

ECONOMIC STATISTICS

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Course Material Developed by Department of Economics,

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Binary variables – interactions, dependent variable, summary

Interactions

- The effects of two variables are interdependent – multiplication
- Interaction between continuous X and binary D:
 - Different effect of X in two subgroups
 - Different slope and different intercept:

$$Y = \alpha + \beta_1 X + \beta_2 D + \beta_3 (DX) + e$$

$$\hat{Y} = \hat{\alpha} + \hat{\beta}_1 X \text{ if } D = 0$$

$$\hat{Y} = (\hat{\alpha} + \hat{\beta}_2) + (\hat{\beta}_1 + \hat{\beta}_3) X \text{ if } D = 1$$

Modeling

4 possibilities:

- Same regression line for all subgroups
- Different intercept
- Different slope
- Intercept and slope are both different

Example 1

Housing prices (hprice.xls)

- Dependent variable: price (CAD)
- Regressors: air conditioning, recreation room, basement, lot size
- Interaction between recreation room and basement
- Interpretation of the coefficient of the interaction term?

Example 1 – estimation result

Regression of housing price:

	<i>Coefficient</i>	<i>Standard dev.</i>	<i>t statistic</i>	<i>p-value</i>
Intercept	33707,34	2575,85	13,09	0,00
Air cond.	5990,53	5412,63	1,11	0,27
Recr. room	7584,15	2450,21	3,10	0,00
Basement	6179,81	1935,23	3,19	0,00
Lot siye	4,77	0,48	9,96	0,00
Recr. room*basement	2,38	0,91	2,62	0,01

Example 2

Monthly gross earnings (Wage tariff, 2003 subsample)

	<i>Coefficient</i>	<i>Standard dev.</i>	<i>t statistic</i>	<i>p-value</i>
Intercept	-157097,04	8218,74	-19,11	0,00
Male	-3141,61	14533,26	-0,22	0,83
Education	24314,10	621,30	39,13	0,00
Male*education	2679,41	1031,51	2,60	0,01

	<i>Coefficient</i>	<i>Standard dev.</i>	<i>t statistic</i>	<i>p-value</i>
Intercept	-169745,95	6624,63	-25.62	0,00

Male	33946,02	2714,01	12.51	0,00
Education	25286,16	496,24	50.96	0,00

- Discrimination?
- Ceteris paribus difference between earnings of males and females?

Binary dependent variable

- Example:
 - Having own car?
 - Company profitable?
 - Etc.
- OLS estimation feasible, but:
 - Estimated value is not 0-1!
 - Further problems – different estimation method is preferable

Summary

- Interpretation of the coefficients in multiple regressions
- Interpretation of R-squared
- Hypothesis testing
- Problems:
 - Omitted variables
 - Multicollinearity
- Binary variables:

- Different intercept
- Interactions