

The Problem of Multicollinearity:

Definition:

Multicollinearity refers to a statistical phenomenon in which two or more independent (predictor) variables in a multiple regression model are highly linearly correlated. This high correlation makes it difficult to determine the individual effect of each variable on the dependent variable because their effects are not distinct.

Detection Techniques:

Utilizing Variance Inflation Factor (VIF) and correlation matrices to identify multicollinearity.

Using Correlation Matrices

Equation: UNTITLED Workfile: LONGLEY (2)::Untitled\

View Proc Object Print Name Freeze Estimate Forecast Stats Resids

Dependent Variable: Y
Method: Least Squares
Date: 04/13/24 Time: 22:15
Sample: 1947 1962
Included observations: 16

Variable	Coefficient	Std. Error	t-Statistic	Prob.
X1	0.015062	0.084915	0.177376	0.8631
X2	-0.035819	0.033491	-1.069516	0.3127
X3	-0.020202	0.004884	-4.136427	0.0025
X4	-0.010332	0.002143	-4.821985	0.0009
X5	-0.051104	0.226073	-0.226051	0.8262
X6	1.829151	0.455478	4.015890	0.0030
C	-3482.259	890.4204	-3.910803	0.0036

R-squared	0.995479	Mean dependent var	65.31700
Adjusted R-squared	0.992465	S.D. dependent var	3.511968
S.E. of regression	0.304854	Akaike info criterion	0.761669
Sum squared resid	0.836424	Schwarz criterion	1.099676
Log likelihood	0.906650	Hannan-Quinn criter.	0.778978
F-statistic	330.2853	Durbin-Watson stat	2.559488
Prob(F-statistic)	0.000000		

Equation: UNTITLED Workfile: LONGLEY01::Untitled\

View Proc Object Print Name Freeze Estimate Forecast Stats Resids

Dependent Variable: Y
 Method: Least Squares
 Date: 04/17/20 Time: 15:45
 Sample: 1947 1962
 Included observations: 16

Variable	Coefficient	Std. Error	t-Statistic	Prob.
X1	15.06187	84.91493	0.177376	0.8631
X2	-35.81918	33.49101	-1.069516	0.3127
X3	-20.20230	4.883997	-4.136427	0.0025
X4	-10.33227	2.142742	-4.821985	0.0009
X5	-51.10411	226.0732	-0.226051	0.8262
X6	1829.151	455.4785	4.015890	0.0030
C	-3482259.	890420.4	-3.910803	0.0036

R-squared	0.995479	Mean dependent var	65317.00
Adjusted R-squared	0.992465	S.D. dependent var	3511.968
S.E. of regression	304.8541	Akaike info criterion	14.57718
Sum squared resid	836424.1	Schwarz criterion	14.91519
Log likelihood	-109.6174	Hannan-Quinn criter.	14.59449
F-statistic	330.2853	Durbin-Watson stat	2.559488
Prob(F-statistic)	0.000000		

Equation: UNTITLED Workfile: LONGLEY (2)::Untitled\

View Proc Object Print Name Freeze Estimate Forecast Stats Resids

Dependent Variable: Y
 Method: Least Squares
 Date: 04/13/24 Time: 22:33
 Sample: 1947 1962
 Included observations: 16

Variable	Coefficient	Std. Error	t-Statistic	Prob.
X1	0.015062	0.084915	0.177376	0.8631
X2	-0.035819	0.033491	-1.069516	0.3127
X3	-0.020202	0.004884	-4.136427	0.0025
X4	-0.010332	0.002143	-4.821985	0.0009
X5	-0.051104	0.226073	-0.226051	0.8262
X6	1.829151	0.455478	4.015890	0.0030
C	-3482.259	890.4204	-3.910803	0.0036

R-squared	0.995479	Mean dependent var	65.31700
Adjusted R-squared	0.992465	S.D. dependent var	3.511968
S.E. of regression	0.304854	Akaike info criterion	0.761669
Sum squared resid	0.836424	Schwarz criterion	1.099676
Log likelihood	0.906650	Hannan-Quinn criter.	0.778978
F-statistic	330.2853	Durbin-Watson stat	2.559488
Prob(F-statistic)	0.000000		

Table: UNTITLED Workfile: LONGLEY (2)::Untitled\

View	Proc	Object	Print	Name	Edit+/-	CellFmt	Grid+/-	Title	Comments+/-
	A	B	C	D	E				
1	Dependent Variable: Y								
2	Method: Least Squares								
3	Date: 04/13/24 Time: 22:33								
4	Sample: 1947 1962								
5	Included observations: 16								
6									
	Variable	Coefficient	Std. Error	t-Statistic	Prob.				
9	X1	0.015062	0.084915	0.177376	0.8631				
10	X2	-0.035819	0.033491	-1.069516	0.3127				
11	X3	-0.020202	0.004884	-4.136427	0.0025				
12	X4	-0.010332	0.002143	-4.821985	0.0009				
13	X5	-0.051104	0.226073	-0.226051	0.8262				
14	X6	1.829151	0.455478	4.015890	0.0030				
15	C	-3482.259	890.4204	-3.910803	0.0036				
16									
17	R-squared	0.995479	Mean dependent var	65.31700					
18	Adjusted R-squared	0.992465	S.D. dependent var	3.511968					
19	S.E. of regression	0.304854	Akaike info criterion	0.761669					
20	Sum squared resid	0.836424	Schwarz criterion	1.099676					
21	Log likelihood	0.906650	Hannan-Quinn criter.	0.778978					
22	F-statistic	330.2853	Durbin-Watson stat	2.559488					
23	Prob(F-statistic)	0.000000							
24									
25									
26									

Date: 04/13/24 Time: 22:33

Sample: 1947 1962

Includ

Object Name

Name to identify object

mulcolin 24 characters maximum, 16 or fewer recommended

Display name for labeling tables and graphs (optional)

OK Cancel

-squ
fjust
E. of regression 0.304854 Akaike info criterion

Range: 1947 1962 -- 16 obs Order: Name

Name	Type	Last Update	Description
<input checked="" type="checkbox"/> c	coef	04/13/24 22:33	
<input checked="" type="checkbox"/> mulcolin	table	04/14/24 00:31	
<input checked="" type="checkbox"/> resid	series	04/13/24 22:33	
<input checked="" type="checkbox"/> rownames	series	04/13/24 22:17	
<input checked="" type="checkbox"/> x1	series	04/13/24 22:18	
<input checked="" type="checkbox"/> x2	series	04/13/24 22:18	
<input checked="" type="checkbox"/> x3	series	04/13/24 22:19	
<input checked="" type="checkbox"/> x4	series	04/13/24 22:18	
<input checked="" type="checkbox"/> x5	series	04/13/24 22:19	

Range: 1947 1962 -- 16 obs Order: Name

Name	Type	Last Update	Description
<input checked="" type="checkbox"/> c	coef	04/13/24 22:33	
<input checked="" type="checkbox"/> mulcolin	table	04/14/24 00:31	
<input checked="" type="checkbox"/> resid	series	04/13/24 22:33	
<input checked="" type="checkbox"/> rownames	series	04/13/24 22:17	
<input checked="" type="checkbox"/> x1	series	04/13/24 22:18	
<input checked="" type="checkbox"/> x2	series	04/13/24 22:18	
<input checked="" type="checkbox"/> x3	series	04/13/24 22:19	
<input checked="" type="checkbox"/> x4	series	04/13/24 22:18	
<input checked="" type="checkbox"/> x5	series	04/13/24 22:19	
<input checked="" type="checkbox"/> x6	series	04/13/24 22:20	
<input checked="" type="checkbox"/> y	series	04/13/24 22:18	

Open

Preview F9

Copy Ctrl+C

Copy Special...

Paste Ctrl+V

Paste Special...

Fetch from DB...

Update... Ctrl+F5

Store to DB...

as Group

as Equation...

as Factor...

as VAR...

as System...

as Multiple series

workfile: LONGLEY (2) - (c:\users\dj...)

View Proc Object Save Freeze Details +/- Show Fetch Store Delete Genr Sample

Range: 1947 1962 -- 16 obs Filter: *

Sample: 1947 1962 -- 16 obs Order: Name

Name	Group: UNTITLED Workfile: LONGLEY (2)::Untitled\										
	View	Proc	Object	Print	Name	Freeze	Default	Sort	Edit +/-	Smpl +/-	Compare +/-
<input checked="" type="checkbox"/> c											
<input checked="" type="checkbox"/> mulcolin											
<input checked="" type="checkbox"/> resid											
<input checked="" type="checkbox"/> rownames											
<input checked="" type="checkbox"/> x1											
<input checked="" type="checkbox"/> x2											
<input checked="" type="checkbox"/> x3											
<input checked="" type="checkbox"/> x4											
<input checked="" type="checkbox"/> x5											
<input checked="" type="checkbox"/> x6											
<input checked="" type="checkbox"/> y											

Group Members

Spreadsheet

Dated Data Table

Graph...

Descriptive Stats

Covariance Analysis...

N-Way Tabulation...

Tests of Equality...

Principal Components...

	X2	X3	X4	X5
89	235.6	159.0	107.608	
26	232.5	145.6	108.632	
54	368.2	161.6	109.773	
99	335.1	165.0	110.929	
75	209.9	309.9	112.075	
99	193.2	359.4	113.270	
85	187.0	354.7	115.094	
12	357.8	335.0	116.219	
69	290.4	304.8	117.388	
80	282.2	285.7	118.734	
69	293.6	279.8	120.445	
46	468.1	263.7	121.950	
04	281.2	255.2	123.266	

1947	88.5	259.426	232.5	145.6	108.632
1948	88.5	259.426	232.5	145.6	108.632
1949	88.2	258.054	368.2	161.6	109.773
1950					
1951					
1952					
1953					
1954					
1955					
1956					
1957					
1958					
1959					
1960					
1961					
1962					

Covariance Analysis

Statistics

Method: Ordinary

Covariance Number of cases
 Correlation Number of obs.
 SSCP Sum of weights
 t-statistic
 Probability | t | = 0

Layout: Spreadsheet

Partial analysis

Series or groups for conditioning (optional):

Options

Weighting: None

Weight series:

d.f. corrected covariances

Multiple comparison adjustments: None

Saved results basename:

Sample

1947 1962

Balanced sample (listwise deletion)

OK
Cancel

Group: UNTITLED Workfile: LONGLEY (2)::Untitled\

	X1	X2	X3	X4	X5	X6
X1	1.000000	0.991589	0.620633	0.464744	0.979163	0.991149
X2	0.991589	1.000000	0.604261	0.446437	0.991090	0.995273
X3	0.620633	0.604261	1.000000	-0.177421	0.686552	0.668257
X4	0.464744	0.446437	-0.177421	1.000000	0.364416	0.417245
X5	0.979163	0.991090	0.686552	0.364416	1.000000	0.993953
X6	0.991149	0.995273	0.668257	0.417245	0.993953	1.000000

Group: UNTITLED Workfile: LONGLEY (2)::Untitled

View	Proc	Object	Print	Name	Freeze	Sample	Sheet	Stats	Spec
Correlation									
	X1	X2	X3	X4	X5	X6			
X1	1.000000	0.991589	0.620633	0.464744	0.979163	0.991149			
X2	0.991589	1.000000	0.604261	0.446437	0.991090	0.995273			
X3	0.620633	0.604261	1.000000	-0.177421	0.686552	0.688257			
X4	0.464744	0.446437	-0.177421	1.000000	0.364416	0.417245			
X5	0.979163	0.991090	0.686552	0.364416	1.000000	0.993953			
X6	0.991149	0.995273	0.688257	0.417245	0.993953	1.000000			

Multiple high orrelations