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Error Correction Model (ECM) dengan STATCAL

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Prana Ugiana Gio (CEO STATCAL)

Created by Prana Ugiana Gio & Rezzy Eko Caraka

Rezzy Eko Caraka (CFO STATCAL)

Error Correction Model (ECM)

STATCAL is a free statistical application program created by Prana Ugiana Gio (CEO) & Rezzy Eko Caraka (CFO), in January 2017, using R programming language in RStudio, with shiny package as the main package. STATCAL uses various of **R packages** to perform statistical and graphical data analysis.

STATCAL can be used by online visiting <https://gioprana.shinyapps.io/STATCAL/> or you can run it by offline downloading <http://www.statcal.com/>.

1. Dataset

Tabel 1 Contoh Data

No	Tahun	Y	X1	X2	X3	X4	X5	X6
1	1970	11.5235	3.824368	3.337364	12.1286	15.16349	3.07478	9.328724
2	1971	11.18396	3.652242	3.404265	12.10579	15.35523	3.456549	9.4439
3	1972	11.44798	3.731015	3.309451	12.09366	15.33518	3.548518	9.358715
4	1973	11.44638	3.886701	3.308395	11.91948	15.24719	3.873584	9.128001
5	1974	11.62498	3.88877	3.353976	11.91713	15.37789	3.631063	8.827534
6	1975	11.76291	3.852621	3.14272	12.04574	15.34226	3.408516	8.800343
7	1976	11.82241	4.479436	3.894126	12.1724	15.07468	3.273096	8.721122
8	1977	11.9852	4.896764	4.595025	12.17544	15.29698	3.331712	8.660603

9	1978	12.28243	4.438688	4.031319	12.31353	15.36842	3.829181	9.033985
10	1979	12.30231	4.447262	4.154883	12.5197	15.41955	4.420551	8.835626
11	1980	12.38287	4.242254	4.052823	12.59464	15.39226	4.142075	8.666712
12	1981	12.25769	3.886164	3.44852	12.66001	15.62104	3.332301	8.613616
13	1982	12.33264	3.90662	3.302022	12.547	15.41305	2.683446	8.69551
14	1983	12.39354	3.891447	3.42579	12.63019	15.53507	2.553699	8.919711
15	1984	12.59294	3.952802	2.712842	12.66188	15.4683	2.385247	8.954752
16	1985	12.55204	3.863933	3.464338	12.64883	15.57759	1.872441	8.964724
17	1986	12.60526	4.092246	3.77545	12.78499	15.4713	2.039142	9.30351
18	1987	12.56485	3.602731	3.363238	12.87048	15.66949	2.701613	9.23553
19	1988	12.60819	3.641865	3.31315	12.87671	15.54637	2.578411	9.22376
20	1989	12.78559	3.36977	2.989961	12.90184	15.59182	2.557688	9.185988
21	1990	12.95236	3.08384	2.516354	12.93064	15.61773	1.652854	9.189581
22	1991	12.84968	2.979928	2.570967	12.96759	15.62393	0.382742	9.168891
23	1992	12.50377	2.73147	2.440277	12.98753	15.62158	-0.41583	9.167704
24	1993	12.76545	2.85387	2.530887	12.99195	15.53001	-0.37074	9.120401
25	1994	12.57518	3.613071	3.473444	13.01743	15.56085	1.649474	9.108132
26	1995	12.34671	3.621512	3.474398	13.03419	15.52607	2.085215	9.082442
27	1996	12.81203	3.297999	2.971732	13.03726	15.64214	1.5286	9.050078
28	1997	12.65533	3.552004	2.958846	12.96785	15.60604	1.493754	9.617671
29	1998	12.78703	3.334563	2.949309	13.15086	15.70769	2.112545	9.613431
30	1999	12.77413	3.080043	2.725447	13.18381	15.73089	2.614584	9.371017
31	2000	12.73931	2.770257	2.378375	13.22596	15.83896	2.069748	9.509648
32	2001	12.43248	2.404995	2.114231	13.25205	15.81773	1.93613	9.47894
33	2002	12.69161	2.435052	2.011254	13.43281	15.8737	0.962551	9.286443
34	2003	12.68702	2.4978	2.1398	13.4169	15.77751	0.909129	9.199238
35	2004	12.74862	2.6502	2.178357	13.3807	15.85925	1.232547	9.237956
36	2005	13.00769	2.98068	2.4249	13.36979	15.79178	1.098612	9.193194
37	2006	12.93241	3.017848	2.620944	13.43302	15.8818	2.266104	9.007207
38	2007	12.68045	3.106732	2.925178	13.42465	15.90964	3.499188	8.972411
39	2008	13.05782	3.227914	2.96935	13.456	15.93289	4.50739	8.978174
40	2009	12.97988	3.147683	2.841772	13.4338	15.86434	1.30699	8.754715
41	2010	12.97987	3.375728	2.82852	13.43997	15.93223	3.925905	8.645545
42	2011	12.75562	3.711534	3.273103	13.36711	15.95053	5.023079	8.594549

2. Uji Stasioneritas Seluruh Data pada Kondisi Level

Gambar 1

EViews - [Series: Y Workfile: UNTITLED::Untitled\]

View	Proc	Object	Properties	Print	Name	Freeze	Default	Sort	Edit+/-	Smpl+/-	Label+/-	Wide+/-	Title	Sample	Genr
Y															
Last updated: 11/11/18 - 14:21															
Imported from 'D:\TERBARU STATCAL PRASMANAN YA 1 NOVEMBER 2018\Error Correction Model (ECM)\data.txt'															
1		11.52350													
2		11.18396													
3		11.44798													
4		11.44638													
5		11.62498													
6		11.76291													
7		11.82241													
8		11.98520													
9		12.28243													
10		12.30231													
11		12.38287													
12		12.25769													
13		12.33264													

Gambar 2

Gambar 3

Gambar 4

Tabel 2 Hasil Uji Stasioner dengan Uji Augmented Dickey-Fuller (ADF) (Kondisi *Level*) pada Variabel Y

Null Hypothesis: Y has a unit root

Exogenous: Constant

Lag Length: 1 (Fixed)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-2.905568	0.0536
Test critical values: 1% level	-3.605593	
5% level	-2.936942	
10% level	-2.606857	

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

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(Y)

Method: Least Squares

Date: 11/11/18 Time: 16:14

Sample (adjusted): 3 42

Included observations: 40 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Y(-1)	-0.163784	0.056369	-2.905568	0.0062
D(Y(-1))	-0.291175	0.136445	-2.134012	0.0395
C	2.092664	0.702935	2.977038	0.0051
R-squared	0.284682	Mean dependent var		0.039291
Adjusted R-squared	0.246016	S.D. dependent var		0.186962
S.E. of regression	0.162343	Akaike info criterion		-0.726174
Sum squared resid	0.975143	Schwarz criterion		-0.599508
Log likelihood	17.52348	Hannan-Quinn criter.		-0.680375
F-statistic	7.362634	Durbin-Watson stat		2.174591
Prob(F-statistic)	0.002033			

Tabel 3 Hasil Uji Stasioner dengan Uji Augmented Dickey-Fuller (ADF) (Kondisi *Level*) pada Variabel X1

Null Hypothesis: X1 has a unit root

Exogenous: Constant

Lag Length: 1 (Fixed)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-1.658015	0.4443
Test critical values: 1% level	-3.605593	
5% level	-2.936942	
10% level	-2.606857	

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

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(X1)

Method: Least Squares

Date: 11/11/18 Time: 16:15

Sample (adjusted): 3 42

Included observations: 40 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
X1(-1)	-0.122002	0.073583	-1.658015	0.1058
D(X1(-1))	0.189841	0.163604	1.160369	0.2533
C	0.429053	0.260523	1.646895	0.1080
R-squared	0.084631	Mean dependent var		0.001482
Adjusted R-squared	0.035151	S.D. dependent var		0.274838
S.E. of regression	0.269964	Akaike info criterion		0.290983
Sum squared resid	2.696583	Schwarz criterion		0.417649
Log likelihood	-2.819663	Hannan-Quinn criter.		0.336782
F-statistic	1.710426	Durbin-Watson stat		1.946725
Prob(F-statistic)	0.194774			

Tabel 4 Hasil Uji Stasioner dengan Uji Augmented Dickey-Fuller (ADF) (Kondisi *Level*) pada Variabel X2

Null Hypothesis: X2 has a unit root

Exogenous: Constant

Lag Length: 1 (Fixed)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-2.110067	0.2419
Test critical values: 1% level	-3.605593	
5% level	-2.936942	
10% level	-2.606857	

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

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(X2)

Method: Least Squares

Date: 11/11/18 Time: 16:15

Sample (adjusted): 3 42

Included observations: 40 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
X2(-1)	-0.210708	0.099858	-2.110067	0.0417
D(X2(-1))	0.112240	0.165967	0.676276	0.5031
C	0.646532	0.313141	2.064668	0.0460
R-squared	0.107450	Mean dependent var		-0.003279
Adjusted R-squared	0.059204	S.D. dependent var		0.371206
S.E. of regression	0.360050	Akaike info criterion		0.866892
Sum squared resid	4.796538	Schwarz criterion		0.993558
Log likelihood	-14.33784	Hannan-Quinn criter.		0.912690
F-statistic	2.227135	Durbin-Watson stat		1.936076
Prob(F-statistic)	0.122096			

Tabel 5 Hasil Uji Stasioner dengan Uji Augmented Dickey-Fuller (ADF) (Kondisi *Level*) pada Variabel X3

Null Hypothesis: X3 has a unit root

Exogenous: Constant

Lag Length: 1 (Fixed)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-1.238471	0.6482
Test critical values: 1% level	-3.605593	
5% level	-2.936942	
10% level	-2.606857	

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

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(X3)

Method: Least Squares

Date: 11/11/18 Time: 16:16

Sample (adjusted): 3 42

Included observations: 40 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
X3(-1)	-0.032396	0.026158	-1.238471	0.2233
D(X3(-1))	0.104414	0.163283	0.639469	0.5265
C	0.444373	0.336190	1.321790	0.1944
R-squared	0.048603	Mean dependent var		0.031533
Adjusted R-squared	-0.002824	S.D. dependent var		0.077263
S.E. of regression	0.077372	Akaike info criterion		-2.208352
Sum squared resid	0.221496	Schwarz criterion		-2.081686
Log likelihood	47.16703	Hannan-Quinn criter.		-2.162553
F-statistic	0.945088	Durbin-Watson stat		1.987017
Prob(F-statistic)	0.397826			

Tabel 6 Hasil Uji Stasioner dengan Uji Augmented Dickey-Fuller (ADF) (Kondisi *Level*) pada Variabel X4

Null Hypothesis: X4 has a unit root

Exogenous: Constant

Lag Length: 1 (Fixed)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-0.633686	0.8515
Test critical values: 1% level	-3.605593	
5% level	-2.936942	
10% level	-2.606857	

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

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(X4)

Method: Least Squares

Date: 11/11/18 Time: 16:16

Sample (adjusted): 3 42

Included observations: 40 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
X4(-1)	-0.042988	0.067838	-0.633686	0.5302
D(X4(-1))	-0.537887	0.132590	-4.056775	0.0002
C	0.695560	1.057363	0.657825	0.5147
R-squared	0.339018	Mean dependent var		0.014883
Adjusted R-squared	0.303289	S.D. dependent var		0.105433
S.E. of regression	0.088004	Akaike info criterion		-1.950833
Sum squared resid	0.286553	Schwarz criterion		-1.824167
Log likelihood	42.01665	Hannan-Quinn criter.		-1.905034
F-statistic	9.488655	Durbin-Watson stat		2.217028
Prob(F-statistic)	0.000472			

Tabel 7 Hasil Uji Stasioner dengan Uji Augmented Dickey-Fuller (ADF) (Kondisi *Level*) pada Variabel X5

Null Hypothesis: X5 has a unit root

Exogenous: Constant

Lag Length: 1 (Fixed)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-2.081479	0.2529
Test critical values: 1% level	-3.605593	
5% level	-2.936942	
10% level	-2.606857	

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

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(X5)

Method: Least Squares

Date: 11/11/18 Time: 16:17

Sample (adjusted): 3 42

Included observations: 40 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
X5(-1)	-0.270078	0.129753	-2.081479	0.0444
D(X5(-1))	0.082285	0.171850	0.478822	0.6349
C	0.686047	0.342156	2.005071	0.0523
R-squared	0.107986	Mean dependent var		0.039163
Adjusted R-squared	0.059769	S.D. dependent var		0.941992
S.E. of regression	0.913408	Akaike info criterion		2.728769
Sum squared resid	30.86959	Schwarz criterion		2.855435
Log likelihood	-51.57538	Hannan-Quinn criter.		2.774568
F-statistic	2.239585	Durbin-Watson stat		1.937295
Prob(F-statistic)	0.120747			

Tabel 8 Hasil Uji Stasioner dengan Uji Augmented Dickey-Fuller (ADF) (Kondisi *Level*) pada Variabel X6

Null Hypothesis: X6 has a unit root

Exogenous: Constant

Lag Length: 1 (Fixed)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-2.005833	0.2833
Test critical values: 1% level	-3.605593	
5% level	-2.936942	
10% level	-2.606857	

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

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(X6)

Method: Least Squares

Date: 11/11/18 Time: 16:17

Sample (adjusted): 3 42

Included observations: 40 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
X6(-1)	-0.205784	0.102593	-2.005833	0.0522
D(X6(-1))	0.147231	0.165328	0.890541	0.3789
C	1.850452	0.933216	1.982878	0.0548
R-squared	0.098957	Mean dependent var		-0.021234
Adjusted R-squared	0.050252	S.D. dependent var		0.166939
S.E. of regression	0.162690	Akaike info criterion		-0.721896
Sum squared resid	0.979323	Schwarz criterion		-0.595230
Log likelihood	17.43792	Hannan-Quinn criter.		-0.676097
F-statistic	2.031753	Durbin-Watson stat		1.955589
Prob(F-statistic)	0.145477			

Berdasarkan hasil uji stasioner pada Tabel 2 sampai Tabel 8, diringkas sebagai berikut.

Tabel 9 Uji Stasioner pada Variabel Y, X1, X2, X3, X4, X5 dan X6 dengan Menggunakan Uji Augmented Dickey-Fuller (ADF) pada Level (EViews)

Variabel	Augmented Dickey-Fuller test statistic	Test critical values (5%)	Keterangan
Y	-2.9055	-2.9369	Tidak Stasioner
X1	-1.6580	-2.9369	Tidak Stasioner
X2	-2.1100	-2.9369	Tidak Stasioner
X3	-1.2384	-2.9369	Tidak Stasioner
X4	-0.6336	-2.9369	Tidak Stasioner
X5	-2.0814	-2.9369	Tidak Stasioner
X6	-2.0058	-2.9369	Tidak Stasioner

Gambar 5 Uji Stasioner pada Variabel Y, X1, X2, X3, X4, X5 dan X6 dengan Menggunakan Uji Augmented Dickey-Fuller (ADF) pada Level (STATCAL)

Stationerity Test based on Graph

Data In:

- ☒ Level ☐ First Difference (1st)
☐ Second Difference (2nd)

Facet:

Gambar 6 Grafik Garis (Sumbu-X sebagai Waktu) (pada Kondisi Level)

3. Uji Stasioneritas Seluruh Data pada Kondisi *First Difference* (1st Difference)

Gambar 7

Gambar 8

Tabel 10 Hasil Uji Stasioner dengan Uji Augmented Dickey-Fuller (ADF) (Kondisi *First Difference*) pada Variabel Y

Null Hypothesis: D(Y) has a unit root

Exogenous: Constant

Lag Length: 1 (Fixed)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-5.604044	0.0000
Test critical values: 1% level	-3.610453	
5% level	-2.938987	
10% level	-2.607932	

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

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(Y,2)

Method: Least Squares

Date: 11/11/18 Time: 16:26

Sample (adjusted): 4 42

Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(Y(-1))	-1.528467	0.272744	-5.604044	0.0000
D(Y(-1),2)	0.157370	0.160674	0.979437	0.3339
C	0.056495	0.030894	1.828651	0.0757
R-squared	0.660547	Mean dependent var		-0.012520
Adjusted R-squared	0.641688	S.D. dependent var		0.299373
S.E. of regression	0.179202	Akaike info criterion		-0.526804
Sum squared resid	1.156079	Schwarz criterion		-0.398838
Log likelihood	13.27269	Hannan-Quinn criter.		-0.480891
F-statistic	35.02648	Durbin-Watson stat		1.911407
Prob(F-statistic)	0.000000			

Tabel 11 Hasil Uji Stasioner dengan Uji Augmented Dickey-Fuller (ADF) (Kondisi *First Difference*) pada Variabel X1

Null Hypothesis: D(X1) has a unit root
 Exogenous: Constant
 Lag Length: 1 (Fixed)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-4.155656	0.0023
Test critical values: 1% level	-3.610453	
5% level	-2.938987	
10% level	-2.607932	

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

Augmented Dickey-Fuller Test Equation
 Dependent Variable: D(X1,2)
 Method: Least Squares
 Date: 11/11/18 Time: 16:28
 Sample (adjusted): 4 42
 Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(X1(-1))	-0.940775	0.226384	-4.155656	0.0002
D(X1(-1),2)	0.086304	0.169570	0.508956	0.6139
C	-0.000965	0.045287	-0.021312	0.9831
R-squared	0.426440	Mean dependent var		0.006591
Adjusted R-squared	0.394575	S.D. dependent var		0.362643
S.E. of regression	0.282169	Akaike info criterion		0.381182
Sum squared resid	2.866295	Schwarz criterion		0.509148
Log likelihood	-4.433043	Hannan-Quinn criter.		0.427095
F-statistic	13.38293	Durbin-Watson stat		1.943393
Prob(F-statistic)	0.000045			

Tabel 12 Hasil Uji Stasioner dengan Uji Augmented Dickey-Fuller (ADF) (Kondisi *First Difference*) pada Variabel X2

Null Hypothesis: D(X2) has a unit root
 Exogenous: Constant
 Lag Length: 1 (Fixed)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-5.222613	0.0001
Test critical values: 1% level	-3.610453	
5% level	-2.938987	
10% level	-2.607932	

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

Augmented Dickey-Fuller Test Equation
 Dependent Variable: D(X2,2)
 Method: Least Squares
 Date: 11/11/18 Time: 16:29
 Sample (adjusted): 4 42
 Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(X2(-1))	-1.217831	0.233184	-5.222613	0.0000
D(X2(-1),2)	0.227738	0.165408	1.376824	0.1771
C	-0.003680	0.060336	-0.060987	0.9517
R-squared	0.512168	Mean dependent var		0.013831
Adjusted R-squared	0.485066	S.D. dependent var		0.524343
S.E. of regression	0.376263	Akaike info criterion		0.956745
Sum squared resid	5.096647	Schwarz criterion		1.084711
Log likelihood	-15.65652	Hannan-Quinn criter.		1.002658
F-statistic	18.89793	Durbin-Watson stat		1.846344
Prob(F-statistic)	0.000002			

Tabel 13 Hasil Uji Stasioner dengan Uji Augmented Dickey-Fuller (ADF) (Kondisi *First Difference*) pada Variabel X3

Null Hypothesis: D(X3) has a unit root
 Exogenous: Constant
 Lag Length: 1 (Fixed)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-4.185762	0.0021
Test critical values: 1% level	-3.610453	
5% level	-2.938987	
10% level	-2.607932	

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

Augmented Dickey-Fuller Test Equation
 Dependent Variable: D(X3,2)
 Method: Least Squares
 Date: 11/11/18 Time: 16:29
 Sample (adjusted): 4 42
 Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(X3(-1))	-0.959044	0.229121	-4.185762	0.0002
D(X3(-1),2)	0.051004	0.168950	0.301887	0.7645
C	0.031214	0.014931	2.090541	0.0437
R-squared	0.447441	Mean dependent var		-0.001557
Adjusted R-squared	0.416743	S.D. dependent var		0.104336
S.E. of regression	0.079683	Akaike info criterion		-2.147717
Sum squared resid	0.228578	Schwarz criterion		-2.019751
Log likelihood	44.88048	Hannan-Quinn criter.		-2.101804
F-statistic	14.57569	Durbin-Watson stat		1.841532
Prob(F-statistic)	0.000023			

Tabel 14 Hasil Uji Stasioner dengan Uji Augmented Dickey-Fuller (ADF) (Kondisi *First Difference*) pada Variabel X4

Null Hypothesis: D(X4) has a unit root
 Exogenous: Constant
 Lag Length: 1 (Fixed)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-6.578304	0.0000
Test critical values: 1% level	-3.610453	
5% level	-2.938987	
10% level	-2.607932	

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

Augmented Dickey-Fuller Test Equation
 Dependent Variable: D(X4,2)
 Method: Least Squares
 Date: 11/11/18 Time: 16:30
 Sample (adjusted): 4 42
 Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(X4(-1))	-1.872783	0.284691	-6.578304	0.0000
D(X4(-1),2)	0.182308	0.157734	1.155799	0.2554
C	0.029270	0.014759	1.983144	0.0550
R-squared	0.799046	Mean dependent var		0.000983
Adjusted R-squared	0.787882	S.D. dependent var		0.189888
S.E. of regression	0.087455	Akaike info criterion		-1.961573
Sum squared resid	0.275344	Schwarz criterion		-1.833607
Log likelihood	41.25067	Hannan-Quinn criter.		-1.915660
F-statistic	71.57260	Durbin-Watson stat		1.986123
Prob(F-statistic)	0.000000			

Tabel 15 Hasil Uji Stasioner dengan Uji Augmented Dickey-Fuller (ADF) (Kondisi *First Difference*) pada Variabel X5

Null Hypothesis: D(X5) has a unit root
 Exogenous: Constant
 Lag Length: 1 (Fixed)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-5.010206	0.0002
Test critical values: 1% level	-3.610453	
5% level	-2.938987	
10% level	-2.607932	

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

Augmented Dickey-Fuller Test Equation
 Dependent Variable: D(X5,2)
 Method: Least Squares
 Date: 11/11/18 Time: 16:30
 Sample (adjusted): 4 42
 Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(X5(-1))	-1.355001	0.270448	-5.010206	0.0000
D(X5(-1),2)	0.256660	0.187216	1.370927	0.1789
C	0.027359	0.153002	0.178815	0.8591
R-squared	0.545872	Mean dependent var		0.025774
Adjusted R-squared	0.520642	S.D. dependent var		1.377980
S.E. of regression	0.954054	Akaike info criterion		2.817610
Sum squared resid	32.76787	Schwarz criterion		2.945576
Log likelihood	-51.94340	Hannan-Quinn criter.		2.863523
F-statistic	21.63637	Durbin-Watson stat		2.041095
Prob(F-statistic)	0.000001			

Tabel 16 Hasil Uji Stasioner dengan Uji Augmented Dickey-Fuller (ADF) (Kondisi *First Difference*) pada Variabel X6

Null Hypothesis: D(X6) has a unit root
 Exogenous: Constant
 Lag Length: 1 (Fixed)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-5.102226	0.0002
Test critical values: 1% level	-3.610453	
5% level	-2.938987	
10% level	-2.607932	

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

Augmented Dickey-Fuller Test Equation
 Dependent Variable: D(X6,2)
 Method: Least Squares
 Date: 11/11/18 Time: 16:31
 Sample (adjusted): 4 42
 Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(X6(-1))	-1.155954	0.226559	-5.102226	0.0000
D(X6(-1),2)	0.201304	0.162216	1.240958	0.2226
C	-0.021628	0.027472	-0.787292	0.4363
R-squared	0.502287	Mean dependent var		0.000877
Adjusted R-squared	0.474636	S.D. dependent var		0.234117
S.E. of regression	0.169693	Akaike info criterion		-0.635852
Sum squared resid	1.036641	Schwarz criterion		-0.507886
Log likelihood	15.39912	Hannan-Quinn criter.		-0.589939
F-statistic	18.16542	Durbin-Watson stat		1.911830
Prob(F-statistic)	0.000004			

Berdasarkan hasil uji stasioner pada Tabel 10 sampai Tabel 16, diringkas sebagai berikut.

Tabel 17 Uji Stasioner pada Variabel Y, X1, X2, X3, X4, X5 dan X6 dengan Menggunakan Uji Augmented Dickey-Fuller (ADF) pada *First Difference* (EViews)

Variabel	Augmented Dickey-Fuller test statistic	Test critical values (5%)	Keterangan
D(Y)	-5.6040	-2.9389	Stasioner
D(X1)	-4.1556	-2.9389	Stasioner
D(X2)	-5.2226	-2.9389	Stasioner
D(X3)	-4.1857	-2.9389	Stasioner
D(X4)	-6.5783	-2.9389	Stasioner
D(X5)	-5.0102	-2.9389	Stasioner
D(X6)	-5.1022	-2.9389	Stasioner

Stationerity Test (Augmented Dickey-Fuller Test Unit Root Test)

Data In:

☐ Level
 ☒ First Difference (1st)
 ☐ Second Difference (2nd)

Decimals:

0 4 30

Show 10 entries

Lags

1 1

Select Lags:

☐ Fixed
 ☒ Akaike (AIC)
 ☐ Bayes (BIC)

Type:

☐ None
 ☒ Drift
 ☐ Trend

Search:

	Variable	Augmented Dickey-Fuller Test Statistic	Critical Value 5% Level	Conclusion
1	D(Y)	-5.604	-2.93	Stationer at First Difference (1st Difference)
2	D(X1)	-4.1557	-2.93	Stationer at First Difference (1st Difference)
3	D(X2)	-5.2226	-2.93	Stationer at First Difference (1st Difference)
4	D(X3)	-4.1858	-2.93	Stationer at First Difference (1st Difference)
5	D(X4)	-6.5783	-2.93	Stationer at First Difference (1st Difference)
6	D(X5)	-5.0102	-2.93	Stationer at First Difference (1st Difference)
7	D(X6)	-5.1022	-2.93	Stationer at First Difference (1st Difference)

Gambar 9 Uji Stasioner pada Variabel Y, X1, X2, X3, X4, X5 dan X6 dengan Menggunakan Uji Augmented Dickey-Fuller (ADF) pada *First Difference* (STATCAL)

Stationerity Test based on Graph

Data In:

- ☐ Level ☒ First Difference (1st)
☐ Second Difference (2nd)

Facet:

Gambar 10 Grafik Garis (Sumbu-X sebagai Waktu) (pada Kondisi *First Difference*)

4. Estimasi Persamaan Jangka Panjang

Gambar 11

Gambar 12

Gambar 13

Tabel 18 Persamaan Jangka Panjang

Dependent Variable: Y
 Method: Least Squares
 Date: 11/11/18 Time: 16:53
 Sample: 1 42
 Included observations: 42

Variable	Coefficient	Std. Error	t-Statistic	Prob.
X1	0.742223	0.193489	3.836002	0.0005
X2	-0.320699	0.156932	-2.043557	0.0486
X3	0.973859	0.189015	5.152277	0.0000
X4	0.446326	0.438458	1.017943	0.3157
X5	-0.117218	0.035863	-3.268503	0.0024
X6	-0.025312	0.126963	-0.199363	0.8431
C	-8.098764	5.515109	-1.468468	0.1509
R-squared	0.881611	Mean dependent var	12.45648	
Adjusted R-squared	0.861316	S.D. dependent var	0.478546	
S.E. of regression	0.178212	Akaike info criterion	-0.460670	
Sum squared resid	1.111587	Schwarz criterion	-0.171058	
Log likelihood	16.67407	Hannan-Quinn criter.	-0.354516	
F-statistic	43.43920	Durbin-Watson stat	1.337126	
Prob(F-statistic)	0.000000			

Berdasarkan hasil pada Tabel 18, diperoleh persamaan jangka panjang sebagai berikut.

$$Y = -8,099 + 0,742X_1 - 0,320X_2 + 0,973X_3 + 0,446X_4 - 0,117X_5 - 0,025X_6 + e$$

Berdasarkan Tabel 18, diketahui:

- ⇒ X_1 dalam jangka panjang berpengaruh signifikan terhadap Y (Prob 0,0005 < 0,05).
- ⇒ X_2 dalam jangka panjang berpengaruh signifikan terhadap Y (Prob 0,0486 < 0,05).
- ⇒ X_3 dalam jangka panjang berpengaruh signifikan terhadap Y (Prob 0,0000 < 0,05).
- ⇒ X_4 dalam jangka panjang tidak berpengaruh signifikan terhadap Y (Prob 0,3157 > 0,05).
- ⇒ X_5 dalam jangka panjang berpengaruh signifikan terhadap Y (Prob 0,0024 < 0,05).
- ⇒ X_6 dalam jangka panjang tidak berpengaruh signifikan terhadap Y (Prob 0,8432 > 0,05).

Long Term Equation

Coefficient				
Show 10 entries	Search: <input type="text"/>			
	Estimate	Std. Error	t value	P-Value
(Intercept)	-8.0988	5.5151	-1.4685	0.1509
X1	0.7422	0.1935	3.836	0.0005
X2	-0.3207	0.1569	-2.0436	0.0486
X3	0.9739	0.189	5.1523	0
X4	0.4463	0.4385	1.0179	0.3157
X5	-0.1172	0.0359	-3.2685	0.0024
X6	-0.0253	0.127	-0.1994	0.8431

Gambar 14 Persamaan Jangka Panjang berdasarkan STATCAL

5. Pengujian Kointegrasi

Pada teori mengenai ECM sebelumnya telah dijelaskan bahwa kointegrasi suatu persamaan regresi dapat dilihat dari residualnya. **Apabila residual stasioner, terdapat kointegrasi.**

Gambar 15

Gambar 16

Gambar 17 Buka Data residual

The screenshot shows the EViews software interface with the 'RESIDUAL' data series selected. The title bar reads 'EViews - [Series: RESIDUAL Workfile: ECM::Untit... -]'. The menu bar includes 'File', 'Edit', 'Object', 'View', 'Proc', 'Quick', 'Options', 'Add-ins', and 'Window'. Below the menu bar, there is a toolbar with buttons for 'View', 'Proc', 'Object', 'Properties', 'Print', 'Name', 'Freeze', 'Default', 'Sort', and 'Edit'. The status bar indicates 'Last updated: 11/21/17 - 15:18' and 'Modified: 1970 2011 // residual = resid'. The main window displays a table of residual values for each year from 1970 to 1995.

Year	Residual
1970	-0.128839
1971	-0.334867
1972	-0.130336
1973	-0.006664
1974	0.092930
1975	0.053830
1976	-0.132724
1977	-0.151760
1978	0.206085
1979	0.099933
1980	0.202198
1981	-0.114517
1982	0.027170
1983	-0.005988
1984	-0.100681
1985	0.069450
1986	-0.004058
1987	0.090880
1988	0.123269
1989	0.350828
1990	0.432359
1991	0.236156
1992	-0.079252
1993	0.161283
1994	-0.092289
1995	-0.277090

Gambar 18 Data residual

Gambar 19

Gambar 20

Tabel 19 Hasil Uji Kointegrasi (Uji Stasioner pada Data Residual (Kondisi Level))

Null Hypothesis: RESIDUAL has a unit root
 Exogenous: Constant
 Lag Length: 1 (Fixed)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-3.587362	0.0105
Test critical values:		
1% level	-3.605593	
5% level	-2.936942	
10% level	-2.606857	

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

Augmented Dickey-Fuller Test Equation
 Dependent Variable: D(RESIDUAL)
 Method: Least Squares
 Date: 11/11/18 Time: 17:02
 Sample (adjusted): 3 42
 Included observations: 40 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RESIDUAL(-1)	-0.663573	0.184975	-3.587362	0.0010
D(RESIDUAL(-1))	-0.082145	0.157254	-0.522371	0.6045
C	0.009167	0.024524	0.373792	0.7107
R-squared	0.384940	Mean dependent var		0.003842
Adjusted R-squared	0.351694	S.D. dependent var		0.192373
S.E. of regression	0.154894	Akaike info criterion		-0.820110
Sum squared resid	0.887712	Schwarz criterion		-0.693444
Log likelihood	19.40220	Hannan-Quinn criter.		-0.774311
F-statistic	11.57837	Durbin-Watson stat		1.986025
Prob(F-statistic)	0.000124			

Berdasarkan hasil pada Tabel 19, diketahui **residual** stasioner pada Level, dan secara tersirat menyatakan bahwa **Y, X1, X2, X3, X4, X5, dan X6 sailing berkointegrasi.**

Gambar 21 Hasil Pengujian Kointegrasi berdasarkan STATCAL

Gambar 22 Grafik Garis antara Waktu (Sumbu-X) dan Data Residual (Sumbu-Y) (STATCAL)

6. Estimasi Persamaan Jangka Pendek

Gambar 23

d(y) c d(x1) d(x2) d(x3) d(x4) d(x5) d(x6) residual(-1)

Gambar 24

Tabel 20 Hasil Persamaan Jangka Pendek

Dependent Variable: D(Y)
Method: Least Squares
Date: 11/21/17 Time: 15:27
Sample (adjusted): 1971 2011
Included observations: 41 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.002475	0.026269	0.094228	0.9255
D(X1)	0.415741	0.168709	2.464251	0.0191
D(X2)	-0.315554	0.109594	-2.879312	0.0069
D(X3)	1.055822	0.336575	3.136960	0.0036
D(X4)	0.081628	0.272214	0.299868	0.7662
D(X5)	-0.073895	0.031815	-2.322641	0.0265
D(X6)	-0.074052	0.146768	-0.504547	0.6172
RESIDUAL(-1)	-0.689936	0.165247	-4.175181	0.0002
R-squared	0.486694	Mean dependent var		0.030052
Adjusted R-squared	0.377811	S.D. dependent var		0.193858
S.E. of regression	0.152913	Akaike info criterion		-0.744717
Sum squared resid	0.771618	Schwarz criterion		-0.410362
Log likelihood	23.26671	Hannan-Quinn criter.		-0.622964
F-statistic	4.469871	Durbin-Watson stat		2.047455
Prob(F-statistic)	0.001368			

Berdasarkan Tabel 20, diperoleh persamaan jangka pendek sebagai berikut.

$$\Delta Y = 0,002 + 0,415\Delta X_1 - 0,315\Delta X_2 + 1,055\Delta X_3 + 0,081\Delta X_4 - 0,073\Delta X_5 - 0,074\Delta X_6 \\ - 0,689RESIDUAL + \varepsilon$$

Berdasarkan Tabel 6, diketahui:

- ⇒ X_1 dalam jangka pendek tidak berpengaruh signifikan terhadap Y (Prob 0,9255 > 0,05).
- ⇒ X_2 dalam jangka pendek berpengaruh signifikan terhadap Y (Prob 0,0191 < 0,05).
- ⇒ X_3 dalam jangka pendek berpengaruh signifikan terhadap Y (Prob 0,0069 < 0,05).
- ⇒ X_4 dalam jangka pendek tidak berpengaruh signifikan terhadap Y (Prob 0,7662 > 0,05).
- ⇒ X_5 dalam jangka pendek tidak berpengaruh signifikan terhadap Y (Prob 0,0265 > 0,05).
- ⇒ X_6 dalam jangka pendek tidak berpengaruh signifikan terhadap Y (Prob 0,6172 > 0,05).

Untuk persamaan jangka pendek, pertama-tama pastikan nilai probabilitas F-statistic berada di bawah α (0.05). Setelah itu, cek speed of adjustment-nya (koefisien dari residual(-1)).

Nilai koefisien tersebut harus negatif dan signifikan (probabilitasnya berada di bawah 0.05). Barulah kemudian kita cek probabilitas masing-masing variabel, yg mana saja yang nilainya signifikan atau berada di bawah α (0.05), sama seperti pada persamaan jangka panjang.

Berdasarkan nilai speed of adjustment, ada sebesar 69% ketidakseimbangan, pada pengaruh jangka pendek X_1 , X_2 , X_3 , X_4 , X_5 , dan X_6 terhadap Y , yg terkoreksi setiap.

Model ECM ini dikatakan valid jika tanda koefisien koreksi kesalahan (ECT) bertanda negatif dan signifikan secara statistik (Widarjono, 2009:332).

Coefficient

Show 10 entries

Search:

	Estimate ↕	Std. Error ↕	t value ↕	P-Value ↕
(Intercept)	0.0025	0.0263	0.0942	0.9255
`D(X1)`	0.4157	0.1687	2.4642	0.0191
`D(X2)`	-0.3156	0.1096	-2.8793	0.0069
`D(X3)`	1.0558	0.3366	3.137	0.0036
`D(X4)`	0.0816	0.2722	0.2998	0.7662
`D(X5)`	-0.0739	0.0318	-2.3226	0.0265
`D(X6)`	-0.0741	0.1468	-0.5046	0.6172
`res(-1)`	-0.6899	0.1652	-4.1752	0.0002

Showing 1 to 8 of 8 entries

Previous

1

Next

Gambar 25 Hasil Persamaan Jangka Pendek berdasarkan STATCAL

Error Correction Model (ECM) dengan STATCAL

Prana Ugiana Gio (CEO STATCAL)

Created by Prana Ugiana Gio & Rezzy Eko Caraka

Rezzy Eko Caraka (CFO STATCAL)

Error Correction Model (ECM)

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Input: Time, Value, Name of Variable

Input Time Input Value Name Choose Variable Result Watch Tutorial Video

Time

1 1970
2 1971
3 1972
4 1973
5 1974
6 1975
7 1976
8 1977
9 1978
10 1979
11 1980
12 1981
13 1982
14 1983
15 1984
16 1985
17 1986
18 1987
19 1988
20 1989
21 1990
22 1991
23 1992

Error Correction Model (ECM)

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Input: Time, Value, Name of Variable

[Input Time](#)[Input Value](#)[Name](#)[Choose Variable](#)[Result](#)[Watch Tutorial Video](#)**Time**

1	11.5235	3.824368	3.337364	12.1286	15.16349	3.07476	9.328724
2	11.18396	3.652242	3.404265	12.10579	15.35523	3.456549	9.4439
3	11.44798	3.731015	3.309451	12.09366	15.33518	3.548518	9.358715
4	11.44638	3.886701	3.308395	11.91948	15.24719	3.873584	9.128001
5	11.62498	3.88877	3.353976	11.91713	15.37789	3.631063	8.827534
6	11.76291	3.882621	3.14272	12.04594	15.34226	3.408516	8.900343
7	11.82241	4.479436	3.894126	12.1724	15.07468	3.273056	8.721122
8	11.9852	4.896764	4.595025	12.17544	15.29698	3.331712	8.660603
9	12.28243	4.438688	4.031319	12.31353	15.36842	3.829181	9.033985
10	12.30231	4.447262	4.154883	12.5197	15.41995	4.420551	8.835626
11	12.38287	4.242254	4.052823	12.59464	15.39226	4.142075	8.666712
12	12.25769	3.886164	3.44852	12.66001	15.62104	3.332301	8.613616
13	12.33264	3.90662	3.302022	12.247	15.41305	2.683446	8.69851
14	12.39354	3.891447	3.42579	12.43019	15.53507	2.553699	8.919711
15	12.59294	3.952802	2.712842	12.66188	15.4683	2.385247	8.954752
16	12.55204	3.863933	3.464338	12.64883	15.57759	1.872441	8.964724
17	12.60526	4.092246	3.77545	12.78499	15.4713	2.039142	9.30351
18	12.56485	3.602731	3.363238	12.87048	15.66949	2.701613	9.23553
19	12.60819	3.641865	3.31315	12.87671	15.54637	2.579411	9.22376
20	12.78559	3.36977	2.98961	12.90184	15.55182	2.857688	9.185988
21	12.95236	3.08384	2.516354	12.93064	15.61773	1.652854	9.189581
22	12.84968	2.979928	2.570967	12.96759	15.62393	0.382742	9.168891
23	12.50377	2.73147	2.440277	12.98753	15.62158	-0.41583	9.167704

Error Correction Model (ECM)

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Input: Time, Value, Name of Variable

[Input Time](#)[Input Value](#)[Name](#)[Choose Variable](#)[Result](#)[Watch Tutorial Video](#)**Label**

Tahun
Y
X1
X2
X3
X4
X5

Error Correction Model (ECM)

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Input: Time, Value, Name of Variable

[Input Time](#)[Input Value](#)[Name](#)[Choose Variable](#)[Result](#)[Watch Tutorial Video](#)**Label**

Y
X1
X2
X3
X4
X5
X6

Input: Time, Value, Name of Variable

Input Time Input Value Name **Choose Variable** Result Watch Tutorial Video

Choose Numeric Variable (Multiple Choices)

Y
X1
X2
X3
X4
X5
X6

Choose Time (Single Choice)

Tahun

Input: Time, Value, Name of Variable

Input Time Input Value Name Choose Variable **Result** Watch Tutorial Video

Error Correction Model (ECM)

Descriptive Statistics

Decimals:

Show 10 entries

Search:

	Minimum	Maximum	Mean	Standard Deviation
Y	11.18	13.06	12.46	0.48
X1	2.4	4.9	3.5	0.59
X2	2.01	4.6	3.09	0.59
X3	11.92	13.46	12.84	0.48
X4	15.07	15.95	15.59	0.23
X5	-0.42	5.02	2.48	1.27
X6	8.59	9.62	9.08	0.28

Scatter Plot & Pearson Correlation

Facet:

Your Data in Level, First Difference or Second Difference

Data In:

☒ Level ☐ First Difference (1st) ☐ Second Difference (2nd)

Decimals:

Show 10 entries

Search:

	Time	Y	X1	X2	X3	X4	X5	X6
1	1970	11.52	3.82	3.34	12.13	15.16	3.07	9.33
2	1971	11.18	3.65	3.4	12.11	15.36	3.46	9.44
3	1972	11.45	3.73	3.31	12.09	15.34	3.55	9.36
4	1973	11.45	3.89	3.31	11.92	15.25	3.87	9.13
5	1974	11.62	3.89	3.35	11.92	15.38	3.63	8.83
6	1975	11.76	3.85	3.14	12.05	15.34	3.41	8.8
7	1976	11.82	4.48	3.89	12.17	15.07	3.27	8.72
8	1977	11.99	4.9	4.6	12.18	15.3	3.33	8.66
9	1978	12.28	4.44	4.03	12.31	15.37	3.83	9.03
10	1979	12.2	4.45	4.15	12.52	15.42	4.42	8.84

Stationerity Test based on Graph

Stationerity Test (Augmented Dickey-Fuller Test Unit Root Test)

Data In:

☒ Level

☐ First Difference (1st)

☐ Second Difference (2nd)

Decimals:

0

3

30

Legs

1

1

Select Legs:

☐ Fixed

☒ Akaike (AIC)

☐ Bayes (BIC)

Type:

☐ None

☒ Drift

☐ Trend

Show

10

 entries

Search:

	Variable	Augmented Dickey-Fuller Test Statistic	Critical Value 5% Level	Conclusion
1	Y	-2.91	-2.93	Not Stationer at Level
2	X1	-1.66	-2.93	Not Stationer at Level
3	X2	-2.11	-2.93	Not Stationer at Level
4	X3	-1.24	-2.93	Not Stationer at Level
5	X4	-0.63	-2.93	Not Stationer at Level
6	X5	-2.08	-2.93	Not Stationer at Level
7	X6	-2.01	-2.93	Not Stationer at Level

Cointegration Test

Decimals:

0

3

30

Legs

1

1

Select Legs:

☐ Fixed

☒ Akaike (AIC)

☐ Bayes (BIC)

Type:

☐ None

☒ Drift

☐ Trend

Show

10

 entries

Search:

	Augmented Dickey-Fuller Test Statistic	Critical Value 5% Level	Conclusion
Residual	-3.59	-2.93	Residual Data is Stationer (There is Cointegration)

Showing 1 to 1 of 1 entries

Previous

1

Next

Show 10 entries

Search:

	Augmented Dickey-Fuller Test Statistic	Critical Value 5% Level	Conclusion
Residual	-3.59	-2.93	Residual Data is Stationer (There is Cointegration)

Showing 1 to 1 of 1 entries

Previous1Next

Long Term Equation

Coefficient

Show 10 entries

Search:

	Estimate	Std. Error	t value	P-Value
(Intercept)	-8.0988	5.5151	-1.4685	0.1509
X1	0.7422	0.1935	3.836	0.0005
X2	-0.3207	0.1569	-2.0436	0.0486
X3	0.9739	0.189	5.1523	0
X4	0.4463	0.4385	1.0179	0.3157
X5	-0.1172	0.0359	-3.2685	0.0024
X6	-0.0253	0.127	-0.1994	0.8431

Showing 1 to 7 of 7 entries

Previous1Next

ANOVA

Show 10 entries

Search:

	df1	df2	F Statistic	Critical Value of F	P-Value
	6	35	43.4392	2.3718	0

Showing 1 to 1 of 1 entries

Previous1Next

Model Summary

Show 10 entries

Search:

	R-Square	Adjusted R-Square
1	0.8816	0.8613

Showing 1 to 1 of 1 entries

Previous1Next

Short Term Equation

Data In:

☐ Level ☒ First Difference (1st) ☐ Second Difference (2nd)

Decimals:

Coefficient

Show 10 entries

Search:

	Estimate	Std. Error	t value	P-Value
(Intercept)	0.0025	0.0263	0.0942	0.9255
'D(X1)'	0.4157	0.1687	2.4642	0.0191
'D(X2)'	-0.3156	0.1096	-2.8793	0.0069
'D(X3)'	1.0558	0.3366	3.137	0.0036
'D(X4)'	0.0816	0.2722	0.2998	0.7662
'D(X5)'	-0.0739	0.0318	-2.3226	0.0265
'D(X6)'	-0.0741	0.1468	-0.5046	0.6172

ANOVA

Show 10 entries

Search:

df1	df2	F Statistic	Critical Value of F	P-Value
7	33	4.4699	2.303	0.0014

Showing 1 to 1 of 1 entries

Previous 1 Next

Model Summary

Show 10 entries

Search:

	R-Square	Adjusted R-Square
1	0.4867	0.3778

Showing 1 to 1 of 1 entries

Previous 1 Next

A