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: UNTITLE	D Workfile: LONG	GLEY (2)::Unt	itled\		- (Ξ
View Proc Object P	rint Name Freeze	Estimate	Forecast	Stats	Resids	
Dependent Variable: Method: Least Squar Date: 04/13/24 Time Sample: 1947 1962 Included observation	Y es e: 22:15 s: 16					
Variable	Coefficient	Std. Erro	or t-S	tatisti	C F	rob.
X1	0.015062	0.08491	5 0.1	77376	6 0 .	8631
X2	-0.035819	0.03349	1 -1.0	69516	6 0 .	3127
X3	-0.020202	0.00488	4 -4.1	36421	70.	0025
X4	-0.010332	0.00214	3 -4.8	321985		0009
X5	-0.051104	0.22607	3 -0.2	2605	1 0.	8262
Х6	1.829151	0.45547	8 4.0	15890	0 0.	0030
С	-3482.259	890.420	4 -3.9	1080.	3 0.	0036
R-squared	0.995479	Mean depe	endent va	ar	65.3	31700
Adjusted R-squared	0.992465	S.D. deper	ndent var		3.51	1968
S.E. of regression	0.304854	Akaike info	criterior	1	0.76	1669
Sum squared resid	0.836424	Schwarz ci	riterion		1.09	9676
Log likelihood	0.906650	Hannan-Q	uinn crite	er.	0.77	8978
	330.2853	Durbin-Wa	atson sta	t	2.55	9488
F-statistic						

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	0.8242
X6	1829.151	455.4785	4.015890	0.0030
С	-3482259.	890420.4	-3.910803	0.0036
R-squared	0.995479	Mean depend	lent var	65317.00
Adjusted R-squared	0.992465	S.D. depende	ent var	3511.968
S.E. of regression	304.8541	Akaike info cr	iterion	14.57718
Sum squared resid	836424.1	Schwarz crite	rion	14.91519
Log likelihood	-109.6174	Hannan-Quin	in criter.	14.59449
F-statistic	330.2853	Durbin-Watso	on stat	2.559488
Prob(F-statistic)	0.000000			

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View Proc Object Pri	int Name Freeze	Estimate Fo	orecast Stats	Resids
Dependent Variable: Method: Least Square Date: 04/13/24 Time Sample: 1947 1962 Included observations	r es : 22:33 s: 16	•		
Variable	Coefficient	Std. Error	t-Statist	tic Prob.
X1 X2 X3 X4 X5 X6 C	0.015062 -0.035819 -0.020202 -0.010332 -0.051104 1.829151 -3482.259	0.084915 0.033491 0.004884 0.002143 0.226073 0.455478 890.4204	0.17737 -1.06954 -4.13642 -4.82198 -0.22605 4.01589 -3.91080	76 0.8631 16 0.3127 27 0.0025 35 0.0009 51 0.8262 90 0.0030 03 0.0036
R-squared Adjusted R-squared S.E. of regression Sum squared resid Log likelihood F-statistic Prob(F-statistic)	0.995479 0.992465 0.304854 0.836424 0.906650 330.2853 0.000000	Mean depen S.D. depend Akaike info d Schwarz crit Hannan-Qui Durbin-Wats	ident var lent var criterion erion nn criter. son stat	65.31700 3.511968 0.761669 1.099676 0.778978 2.559488

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1	Dependent Variable: Y	\mathbf{N}				^
2	Method: Least Squares					
3	Date: 04/13/24 Time: 2	2:33				
4	Sample: 1947 1962					
5	Included observations: 1	6				
6						
	Variable	Coefficient	Std. Error	t-Statistic	Prob.	
8			0.004045			
9	X1	0.015062	0.084915	0.1//3/6	0.8631	
10	X2	-0.035819	0.033491	-1.009510	0.3127	
10	λ3 	-0.020202	0.004884	-4.130427	0.0025	
12	Λ4 VE	-0.010332	0.002143	-4.821985	0.0009	
13	XC	1 020151	0.220073	-0.220001	0.8202	
14	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	2402.250	0.400476	2.010002	0.0030	
10		-3462.239	090.4204	-3.910603	0.0030	
17	R-squared	0 995479	Mean denen	dentvar	65 31700	
18	Adjusted R-squared	0.992465	SD depend	lentvar	3 511968	
19	S.F. of regression	0.304854	Akaike info o	riterion	0 761669	
20	Sum squared resid	0 836424	Schwarz crit	erion	1 099676	
21	Log likelihood	0.906650	Hannan-Qui	nn criter.	0.778978	
22	F-statistic	330,2853	Durbin-Wats	on stat	2.559488	
23	Prob(F-statistic)	0.000000				
24						
25	1					5
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1949	88.2	258.054	368.2	161.6	109.773	
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	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	

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		X1		X2		X3		X4		X	5	X6	6			
Х	1	1.00000	0	0.9915	89	0.620633		0.46	4744	0.979	163	0.99	1149	^		
Х	2	0.99158	39	1.00000	00	0.604261		0.604261		0.44	6437	0.99	090	0.99	5273	
Х	3	0.62063	33	0.6042	61	1 0000	000	-0.17	7421	0.68	52	0.66	8257			
Х	4	0.46474	14	0.4464	37	-0.117	421	1.00	00000	0.564	416	0.41	7245			
Х	5	0.9791	13	0.9910	90	0.6865	100	0.36	4416	1.000	0000	0,99	3953			
Х	6	0.99114	19	0.9952	73	0.6682	257	0.41	72	0.993	953	1.00	0000			