House study

The MEANS Procedure

Variable	Label	N	Mean	Median	Std Dev	t Value	Pr > |t|
area	Chimney area	89	62.5617978	64.0000000	32.5307390	18.14	<.0001
height	Chimney height in feet	90	21.9666667	20.0000000	5.9254735	35.17	<.0001
age	House age in yrs	90	38.5666667	30.0000000	31.0932089	11.77	<.0001
in	Energy consumpt with damper active	90	10.0384444	9.8350000	2.8679903	33.21	<.0001
out	Energy consumpt with damper inactive	90	10.8131111	10.7400000	3.0884073	33.22	<.0001
average_energy		90	10.4257778	10.2725000	2.9641170	33.37	<.0001
diff_energy		90	0.7746667	0.7100000	0.6191099	11.87	<.0001

House study

The FREQ Procedure

Type of furnace				
furnace	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Forced air	76	84.44	76	84.44
Gravity	7	7.78	83	92.22
Forced water	7	7.78	90	100.00

Chimney shape				
shape	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Round	39	43.82	39	43.82
Square	32	35.96	71	79.78
Rectangular	18	20.22	89	100.00
Frequency Missing = 1				

Type of Chimney liner				
chimney	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Unlined	24	26.97	24	26.97
Tile	40	44.94	64	71.91
Metal	25	28.09	89	100.00
Frequency Missing = 1				

Type of house				
house	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Ranch	38	42.22	38	42.22
Two-story	40	44.44	78	86.67
tri-level	3	3.33	81	90.00
Bi-level	6	6.67	87	96.67
One and a half stories	3	3.33	90	100.00

Type of damper				
damper	Frequency	Percent	Cumulative Frequency	Cumulative Percent
EVD	40	44.44	40	44.44
TVD	50	55.56	90	100.00

home	Frequency	Percent	Cumulative Frequency	Cumulative Percent
1	38	42.22	38	42.22
2	40	44.44	78	86.67
3	12	13.33	90	100.00

House study

The MEANS Procedure

Analysis Variable : diff_energy					
N	Mean	Median	Std Dev	t Value	Pr > |t|
90	0.7746667	0.7100000	0.6191099	11.87	<.0001

House study

Damper with furnace shape chimney and home

The FREQ Procedure

Frequency
Row Pct

Table of furnace by damper			
furnace(Type of furnace)	damper(Type of damper)		
	EVD	TVD	Total
Forced air	31 40.79	45 59.21	76
Gravity	4 57.14	3 42.86	7
Forced water	5 71.43	2 28.57	7
Total	40	50	90

Statistics for Table of furnace by damper

Statistic	DF	Value	Prob
Chi-Square	2	2.9326	0.2308
Likelihood Ratio Chi-Square	2	2.9520	0.2286
Mantel-Haenszel Chi-Square	1	2.8977	0.0887
Phi Coefficient		0.1805	
Contingency Coefficient		0.1776	
Cramer's V		0.1805	
WARNING: 67% of the cells have expected counts less than 5. Chi-Square may not be a valid test.			

Sample Size = 90

Frequency
Row Pct

Table of shape by damper			
shape(Chimney shape)	damper(Type of damper)		
	EVD	TVD	Total
Round	15 38.46	24 61.54	39
Square	14 43.75	18 56.25	32

Rectangular	10 55.56	8 44.44	18
Total	39	50	89
Frequency Missing = 1			

Statistics for Table of shape by damper

Statistic	DF	Value	Prob
Chi-Square	2	1.4619	0.4814
Likelihood Ratio Chi-Square	2	1.4567	0.4827
Mantel-Haenszel Chi-Square	1	1.3628	0.2431
Phi Coefficient		0.1282	
Contingency Coefficient		0.1271	
Cramer's V		0.1282	

Effective Sample Size = 89
Frequency Missing = 1

Frequency
Row Pct

Table of chimney by damper

chimney(Type of Chimney liner)	damper(Type of damper)		
	EVD	TVD	Total
Unlined	11 45.83	13 54.17	24
Tile	18 45.00	22 55.00	40
Metal	10 40.00	15 60.00	25
Total	39	50	89
Frequency Missing = 1			

Statistics for Table of chimney by damper

Statistic	DF	Value	Prob
Chi-Square	2	0.2103	0.9002
Likelihood Ratio Chi-Square	2	0.2113	0.8998
Mantel-Haenszel Chi-Square	1	0.1696	0.6805
Phi Coefficient		0.0486	
Contingency Coefficient		0.0486	
Cramer's V		0.0486	

Effective Sample Size = 89
Frequency Missing = 1

Frequency
Row Pct

Table of home by damper

home	damper(Type of damper)		
	EVD	TVD	Total
1	14 36.84	24 63.16	38
2	20 50.00	20 50.00	40
3	6 50.00	6 50.00	12
Total	40	50	90

Statistics for Table of home by damper

Statistic	DF	Value	Prob
Chi-Square	2	1.5395	0.4631
Likelihood Ratio Chi-Square	2	1.5494	0.4608
Mantel-Haenszel Chi-Square	1	1.1916	0.2750
Phi Coefficient		0.1308	
Contingency Coefficient		0.1297	
Cramer's V		0.1308	

Sample Size = 90

House study

Damper and area

The GLM Procedure

Class Level Information		
Class	Levels	Values
damper	2	EVD TVD

Number of Observations Read	90
Number of Observations Used	89

House study

Damper and area

The GLM Procedure

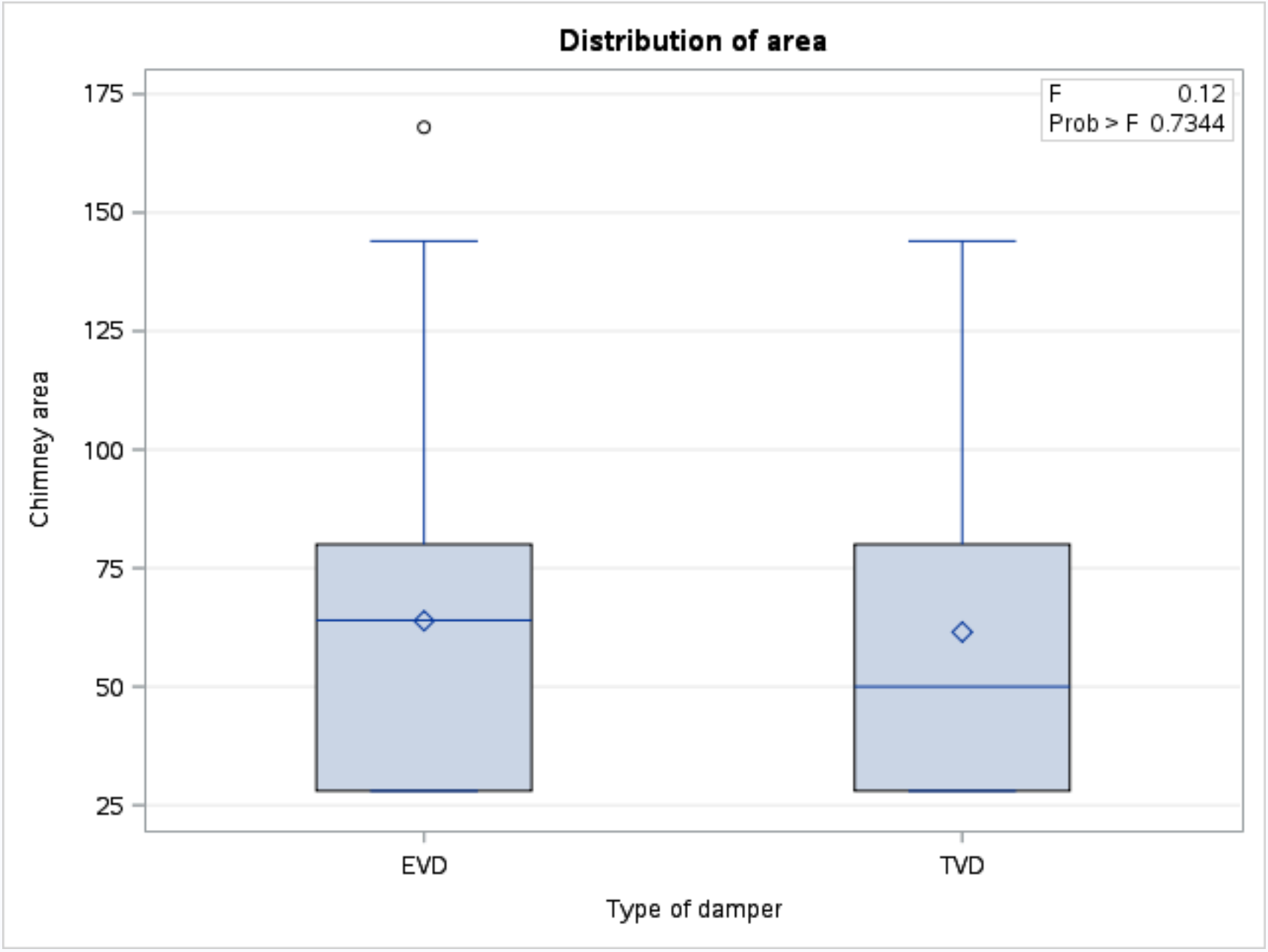
Dependent Variable: area Chimney area

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	123.84037	123.84037	0.12	0.7344
Error	87	93002.06974	1068.98931		
Corrected Total	88	93125.91011			

R-Square	Coeff Var	Root MSE	area Mean
0.001330	52.26097	32.69540	62.56180

Source	DF	Type I SS	Mean Square	F Value	Pr > F
damper	1	123.8403688	123.8403688	0.12	0.7344

Source	DF	Type III SS	Mean Square	F Value	Pr > F
damper	1	123.8403688	123.8403688	0.12	0.7344



House study

Damper and height

The GLM Procedure

Class Level Information		
Class	**Levels**	**Values**
damper	2	EVD TVD

Number of Observations Read	90
Number of Observations Used	90

House study

Damper and height

The GLM Procedure

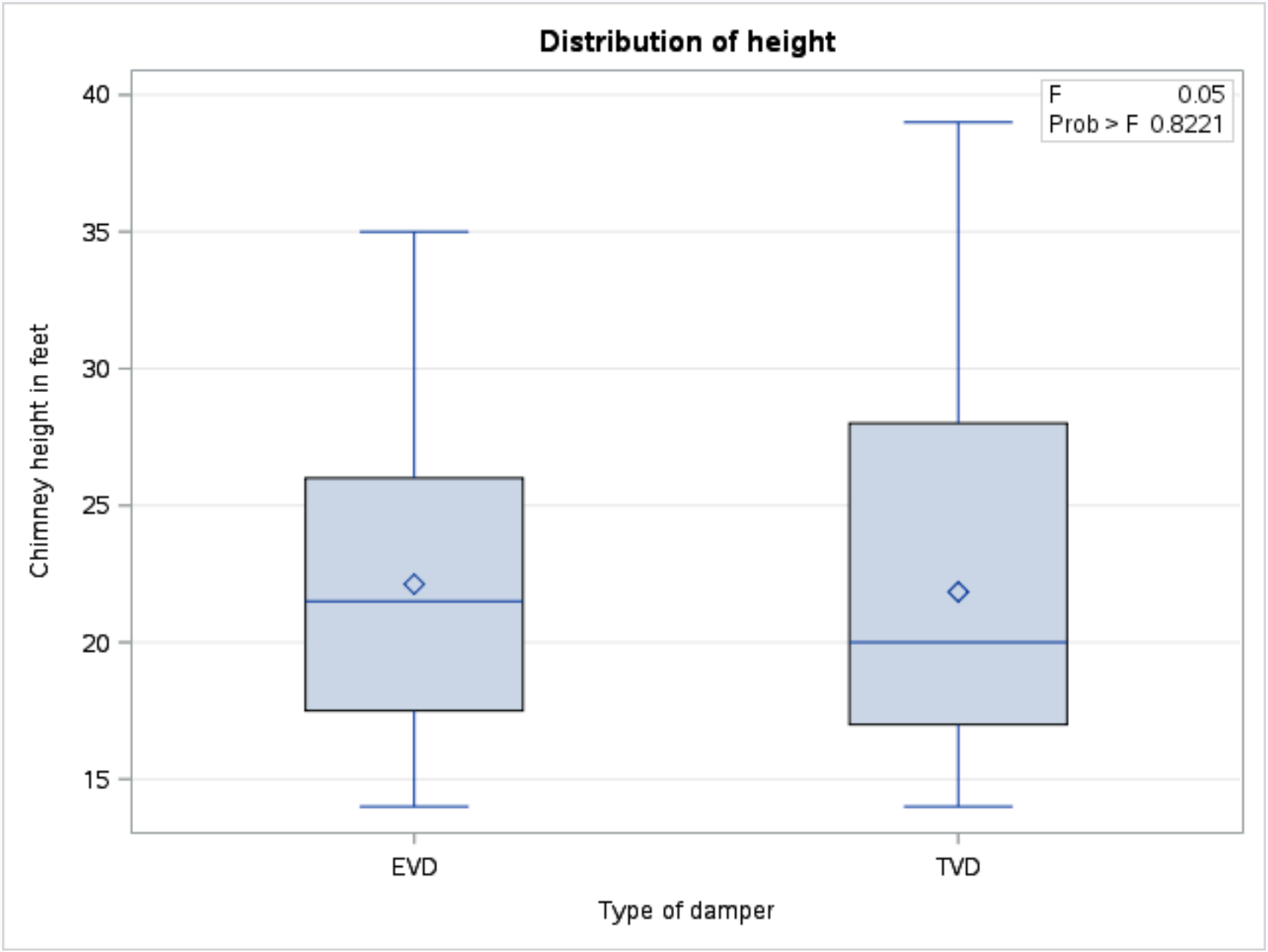
Dependent Variable: height Chimney height in feet

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	1.805000	1.805000	0.05	0.8221
Error	88	3123.095000	35.489716		
Corrected Total	89	3124.900000			

R-Square	Coeff Var	Root MSE	height Mean
0.000578	27.11984	5.957325	21.96667

Source	DF	Type I SS	Mean Square	F Value	Pr > F
damper	1	1.80500000	1.80500000	0.05	0.8221

Source	DF	Type III SS	Mean Square	F Value	Pr > F
damper	1	1.80500000	1.80500000	0.05	0.8221



House study

Damper and Age

The GLM Procedure

Class Level Information		
Class	Levels	Values
damper	2	EVD TVD

Number of Observations Read	90
Number of Observations Used	90

House study

Damper and Age

The GLM Procedure

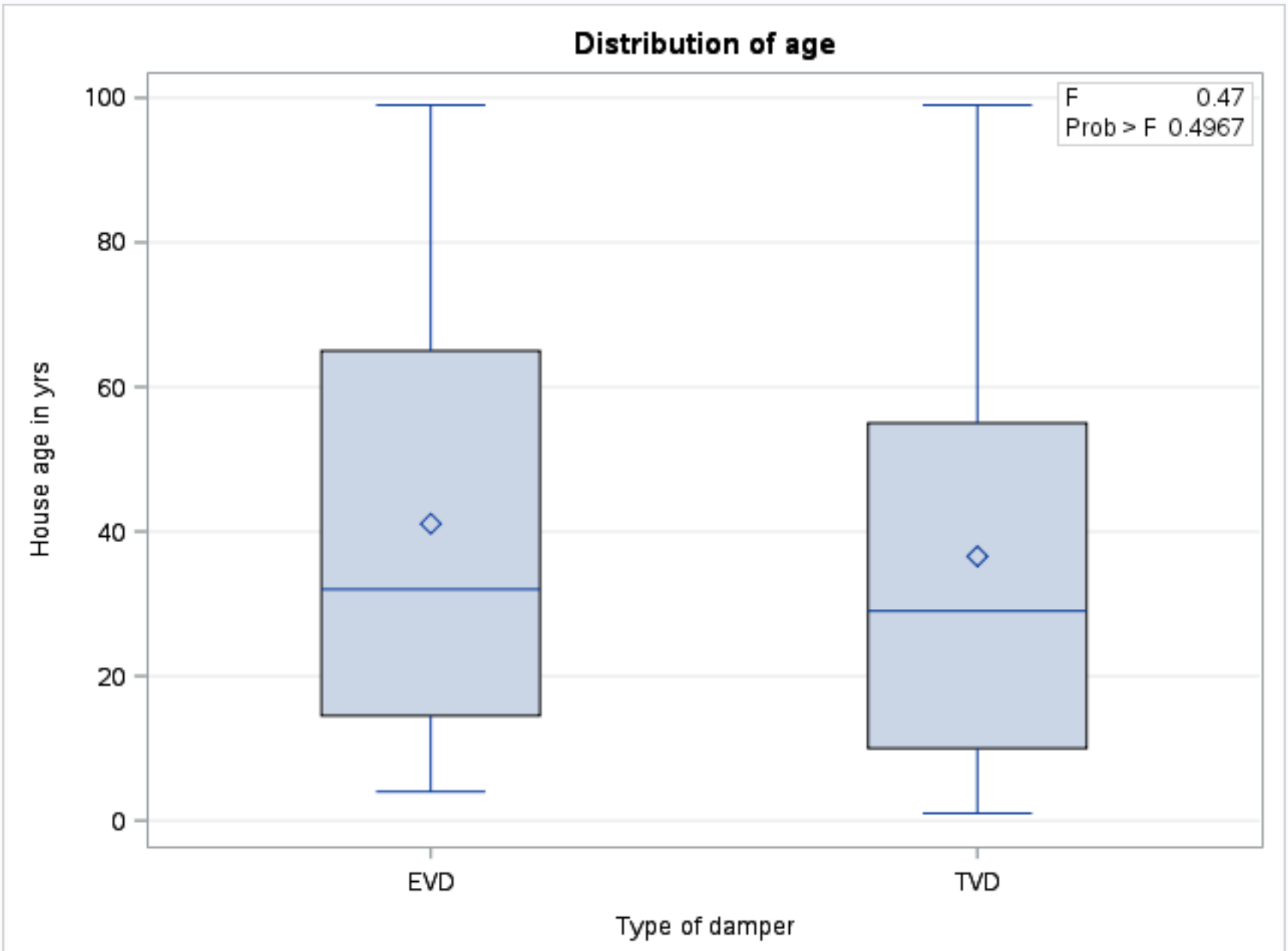
Dependent Variable: age House age in yrs

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	453.00500	453.00500	0.47	0.4967
Error	88	85591.09500	972.62608		
Corrected Total	89	86044.10000			

R-Square	Coeff Var	Root MSE	age Mean
0.005265	80.86505	31.18695	38.56667

Source	DF	Type I SS	Mean Square	F Value	Pr > F
damper	1	453.0050000	453.0050000	0.47	0.4967

Source	DF	Type III SS	Mean Square	F Value	Pr > F
damper	1	453.0050000	453.0050000	0.47	0.4967



House study

Damper and Active

The GLM Procedure

Class Level Information

Class	Levels	Values
damper	2	EVD TVD

Number of Observations Read	90
Number of Observations Used	90

House study

Damper and Active

The GLM Procedure

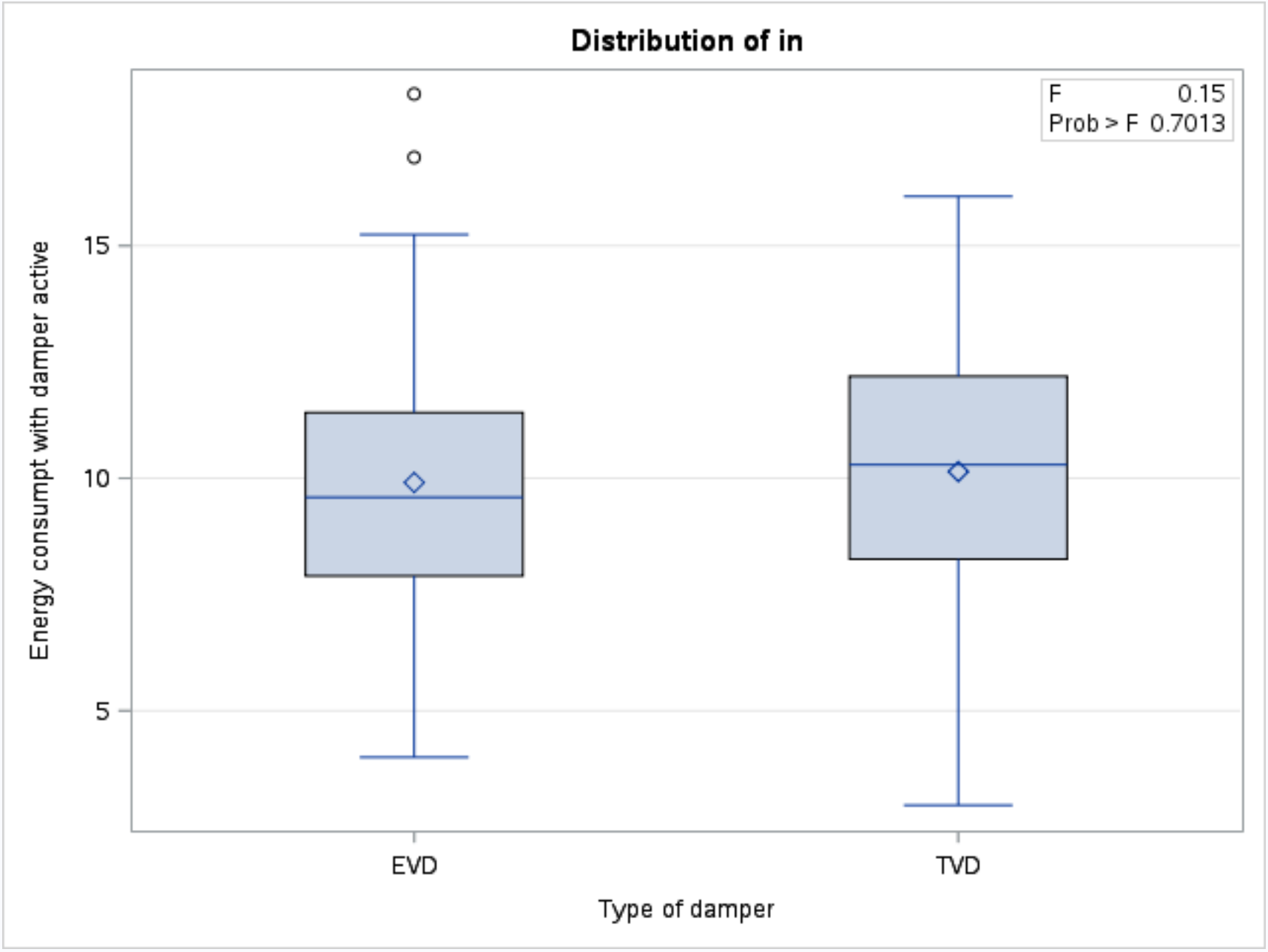
Dependent Variable: in Energy consumpt with damper active

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	1.2298347	1.2298347	0.15	0.7013
Error	88	730.8279475	8.3048630		
Corrected Total	89	732.0577822			

R-Square	Coeff Var	Root MSE	in Mean
0.001680	28.70779	2.881816	10.03844

Source	DF	Type I SS	Mean Square	F Value	Pr > F
damper	1	1.22983472	1.22983472	0.15	0.7013

Source	DF	Type III SS	Mean Square	F Value	Pr > F
damper	1	1.22983472	1.22983472	0.15	0.7013



House study

Damper and Inactive

The GLM Procedure

Class Level Information		
Class	**Levels**	**Values**
damper	2	EVD TVD

Number of Observations Read	90
Number of Observations Used	90

House study

Damper and Inactive

The GLM Procedure

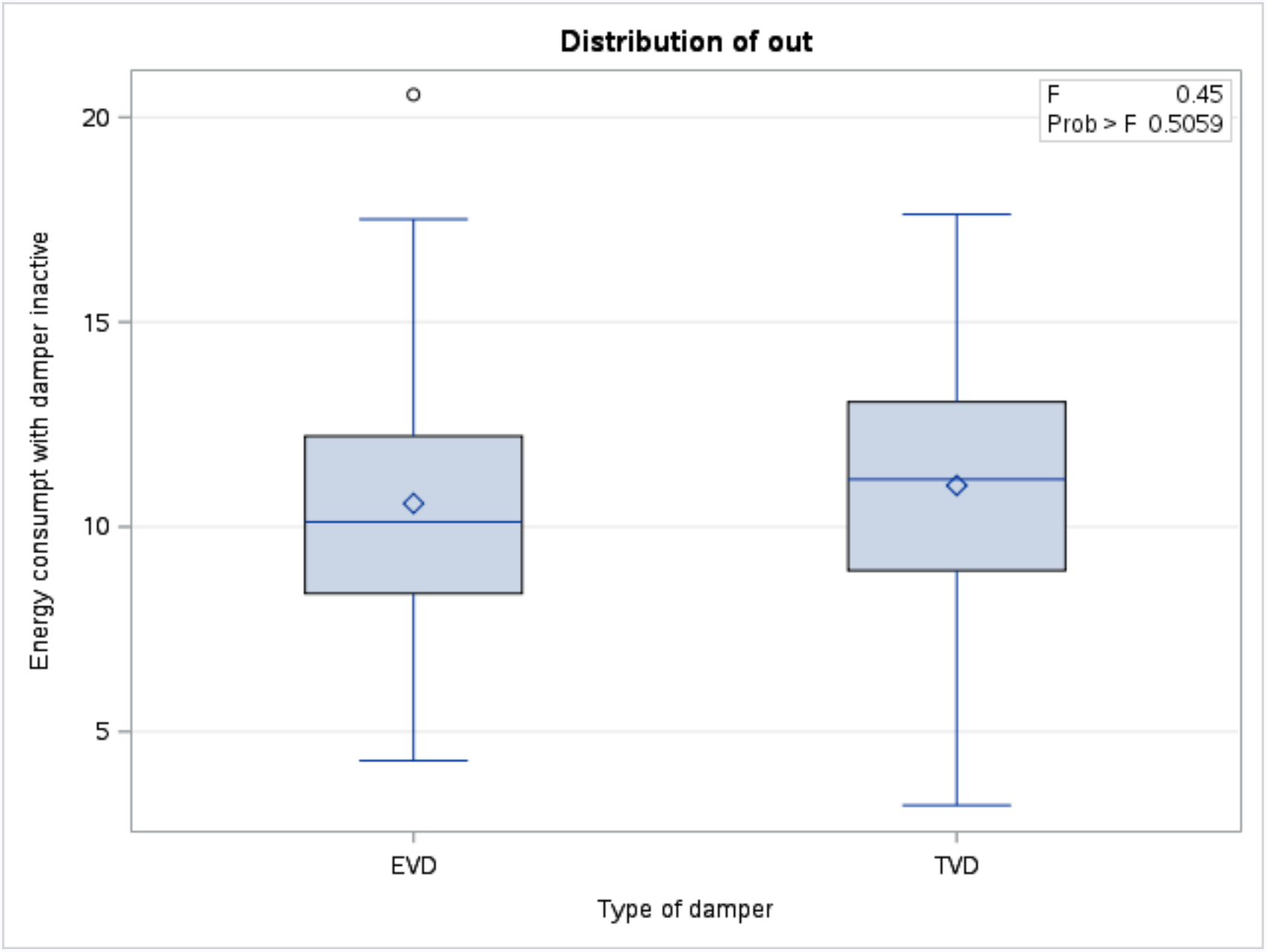
Dependent Variable: out Energy consumpt with damper inactive

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	4.2817134	4.2817134	0.45	0.5059
Error	88	844.6234155	9.5979934		
Corrected Total	89	848.9051289			

R-Square	Coeff Var	Root MSE	out Mean
0.005044	28.65098	3.098063	10.81311

Source	DF	Type I SS	Mean Square	F Value	Pr > F
damper	1	4.28171339	4.28171339	0.45	0.5059

Source	DF	Type III SS	Mean Square	F Value	Pr > F
damper	1	4.28171339	4.28171339	0.45	0.5059



House study

Question 4

The REG Procedure
Model: MODEL1
Dependent Variable: in Energy consumpt with damper active

Number of Observations Read	90
Number of Observations Used	90

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	704.65568	704.65568	2262.95	<.0001
Error	88	27.40210	0.31139		
Corrected Total	89	732.05778			

Root MSE	0.55802	**R-Square**	0.9626
Dependent Mean	10.03844	**Adj R-Sq**	0.9621
Coeff Var	5.55884		

Parameter Estimates

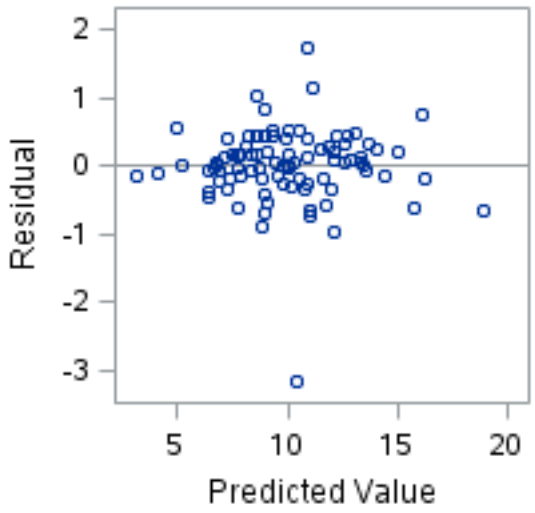
Variable	Label	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	Intercept	1	0.18678	0.21529	0.87	0.3880
out	Energy consumpt with damper inactive	1	0.91109	0.01915	47.57	<.0001

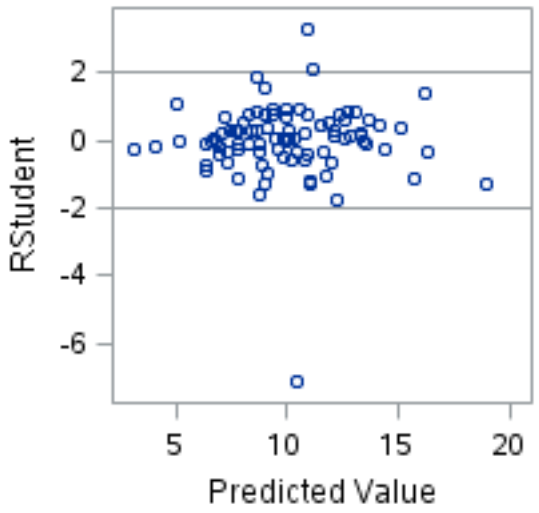
House study

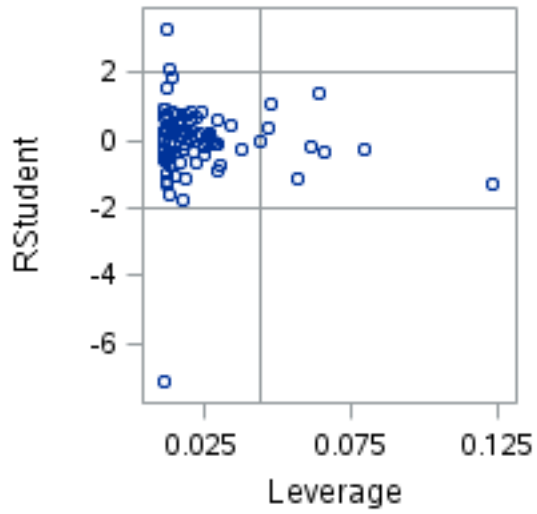
Question 4

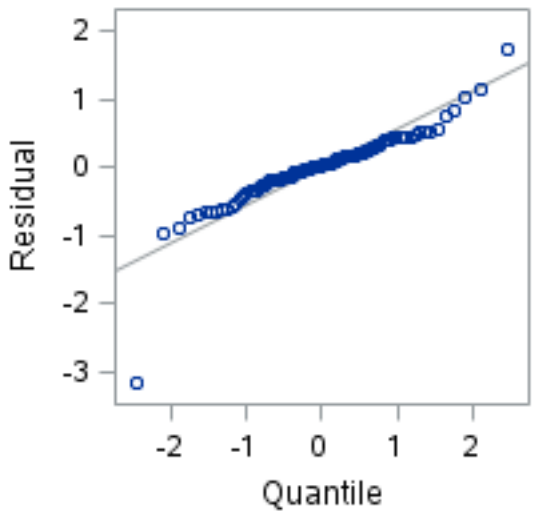
The REG Procedure
Model: MODEL1
Dependent Variable: in Energy consumpt with damper active

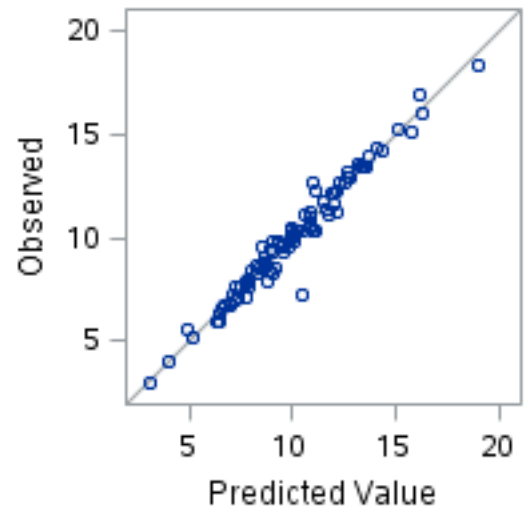
Fit Diagnostics for in

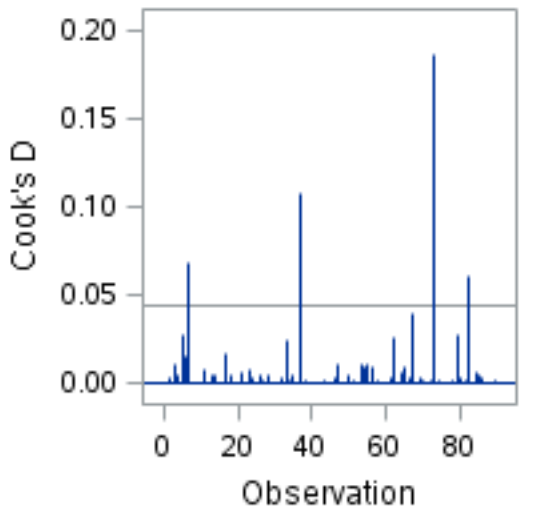


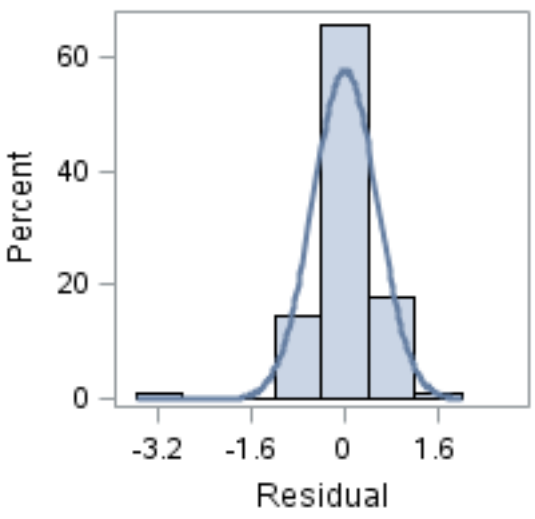


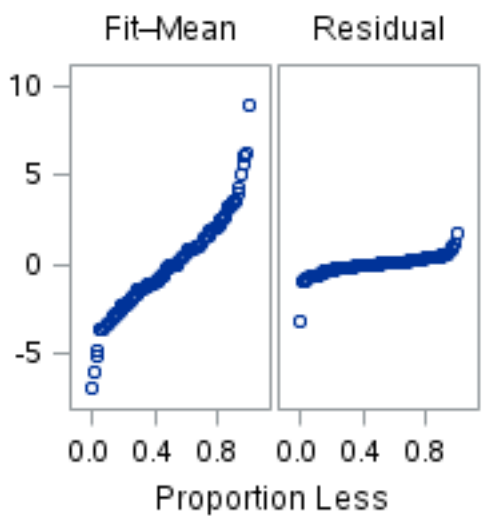




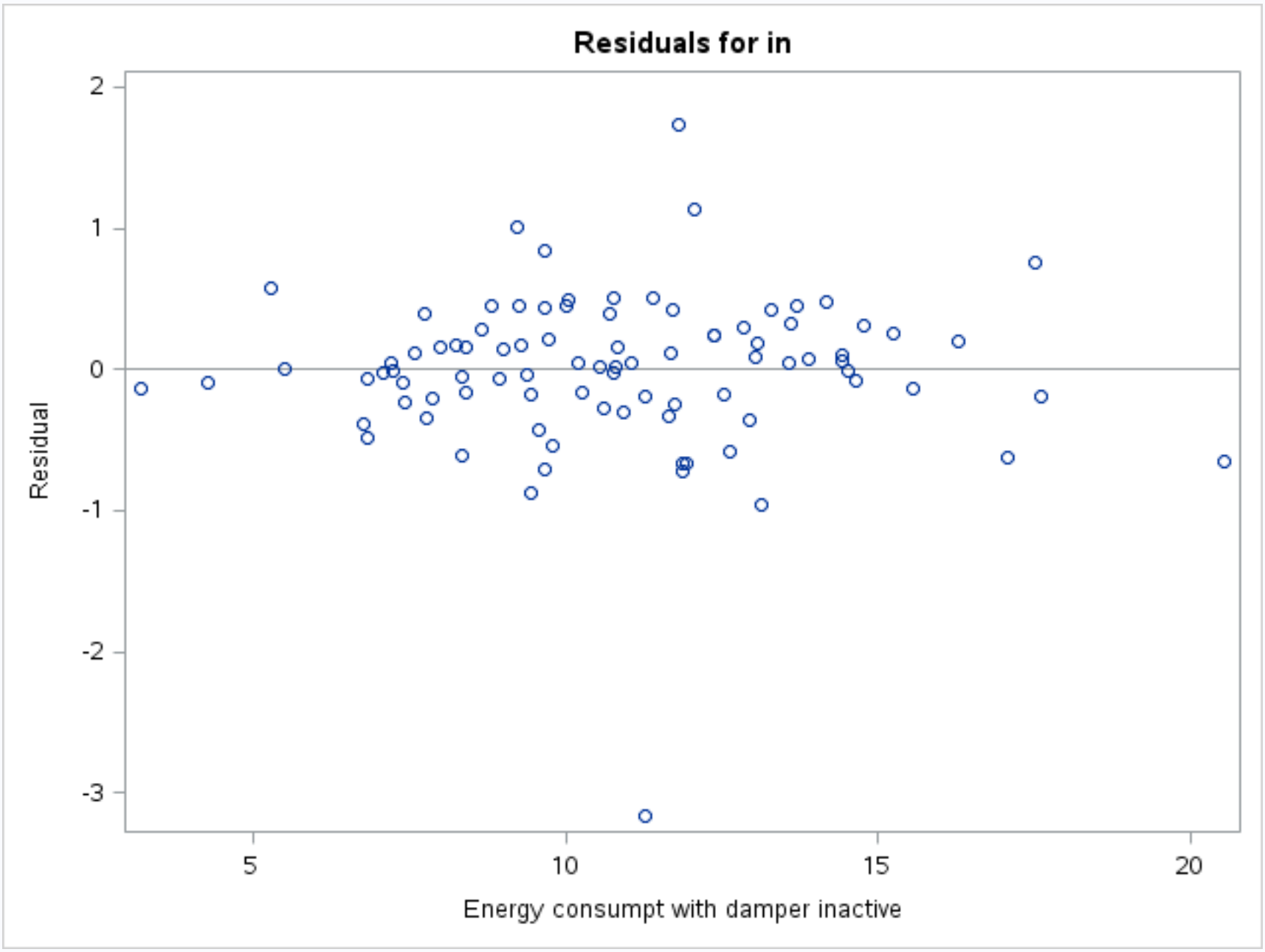








Observations	90
Parameters	2
Error DF	88
MSE	0.3114
R-Square	0.9626
Adj R-Square	0.9621


Residuals for in
Residual
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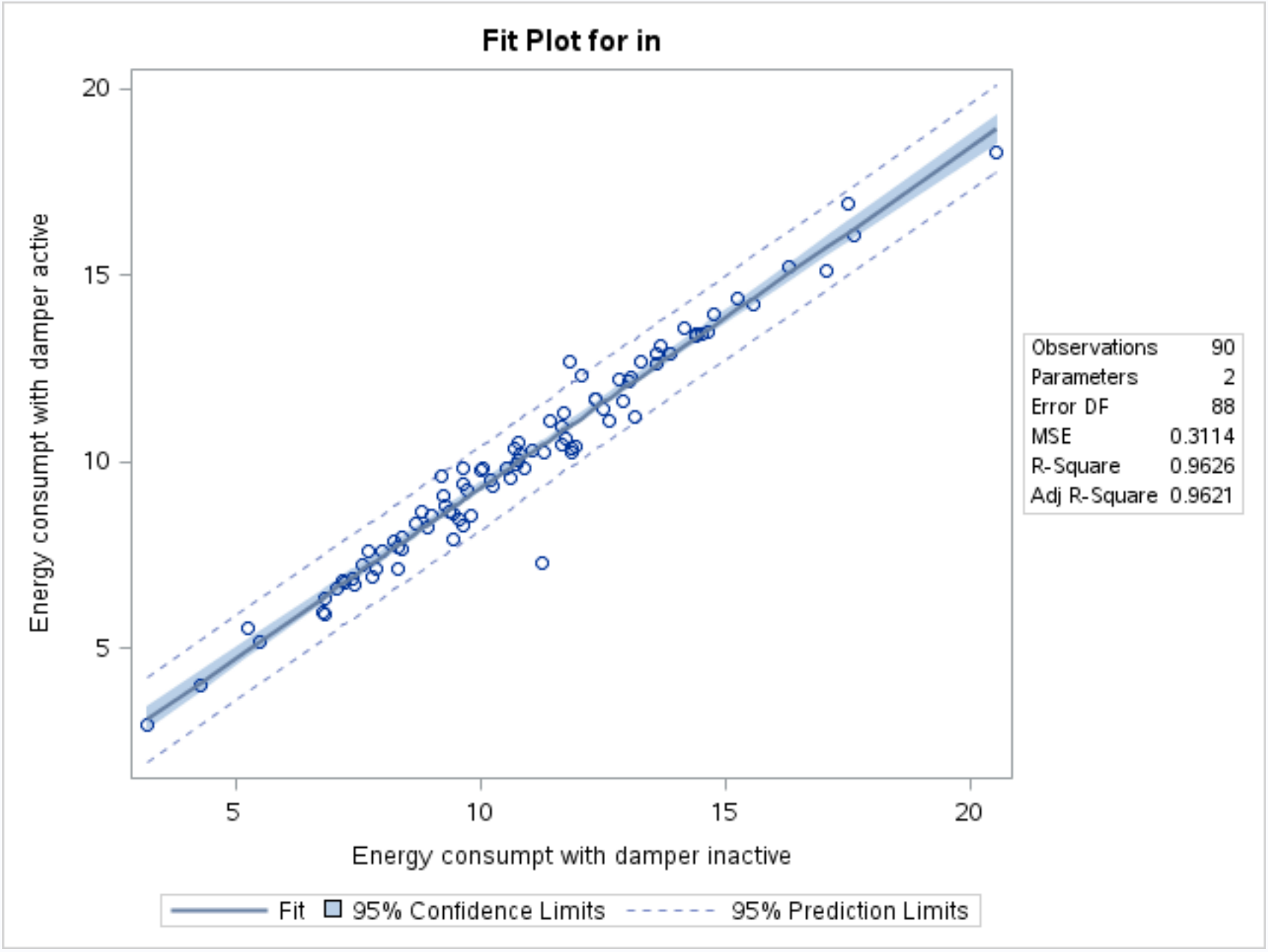
-2
-3
5
10
15
20
Energy consumpt with damper inactive



House study

Question 5

The REG Procedure
Model: MODEL1
Dependent Variable: in Energy consumpt with damper active

Number of Observations Read	90
Number of Observations Used	90

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	1.22983	1.22983	0.15	0.7013
Error	88	730.82795	8.30486		
Corrected Total	89	732.05778			

Root MSE	2.88182	**R-Square**	0.0017
Dependent Mean	10.03844	**Adj R-Sq**	-0.0097
Coeff Var	28.70779		

Parameter Estimates

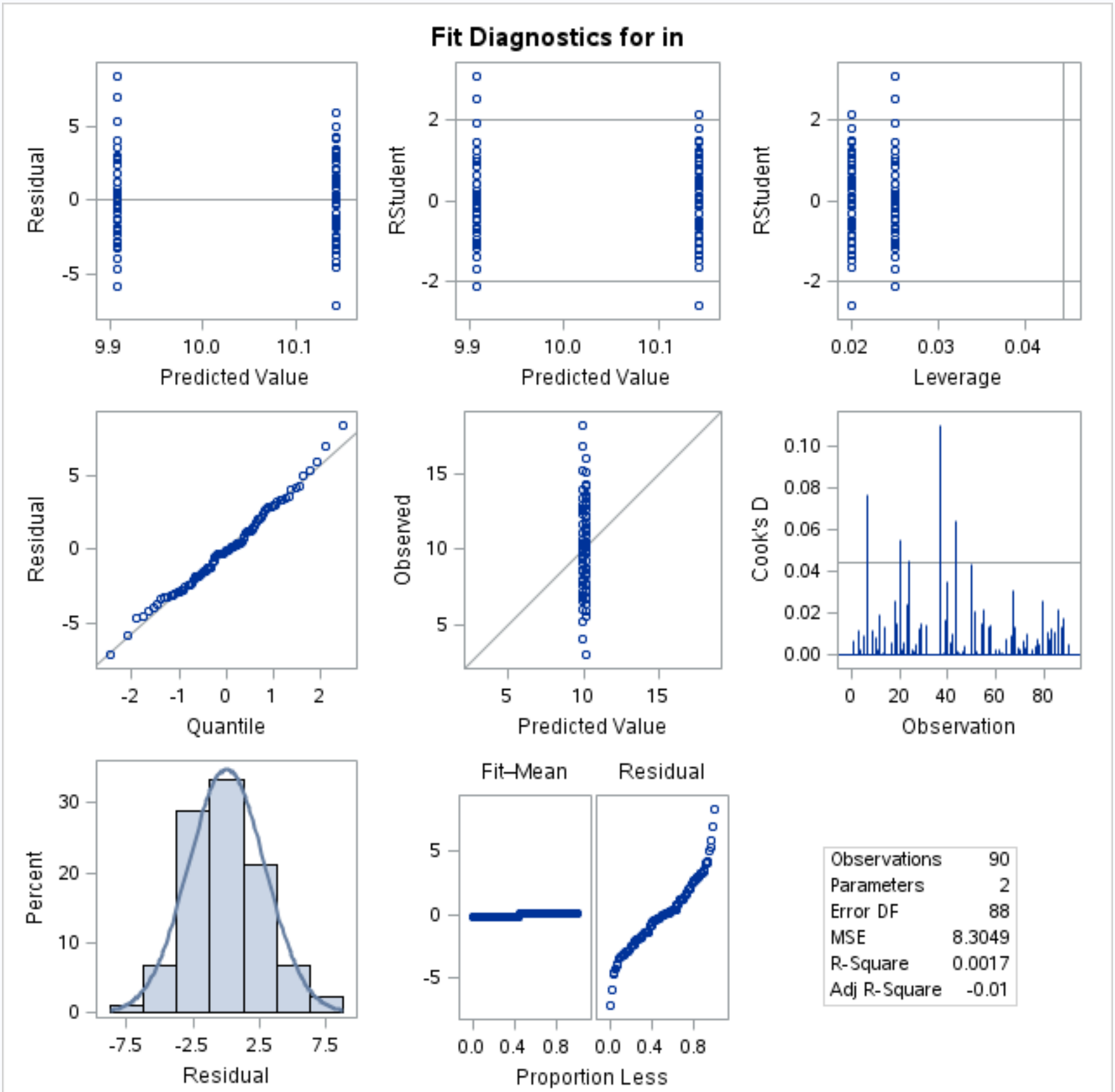
Variable	Label	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	Intercept	1	10.14300	0.40755	24.89	<.0001

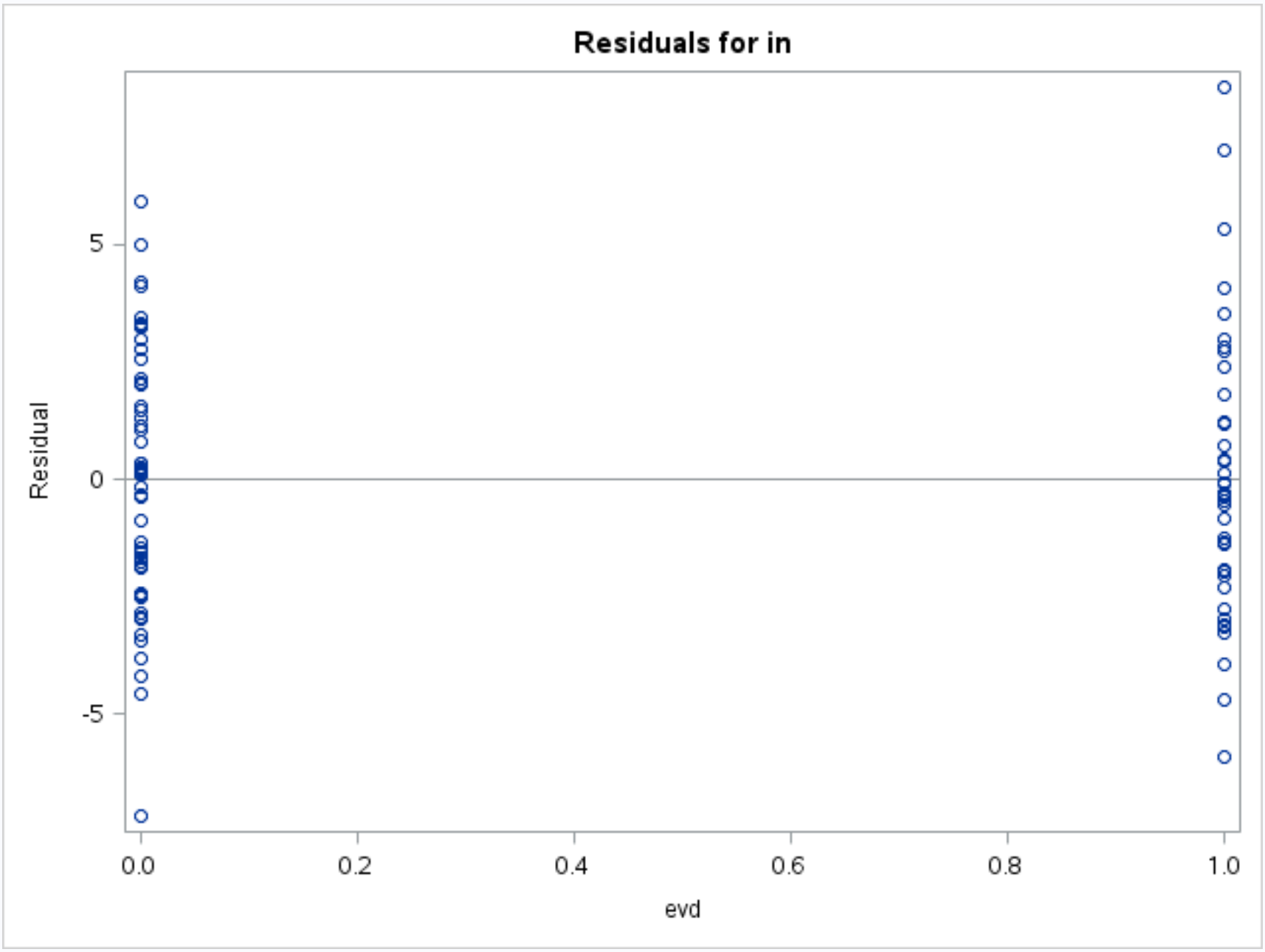
evd		1	-0.23525	0.61133	-0.38	0.7013

House study

Question 5

The REG Procedure
Model: MODEL1
Dependent Variable: in Energy consumpt with damper active




Residuals for in
Residual
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-5
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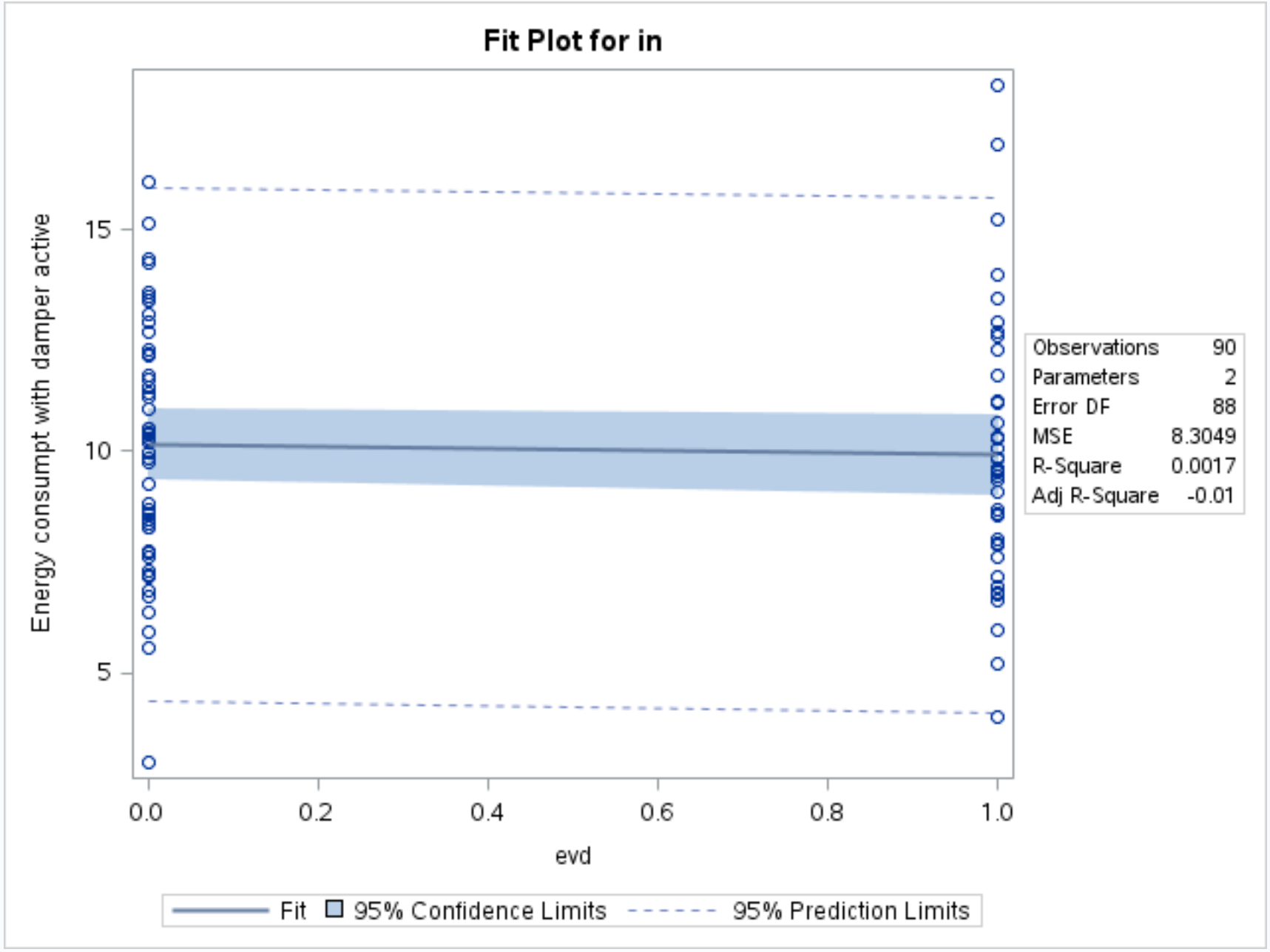
0.2
0.4
0.6
0.8
1.0
evd



House study

Question 6

The GLM Procedure

Class Level Information		
Class	Levels	Values
damper	2	EVD TVD

Number of Observations Read	90
Number of Observations Used	90

House study

Question 6

The GLM Procedure

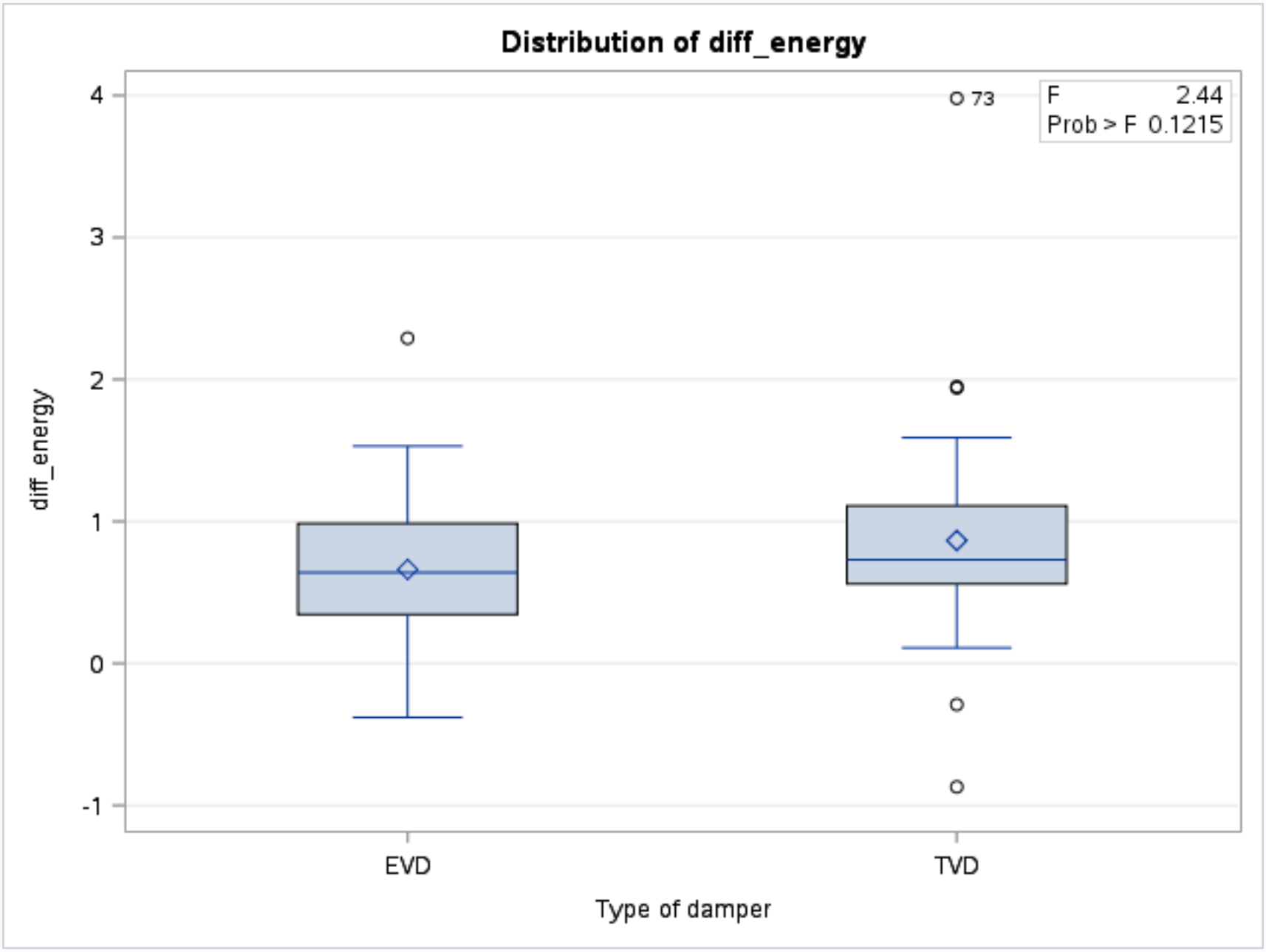
Dependent Variable: diff_energy

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	0.92208200	0.92208200	2.44	0.1215
Error	88	33.19135800	0.37717452		
Corrected Total	89	34.11344000			

R-Square	Coeff Var	Root MSE	diff_energy Mean
0.027030	79.27866	0.614145	0.774667

Source	DF	Type I SS	Mean Square	F Value	Pr > F
damper	1	0.92208200	0.92208200	2.44	0.1215

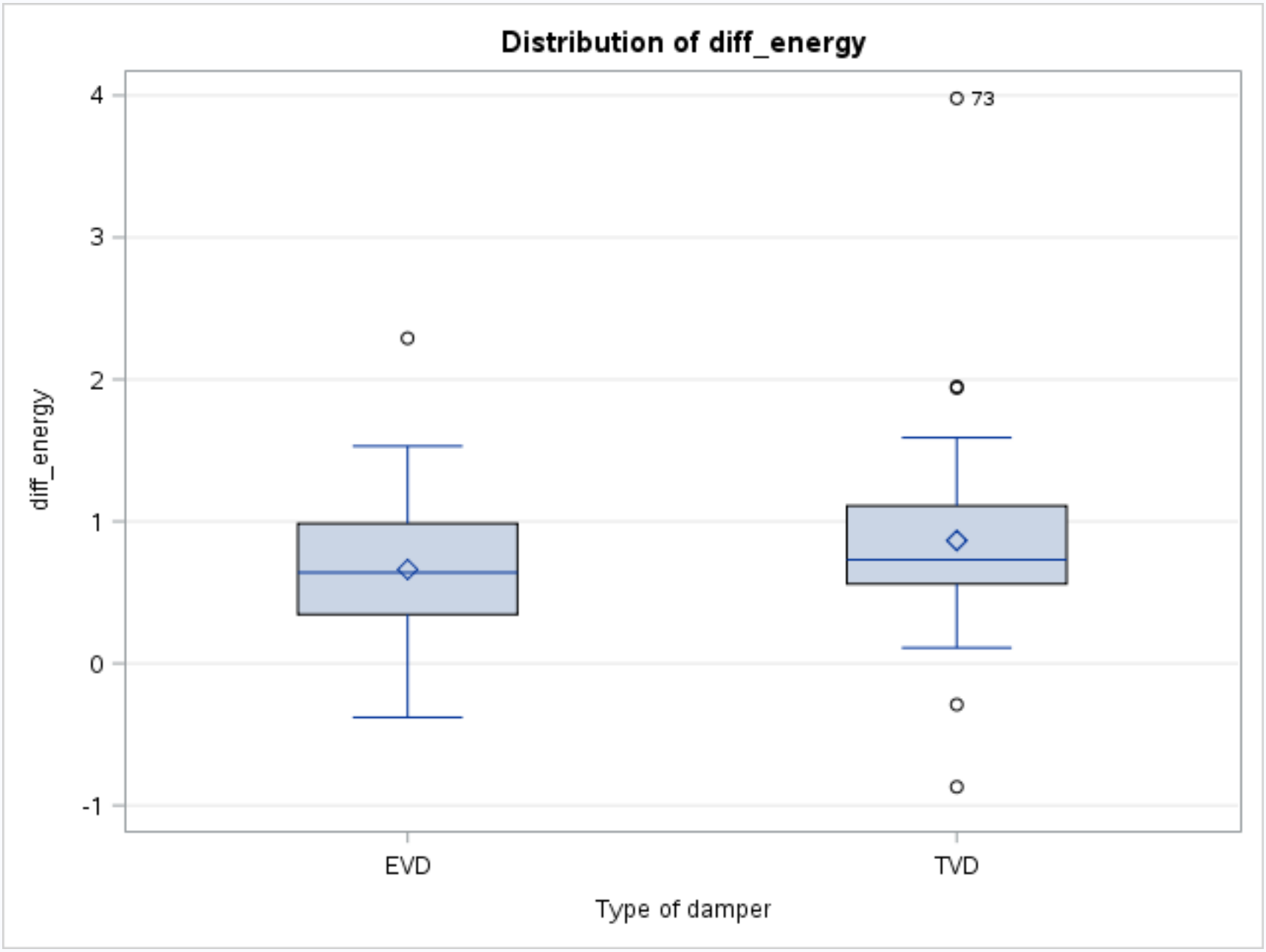
Source	DF	Type III SS	Mean Square	F Value	Pr > F
damper	1	0.92208200	0.92208200	2.44	0.1215



House study

Question 6

The GLM Procedure



Level of damper	N	diff_energy	
		Mean	Std Dev
EVD	40	0.66150000	0.51063334
TVD	50	0.86520000	0.68545007

House study

Question 7

The REG Procedure
Model: MODEL1
Dependent Variable: in Energy consumpt with damper active

Number of Observations Read	90
Number of Observations Used	90

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	2	705.26132	352.63066	1144.89	<.0001
Error	87	26.79646	0.30801		
Corrected Total	89	732.05778			

Root MSE	0.55498	R-Square	0.9634
Dependent Mean	10.03844	Adj R-Sq	0.9626

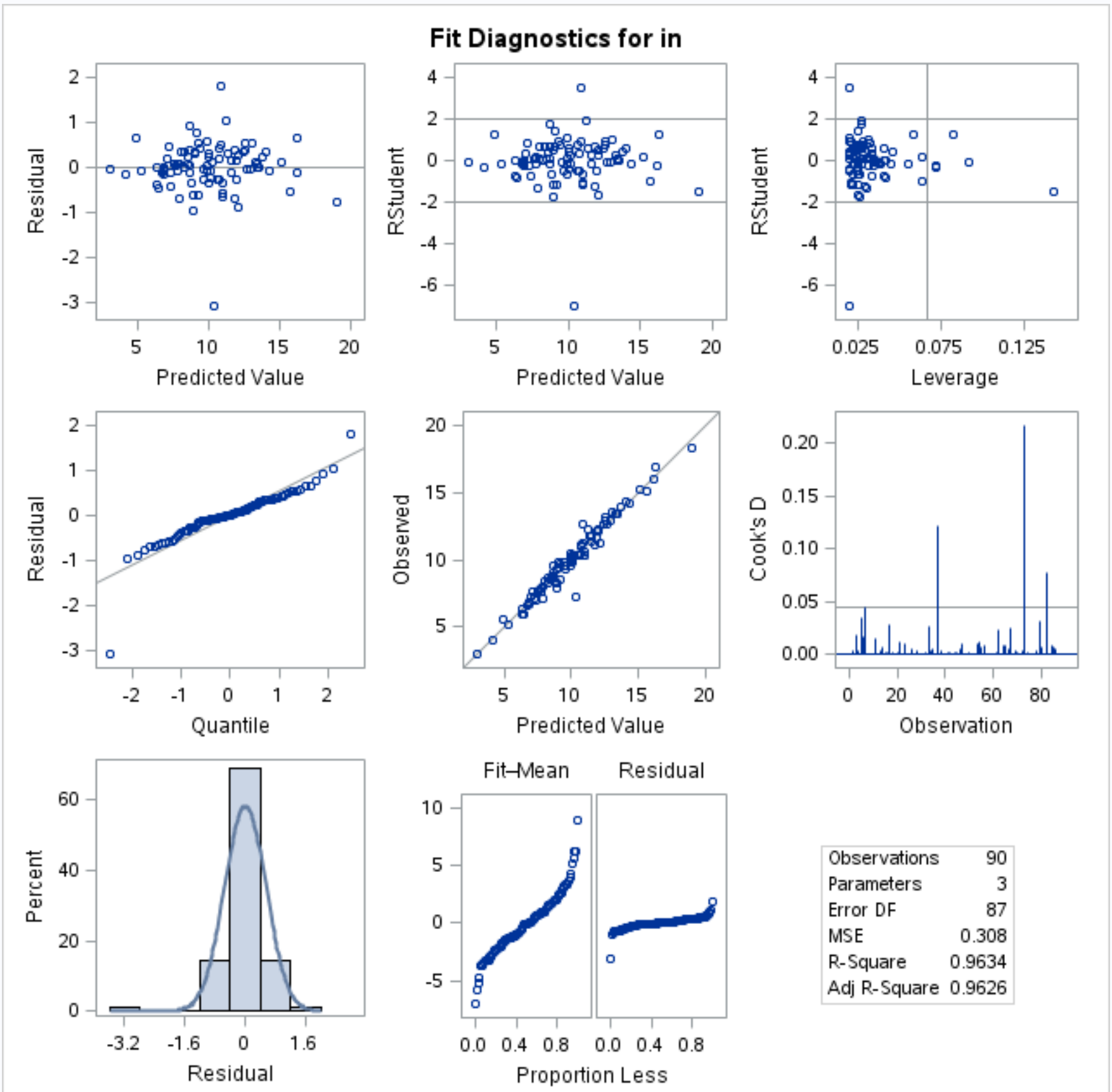
Coeff Var	5.52857		

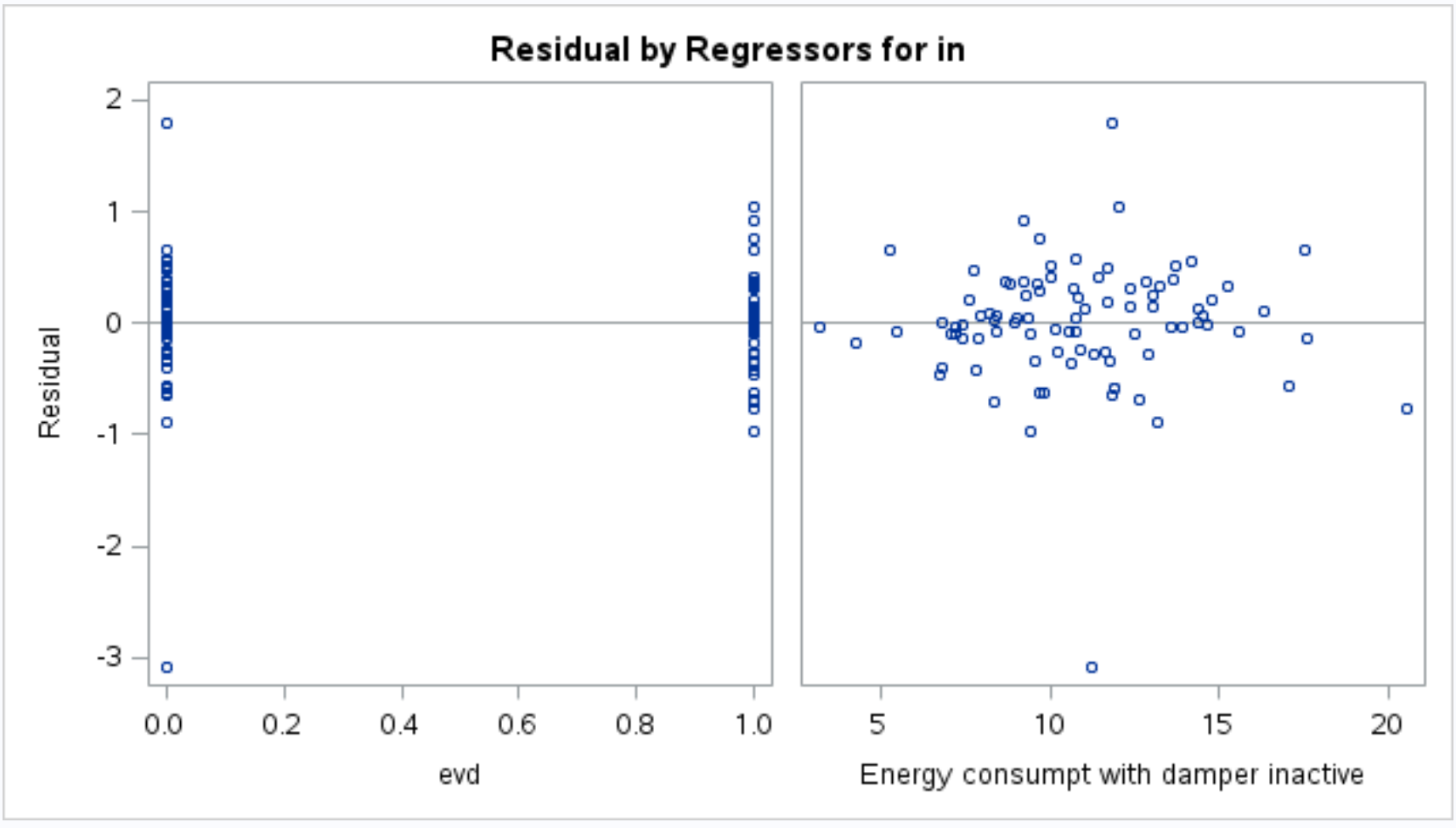
Parameter Estimates						
Variable	**Label**	**DF**	**Parameter Estimate**	**Standard Error**	**t Value**	**Pr > |t|**
Intercept	Intercept	1	0.09266	0.22439	0.41	0.6807
evd		1	0.16551	0.11803	1.40	0.1644
out	Energy consumpt with damper inactive	1	0.91299	0.01910	47.81	<.0001

House study

Question 7

The REG Procedure
Model: MODEL1
Dependent Variable: in Energy consumpt with damper active




Residual by Regressors for in
Residual
2
1
0
-1
-2
-3
0.0
0.2
0.4
0.6
0.8
1.0
evd
5
10
15
20
Energy consumpt with damper inactive