Class 10. Endogeneity
Advanced Econometrics I

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Problem 1

Mr. Grinch studies the influence of different factors on the holiday mood. He estimates the following regression using a sample of 100 HSE students:

$$h\_mood_i = \beta_0 + \beta_1 * n\_presents_i + \beta_2 * snow\_lvl_i + \varepsilon_i.$$

However, he believes that variable $n\_presents$ may be endogeneous. He decided to use variables $n\_friends$ and $money\_fr$ as instrumental variables. After that Grinch decided to check whether his model suffers from endogeneity or not. For this he estimated two auxilary models:

$$n\_presents_i = \Delta_0 + \Delta_1 * snow\_lvl_i + \Delta_2 * n\_friends_i + \Delta_3 * money\_fr_i + u_i,$$

$$h\_mood_i = \alpha_0 + \alpha_1 * n\_presents_i + \alpha_2 * snow\_lvl_i + \gamma * \hat{u}_i + \xi_i.$$

Variable	Estimate
Intercept	5.6 (1.01)
$n\_presents$	8.67 (2.1)
$snow\_lvl$	6.23 (1.55)
$\hat{u}_i$	3.5 (0.96)

Given the information above, help Grinch to determine whether he can use OLS to estimate the model or not.

Problem 2

Now Mr. Grinch want to check whether his instruments are relevant or not. For this purpose, he estimated two different auxilary models:

$$n\_presents_i = \lambda_0 + \lambda_1 * snow\_lvl_i + \lambda_2 * n\_friends_i + \lambda_3 * money\_fr_i + v_i,$$

$$n\_presents_i = \lambda_0 + \lambda_1 * snow\_lvl_i + \varepsilon_i.$$

After the estimation he got that residual sum of squares for the first model is $RSS_1 = 120.13$, while for the second model $RSS_2 = 156.15$. Help Grinch to check whether his instruments are weak.

This is the end of Advanced Econometrics 1!

I wish you wonderful holidays!

See you in Advanced Econometrics 2!