.096	22.315	0.324
		22 -0.053	-0.001	22.705	0.360
		23 0.107	0.098	24.298	0.332
		24 0.119	0.078	26.275	0.288

*Probabilities may not be valid for this equation specification.



Lampiran 6. Hasil Uji *Ljung-Box* Model ARIMAX (lanjutan)

- ARIMAX(1,1,1)

Date: 10/02/20 Time: 10:30

Sample: 2010M01 2018M12

Included observations: 107

Q-statistic probabilities adjusted for 2 ARMA terms and 1 dynamic regressor

Autocorrelation	Partial Correlation	AC	PAC	Q-Stat	Prob*	
		1	-0.009	-0.009	0.0095	
		2	-0.033	-0.033	0.1298	
		3	0.031	0.030	0.2365	0.627
		4	0.113	0.112	1.6709	0.434
		5	0.004	0.009	1.6728	0.643
		6	-0.092	-0.087	2.6423	0.619
		7	-0.131	-0.143	4.6450	0.461
		8	-0.050	-0.075	4.9338	0.552
		9	0.071	0.070	5.5321	0.595
		10	-0.101	-0.072	6.7633	0.562
		11	0.088	0.132	7.7038	0.564
		12	-0.006	-0.005	7.7075	0.657
		13	-0.105	-0.143	9.0788	0.615
		14	-0.024	-0.053	9.1512	0.690
		15	0.205	0.186	14.457	0.342
		16	-0.094	-0.084	15.579	0.340
		17	-0.048	-0.009	15.873	0.391
		18	0.007	0.013	15.879	0.461
		19	0.001	-0.045	15.879	0.532
		20	0.069	0.026	16.526	0.556
		21	0.047	0.109	16.828	0.602
		22	-0.039	0.001	17.038	0.650
		23	0.108	0.094	18.666	0.607
		24	0.096	0.059	19.966	0.585

*Probabilities may not be valid for this equation specification.



Lampiran 6. Hasil Uji *Ljung-Box* Model ARIMAX (lanjutan)

- ARIMAX(0,1,1)

Date: 10/02/20 Time: 10:24

Sample: 2010M01 2018M12

Included observations: 107

Q-statistic probabilities adjusted for 1 ARMA term and 1 dynamic regressor

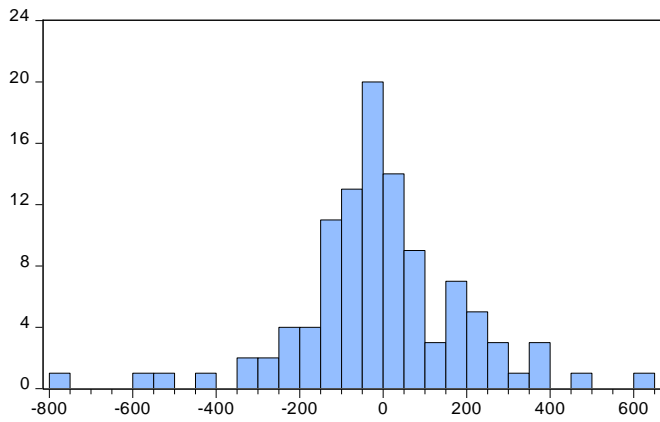
Autocorrelation	Partial Correlation	AC	PAC	Q-Stat	Prob*
		1 -0.031	-0.031	0.1086	
		2 -0.111	-0.112	1.4739	0.225
		3 0.071	0.065	2.0417	0.360
		4 0.092	0.085	3.0013	0.391
		5 0.015	0.036	3.0258	0.554
		6 -0.092	-0.078	4.0021	0.549
		7 -0.130	-0.148	5.9830	0.425
		8 -0.035	-0.079	6.1308	0.525
		9 0.077	0.057	6.8398	0.554
		10 -0.109	-0.080	8.2799	0.506
		11 0.084	0.135	9.1458	0.518
		12 0.023	0.011	9.2112	0.602
		13 -0.138	-0.147	11.569	0.481
		14 -0.013	-0.060	11.589	0.562
		15 0.213	0.181	17.341	0.238
		16 -0.099	-0.083	18.586	0.233
		17 -0.059	0.003	19.032	0.267
		18 0.023	0.005	19.102	0.323
		19 -0.013	-0.046	19.124	0.384
		20 0.075	0.022	19.882	0.402
		21 0.043	0.104	20.133	0.450
		22 -0.055	0.002	20.547	0.487
		23 0.104	0.089	22.045	0.457
		24 0.107	0.074	23.654	0.423

*Probabilities may not be valid for this equation specification.



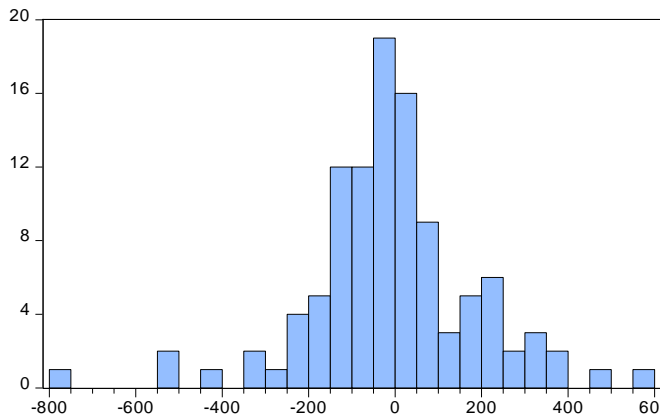
Lampiran 7. Uji Kenormalan Model ARIMAX

- ARIMAX(1,1,0)



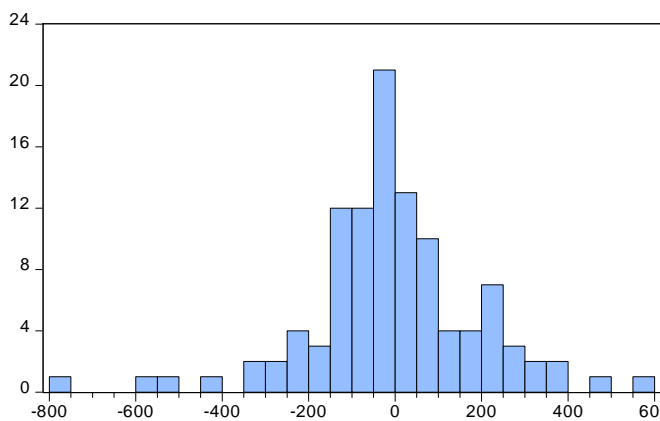
Series: Residuals	
Sample 2010M02 2018M12	
Observations 107	
Mean	-6.673374
Median	-23.34862
Maximum	606.1159
Minimum	-776.7676
Std. Dev.	199.7602
Skewness	-0.368687
Kurtosis	5.465631
Jarque-Bera	29.52779
Probability	0.000000

- ARIMAX(1,1,1)



Series: Residuals	
Sample 2010M02 2018M12	
Observations 107	
Mean	-7.041814
Median	-14.79998
Maximum	594.2802
Minimum	-759.6451
Std. Dev.	197.0117
Skewness	-0.306619
Kurtosis	5.346441
Jarque-Bera	26.22323
Probability	0.000002

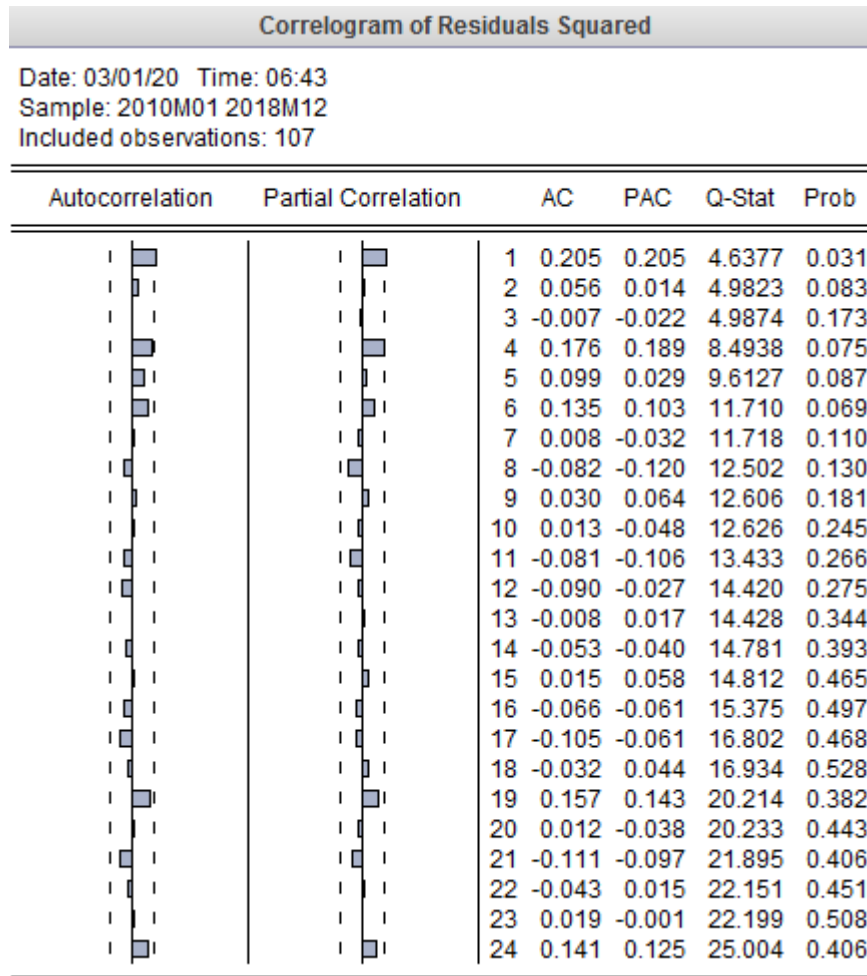
- ARIMAX(0,1,1)



Series: Residuals	
Sample 2010M02 2018M12	
Observations 107	
Mean	-6.560400
Median	-14.46608
Maximum	582.1000
Minimum	-792.9452
Std. Dev.	198.3170
Skewness	-0.430292
Kurtosis	5.547160
Jarque-Bera	32.22764
Probability	0.000000



Lampiran 8. Plot FAK dan FAKP *Residual* Kuadrat Model ARIMAX(0,1,1)



Lampiran 9. Estimasi Parameter Model ARIMAX-GARCH

- ARIMAX(0,1,1) – GARCH(1,0)

Dependent Variable: D(KURS)				
Method: ML ARCH - Normal distribution (BFGS / Marquardt steps)				
Date: 03/01/20 Time: 06:50				
Sample (adjusted): 2010M02 2018M12				
Included observations: 107 after adjustments				
Convergence achieved after 12 iterations				
Coefficient covariance computed using outer product of gradients				
MA Backcast: 2010M01				
Presample variance: backcast (parameter = 0.7)				
GARCH = C(3) + C(4)*RESID(-1)^2				
Variable	Coefficient	Std. Error	z-Statistic	Prob.
INFLASI	12.12474	4.077703	2.973423	0.0029
MA(1)	0.245984	0.089705	2.742149	0.0061
Variance Equation				
C	19931.23	3679.471	5.416872	0.0000
RESID(-1)^2	0.564408	0.211537	2.668125	0.0076
R-squared	0.076297	Mean dependent var		49.04224
Adjusted R-squared	0.067500	S.D. dependent var		206.5124
S.E. of regression	199.4209	Akaike info criterion		13.29744
Sum squared resid	4175712.	Schwarz criterion		13.39736
Log likelihood	-707.4129	Hannan-Quinn criter.		13.33794
Durbin-Watson stat	2.027829			
Inverted MA Roots	-0.25			



Lampiran 9. Estimasi Parameter Model ARIMAX-GARCH (lanjutan)

- ARIMAX(0,1,1) – GARCH(1,1)

Dependent Variable: D(KURS)				
Method: ML ARCH - Normal distribution (BFGS / Marquardt steps)				
Date: 03/01/20 Time: 06:52				
Sample (adjusted): 2010M02 2018M12				
Included observations: 107 after adjustments				
Convergence achieved after 23 iterations				
Coefficient covariance computed using outer product of gradients				
MA Backcast: 2010M01				
Presample variance: backcast (parameter = 0.7)				
GARCH = C(3) + C(4)*RESID(-1)^2 + C(5)*GARCH(-1)				
Variable	Coefficient	Std. Error	z-Statistic	Prob.
INFLASI	6.022551	2.741382	2.196903	0.0280
MA(1)	0.202507	0.137697	1.470674	0.1414
Variance Equation				
C	2207.381	1089.360	2.026309	0.0427
RESID(-1)^2	0.563700	0.186314	3.025534	0.0025
GARCH(-1)	0.528584	0.100677	5.250281	0.0000
R-squared	0.060933	Mean dependent var	49.04224	
Adjusted R-squared	0.051990	S.D. dependent var	206.5124	
S.E. of regression	201.0725	Akaike info criterion	13.18270	
Sum squared resid	4245165.	Schwarz criterion	13.30760	
Log likelihood	-700.2744	Hannan-Quinn criter.	13.23333	
Durbin-Watson stat	1.927189			
Inverted MA Roots	-.20			



Lampiran 9. Estimasi Parameter Model ARIMAX-GARCH (lanjutan)

- ARIMAX(0,1,1) – GARCH(0,1)

Dependent Variable: D(KURS)				
Method: ML ARCH - Normal distribution (BFGS / Marquardt steps)				
Date: 03/01/20 Time: 05:09				
Sample (adjusted): 2010M02 2018M12				
Included observations: 107 after adjustments				
Convergence achieved after 46 iterations				
Coefficient covariance computed using outer product of gradients				
MA Backcast: 2010M01				
Presample variance: backcast (parameter = 0.7)				
GARCH = C(3) + C(4)*GARCH(-1)				
Variable	Coefficient	Std. Error	z-Statistic	Prob.
INFLASI	8.035160	4.390294	1.830210	0.0672
MA(1)	0.324968	0.089914	3.614204	0.0003
Variance Equation				
C	374.4984	635.5234	0.589276	0.5557
GARCH(-1)	1.001941	0.020718	48.35976	0.0000
R-squared	0.069911	Mean dependent var		49.04224
Adjusted R-squared	0.061053	S.D. dependent var		206.5124
S.E. of regression	200.1090	Akaike info criterion		13.39094
Sum squared resid	4204580.	Schwarz criterion		13.49085
Log likelihood	-712.4151	Hannan-Quinn criter.		13.43144
Durbin-Watson stat	2.161719			
Inverted MA Roots	-0.32			



Lampiran 10. Hasil Uji *Ljung-Box* Model ARIMAX-GARCH

- ARIMAX(0,1,1) – GARCH(1,0)

Date: 10/02/20 Time: 10:27

Sample: 2010M01 2018M12

Included observations: 107

Q-statistic probabilities adjusted for 1 ARMA term and 1 dynamic regressor

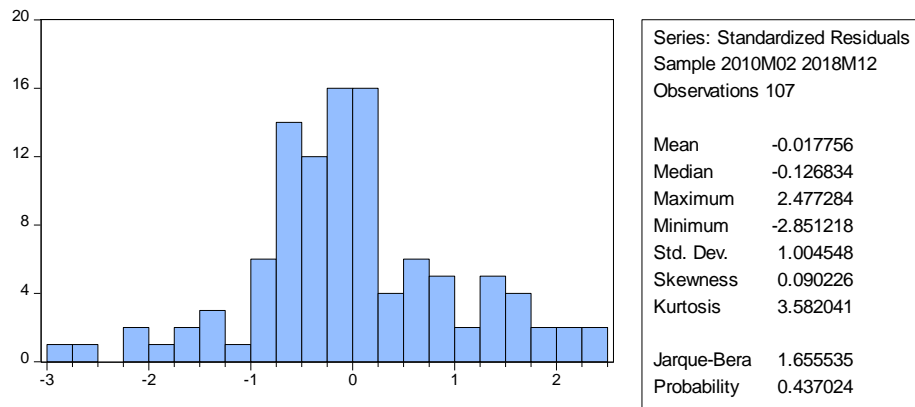
	Autocorrelation	Partial Correlation	AC	PAC	Q-Stat	Prob*
1			0.056	0.056	0.3452	
2			-0.082	-0.086	1.0971	0.295
3			0.079	0.090	1.8029	0.406
4			0.057	0.039	2.1645	0.539
5			0.039	0.048	2.3352	0.674
6			-0.092	-0.098	3.3141	0.652
7			-0.076	-0.066	3.9847	0.679
8			-0.044	-0.063	4.2122	0.755
9			0.064	0.075	4.7070	0.788
10			-0.017	-0.015	4.7409	0.856
11			0.080	0.124	5.5240	0.854
12			0.052	0.026	5.8562	0.883
13			-0.185	-0.195	10.083	0.609
14			0.065	0.059	10.610	0.643
15			0.178	0.144	14.640	0.403
16			-0.095	-0.089	15.799	0.396
17			-0.062	0.000	16.299	0.432
18			0.015	0.008	16.330	0.501
19			-0.026	-0.069	16.416	0.564
20			-0.018	-0.037	16.460	0.626
21			0.033	0.075	16.604	0.679
22			-0.035	-0.007	16.777	0.725
23			0.163	0.174	20.467	0.554
24			0.061	0.035	20.995	0.581

*Probabilities may not be valid for this equation specification.



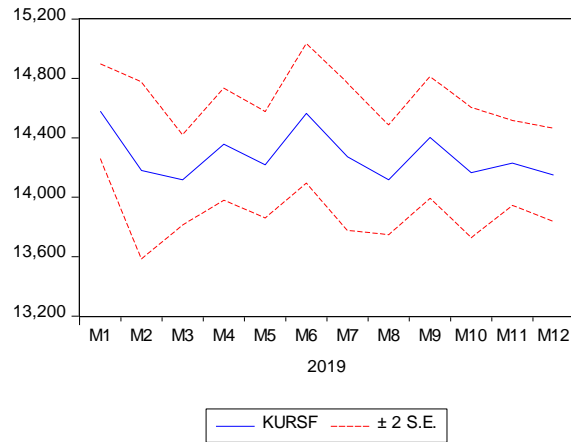
Lampiran 11. Uji Kenormalan Model ARIMAX-GARCH

- ARIMAX(0,1,1) – GARCH(1,0)

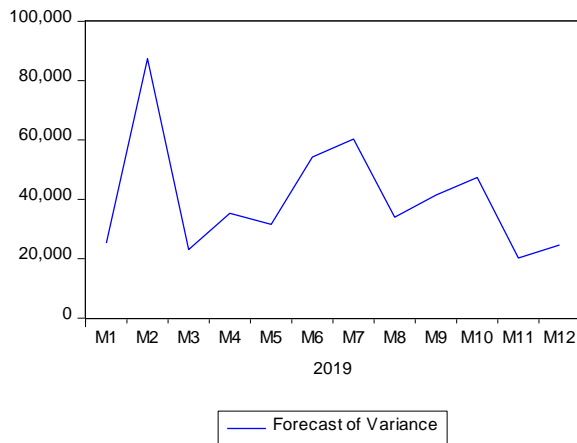


Lampiran 12. Peramalan Nilai Tukar Rupiah terhadap Dolar AS

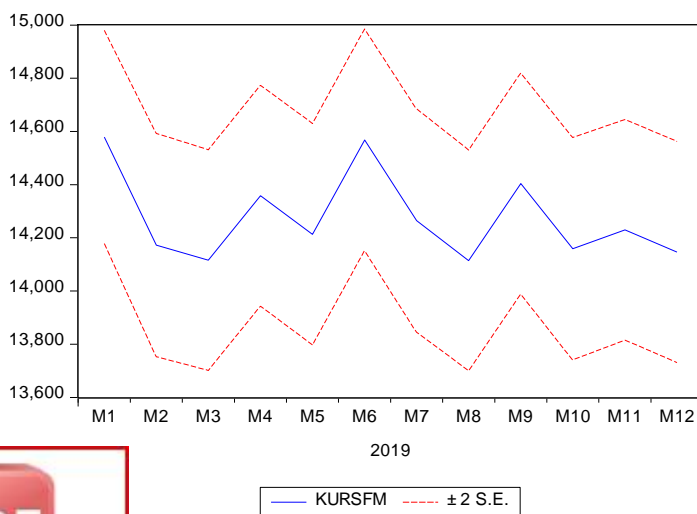
- ARIMAX(0,1,1) – GARCH(1,0)



Forecast:	KURSF
Actual:	KURS
Forecast sample:	2019M01 2019M12
Included observations:	12
Root Mean Squared Error	189.2472
Mean Absolute Error	166.1007
Mean Abs. Percent Error	1.165536
Theil Inequality Coefficient	0.006640
Bias Proportion	0.104326
Variance Proportion	0.075240
Covariance Proportion	0.820435
Theil U2 Coefficient	1.135494
Symmetric MAPE	1.161922



- ARIMAX(0,1,1)



Forecast:	KURSFM
Actual:	KURS
Forecast sample:	2019M01 2019M12
Included observations:	12
Root Mean Squared Error	189.8680
Mean Absolute Error	166.2581
Mean Abs. Percent Error	1.166488
Theil Inequality Coefficient	0.006663
Bias Proportion	0.095312
Variance Proportion	0.081112
Covariance Proportion	0.823577
Theil U2 Coefficient	1.141409
Symmetric MAPE	1.163004

