PROGRAM STUDI STATISTIKA
SK BAN-PT No. 1765/SK/BAN-PT/AK-PPJ/S/III/2022
FAKULTAS SAINS DAN TEKNOLOGI
UNIVERSITAS PGRI ADI BUANA SURABAYA

FORM F.SK05
BUKTI BIMBINGAN SKRIPSI

Nama Mahasiswa : Haryanti Dewi Priyanto

NIM : 202400014

Judul Skripsi : Pemodelan ARIMAX Untuk Peramalan Rata-Rata Harga Beras Premium Di Provinsi Jawa Timur

Dosen Pembimbing : Artanti Indrasetianingsih, S.Si., M.Si

Materi Pembimbingan Proposal	Tanda Tangan Dosen Pembimbing
1. Revisi tambahan karakteristik setiap tahun dan bulan	
2. Analisis ARIMA tidak perlu di transformasi dan dicoba mendapatkan model ARIMA	
3. Penggunaan alfa yang awalnya 10% bisa menggunakan 5%	
4. Fungsi transfer bagian deret input menggunakan musiman 12	
5. Cek bab 4 dan 3, pengecekan fungsi transfer arima deret input dan penataan struktur	
6. Cek fungsi transfer deret input dan pemilihan model terbaik	
7. Pengecekan CCF sampai fungsi transfer pemilihan model terbaik dan peramalan	
8. Pengecekan semua isi dan ACC dosen pembimbing	

FORM F.SK08
PERBAIKAN/REVISI SEMINAR DAN UJIAN SKRIPSI

Nama Mahasiswa : Haryanti Dewi Priyanto

NIM : 202400014

Judul Skripsi : Pemodelan ARIMA Dan ARIMAX Untuk Peramalan Rata-Rata Harga Beras Premium Di Provinsi Jawa Timur

Dosen Pembimbing : Artanti Indrasetianingsih, S.Si., M.Si

Materi Revisi Seminar dan Ujian Skripsi	Tanda Tangan Dosen Penguji
1. Batasan masalah ditambahkan "ARIMAX menggunakan ARIMA dengan fungsi transfer"	
2. Contoh AR (1), MA (1), dan ARIMA	
3. Penambahan langkah-langkah deteksi outlier	
4. Abstrak dan latar belakang disesuaikan dengan artikel	
5. Penambahan penjelasan hasil peramalan	
6. Kesimpulan lebih dijelaskan dengan baik	

Surabaya, 4 Juli 2024
Dosen Pembimbing,

Artanti Indrasetianingsih, S.Si., M.Si
NPP. 0609466/DY

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PERBAIKAN/REVISI SEMINAR DAN UJIAN SKRIPSI

Nama Mahasiswa : Haryanti Dewi Priyanto

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Dosen Pembimbing : Artanti Indrasetianingsih, S.Si., M.Si

Materi Revisi Seminar dan Ujian Skripsi	Tanda Tangan Dosen Penguji
1. Tujuan penelitian ditambahkan "bagaimana model ARIMA dan ARIMAX"	
2. Judul tabel ditambahkan ARIMAX (ARIMA dengan fungsi transfer)	
3. Saran ditambahkan "variabel yang mungkin mempengaruhi seperti luas panen"	
4. Bagian plot hasil peramalan ditambahkan juga untuk model ARIMAX	
5.	
6.	

Surabaya, 4 Juli 2024
Dosen Pembimbing,

Artanti Indrasetianingsih, S.Si., M.Si
NPP. 0609466/DY

LAMPIRAN

Lampiran 1. Data Harga Beras Premium dan Produksi Padi Tahun 2014-2023

No.	Tahun	Bulan	Harga Beras Premium (Rp)	Produksi Padi (Ton)
1	2014	Januari	9090,387	326419
2	2014	Februari	9246,714	340789
3	2014	Maret	9293,419	1569267
4	2014	April	9049,867	4025096
5	2014	Mei	9194,677	1385256
6	2014	Juni	9135,7	374548
7	2014	Juli	9224,29	715930
8	2014	Agustus	9220,387	1646421
9	2014	September	9212,733	736887
10	2014	Oktober	9274,677	432874
11	2014	November	9449,367	455438
12	2014	Desember	9911,935	388123
13	2015	Januari	9963,742	244605
14	2015	Februari	10171,68	353073
15	2015	Maret	10523,35	1300291
16	2015	April	9818,533	4474541
17	2015	Mei	9789,29	1552797
18	2015	Juni	9942,267	420911
19	2015	Juli	9954	1175566
20	2015	Agustus	10038,16	1433322
21	2015	September	10256,97	856616
22	2015	Oktober	10376,84	438636
23	2015	November	10462,5	452855
24	2015	Desember	10586,87	451754
25	2016	Januari	10579,68	313450

No.	Tahun	Bulan	Harga Beras Premium (Rp)	Produksi Padi (Ton)
26	2016	Februari	10511,41	161873
27	2016	Maret	10448,65	537727
28	2016	April	10246	2916488
29	2016	Mei	10227,9	1530786
30	2016	Juni	10399,4	488032
31	2016	Juli	10402,77	1101395
32	2016	Agustus	10284,23	1612727
33	2016	September	10233,47	876207
34	2016	Oktober	10200,48	498546
35	2016	November	10187,4	537438
36	2016	Desember	10258,32	473745
37	2017	Januari	10377,48	273782
38	2017	Februari	10419,07	253444
39	2017	Maret	10367,68	954706
40	2017	April	10372,6	2870261
41	2017	Mei	10422,03	1542229
42	2017	Juni	10422,03	499475
43	2017	Juli	10441,77	1112838
44	2017	Agustus	10403,42	1624170
45	2017	September	10440,23	887650
46	2017	Oktober	10605,13	509989
47	2017	November	10709,2	548881
48	2017	Desember	11098,19	485188
49	2018	Januari	11938,26	222130
50	2018	Februari	12196,79	1017520
51	2018	Maret	11903,61	2418610
52	2018	April	11588,5	1416450
53	2018	Mei	11422,81	663270
54	2018	Juni	11374,93	976180

No.	Tahun	Bulan	Harga Beras Premium (Rp)	Produksi Padi (Ton)
55	2018	Juli	11321	1250800
56	2018	Agustus	11280,9	744380
57	2018	September	11225,8	599700
58	2018	Oktober	11204,39	446640
59	2018	November	11300,33	397200
60	2018	Desember	11390,06	382030
61	2019	Januari	11378,94	310000
62	2019	Februari	11383,11	440000
63	2019	Maret	11361,55	1930000
64	2019	April	11243,63	1860000
65	2019	Mei	11203,42	620000
66	2019	Juni	11186,27	810000
67	2019	Juli	11144,26	1070000
68	2019	Agustus	11121,84	750000
69	2019	September	11144,7	520000
70	2019	Oktober	11197,39	500000
71	2019	November	11176,33	500000
72	2019	Desember	11244,97	270000
73	2020	Januari	11348,32	288721,1
74	2020	Februari	11419,14	345241,4
75	2020	Maret	11420,61	1324021
76	2020	April	11449,07	2243967
77	2020	Mei	11426,29	992091,9
78	2020	Juni	11399,83	603419,9
79	2020	Juli	11362,13	1135872
80	2020	Agustus	11396,13	924107,6
81	2020	September	11382,03	599081
82	2020	Oktober	11361,74	618298,5
83	2020	November	11340,47	603416,1

No.	Tahun	Bulan	Harga Beras Premium (Rp)	Produksi Padi (Ton)
84	2020	Desember	11353,74	266300,4
85	2021	Januari	11370,58	300797,2
86	2021	Februari	11357,04	507757,4
87	2021	Maret	11350,81	2192542
88	2021	April	11320,13	1659178
89	2021	Mei	11291,97	532441,9
90	2021	Juni	11293,13	811440,4
91	2021	Juli	11269,23	1200996
92	2021	Agustus	11235,29	715158,8
93	2021	September	11241,17	484774,4
94	2021	Oktober	11249,32	493039,3
95	2021	November	11212,27	520043,1
96	2021	Desember	11230,1	371418,5
97	2022	Januari	11278,35	280648,7
98	2022	Februari	11278,36	649333,1
99	2022	Maret	11287,26	2287461
100	2022	April	11315,4	1419039
101	2022	Mei	11307,42	532767,5
102	2022	Juni	11303,77	823022
103	2022	Juli	11325,45	1057837
104	2022	Agustus	11342,87	641197
105	2022	September	11573,83	460667,8
106	2022	Oktober	11772,9	485091,1
107	2022	November	11830,5	547787,4
108	2022	Desember	11973,16	341664,6
109	2023	Januari	12210,03	320000
110	2023	Februari	12603,25	980000
111	2023	Maret	12486,23	2110000
112	2023	April	12570,97	1190000

No.	Tahun	Bulan	Harga Beras Premium (Rp)	Produksi Padi (Ton)
113	2023	Mei	12623,68	630000
114	2023	Juni	12595,77	940000
115	2023	Juli	12593,26	920000
116	2023	Agustus	12707,26	740000
117	2023	September	13514,83	530000
118	2023	Oktober	13856,03	430000
119	2023	November	13930,77	490000
120	2023	Desember	13910,26	440000

Lampiran 2. *Syntax* SAS Model ARIMA (0,1,1) Harga Beras Premium

```
data arimaskripsi;
input y;
datalines;
9090.387097
9246.714286
9293.419355
...
...
...
11342.87097
11573.83333
11772.90323
11830.5
11973.16129
;


proc arima data=arimaskripsi;
     identify var=y(1) nlag=50;
     run;
     estimate q=1 method=cls noint;
     forecast lead=12 out=ramalan;
       run;

proc print data=ramalan;
            run;

proc univariate data= ramalan normal;
     var residual;
     run;
```

Lampiran 3. *Syntax* SAS Model ARIMA ([1,4],1,0) Harga Beras Premium

```
data arimaskripsi;
input y;
datalines;
9090.387097
9246.714286
9293.419355
...
...
...
11342.87097
11573.83333
11772.90323
11830.5
11973.16129
;


proc arima data=arimaskripsi;
     identify var=y(1) nlag=50;
     run;
     estimate p=(1,4) method=cls noint;
     forecast lead=12 out=ramalan;
       run;

proc print data=ramalan;
                        run;

proc univariate data= ramalan normal;
     var residual;
     run;
```

Lampiran 4. *Syntax* SAS Model ARIMA ([1,1,1) Harga Beras Premium

```
data arimaskripsi;
input y;
datalines;
9090.387097
9246.714286
9293.419355
...
...
...
11342.87097
11573.83333
11772.90323
11830.5
11973.16129
;


proc arima data=arimaskripsi;
     identify var=y(1) nlag=50;
     run;
     estimate p=1 q=1 method=cls noint;
     forecast lead=12 out=ramalan;
       run;

proc print data=ramalan;
                    run;

proc univariate data= ramalan normal;
     var residual;
     run;
```

Lampiran 5. *Syntax* SAS Model ARIMA ([12],1,1) Harga Beras Premium

```
data arimaskripsi;
input y;
datalines;
9090.387097
9246.714286
9293.419355
...
...
...
11342.87097
11573.83333
11772.90323
11830.5
11973.16129
;


proc arima data=arimaskripsi;
     identify var=y(1) nlag=50;
     run;
     estimate p=(12) q=1 method=cls noint;
     forecast lead=12 out=ramalan;
       run;

proc print data=ramalan;
                        run;

proc univariate data= ramalan normal;
     var residual;
     run;
```

Lampiran 6. *Syntax* SAS Model ARIMA ([4],1,1) Harga Beras Premium

```
data arimaskripsi;
input y;
datalines;
9090.387097
9246.714286
9293.419355
...
...
...
11342.87097
11573.83333
11772.90323
11830.5
11973.16129
;


proc arima data=arimaskripsi;
     identify var=y(1) nlag=50;
     run;
     estimate p=(4) q=1 method=cls noint;
     forecast lead=12 out=ramalan;
       run;

proc print data=ramalan;
                    run;

proc univariate data= ramalan normal;
     var residual;
     run;
```

Lampiran 7. *Syntax* SAS Deteksi Outlier Model ARIMA ([12],1,1) Harga Beras Premium

```
data arimaskripsi;
input y;
datalines;
9090.387097
9246.714286
9293.419355
...
...
...
11342.87097
11573.83333
11772.90323
11830.5
11973.16129
;


proc arima data=arimaskripsi;
    identify var=y(1) nlag=50;
    run;
    estimate p=(12) q=1 method=cls noint;
    outlier maxnum=5;
    run;
```

Lampiran 8. *Syntax* SAS Deteksi Outlier Model ARIMA ([4],1,1) Harga Beras Premium

```
data arimaskripsi;
input y;
datalines;
9090.387097
9246.714286
9293.419355
...
...
...
11342.87097
11573.83333
11772.90323
11830.5
11973.16129
;


proc arima data=arimaskripsi;
    identify var=y(1) nlag=50;
    run;
    estimate p=(4) q=1 method=cls noint;
    outlier maxnum=5;
    run;
```

Lampiran 9. *Syntax* SAS Model ARIMA ([12],1,1) Harga Beras Premium dengan Outlier

```
data arimaskripsi;
input y          w15   w49   w12   w4    w50;
datalines;
9090.387097      0     0     0     0     0
9246.714286      0     0     0     0     0
...
11973.16129      0     1     1     0     0
.                0     1     1     0     0
.                0     1     1     0     0
.                0     1     1     0     0
.                0     1     1     0     0
.                0     1     1     0     0
.                0     1     1     0     0
.                0     1     1     0     0
.                0     1     1     0     0
.                0     1     1     0     0
.                0     1     1     0     0
.                0     1     1     0     0
.                0     1     1     0     0
;

proc arima data=arimaskripsi;
    identify var=y(1)  crosscorr=(w15(1) w49(1) w12(1) w4(1) w50(1));
    run;
    estimate p=(12) q=1  input=(w15 w49 w12 w4 w50)
    method=cls noint;
    forecast lead=12 out=ramalan;
     run;
proc print data=ramalan;
                run;
proc univariate data= ramalan normal;
    var residual;
    run;
```

Lampiran 10. *Syntax* SAS Model ARIMA ([4],1,1) Harga Beras Premium dengan Outlier

```
data arimaskripsi;
input y          w15   w49   w12   w4    w50;
datalines;
9090.387097      0     0     0     0     0
9246.714286      0     0     0     0     0
...
11973.16129      0     1     1     0     0
.                0     1     1     0     0
.                0     1     1     0     0
.                0     1     1     0     0
.                0     1     1     0     0
.                0     1     1     0     0
.                0     1     1     0     0
.                0     1     1     0     0
.                0     1     1     0     0
.                0     1     1     0     0
.                0     1     1     0     0
.                0     1     1     0     0
.                0     1     1     0     0
;

proc arima data=arimaskripsi;
    identify var=y(1)  crosscorr=(w15(1) w49(1) w12(1) w4(1) w50(1));
    run;
    estimate p=(12) q=1  input=(w15 w49 w12 w4 w50)
    method=cls noint;
    forecast lead=12 out=ramalan;
     run;
proc print data=ramalan;
                run;
proc univariate data= ramalan normal;
    var residual;
    run;
```

Lampiran 11. *Syntax* SAS Model ARIMA $([2],0,[24])(0,1,0)^{12}$ Produksi Padi

```
data arimaskripsi;
input x;
datalines;
0.001750299
0.001712999
0.000798273
...
...
...
0.001248833
0.001473351
0.001435782
0.00135112
0.001710803
;

proc arima data=arimaskripsi;
     identify var=x(12) nlag=50;
     run;
     estimate  p=(2) q=(24) method=cls noint;
     forecast lead=12 out=ramalan;
       run;

proc print data=ramalan;
                        run;

 proc univariate data= ramalan normal;
     var residual;
     run;
```

Lampiran 12. *Syntax* SAS Model ARIMA $([2,24],0,0)(0,1,0)^{12}$ Produksi Padi

```
data arimaskripsi;
input x;
datalines;
0.001750299
0.001712999
0.000798273
...
...
...
0.001248833
0.001473351
0.001435782
0.00135112
0.001710803
;

proc arima data=arimaskripsi;
     identify var=x(12) nlag=50;
     run;
     estimate  p=(2,24) method=cls noint;
     forecast lead=12 out=ramalan;
      run;

proc print data=ramalan;
                    run;

 proc univariate data= ramalan normal;
     var residual;
     run;
```

Lampiran 13. *Syntax* SAS Model ARIMA $([2,24].0,0)(1,1,0)^{12}$ Produksi Padi

```
data arimaskripsi;
input x;
datalines;
0.001750299
0.001712999
0.000798273
...
...
...
0.001248833
0.001473351
0.001435782
0.00135112
0.001710803
;

proc arima data=arimaskripsi;
     identify var=x(12) nlag=50;
     run;
     estimate  p=(2,24)(12) method=cls noint;
     forecast lead=12 out=ramalan;
       run;

proc print data=ramalan;
                        run;

 proc univariate data= ramalan normal;
     var residual;
     run;
```

Lampiran 14. *Syntax* SAS CCF Fungsi Transfer

```
data arimaskripsi;
input x y;
datalines;
0                   0
0                   0
0                   0
0                   0
0                   0
...
...
...
0.000108638         -0.000065761
0.000072821         -0.000109388
0.000039335         -0.000219912
-0.000078628        -0.000285055
-0.000095666        -0.000287488
0.000563229         -0.000268491
;


proc arima data=arimaskripsi;
    identify var=x;
    run;
    identify var=y crosscorr=(x) nlag=30;
    run;
```

Lampiran 15. *Syntax* SAS Fungsi Transfer dengan Orde (0,[9],0)

```
data arimaskripsi;
input x y;
datalines;
0.001750299     0.01048839
0.001712999     0.010399352
0.000798273     0.010373188
0.000498439     0.010511844
0.00084964      0.010428738
...
...
0.001248833     0.009389414
0.001473351     0.009295257
0.001435782     0.009216334
0.00135112      0.009193872
0.001710803     0.009138935
;

proc arima data=arimaskripsi;
    identify var=x(12);
    run;
    estimate p=(2) q=(24) method=cls noint;
    run;
    identify var=y(12) crosscorr=(x(12)) nlag=50;
    run;
    estimate input=(0 $ (9)/ (0) x) method=cls noint;
    run;
```

Lampiran 16. *Syntax* SAS Fungsi Transfer dengan Orde (0,[23],0)

```
data arimaskripsi;
input x y;
datalines;
0.001750299      0.01048839
0.001712999      0.010399352
0.000798273      0.010373188
0.000498439      0.010511844
0.00084964       0.010428738
...
...
0.001248833      0.009389414
0.001473351      0.009295257
0.001435782      0.009216334
0.00135112       0.009193872
0.001710803      0.009138935
;

proc arima data=arimaskripsi;
    identify var=x(12);
    run;
    estimate p=(2) q=(24) method=cls noint;
    run;
    identify var=y(12) crosscorr=(x(12)) nlag=50;
    run;
    estimate input=(0 $ (23)/ (0) x) method=cls noint;
    run;
```

Lampiran 17. *Syntax* SAS Fungsi Transfer dengan Orde (0,[24],0)

```
data arimaskripsi;
input x y;
datalines;
0.001750299      0.01048839
0.001712999      0.010399352
0.000798273      0.010373188
0.000498439      0.010511844
0.00084964       0.010428738
...
...
0.001248833      0.009389414
0.001473351      0.009295257
0.001435782      0.009216334
0.00135112       0.009193872
0.001710803      0.009138935
;

proc arima data=arimaskripsi;
    identify var=x(12);
    run;
    estimate p=(2) q=(24) method=cls noint;
    run;
    identify var=y(12) crosscorr=(x(12)) nlag=50;
    run;
    estimate input=(0 $ (24)/ (0) x) method=cls noint;
    run;
```

Lampiran 18. *Syntax* SAS Model Fungsi Transfer Orde (0,[9],0) dengan ARIMA

```
data arimaskripsi;
input x y;
datalines;
0.001750299     0.01048839
0.001712999     0.010399352
0.000798273     0.010373188
0.000498439     0.010511844
0.00084964      0.010428738
...
...
0.001473351     0.009295257
0.001435782     0.009216334
0.00135112      0.009193872
0.001710803     0.009138935
;

proc arima data=arimaskripsi;
    identify var=x(12);
    run;
    estimate p=(2) q=(24) method=cls noint;
    run;
    identify var=y(12) crosscorr=(x(12)) nlag=50;
    run;
    estimate p=1 q=1 input=(0 $ (9)/ (0) x) method=cls noint;
    run;
     forecast lead=12 out=ramalan;
     run;

proc print data=ramalan;
                run;
proc univariate data= ramalan normal;
    var residual;
    run;
```

Lampiran 19. *Syntax* SAS Model Fungsi Transfer Orde (0,[23],0) dengan ARIMA

```
data arimaskripsi;
input x y;
datalines;
0.001750299     0.01048839
0.001712999     0.010399352
0.000798273     0.010373188
0.000498439     0.010511844
0.00084964      0.010428738
...
...
0.001473351     0.009295257
0.001435782     0.009216334
0.00135112      0.009193872
0.001710803     0.009138935
;

proc arima data=arimaskripsi;
    identify var=x(12);
    run;
    estimate p=(2) q=(24) method=cls noint;
    run;
    identify var=y(12) crosscorr=(x(12)) nlag=50;
    run;
    estimate p=1 q=1 input=(0 $ (23)/ (0) x) method=cls noint;
    run;
     forecast lead=12 out=ramalan;
     run;

proc print data=ramalan;
                run;
proc univariate data= ramalan normal;
    var residual;
    run;
```

Lampiran 20. *Syntax* SAS Model Fungsi Transfer Orde (0,[24],0) dengan ARIMA

```
data arimaskripsi;
input x y;
datalines;
0.001750299     0.01048839
0.001712999     0.010399352
0.000798273     0.010373188
0.000498439     0.010511844
0.00084964      0.010428738
...
...
0.001473351     0.009295257
0.001435782     0.009216334
0.00135112      0.009193872
0.001710803     0.009138935
;

proc arima data=arimaskripsi;
    identify var=x(12);
    run;
    estimate p=(2) q=(24) method=cls noint;
    run;
    identify var=y(12) crosscorr=(x(12)) nlag=50;
    run;
    estimate p=1 q=1 input=(0 $ (24)/ (0) x) method=cls noint;
    run;
     forecast lead=12 out=ramalan;
     run;

proc print data=ramalan;
                run;
proc univariate data= ramalan normal;
    var residual;
    run;
```

Lampiran 21. *Syntax* SAS Deteksi Outlier Model Fungsi Transfer dengan ARIMA

```
data arimaskripsi;
input x y;
datalines;
0.001750299     0.01048839
0.001712999     0.010399352
0.000798273     0.010373188
0.000498439     0.010511844
...
...
...
0.000972278     0.009396632
0.001248833     0.009389414
0.001473351     0.009295257
0.001435782     0.009216334
0.00135112      0.009193872
0.001710803     0.009138935
;


proc arima data=arimaskripsi;
    identify var=x(12);
    run;
    estimate p=(2) q=(24) method=cls noint;
    run;
    identify var=y(12) crosscorr=(x(12)) nlag=50;
    run;
    estimate p=(1) q=(1) input=(0 $ (24)/ (0) x) method=cls noint;
    outlier maxnum=5;
    run;
```

Lampiran 22. *Syntax* SAS Model Fungsi Transfer Orde (0,[9],0) dengan ARIMA dengan Outlier

```
data arimaskripsi;
input x y          w49       w15      w12      w48      w14;
datalines;
0.001750299    0.01048839      0        0        0        0 0
0.001712999    0.010399352     0        0        0        0 0
...
...
0.00135112     0.009193872     1        0        1        1 1
0.001710803    0.009138935     1        0        1        1 1
.              .               1        0        1        1        1
...
.              .               1        0        1        1        1
;

proc arima data=arimaskripsi;
    identify var=x(12);
    run;
    estimate p=(2) q=(24) method=cls noint;
    run;
    identify var=y(12) crosscorr=(x(12) w49(12) w15(12) w12(12)
                        w48(12) w14(12)) nlag=50;
    run;
    estimate p=1 q=1 input=(0 $ (9)/ (0) x w49 w15 w12 w48  w14)
                    method=cls noint;
    run;
                    forecast lead=12 out=ramalan;
     run;

proc print data=ramalan;
                    run;
proc univariate data= ramalan normal;
    var residual;
    run;
```

Lampiran 23. *Syntax* SAS Model Fungsi Transfer Orde (0,[23],0) dengan ARIMA dengan Outlier

```
data arimaskripsi;
input x y          w49      w50;
datalines;
0.001750299    0.01048839    0        0
0.001712999    0.010399352   0        0
...
...
0.001710803    0.009138935   1        0
.              .             1        0
...
.              .             1        0
.              .             1        0
;

proc arima data=arimaskripsi;
    identify var=x(12);
    run;
    estimate p=(2) q=(24) method=cls noint;
    run;
    identify var=y(12) crosscorr=(x(12)       w49(12) w50(12)) nlag=50;
    run;
    estimate p=1 q=1 input=(0 $ (23)/ (0) x  w49 w50) method=cls noint;
    run;
                    forecast lead=12 out=ramalan;
     run;

proc print data=ramalan;
                    run;
proc univariate data= ramalan normal;
    var residual;
    run;
```

Lampiran 24. *Syntax* SAS Model Fungsi Transfer Orde (0,[24],0) dengan ARIMA dengan Outlier

```
data arimaskripsi;
input x y          w49       w46       w51;
datalines;
0.001750299    0.01048839    0         0         0
0.001712999    0.010399352   0         0         0
...
0.001710803    0.009138935   1         1         1
.              .             1         1         1
.              .             1         1         1
.              .             1         1         1
...
.              .             1         1         1
.              .             1         1         1
.              .             1         1         1
;
proc arima data=arimaskripsi;
identify var=x(12);
run;
estimate p=(2) q=(24) method=cls noint;
run;
identify var=y(12) crosscorr=(x(12) w49(12) w46(12) w51(12)) nlag=50;
run;
estimate p=(1) q=(1) input=(0 $ (24)/ (0) x w49 w46 w51) method=cls
                noint;
run;
forecast lead=12 out=ramalan;
run;

proc print data=ramalan;
                run;
proc univariate data= ramalan normal;
    var residual;
    run
```

Lampiran 25. *Output* SAS Model ARIMA (0,1,1) Harga Beras Premium

The ARIMA Procedure

Conditional Least Squares Estimation

Parameter	Estimate	Standard Error	t Value	Approx Pr > |t|	Lag
MA1,1	-0.43746	0.08774	-4.99	<.0001	1

Variance Estimate	21953.72
Std Error Estimate	148.1679
AIC	1374.294
SBC	1376.967
Number of Residuals	107

* AIC and SBC do not include log determinant.

Autocorrelation Check of Residuals

To Lag	Chi-Square	DF	Pr > ChiSq	Autocorrelations					
6	7.15	5	0.2097	-0.057	-0.044	0.120	-0.198	-0.064	-0.026
12	20.67	11	0.0369	0.026	-0.072	0.012	0.148	-0.113	0.265
18	24.44	17	0.1080	0.011	-0.149	-0.015	-0.010	-0.083	-0.009
24	27.91	23	0.2192	0.065	-0.042	-0.113	-0.021	0.029	0.073
30	31.80	29	0.3288	0.101	0.052	0.022	0.089	0.008	-0.072
36	46.31	35	0.0956	0.049	-0.038	-0.210	0.091	0.162	0.091
42	49.69	41	0.1657	0.106	0.047	-0.014	-0.066	-0.035	-0.023
48	52.99	47	0.2541	-0.062	0.004	-0.057	-0.025	0.069	0.069

Tests for Normality

Test	--Statistic---		-----p Value------	
Shapiro-Wilk	W	0.778469	Pr < W	<0.0001
Kolmogorov-Smirnov	D	0.200193	Pr > D	<0.0100
Cramer-von Mises	W-Sq	1.264205	Pr > W-Sq	<0.0050
Anderson-Darling	A-Sq	6.61657	Pr > A-Sq	<0.0050

Lampiran 26. *Output* SAS Model ARIMA ([1,4],1,0) Harga Beras Premium

The ARIMA Procedure

Conditional Least Squares Estimation

Parameter	Estimate	Standard Error	t Value	Approx Pr > |t|	Lag
AR1,1	0.30982	0.09122	3.40	0.0010	1
AR1,2	-0.20426	0.09294	-2.20	0.0302	4

Variance Estimate	21905.13
Std Error Estimate	148.0038
AIC	1375.043
SBC	1380.389
Number of Residuals	107

* AIC and SBC do not include log determinant.

Autocorrelation Check of Residuals

To Lag	Chi-Square	DF	Pr > ChiSq	Autocorrelations					
6	5.25	4	0.2624	0.036	-0.178	0.111	-0.009	-0.035	0.017
12	15.28	10	0.1220	0.041	-0.072	-0.003	0.073	-0.078	0.253
18	20.80	16	0.1862	0.027	-0.171	-0.023	0.031	-0.104	-0.038
24	27.06	22	0.2088	0.093	-0.026	-0.138	-0.032	0.068	0.108
30	29.97	28	0.3647	0.086	0.021	0.037	0.100	-0.010	-0.027
36	49.91	34	0.0384	0.129	-0.012	-0.222	0.081	0.213	0.084
42	51.34	40	0.1080	0.049	0.051	-0.001	-0.054	-0.020	-0.007
48	55.70	46	0.1548	-0.034	-0.005	-0.082	-0.048	0.080	0.077

Tests for Normality

Test	--Statistic---		-----p Value------	
Shapiro-Wilk	W	0.804641	Pr < W	<0.0001
Kolmogorov-Smirnov	D	0.169967	Pr > D	<0.0100
Cramer-von Mises	W-Sq	1.030544	Pr > W-Sq	<0.0050
Anderson-Darling	A-Sq	5.595016	Pr > A-Sq	<0.0050

Lampiran 27. *Output* SAS Model ARIMA (1,1,1) Harga Beras Premium

The ARIMA Procedure

Conditional Least Squares Estimation

Parameter	Estimate	Standard Error	t Value	Approx Pr > |t|	Lag
MA1,1	-0.71638	0.13417	-5.34	<.0001	1
AR1,1	-0.32367	0.18200	-1.78	0.0782	1

Variance Estimate	21578.19
Std Error Estimate	146.8952
AIC	1373.434
SBC	1378.779
Number of Residuals	107

* AIC and SBC do not include log determinant.

Autocorrelation Check of Residuals

To Lag	Chi-Square	DF	Pr > ChiSq	Autocorrelations					
6	4.28	4	0.3693	0.010	0.050	0.022	-0.150	-0.107	-0.022
12	17.68	10	0.0606	-0.008	-0.035	-0.012	0.166	-0.084	0.272
18	20.61	16	0.1941	-0.011	-0.106	-0.060	-0.014	-0.088	-0.004
24	24.43	22	0.3250	0.043	-0.041	-0.118	-0.027	0.030	0.093
30	28.77	28	0.4242	0.109	0.074	0.040	0.091	0.007	-0.051
36	43.89	34	0.1193	0.018	-0.051	-0.194	0.087	0.169	0.133
42	48.32	40	0.1720	0.120	0.059	-0.016	-0.067	-0.052	-0.031
48	51.86	46	0.2561	-0.068	-0.009	-0.063	-0.014	0.066	0.073

Tests for Normality

Test	--Statistic---		-----p Value------	
Shapiro-Wilk	W	0.798819	Pr < W	<0.0001
Kolmogorov-Smirnov	D	0.193358	Pr > D	<0.0100
Cramer-von Mises	W-Sq	1.139186	Pr > W-Sq	<0.0050
Anderson-Darling	A-Sq	5.975893	Pr > A-Sq	<0.0050

Lampiran 28. *Output* SAS Model ARIMA ([12],1,1) Harga Beras Premium

The ARIMA Procedure

Conditional Least Squares Estimation

Parameter	Estimate	Standard Error	t Value	Approx Pr > |t|	Lag
MA1,1	-0.48013	0.08719	-5.51	<.0001	1
AR1,1	0.27901	0.09692	2.88	0.0048	12

Variance Estimate	20525.03
Std Error Estimate	143.2656
AIC	1368.08
SBC	1373.425
Number of Residuals	107

* AIC and SBC do not include log determinant.

Autocorrelation Check of Residuals

To Lag	Chi-Square	DF	Pr > ChiSq	Autocorrelations					
6	7.96	4	0.0932	-0.072	-0.040	0.140	-0.204	-0.048	-0.022
12	14.76	10	0.1409	0.031	-0.010	0.008	0.199	-0.126	0.001
18	19.61	16	0.2381	0.006	-0.168	-0.052	0.024	-0.080	0.021
24	21.98	22	0.4611	0.051	-0.015	-0.065	-0.096	0.024	-0.025
30	27.39	28	0.4968	0.079	0.086	0.030	0.122	0.043	-0.075
36	40.25	34	0.2132	0.056	-0.029	-0.192	0.119	0.150	0.056
42	43.87	40	0.3107	0.097	0.040	-0.027	-0.092	-0.031	0.013
48	46.56	46	0.4492	-0.089	0.017	-0.014	-0.064	0.014	0.041

Tests for Normality

Test	--Statistic---		-----p Value------	
Shapiro-Wilk	W	0.817541	Pr < W	<0.0001
Kolmogorov-Smirnov	D	0.180972	Pr > D	<0.0100
Cramer-von Mises	W-Sq	0.993958	Pr > W-Sq	<0.0050
Anderson-Darling	A-Sq	5.253276	Pr > A-Sq	<0.0050

Lampiran 29. *Output* SAS Model ARIMA ([4],1,1) Harga Beras Premium

The ARIMA Procedure

Conditional Least Squares Estimation

Parameter	Estimate	Standard Error	t Value	Approx Pr > |t|	Lag
MA1,1	-0.43458	0.08835	-4.92	<.0001	1
AR1,1	-0.20474	0.09735	-2.10	0.0378	4

Variance Estimate	21266.15
Std Error Estimate	145.8292
AIC	1371.875
SBC	1377.221
Number of Residuals	107

* AIC and SBC do not include log determinant.

Autocorrelation Check of Residuals

To Lag	Chi-Square	DF	Pr > ChiSq	Autocorrelations					
6	3.25	4	0.5171	-0.051	-0.066	0.121	-0.024	-0.082	-0.008
12	16.21	10	0.0938	0.027	-0.064	0.002	0.123	-0.119	0.269
18	20.53	16	0.1971	-0.003	-0.132	-0.027	0.036	-0.111	-0.045
24	24.83	22	0.3051	0.074	-0.032	-0.118	-0.013	0.051	0.091
30	28.37	28	0.4448	0.087	0.037	0.042	0.105	-0.015	-0.047
36	44.09	34	0.1153	0.094	-0.003	-0.204	0.093	0.184	0.074
42	46.14	40	0.2335	0.061	0.065	0.004	-0.053	-0.027	-0.020
48	49.75	46	0.3264	-0.055	0.005	-0.071	-0.035	0.066	0.072

Tests for Normality

Test	--Statistic---		-----p Value------	
Shapiro-Wilk	W	0.807645	Pr < W	<0.0001
Kolmogorov-Smirnov	D	0.169639	Pr > D	<0.0100
Cramer-von Mises	W-Sq	1.065318	Pr > W-Sq	<0.0050
Anderson-Darling	A-Sq	5.661866	Pr > A-Sq	<0.0050

Lampiran 30. *Output* SAS Deteksi Outlier Model ARIMA Harga Beras Premium

ARIMA ([12],1,1)

Outlier Details

Obs	Type	Estimate	Chi-Square	Approx Prob>ChiSq
15	Additive	384.59441	157.26	<.0001
49	Shift	490.24172	82.61	<.0001
12	Shift	379.52535	45.03	<.0001
4	Additive	-192.01676	34.80	<.0001
50	Additive	171.90649	30.32	<.0001

ARIMA ([4],1,1)

Outlier Details

Obs	Type	Estimate	Chi-Square	Approx Prob>ChiSq
15	Additive	414.40952	156.01	<.0001
49	Shift	511.15875	81.99	<.0001
12	Shift	359.30194	38.61	<.0001
4	Additive	-217.07832	39.96	<.0001
50	Additive	201.15603	38.12	<.0001

Lampiran 31. *Output* SAS Model ARIMA ([12],1,1) Harga Beras Premium dengan Outlier

The ARIMA Procedure

Conditional Least Squares Estimation

Parameter	Estimate	Standard Error	t Value	Approx Pr > |t|	Lag	Variable	Shift
MA1,1	-0.79930	0.07350	-10.88	<.0001	1	y	0
AR1,1	0.20581	0.10460	1.97	0.0519	12	y	0
NUM1	413.84827	29.48470	14.04	<.0001	0	w15	0
NUM2	517.06985	76.17665	6.79	<.0001	0	w49	0
NUM3	371.91312	58.27173	6.38	<.0001	0	w12	0
NUM4	-211.75714	27.45128	-7.71	<.0001	0	w4	0
NUM5	184.68651	38.23880	4.83	<.0001	0	w50	0

Variance Estimate	6399.929
Std Error Estimate	79.99955
AIC	1248.166
SBC	1266.876
Number of Residuals	107

* AIC and SBC do not include log determinant.

Autocorrelation Check of Residuals

To Lag	Chi-Square	DF	Pr > ChiSq	Autocorrelations					
6	5.43	4	0.2461	-0.008	0.065	0.073	-0.089	-0.170	-0.037
12	7.50	10	0.6779	0.021	-0.045	0.011	0.082	0.086	-0.022
18	13.87	16	0.6086	0.030	-0.182	-0.112	0.006	-0.046	-0.044
24	19.20	22	0.6329	0.123	-0.066	-0.103	-0.058	0.004	0.077

Tests for Normality

Test	--Statistic---		-----p Value------	
Shapiro-Wilk	W	0.952068	Pr < W	0.0007
Kolmogorov-Smirnov	D	0.078281	Pr > D	0.1041
Cramer-von Mises	W-Sq	0.143692	Pr > W-Sq	0.0291
Anderson-Darling	A-Sq	0.936215	Pr > A-Sq	0.0185

Lampiran 32. *Output* SAS Model ARIMA ([4],1,1) Harga Beras Premium dengan Outlier

The ARIMA Procedure

Conditional Least Squares Estimation

Parameter	Estimate	Standard Error	t Value	Approx Pr > |t|	Lag	Variable	Shift
MA1,1	-0.77516	0.07688	-10.08	<.0001	1	y	0
AR1,1	-0.12639	0.11182	-1.13	0.2610	4	y	0
NUM1	421.77520	31.09616	13.56	<.0001	0	w15	0
NUM2	542.50189	79.12994	6.86	<.0001	0	w49	0
NUM3	382.64092	61.70719	6.20	<.0001	0	w12	0
NUM4	-212.69535	27.76022	-7.66	<.0001	0	w4	0
NUM5	200.50750	40.51981	4.95	<.0001	0	w50	0

Autocorrelation Check of Residuals

To Lag	Chi-Square	DF	Pr > ChiSq	Autocorrelations				
6	4.27	4	0.3702	0.003	0.035	0.074	-0.013	-0.163	-0.064
12	10.08	10	0.4331	0.030	-0.078	-0.023	0.039	0.091	0.174
18	15.33	16	0.5005	0.036	-0.147	-0.061	0.012	-0.089	-0.081
24	22.82	22	0.4120	0.096	-0.077	-0.115	-0.029	0.062	0.147

Tests for Normality

Test	--Statistic---		-----p Value------	
Shapiro-Wilk	W	0.953074	Pr < W	0.0008
Kolmogorov-Smirnov	D	0.086805	Pr > D	0.0462
Cramer-von Mises	W-Sq	0.126544	Pr > W-Sq	0.0487
Anderson-Darling	A-Sq	0.822177	Pr > A-Sq	0.0343

Model ARIMA ([4],1,1) dengan Outlier setelah AR 4 dikeluarkan

The ARIMA Procedure

Conditional Least Squares Estimation

Parameter	Estimate	Standard Error	t Value	Approx Pr > |t|	Lag	Variable	Shift
MA1,1	-0.80298	0.07097	-11.31	<.0001	1	y	0
NUM1	424.10670	29.71719	14.27	<.0001	0	w15	0
NUM2	523.48823	77.70736	6.74	<.0001	0	w49	0
NUM3	396.35161	59.54780	6.66	<.0001	0	w12	0
NUM4	-214.01516	27.67187	-7.73	<.0001	0	w4	0
NUM5	188.45022	39.33311	4.79	<.0001	0	w50	0

Variance Estimate	6572.477
Std Error Estimate	81.07081
AIC	1250.077
SBC	1266.114
Number of Residuals	107

* AIC and SBC do not include log determinant.

Autocorrelation Check of Residuals

To Lag	Chi-Square	DF	Pr > ChiSq	Autocorrelations				
6	5.23	5	0.3887	0.006	0.054	0.044	-0.088	-0.171	-0.063
12	11.35	11	0.4148	0.010	-0.082	-0.010	0.062	0.096	0.174
18	16.43	17	0.4934	0.050	-0.140	-0.088	0.008	-0.080	-0.060
24	23.80	23	0.4152	0.100	-0.085	-0.122	-0.029	0.035	0.140

Tests for Normality

Test	--Statistic---		-----p Value------	
Shapiro-Wilk	W	0.948622	Pr < W	0.0004
Kolmogorov-Smirnov	D	0.086322	Pr > D	0.0483
Cramer-von Mises	W-Sq	0.146005	Pr > W-Sq	0.0265
Anderson-Darling	A-Sq	0.972638	Pr > A-Sq	0.0151

Lampiran 33. Perhitungan Manual MAPE dan RMSE Model ARIMA Harga Beras Premium dengan Outlier

MAPE ARIMA ([12],1,1)

Lag	Y	Forecast	((Y-F)/Y)x100
109	12210,03	12062,69	1,206731
110	12603,25	12062,69	4,289052
111	12486,23	12064,52	3,377368
112	12570,97	12070,31	3,982643
113	12623,68	12068,67	4,396559
114	12595,77	12067,92	4,190667
115	12593,26	12072,38	4,136166
116	12707,26	12075,97	4,967933
117	13514,83	12123,5	10,29486
118	13856,03	12164,47	12,20813
119	13930,77	12176,33	12,59397
120	13910,26	12205,69	12,25404
			6,49151
	MAPE	**6,49151**	

RMSE ARIMA ([12],1,1)

Lag	Y	Forecast	(Y-F)^2
109	12210,03	12062,69	21709,74
110	12603,25	12062,69	292205,1
111	12486,23	12064,52	177835,8
112	12570,97	12070,31	250657,1
113	12623,68	12068,67	308033,2
114	12595,77	12067,92	278622,1
115	12593,26	12072,38	271314
116	12707,26	12075,97	398524,6
117	13514,83	12123,5	1935808
118	13856,03	12164,47	2861383
119	13930,77	12176,33	3078048
120	13910,26	12205,69	2905552
			1031,976
	RMSE	**1031,976**	

MAPE ARIMA (0,1,1)

Lag	Y	Forecast	((Y-F)/Y)x100
109	12210,03	12060,37	1,225732
110	12603,25	12060,37	4,30746
111	12486,23	12060,37	3,410605
112	12570,97	12060,37	4,061714
113	12623,68	12060,37	4,462308
114	12595,77	12060,37	4,250608
115	12593,26	12060,37	4,231535
116	12707,26	12060,37	5,090697
117	13514,83	12060,37	10,76198
118	13856,03	12060,37	12,95943
119	13930,77	12060,37	13,42637
120	13910,26	12060,37	13,29873
			6,790597
	MAPE	**6,790597**	

RMSE ARIMA (0,1,1)

Lag	Y	Forecast	(Y-F)^2
109	12210,03	12060,37	22398,79
110	12603,25	12060,37	294718,7
111	12486,23	12060,37	181353,2
112	12570,97	12060,37	260709
113	12623,68	12060,37	317315,2
114	12595,77	12060,37	286649,6
115	12593,26	12060,37	283969,7
116	12707,26	12060,37	418464,2
117	13514,83	12060,37	2115464
118	13856,03	12060,37	3224403
119	13930,77	12060,37	3498384
120	13910,26	12060,37	3422086
			1092,624
	RMSE	**1092,624**	

Lampiran 34. *Output* SAS Model ARIMA ([2],0,[24])(0,1,0)^{12} Produksi Padi

The ARIMA Procedure

Conditional Least Squares Estimation

Parameter	Estimate	Standard Error	t Value	Approx Pr > |t|	Lag
MA1,1	0.66236	0.09568	6.92	<.0001	24
AR1,1	-0.26934	0.10035	-2.68	0.0086	2

Variance Estimate	3.427E-8
Std Error Estimate	0.000185
AIC	-1375.74
SBC	-1370.61
Number of Residuals	96

* AIC and SBC do not include log determinant.

Autocorrelation Check of Residuals

To Lag	Chi-Square	DF	Pr > ChiSq	Autocorrelations					
6	3.73	4	0.4433	0.108	0.037	0.025	0.119	-0.011	-0.093
12	11.31	10	0.3341	-0.075	-0.098	-0.056	-0.117	0.029	-0.189
18	17.91	16	0.3290	0.011	-0.077	-0.029	0.150	-0.069	-0.147
24	21.78	22	0.4729	-0.016	0.094	-0.077	-0.096	-0.075	-0.028
30	24.93	28	0.6314	0.023	-0.025	0.037	-0.102	0.099	-0.006
36	35.14	34	0.4140	0.138	0.096	0.102	-0.129	-0.029	0.109
42	39.61	40	0.4876	-0.085	-0.059	-0.060	0.082	-0.075	0.021
48	45.77	46	0.4820	-0.039	0.073	-0.008	0.091	0.090	0.095

Tests for Normality

Test	--Statistic---		-----p Value------	
Shapiro-Wilk	W	0.953266	Pr < W	0.0018
Kolmogorov-Smirnov	D	0.086089	Pr > D	0.0795
Cramer-von Mises	W-Sq	0.15679	Pr > W-Sq	0.0202
Anderson-Darling	A-Sq	1.016628	Pr > A-Sq	0.0109

Lampiran 35. *Output* SAS Model ARIMA $([2,24],0,0)(0,1,0)^{12}$ Produksi Padi

The ARIMA Procedure

Conditional Least Squares Estimation

Parameter	Estimate	Standard Error	t Value	Approx Pr > |t|	Lag
AR1,1	-0.22279	0.08697	-2.56	0.0120	2
AR1,2	-0.52896	0.09211	-5.74	<.0001	24

Variance Estimate	3.566E-8
Std Error Estimate	0.000189
AIC	-1371.9
SBC	-1366.77
Number of Residuals	96

* AIC and SBC do not include log determinant.

Autocorrelation Check of Residuals

To Lag	Chi-Square	DF	Pr > ChiSq	Autocorrelations					
6	2.65	4	0.6186	0.060	0.019	0.052	0.107	-0.010	-0.088
12	11.89	10	0.2927	-0.063	-0.106	-0.045	-0.090	0.103	-0.218
18	19.33	16	0.2522	0.060	-0.024	-0.078	0.134	-0.092	-0.161
24	24.81	22	0.3063	-0.050	0.091	-0.066	-0.090	-0.125	-0.067
30	30.55	28	0.3373	0.022	-0.078	0.061	-0.140	0.099	0.042
36	43.88	34	0.1194	0.157	0.085	0.115	-0.099	0.001	0.182
42	48.37	40	0.1707	-0.085	-0.027	-0.060	0.110	-0.060	0.003
48	54.72	46	0.1772	-0.028	0.045	-0.009	0.096	0.050	-0.136

Tests for Normality

Test		--Statistic---	-----p Value------	
Shapiro-Wilk	W	0.950597	Pr < W	0.0012
Kolmogorov-Smirnov	D	0.08909	Pr > D	0.0600
Cramer-von Mises	W-Sq	0.174327	Pr > W-Sq	0.0114
Anderson-Darling	A-Sq	1.112259	Pr > A-Sq	0.0065

Lampiran 36. *Output* SAS Model ARIMA $([2,24].0,0)(1,1,0)^{12}$ Produksi Padi

The ARIMA Procedure

Conditional Least Squares Estimation

Parameter	Estimate	Standard Error	t Value	Approx Pr > |t|	Lag
AR1,1	-0.23178	0.08632	-2.69	0.0086	2
AR1,2	-0.54866	0.09406	-5.83	<.0001	24
AR2,1	-0.22686	0.10650	-2.13	0.0358	12

Variance Estimate	3.426E-8
Std Error Estimate	0.000185
AIC	-1374.78
SBC	-1367.08
Number of Residuals	96

* AIC and SBC do not include log determinant.

Autocorrelation Check of Residuals

To Lag	Chi-Square	DF	Pr > ChiSq	Autocorrelations					
6	5.72	3	0.1258	0.104	0.000	0.027	0.124	-0.047	-0.163
12	10.02	9	0.3491	-0.083	-0.064	-0.052	-0.121	0.103	-0.023
18	19.06	15	0.2109	0.089	-0.042	-0.066	0.139	-0.084	-0.189
24	25.39	21	0.2308	-0.033	0.092	-0.054	-0.142	-0.116	-0.060
30	29.22	27	0.3505	0.017	-0.105	0.035	-0.098	0.076	0.011
36	41.85	33	0.1389	0.152	0.124	0.111	-0.107	-0.016	0.148
42	45.88	39	0.2083	-0.082	-0.046	-0.069	0.093	-0.048	-0.003
48	50.07	45	0.2792	0.002	0.065	0.016	0.077	0.024	-0.105

Tests for Normality

Test		--Statistic---	-----p Value------	
Shapiro-Wilk	W	0.937527	Pr < W	0.0002
Kolmogorov-Smirnov	D	0.090433	Pr > D	0.0513
Cramer-von Mises	W-Sq	0.191545	Pr > W-Sq	0.0068
Anderson-Darling	A-Sq	1.287158	Pr > A-Sq	<0.0050

Lampiran 37. Perhitungan Manual MAPE dan RMSE Model ARIMA Produksi Padi

MAPE ARIMA ([2],0,[24])$(0,1,0)^{12}$

Lag	Y	Forecast	((Y-F)/Y)x100
109	320000	254900,9	20,34347
110	980000	571259,8	41,70818
111	2110000	1431431	32,15968
112	1190000	1456098	22,36119
113	630000	797537,1	26,59319
114	940000	699155,8	25,62173
115	920000	982960,9	6,843575
116	740000	759640,6	2,654133
117	530000	545246,3	2,876652
118	430000	527232,5	22,61221
119	490000	537250	9,642857
120	440000	308421,6	29,90419
			20,27675
	MAPE	**20,27675**	

RMSE ARIMA ([2],0,[24])$(0,1,0)^{12}$

Lag	Y	Forecast	(Y-F)^2
109	320000	254900,9	4237892933
110	980000	571259,8	167068512638
111	2110000	1431431	460456304368
112	1190000	1456098	70808222692
113	630000	797537,1	28068668617
114	940000	699155,8	58005937271
115	920000	982960,9	3964073318
116	740000	759640,6	385752612,8
117	530000	545246,3	232448272,6
118	430000	527232,5	9454162438
119	490000	537250	2232562225
120	440000	308421,6	17312879067
			261761,2488
	RMSE	**261761,2488**	

MAPE ARIMA ([2,24],0,0)(0,1,0)^{12}

Lag	Y	Forecast	((Y-F)/Y)x100
109	320000	272536,3	14,83241
110	980000	522583	46,6752
111	2110000	1743015	17,39263
112	1190000	1776768	49,30827
113	630000	749952,6	19,0401
114	940000	676394,4	28,04315
115	920000	935518	1,686744
116	740000	758411,9	2,488098
117	530000	522587,6	1,39857
118	430000	526958,5	22,54849
119	490000	575120,3	17,37149
120	440000	282674,2	35,75587
			21,37842
	MAPE	**21,37842**	

RMSE ARIMA ([2,24],0,0)(0,1,0)^{12}

Lag	Y	Forecast	(Y-F)^2
109	320000	272536,3	2252803083
110	980000	522583	209230269850
111	2110000	1743015	134677667810
112	1190000	1776768	344297190448
113	630000	749952,6	14388635173
114	940000	676394,4	69487917605
115	920000	935518	240809832,4
116	740000	758411,9	338999116,7
117	530000	522587,6	54943980,93
118	430000	526958,5	9400954532
119	490000	575120,3	7245467636
120	440000	282674,2	24751414774
			260826,7423
	RMSE	**260826,7423**	

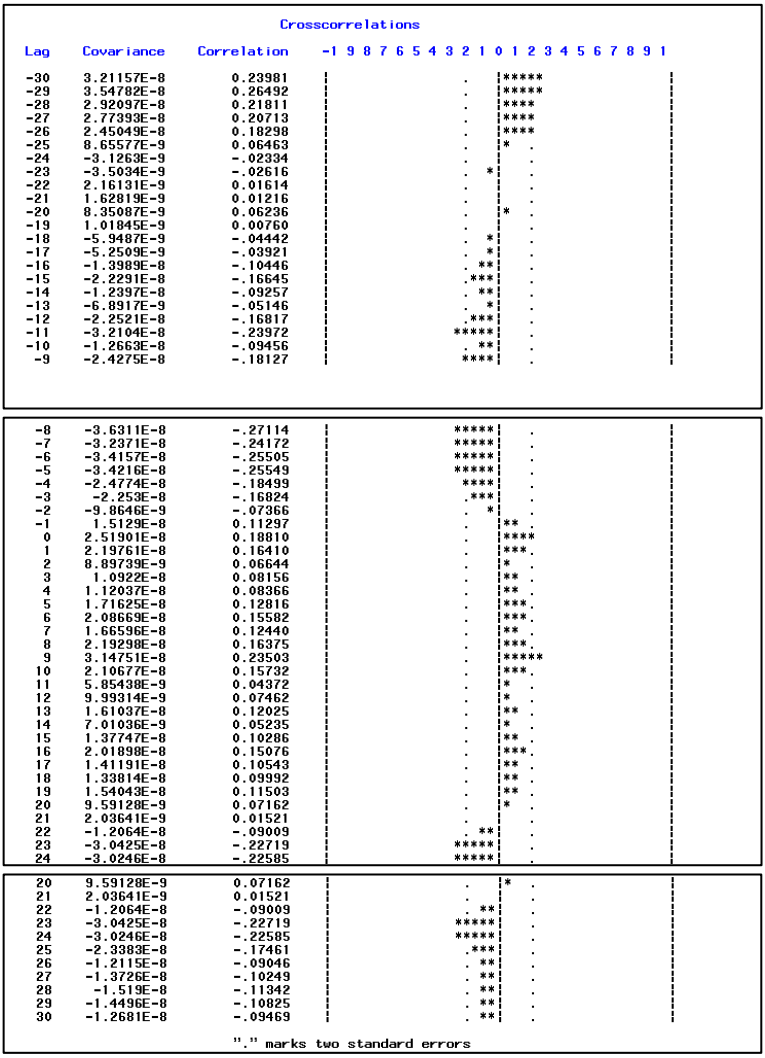
MAPE ARIMA ([2,24],0,0)(1,1,0)^{12}

Lag	Y	Forecast	((Y-F)/Y)x100
109	320000	280338,2	12,39431
110	980000	498152,9	49,16807
111	2110000	1784996	15,40303
112	1190000	1819187	52,87283
113	630000	714932	13,48128
114	940000	695878,4	25,97039
115	920000	961442,1	4,504577
116	740000	758731,7	2,531311
117	530000	522517,3	1,411827
118	430000	519715,5	20,86407
119	490000	557444,3	13,76414
120	440000	286924,8	34,78981
			20,5963
	MAPE	**20,5963**	

RMSE ARIMA ([2,24],0,0)(1,1,0)^{12}

Lag	Y	Forecast	(Y-F)^2
109	320000	280338,2	1573056491
110	980000	498152,9	232176616887
111	2110000	1784996	105627515685
112	1190000	1819187	395875857379
113	630000	714932	7213451338
114	940000	695878,4	59595368164
115	920000	961442,1	1717448730
116	740000	758731,7	350876608
117	530000	522517,3	55990510
118	430000	519715,5	8048871285
119	490000	557444,3	4548730265
120	440000	286924,8	23432009427
			264609,1131
	RMSE	**264609,1131**	

Lampiran 38. *Output* SAS CCF Fungsi Transfer



Crosscorrelations

Lag	Covariance	Correlation	-1 9 8 7 6 5 4 3 2 1 0 1 2 3 4 5 6 7 8 9 1
-30	3.21157E-8	0.23981	. |*****
-29	3.54782E-8	0.26492	. |*****
-28	2.92097E-8	0.21811	. |****
-27	2.77393E-8	0.20713	. |****
-26	2.45049E-8	0.18298	. |****
-25	8.65577E-9	0.06463	. |* .
-24	-3.1263E-9	-.02334	. | .
-23	-3.5034E-9	-.02616	. * | .
-22	2.16131E-9	0.01614	. | .
-21	1.62819E-9	0.01216	. | .
-20	8.35087E-9	0.06236	. |* .
-19	1.01845E-9	0.00760	. | .
-18	-5.9487E-9	-.04442	. * | .
-17	-5.2509E-9	-.03921	. * | .
-16	-1.3989E-8	-.10446	. ** | .
-15	-2.2291E-8	-.16645	.*** | .
-14	-1.2397E-8	-.09257	. ** | .
-13	-6.8917E-9	-.05146	. * | .
-12	-2.2521E-8	-.16817	.*** | .
-11	-3.2104E-8	-.23972	***** | .
-10	-1.2663E-8	-.09456	. ** | .
-9	-2.4275E-8	-.18127	**** | .
-8	-3.6311E-8	-.27114	***** | .
-7	-3.2371E-8	-.24172	***** | .
-6	-3.4157E-8	-.25505	***** | .
-5	-3.4216E-8	-.25549	***** | .
-4	-2.4774E-8	-.18499	**** | .
-3	-2.253E-8	-.16824	.*** | .
-2	-9.8646E-9	-.07366	. * | .
-1	1.5129E-8	0.11297	. |** .
0	2.51901E-8	0.18810	. |****
1	2.19761E-8	0.16410	. |***.
2	8.89739E-9	0.06644	. |* .
3	1.0922E-8	0.08156	. |** .
4	1.12037E-8	0.08366	. |** .
5	1.71625E-8	0.12816	. |***.
6	2.08669E-8	0.15582	. |***.
7	1.66596E-8	0.12440	. |** .
8	2.19298E-8	0.16375	. |***.
9	3.14751E-8	0.23503	. |*****
10	2.10677E-8	0.15732	. |***.
11	5.85438E-9	0.04372	. |* .
12	9.99314E-9	0.07462	. |* .
13	1.61037E-8	0.12025	. |** .
14	7.01036E-9	0.05235	. |* .
15	1.37747E-8	0.10286	. |** .
16	2.01898E-8	0.15076	. |***.
17	1.41191E-8	0.10543	. |** .
18	1.33814E-8	0.09992	. |** .
19	1.54043E-8	0.11503	. |** .
20	9.59128E-9	0.07162	. |* .
21	2.03641E-9	0.01521	. | .
22	-1.2064E-8	-.09009	. ** | .
23	-3.0425E-8	-.22719	***** | .
24	-3.0246E-8	-.22585	***** | .
20	9.59128E-9	0.07162	. |* .
21	2.03641E-9	0.01521	. | .
22	-1.2064E-8	-.09009	. ** | .
23	-3.0425E-8	-.22719	***** | .
24	-3.0246E-8	-.22585	***** | .
25	-2.3383E-8	-.17461	.*** | .
26	-1.2115E-8	-.09046	. ** | .
27	-1.3726E-8	-.10249	. ** | .
28	-1.519E-8	-.11342	. ** | .
29	-1.4496E-8	-.10825	. ** | .
30	-1.2681E-8	-.09469	. ** | .

"." marks two standard errors

Lampiran 39. *Output* SAS Fungsi Transfer dengan Orde (0,[9],0)

The ARIMA Procedure

Conditional Least Squares Estimation

Parameter	Estimate	Standard Error	t Value	Approx Pr > |t|	Lag	Variable	Shift
NUM1	0.12417	0.10612	1.17	0.2453	0	x	0
NUM1,1	-0.17396	0.10442	-1.67	0.0994	9	x	0

Autocorrelation Check of Residuals

To Lag	Chi-Square	DF	Pr > ChiSq	Autocorrelations					
6	198.06	6	<.0001	0.858	0.730	0.614	0.499	0.392	0.336
12	213.74	12	<.0001	0.254	0.157	0.078	-0.046	-0.140	-0.201
18	227.53	18	<.0001	-0.203	-0.198	-0.173	-0.122	-0.067	0.004
24	259.46	24	<.0001	0.052	0.095	0.139	0.194	0.279	0.343
30	397.18	30	<.0001	0.405	0.455	0.492	0.439	0.391	0.321
36	417.69	36	<.0001	0.253	0.203	0.155	0.119	0.050	-0.016
42	438.59	42	<.0001	-0.087	-0.134	-0.173	-0.169	-0.161	-0.132
48	445.09	48	<.0001	-0.106	-0.109	-0.093	-0.051	-0.016	0.038

Crosscorrelation Check of Residuals with Input x

To Lag	Chi-Square	DF	Pr > ChiSq	Crosscorrelations					
5	1.77	4	0.7774	-0.119	0.005	0.006	-0.015	0.017	0.076
11	26.15	10	0.0035	0.178	0.191	0.233	0.146	0.277	0.244
17	33.81	16	0.0058	0.166	0.114	0.096	0.122	0.105	0.111
23	47.99	22	0.0011	0.060	-0.005	-0.039	-0.102	-0.214	-0.319
29	65.77	28	<.0001	-0.232	-0.247	-0.169	-0.142	-0.138	-0.147
35	70.69	34	0.0002	-0.119	-0.094	-0.065	0.067	0.084	0.133
41	73.55	40	0.0010	0.099	0.126	0.058	0.033	0.046	0.028
47	74.25	46	0.0052	0.025	0.046	0.022	-0.026	-0.044	-0.046

Autocorrelations

Lag	Covariance	Correlation	-1 9 8 7 6 5 4 3 2 1 0 1 2 3 4 5 6 7 8 9 1	Std Error
0	5.05648E-8	1.00000	|********************|	0
1	4.62781E-8	0.91522	|****************** |	0.102062
2	3.9812E-8	0.78735	|**************** |	0.166935
3	3.30724E-8	0.65406	|************* |	0.201946
4	2.67036E-8	0.52811	|*********** |	0.222923
5	2.21236E-8	0.43753	|********* |	0.235595
6	1.8255E-8	0.36102	|******* |	0.243912
7	1.47919E-8	0.29253	|****** |	0.249416
8	1.05639E-8	0.20892	|**** |	0.252965
9	5.08748E-9	0.10061	|** |	0.254756
10	-1.2382E-9	-.02449	| |	0.255170
11	-8.8188E-9	-.17441	| *** |	0.255194
12	-1.4735E-8	-.29141	| ****** |	0.256433
13	-1.7675E-8	-.34956	| ******* |	0.259860
14	-1.8577E-8	-.36739	| ******* |	0.264712
15	-1.7237E-8	-.34089	| ******* |	0.269972
16	-1.5796E-8	-.31240	| ****** |	0.274419
17	-1.3972E-8	-.27633	| ****** |	0.278098
18	-1.2001E-8	-.23733	| ***** |	0.280944
19	-1.0315E-8	-.20400	| **** |	0.283025
20	-8.8734E-9	-.17548	| **** |	0.284552
21	-7.2446E-9	-.14327	| *** |	0.285677
22	-4.9827E-9	-.09854	| ** |	0.286425
23	-1.4285E-9	-.02825	| * |	0.286778
24	3.19059E-9	0.06310	|* |	0.286807
25	8.16925E-9	0.16156	|*** |	0.286951
26	1.25376E-8	0.24795	|***** |	0.287897
27	1.57331E-8	0.31115	|****** |	0.290113
28	1.72649E-8	0.34144	|******* |	0.293569
29	1.69903E-8	0.33601	|******* |	0.297677
30	1.61948E-8	0.32028	|****** |	0.301602
31	1.54679E-8	0.30590	|****** |	0.305124
32	1.43252E-8	0.28330	|****** |	0.308302
33	1.37825E-8	0.27257	|***** |	0.311002
34	1.41355E-8	0.27955	|****** |	0.313481
35	1.3281E-8	0.26265	|***** |	0.316067
36	1.06119E-8	0.20987	|**** |	0.318332
37	6.46602E-9	0.12788	|*** |	0.319770
38	1.73288E-9	0.03427	|* |	0.320302
39	-2.7048E-9	-.05349	| * |	0.320341
40	-6.0464E-9	-.11958	| ** |	0.320434
41	-8.1077E-9	-.16034	| *** |	0.320898

42	-9.9323E-9	-.19643	****		0.321732
43	-1.1734E-8	-.23206	*****		0.322970
44	-1.2839E-8	-.25392	*****		0.324711
45	-1.3795E-8	-.27281	*****		0.326772
46	-1.4725E-8	-.29121	******		0.329136
47	-1.4621E-8	-.28916	******		0.331809
48	-1.3385E-8	-.26471	*****		0.334424
49	-1.1414E-8	-.22573	*****		0.336599
50	-9.1494E-9	-.18094	****		0.338173

"." marks two standard errors

Partial Autocorrelations

Lag	Correlation	-1 9 8 7 6 5 4 3 2 1 0 1 2 3 4 5 6 7 8 9 1
1	0.91522	|******************|
2	-0.30971	|******|
3	-0.04266	| * |
4	-0.03157	| * |
5	0.13435	|***. |
6	-0.07854	| ** |
7	-0.02659	| * |
8	-0.17939	|****|
9	-0.15211	|***|
10	-0.14982	|***|
11	-0.25460	|*****|
12	0.11122	|** . |
13	0.14279	|***. |
14	0.02044	| . |
15	0.11512	|** . |
16	-0.05987	| * |
17	0.14803	|***. |
18	0.06485	|* . |
19	0.03148	|* . |
20	-0.11669	| ** |
21	0.00465	| . |
22	-0.09001	| ** |
23	0.06744	|* . |
24	0.13156	|***. |
25	0.08487	|** . |
26	0.09773	|** . |
27	0.02014	| . |
28	-0.07363	| * |
29	-0.04557	| * |
30	0.05517	|* . |
31	0.01713	| . |
32	-0.17207	|***|
33	0.03307	|* . |
34	0.10640	|** . |
35	-0.05651	| * |
36	-0.09906	| ** |
37	-0.00050	| . |
38	0.06323	|* . |
39	0.01002	| . |
40	-0.02868	| * |
41	-0.03404	| * |
42	-0.07995	| ** |
43	-0.11142	| ** |
44	0.03457	|* . |
45	0.08306	|** . |
46	0.01897	| . |
47	0.14636	|***. |
48	0.04277	|* . |
49	-0.08801	| ** |
50	-0.04127	| * |

Lampiran 40. *Output* SAS Fungsi Transfer dengan Orde (0,[23],0)

The ARIMA Procedure

Conditional Least Squares Estimation

Parameter	Estimate	Standard Error	t Value	Approx Pr > |t|	Lag	Variable	Shift
NUM1	0.11816	0.11534	1.02	0.3091	0	x	0
NUM1,1	0.19384	0.10599	1.83	0.0716	23	x	0

Autocorrelation Check of Residuals

To Lag	Chi-Square	DF	Pr > ChiSq	Autocorrelations					
6	209.20	6	<.0001	0.901	0.795	0.706	0.595	0.484	0.396
12	226.18	12	<.0001	0.318	0.213	0.098	-0.004	-0.094	-0.188
18	243.72	18	<.0001	-0.213	-0.203	-0.201	-0.172	-0.139	-0.103
24	246.99	24	<.0001	-0.085	-0.065	-0.023	0.020	0.057	0.121
30	257.82	30	<.0001	0.146	0.139	0.137	0.120	0.103	0.081
36	259.60	36	<.0001	0.063	0.046	0.030	0.003	-0.028	-0.071
42	274.21	42	<.0001	-0.100	-0.110	-0.123	-0.124	-0.133	-0.135
48	283.84	48	<.0001	-0.126	-0.127	-0.111	-0.065	-0.011	0.042

Crosscorrelation Check of Residuals with Input x

To Lag	Chi-Square	DF	Pr > ChiSq	Crosscorrelations					
5	6.24	4	0.1823	-0.136	0.002	0.109	0.118	0.118	0.165
11	37.50	10	<.0001	0.232	0.217	0.256	0.310	0.351	0.204
17	45.93	16	<.0001	0.199	0.180	0.127	0.115	0.084	0.084
23	47.50	22	0.0013	0.075	0.084	0.058	-0.004	-0.073	-0.011
29	48.56	28	0.0093	-0.069	-0.096	-0.019	-0.004	-0.012	0.006
35	49.31	34	0.0434	0.041	-0.029	-0.015	0.022	0.056	0.063
41	50.26	40	0.1283	0.027	0.057	0.044	0.079	0.028	0.007
47	51.71	46	0.2607	0.020	0.018	-0.008	-0.025	-0.055	-0.124

Lampiran 41. *Output* SAS Fungsi Transfer dengan Orde (0,[24],0)

The ARIMA Procedure

Conditional Least Squares Estimation

Parameter	Estimate	Standard Error	t Value	Approx Pr > |t|	Lag	Variable	Shift
NUM1	0.05492	0.14041	0.39	0.6969	0	x	0
NUM1,1	0.15929	0.12903	1.23	0.2211	24	x	0

Autocorrelation Check of Residuals

To Lag	Chi-Square	DF	Pr > ChiSq	Autocorrelations					
6	202.58	6	<.0001	0.895	0.789	0.691	0.587	0.482	0.396
12	218.92	12	<.0001	0.310	0.208	0.110	0.015	-0.085	-0.189
18	234.42	18	<.0001	-0.208	-0.200	-0.179	-0.152	-0.135	-0.100
24	237.40	24	<.0001	-0.064	-0.046	-0.015	0.030	0.084	0.115
30	250.59	30	<.0001	0.158	0.151	0.138	0.129	0.131	0.101
36	252.52	36	<.0001	0.072	0.056	0.034	0.007	-0.033	-0.059
42	265.45	42	<.0001	-0.092	-0.095	-0.114	-0.125	-0.126	-0.126
48	275.28	48	<.0001	-0.129	-0.124	-0.106	-0.075	-0.029	0.038

Crosscorrelation Check of Residuals with Input x

To Lag	Chi-Square	DF	Pr > ChiSq	Crosscorrelations					
5	5.93	4	0.2046	-0.070	0.010	0.084	0.100	0.135	0.205
11	37.10	10	<.0001	0.200	0.193	0.272	0.328	0.327	0.259
17	42.98	16	0.0003	0.154	0.144	0.126	0.108	0.076	0.065
23	45.93	22	0.0020	0.058	0.013	0.080	0.012	-0.090	-0.151
29	46.35	28	0.0160	0.001	-0.057	-0.048	-0.015	0.004	0.005
35	46.83	34	0.0704	0.014	0.021	-0.030	0.010	0.053	0.047
41	48.11	40	0.1775	0.064	0.071	0.040	0.030	0.074	0.023
47	48.73	46	0.3637	0.003	0.017	-0.003	-0.026	-0.069	-0.055

Lampiran 42. *Output* SAS Model Fungsi Transfer Orde (0,[9],0) dengan ARIMA

The ARIMA Procedure

Conditional Least Squares Estimation

Parameter	Estimate	Standard Error	t Value	Approx Pr > |t|	Lag	Variable	Shift
MA1,1	-0.37336	0.11245	-3.32	0.0013	1	y	0
AR1,1	0.84394	0.06621	12.75	<.0001	1	y	0
NUM1	0.0027093	0.03194	0.08	0.9326	0	x	0
NUM1,1	-0.01150	0.03070	-0.37	0.7089	9	x	0

Autocorrelation Check of Residuals

To Lag	Chi-Square	DF	Pr > ChiSq	Autocorrelations					
6	11.43	4	0.0222	-0.017	-0.001	0.132	-0.078	-0.175	0.257
12	16.80	10	0.0788	-0.061	0.055	0.096	0.015	-0.120	-0.150
18	21.83	16	0.1488	-0.124	-0.126	-0.026	-0.030	-0.075	0.091
24	23.93	22	0.3509	0.041	-0.044	0.047	-0.068	-0.052	0.066
30	35.99	28	0.1429	0.030	0.103	0.252	0.124	0.044	-0.028
36	39.40	34	0.2411	0.012	0.022	-0.082	0.102	0.059	-0.047
42	47.98	40	0.1808	0.041	-0.020	-0.221	-0.039	0.026	0.003
48	49.14	46	0.3485	-0.017	-0.043	-0.027	-0.040	-0.032	0.026

Crosscorrelation Check of Residuals with Input x

To Lag	Chi-Square	DF	Pr > ChiSq	Crosscorrelations					
5	3.74	4	0.4430	0.040	0.018	-0.072	0.067	0.043	0.172
11	9.67	10	0.4702	0.136	0.052	0.151	0.134	0.062	-0.051
17	10.96	16	0.8119	-0.049	0.002	-0.024	0.068	0.022	-0.083
23	22.54	22	0.4279	-0.052	-0.056	-0.119	-0.154	-0.209	-0.214
29	23.63	28	0.7009	0.072	0.041	0.025	-0.046	-0.053	0.003
35	28.17	34	0.7486	-0.002	0.005	0.048	0.080	0.138	0.156
41	28.70	40	0.9083	-0.060	-0.041	-0.006	0.008	0.025	-0.005
47	29.45	46	0.9725	0.007	-0.016	-0.004	0.001	-0.054	-0.073

Tests for Normality

Test	--Statistic---		-----p Value------	
Shapiro-Wilk	W	0.718914	Pr < W	<0.0001
Kolmogorov-Smirnov	D	0.202897	Pr > D	<0.0100
Cramer-von Mises	W-Sq	1.263215	Pr > W-Sq	<0.0050
Anderson-Darling	A-Sq	6.840638	Pr > A-Sq	<0.0050

Lampiran 43. *Output* SAS Model Fungsi Transfer Orde (0,[23],0) dengan ARIMA

The ARIMA Procedure

Conditional Least Squares Estimation

Parameter	Estimate	Standard Error	t Value	Approx Pr > |t|	Lag	Variable	Shift
MA1,1	-0.75994	0.08772	-8.66	<.0001	1	y	0
AR1,1	0.90485	0.05600	16.16	<.0001	1	y	0
NUM1	-0.01821	0.01699	-1.07	0.2875	0	x	0
NUM1,1	0.01674	0.01554	1.08	0.2851	23	x	0

Autocorrelation Check of Residuals

To Lag	Chi-Square	DF	Pr > ChiSq	Autocorrelations				
6	2.14	4	0.7096	0.056	0.047	0.061	-0.004	-0.064	0.116
12	15.46	10	0.1160	-0.067	0.021	0.081	0.083	-0.061	-0.357
18	20.99	16	0.1788	-0.185	-0.020	-0.108	-0.003	0.046	-0.103
24	23.15	22	0.3933	0.100	-0.037	-0.068	-0.033	-0.048	0.036
30	27.18	28	0.5087	0.145	0.038	0.065	0.029	-0.009	0.081
36	27.79	34	0.7648	0.021	0.025	0.031	-0.038	0.028	0.015
42	28.43	40	0.9143	-0.053	-0.021	-0.021	-0.017	0.003	-0.009
48	32.66	46	0.9308	0.000	-0.087	-0.070	-0.024	-0.077	-0.047

Crosscorrelation Check of Residuals with Input x

To Lag	Chi-Square	DF	Pr > ChiSq	Crosscorrelations					
5	6.10	4	0.1920	-0.078	0.109	0.149	0.007	0.081	0.191
11	13.75	10	0.1848	0.024	-0.020	0.236	0.199	-0.002	-0.094
17	15.97	16	0.4549	-0.051	-0.049	-0.077	0.040	-0.063	-0.119
23	17.80	22	0.7175	0.014	-0.012	-0.062	-0.085	-0.081	-0.085
29	19.04	28	0.8969	0.063	0.063	0.074	-0.013	-0.005	0.057
35	19.52	34	0.9778	0.011	-0.022	0.020	-0.028	0.026	0.064
41	19.87	40	0.9968	-0.025	0.048	-0.020	0.032	-0.022	0.006
47	21.12	46	0.9994	0.006	-0.053	-0.002	-0.051	-0.055	-0.092

Tests for Normality

Test	--Statistic---		-----p Value------	
Shapiro-Wilk	W	0.885218	Pr < W	<0.0001
Kolmogorov-Smirnov	D	0.12813	Pr > D	<0.0100
Cramer-von Mises	W-Sq	0.413376	Pr > W-Sq	<0.0050
Anderson-Darling	A-Sq	2.589496	Pr > A-Sq	<0.0050

Lampiran 44. *Output* SAS Model Fungsi Transfer Orde (0,[24],0) dengan ARIMA

The ARIMA Procedure

Conditional Least Squares Estimation

Parameter	Estimate	Standard Error	t Value	Approx Pr > |t|	Lag	Variable	Shift
MA1,1	-0.78741	0.07638	-10.31	<.0001	1	y	0
AR1,1	0.90875	0.05540	16.40	<.0001	1	y	0
NUM1	0.01760	0.01611	1.09	0.2787	0	x	0
NUM1,1	-0.03934	0.01573	-2.50	0.0148	24	x	0

Autocorrelation Check of Residuals

To Lag	Chi-Square	DF	Pr > ChiSq	Autocorrelations					
6	1.22	4	0.8742	0.085	0.052	0.021	0.018	-0.039	0.060
12	23.26	10	0.0098	-0.051	0.047	0.020	0.135	-0.087	-0.467
18	25.81	16	0.0568	-0.048	-0.026	-0.133	0.056	-0.025	-0.051
24	31.08	22	0.0945	0.046	0.006	-0.058	-0.076	-0.036	0.189
30	33.75	28	0.2092	-0.048	0.064	0.093	-0.026	0.055	0.060
36	34.29	34	0.4539	0.032	0.033	0.003	0.012	0.007	-0.039
42	35.55	40	0.6709	0.009	-0.046	-0.050	0.044	-0.031	0.011
48	39.32	46	0.7464	-0.011	-0.077	-0.058	-0.043	-0.082	-0.025

Crosscorrelation Check of Residuals with Input x

To Lag	Chi-Square	DF	Pr > ChiSq	Crosscorrelations					
5	7.50	4	0.1117	0.048	0.104	0.179	-0.071	0.108	0.205
11	17.06	10	0.0730	0.042	-0.080	0.293	0.157	0.018	-0.118
17	19.24	16	0.2566	-0.035	-0.115	-0.040	0.030	-0.089	-0.073
23	21.93	22	0.4642	-0.004	-0.036	-0.090	-0.017	-0.108	-0.127
29	24.12	28	0.6754	0.095	0.118	0.061	-0.037	0.015	0.047
35	24.88	34	0.8731	0.013	-0.028	0.036	-0.061	0.066	0.018
41	25.51	40	0.9637	-0.009	0.062	-0.015	0.017	-0.040	0.052
47	26.56	46	0.9904	-0.031	-0.029	-0.030	-0.022	-0.083	-0.068

Tests for Normality

Test		--Statistic---	-----p Value------	
Shapiro-Wilk	W	0.885139	Pr < W	<0.0001
Kolmogorov-Smirnov	D	0.136816	Pr > D	<0.0100
Cramer-von Mises	W-Sq	0.436225	Pr > W-Sq	<0.0050
Anderson-Darling	A-Sq	2.553134	Pr > A-Sq	<0.0050

Lampiran 45. *Output* SAS Deteksi Outlier Model Fungsi Transfer dengan ARIMA

Orde (0,[9],0)

Outlier Details

Obs	Type	Estimate	Chi-Square	Approx Prob> ChiSq
49	Shift	-0.0002404	95.14	<.0001
15	Additive	-0.0001917	57.00	<.0001
12	Shift	-0.0002048	25.25	<.0001
48	Shift	-0.0001264	20.31	<.0001
14	Shift	-0.0001345	15.52	<.0001

Orde (0,[23],0)

Outlier Details

Obs	Type	Estimate	Chi-Square	Approx Prob> ChiSq
49	Shift	-0.0000754	16.64	<.0001
50	Additive	-0.0000414	17.41	<.0001

Orde (0,[24],0)

Outlier Details

Obs	Type	Estimate	Chi-Square	Approx Prob> ChiSq
49	Shift	-0.0000974	30.22	<.0001
46	Shift	-0.0000689	12.57	0.0004
51	Shift	0.00004522	6.48	0.0109

Lampiran 46. *Output* SAS Model Fungsi Transfer Orde (0,[9],0) dengan ARIMA dengan Outlier

The ARIMA Procedure

Conditional Least Squares Estimation

Parameter	Estimate	Standard Error	t Value	Approx Pr > |t|	Lag	Variable	Shift
MA1,1	-0.32138	0.13012	-2.47	0.0157	1	y	0
AR1,1	0.92090	0.06159	14.95	<.0001	1	y	0
NUM1	0.03032	0.01766	1.72	0.0900	0	x	0
NUM1,1	-0.01026	0.01515	-0.68	0.5005	9	x	0
NUM2	-0.0003012	0.00003826	-7.87	<.0001	0	w49	0
NUM3	-0.0002403	0.00003146	-7.64	<.0001	0	w15	0
NUM4	-0.0002600	0.00004290	-6.06	<.0001	0	w12	0
NUM5	-0.0001326	0.00003669	-3.61	0.0005	0	w48	0
NUM6	-0.0002163	0.00004228	-5.12	<.0001	0	w14	0

Autocorrelation Check of Residuals

To Lag	Chi-Square	DF	Pr > ChiSq	Autocorrelations					
6	7.55	4	0.1094	0.074	0.229	0.040	0.119	-0.080	-0.046
12	24.84	10	0.0057	-0.088	-0.177	0.099	0.040	-0.138	-0.318
18	29.02	16	0.0238	-0.070	-0.139	-0.103	-0.062	-0.014	-0.020
24	37.83	22	0.0191	0.189	0.093	-0.091	-0.045	0.004	0.143
30	42.44	28	0.0394	0.002	0.108	-0.025	0.123	0.060	0.066
36	45.48	34	0.0902	-0.126	-0.013	0.042	0.019	-0.015	-0.056
42	48.56	40	0.1661	0.067	-0.018	0.065	-0.082	0.034	-0.045
48	53.47	46	0.2092	0.048	-0.063	-0.090	-0.073	-0.063	-0.051

Crosscorrelation Check of Residuals with Input x

To Lag	Chi-Square	DF	Pr > ChiSq	Crosscorrelations					
5	9.05	4	0.0599	-0.108	0.024	0.130	-0.103	-0.032	0.251
11	18.08	10	0.0537	0.225	0.076	-0.029	0.086	-0.042	-0.193
17	28.10	16	0.0307	-0.126	-0.109	-0.177	0.058	-0.032	-0.227
23	33.01	22	0.0617	-0.093	-0.165	-0.112	-0.072	0.009	-0.054
29	41.21	28	0.0514	0.033	0.220	0.192	0.035	-0.002	0.080
35	44.58	34	0.1058	0.081	0.100	0.048	0.050	0.075	0.108
41	45.95	40	0.2393	-0.025	-0.108	-0.028	-0.004	0.040	-0.031
47	49.40	46	0.3390	0.003	-0.039	-0.023	-0.001	-0.130	-0.143

Tests for Normality

Test	Statistic		p Value	
Shapiro-Wilk	W	0.974246	Pr < W	0.0798
Kolmogorov-Smirnov	D	0.094191	Pr > D	0.0558
Cramer-von Mises	W-Sq	0.158315	Pr > W-Sq	0.0194
Anderson-Darling	A-Sq	0.887761	Pr > A-Sq	0.0229

Lampiran 47. *Output* SAS Model Fungsi Transfer Orde (0,[23],0) dengan ARIMA dengan Outlier

The ARIMA Procedure

Conditional Least Squares Estimation

Parameter	Estimate	Standard Error	t Value	Approx Pr > |t|	Lag	Variable	Shift
MA1,1	-0.44173	0.14130	-3.13	0.0026	1	y	0
AR1,1	0.92162	0.06122	15.05	<.0001	1	y	0
NUM1	-0.0011998	0.02391	-0.05	0.9601	0	x	0
NUM1,1	-0.01374	0.01703	-0.81	0.4228	23	x	0
NUM2	-0.0002665	0.00004628	-5.76	<.0001	0	w49	0
NUM3	-0.0000770	0.00002647	-2.91	0.0049	0	w50	0

Autocorrelation Check of Residuals

To Lag	Chi-Square	DF	Pr > ChiSq	Autocorrelations					
6	9.28	4	0.0546	0.022	0.176	0.218	-0.183	0.004	0.079
12	33.51	10	0.0002	-0.080	0.144	-0.057	-0.075	0.113	-0.473
18	38.92	16	0.0011	-0.059	-0.165	-0.147	0.050	-0.031	-0.045
24	49.36	22	0.0007	0.075	-0.161	-0.037	0.020	-0.191	0.164
30	53.84	28	0.0023	0.064	0.105	0.040	0.046	0.081	0.107
36	57.82	34	0.0066	0.022	0.118	0.031	-0.057	0.099	0.020
42	60.54	40	0.0196	-0.034	-0.072	0.048	-0.086	0.028	-0.006
48	68.78	46	0.0164	-0.002	-0.076	-0.102	-0.057	-0.105	-0.099

Crosscorrelation Check of Residuals with Input x

To Lag	Chi-Square	DF	Pr > ChiSq	Crosscorrelations					
5	6.01	4	0.1987	0.085	0.087	0.104	0.005	-0.039	0.235
11	9.83	10	0.4552	-0.058	0.091	0.067	0.116	-0.015	-0.150
17	15.81	16	0.4666	-0.084	-0.082	-0.152	0.005	-0.073	-0.199
23	16.94	22	0.7664	0.036	-0.047	-0.031	-0.076	-0.074	-0.003
29	19.34	28	0.8874	0.042	0.051	0.155	-0.027	0.017	0.057
35	19.82	34	0.9748	0.026	0.006	-0.029	-0.006	0.031	0.064

Crosscorrelation Check of Residuals with Input x

To Lag	Chi-Square	DF	Pr > ChiSq	Crosscorrelations					
41	20.17	40	0.9962	0.012	0.039	0.000	-0.014	0.042	-0.032
47	21.86	46	0.9990	0.007	-0.057	-0.033	-0.051	-0.109	-0.067

Tests for Normality

Test	--Statistic---		-----p Value------	
Shapiro-Wilk	W	0.916941	Pr < W	0.0001
Kolmogorov-Smirnov	D	0.142635	Pr > D	<0.0100
Cramer-von Mises	W-Sq	0.393947	Pr > W-Sq	<0.0050
Anderson-Darling	A-Sq	2.174998	Pr > A-Sq	<0.0050

Lampiran 48. *Output* SAS Model Fungsi Transfer Orde (0,[24],0) dengan ARIMA dengan Outlier

The ARIMA Procedure

Conditional Least Squares Estimation

Parameter	Estimate	Standard Error	t Value	Approx Pr > |t|	Lag	Variable	Shift
MA1,1	-0.65571	0.10373	-6.32	<.0001	1	y	0
AR1,1	0.91056	0.06774	13.44	<.0001	1	y	0
NUM1	0.05378	0.01787	3.01	0.0037	0	x	0
NUM1,1	-0.03379	0.01356	-2.49	0.0153	24	x	0
NUM2	-0.0002345	0.00003175	-7.39	<.0001	0	w49	0
NUM3	-0.0000944	0.00002553	-3.70	0.0005	0	w46	0
NUM4	0.00006412	0.00003094	2.07	0.0422	0	w51	0

Autocorrelation Check of Residuals

To Lag	Chi-Square	DF	Pr > ChiSq	Autocorrelations				
6	1.44	4	0.8370	0.048	0.108	0.036	-0.034	0.008	-0.048
12	11.84	10	0.2959	0.006	0.176	-0.044	0.037	-0.020	-0.291
18	16.84	16	0.3958	-0.190	-0.106	-0.003	-0.077	0.017	-0.035
24	19.88	22	0.5904	0.039	-0.093	-0.056	-0.089	-0.042	0.077
30	27.61	28	0.4850	0.202	-0.028	0.018	0.062	0.095	0.105
36	32.32	34	0.5502	-0.053	0.143	0.058	-0.054	0.037	0.059

Autocorrelation Check of Residuals

To Lag	Chi-Square	DF	Pr > ChiSq	Autocorrelations				
42	35.66	40	0.6660	-0.118	0.016	-0.063	0.053	-0.016	-0.014
48	43.80	46	0.5647	-0.018	-0.048	-0.142	-0.068	-0.091	-0.067

Crosscorrelation Check of Residuals with Input x

To Lag	Chi-Square	DF	Pr > ChiSq	Crosscorrelations				
5	8.85	4	0.0651	0.152	0.149	0.151	-0.133	0.069	0.180
11	15.42	10	0.1174	-0.026	0.035	0.072	0.238	-0.029	-0.164
17	21.05	16	0.1765	-0.038	-0.121	-0.147	0.067	-0.179	-0.061
23	22.82	22	0.4118	0.046	-0.070	-0.007	-0.113	-0.029	-0.062
29	26.55	28	0.5426	-0.010	0.134	0.155	-0.078	0.047	0.038
35	27.73	34	0.7676	0.049	-0.057	0.021	-0.041	0.092	0.006
41	28.67	40	0.9090	-0.018	0.094	-0.006	0.018	-0.046	0.039
47	31.05	46	0.9552	-0.021	-0.037	-0.061	-0.019	-0.132	-0.098

Tests for Normality

Test	--Statistic---		-----p Value------	
Shapiro-Wilk	W	0.987157	Pr < W	0.6780
Kolmogorov-Smirnov	D	0.071373	Pr > D	>0.1500
Cramer-von Mises	W-Sq	0.043573	Pr > W-Sq	>0.2500
Anderson-Darling	A-Sq	0.31044	Pr > A-Sq	>0.2500

Lampiran 49. Perhitungan Manual MAPE dan RMSE Model Fungsi Transfer ARIMA (1,0,1) b,s,r (0,[24],0)

MAPE Fungsi Transfer

Lag	Y	Forecast	((Y-F)/Y)x100
109	12210,03	12054,41	1,274569
110	12603,25	12005,61	4,741926
111	12486,23	11926,54	4,482432
112	12570,97	11896,21	5,367619
113	12623,68	11843,95	6,176682
114	12595,77	11790,46	6,393435
115	12593,26	11763,66	6,58761
116	12707,26	11745,96	7,564964
117	13514,83	11953,78	11,55065
118	13856,03	12118,07	12,54301
119	13930,77	12140,49	12,85123
120	13910,26	12284,3	11,68894
			7,601923
	MAPE	**7,601923**	

RMSE Fungsi Transfer

Lag	Y	Forecast	(Y-F)^2
109	12210,03	12054,41	24219,23
110	12603,25	12005,61	357169,8
111	12486,23	11926,54	313249,1
112	12570,97	11896,21	455303,2
113	12623,68	11843,95	607970,1
114	12595,77	11790,46	648511,6
115	12593,26	11763,66	688227,5
116	12707,26	11745,96	924096,6
117	13514,83	11953,78	2436883
118	13856,03	12118,07	3020517
119	13930,77	12140,49	3205083
120	13910,26	12284,3	2643754
			1130,08
	RMSE	**1130,08**	