The SAS System

The Mixed Procedure

Model Information	
Data Set	WORK.A
Dependent Variable	DS
Covariance Structure	Variance Components
Estimation Method	Type 3
Residual Variance Method	Factor
Fixed Effects SE Method	Model-Based
Degrees of Freedom Method	Containment

Class Level Information		
Class	Levels	Values
BLK	4	1 2 3 4
TRT	3	1 2 3
FUNG	2	0 1

Dimensions	
Covariance Parameters	3
Columns in X	12
Columns in Z	16
Subjects	1
Max Obs per Subject	24

Number of Observations	
Number of Observations Read	24
Number of Observations Used	24
Number of Observations Not Used	0

Type 3 Analysis of Variance								
Source	DF	Sum of Squares	Mean Square	Expected Mean Square	Error Term	Error DF	F Value	Pr > F
TRT	2	3803.583333	1901.791667	Var(Residual) + 2 Var (BLK*TRT) + Q (TRT,TRT*FUNG)	MS (BLK*TRT)	6	30.00	0.0008
FUNG	1	8400.041667	8400.041667	Var(Residual) + Q (FUNG,TRT*FUNG)	MS (Residual)	9	133.13	<.0001

TRT*FUNG	2	3548.583333	1774.291667	Var(Residual) + Q (TRT*FUNG)	MS (Residual)	9	28.12	0.0001
BLK	3	180.458333	60.152778	Var(Residual) + 2 Var (BLK*TRT) + 6 Var (BLK)	MS (BLK*TRT)	6	0.95	0.4744
BLK*TRT	6	380.416667	63.402778	Var(Residual) + 2 Var (BLK*TRT)	MS (Residual)	9	1.00	0.4774
Residual	9	567.875000	63.097222	Var(Residual)	.	.	.	.

Covariance Parameter Estimates

Cov Parm	Estimate	Standard Error	Z Value	Pr Z
BLK	-0.5417	10.2092	-0.05	0.9577
BLK*TRT	0.1528	23.5833	0.01	0.9948
Residual	63.0972	29.7443	2.12	0.0169

Fit Statistics

-2 Res Log Likelihood	133.9
AIC (Smaller is Better)	139.9
AICC (Smaller is Better)	141.6
BIC (Smaller is Better)	138.0

Type 3 Tests of Fixed Effects

Effect	Num DF	Den DF	F Value	Pr > F
TRT	2	6	30.00	0.0008
FUNG	1	9	133.13	<.0001
TRT*FUNG	2	9	28.12	0.0001

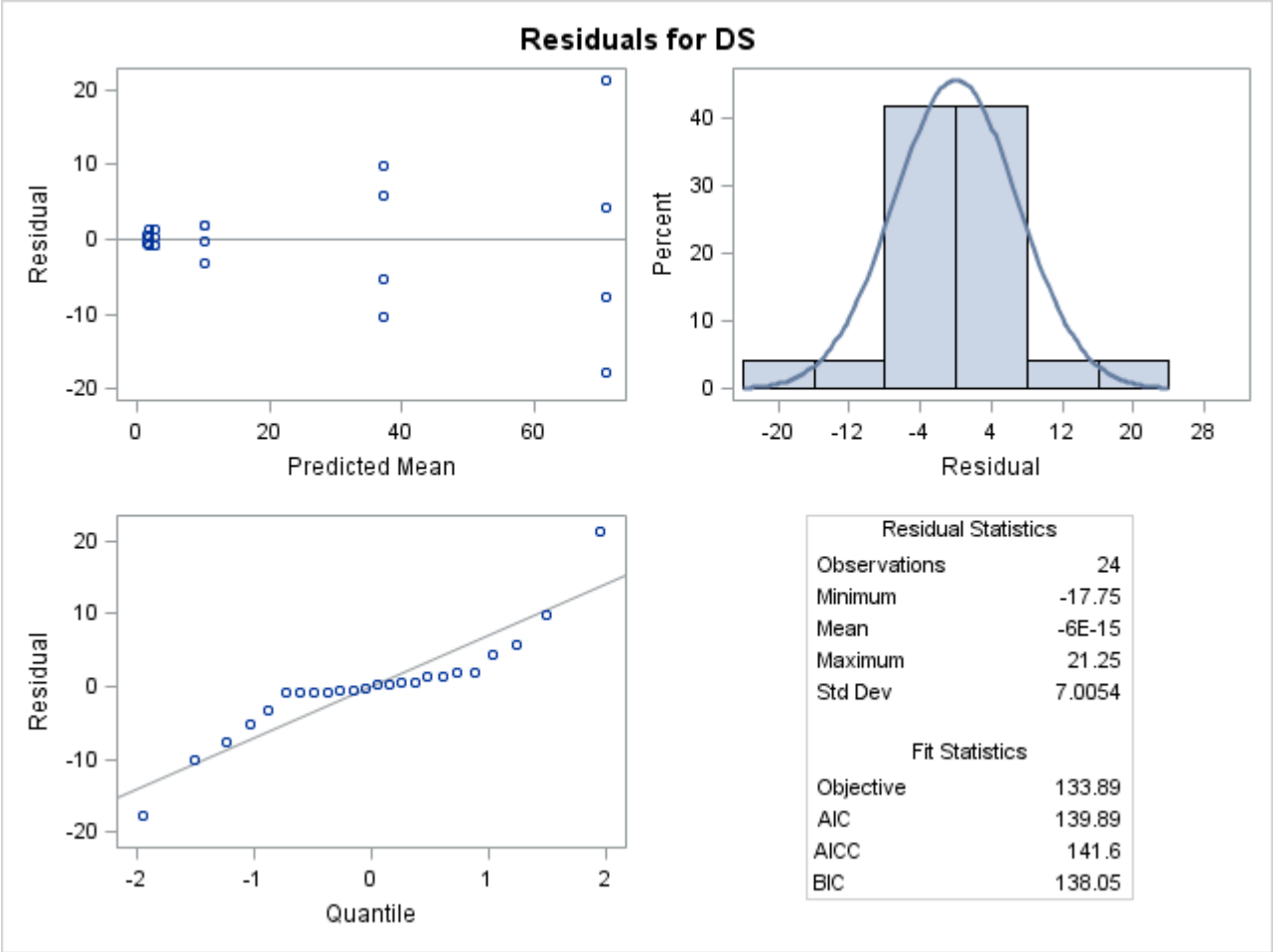
Least Squares Means

Effect	TRT	FUNG	Estimate	Standard Error	DF	t Value	Pr > |t|
TRT	1		19.3750	2.7910	6	6.94	0.0004
TRT	2		36.7500	2.7910	6	13.17	<.0001
TRT	3		6.0000	2.7910	6	2.15	0.0751
FUNG		0	39.4167	2.2661	9	17.39	<.0001
FUNG		1	2.0000	2.2661	9	0.88	0.4004
TRT*FUNG	1	0	37.2500	3.9594	9	9.41	<.0001
TRT*FUNG	1	1	1.5000	3.9594	9	0.38	0.7136
TRT*FUNG	2	0	70.7500	3.9594	9	17.87	<.0001

TRT*FUNG	2	1	2.7500	3.9594	9	0.69	0.5049
TRT*FUNG	3	0	10.2500	3.9594	9	2.59	0.0293
TRT*FUNG	3	1	1.7500	3.9594	9	0.44	0.6689

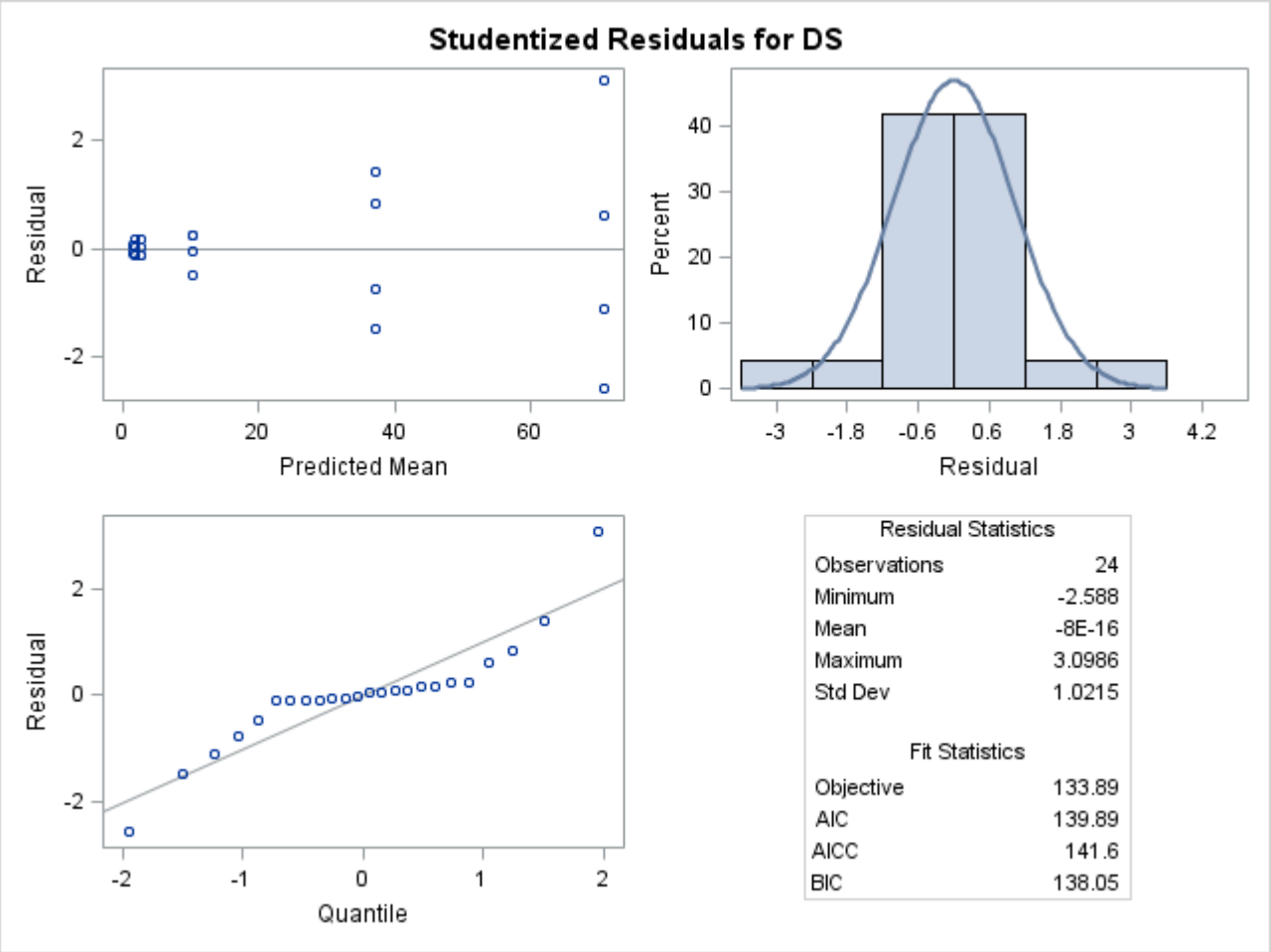
Differences of Least Squares Means

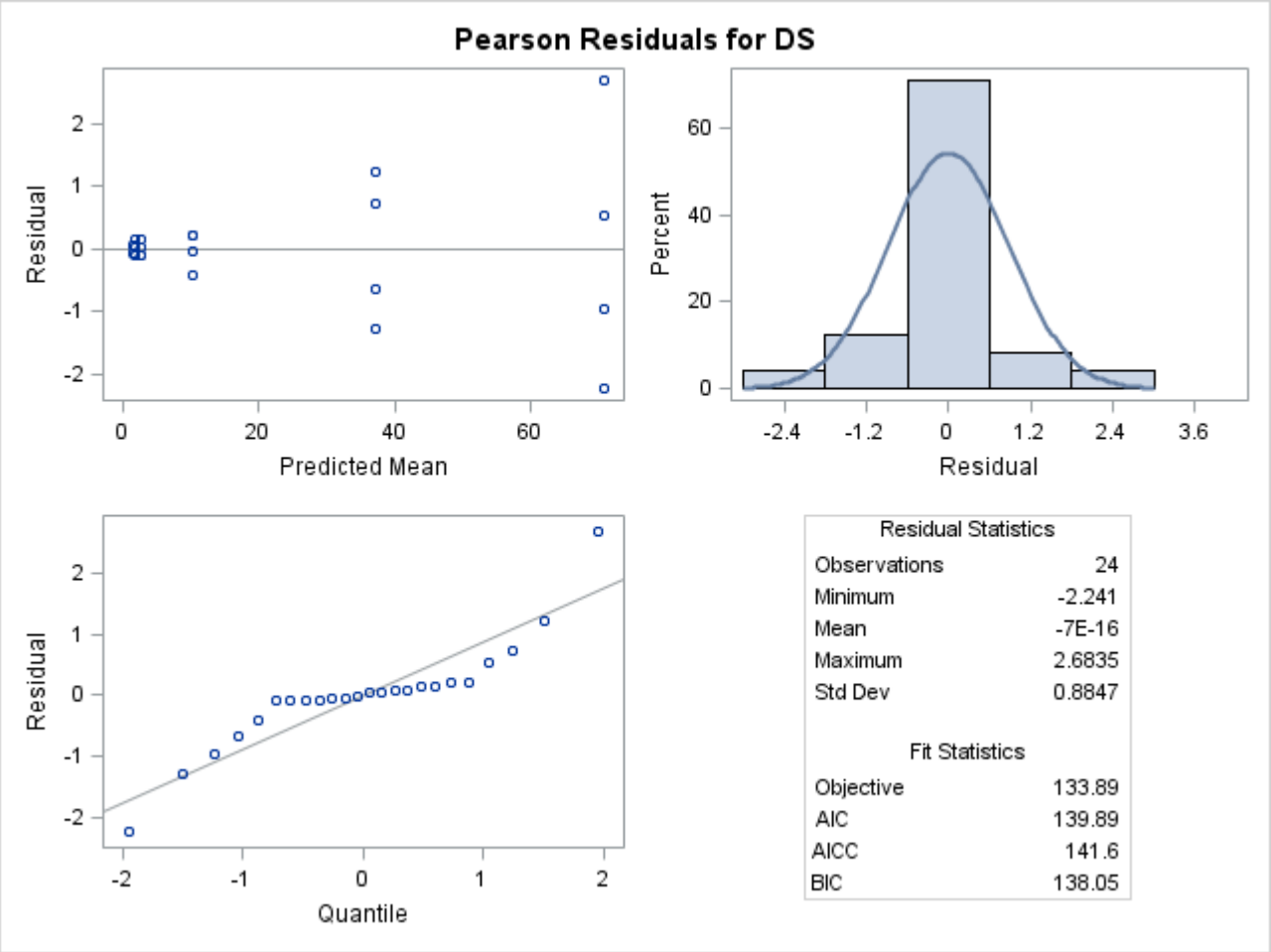
Effect	TRT	FUNG	_TRT	_FUNG	Estimate	Standard Error	DF	t Value	Pr > |t|
TRT	1		2		-17.3750	3.9813	6	-4.36	0.0047
TRT	1		3		13.3750	3.9813	6	3.36	0.0152
TRT	2		3		30.7500	3.9813	6	7.72	0.0002
FUNG		0		1	37.4167	3.2429	9	11.54	<.0001
TRT*FUNG	1	0	1	1	35.7500	5.6168	9	6.36	0.0001
TRT*FUNG	1	0	2	0	-33.5000	5.6236	9	-5.96	0.0002
TRT*FUNG	1	0	2	1	34.5000	5.6236	9	6.13	0.0002
TRT*FUNG	1	0	3	0	27.0000	5.6236	9	4.80	0.0010
TRT*FUNG	1	0	3	1	35.5000	5.6236	9	6.31	0.0001
TRT*FUNG	1	1	2	0	-69.2500	5.6236	9	-12.31	<.0001
TRT*FUNG	1	1	2	1	-1.2500	5.6236	9	-0.22	0.8291
TRT*FUNG	1	1	3	0	-8.7500	5.6236	9	-1.56	0.1541
TRT*FUNG	1	1	3	1	-0.2500	5.6236	9	-0.04	0.9655
TRT*FUNG	2	0	2	1	68.0000	5.6168	9	12.11	<.0001
TRT*FUNG	2	0	3	0	60.5000	5.6236	9	10.76	<.0001
TRT*FUNG	2	0	3	1	69.0000	5.6236	9	12.27	<.0001
TRT*FUNG	2	1	3	0	-7.5000	5.6236	9	-1.33	0.2151
TRT*FUNG	2	1	3	1	1.0000	5.6236	9	0.18	0.8628
TRT*FUNG	3	0	3	1	8.5000	5.6168	9	1.51	0.1645

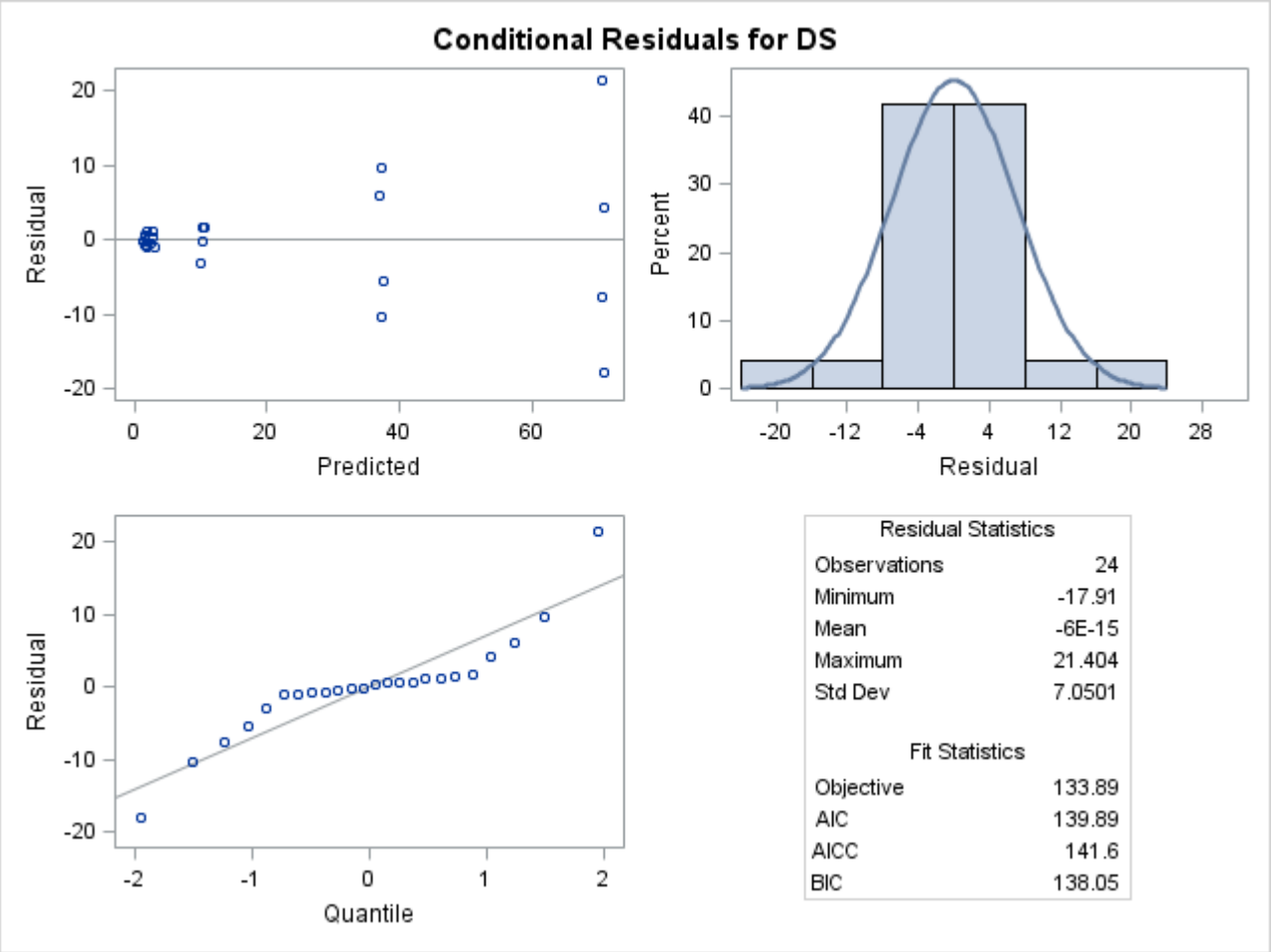


Residual Statistics	
Observations	24
Minimum	-17.75
Mean	-6E-15
Maximum	21.25
Std Dev	7.0054

Fit Statistics	
Objective	133.89
AIC	139.89
AICC	141.6
BIC	138.05

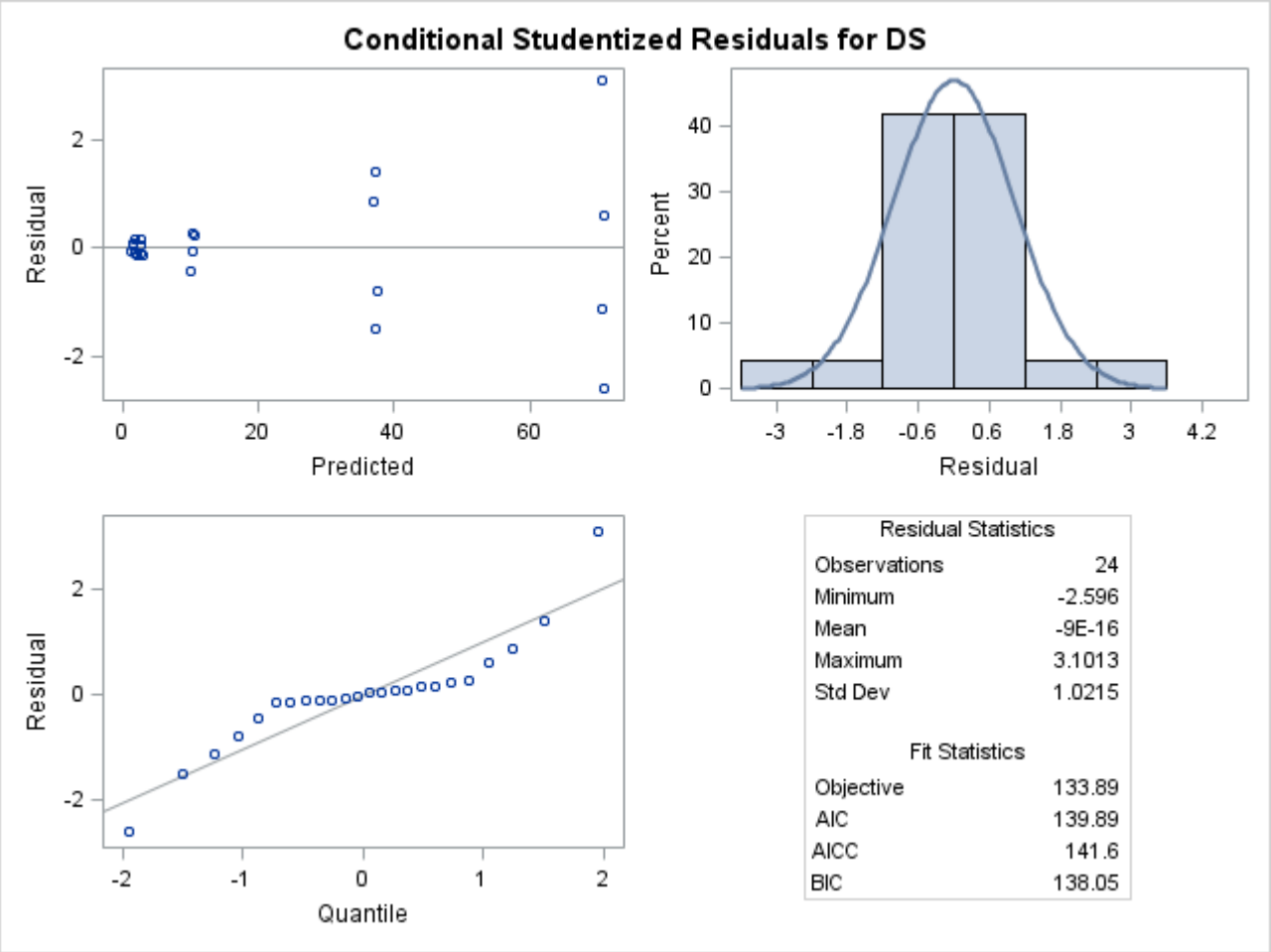

Studentized Residuals for DS
Residual
Predicted Mean
Percent
Residual
Residual
Quantile
Residual Statistics
Observations 24
Minimum -2.588
Mean -8E-16
Maximum 3.0986
Std Dev 1.0215
Fit Statistics
Objective 133.89
AIC 139.89
AICC 141.6
BIC 138.05

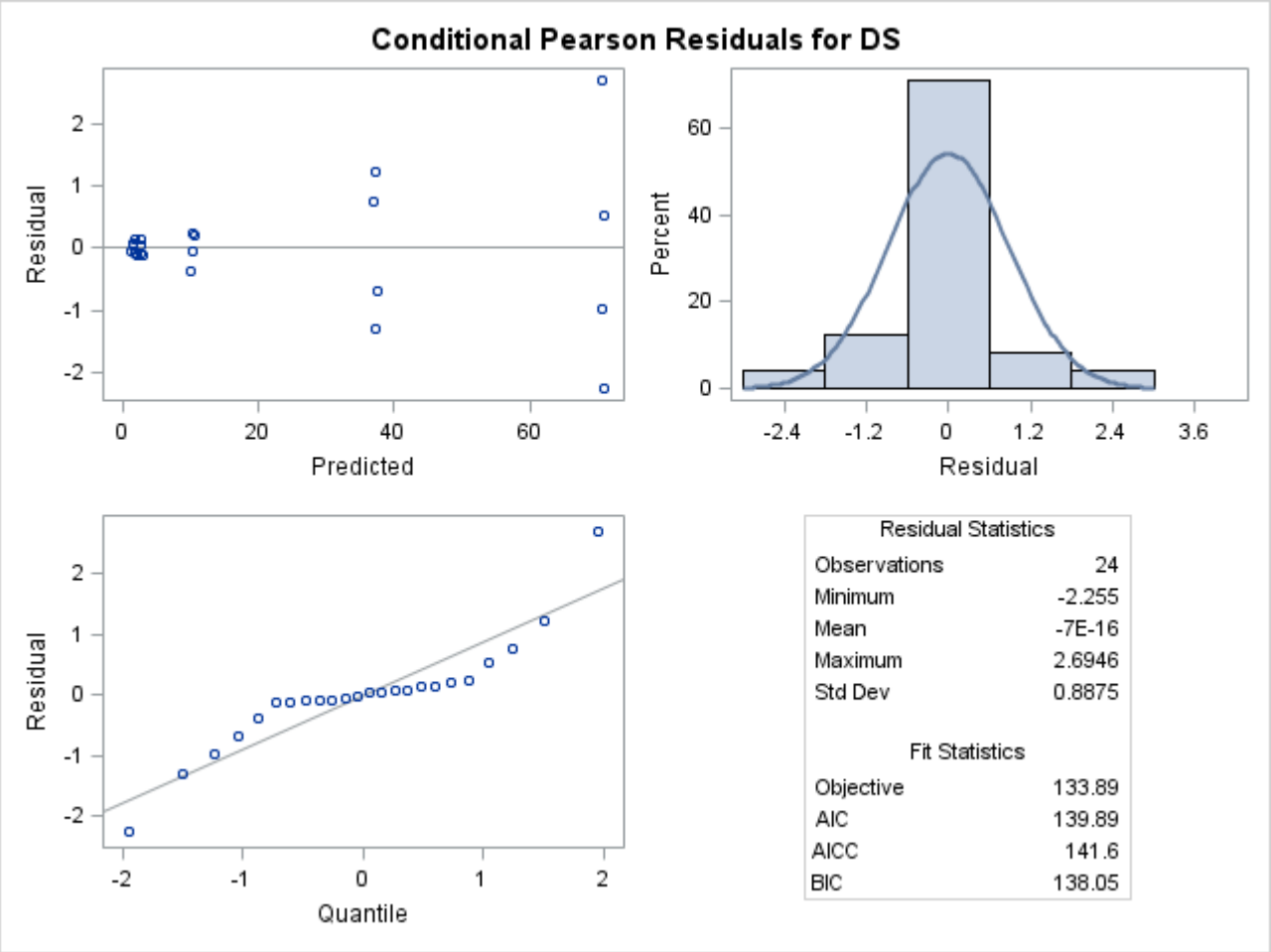

Pearson Residuals for DS
Residual
Predicted Mean
Percent
Residual
Residual
Quantile
Residual Statistics
Observations 24
Minimum -2.241
Mean -7E-16
Maximum 2.6835
Std Dev 0.8847
Fit Statistics
Objective 133.89
AIC 139.89
AICC 141.6
BIC 138.05



Residual Statistics	
Observations	24
Minimum	-17.91
Mean	-6E-15
Maximum	21.404
Std Dev	7.0501

Fit Statistics	
Objective	133.89
AIC	139.89
AICC	141.6
BIC	138.05


Conditional Studentized Residuals for DS
Residual
Predicted
Percent
Residual
Residual
Quantile
Residual Statistics
Observations 24
Minimum -2.596
Mean -9E-16
Maximum 3.1013
Std Dev 1.0215
Fit Statistics
Objective 133.89
AIC 139.89
AICC 141.6
BIC 138.05


Conditional Pearson Residuals for DS
Residual
Predicted
Percent
Residual
Residual
Quantile
Residual Statistics
Observations 24
Minimum -2.255
Mean -7E-16
Maximum 2.6946
Std Dev 0.8875
Fit Statistics
Objective 133.89
AIC 139.89
AICC 141.6
BIC 138.05

The SAS System

The Mixed Procedure

Model Information	
Data Set	WORK.A
Dependent Variable	YIELD
Covariance Structure	Variance Components
Estimation Method	Type 3
Residual Variance Method	Factor
Fixed Effects SE Method	Model-Based
Degrees of Freedom Method	Containment

Class Level Information		
Class	Levels	Values
BLK	4	1 2 3 4
TRT	3	1 2 3
FUNG	2	0 1

Dimensions	
Covariance Parameters	3
Columns in X	12
Columns in Z	16
Subjects	1
Max Obs per Subject	24

Number of Observations	
Number of Observations Read	24
Number of Observations Used	24
Number of Observations Not Used	0

Type 3 Analysis of Variance								
Source	DF	Sum of Squares	Mean Square	Expected Mean Square	Error Term	Error DF	F Value	Pr > F
TRT	2	27438	13719	Var(Residual) + 2 Var (BLK*TRT) + Q (TRT,TRT*FUNG)	MS (BLK*TRT)	6	24.89	0.0012
FUNG	1	105868	105868	Var(Residual) + Q (FUNG,TRT*FUNG)	MS (Residual)	9	69.83	<.0001

TRT*FUNG	2	26728	13364	Var(Residual) + Q (TRT*FUNG)	MS (Residual)	9	8.81	0.0076
BLK	3	5981.666667	1993.888889	Var(Residual) + 2 Var (BLK*TRT) + 6 Var (BLK)	MS (BLK*TRT)	6	3.62	0.0844
BLK*TRT	6	3307.083333	551.180556	Var(Residual) + 2 Var (BLK*TRT)	MS (Residual)	9	0.36	0.8846
Residual	9	13645	1516.138889	Var(Residual)	.	.	.	.

Covariance Parameter Estimates

Cov Parm	Estimate	Standard Error	Z Value	Pr Z
BLK	240.45	276.47	0.87	0.3845
BLK*TRT	-482.48	391.18	-1.23	0.2174
Residual	1516.14	714.71	2.12	0.0169

Fit Statistics

-2 Res Log Likelihood	186.0
AIC (Smaller is Better)	192.0
AICC (Smaller is Better)	193.7
BIC (Smaller is Better)	190.1

Type 3 Tests of Fixed Effects

Effect	Num DF	Den DF	F Value	Pr > F
TRT	2	6	24.89	0.0012
FUNG	1	9	69.83	<.0001
TRT*FUNG	2	9	8.81	0.0076

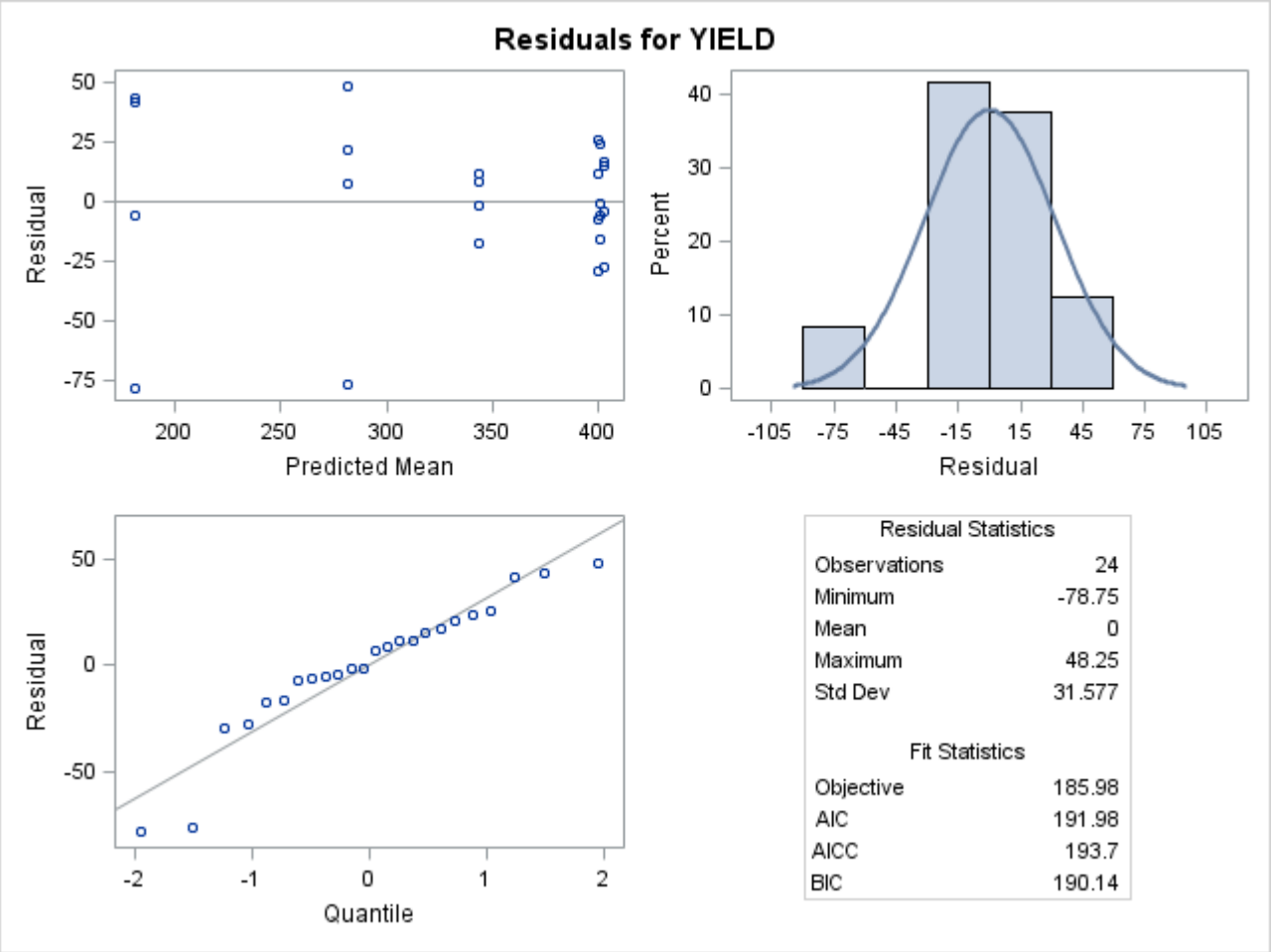
Least Squares Means

Effect	TRT	FUNG	Estimate	Standard Error	DF	t Value	Pr > |t|
TRT	1		342.37	11.3583	6	30.14	<.0001
TRT	2		290.63	11.3583	6	25.59	<.0001
TRT	3		372.50	11.3583	6	32.80	<.0001
FUNG		0	268.75	12.0934	9	22.22	<.0001
FUNG		1	401.58	12.0934	9	33.21	<.0001
TRT*FUNG	1	0	281.75	17.8473	9	15.79	<.0001
TRT*FUNG	1	1	403.00	17.8473	9	22.58	<.0001
TRT*FUNG	2	0	180.75	17.8473	9	10.13	<.0001

TRT*FUNG	2	1	400.50	17.8473	9	22.44	<.0001
TRT*FUNG	3	0	343.75	17.8473	9	19.26	<.0001
TRT*FUNG	3	1	401.25	17.8473	9	22.48	<.0001

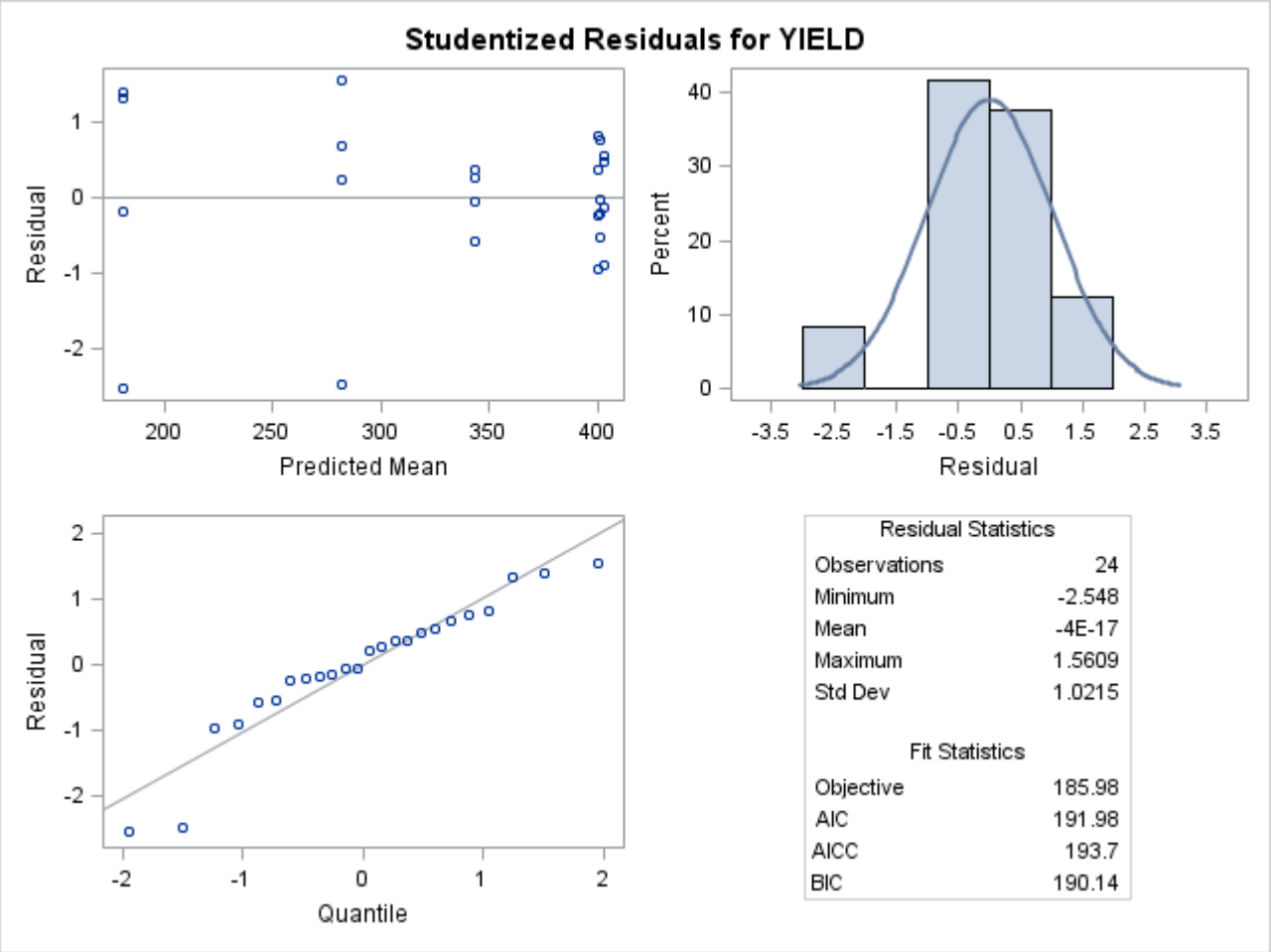
Differences of Least Squares Means

Effect	TRT	FUNG	_TRT	_FUNG	Estimate	Standard Error	DF	t Value	Pr > |t|
TRT	1		2		51.7500	11.7386	6	4.41	0.0045
TRT	1		3		-30.1250	11.7386	6	-2.57	0.0425
TRT	2		3		-81.8750	11.7386	6	-6.97	0.0004
FUNG		0		1	-132.83	15.8962	9	-8.36	<.0001
TRT*FUNG	1	0	1	1	-121.25	27.5331	9	-4.40	0.0017
TRT*FUNG	1	0	2	0	101.00	22.7339	9	4.44	0.0016
TRT*FUNG	1	0	2	1	-118.75	22.7339	9	-5.22	0.0005
TRT*FUNG	1	0	3	0	-62.0000	22.7339	9	-2.73	0.0233
TRT*FUNG	1	0	3	1	-119.50	22.7339	9	-5.26	0.0005
TRT*FUNG	1	1	2	0	222.25	22.7339	9	9.78	<.0001
TRT*FUNG	1	1	2	1	2.5000	22.7339	9	0.11	0.9148
TRT*FUNG	1	1	3	0	59.2500	22.7339	9	2.61	0.0284
TRT*FUNG	1	1	3	1	1.7500	22.7339	9	0.08	0.9403
TRT*FUNG	2	0	2	1	-219.75	27.5331	9	-7.98	<.0001
TRT*FUNG	2	0	3	0	-163.00	22.7339	9	-7.17	<.0001
TRT*FUNG	2	0	3	1	-220.50	22.7339	9	-9.70	<.0001
TRT*FUNG	2	1	3	0	56.7500	22.7339	9	2.50	0.0341
TRT*FUNG	2	1	3	1	-0.7500	22.7339	9	-0.03	0.9744
TRT*FUNG	3	0	3	1	-57.5000	27.5331	9	-2.09	0.0664



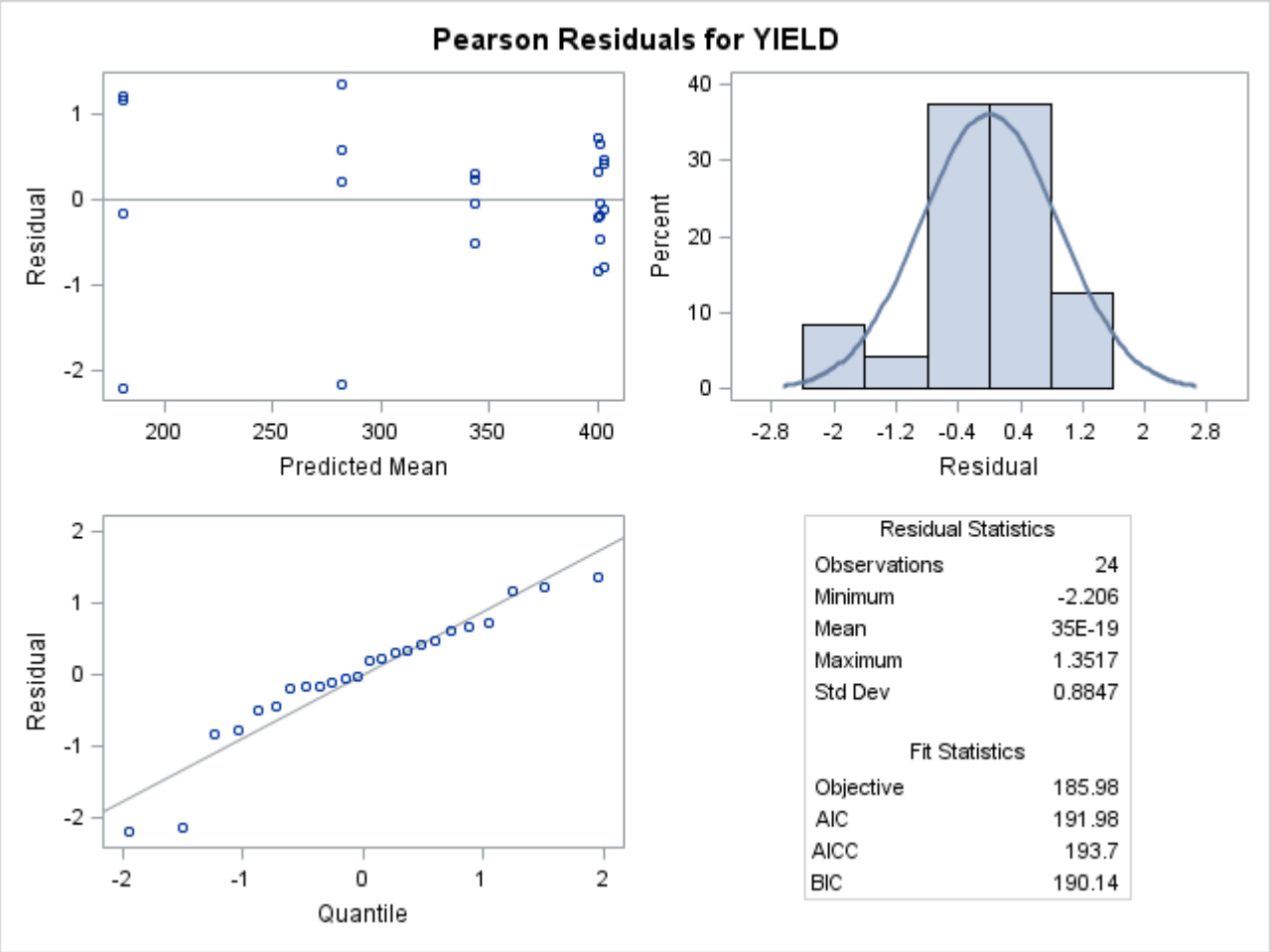
Residual Statistics	
Observations	24
Minimum	-78.75
Mean	0
Maximum	48.25
Std Dev	31.577

Fit Statistics	
Objective	185.98
AIC	191.98
AICC	193.7
BIC	190.14



Residual Statistics	
Observations	24
Minimum	-2.548
Mean	-4E-17
Maximum	1.5609
Std Dev	1.0215

Fit Statistics	
Objective	185.98
AIC	191.98
AICC	193.7
BIC	190.14


Pearson Residuals for YIELD
Residual
Predicted Mean
Percent
Residual
Residual
Quantile
Residual Statistics
Observations 24
Minimum -2.206
Mean 35E-19
Maximum 1.3517
Std Dev 0.8847
Fit Statistics
Objective 185.98
AIC 191.98
AICC 193.7
BIC 190.14

The SAS System

The REG Procedure
Model: MODEL1
Dependent Variable: YIELD

Number of Observations Read	24
Number of Observations Used	24

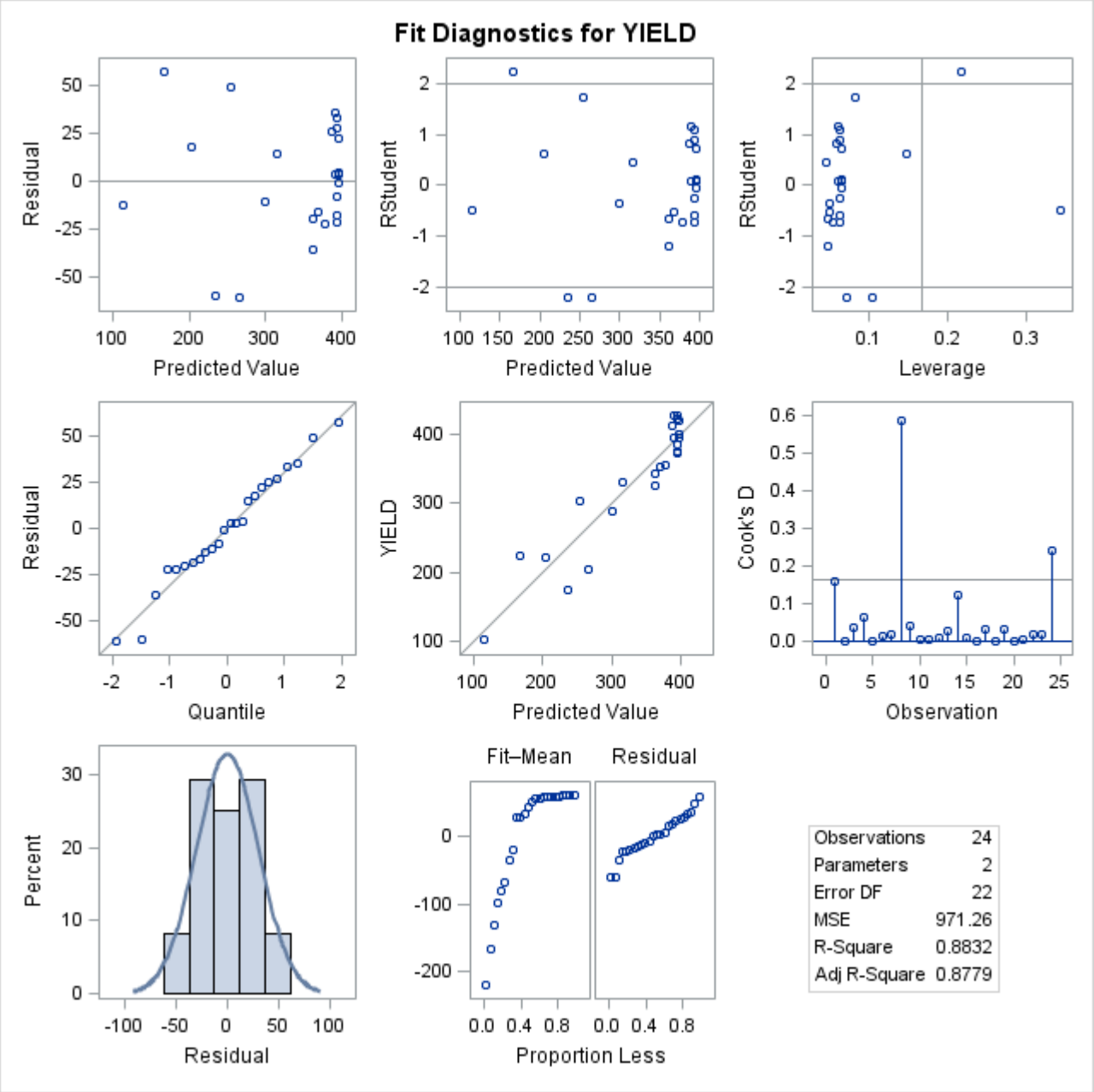
Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	161600	161600	166.38	<.0001
Error	22	21368	971.26229		
Corrected Total	23	182967			

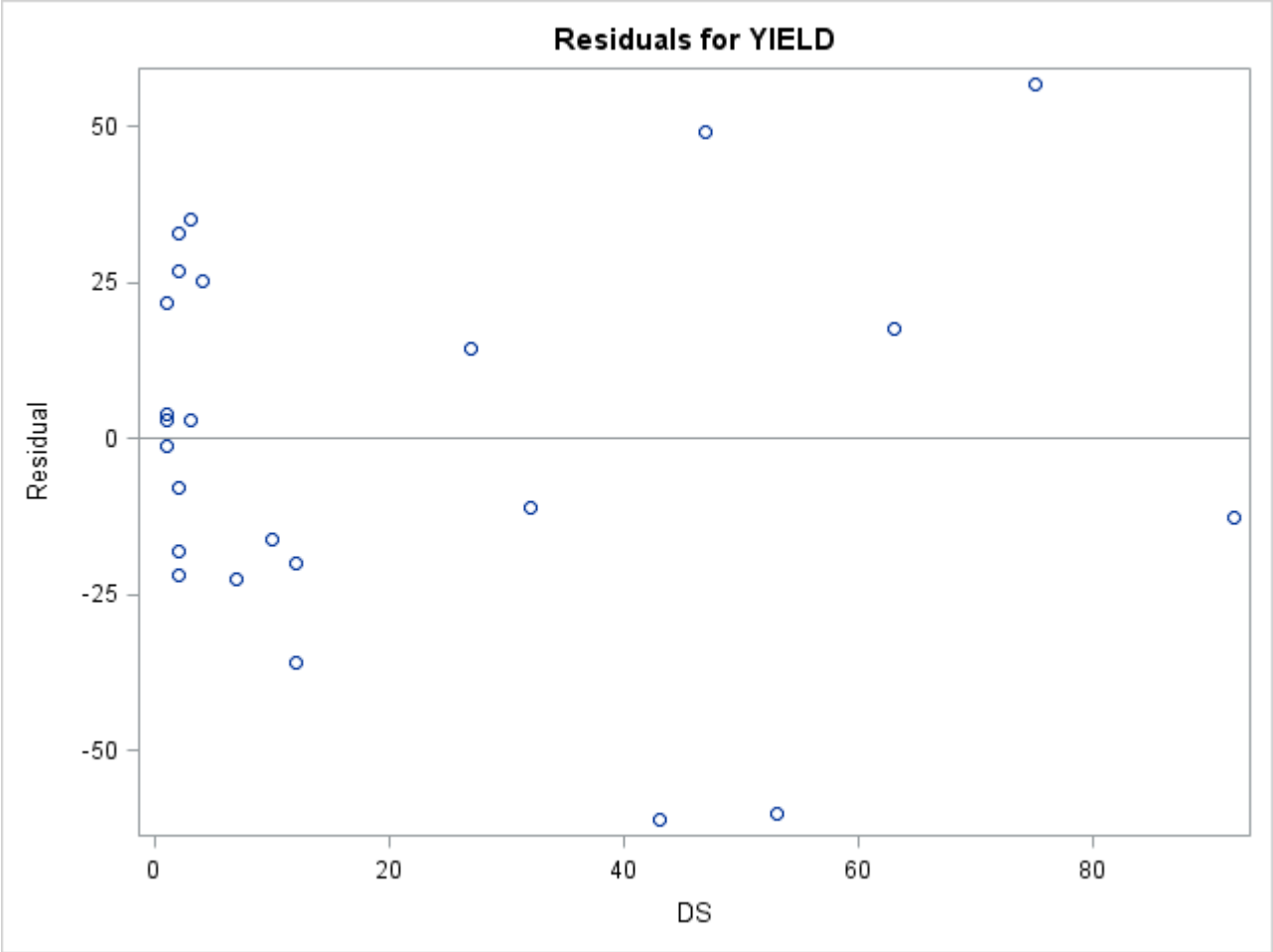
Root MSE	31.16508	R-Square	0.8832
Dependent Mean	335.16667	Adj R-Sq	0.8779
Coeff Var	9.29838		

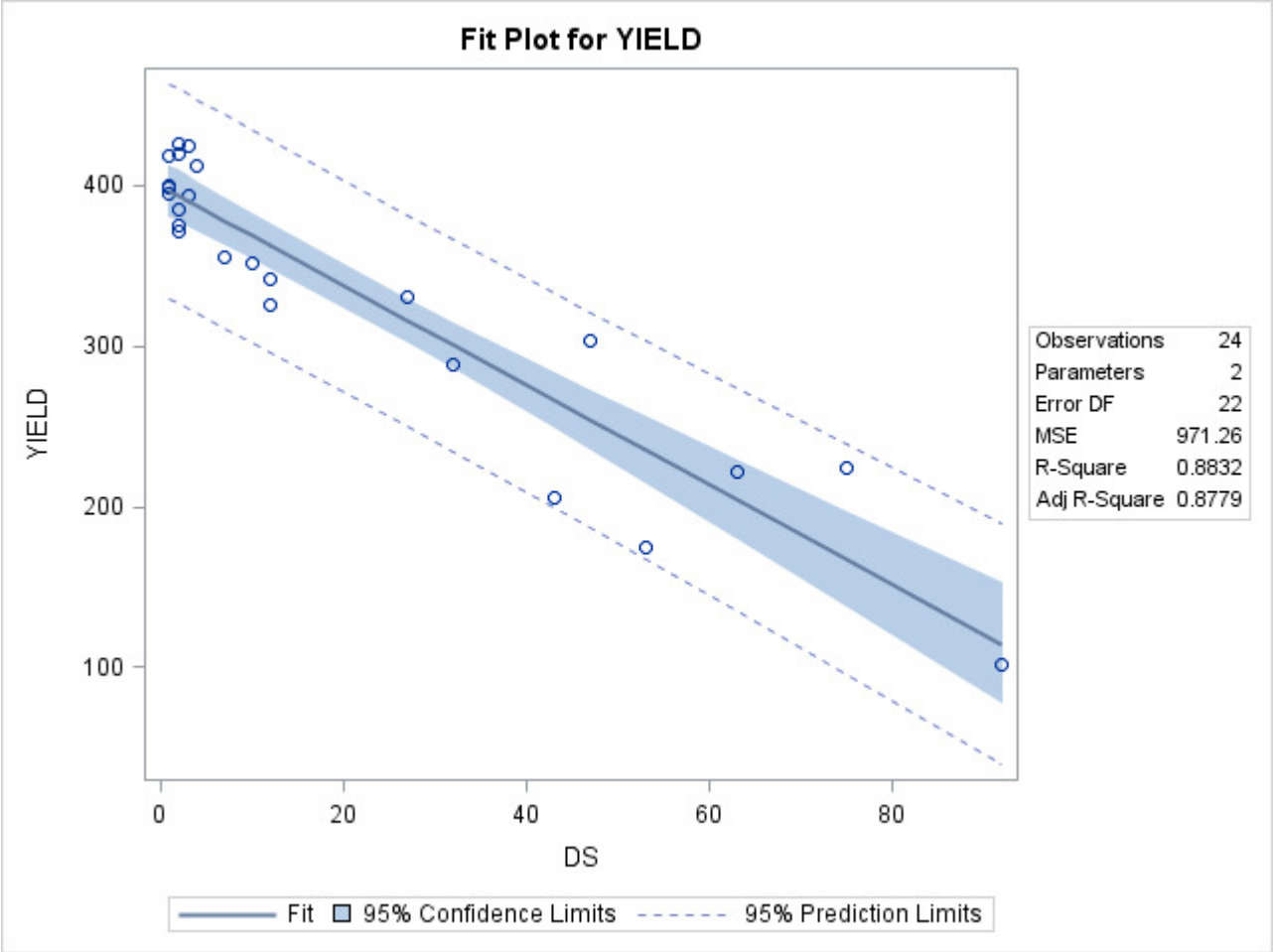
Parameter Estimates					
Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	399.23843	8.07110	49.47	<.0001
DS	1	-3.09401	0.23987	-12.90	<.0001

The SAS System

The REG Procedure
Model: MODEL1
Dependent Variable: YIELD




Residuals for YIELD
Residual
50
25
0
-25
-50
0
20
40
60
80
DS


Fit Plot for YIELD
YIELD
400
300
200
100
0
20
40
60
80
DS
Observations 24
Parameters 2
Error DF 22
MSE 971.26
R-Square 0.8832
Adj R-Square 0.8779
Fit
95% Confidence Limits
95% Prediction Limits

The SAS System

The REG Procedure
Model: MODEL1
Dependent Variable: RY1

Number of Observations Read	24
Number of Observations Used	24

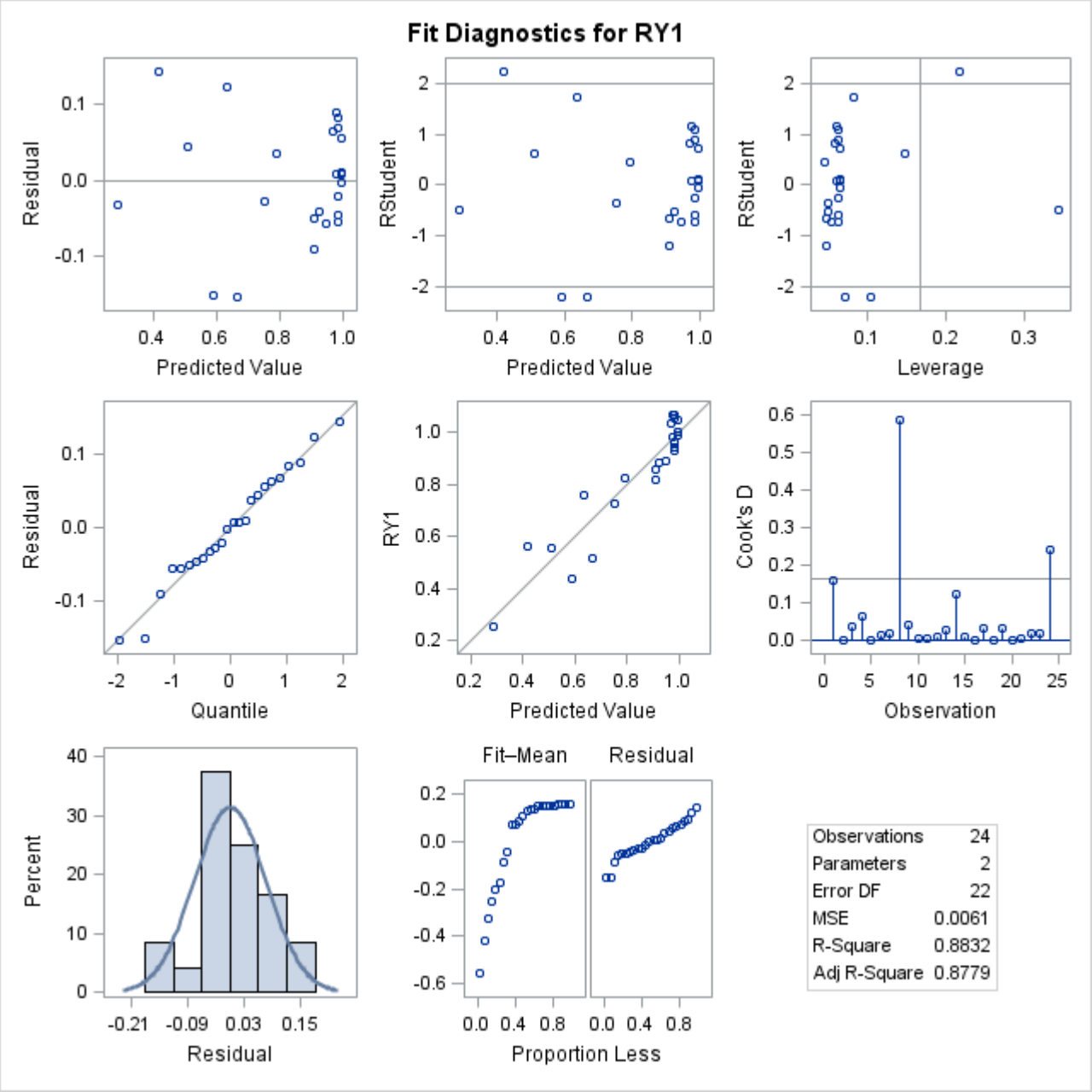
Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	1.01385	1.01385	166.38	<.0001
Error	22	0.13406	0.00609		
Corrected Total	23	1.14791			

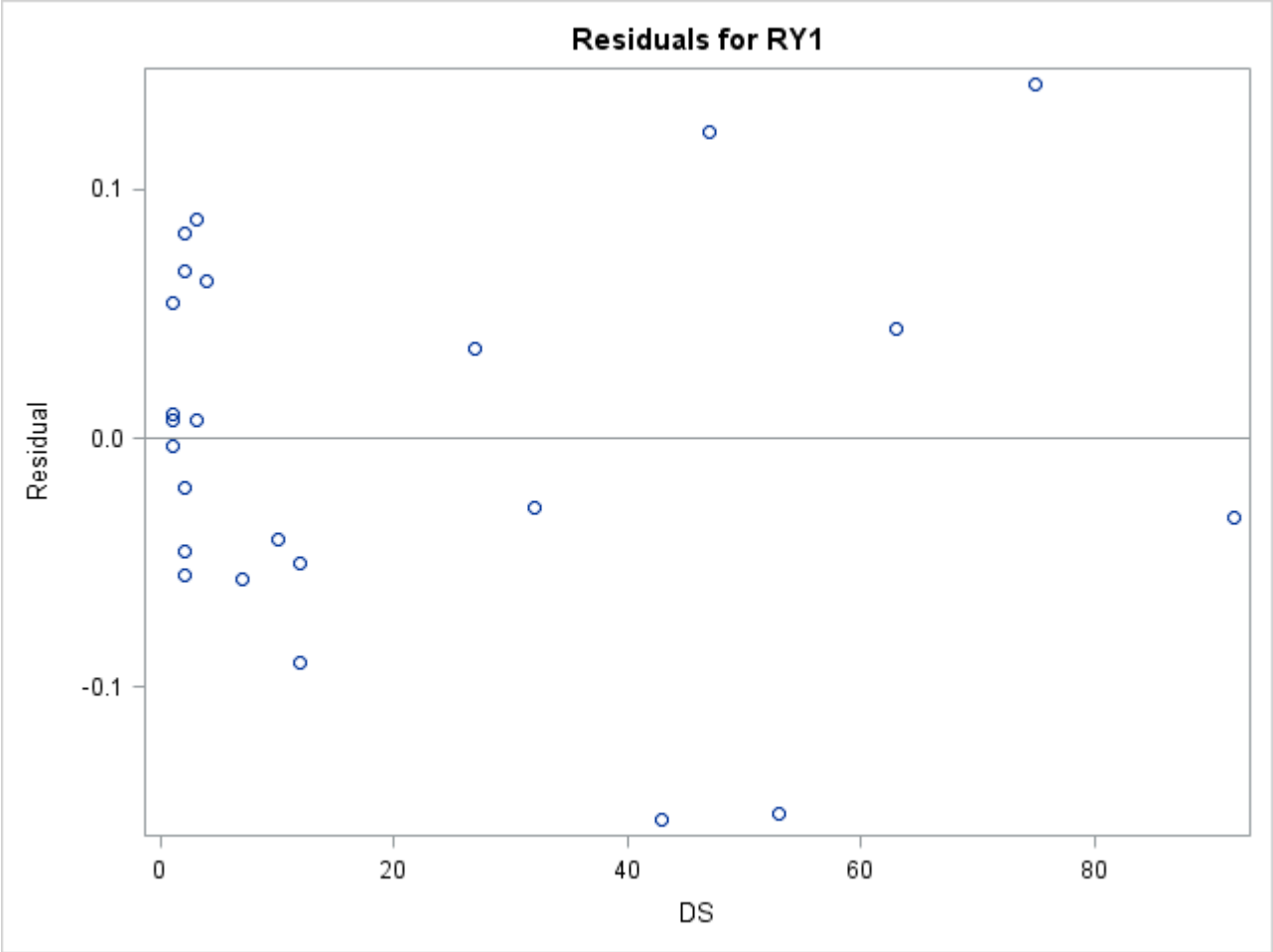
Root MSE	0.07806	R-Square	0.8832
Dependent Mean	0.83952	Adj R-Sq	0.8779
Coeff Var	9.29838		

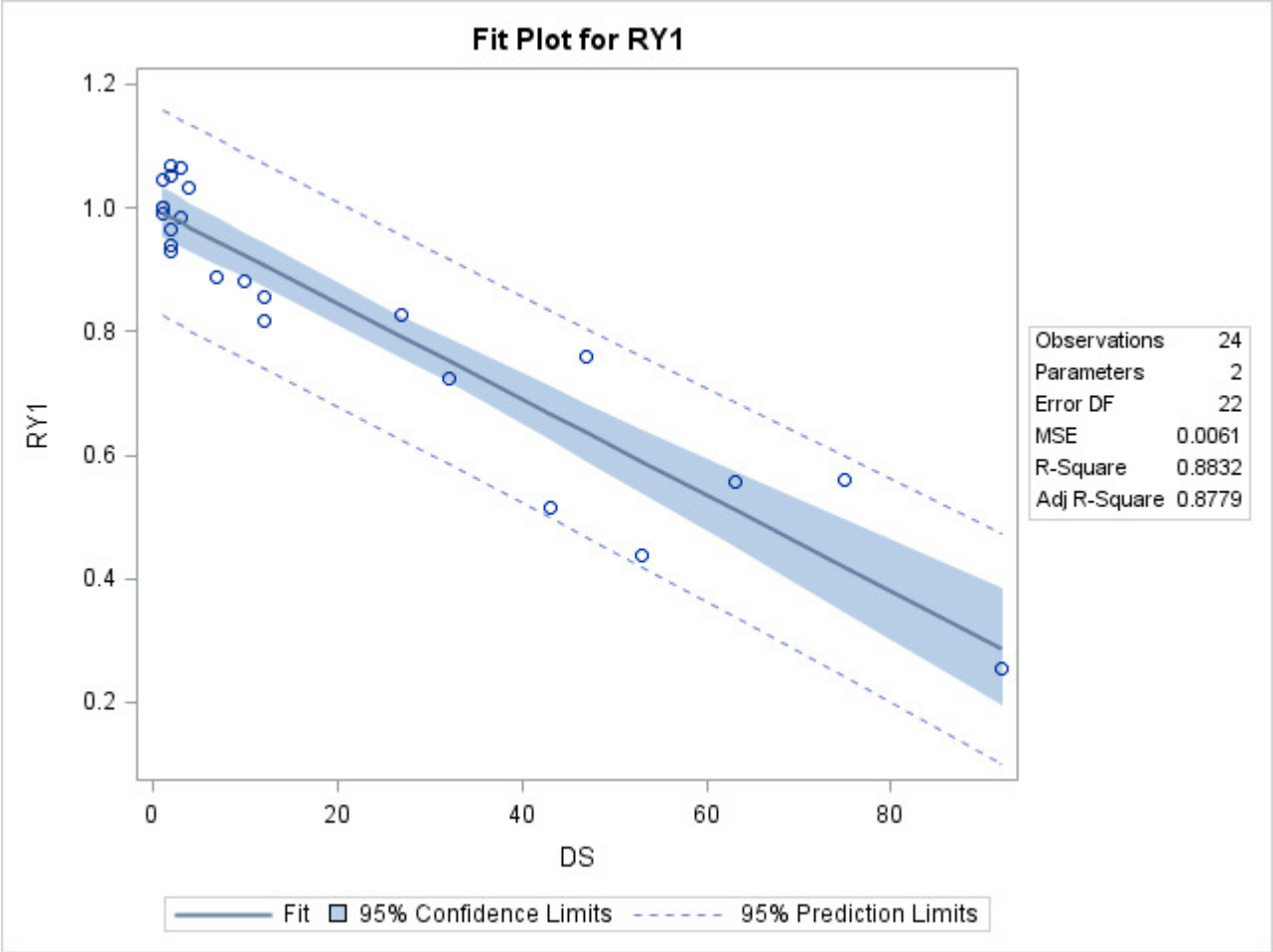
Parameter Estimates					
Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	1.00000	0.02022	49.47	<.0001
DS	1	-0.00775	0.00060081	-12.90	<.0001

The SAS System

The REG Procedure
Model: MODEL1
Dependent Variable: RY1




Residuals for RY1
Residual
0.1
0.0
-0.1
0
20
40
60
80
DS


Fit Plot for RY1
RY1
DS
1.2
1.0
0.8
0.6
0.4
0.2
0
20
40
60
80
Observations 24
Parameters 2
Error DF 22
MSE 0.0061
R-Square 0.8832
Adj R-Square 0.8779
Fit
95% Confidence Limits
95% Prediction Limits

The SAS System

Obs	BLK	TRT	RY2	CDS
1	1	1	0.51378	43
2	1	2	0.23944	92
3	1	3	0.92208	7
4	2	1	0.88000	27
5	2	2	0.54369	75
6	2	3	0.82824	10
7	3	1	0.72143	47
8	3	2	0.56489	63
9	3	3	0.86582	12
10	4	1	0.69139	32
11	4	2	0.47170	53
12	4	3	0.81500	12

The SAS System

The Mixed Procedure

Model Information	
Data Set	WORK.T3
Dependent Variable	RY2
Covariance Structure	Variance Components
Estimation Method	REML
Residual Variance Method	Profile
Fixed Effects SE Method	Model-Based
Degrees of Freedom Method	Containment

Class Level Information		
Class	Levels	Values
BLK	4	1 2 3 4
TRT	3	1 2 3

Dimensions	
Covariance Parameters	2
Columns in X	4
Columns in Z	4
Subjects	1
Max Obs per Subject	12

Number of Observations	
Number of Observations Read	12
Number of Observations Used	12
Number of Observations Not Used	0

Iteration History			
Iteration	Evaluations	-2 Res Log Like	Criterion
0	1	-7.69423558	
1	1	-7.95922951	0.00000000

Convergence criteria met.

Covariance Parameter Estimates

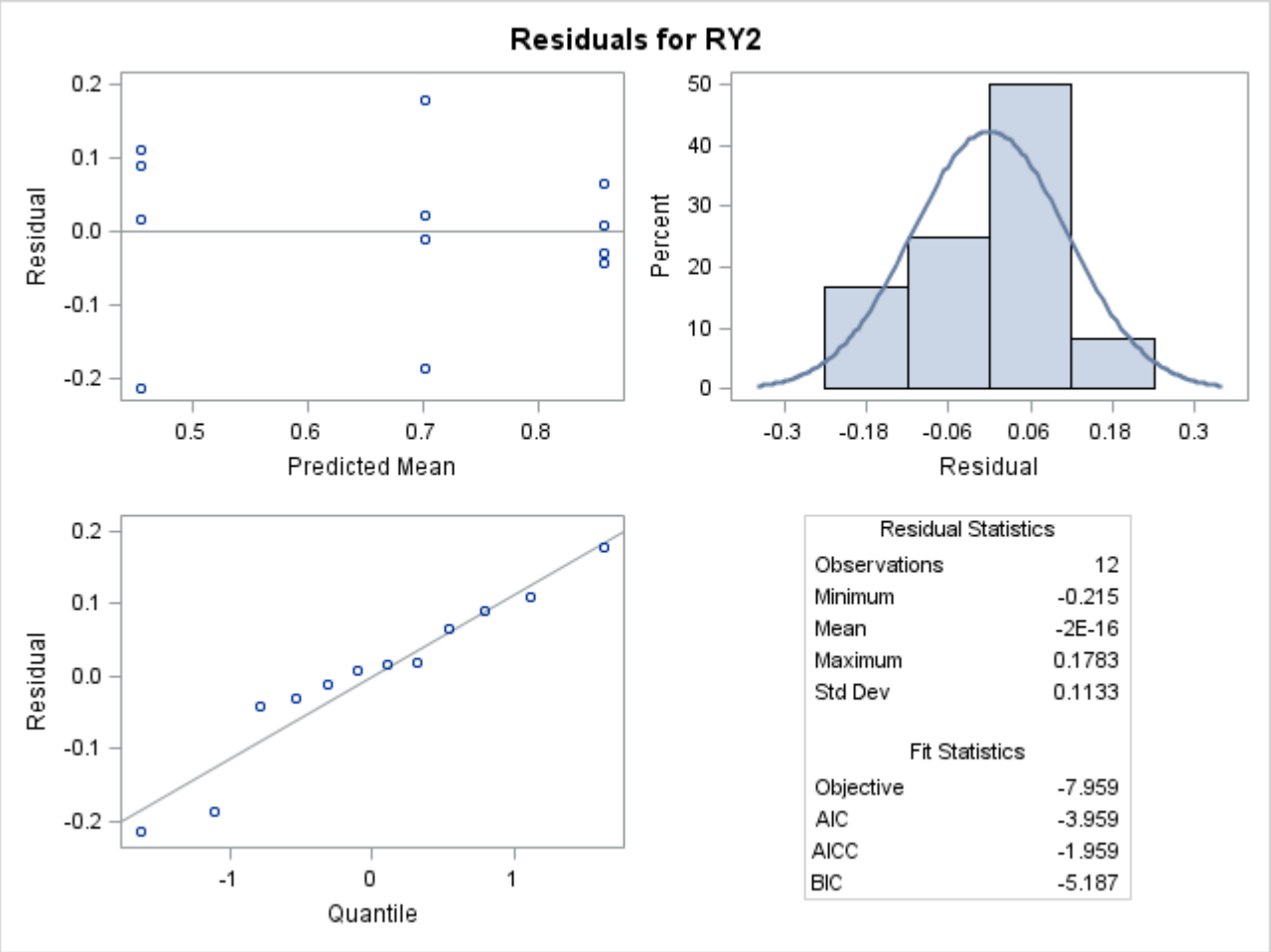
Cov Parm	Estimate	Standard Error	Z Value	Pr > Z
BLK	0.002806	0.006305	0.45	0.3281
Residual	0.01288	0.007437	1.73	0.0416

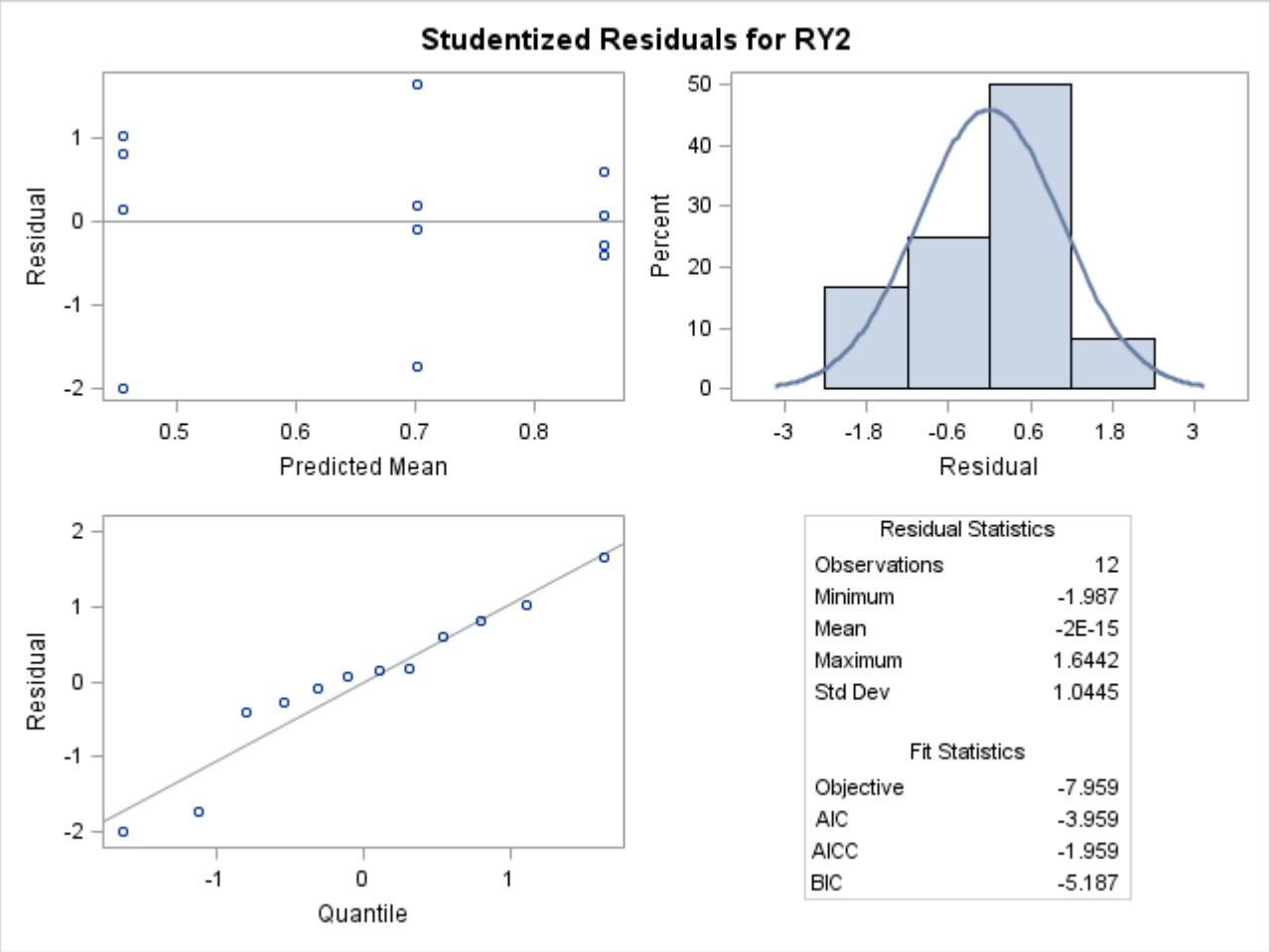
Fit Statistics	
-2 Res Log Likelihood	-8.0
AIC (Smaller is Better)	-4.0
AICC (Smaller is Better)	-2.0
BIC (Smaller is Better)	-5.2

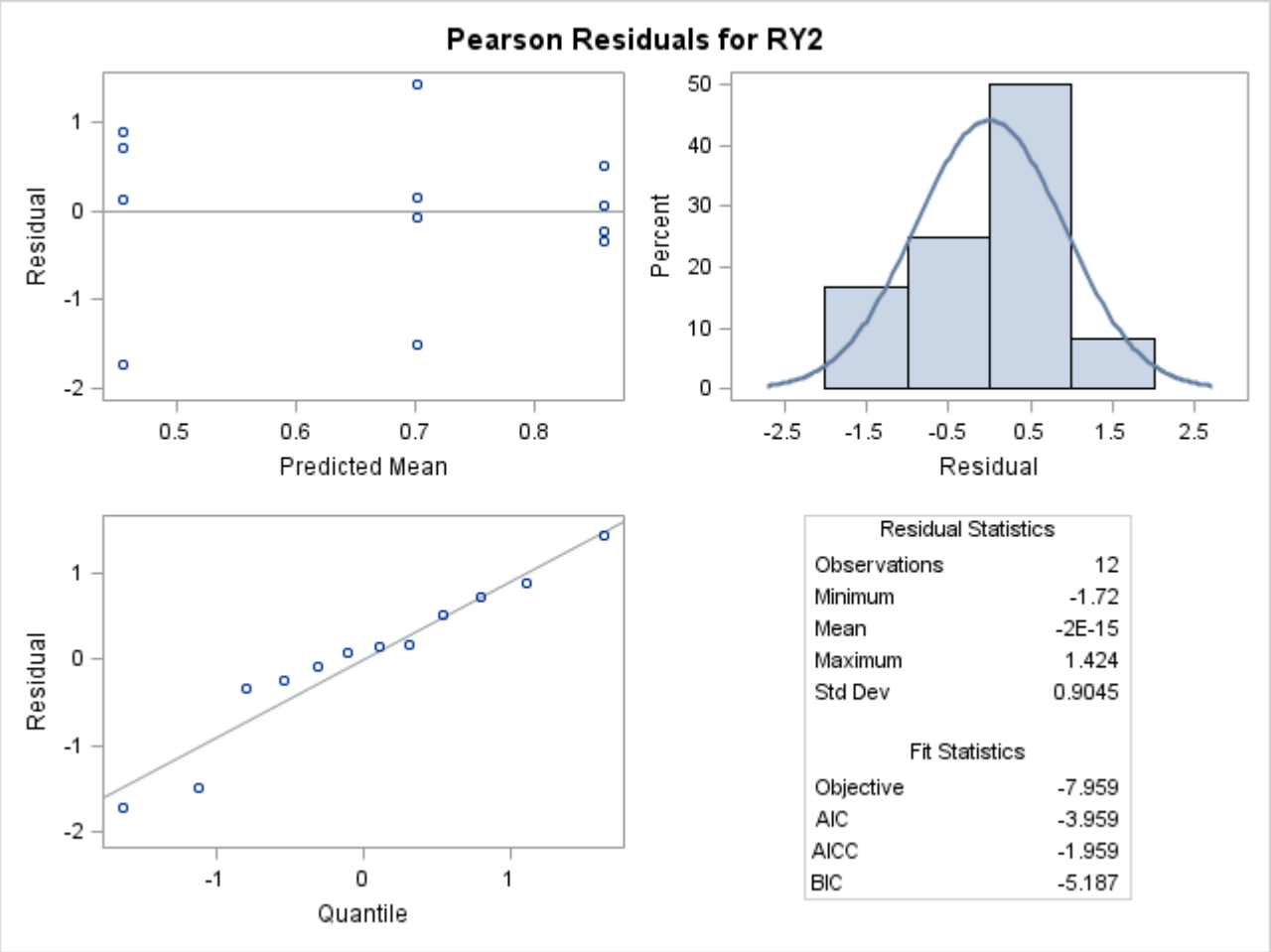
Type 3 Tests of Fixed Effects				
Effect	Num DF	Den DF	F Value	Pr > F
TRT	2	6	12.81	0.0068

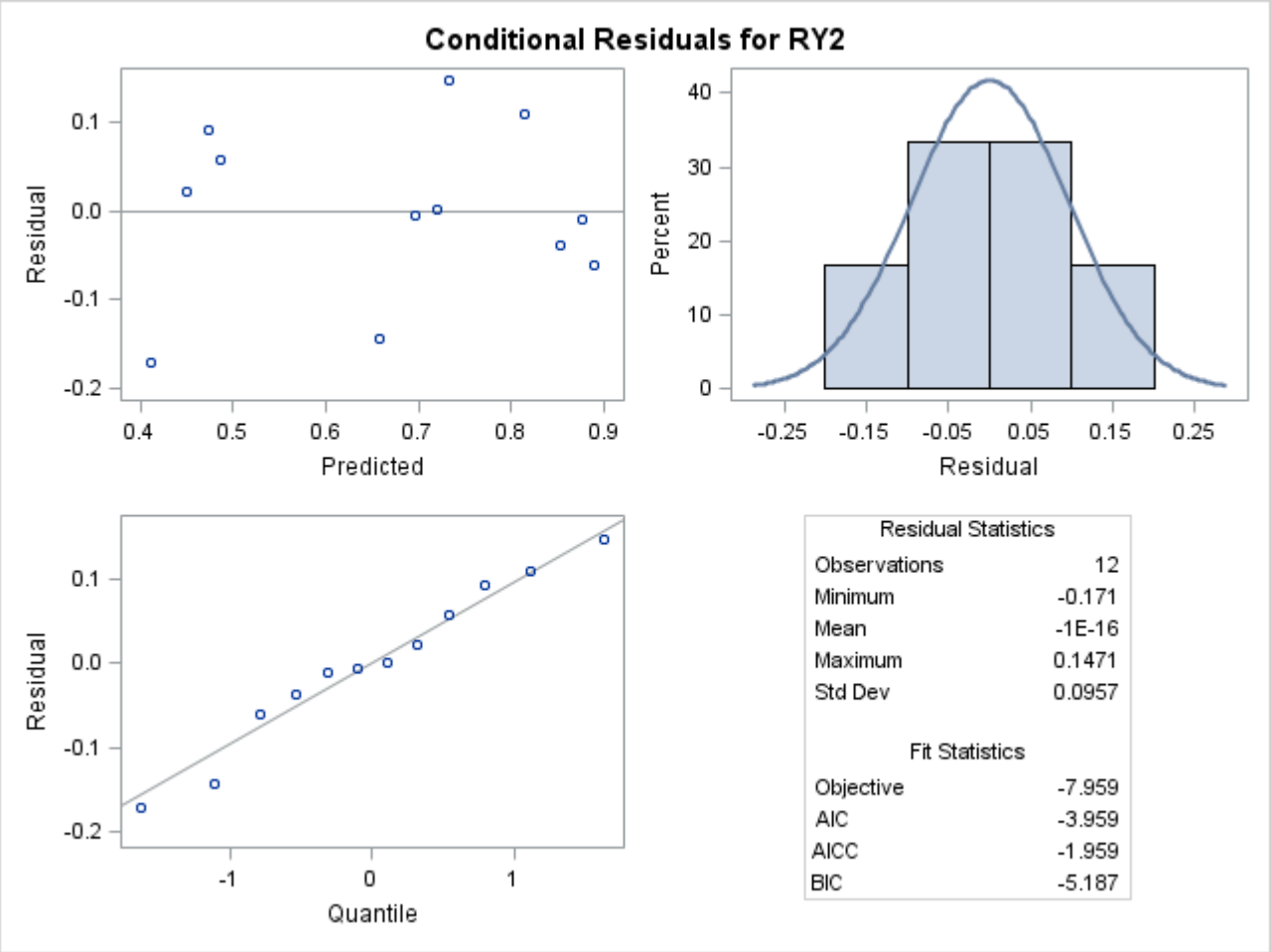
Least Squares Means						
Effect	TRT	Estimate	Standard Error	DF	t Value	Pr > |t|
TRT	1	0.7017	0.06262	6	11.20	<.0001
TRT	2	0.4549	0.06262	6	7.26	0.0003
TRT	3	0.8578	0.06262	6	13.70	<.0001

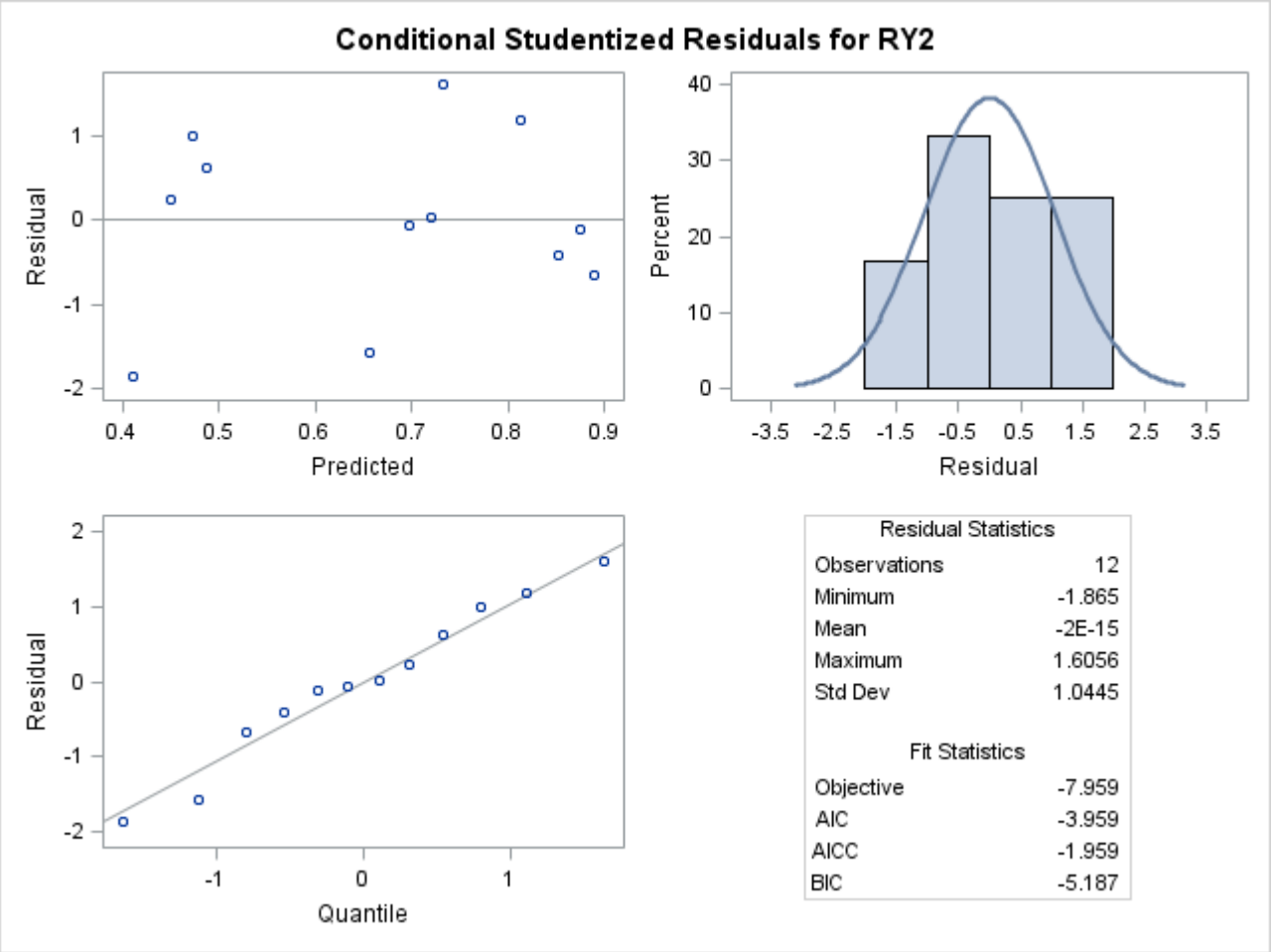
Differences of Least Squares Means							
Effect	TRT	_TRT	Estimate	Standard Error	DF	t Value	Pr > |t|
TRT	1	2	0.2467	0.08025	6	3.07	0.0218
TRT	1	3	-0.1561	0.08025	6	-1.95	0.0997
TRT	2	3	-0.4029	0.08025	6	-5.02	0.0024

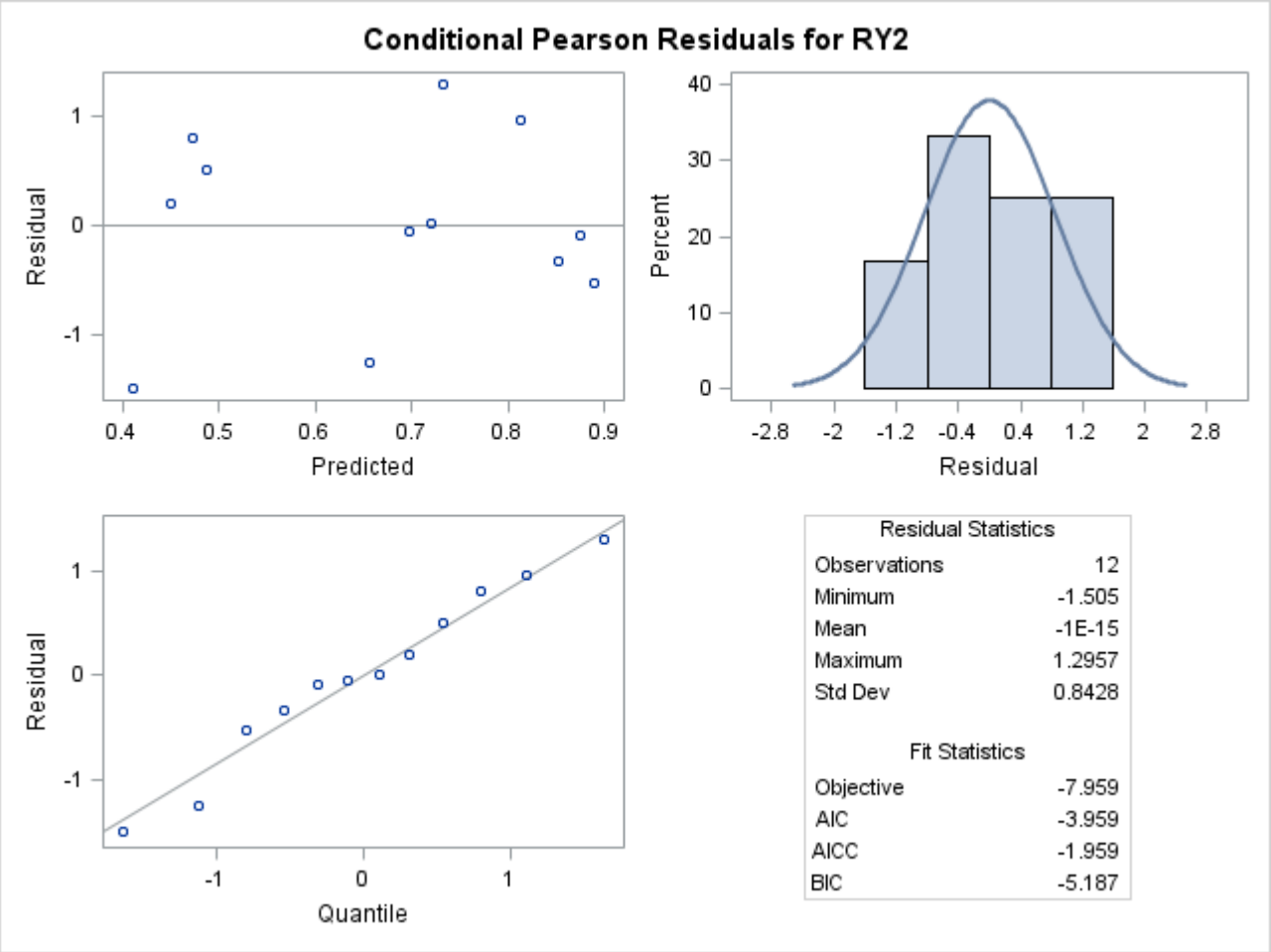

Residuals for RY2
Residual
Predicted Mean
0.2
0.1
0.0
-0.1
-0.2
0.5
0.6
0.7
0.8
Percent
Residual
50
40
30
20
10
0
-0.3
-0.18
-0.06
0.06
0.18
0.3
Residual
Quantile
-1
0
1
Residual Statistics
Observations 12
Minimum -0.215
Mean -2E-16
Maximum 0.1783
Std Dev 0.1133
Fit Statistics
Objective -7.959
AIC -3.959
AICC -1.959
BIC -5.187


Studentized Residuals for RY2
Residual
Predicted Mean
Percent
Residual
Residual
Quantile
Residual Statistics
Observations 12
Minimum -1.987
Mean -2E-15
Maximum 1.6442
Std Dev 1.0445
Fit Statistics
Objective -7.959
AIC -3.959
AICC -1.959
BIC -5.187


Pearson Residuals for RY2
Residual
Predicted Mean
Percent
Residual
Residual
Quantile
Residual Statistics
Observations 12
Minimum -1.72
Mean -2E-15
Maximum 1.424
Std Dev 0.9045
Fit Statistics
Objective -7.959
AIC -3.959
AICC -1.959
BIC -5.187


Conditional Residuals for RY2
Residual
Predicted
0.4
0.5
0.6
0.7
0.8
0.9
0.1
0.0
-0.1
-0.2
Percent
Residual
40
30
20
10
0
-0.25
-0.15
-0.05
0.05
0.15
0.25
Residual
Quantile
-1
0
1
Residual Statistics
Observations 12
Minimum -0.171
Mean -1E-16
Maximum 0.1471
Std Dev 0.0957
Fit Statistics
Objective -7.959
AIC -3.959
AICC -1.959
BIC -5.187


Conditional Studentized Residuals for RY2
Residual
Predicted
Percent
Residual
Residual
Quantile
Residual Statistics
Observations 12
Minimum -1.865
Mean -2E-15
Maximum 1.6056
Std Dev 1.0445
Fit Statistics
Objective -7.959
AIC -3.959
AICC -1.959
BIC -5.187


Conditional Pearson Residuals for RY2
Residual
Predicted
0.4
0.5
0.6
0.7
0.8
0.9
1
0
-1
Percent
Residual
40
30
20
10
0
-2.8
-2
-1.2
-0.4
0.4
1.2
2
2.8
Residual
Quantile
-1
0
1
Residual Statistics
Observations 12
Minimum -1.505
Mean -1E-15
Maximum 1.2957
Std Dev 0.8428
Fit Statistics
Objective -7.959
AIC -3.959
AICC -1.959
BIC -5.187

The SAS System

The REG Procedure
Model: MODEL1
Dependent Variable: RY2

Number of Observations Read	12
Number of Observations Used	12

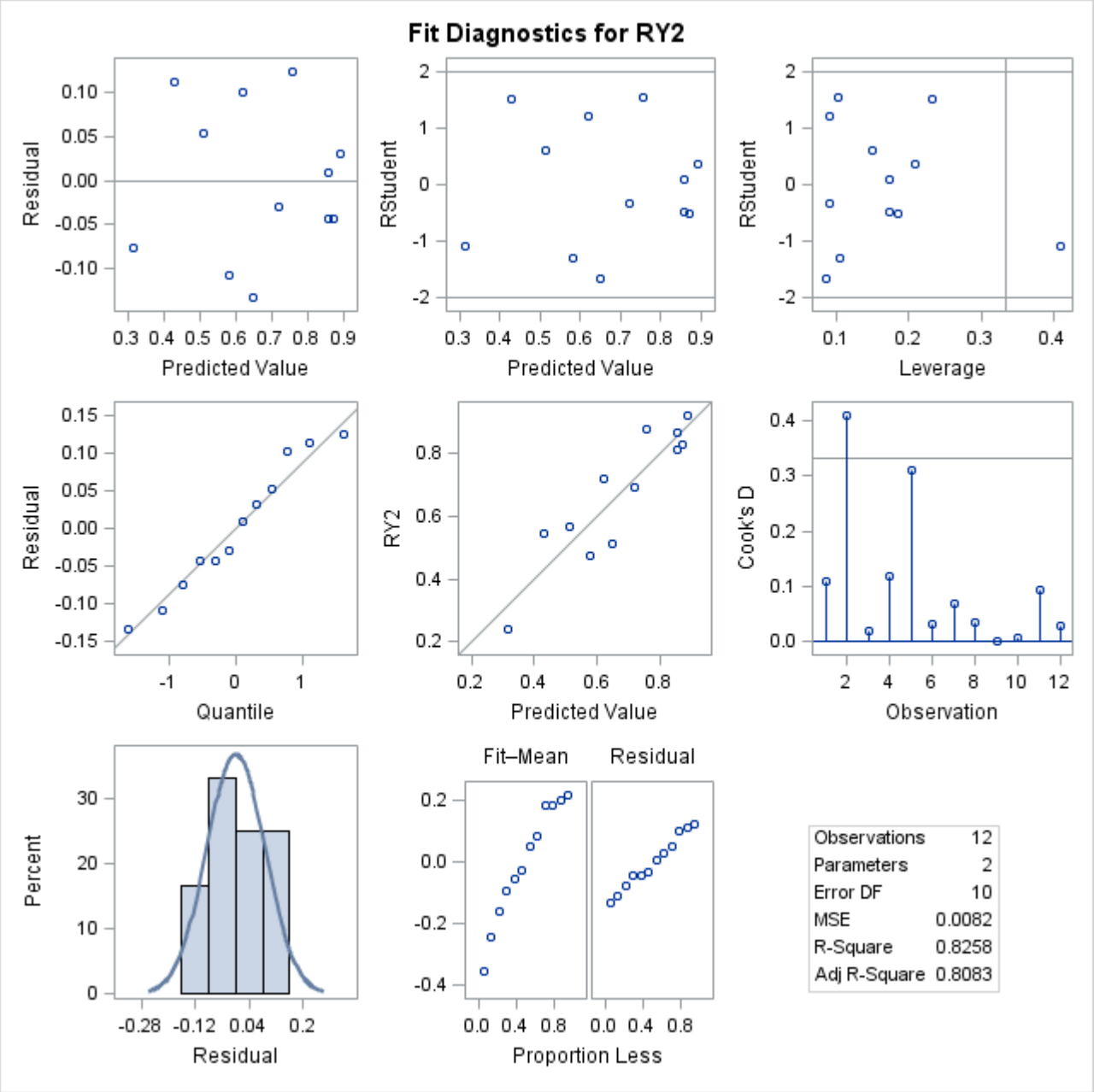
Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	0.38914	0.38914	47.39	<.0001
Error	10	0.08211	0.00821		
Corrected Total	11	0.47125			

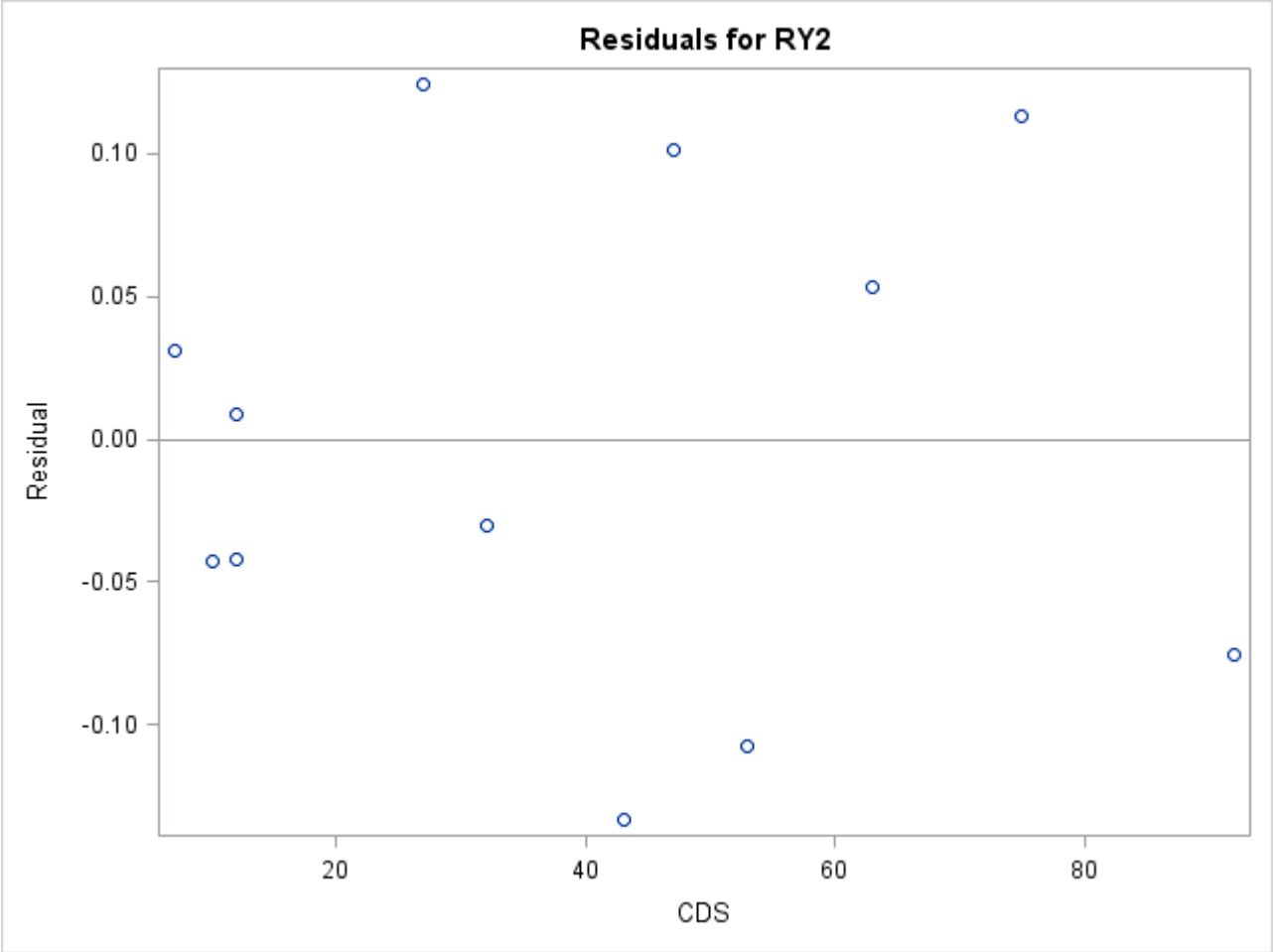
Root MSE	0.09061	R-Square	0.8258
Dependent Mean	0.67145	Adj R-Sq	0.8083
Coeff Var	13.49499		

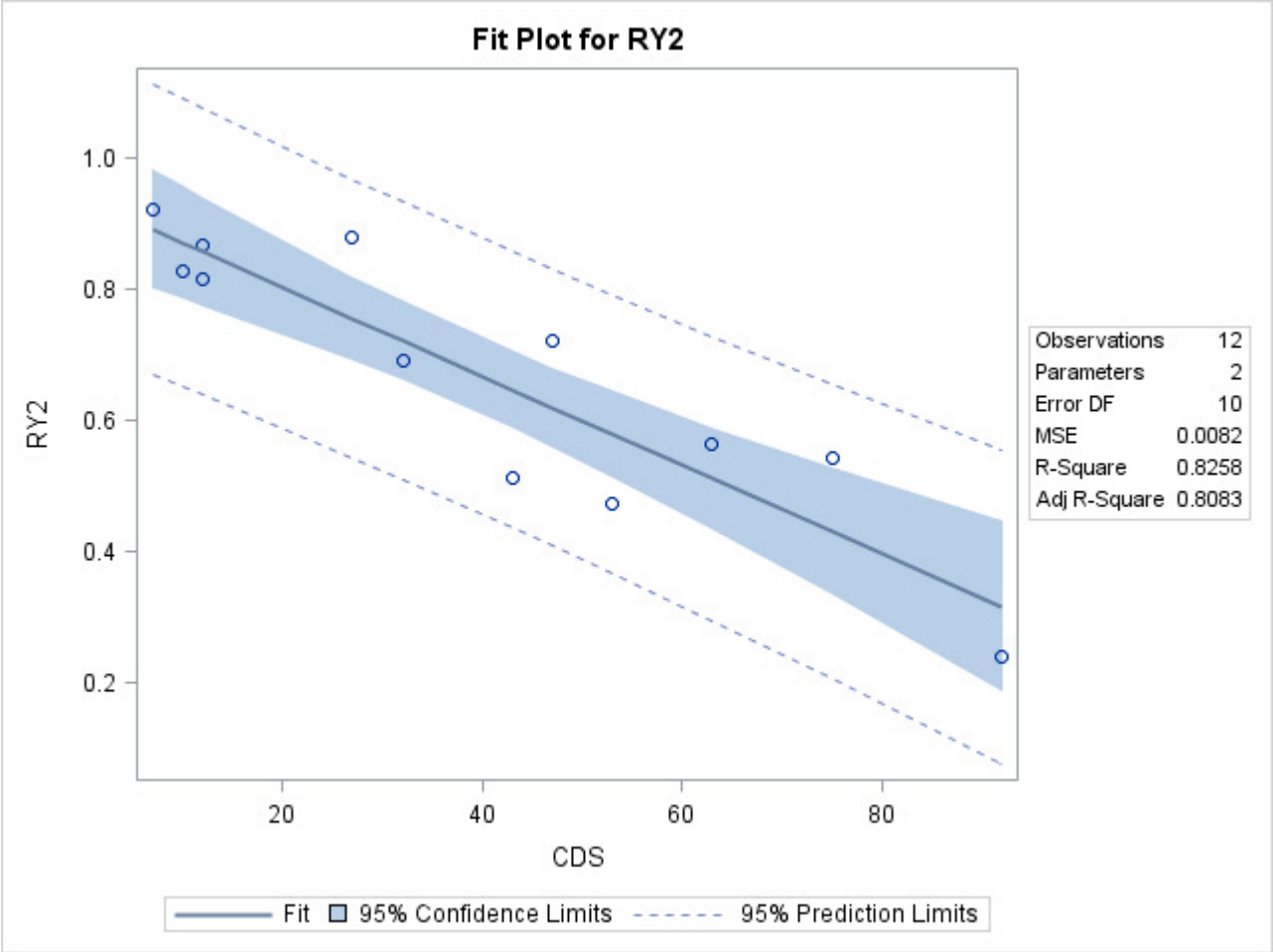
Parameter Estimates					
Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	0.93861	0.04680	20.06	<.0001
CDS	1	-0.00678	0.00098452	-6.88	<.0001

The SAS System

The REG Procedure
Model: MODEL1
Dependent Variable: RY2




Residuals for RY2
Residual
0.10
0.05
0.00
-0.05
-0.10
20
40
60
80
CDS


Fit Plot for RY2
RY2
1.0
0.8
0.6
0.4
0.2
20
40
60
80
CDS
Observations 12
Parameters 2
Error DF 10
MSE 0.0082
R-Square 0.8258
Adj R-Square 0.8083
Fit
95% Confidence Limits
95% Prediction Limits