T.C.

AKDENİZ ÜNİVERSİTESİ

SOSYAL BİLİMLER ENSTİTÜSÜ

BİLGİSAYAR UYGULAMALI TAHMİNLEME VE ÖNGÖRÜ FİNAL PROJESİ

Sınav Notları Analizi

BARAN BATUHAN ALKAN

202152099001

OCAK 2022

ANTALYA

Temel Tahmin Modelleri:

1. Basit Ortalama Metodu (Simple Average)

Adından da anlaşılacağı gibi, bir değer kümesinin basit ortalaması, tüm değerlerin toplamının kümedeki değer sayısına bölünmesiyle belirlenmektedir.

2. Basit Hareketli Ortalama Metodu (Simple Moving Average)

- Basit Hareketli Ortalama, ağırlıksız bir hareketli ortalamadır.
- **Ağırlıksız:** Veri kümesindeki her periyodun eşit önemde olduğu ve eşit derecede ağırlıklandırıldığı anlamına gelir.
- Her dönem sona erdiğinde, en eski veri noktası çıkar ve en yenisi başa eklenir. Bu algoritma genellikle, oldukça istikrarlı satış sayılarına sahip ürünler için bir satış tahmini oluşturmak için kullanılır.

Üstel Düzleştirme Metodları Nedirler?

- Üstel düzleştirme yöntemi, verilerdeki son değişim ve sıçramaları dikkate alarak tahminlerin ya da öngörülerin devamlı güncelleştirildiği bir yöntemdir.
- Üstel düzleştirme yöntemi hem deterministik hem de stokastik trende sahip olan tüm serilere uygulanabilmektedir.
- Üstel düzeltme genellikle kısa vadeli tahminler yapmak için kullanılır, çünkü bu tekniği kullanan daha uzun vadeli tahminler oldukça güvenilir olmayabilir.

3. Basit Üstel Düzleştirme Metodu (Single Exponential Smoothing)

- Bu yöntem trende ve mevsimsel dalgalanmaya sahip olmayan sadece bir ortalama düzey etrafında hareket eden serilerin analizinde uygulanmaktadır.

4. Double Üstel Düzleştirme Metodu (Double Exponential Smooting)

- Double metodu, zaman serilerinin, doğrusal trend ile izlenmesi için tasarlanmış bir yöntemdir. Trende sahip mevsimsel dalgalanması olmayan serilerin tahmin işleminde Double Düzleştirme metodu kullanılmaktadır.
- Bu algoritma genellikle verilerde bir eğilim gözlemlendiğinde yani büyüme veya düşüş aşamasında ürünler için bir tahmin oluşturmak için kullanılır.

5. Holt-Winters Üstel Düzleştirme Metodları

Hot-Winters No Seasonal : Doğrusal trende sahip ama mevsimsel bileşene sahip olmayan zaman serileri.

Hot-Winters Addictive : Doğrusal trende ve mevsimsel bileşene sahip zaman serileri.

- Veriler trend'den bağımsız ve mevsimsel hareketlerin büyüklüğü zaman içinde sabit varsayılır.

Hot-Winters Multiplicative : Doğrusal trende ve mevsimsel bileşene sahip zaman serileri.

- Mevsimsel hareketlerin trende bağlı olarak değiştiği ve trendin bir çarpanı olduğu varsayılmaktadır. Genellikle çarpımsal model tercih edilmektedir.

En iyi modellemenin "Root Mean Squared Error" değeri en azı olmalıdır.

- **Beyaz et** serisi için en uygun tahminleme ve öngörü modeli **"Holt-Winters Addictive Metodu"**dur.
    - Bu model diğerlerine göre "Root Mean Squared Error" değeri daha düşük tespit edilmiştir. "Root Mean Squared Error" = 5659.046

- **Turist serisi** için en uygun tahminleme ve öngörü modeli **"Holt-Winters Multiplicative Metodu**"dur.
    - Bu model diğerlerine göre "Root Mean Squared Error" değeri daha düşük tespit edilmiştir. "Root Mean Squared Error" = 261009.4

- **Y serisi** için en uygun tahminleme ve öngörü modeli **"ETS Smoothing Metod Mod: A,M,N"**dur.
    - Bu model diğerlerine göre "Root Mean Squared Error" değeri daha düşük tespit edilmiştir. "Root Mean Squared Error" = 19.87040

Üst kısımda belirtilen seriler için yapılan tahminleme ve öngörü metodlarında ortaya çıkan veri sonuçları aşağıdaki gibidir.

Turist Serisi DOĞRU TAHMİN SONUCU

	TURIST_SA...	TURISTSM
2017M10	3913759	4150187.
2017M11	2293847	2191886.
2017M12	2041323	1797677.
2018M01	2045341	1958929.
2018M02	1806822	1838765.
2018M03	2270019	2335358.
2018M04	2870569	2878107.
2018M05	3790524	4023807.
2018M06	4406894	4390616.
2018M07	5712975	5494549.
2018M08	7052433	7050636.
2018M09	6021357	6046961.
2018M10	4791439	4696433.
2018M11	2679420	2642941.
2018M12	2180881	2110176.
2019M01	2226288	2125647.
2019M02	1944957	1999732.
2019M03	2473147	2517907.
2019M04	3266256	3128636.
2019M05	4219837	4539506.
2019M06	5276253	4898122.
2019M07	6703045	6493740.
2019M08	8167150	8278079.
2019M09	6741769	7016300.
2019M10	5437494	5290436.
2019M11	3005517	2994010.
2019M12	2398329	2370166.
2020M01	2529423	2345514.
2020M02	2051923	2259741.
2020M03	1058068	2690537.
2020M04	NA	1709984.
2020M05	NA	2402367.

HOLT&WİNTER MULTİPLİCTİVE

Beyaz Et Serisi DOĞRU TAHMİN SONUCU

	EYAZ_ET_...	BEYAZ_SM
2018M06	114276	116757.7
2018M07	95641	112580.1
2018M08	108939	102323.1
2018M09	99595	100621.2
2018M10	107276	108119.6
2018M11	104040	105436.3
2018M12	107948	111069.7
2019M01	114609	112754.5
2019M02	99892	105490.0
2019M03	111931	115618.6
2019M04	107158	113850.4
2019M05	120595	116290.4
2019M06	108610	112505.5
2019M07	109772	107974.5
2019M08	115463	102401.4
2019M09	106023	102310.8
2019M10	113407	110993.8
2019M11	107674	109124.7
2019M12	112597	114744.4
2020M01	116848	116672.9
2020M02	110442	108988.5
2020M03	126915	120879.9
2020M04	107496	121542.3
2020M05	116417	122143.9
2020M06	103937	115851.2
2020M07	109647	109315.7
2020M08	107667	103376.1
2020M09	105238	101092.9
2020M10	NA	109884.1
2020M11	NA	107411.7

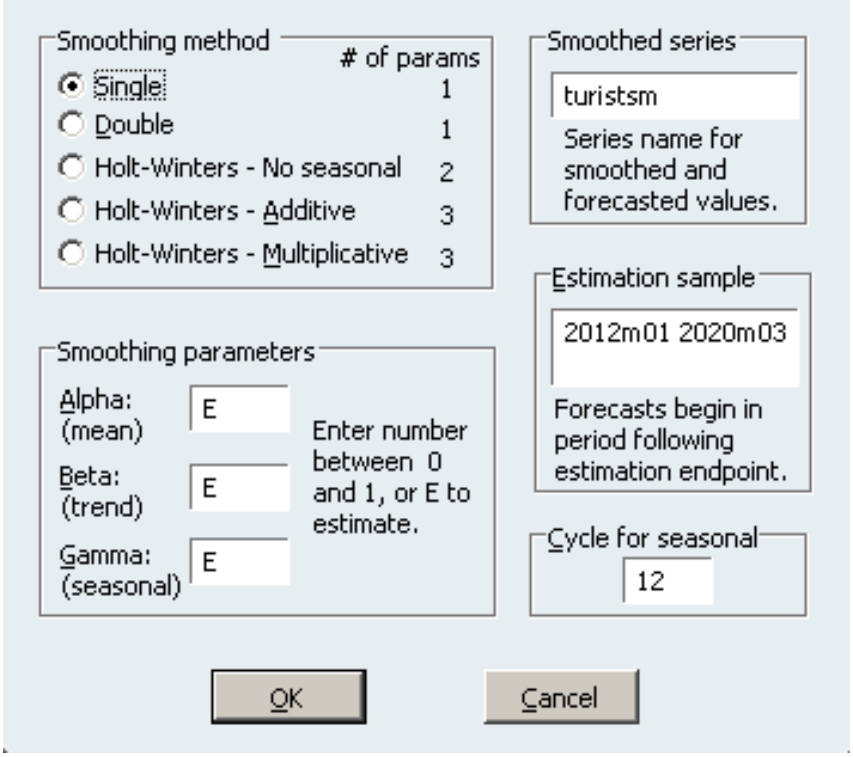
HOLT&WİNTER ADDİCTİVE

Y Serisi DOĞRU TAHMİN SONUCU

	YT	YTSM
15	862.7233	842.0589
16	1028.503	1015.273
17	1218.914	1194.282
18	1432.502	1409.326
19	1666.700	1646.090
20	1928.026	1900.899
21	2211.599	2189.352
22	2523.027	2495.171
23	2863.400	2834.455
24	3230.571	3203.772
25	3631.759	3597.743
26	4065.417	4032.947
27	4528.319	4499.075
28	5027.549	4991.221
29	5562.351	5526.779
30	6129.848	6097.152
31	6736.730	6697.345
32	7383.583	7343.613
33	8067.865	8030.435
34	8797.216	8752.148
35	9567.946	9526.566
36	10377.96	10338.68
37	11236.14	11187.97
38	12141.65	12094.32
39	13093.91	13047.17
40	14090.98	14046.17
41	15141.75	15088.04
42	16243.82	16192.53
43	17393.15	17345.88
44	18599.53	18542.48
45	19859.01	19805.92
46	21174.72	21118.49
47	22544.83	22490.42
48	23975.49	23914.94
49	25464.98	25406.15
50	27014.51	26954.47
51	NA	28564.03
52	NA	30113.56

ETS SMOOTHİNG

TURİST SERİSİ - SİNGLE METOT

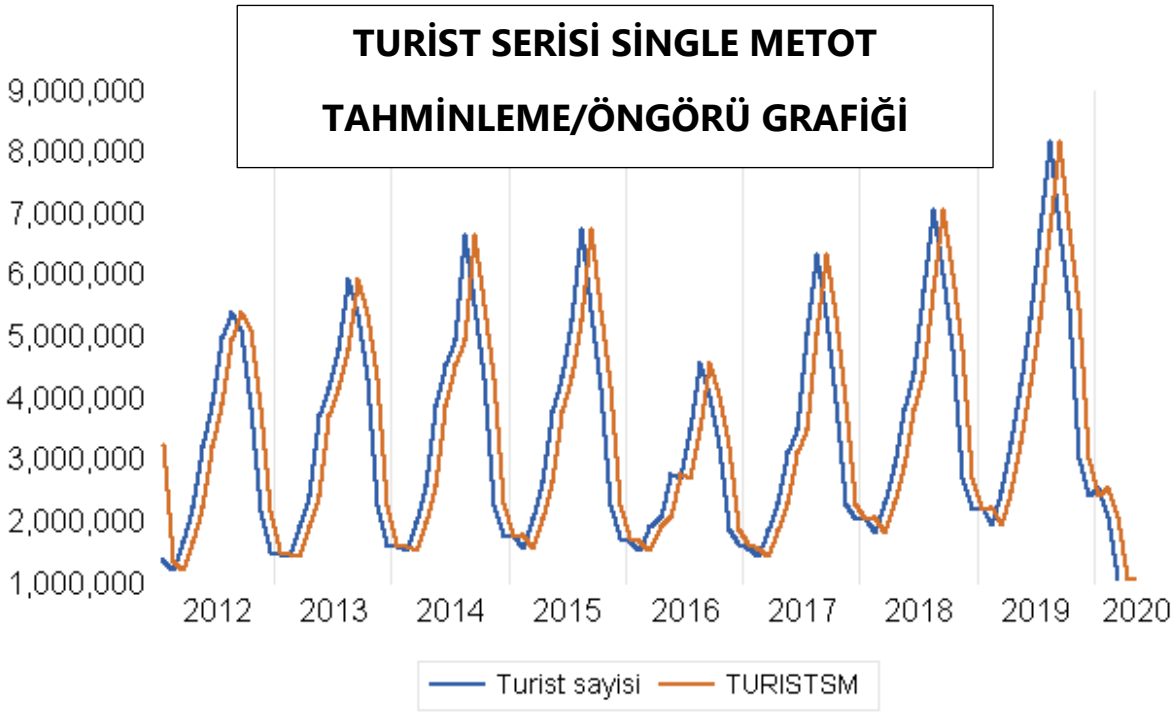


TURİST SERİSİ SİNGLE METOT - RMSE

Date: 01/12/22 Time: 22:22
Sample: 2012M01 2020M03
Included observations: 99
Method: Single Exponential
Original Series: TURIST_SAYISI
Forecast Series: TURISTSM

Parameters:	Alpha	0.9990
Sum of Squared Residuals		9.47E+13
Root Mean Squared Error		978157.7

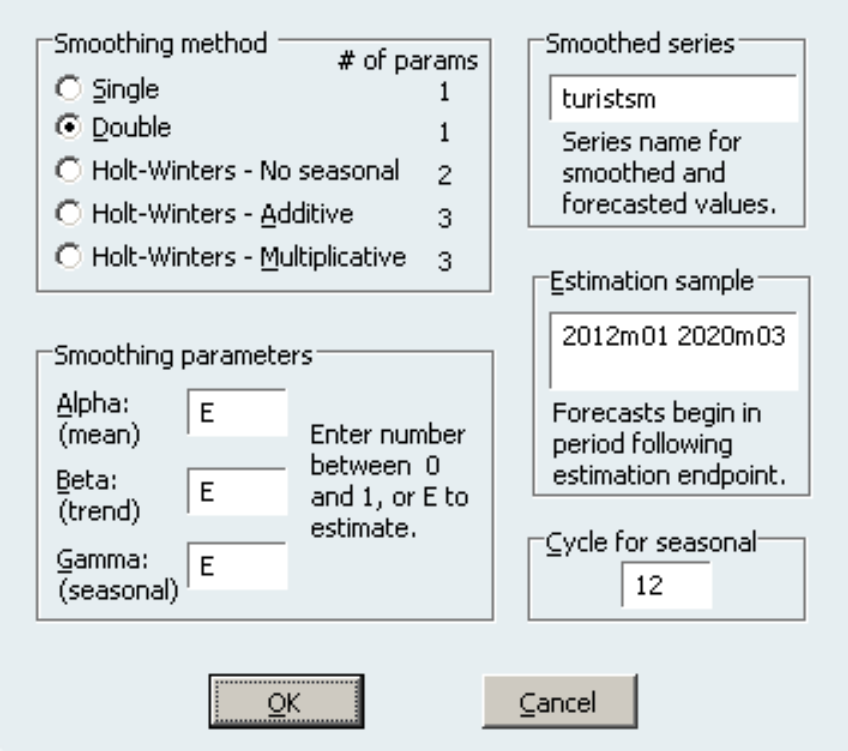
End of Period Levels:	Mean	1059062.



TURİST SERİSİ SİNGLE METOT - TAHMİN SONUÇLARI

	TURIST_SA...	TURISTSM
2017M10	3913759	5307904.
2017M11	2293847	3915153.
2017M12	2041323	2295468.
2018M01	2045341	2041577.
2018M02	1806822	2045337.
2018M03	2270019	1807061.
2018M04	2870569	2269556.
2018M05	3790524	2869968.
2018M06	4406894	3789603.
2018M07	5712975	4406277.
2018M08	7052433	5711668.
2018M09	6021357	7051092.
2018M10	4791439	6022387.
2018M11	2679420	4792670.
2018M12	2180881	2681533.
2019M01	2226288	2181382.
2019M02	1944957	2226243.
2019M03	2473147	1945238.
2019M04	3266256	2472619.
2019M05	4219837	3265462.
2019M06	5276253	4218883.
2019M07	6703045	5275196.
2019M08	8167150	6701617.
2019M09	6741769	8165684.
2019M10	5437494	6743193.
2019M11	3005517	5438800.
2019M12	2398329	3007950.
2020M01	2529423	2398939.
2020M02	2051923	2529293.
2020M03	1058068	2052400.
2020M04	NA	1059062.
2020M05	NA	1059062.

TURİST SERİSİ - DOUBLE METOT

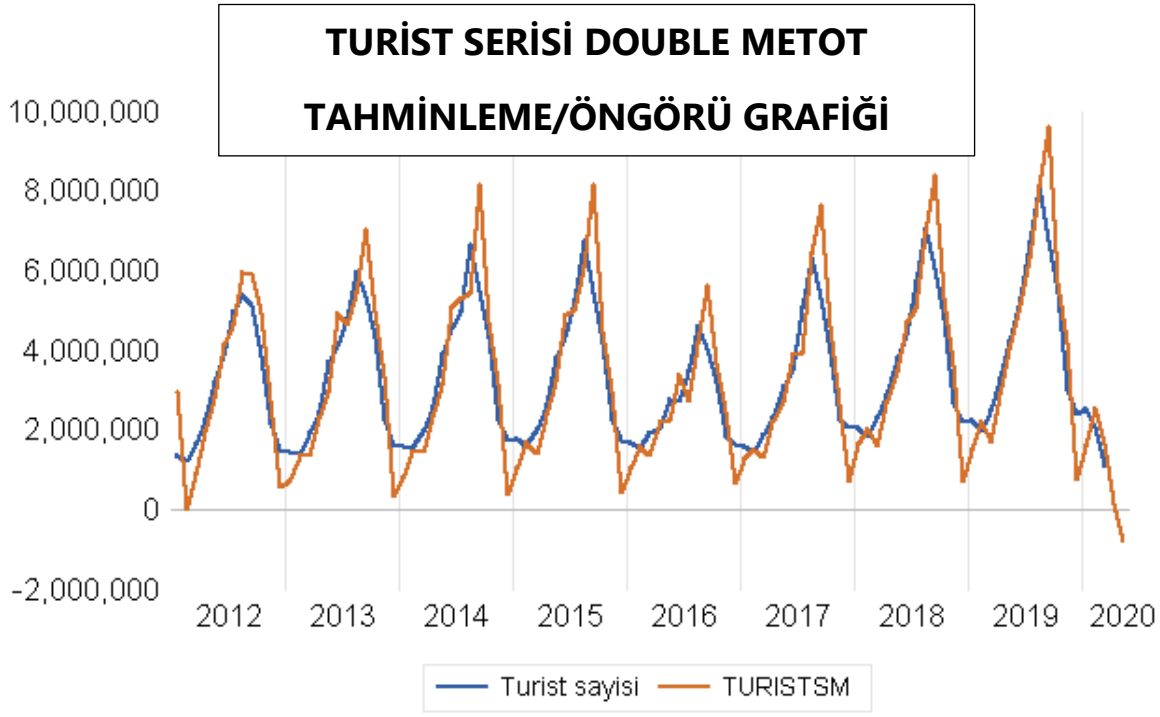


TURİST SERİSİ DOUBLE METOT - RMSE

Date: 01/12/22 Time: 22:24
Sample: 2012M01 2020M03
Included observations: 99
Method: Double Exponential
Original Series: TURIST_SAYISI
Forecast Series: TURISTSM

Parameters:	Alpha	0.9360
Sum of Squared Residuals		8.37E+13
Root Mean Squared Error		919462.6

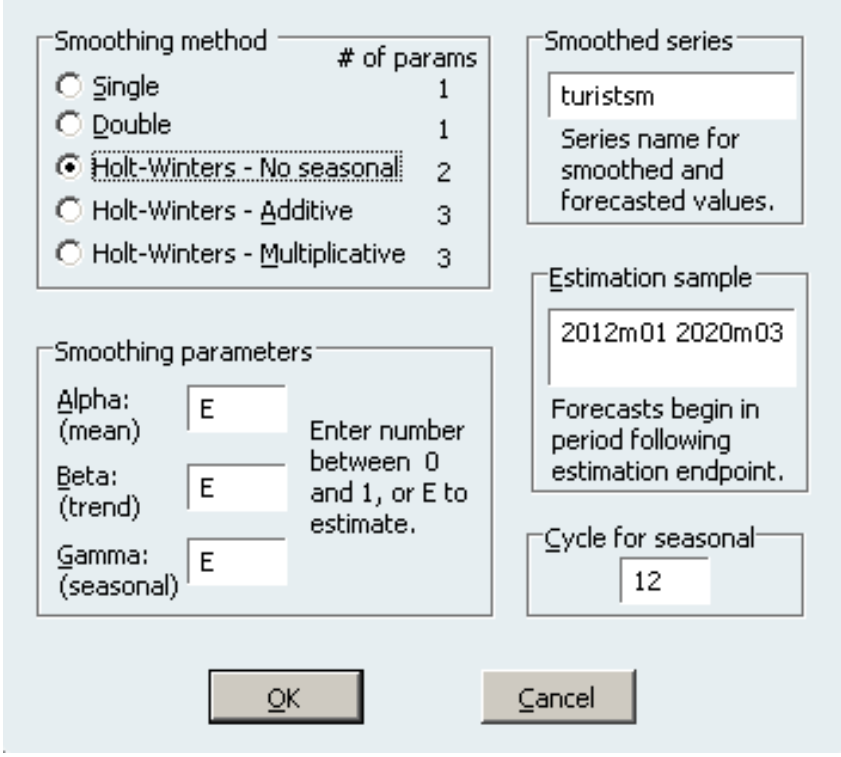
End of Period Levels:	Mean	1060457.
	Trend	-923600.8



TURİST SERİSİ DOUBLE METOT - TAHMİN SONUÇLARI

	TURIST_SA...	TURISTSM
2017M12	2041323	710014.4
2018M01	2045341	1617168.
2018M02	1806822	2000011.
2018M03	2270019	1594782.
2018M04	2870569	2646004.
2018M05	3790524	3445143.
2018M06	4406894	4667195.
2018M07	5712975	5057993.
2018M08	7052433	6934162.
2018M09	6021357	8379436.
2018M10	4791439	5292566.
2018M11	2679420	3616001.
2018M12	2180881	685217.8
2019M01	2226288	1487083.
2019M02	1944957	2183212.
2019M03	2473147	1697146.
2019M04	3266256	2901044.
2019M05	4219837	4015801.
2019M06	5276253	5148800.
2019M07	6703045	6317192.
2019M08	8167150	8080975.
2019M09	6741769	9621806.
2019M10	5437494	5685344.
2019M11	3005517	4153146.
2019M12	2398329	719405.1
2020M01	2529423	1571563.
2020M02	2051923	2544800.
2020M03	1058068	1641427.
2020M04	NA	136856.1
2020M05	NA	-786744.6

TURİST SERİSİ - HOLT&WİNTERS NO SEASONAL METOT

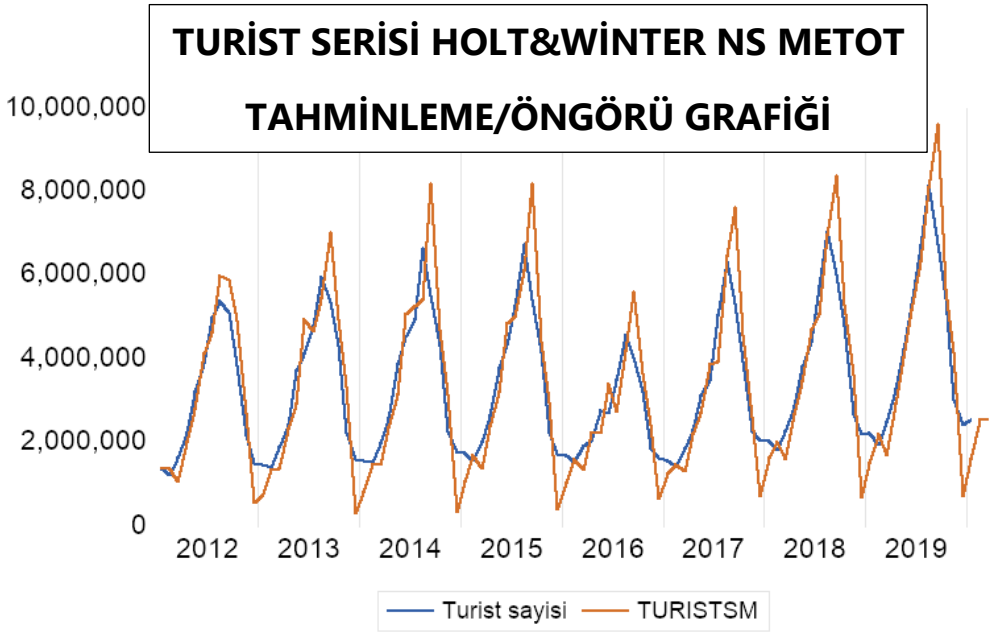


TURİST SERİSİ - HOLT&WİNTERS NO SEASONAL METOT

Date: 01/12/22 Time: 22:25
Sample: 2012M01 2020M03
Included observations: 99
Method: Holt-Winters No Seasonal
Original Series: TURIST_SAYISI
Forecast Series: TURISTSM

Parameters:	Alpha	1.0000
	Beta	0.8800
Sum of Squared Residuals		7.95E+13
Root Mean Squared Error		895894.2

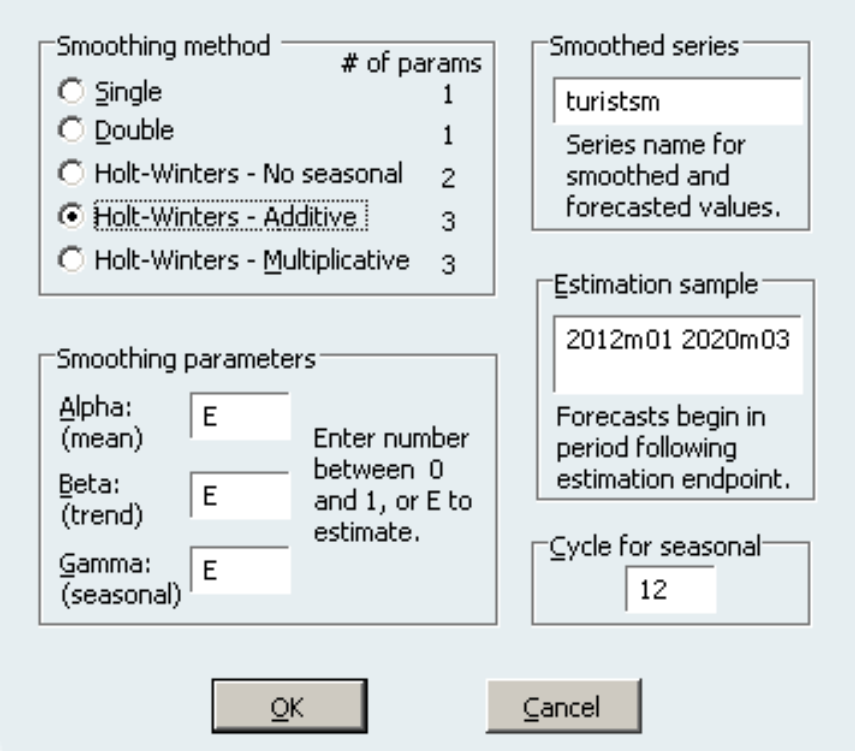
End of Period Levels:	Mean	1058068.
	Trend	-924781.9



TURİST SERİSİ - HOLT&WİNTERS NS METOT - TAHMİN SONUÇLARI

	TURIST_SA...	TURISTSM
2018M03	2270019	1591408.
2018M04	2870569	2651813.
2018M05	3790524	3444878.
2018M06	4406894	4669017.
2018M07	5712975	5054707.
2018M08	7052433	6940093.
2018M09	6021357	8378415.
2018M10	4791439	5273022.
2018M11	2679420	3619289.
2018M12	2180881	680143.0
2019M01	2226288	1502321.
2019M02	1944957	2184852.
2019M03	2473147	1692403.
2019M04	3266256	2907683.
2019M05	4219837	4016352.
2019M06	5276253	5149009.
2019M07	6703045	6317405.
2019M08	8167150	8083578.
2019M09	6741769	9621230.
2019M10	5437494	5661794.
2019M11	3005517	4160125.
2019M12	2398329	712041.0
2020M01	2529423	1588862.
2020M02	2051923	2547692.
2020M03	1058068	1633893.
2020M04	NA	133286.1
2020M05	NA	-791495.8

TURİST SERİSİ - HOLT&WİNTERS ADDİCTİVE METOT

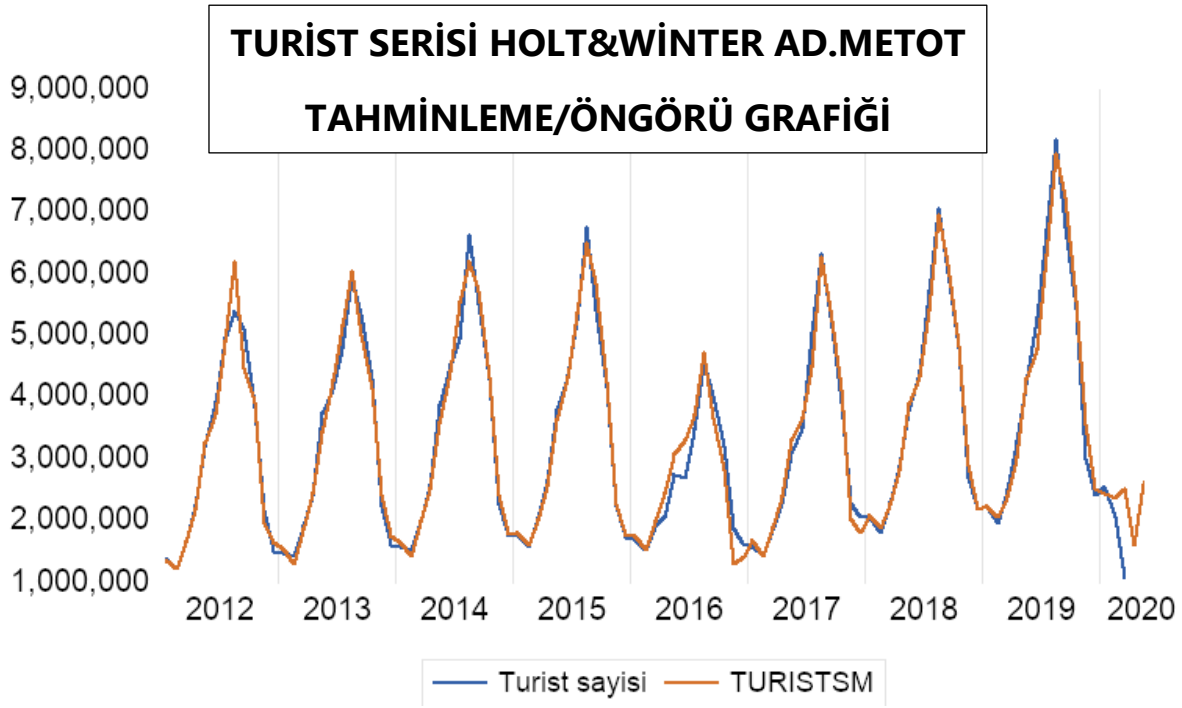


TURİST SERİSİ - HOLT&WİNTERS ADDİCTİVE METOT

Date: 01/12/22 Time: 22:27
Sample: 2012M01 2020M03
Included observations: 99
Method: Holt-Winters Additive Seasonal
Original Series: TURIST_SAYISI
Forecast Series: TURISTSM

Parameters:	Alpha	1.0000
	Beta	0.0000
	Gamma	0.0000
Sum of Squared Residuals		8.04E+12
Root Mean Squared Error		284915.1

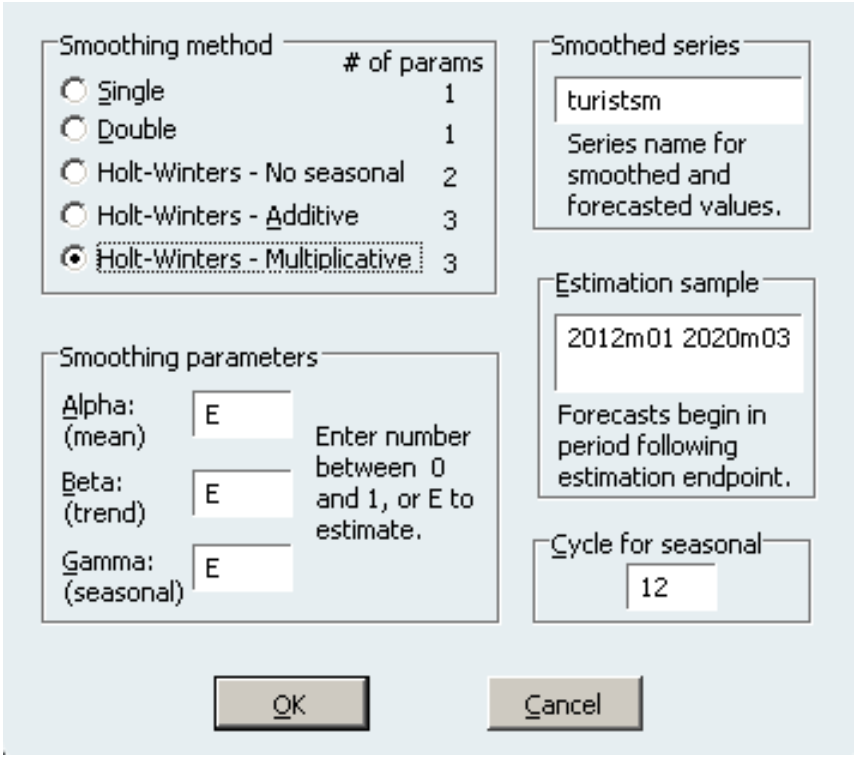
End of Period Levels:	Mean		2402642.
	Trend		15273.93
	Seasonals:	2019M04	-820288.5
		2019M05	175832.5
		2019M06	706834.4
		2019M07	1703635.
		2019M08	2930270.
		2019M09	1992837.
		2019M10	788546.9
		2019M11	-1123113.
		2019M12	-1632368.
		2020M01	-1600231.
		2020M02	-1777381.
		2020M03	-1344574.



TURİST SERİSİ - HOLT&WİNTERS AD METOT - TAHMİN SONUÇLARI

	TURIST_SA...	TURISTSM
2018M04	2870569	2809579.
2018M05	3790524	3881964.
2018M06	4406894	4336800.
2018M07	5712975	5418969.
2018M08	7052433	6954884.
2018M09	6021357	6130273.
2018M10	4791439	4832341.
2018M11	2679420	2895054.
2018M12	2180881	2185438.
2019M01	2226288	2228292.
2019M02	1944957	2064412.
2019M03	2473147	2393037.
2019M04	3266256	3012707.
2019M05	4219837	4277651.
2019M06	5276253	4766113.
2019M07	6703045	6288328.
2019M08	8167150	7944954.
2019M09	6741769	7244990.
2019M10	5437494	5552753.
2019M11	3005517	3541109.
2019M12	2398329	2511535.
2020M01	2529423	2445740.
2020M02	2051923	2367547.
2020M03	1058068	2500003.
2020M04	NA	1597628.
2020M05	NA	2609023.

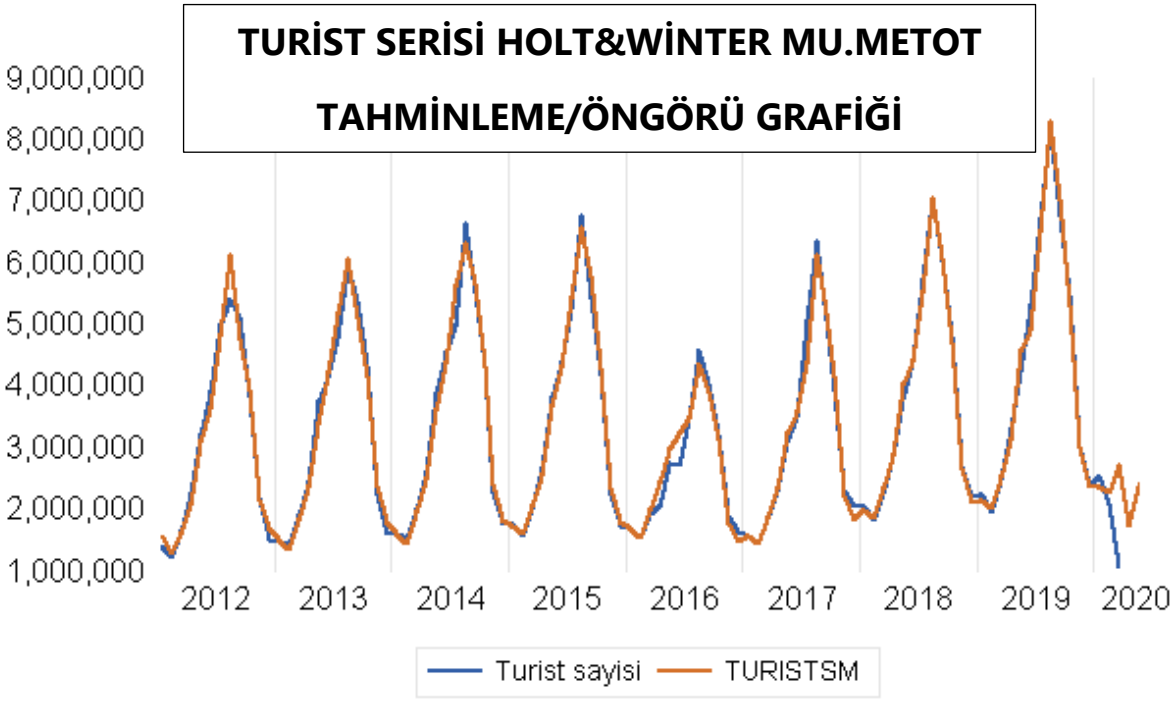
TURİST SERİSİ - HOLT&WİNTERS MULTİPLİCATİVE METOT



TURİST SERİSİ - HOLT&WİNTERS MU.METOT - TAHMİN SONUÇLARI

Date: 01/12/22 Time: 22:28
Sample: 2012M01 2020M03
Included observations: 99
Method: Holt-Winters Multiplicative Seasonal
Original Series: TURIST_SAYISI
Forecast Series: TURISTSM

Parameters:	Alpha		0.8200
	Beta		0.0000
	Gamma		0.0000
Sum of Squared Residuals			6.74E+12
Root Mean Squared Error			261009.4
End of Period Levels:	Mean		2240382.
	Trend		15273.93
	Seasonals:	2019M04	0.758087
		2019M05	1.057878
		2019M06	1.206840
		2019M07	1.499422
		2019M08	1.855837
		2019M09	1.584951
		2019M10	1.230314
		2019M11	0.678398
		2019M12	0.533516
		2020M01	0.521098
		2020M02	0.470215
		2020M03	0.603444



TURİST SERİSİ - ETS TESTİ

ETS Smoothing
Original series: TURIST_SAYISI
Date: 01/12/22 Time: 22:32
Sample: 2012M01 2020M05
Included observations: 99
Model: M,MD,A - Multiplicative Error, Multiplicative -Dampened Trend, Additive Season (Auto E=*, T=*, S=*)
Model selection: Akaike Information Criterion
Failure to improve objective (non-zero gradients) after 0 iterations

Parameters	
Alpha:	0.999982
Beta:	0.999762
Gamma:	0.000000
Phi:	0.565377

Initial Parameters	
Initial level:	1559122.
Initial trend:	0.701527
Initial state 1:	-47342.09
Initial state 2:	47342.09

Compact Log-likelihood	-1543.811
Log-likelihood	-1456.827
Akaike Information Criterion	3101.621
Schwarz Criterion	3119.787
Hannan-Quinn Criterion	3108.971
Sum of Squared Residuals	3.966615
Root Mean Squared Error	0.200167
Average Mean Squared Error	3.13E+12

DOĞRU TAHMİN

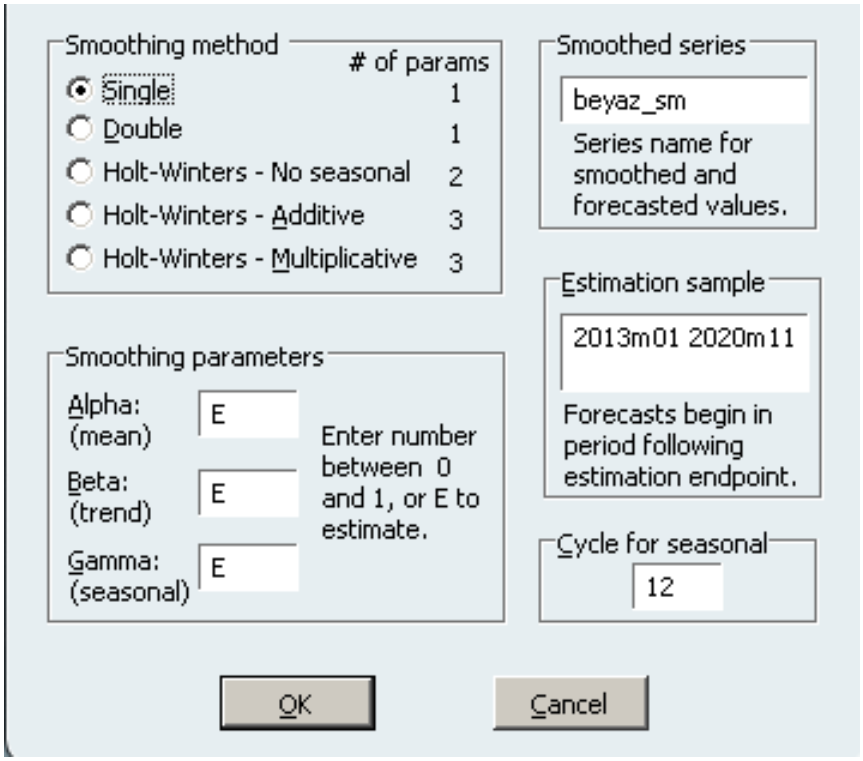
SONUCU

TURİST SERİSİ - HOLT&WİNTERS MU.METOT - TAHMİN SONUÇLARI

	TURIST_SA...	TURISTSM
2017M10	3913759	4150187.
2017M11	2293847	2191886.
2017M12	2041323	1797677.
2018M01	2045341	1958929.
2018M02	1806822	1838765.
2018M03	2270019	2335358.
2018M04	2870569	2878107.
2018M05	3790524	4023807.
2018M06	4406894	4390616.
2018M07	5712975	5494549.
2018M08	7052433	7050636.
2018M09	6021357	6046961.
2018M10	4791439	4696433.
2018M11	2679420	2642941.
2018M12	2180881	2110176.
2019M01	2226288	2125647.
2019M02	1944957	1999732.
2019M03	2473147	2517907.
2019M04	3266256	3128636.
2019M05	4219837	4539506.
2019M06	5276253	4898122.
2019M07	6703045	6493740.
2019M08	8167150	8278079.
2019M09	6741769	7016300.
2019M10	5437494	5290436.
2019M11	3005517	2994010.
2019M12	2398329	2370166.
2020M01	2529423	2345514.
2020M02	2051923	2259741.
2020M03	1058068	2690537.
2020M04	NA	1709984.
2020M05	NA	2402367.

GERÇEK VERİDE 2020 M03'de PANDEMİ BAŞLAMASI NEDENİYLE, 1 MİLYON CİVARI TURİST GELMİŞTİR. 2020'NİN 2. AYINDA EN YAKIN TAHMİNİ HOLT WİNTER MULTİPLİCATİVE İLE YAPSAK DA M03 OLAN 2020'NİN 3.AYINI TAHMİN ETMEMİZ OLANAKSIZDIR. 2020'NİN 3. AYINDA PANDEMİ SEBEBİYLE VERİ SETİNDE ANOMALİ MEYDANA GELMİŞTİR.

BEYAZ ET SERİSİ - SİNGLE METOT

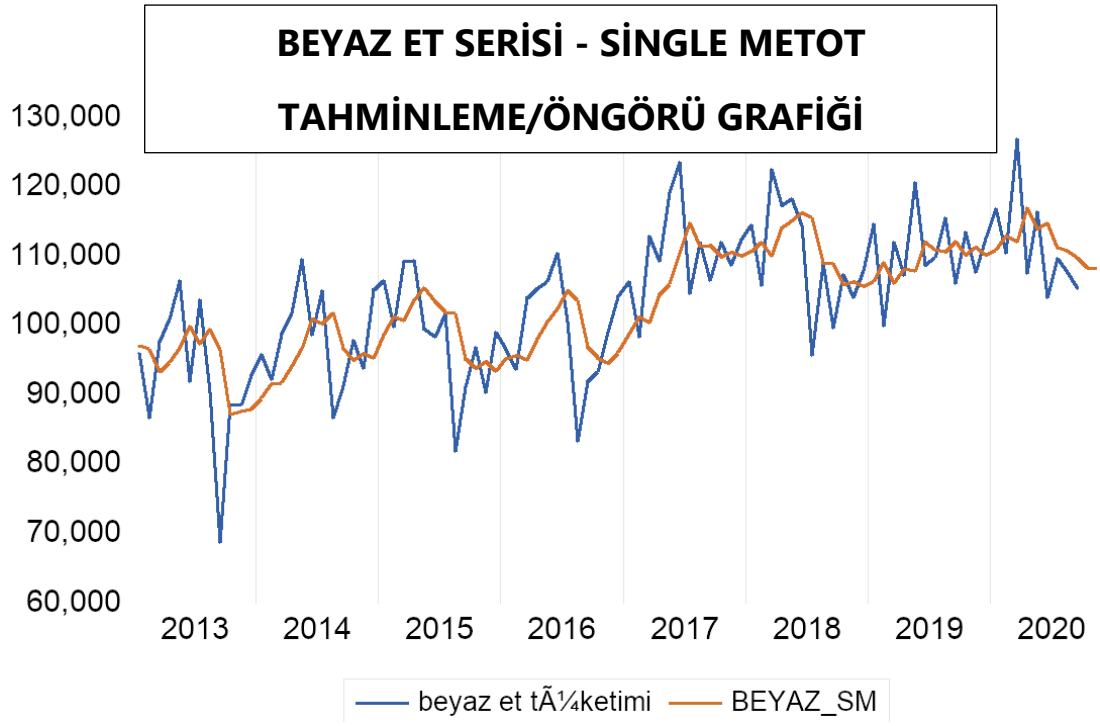


BEYAZ ET SERİSİ SİNGLE METOT - TAHMİN SONUÇLARI

Date: 01/10/22 Time: 21:10
Sample: 2013M01 2020M09
Included observations: 93
Method: Single Exponential
Original Series: BEYAZ_ET_T__KETIMI
Forecast Series: BEYAZ_SM

Parameters:	Alpha	0.3320
Sum of Squared Residuals		5.86E+09
Root Mean Squared Error		7941.077

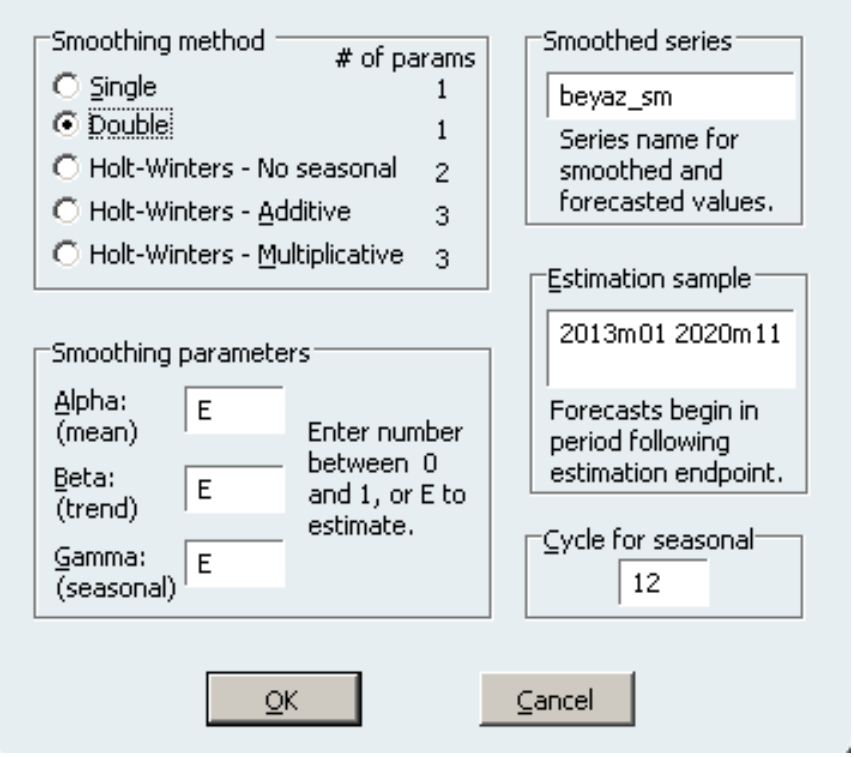
End of Period Levels:	Mean	108184.2



BEYAZ ET SERİSİ - SİNGLE METOT

	EYAZ_ET_...	BEYAZ_SM
2017M12	112319	109901.1
2018M01	114527	110703.9
2018M02	105689	111973.2
2018M03	122517	109886.8
2018M04	117227	114080.1
2018M05	118280	115124.9
2018M06	114276	116172.4
2018M07	95641	115542.8
2018M08	108939	108935.3
2018M09	99595	108936.5
2018M10	107276	105835.1
2018M11	104040	106313.5
2018M12	107948	105558.7
2019M01	114609	106351.9
2019M02	99892	109093.3
2019M03	111931	106038.4
2019M04	107158	107994.8
2019M05	120595	107717.0
2019M06	108610	111992.6
2019M07	109772	110869.5
2019M08	115463	110505.1
2019M09	106023	112151.2
2019M10	113407	110116.6
2019M11	107674	111209.0
2019M12	112597	110035.4
2020M01	116848	110885.9
2020M02	110442	112865.3
2020M03	126915	112060.8
2020M04	107496	116992.5
2020M05	116417	113839.6
2020M06	103937	114695.3
2020M07	109647	111123.5
2020M08	107667	110633.3
2020M09	105238	109648.5
2020M10	NA	108184.2
2020M11	NA	108184.2

BEYAZ ET SERİSİ - DOUBLE METOT

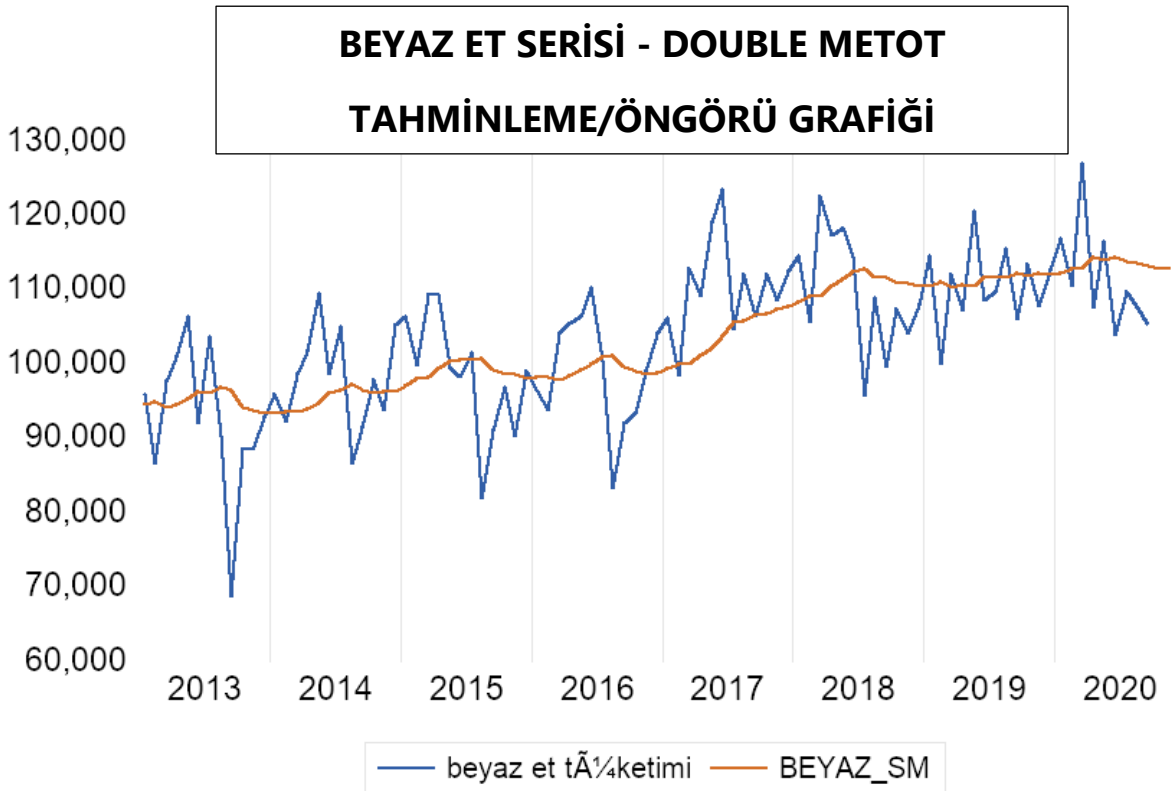


BEYAZ ET SERİSİ DOUBLE METOT - TAHMİN SONUÇLARI

Date: 01/10/22 Time: 21:12
Sample: 2013M01 2020M09
Included observations: 93
Method: Double Exponential
Original Series: BEYAZ_ET_T__KETIMI
Forecast Series: BEYAZ_SM

Parameters:	Alpha	0.0440
Sum of Squared Residuals		6.07E+09
Root Mean Squared Error		8079.048

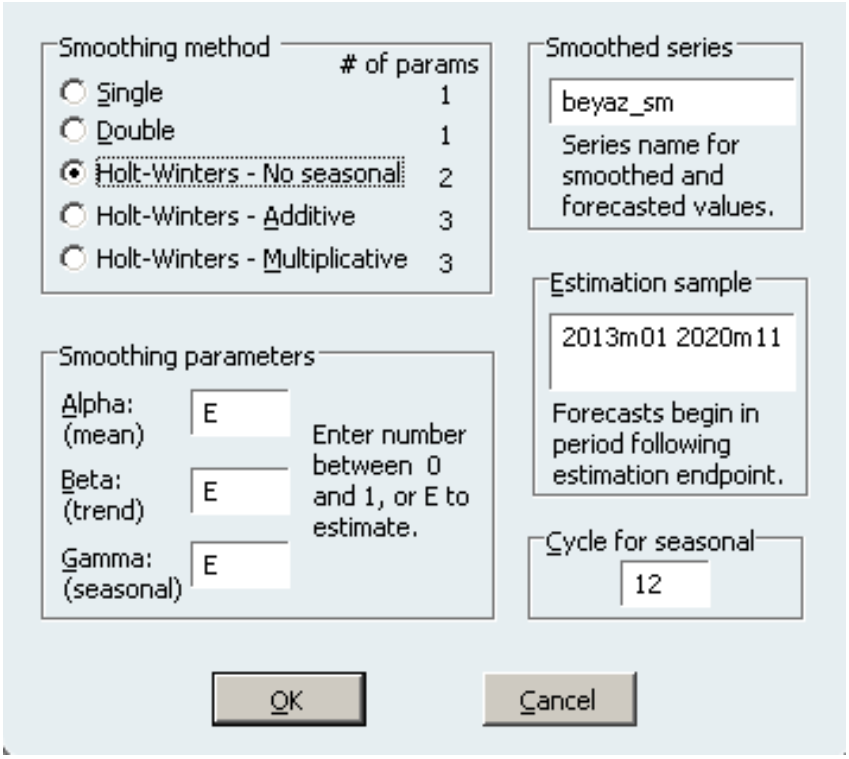
End of Period Levels:	Mean	112555.5
	Trend	173.1558



BEYAZ ET SERİSİ - DOUBLE METOT

	EYAZ_ET_...	BEYAZ_SM
2018M01	114527	108380.3
2018M02	105689	109167.6
2018M03	122517	109120.1
2018M04	117227	110550.5
2018M05	118280	111415.5
2018M06	114276	112310.0
2018M07	95641	112786.9
2018M08	108939	111586.1
2018M09	99595	111627.7
2018M10	107276	110838.5
2018M11	104040	110771.2
2018M12	107948	110418.2
2019M01	114609	110427.0
2019M02	99892	111016.3
2019M03	111931	110267.1
2019M04	107158	110621.5
2019M05	120595	110528.0
2019M06	108610	111618.1
2019M07	109772	111577.4
2019M08	115463	111636.7
2019M09	106023	112188.0
2019M10	113407	111867.7
2019M11	107674	112213.2
2019M12	112597	112027.0
2020M01	116848	112281.4
2020M02	110442	112888.6
2020M03	126915	112887.6
2020M04	107496	114331.2
2020M05	116417	113966.6
2020M06	103937	114405.6
2020M07	109647	113712.8
2020M08	107667	113563.0
2020M09	105238	113244.3
2020M10	NA	112728.6
2020M11	NA	112901.8

BEYAZ ET SERİSİ - HOLT&WİNTERS NO SEASONAL METOT

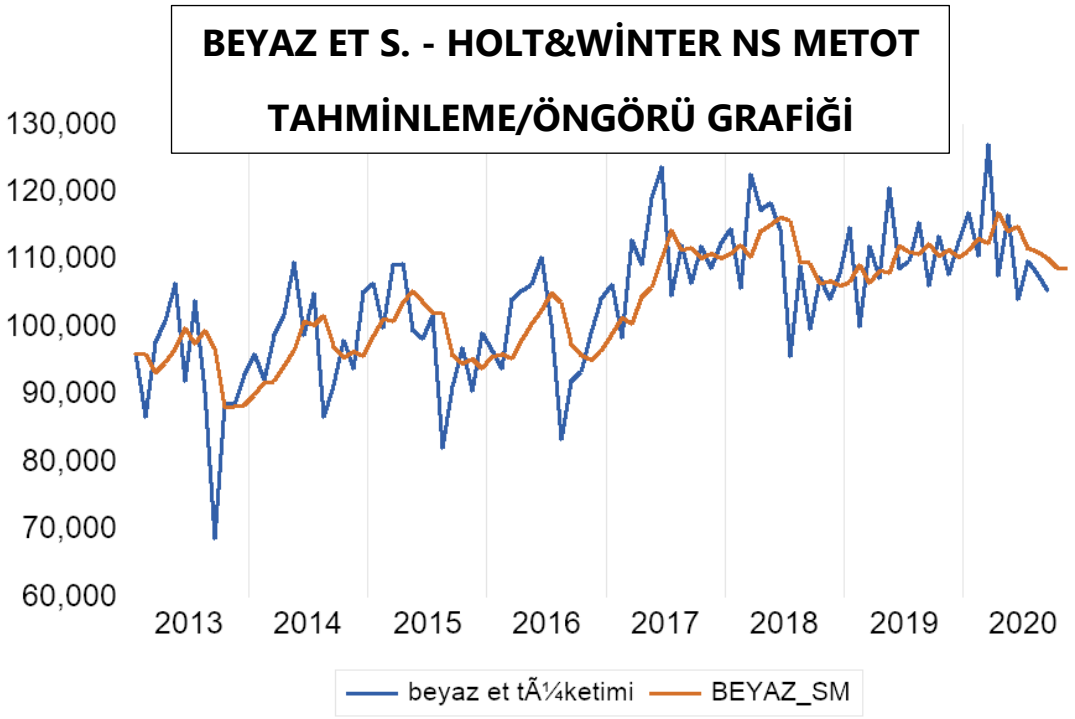


BEYAZ ET SERİSİ - HOLT&WİNTERS NS.METOT TAHMİN SONUÇLARI

Date: 01/10/22 Time: 19:55
Sample: 2013M01 2020M09
Included observations: 93
Method: Holt-Winters No Seasonal
Original Series: BEYAZ_ET_T__KETIMI
Forecast Series: BEYAZ_SM

Parameters:	Alpha	0.3100
	Beta	0.0000
Sum of Squared Residuals		5.85E+09
Root Mean Squared Error		7927.881

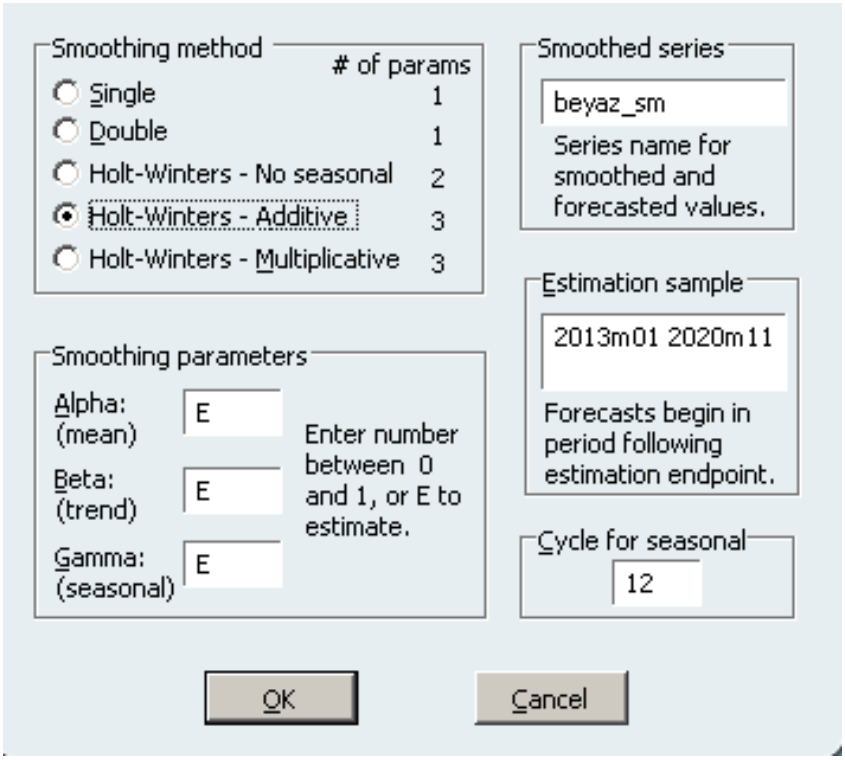
End of Period Levels:	Mean	108554.2
	Trend	69.17391



BEYAZ ET SERİSİ - HOLT&WİNTERS NS.METOT TAHMİN SONUÇLARI

	EYAZ_ET_...	BEYAZ_SM
2018M05	118280	115114.7
2018M06	114276	116165.2
2018M07	95641	115648.7
2018M08	108939	109515.4
2018M09	99595	109405.9
2018M10	107276	106433.7
2018M11	104040	106764.0
2018M12	107948	105988.7
2019M01	114609	106665.3
2019M02	99892	109197.0
2019M03	111931	106381.6
2019M04	107158	108171.1
2019M05	120595	107926.2
2019M06	108610	111922.7
2019M07	109772	110965.0
2019M08	115463	110664.3
2019M09	106023	112221.1
2019M10	113407	110368.8
2019M11	107674	111379.9
2019M12	112597	110300.2
2020M01	116848	111081.4
2020M02	110442	112938.2
2020M03	126915	112233.6
2020M04	107496	116854.0
2020M05	116417	114022.2
2020M06	103937	114833.8
2020M07	109647	111524.9
2020M08	107667	111011.9
2020M09	105238	110044.2
2020M10	NA	108623.4
2020M11	NA	108692.6

BEYAZ ET SERİSİ - HOLT&WİNTERS ADDİCTİVE METOT

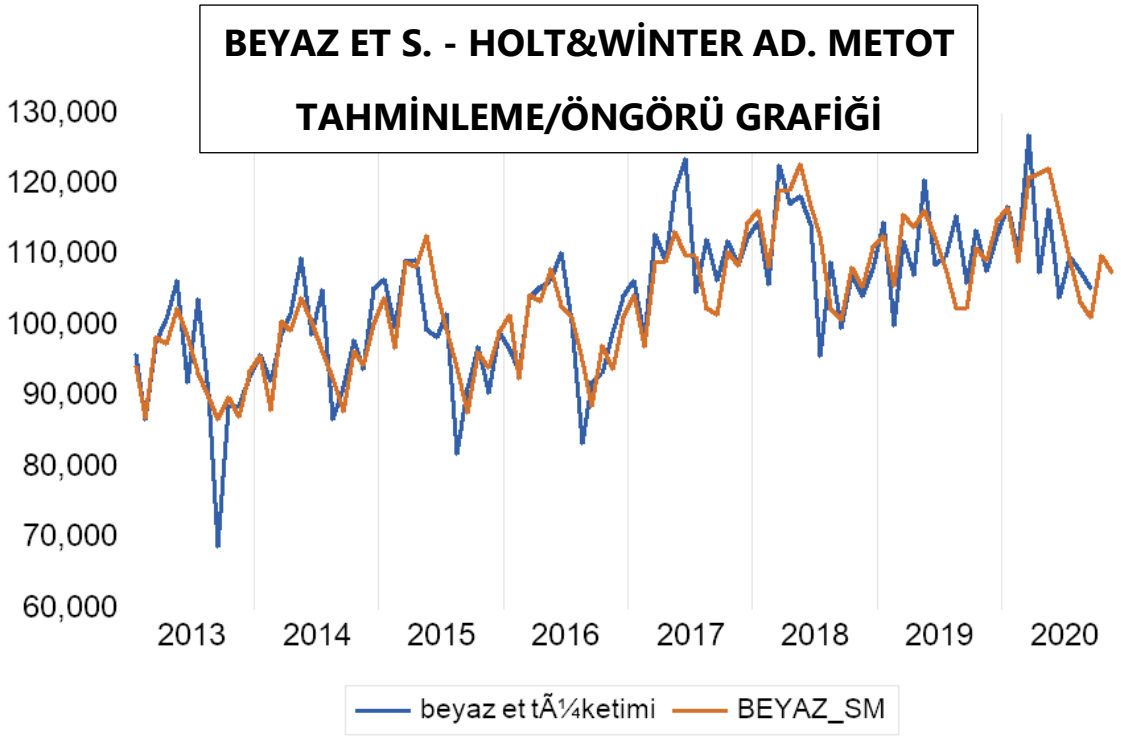


BEYAZ ET - HOLT&WİNTERS AD.METOT TAHMİN SONUÇLARI

Date: 01/10/22 Time: 21:07
Sample: 2013M01 2020M09
Included observations: 93
Method: Holt-Winters Additive Seasonal
Original Series: BEYAZ_ET_T__KETIMI
Forecast Series: BEYAZ_SM

Parameters:	Alpha	0.2500
	Beta	0.0000
	Gamma	0.0000
Sum of Squared Residuals		2.98E+09
Root Mean Squared Error		5659.046

End of Period Levels:	Mean		111897.0
	Trend		250.0324
	Seasonals:	2019M10	-2262.887
		2019M11	-4985.348
		2019M12	747.0479
		2020M01	2962.262
		2020M02	-5015.914
		2020M03	6262.054
		2020M04	5165.736
		2020M05	9028.703
		2020M06	3917.671
		2020M07	110.4957
		2020M08	-6161.965
		2020M09	-9767.855



BEYAZ ET SERİSİ - DOĞRU CEVAP - ETS TESTİ

ETS Smoothing
Original series: BEYAZ_ET_T__KETIMI
Date: 01/12/22 Time: 22:35
Sample: 2013M01 2020M11
Included observations: 93
Model: A,N,N - Additive Error, No Trend, No Season
(Simple exponential model) (Auto E=*, T=*, S=*)
Model selection: Akaike Information Criterion
Convergence achieved after 5 iterations

Parameters	
Alpha:	0.330648

Initial Parameters	
Initial level:	94740.85

Compact Log-likelihood	-1045.820
Log-likelihood	-967.0151
Akaike Information Criterion	2095.639
Schwarz Criterion	2100.705
Hannan-Quinn Criterion	2097.685
Sum of Squared Residuals	5.86E+09
Root Mean Squared Error	7935.277
Average Mean Squared Error	73357916

DOĞRU TAHMİN

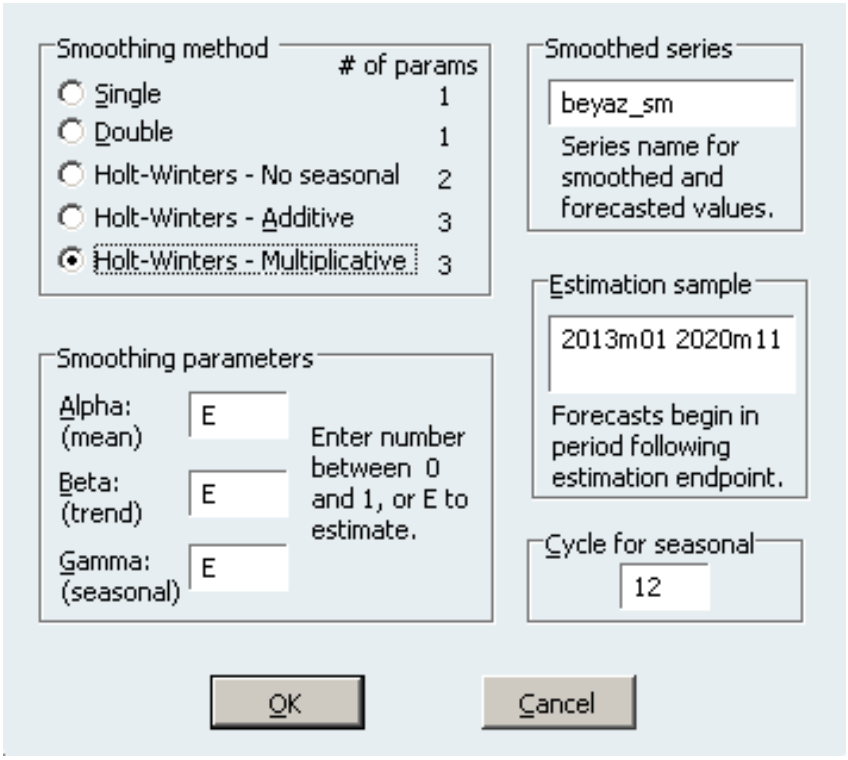
SONUCU

BEYAZ ET - HOLT&WİNTERS AD.METOT TAHMİN SONUÇLARI

	EYAZ_ET_...	BEYAZ_SM
2018M06	114276	116757.7
2018M07	95641	112580.1
2018M08	108939	102323.1
2018M09	99595	100621.2
2018M10	107276	108119.6
2018M11	104040	105436.3
2018M12	107948	111069.7
2019M01	114609	112754.5
2019M02	99892	105490.0
2019M03	111931	115618.6
2019M04	107158	113850.4
2019M05	120595	116290.4
2019M06	108610	112505.5
2019M07	109772	107974.5
2019M08	115463	102401.4
2019M09	106023	102310.8
2019M10	113407	110993.8
2019M11	107674	109124.7
2019M12	112597	114744.4
2020M01	116848	116672.9
2020M02	110442	108988.5
2020M03	126915	120879.9
2020M04	107496	121542.3
2020M05	116417	122143.9
2020M06	103937	115851.2
2020M07	109647	109315.7
2020M08	107667	103376.1
2020M09	105238	101092.9
2020M10	NA	109884.1
2020M11	NA	107411.7

BEYAZ ET TÜKETİMİ ADLI VERİ SETİ İÇİN, ÖNGÖRÜ/TAHMİN TESTİ YAPILDIĞINDA GERÇEĞE EN YAKIN SONUCU(RMSE) HOLT WİNTER ADDİCTİVE VERMİŞTİR.

BEYAZ ET SERİSİ - HOLT&WİNTERS MULTİPLİCATİVE METOT

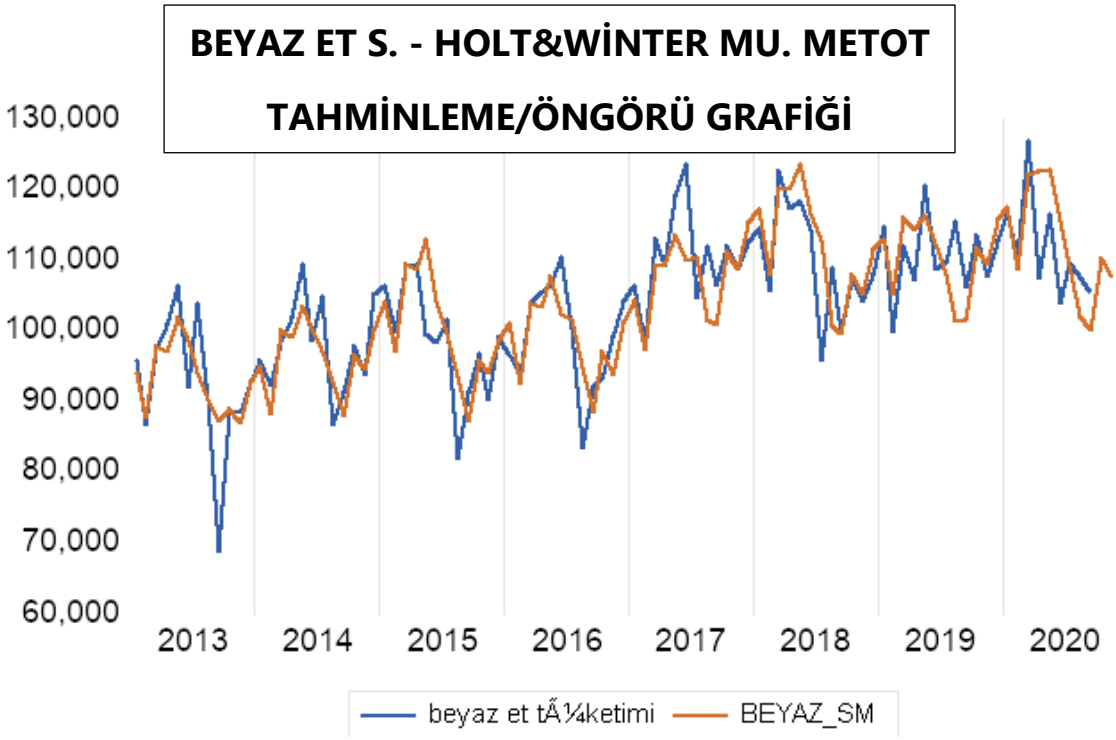


BEYAZ ET - HOLT&WİNTERS MU.METOT TAHMİN SONUÇLARI

Date: 01/10/22 Time: 20:50
Sample: 2013M01 2020M09
Included observations: 93
Method: Holt-Winters Additive Seasonal
Original Series: BEYAZ_ET_T__KETIMI
Forecast Series: BEYAZ_SM

Parameters:	Alpha	0.2500
	Beta	0.0000
	Gamma	0.0000
Sum of Squared Residuals		2.98E+09
Root Mean Squared Error		5659.046

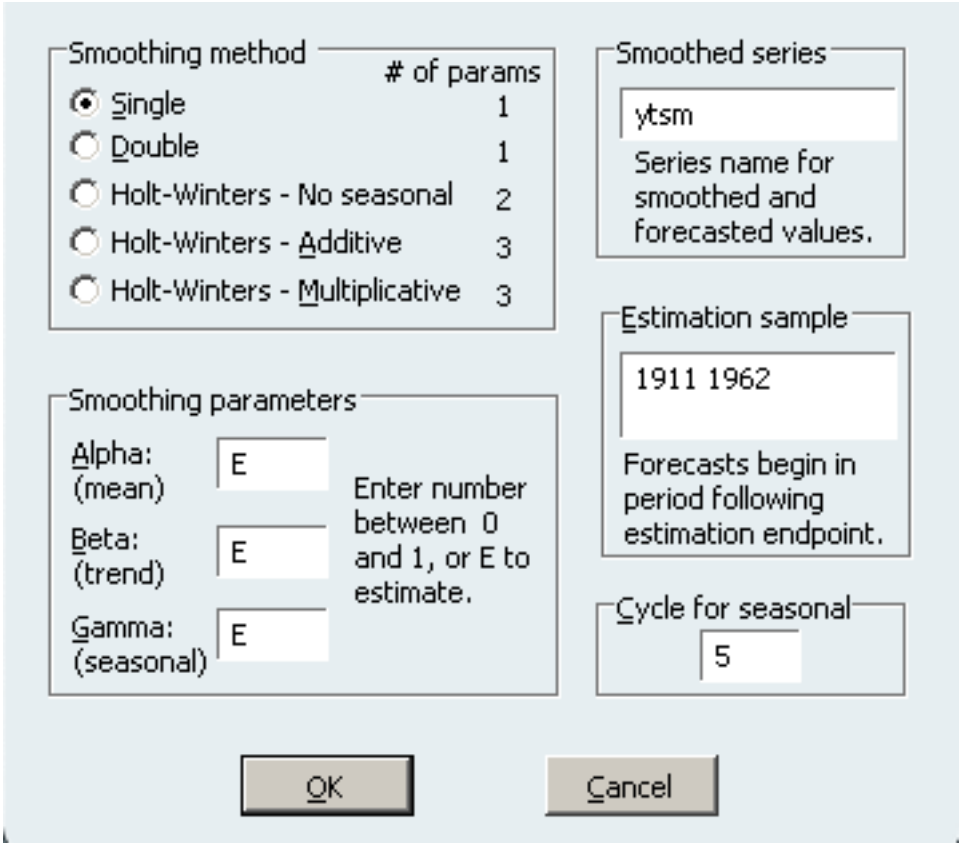
End of Period Levels:	Mean		111897.0
	Trend		250.0324
	Seasonals:	2019M10	-2262.887
		2019M11	-4985.348
		2019M12	747.0479
		2020M01	2962.262
		2020M02	-5015.914
		2020M03	6262.054
		2020M04	5165.736
		2020M05	9028.703
		2020M06	3917.671
		2020M07	110.4957
		2020M08	-6161.965
		2020M09	-9767.855



BEYAZ ET - HOLT&WİNTERS MU.METOT TAHMİN SONUÇLARI

	EYAZ_ET_...	BEYAZ_SM
2018M04	117227	119933.7
2018M05	118280	123525.2
2018M06	114276	116518.8
2018M07	95641	112581.0
2018M08	108939	100715.9
2018M09	99595	99460.23
2018M10	107276	107963.3
2018M11	104040	105210.4
2018M12	107948	111319.7
2019M01	114609	113031.6
2019M02	99892	105138.2
2019M03	111931	115909.1
2019M04	107158	114106.7
2019M05	120595	116270.5
2019M06	108610	112160.9
2019M07	109772	108001.9
2019M08	115463	101330.6
2019M09	106023	101646.1
2019M10	113407	111615.8
2019M11	107674	109444.0
2019M12	112597	115625.2
2020M01	116848	117528.9
2020M02	110442	108711.2
2020M03	126915	122074.0
2020M04	107496	122669.2
2020M05	116417	122744.4
2020M06	103937	115486.5
2020M07	109647	109054.6
2020M08	107667	102004.2
2020M09	105238	100010.7
2020M10	NA	110103.0
2020M11	NA	107482.0

Y SERİSİ - SİNGLE METOT

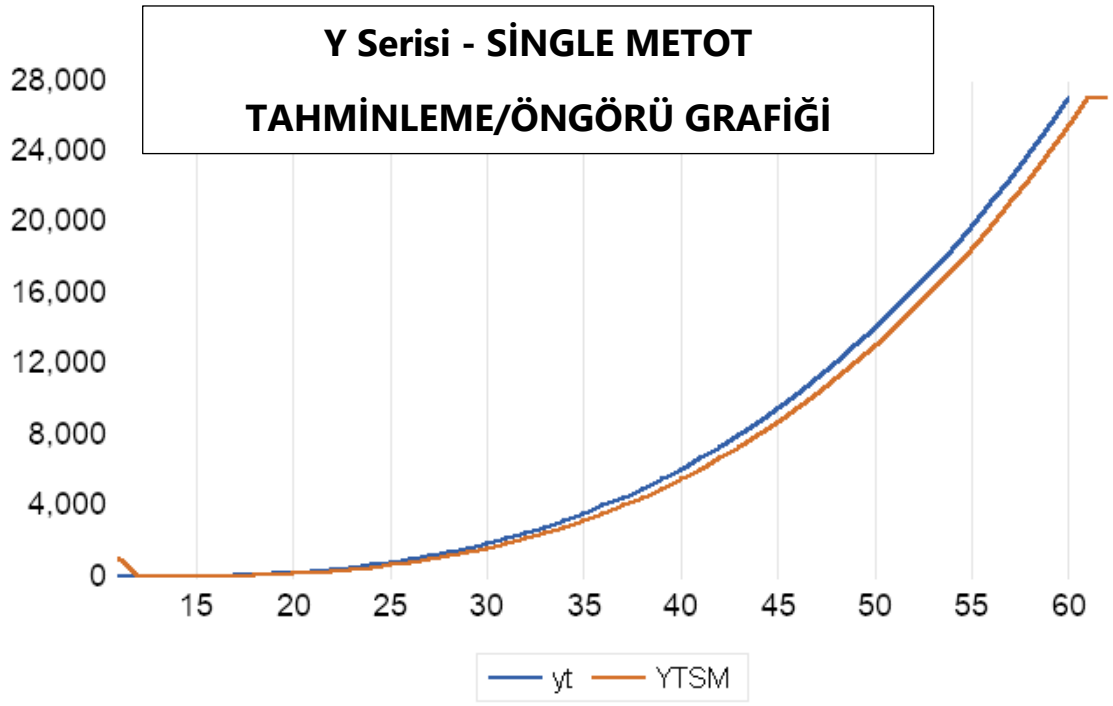


Y SERİSİ - SİNGLE METOT TAHMİN SONUÇLARI

Date: 01/14/22 Time: 03:04
Sample: 1911 1960
Included observations: 50
Method: Single Exponential
Original Series: YT
Forecast Series: YTSM

Parameters:	Alpha	0.9990
Sum of Squared Residuals		26710857
Root Mean Squared Error		730.9016

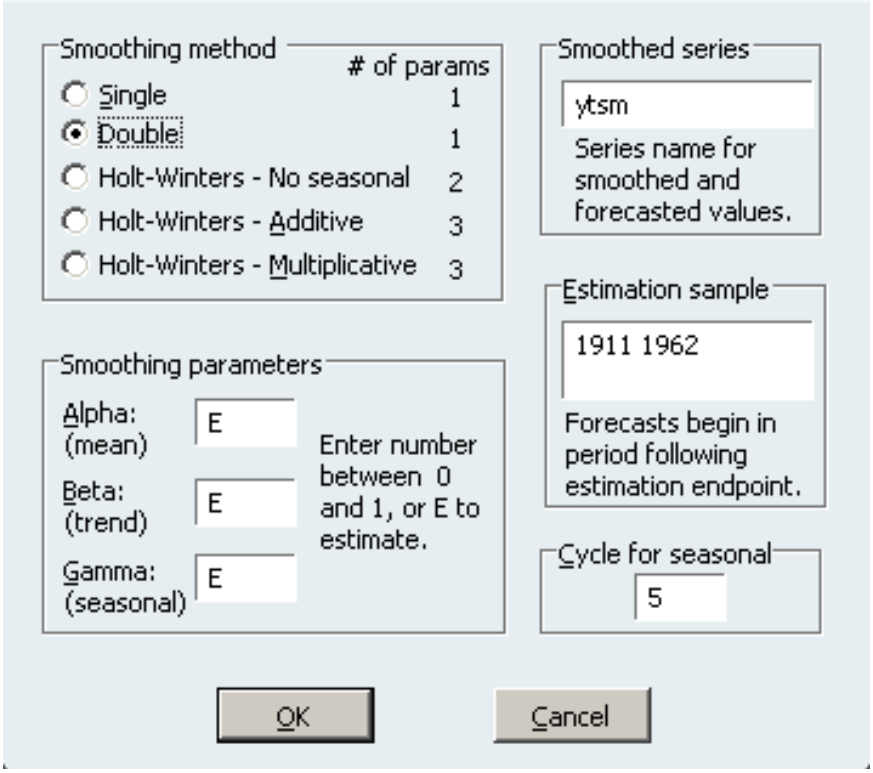
End of Period Levels:	Mean	27012.96



Y SERİSİ - SİNGLE METOT TAHMİN SONUÇLARI

	YT	YTSM
1923	578.2884	465.6511
1924	710.1736	578.1758
1925	862.7233	710.0416
1926	1028.503	862.5706
1927	1218.914	1028.337
1928	1432.502	1218.724
1929	1666.700	1432.288
1930	1928.026	1666.466
1931	2211.599	1927.765
1932	2523.027	2211.315
1933	2863.400	2522.715
1934	3230.571	2863.059
1935	3631.759	3230.203
1936	4065.417	3631.358
1937	4528.319	4064.983
1938	5027.549	4527.856
1939	5562.351	5027.049
1940	6129.848	5561.815
1941	6736.730	6129.280
1942	7383.583	6736.123
1943	8067.865	7382.935
1944	8797.216	8067.180
1945	9567.946	8796.486
1946	10377.96	9567.175
1947	11236.14	10377.15
1948	12141.65	11235.28
1949	13093.91	12140.75
1950	14090.98	13092.96
1951	15141.75	14089.98
1952	16243.82	15140.70
1953	17393.15	16242.71
1954	18599.53	17392.00
1955	19859.01	18598.33
1956	21174.72	19857.75
1957	22544.83	21173.40
1958	23975.49	22543.46
1959	25464.98	23974.06
1960	27014.51	25463.49
1961	NA	27012.96
1962	NA	27012.96

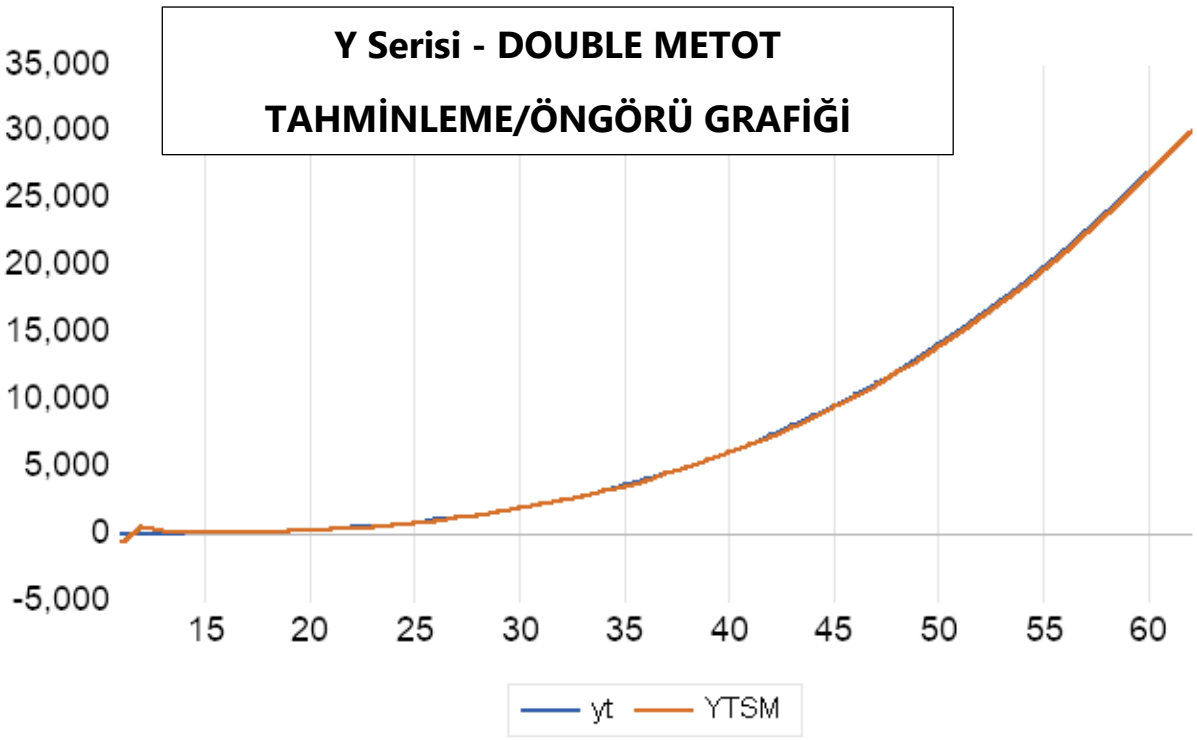
Y SERİSİ - DOUBLE METOT



Y SERİSİ - DOUBLE METOT TAHMİN SONUÇLARI

Date: 01/14/22 Time: 03:12
Sample: 1911 1960
Included observations: 50
Method: Double Exponential
Original Series: YT
Forecast Series: YTSM

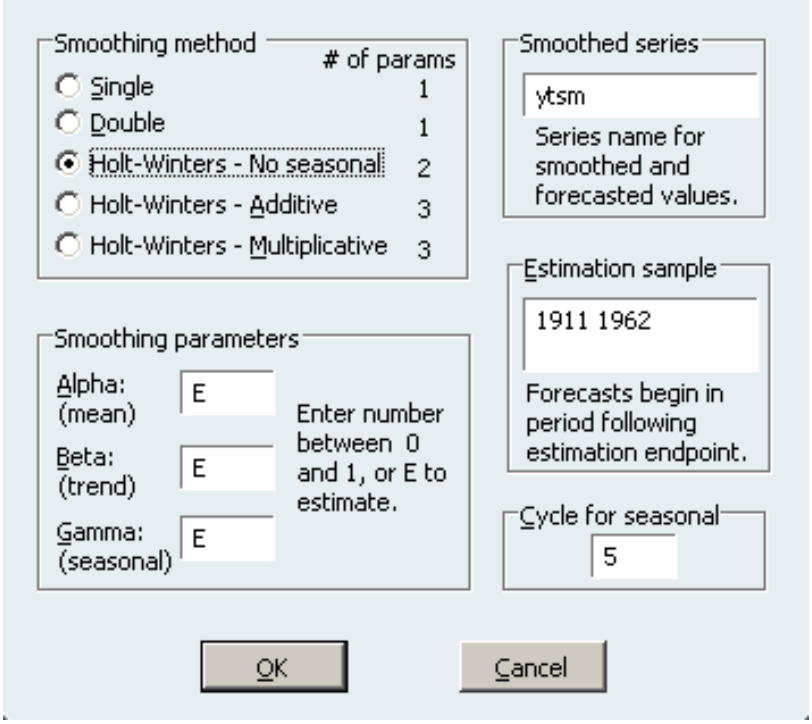
Parameters: Alpha		0.7720
Sum of Squared Residuals		949259.4
Root Mean Squared Error		137.7868
End of Period Levels:	Mean	27009.31
	Trend	1514.284



Y SERİSİ - DOUBLE METOT TAHMİN SONUÇLARI

	YT	YTSM
1937	4528.319	4477.168
1938	5027.549	4970.704
1939	5562.351	5503.516
1940	6129.848	6073.278
1941	6736.730	6674.607
1942	7383.583	7318.225
1943	8067.865	8003.861
1944	8797.216	8726.359
1945	9567.946	9497.582
1946	10377.96	10310.27
1947	11236.14	11160.76
1948	12141.65	12063.46
1949	13093.91	13015.43
1950	14090.98	14014.45
1951	15141.75	15057.23
1952	16243.82	16157.96
1953	17393.15	17311.12
1954	18599.53	18509.54
1955	19859.01	19769.15
1956	21174.72	21082.19
1957	22544.83	22452.90
1958	23975.49	23877.83
1959	25464.98	25366.39
1960	27014.51	26914.59
1961	NA	28523.60
1962	NA	30037.88

Y SERİSİ - HOLT&WİNTER NO SEASONAL METOT

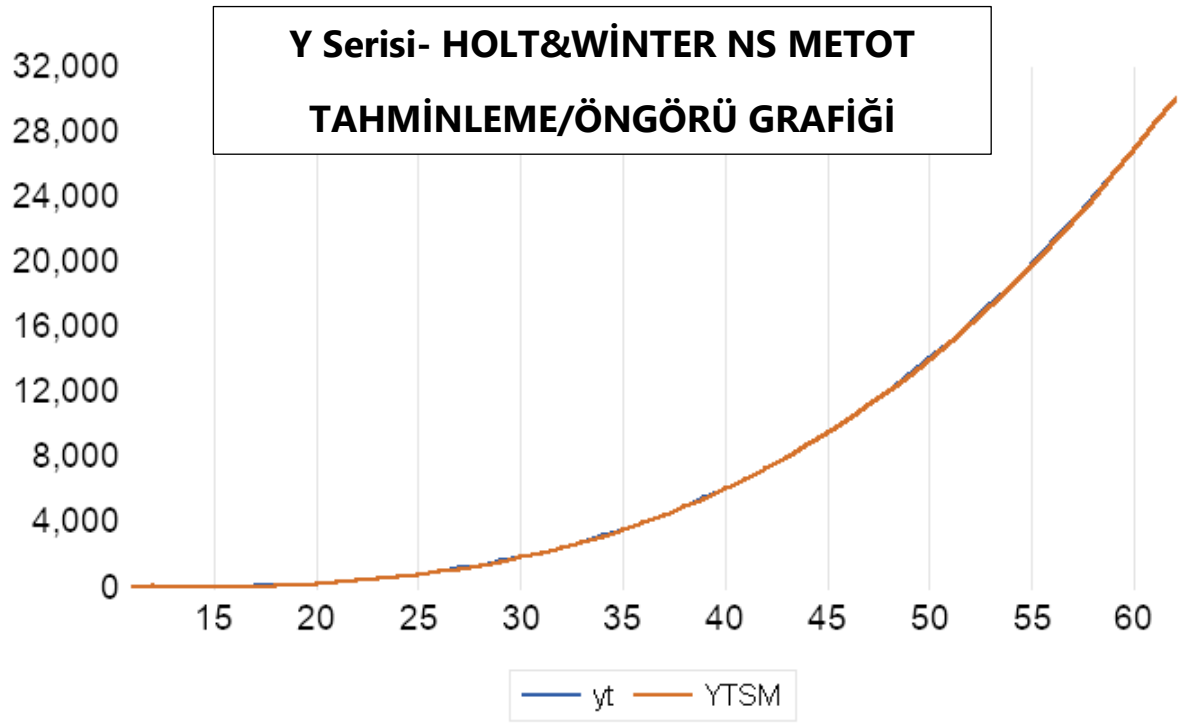


Y SERİSİ - HOLT&WİNTER NS. - METOT TAHMİN SONUÇLARI

Date: 01/14/22 Time: 03:16
Sample: 1911 1960
Included observations: 50
Method: Holt-Winters No Seasonal
Original Series: YT
Forecast Series: YTSM

Parameters:	Alpha	1.0000
	Beta	1.0000
Sum of Squared Residuals		89175.24
Root Mean Squared Error		42.23156

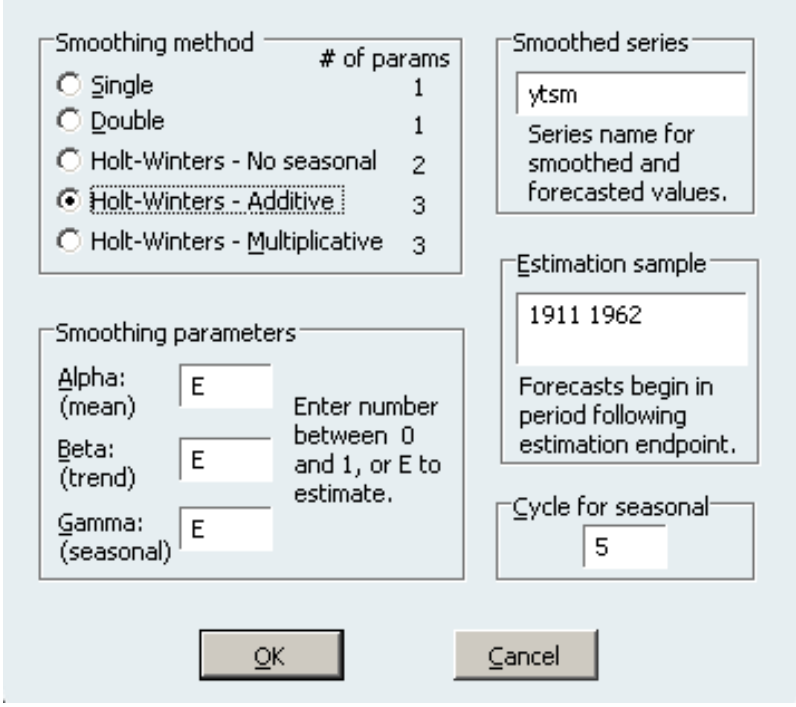
End of Period Levels:	Mean	27014.51
	Trend	1549.527



Y SERİSİ - HOLT&WİNTER NS. METOT - TAHMİN SONUÇLARI

	YT	YTSM
1934	3230.571	3203.772
1935	3631.759	3597.743
1936	4065.417	4032.947
1937	4528.319	4499.075
1938	5027.549	4991.221
1939	5562.351	5526.779
1940	6129.848	6097.152
1941	6736.730	6697.345
1942	7383.583	7343.613
1943	8067.865	8030.435
1944	8797.216	8752.148
1945	9567.946	9526.566
1946	10377.96	10338.68
1947	11236.14	11187.97
1948	12141.65	12094.32
1949	13093.91	13047.17
1950	14090.98	14046.17
1951	15141.75	15088.04
1952	16243.82	16192.53
1953	17393.15	17345.88
1954	18599.53	18542.48
1955	19859.01	19805.92
1956	21174.72	21118.49
1957	22544.83	22490.42
1958	23975.49	23914.94
1959	25464.98	25406.15
1960	27014.51	26954.47
1961	NA	28564.03
1962	NA	30113.56

Y SERİSİ - HOLT&WİNTER ADDİCTİVE METOT

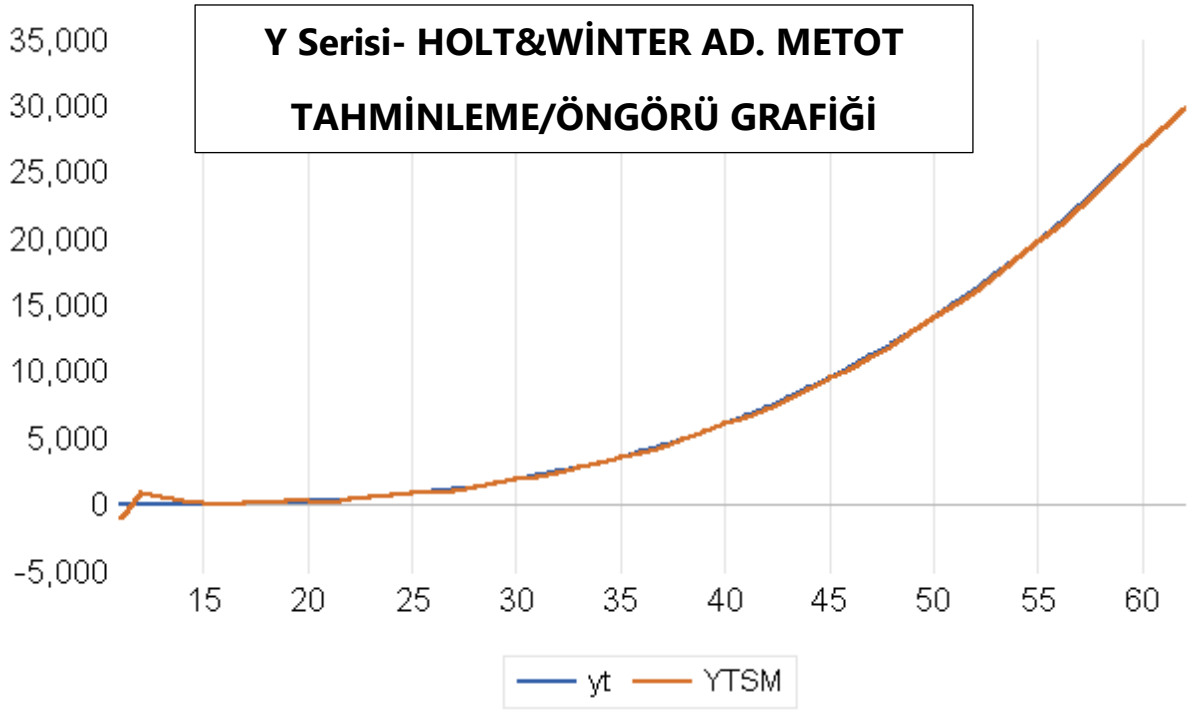


Y SERİSİ - HOLT&WİNTER AD. METOT - TAHMİN SONUÇLARI

Date: 01/14/22 Time: 03:23
Sample: 1911 1960
Included observations: 50
Method: Holt-Winters Additive Seasonal
Original Series: YT
Forecast Series: YTSM

Parameters:	Alpha		0.9800
	Beta		0.4800
	Gamma		0.5201
Sum of Squared Residuals			3022248.
Root Mean Squared Error			245.8555

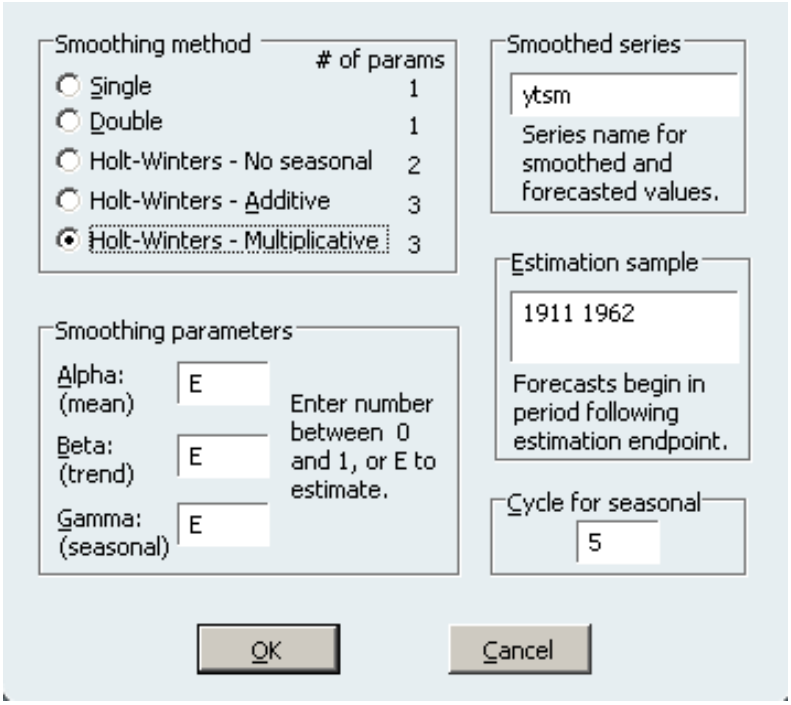
End of Period Levels:	Mean		26941.29
	Trend		1445.393
	Seasonals:	1956	10.52483
		1957	-41.98857
		1958	-39.68224
		1959	-0.205842
		1960	71.35182



Y SERİSİ - HOLT&WİNTER AD. METOT - TAHMİN SONUÇLARI

	YT	YTSM
1942	7383.583	7260.088
1943	8067.865	8021.862
1944	8797.216	8764.061
1945	9567.946	9540.885
1946	10377.96	10186.39
1947	11236.14	11098.71
1948	12141.65	12078.06
1949	13093.91	13050.36
1950	14090.98	14055.20
1951	15141.75	14932.83
1952	16243.82	16091.75
1953	17393.15	17321.72
1954	18599.53	18542.22
1955	19859.01	19807.67
1956	21174.72	20956.73
1957	22544.83	22382.73
1958	23975.49	23885.20
1959	25464.98	25396.42
1960	27014.51	26950.50
1961	NA	28397.21
1962	NA	29790.09

Y SERİSİ - HOLT&WİNTER MULTİPLİCATİVE METOT

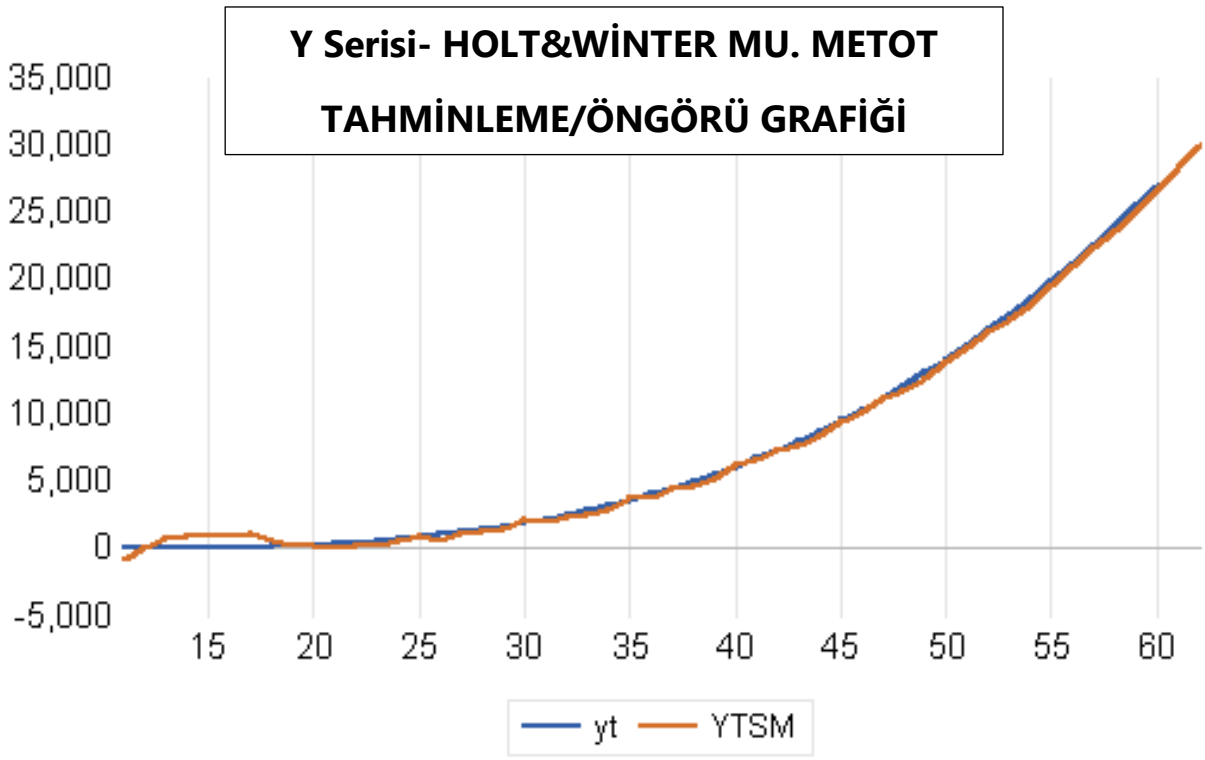


Y SERİSİ - HOLT&WİNTER MU. METOT - TAHMİN SONUÇLARI

Date: 01/14/22 Time: 03:51
Sample: 1911 1960
Included observations: 50
Method: Holt-Winters Multiplicative Seasonal
Original Series: YT
Forecast Series: YTSM

Parameters:	Alpha	0.3000
	Beta	0.5500
	Gamma	0.4901
Sum of Squared Residuals		8186815.
Root Mean Squared Error		404.6434

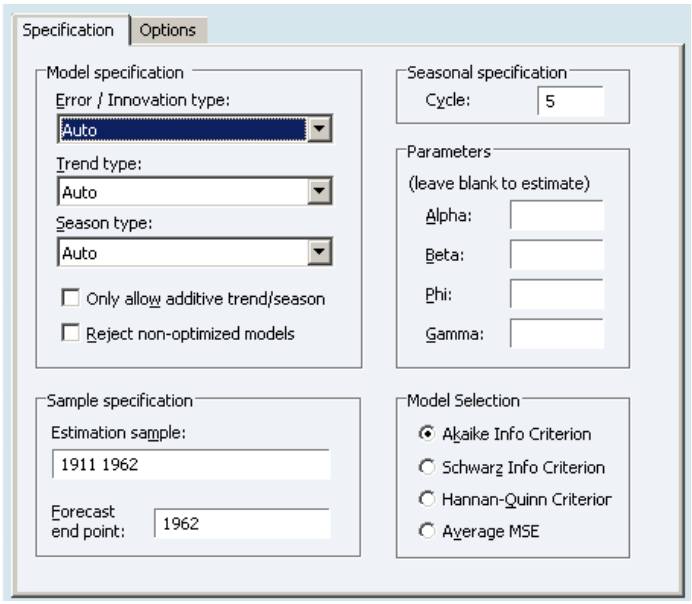
End of Period Levels:	Mean		26786.54
	Trend		1509.760
	Seasonals:	1956	1.000155
		1957	1.003036
		1958	1.001085
		1959	0.997019
		1960	0.998706



Y SERİSİ - HOLT&WİNTER MU. METOT - TAHMİN SONUÇLARI

	YT	YTSM
1940	6129.848	6181.455
1941	6736.730	6520.520
1942	7383.583	7265.963
1943	8067.865	7705.400
1944	8797.216	8324.882
1945	9567.946	9503.321
1946	10377.96	10160.28
1947	11236.14	11110.13
1948	12141.65	11780.82
1949	13093.91	12583.01
1950	14090.98	13914.95
1951	15141.75	14897.16
1952	16243.82	16085.61
1953	17393.15	17041.53
1954	18599.53	18074.29
1955	19859.01	19577.56
1956	21174.72	20892.97
1957	22544.83	22348.67
1958	23975.49	23620.80
1959	25464.98	24935.70
1960	27014.51	26648.18
1961	NA	28300.69
1962	NA	29896.55

Y SERİSİ - ETS SMOOTHİNG



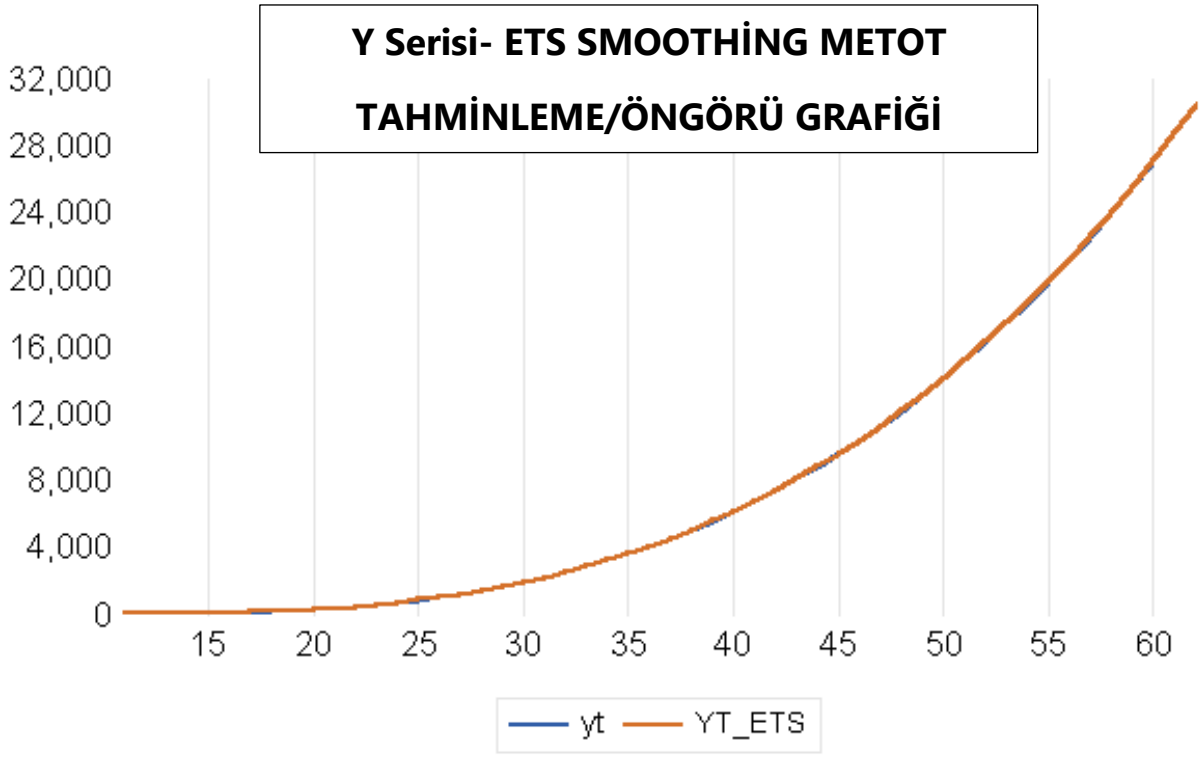
Y SERİSİ - ETS SMOOTHİNG METOT - TAHMİN SONUÇLARI

ETS Smoothing
Original series: YT
Date: 01/14/22 Time: 04:03
Sample: 1911 1962
Included observations: 50
Model: A,M,A - Additive Error, Multiplicative Trend, Additive Season (Auto E=*, T=*, S=*)
Model selection: Akaike Information Criterion
Convergence achieved on boundaries.

Parameters	
Alpha:	1.000000
Beta:	1.000000
Gamma:	0.000000

Initial Parameters	
Initial level:	2.041170
Initial trend:	1.592187
Initial state 1:	-0.447579
Initial state 2:	1.117825
Initial state 3:	0.079678
Initial state 4:	-0.217831
Initial state 5:	-0.532092

Compact Log-likelihood	-247.2953
Log-likelihood	-220.4417
Akaike Information Criterion	512.5907
Schwarz Criterion	529.7989
Hannan-Quinn Criterion	519.1436
Sum of Squared Residuals	19741.64
Root Mean Squared Error	19.87040
Average Mean Squared Error	7249.782



Y SERİSİ - ETS SMOOTHİNG METOT - TAHMİN SONUÇLARI

	YT	YT_ETS
1942	7383.583	7404.108
1943	8067.865	8092.463
1944	8797.216	8816.248
1945	9567.946	9589.710
1946	10377.96	10407.96
1947	11236.14	11256.95
1948	12141.65	12165.21
1949	13093.91	13120.84
1950	14090.98	14118.09
1951	15141.75	15165.69
1952	16243.82	16271.29
1953	17393.15	17426.02
1954	18599.53	18624.50
1955	19859.01	19886.85
1956	21174.72	21205.47
1957	22544.83	22578.00
1958	23975.49	24003.53
1959	25464.98	25497.64
1960	27014.51	27044.28
1961	NA	28660.00
1962	NA	30406.13

Y SERİSİ ADLI VERİ SETİ İÇİN, ÖNGÖRÜ/TAHMİN TESTİ YAPILDIĞINDA GERÇEĞE EN YAKIN SONUCU(RMSE) ETS SMOOTHİNG VERMİŞTİR.

DOĞRU TAHMİN SONUCU

T.C.

AKDENİZ ÜNİVERSİTESİ

SOSYAL BİLİMLER ENSTİTÜSÜ

BİLGİSAYAR UYGULAMALI TAHMİNLEME VE ÖNGÖRÜ FİNAL PROJESİ (2.SORU)

Sınav Notları Analizi

BARAN BATUHAN ALKAN

202152099001

OCAK 2022

ANTALYA

EMİSYON SERİSİ - DURAĞANLIK TESTİ

Durağan olmayan serilerle analiz, tahmin ve öngörüde bulunmak tutarsız ve yanlı sonuçlara neden olur. Zaman serilerini modelleyebilmek için serilerin durağan olması, değilse durağanlaştırılması gerekir. Zaman serisi verilerinin belirli bir zaman sürecinde sürekli artma veya azalmanın olmadığı, verilerin zaman boyunca bir yatay eksen boyunca saçılım gösterdiği biçimde tanımlanır. Genel bir tanımlama ile, sabit ortalama, sabit varyans ve seriye ait iki değer arasındaki farkın zamana değil, yalnızca iki zaman değeri arasındaki farka bağlı olması şeklinde ifade edilir.

Durağanlık : Bir zaman serisinde peş peşe gelen iki veri arasındaki fark, zamanın kendisinden kaynaklanmamakta sadece zaman aralığından kaynaklanmakta ise durağanlık sözkonusudur.

Eğer bir zaman serisinin ortalaması, varyansı ve kovaryansı zaman boyunca sabit kalıyorsa, serinin durağan olduğu söylenebilir.

Yukarıdaki tanımlardan herhangi birini sağlamayan bir zaman serisinin durağan olmadığını söyleyebiliriz.

Emisyon Serisi için Durağanlık Yorumu

- Serinin durağan olup olmadığını anlamak için en az 2-3 birim kök testi yapılması gerekmektedir.
- Emisyon serisi 1.dereceden entegre bir seridir I1 dir. Emisyon serisi düzeyde durağan dışıdır. **1. farkta durağandır**.
- **Durağan dışı bir seriyi farkını alarak durağanlaştırabiliriz**. 1. Farkta durağanlaşmazsa 1. Farkı alınan serinin 2. Farkı alınarak durağanlaştırmaya çalışa biliriz. Kaçıncı farkında durağanlaştığı bize tümleşme derecesini verir.

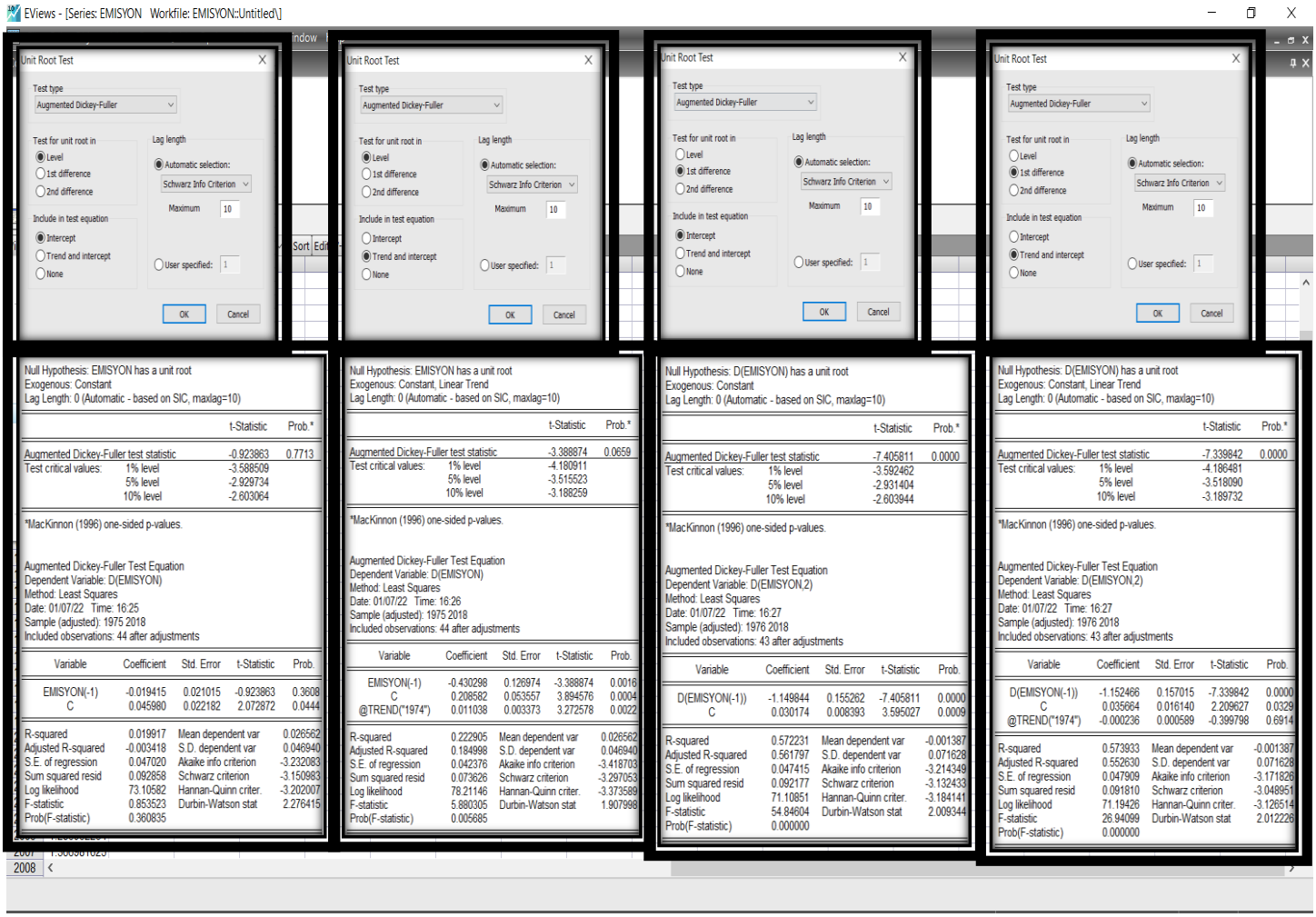
ADP - Testi Yorumu

Emisyon serisi Sabit Model de yanılma düzeyi %5 için Prob değeri **0.7713** test istatistiği>kritik değer -0.9238 > -2.9297 **H0 hipotezini reddemeyiz.** Emisyon serisinin birim kök içerdiği ve durağan bir yapıda olmadığını söyleye biliriz.

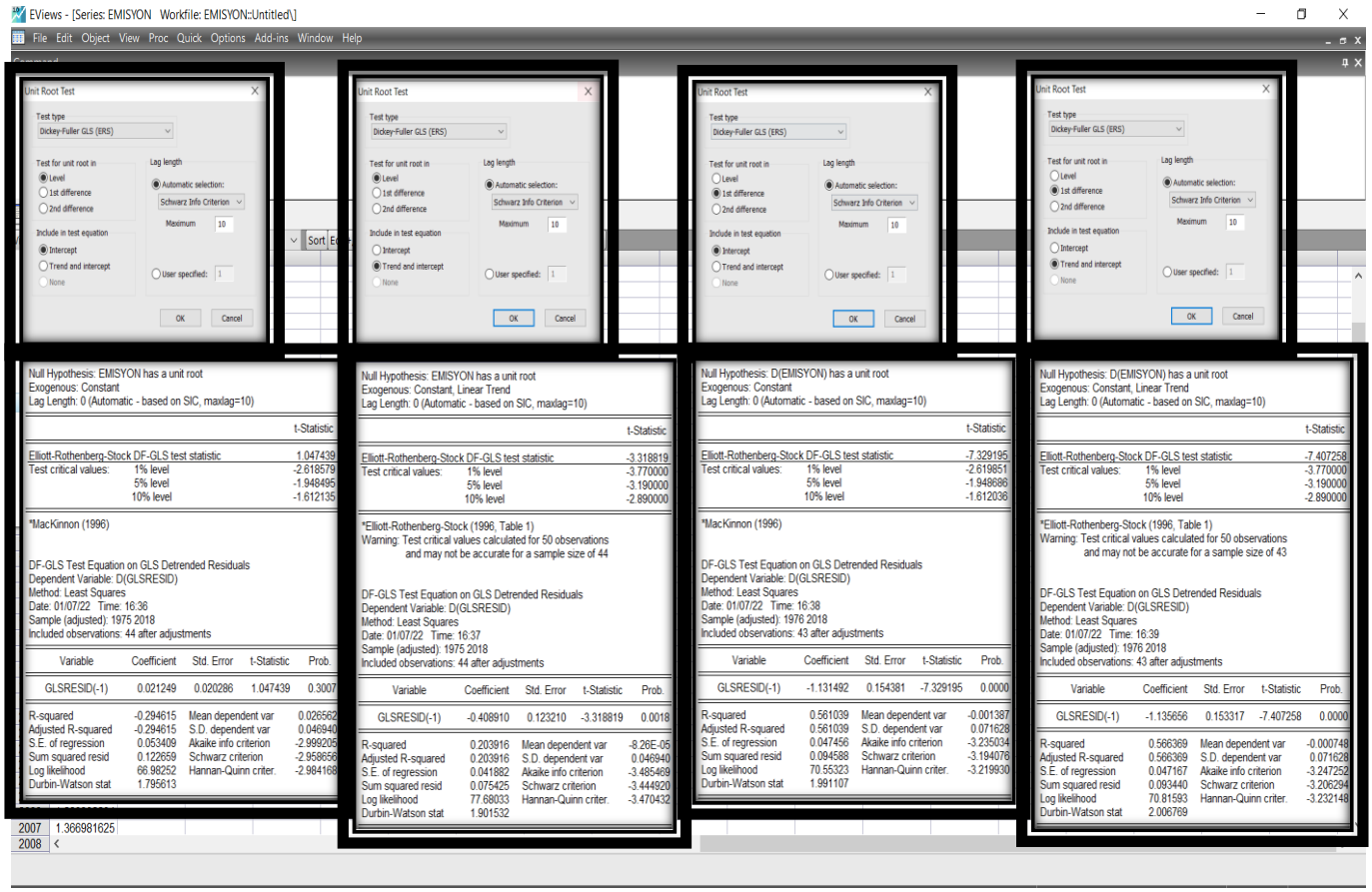
Emisyon serisi Sabit Model ve Trendli modelde yanılma düzeyi %5 için Prob değeri **0.0659** test istatistiği>kritik değer -3.3888> -3.5155 **H0 hipotezini reddemeyiz.** Emisyon serisinin birim kök içerdiği ve durağan bir yapıda olmadığını söyleye biliriz.

Emisyon serisi Sabit 1. farkı alınmış modelde yanılma düzeyi %5 için Prob değeri 0 test istatistiği<kritik değer **-7.4058** < -2.9314 **H0 hipotezini reddederiz.** Emisyon serisinin 1. farkının birim kök içermediğini durağan bir yapıda olduğunu söyleyebiliriz.

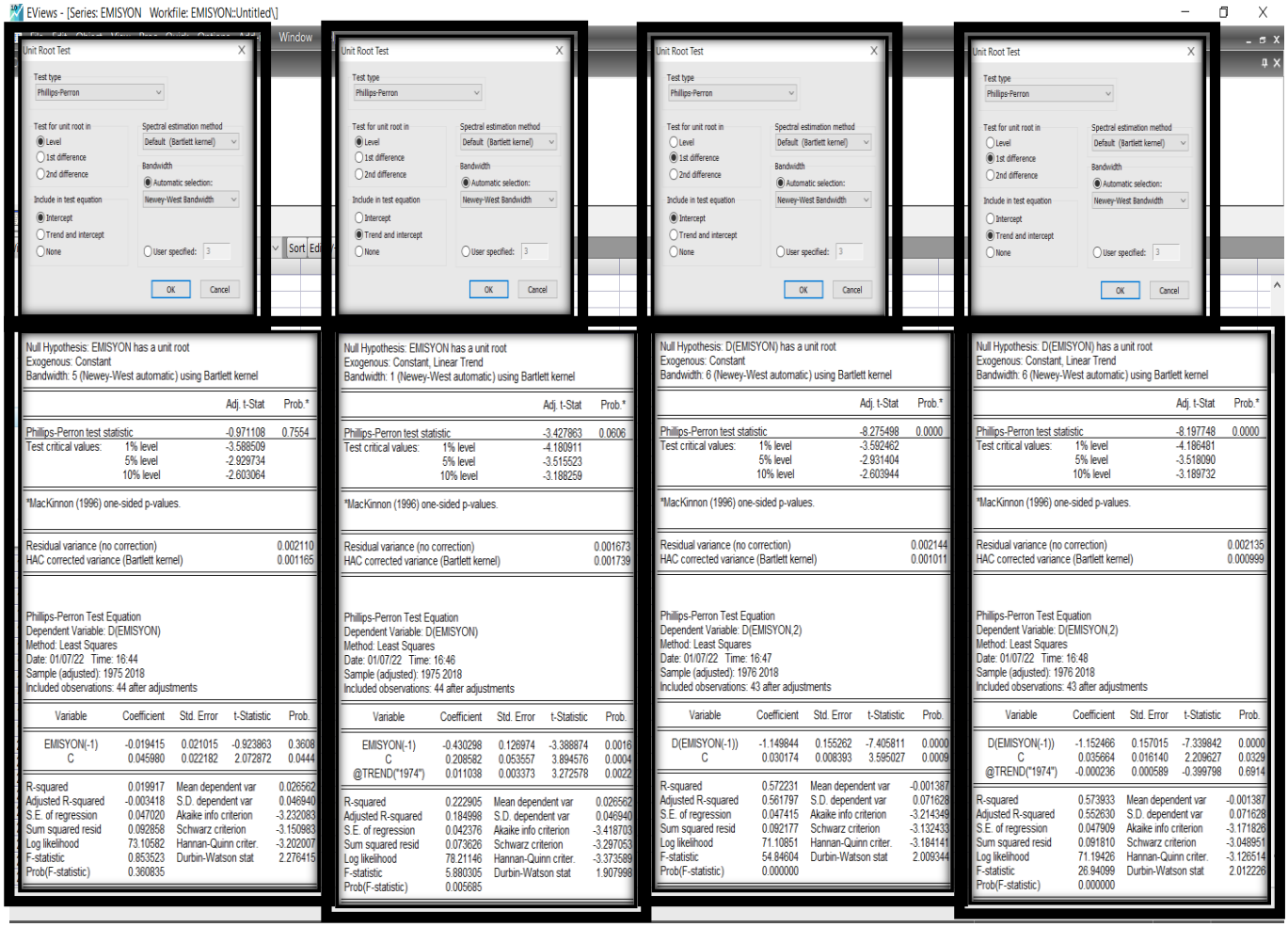
Emisyon serisi Sabit 1. farkı alınmış ve trendli modelde yanılma düzeyi %5 için Prob değeri **0** test istatistiği<kritik değer -7.3398 < -3.5180 **H0 hipotezini reddederiz** Emisyon serisinin 1. farkının trendli modeli birim kök içermediğini durağan bir yapıda olduğunu söyleyebiliriz.



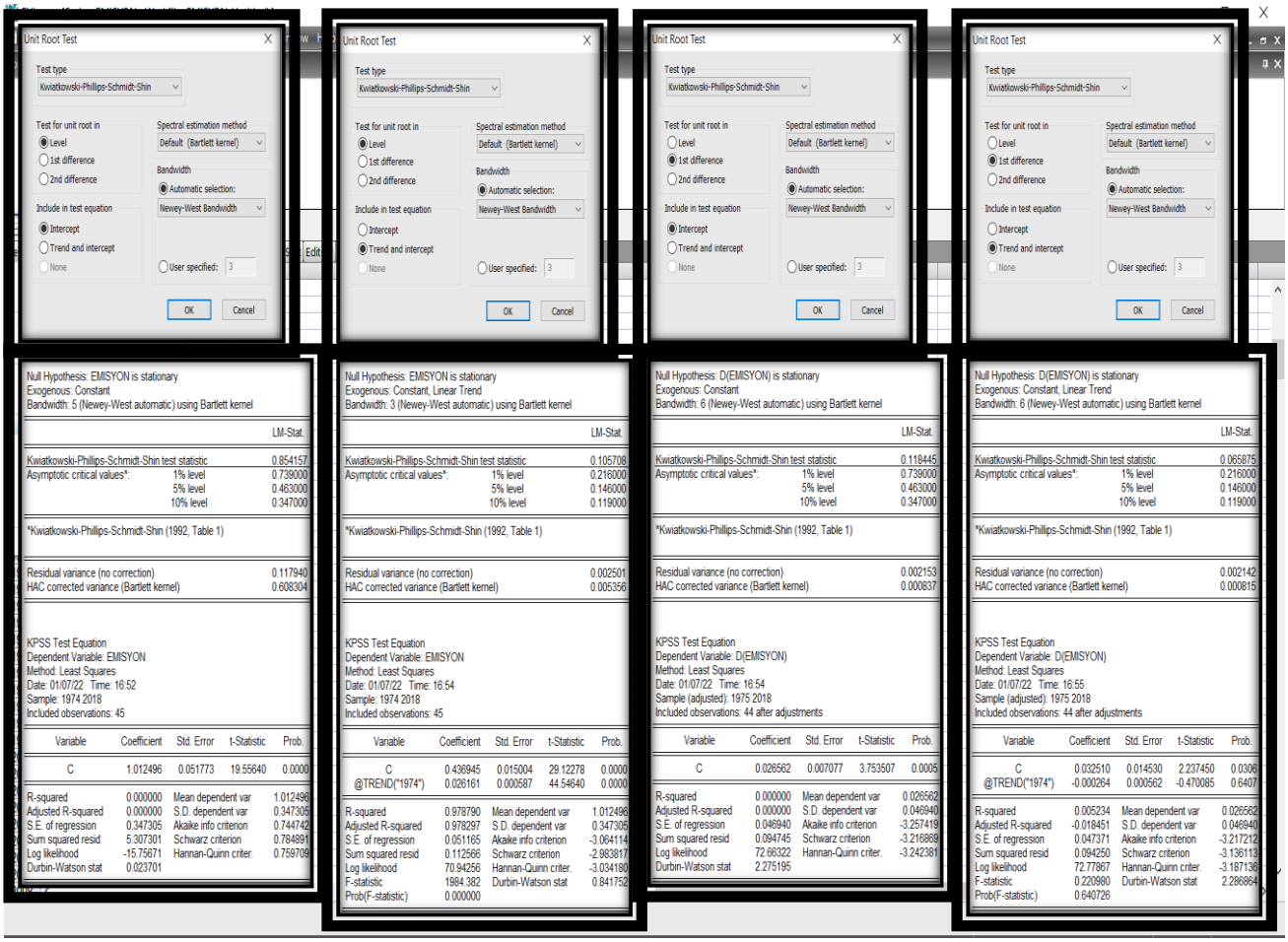
DF-GLS TESTİ


EViews - [Series: EMISYON Workfile: EMISYON::Untitled\]
File Edit Object View Proc Quick Options Add-ins Window Help
Unit Root Test
Test type
Dickey-Fuller GLS (ERS)
Test for unit root in
Level
1st difference
2nd difference
Include in test equation
Intercept
Trend and intercept
None
Lag length
Automatic selection:
Schwarz Info Criterion
Maximum
User specified:
OK
Cancel
Null Hypothesis: EMISYON has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=10)
t-Statistic
Elliott-Rothenberg-Stock DF-GLS test statistic 1.047439
Test critical values: 1% level -2.618579
5% level -1.948495
10% level -1.612135
*MacKinnon (1996)
DF-GLS Test Equation on GLS Detrended Residuals
Dependent Variable: D(GLSRESID)
Method: Least Squares
Date: 01/07/22 Time: 16:36
Sample (adjusted): 1975 2018
Included observations: 44 after adjustments
Variable Coefficient Std. Error t-Statistic Prob.
GLSRESID(-1) 0.021249 0.020286 1.047439 0.3007
R-squared -0.294615 Mean dependent var 0.026562
Adjusted R-squared -0.294615 S.D. dependent var 0.046940
S.E. of regression 0.053409 Akaike info criterion -2.999205
Sum squared resid 0.122659 Schwarz criterion -2.958656
Log likelihood 66.98252 Hannan-Quinn criter. -2.984168
Durbin-Watson stat 1.795613
Null Hypothesis: EMISYON has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=10)
t-Statistic
Elliott-Rothenberg-Stock DF-GLS test statistic -3.318819
Test critical values: 1% level -3.770000
5% level -3.190000
10% level -2.890000
*Elliott-Rothenberg-Stock (1996, Table 1)
Warning: Test critical values calculated for 50 observations
and may not be accurate for a sample size of 44
DF-GLS Test Equation on GLS Detrended Residuals
Dependent Variable: D(GLSRESID)
Method: Least Squares
Date: 01/07/22 Time: 16:37
Sample (adjusted): 1975 2018
Included observations: 44 after adjustments
Variable Coefficient Std. Error t-Statistic Prob.
GLSRESID(-1) -0.408910 0.123210 -3.318819 0.0018
R-squared 0.203916 Mean dependent var -8.26E-05
Adjusted R-squared 0.203916 S.D. dependent var 0.046940
S.E. of regression 0.041882 Akaike info criterion -3.485469
Sum squared resid 0.075425 Schwarz criterion -3.444920
Log likelihood 77.68033 Hannan-Quinn criter. -3.470432
Durbin-Watson stat 1.901532
Null Hypothesis: D(EMISYON) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=10)
t-Statistic
Elliott-Rothenberg-Stock DF-GLS test statistic -7.329195
Test critical values: 1% level -2.619851
5% level -1.948686
10% level -1.612036
*MacKinnon (1996)
DF-GLS Test Equation on GLS Detrended Residuals
Dependent Variable: D(GLSRESID)
Method: Least Squares
Date: 01/07/22 Time: 16:38
Sample (adjusted): 1976 2018
Included observations: 43 after adjustments
Variable Coefficient Std. Error t-Statistic Prob.
GLSRESID(-1) -1.131492 0.154381 -7.329195 0.0000
R-squared 0.561039 Mean dependent var -0.001387
Adjusted R-squared 0.561039 S.D. dependent var 0.071628
S.E. of regression 0.047456 Akaike info criterion -3.235034
Sum squared resid 0.094588 Schwarz criterion -3.194076
Log likelihood 70.55323 Hannan-Quinn criter. -3.219930
Durbin-Watson stat 1.991107
Null Hypothesis: D(EMISYON) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=10)
t-Statistic
Elliott-Rothenberg-Stock DF-GLS test statistic -7.407258
Test critical values: 1% level -3.770000
5% level -3.190000
10% level -2.890000
*Elliott-Rothenberg-Stock (1996, Table 1)
Warning: Test critical values calculated for 50 observations
and may not be accurate for a sample size of 43
DF-GLS Test Equation on GLS Detrended Residuals
Dependent Variable: D(GLSRESID)
Method: Least Squares
Date: 01/07/22 Time: 16:39
Sample (adjusted): 1976 2018
Included observations: 43 after adjustments
Variable Coefficient Std. Error t-Statistic Prob.
GLSRESID(-1) -1.135656 0.153317 -7.407258 0.0000
R-squared 0.566369 Mean dependent var -0.000748
Adjusted R-squared 0.566369 S.D. dependent var 0.071628
S.E. of regression 0.047167 Akaike info criterion -3.247252
Sum squared resid 0.093440 Schwarz criterion -3.206294
Log likelihood 70.81593 Hannan-Quinn criter. -3.232148
Durbin-Watson stat 2.006769
2007 1.366981625
2008

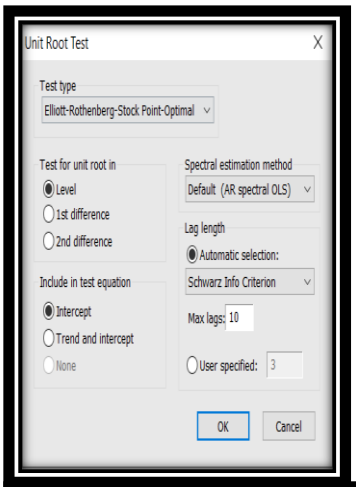
PP TESTİ


EViews - [Series: EMISYON Workfile: EMISYON::Untitled\]
Unit Root Test
Test type
Phillips-Perron
Test for unit root in
Level
1st difference
2nd difference
Include in test equation
Intercept
Trend and intercept
None
Spectral estimation method
Default (Bartlett kernel)
Bandwidth
Automatic selection:
Newey-West Bandwidth
User specified:
OK
Cancel
Null Hypothesis: EMISYON has a unit root
Exogenous: Constant
Bandwidth: 5 (Newey-West automatic) using Bartlett kernel
Adj. t-Stat Prob.*
Phillips-Perron test statistic -0.971108 0.7554
Test critical values: 1% level -3.588509
5% level -2.929734
10% level -2.603064
*MacKinnon (1996) one-sided p-values.
Residual variance (no correction) 0.002110
HAC corrected variance (Bartlett kernel) 0.001165
Phillips-Perron Test Equation
Dependent Variable: D(EMISYON)
Method: Least Squares
Date: 01/07/22 Time: 16:44
Sample (adjusted): 1975 2018
Included observations: 44 after adjustments
Variable Coefficient Std. Error t-Statistic Prob.
EMISYON(-1) -0.019415 0.021015 -0.923863 0.3608
C 0.045980 0.022182 2.072872 0.0444
R-squared 0.019917 Mean dependent var 0.026562
Adjusted R-squared -0.003418 S.D. dependent var 0.046940
S.E. of regression 0.047020 Akaike info criterion -3.232083
Sum squared resid 0.092858 Schwarz criterion -3.150983
Log likelihood 73.10582 Hannan-Quinn criter. -3.202007
F-statistic 0.853523 Durbin-Watson stat 2.276415
Prob(F-statistic) 0.360835
Null Hypothesis: EMISYON has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 1 (Newey-West automatic) using Bartlett kernel
Adj. t-Stat Prob.*
Phillips-Perron test statistic -3.427863 0.0606
Test critical values: 1% level -4.180911
5% level -3.515523
10% level -3.188259
*MacKinnon (1996) one-sided p-values.
Residual variance (no correction) 0.001673
HAC corrected variance (Bartlett kernel) 0.001739
Phillips-Perron Test Equation
Dependent Variable: D(EMISYON)
Method: Least Squares
Date: 01/07/22 Time: 16:46
Sample (adjusted): 1975 2018
Included observations: 44 after adjustments
Variable Coefficient Std. Error t-Statistic Prob.
EMISYON(-1) -0.430298 0.126974 -3.388874 0.0016
C 0.208582 0.053557 3.894576 0.0004
@TREND("1974") 0.011038 0.003373 3.272578 0.0022
R-squared 0.222905 Mean dependent var 0.026562
Adjusted R-squared 0.184998 S.D. dependent var 0.046940
S.E. of regression 0.042376 Akaike info criterion -3.418703
Sum squared resid 0.073626 Schwarz criterion -3.297053
Log likelihood 78.21146 Hannan-Quinn criter. -3.373588
F-statistic 5.880305 Durbin-Watson stat 1.907998
Prob(F-statistic) 0.005685
Null Hypothesis: D(EMISYON) has a unit root
Exogenous: Constant
Bandwidth: 6 (Newey-West automatic) using Bartlett kernel
Adj. t-Stat Prob.*
Phillips-Perron test statistic -8.275498 0.0000
Test critical values: 1% level -3.592462
5% level -2.931404
10% level -2.603944
*MacKinnon (1996) one-sided p-values.
Residual variance (no correction) 0.002144
HAC corrected variance (Bartlett kernel) 0.001011
Phillips-Perron Test Equation
Dependent Variable: D(EMISYON,2)
Method: Least Squares
Date: 01/07/22 Time: 16:47
Sample (adjusted): 1976 2018
Included observations: 43 after adjustments
Variable Coefficient Std. Error t-Statistic Prob.
D(EMISYON(-1)) -1.149844 0.155262 -7.405811 0.0000
C 0.030174 0.008393 3.595027 0.0009
R-squared 0.572231 Mean dependent var -0.001387
Adjusted R-squared 0.561797 S.D. dependent var 0.071628
S.E. of regression 0.047415 Akaike info criterion -3.214349
Sum squared resid 0.092177 Schwarz criterion -3.132433
Log likelihood 71.10851 Hannan-Quinn criter. -3.184141
F-statistic 54.84604 Durbin-Watson stat 2.009344
Prob(F-statistic) 0.000000
Null Hypothesis: D(EMISYON) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 6 (Newey-West automatic) using Bartlett kernel
Adj. t-Stat Prob.*
Phillips-Perron test statistic -8.197748 0.0000
Test critical values: 1% level -4.186481
5% level -3.518090
10% level -3.189732
*MacKinnon (1996) one-sided p-values.
Residual variance (no correction) 0.002135
HAC corrected variance (Bartlett kernel) 0.000999
Phillips-Perron Test Equation
Dependent Variable: D(EMISYON,2)
Method: Least Squares
Date: 01/07/22 Time: 16:48
Sample (adjusted): 1976 2018
Included observations: 43 after adjustments
Variable Coefficient Std. Error t-Statistic Prob.
D(EMISYON(-1)) -1.152466 0.157015 -7.339842 0.0000
C 0.035664 0.016140 2.209627 0.0329
@TREND("1974") -0.000236 0.000589 -0.399798 0.6914
R-squared 0.573933 Mean dependent var -0.001387
Adjusted R-squared 0.552630 S.D. dependent var 0.071628
S.E. of regression 0.047909 Akaike info criterion -3.171826
Sum squared resid 0.091810 Schwarz criterion -3.048951
Log likelihood 71.19426 Hannan-Quinn criter. -3.126514
F-statistic 26.94099 Durbin-Watson stat 2.012226
Prob(F-statistic) 0.000000

KPSS TESTİ


Unit Root Test
Test type
Kwiatkowski-Phillips-Schmidt-Shin
Test for unit root in
Level
1st difference
2nd difference
Spectral estimation method
Default (Bartlett kernel)
Bandwidth
Automatic selection:
Newey-West Bandwidth
Include in test equation
Intercept
Trend and intercept
None
User specified: 3
OK
Cancel
Null Hypothesis: EMISYON is stationary
Exogenous: Constant
Bandwidth: 5 (Newey-West automatic) using Bartlett kernel
LM-Stat.
Kwiatkowski-Phillips-Schmidt-Shin test statistic 0.854157
Asymptotic critical values*: 1% level 0.739000
5% level 0.463000
10% level 0.347000
*Kwiatkowski-Phillips-Schmidt-Shin (1992, Table 1)
Residual variance (no correction) 0.117940
HAC corrected variance (Bartlett kernel) 0.608304
KPSS Test Equation
Dependent Variable: EMISYON
Method: Least Squares
Date: 01/07/22 Time: 16:52
Sample: 1974 2018
Included observations: 45
Variable Coefficient Std. Error t-Statistic Prob.
C 1.012496 0.051773 19.55640 0.0000
R-squared 0.000000 Mean dependent var 1.012496
Adjusted R-squared 0.000000 S.D. dependent var 0.347305
S.E. of regression 0.347305 Akaike info criterion 0.744742
Sum squared resid 5.307301 Schwarz criterion 0.784891
Log likelihood -15.75671 Hannan-Quinn criter. 0.759709
Durbin-Watson stat 0.023701
Null Hypothesis: EMISYON is stationary
Exogenous: Constant, Linear Trend
Bandwidth: 3 (Newey-West automatic) using Bartlett kernel
LM-Stat.
Kwiatkowski-Phillips-Schmidt-Shin test statistic 0.105708
Asymptotic critical values*: 1% level 0.216000
5% level 0.146000
10% level 0.119000
*Kwiatkowski-Phillips-Schmidt-Shin (1992, Table 1)
Residual variance (no correction) 0.002501
HAC corrected variance (Bartlett kernel) 0.005356
KPSS Test Equation
Dependent Variable: EMISYON
Method: Least Squares
Date: 01/07/22 Time: 16:54
Sample: 1974 2018
Included observations: 45
Variable Coefficient Std. Error t-Statistic Prob.
C 0.436945 0.015004 29.12278 0.0000
@TREND("1974") 0.026161 0.000587 44.54640 0.0000
R-squared 0.978790 Mean dependent var 1.012496
Adjusted R-squared 0.978297 S.D. dependent var 0.347305
S.E. of regression 0.051165 Akaike info criterion -3.064114
Sum squared resid 0.112566 Schwarz criterion -2.983817
Log likelihood 70.94256 Hannan-Quinn criter. -3.034180
F-statistic 1984.382 Durbin-Watson stat 0.841752
Prob(F-statistic) 0.000000
Null Hypothesis: D(EMISYON) is stationary
Exogenous: Constant
Bandwidth: 6 (Newey-West automatic) using Bartlett kernel
LM-Stat.
Kwiatkowski-Phillips-Schmidt-Shin test statistic 0.118445
Asymptotic critical values*: 1% level 0.739000
5% level 0.463000
10% level 0.347000
*Kwiatkowski-Phillips-Schmidt-Shin (1992, Table 1)
Residual variance (no correction) 0.002153
HAC corrected variance (Bartlett kernel) 0.000837
KPSS Test Equation
Dependent Variable: D(EMISYON)
Method: Least Squares
Date: 01/07/22 Time: 16:54
Sample (adjusted): 1975 2018
Included observations: 44 after adjustments
Variable Coefficient Std. Error t-Statistic Prob.
C 0.026562 0.007077 3.753507 0.0005
R-squared 0.000000 Mean dependent var 0.026562
Adjusted R-squared 0.000000 S.D. dependent var 0.046940
S.E. of regression 0.046940 Akaike info criterion -3.257419
Sum squared resid 0.094745 Schwarz criterion -3.216869
Log likelihood 72.66322 Hannan-Quinn criter. -3.242381
Durbin-Watson stat 2.275195
Null Hypothesis: D(EMISYON) is stationary
Exogenous: Constant, Linear Trend
Bandwidth: 6 (Newey-West automatic) using Bartlett kernel
LM-Stat.
Kwiatkowski-Phillips-Schmidt-Shin test statistic 0.065875
Asymptotic critical values*: 1% level 0.216000
5% level 0.146000
10% level 0.119000
*Kwiatkowski-Phillips-Schmidt-Shin (1992, Table 1)
Residual variance (no correction) 0.002142
HAC corrected variance (Bartlett kernel) 0.000815
KPSS Test Equation
Dependent Variable: D(EMISYON)
Method: Least Squares
Date: 01/07/22 Time: 16:55
Sample (adjusted): 1975 2018
Included observations: 44 after adjustments
Variable Coefficient Std. Error t-Statistic Prob.
C 0.032510 0.014530 2.237450 0.0306
@TREND("1974") -0.000264 0.000562 -0.470085 0.6407
R-squared 0.005234 Mean dependent var 0.026562
Adjusted R-squared -0.019451 S.D. dependent var 0.046940
S.E. of regression 0.047371 Akaike info criterion -3.217212
Sum squared resid 0.094250 Schwarz criterion -3.136113
Log likelihood 72.77867 Hannan-Quinn criter. -3.187136
F-statistic 0.220980 Durbin-Watson stat 2.286864
Prob(F-statistic) 0.640726

NG-PERRON TESTİ

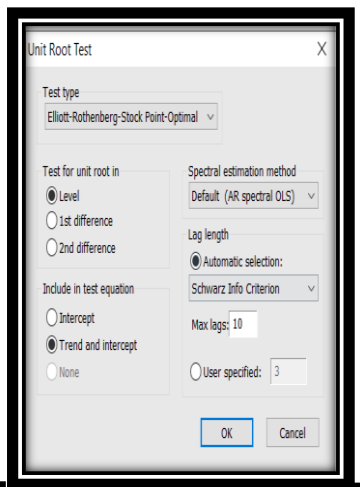


Null Hypothesis: EMISYON has a unit root
Exogenous: Constant
Lag length: 0 (Spectral OLS AR based on SIC, maxlag=10)
Sample: 1974 2018
Included observations: 45

		P-Statistic
Elliott-Rothenberg-Stock test statistic		187.9962
Test critical values:	1% level	1.870000
	5% level	2.970000
	10% level	3.910000

*Elliott-Rothenberg-Stock (1996, Table 1)
Warning: Test critical values calculated for 50 observations and may not be accurate for a sample size of 45

HAC corrected variance (Spectral OLS autoregression) 0.002110

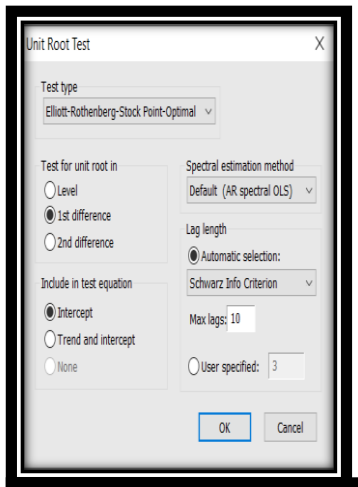


Null Hypothesis: EMISYON has a unit root
Exogenous: Constant, Linear Trend
Lag length: 0 (Spectral OLS AR based on SIC, maxlag=10)
Sample: 1974 2018
Included observations: 45

		P-Statistic
Elliott-Rothenberg-Stock test statistic		6.886694
Test critical values:	1% level	4.220000
	5% level	5.720000
	10% level	6.770000

*Elliott-Rothenberg-Stock (1996, Table 1)
Warning: Test critical values calculated for 50 observations and may not be accurate for a sample size of 45

HAC corrected variance (Spectral OLS autoregression) 0.001673

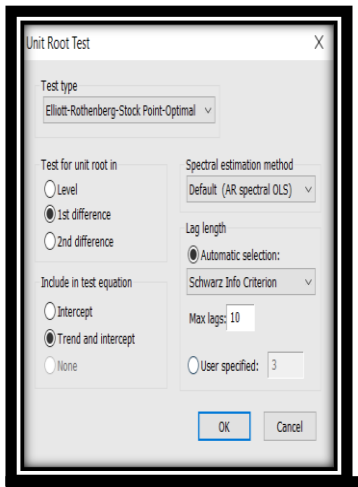


Null Hypothesis: D(EMISYON) has a unit root
Exogenous: Constant
Lag length: 0 (Spectral OLS AR based on SIC, maxlag=10)
Sample (adjusted): 1975 2018
Included observations: 44 after adjustments

		P-Statistic
Elliott-Rothenberg-Stock test statistic		1.353341
Test critical values:	1% level	1.870000
	5% level	2.970000
	10% level	3.910000

*Elliott-Rothenberg-Stock (1996, Table 1)
Warning: Test critical values calculated for 50 observations and may not be accurate for a sample size of 44

HAC corrected variance (Spectral OLS autoregression) 0.002144



Null Hypothesis: D(EMISYON) has a unit root
Exogenous: Constant, Linear Trend
Lag length: 0 (Spectral OLS AR based on SIC, maxlag=10)
Sample (adjusted): 1975 2018
Included observations: 44 after adjustments

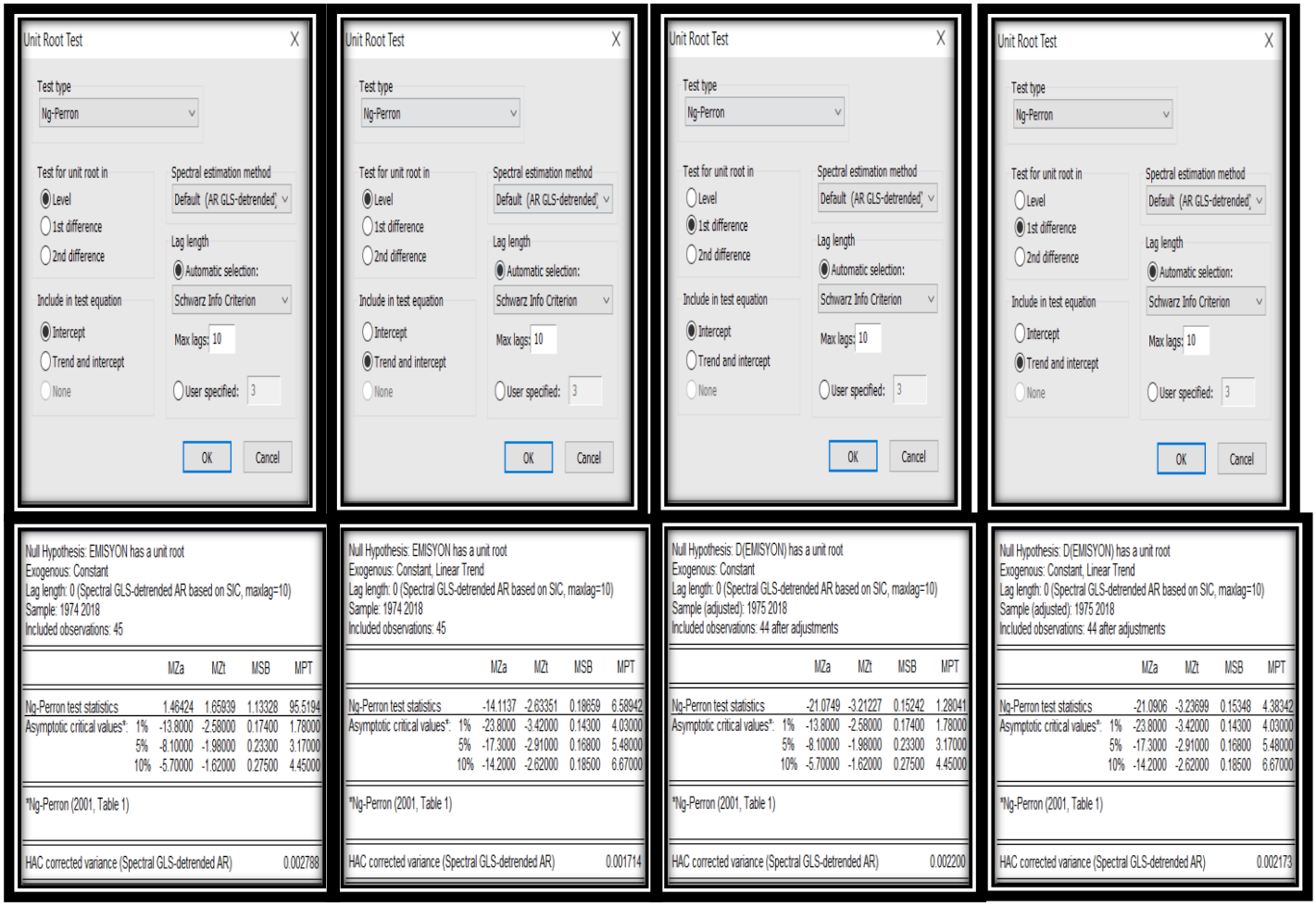
		P-Statistic
Elliott-Rothenberg-Stock test statistic		4.285980
Test critical values:	1% level	4.220000
	5% level	5.720000
	10% level	6.770000

*Elliott-Rothenberg-Stock (1996, Table 1)
Warning: Test critical values calculated for 50 observations and may not be accurate for a sample size of 44

HAC corrected variance (Spectral OLS autoregression) 0.002135

NG-PERRON

(MZα, MZt, MZB, MZT Parametreleri)



EMİSYON SERİSİ İÇİN BİRİM KÖK ANALİZİ

		SABİT MODEL		SABİT VE TRENDLİ MODEL	
Test	**Seri**	**Test İstatistiği**	**Kritik Değer**	**Test İstatistiği**	**Kritik Değer**
ADF	emisyon	-0.9238	-2.9297	-3.3888	-3.5155
	Δemisyon	-7.4058**	-2.9314	-7.3398**	-3.5180
DF-GLS	emisyon	1.0474	-1.9484	-3.3188**	-3.1900
	Δemisyon	-7.3291**	-1.9486	-7.3291**	-3.1900
PP	emisyon	-0.9711	-2.9297	-3.4278	-3.5155
	Δemisyon	-8.2754**	-2.9314	-8.1977**	-3.5180
KPSS	emisyon	0.8541***	0.4630	0.1057***	0.1460
	Δemisyon	0.1184	0.4630	0.0658	0.1460
ERS	emisyon	187.9962	2.9700	6.8866	5.7200
	Δemisyon	1.3533**	2.9700	4.2859**	5.7200
Ng-Perron					
MZα	emisyon	1.4642	-8.1000	-14.1137	-17.3000
	Δemisyon	-21.0906**	-8.1000	-21.0906**	-17.3000
MZt	emisyon	1.6593	-1.9800	-2.6335	-2.9100
	Δemisyon	-3.2122**	-1.9800	-3.2369**	-2.9100
MZB	emisyon	1.1332	0.2330	0.1865	0.1680
	Δemisyon	0.1524**	0.2330	0.1534**	0.1680
MZT	emisyon	95.5194	3.1700	6.5894	5.4800
	Δemisyon	1.2804**	3.1700	4.3834**	5.4800

*:.05 yanılma düzeyi için kritik değerler verilmiştir.

**: Birim kök hipotezi reddedilmektedir.

***: Durağanlık hipotezi reddedilmektedir.

DF-GLS testinde sabit ve trendli modelde de durağan gözükmekte. **Lakin diğer testlerde durağan olmadığı için bunu göz ardı ediyoruz**. KPSS testinin birim kök yorumlaması diğerlerine göre ters olduğundan farklılık göstermekte.

ADF testine göre, Emisyon serisi düzeyde durağandışıdır. 1. farkta durağandır. Emisyon serisi 1.dereceden entegre bir seridir, I1 seridir.

DF-GLS testine göre, Emisyon serisi düzeyde durağandışıdır. 1. farkta durağandır. Emisyon serisi 1.dereceden entegre bir seridir, I1 seridir.

PP testine göre, Emisyon serisi düzeyde durağandışıdır. 1. farkta durağandır. Emisyon serisi 1.dereceden entegre bir seridir, I1 seridir.

KPSS testine göre, Emisyon serisi düzeyde durağan dışı dır. 1. farkta durağandır. Emisyon serisi 1.dereceden entegre bir seridir, I1 seridir.

ERS testine göre, Emisyon serisi düzeyde durağan dışı dır. 1. farkta durağandır. Emisyon serisi 1.dereceden entegre bir seridir, I1 seridir.

NG PERRON TESTİNE GÖRE,

MZα testine göre, Emisyon serisi düzeyde durağandışıdır. 1. farkta durağandır. Emisyon serisi 1.dereceden entegre bir seridir, I1 seridir.

MZt testine göre, Emisyon serisi düzeyde durağandışıdır. 1. farkta durağandır. Emisyon serisi 1.dereceden entegre bir seridir, I1 seridir.

MZB testine göre, Emisyon serisi düzeyde durağandışıdır. 1. farkta durağandır. Emisyon serisi 1.dereceden entegre bir seridir, I1 seridir.

MZT testine göre, Emisyon serisi düzeyde durağandışıdır. 1. farkta durağandır. Emisyon serisi 1.dereceden entegre bir seridir, I1 seridir.

Bütün testlere göre, Emisyon serisi düzeyde durağandışıdır. 1. farkta durağandır. Emisyon serisi 1.dereceden entegre bir seridir, I1 seridir.