EPRS 855
Model Selection

Y	X1	X2	X3	X4
78.5	7.0	26.0	6.0	60.0
74.3	1.0	29.0	15.0	52.0
104.3	11.0	56.0	8.0	20.0
87.6	11.0	31.0	8.0	47.0
95.9	7.0	52.0	6.0	33.0
109.2	11.0	55.0	9.0	22.0
102.7	3.0	71.0	17.0	6.0
72.5	1.0	31.0	22.0	44.0
93.1	2.0	54.0	18.0	22.0
115.9	21.0	47.0	4.0	26.0
83.8	1.0	40.0	23.0	34.0
113.3	11.0	66.0	9.0	12.0
109.4	10.0	68.0	8.0	12.0

SPSS Commands

Analyze

- ***Regression***
  - ***Linear***
    - ***Dependent*** ***Y***
    - ***Independent*** ***X1***
      x2
      x3
      x4
    - ***Method*** ***Forward (or Backward, or Stepwise)***
    - ***Statistics***
      - ***Collinearity diagnostics***

Correlations

Correlations

		Y	X1	X2	X3	X4
Y	Pearson Correlation	1.000	731**	.816**	- 535	-.821**
	Sig (2-tailed)	.	005	.001	060	.001
	N	13	13	13	13	13
X1	Pearson Correlation	.731**	1 000	.229	- 824**	-.245
	Sig (2-tailed)	.005		.453	001	.419
	N	13	13	13	13	13
X2	Pearson Correlation	.816**	229	1.000	-.139	- 973**
	Sig (2-tailed)	.001	.453	.	650	.000
	N	13	13	13	13	13
X3	Pearson Correlation	- 535	- 824**	-.139	1 000	.030
	Sig (2-tailed)	.060	001	650		.924
	N	13	13	13	13	13
X4	Pearson Correlation	- 821**	- 245	- 973**	.030	1 000
	Sig (2-tailed)	.001	419	.000	924	
	N	13	13	13	13	13

** Correlation is significant at the 0 01 level (2-tailed).

Correlations

Regression (Forward Selection)

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	X4		Forward (Criterion. Probability-of-F-to-enter <= 050)
2	X1	.	Forward (Criterion Probability-of-F-to-enter <= 050)

a. Dependent Variable Y

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	821[a]	675	.645	8 964
2	.986[b]	972	.967	2.734

a. Predictors· (Constant), X4

b. Predictors (Constant), X4, X1

ANOVA[c]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1831 896	1	1831.896	22 799	001[a]
	Residual	883 867	11	80.352		
	Total	2715.763	12			
2	Regression	2641.001	2	1320.500	176.627	000[b]
	Residual	74.762	10	7 476		
	Total	2715.763	12			

a Predictors (Constant), X4

b. Predictors (Constant), X4, X1

c. Dependent Variable. Y

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig
		B	Std. Error	Beta		
1	(Constant)	117.568	5.262		22.342	.000
	X4	-.738	.155	-.821	-4.775	.001
2	(Constant)	103.097	2 124		48.540	.000
	X4	- 614	049	-.683	-12 621	.000
	X1	1 440	138	.563	10.403	.000

a Dependent Variable: Y

Excluded Variables[c]

Model		Beta In	t	Sig	Partial Correlation	Collinearity Statistics
						Tolerance
1	X1	.563[a]	10.403	.000	957	.940
	X2	.322[a]	415	.687	.130	5 336E-02
	X3	- 511[a]	-6.348	.000	- 895	.999
2	X2	430[b]	2.242	.052	599	5.325E-02
	X3	-.175[b]	-2 058	.070	- 566	289

a. Predictors in the Model (Constant), X4

b Predictors in the Model: (Constant), X4, X1

c Dependent Variable Y

Regression (Backward Selection)

Variables Entered/Removed[b]

Model	Variables Entered	Variables Removed	Method
1	X4, X3, X1, X2[a]	.	Enter
2	.	X3	Backward (criterion Probability of F-to-remove >= 100)
3	.	X4	Backward (criterion: Probability of F-to-remove >= 100)

a All requested variables entered

b Dependent Variable: Y

Model Summary

Model	R	R Square	Adjusted R Square	Std Error of the Estimate
1	.991[a]	982	.974	2.446
2	.991[b]	.982	.976	2.309
3	.989[c]	.979	974	2.406

a Predictors. (Constant), X4, X3, X1, X2

b. Predictors (Constant), X4, X1, X2

c. Predictors: (Constant), X1, X2

ANOVA[d]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2667.899	4	666.975	111.479	.000[a]
	Residual	47.864	8	5 983		
	Total	2715.763	12			
2	Regression	2667.790	3	889 263	166.832	000[b]
	Residual	47 973	9	5.330		
	Total	2715.763	12			
3	Regression	2657.859	2	1328.929	229 504	.000[c]
	Residual	57.904	10	5.790		
	Total	2715 763	12			

a Predictors (Constant), X4, X3, X1, X2

b Predictors. (Constant), X4, X1, X2

c Predictors: (Constant), X1, X2

d. Dependent Variable Y

Coefficients[a]

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	62.405	70.071		.891	.399
	X1	1 551	745	.607	2.083	.071
	X2	510	724	.528	.705	501
	X3	102	.755	.043	.135	896
	X4	-.144	709	-.160	- 203	844
2	(Constant)	71.648	14 142		5.066	.001
	X1	1.452	.117	.568	12.410	000
	X2	416	186	430	2.242	.052
	X4	- 237	173	- 263	-1 365	.205
3	(Constant)	52 577	2.286		22.998	000
	X1	1.468	.121	574	12 105	000
	X2	662	046	685	14 442	000

a Dependent Variable· Y

Excluded Variables[c]

Model		Beta In	t	Sig	Partial Correlation	Collinearity Statistics Tolerance
2	X3	.043[a]	135	.896	048	2 134E-02
3	X3	.106[b]	1 354	.209	.411	318
	X4	- 263[b]	-1.365	.205	- 414	5.280E-02

a. Predictors in the Model (Constant), X4, X1, X2

b. Predictors in the Model (Constant), X1, X2

c. Dependent Variable Y

Regression (Stepwise Selection)

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	X4	.	Stepwise (Criteria: Probability-of-F-to-enter <= 050, Probability-of-F-to-remove >= 100)
2	X1	.	Stepwise (Criteria Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100)

a Dependent Variable Y

Model Summary

Model	R	R Square	Adjusted R Square	Std Error of the Estimate
1	.821[a]	.675	.645	8 964
2	986[b]	.972	.967	2.734

a. Predictors (Constant), X4

b Predictors: (Constant), X4, X1

ANOVA[c]

Model		Sum of Squares	df	Mean Square	F	Sig
1	Regression	1831.896	1	1831 896	22.799	.001[a]
	Residual	883 867	11	80 352		
	Total	2715.763	12			
2	Regression	2641 001	2	1320 500	176.627	000[b]
	Residual	74 762	10	7 476		
	Total	2715.763	12			

a. Predictors. (Constant), X4

b. Predictors: (Constant), X4, X1

c. Dependent Variable Y

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig
		B	Std Error	Beta		
1	(Constant)	117.568	5.262		22 342	.000
	X4	- 738	155	-.821	-4 775	.001
2	(Constant)	103.097	2.124		48.540	.000
	X4	- 614	049	- 683	-12 621	000
	X1	1 440	138	563	10.403	000

a Dependent Variable· Y

Excluded Variables[c]

Model		Beta In	t	Sig	Partial Correlation	Collinearity Statistics
						Tolerance
1	X1	563[a]	10 403	.000	.957	.940
	X2	.322[a]	415	.687	.130	5 336E-02
	X3	- 511[a]	-6.348	.000	- 895	.999
2	X2	430[b]	2.242	052	599	5 325E-02
	X3	-.175[b]	-2 058	070	-.566	289

a. Predictors in the Model (Constant), X4

b Predictors in the Model: (Constant), X4, X1

c Dependent Variable Y