Multicolinearity

1 The Nature of Multicolinearity

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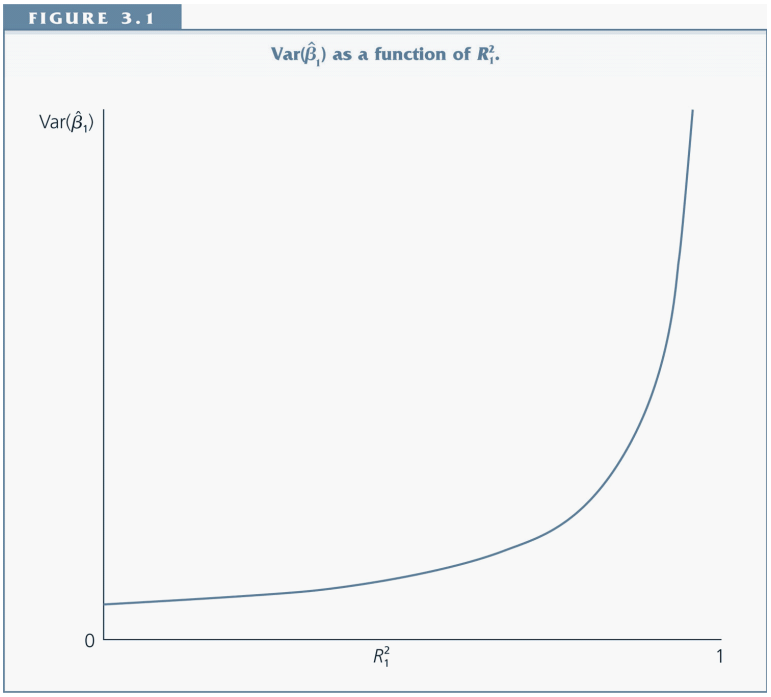
observation	x_1	x_2	$3x_1 - x_2$
1	6	18	0
2	12	36	0
3	7	21	0
4	-5	-15	0

observation	x_1	x_2	$3x_1 - x_2$
1	6	16	-2
2	12	45	9
3	7	18	-3
4	-5	-12	3

2 Consequences of Multicolinearity

2.1 The OLS estimator will still be BLUE.

2.2 The variances and covariances will be very large. This makes precise estimation difficult.



3 Detection of multicolinearity

1. There is conflicting test between t- and F-test: if we find that the conclusion derived from the two tests are inconsistent, specifically R2 is high and F-test results in statistical overall significance; whereas, at least, one null hypothesis of some t-tests cannot be rejected, it is reasonable to suspect the multicollinearity problem.

2. Correlation of regressors is greater than 0.8: the higher the correlation, the higher the variance of estimators.

3. Variance inflation factor (VIF) is greater than 10: when the regressors face the multicollinearity problem, the value of VIF might be so high that the resulting high variance of estimators adversely affects the regression analysis.

    - The VIF (variance inflation factor) to detect high multicolinearity:

4. Scatter plot of two regressors is relatively linear: when we plot the value of on regressor against another and we find that both of them tend to change in the same way, this fact might suggest the existence of multicollinearity.

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4 Remedial Measures

1. Do nothing

2. Apply prior relationship among explanatory variables -

3. Discard some explanatory variables - the removal of the variables could mitigate the problem; but, another problem, namely specification bias problem, might occur instead. For example, suppose we want to construct the model where the production is the explained variables; and labor and capital are the explanatory ones. If there is linear relationship between labor and capital, the elimination of one variable might assuage the multicollinearity problem, but might be contrary to economic reasoning. Hence, the decision of which variables will be disposed of should be based on economic theory.

4. Collect more observations - this practice will increase _____, which is the component of the variances. As a result, the variances will be lower despite high correlation among explanatory variables.

5. Transform the variables - although there is linear relationship among explanatory variables, it is not necessary that the first difference or ratio transformation of the variables will have that relationship