$\boxed{E1}$ gender = { male , female }

$$D = \begin{cases} 0; & \text{females} \\ 1; & \text{males} \end{cases}$$

PDF, pp. 1–2.

a) wage = f(gender) :

$$wage_i = \beta_1 + \beta_2 D_i + u_i \quad \text{(PRM)}$$

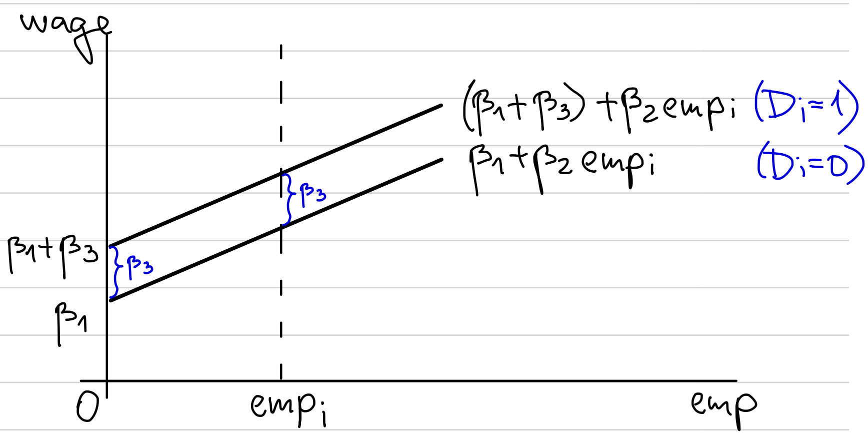
$$\widehat{wage}_i = b_1 + b_2 D_i \quad \text{(SRM)}$$

$$\widehat{wage}_i = 151.32 + 22.26 D_i$$

$$p(b_2) = 0.019 < \alpha = 0.05.$$

b) wage = f(emp, gender) :

$$wage_i = \beta_1 + \beta_2\, emp_i + \beta_3 D_i + u_i \quad \text{(PRM)}$$



$\widehat{wage}_i = b_1 + b_2\, emp_i + b_3 D_i$ (SRM)

$\widehat{wage}_i = 118.96 + \underline{2.976}\, emp_i + \underline{12.677}\, D_i$

$p(b_3) = 0.045 < \alpha = 0.05.$

Interpretation: PDF, p. 2.

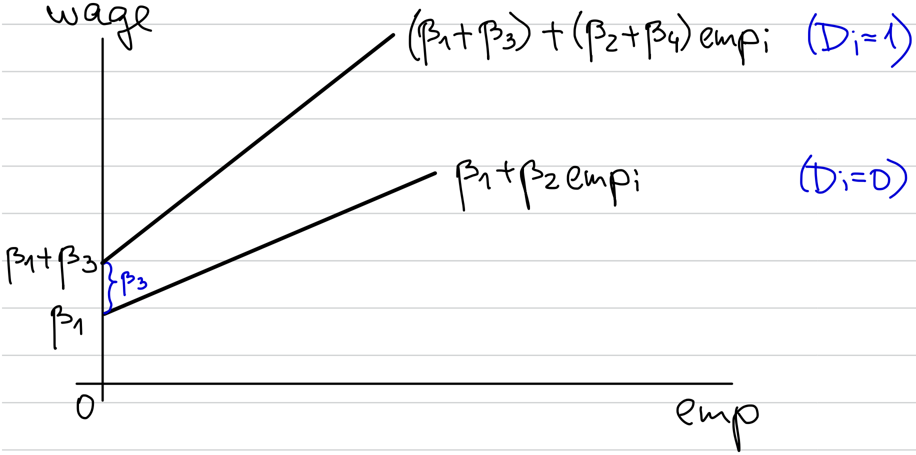
b_2: If the period of employment increases by 1 year, then the net wage will increase on average by 2,976 m.u., for both genders.

b_3: The expected net wage estimate for males is 12,677 m.u. higher than the expected net wage estimate for females, conditional on their period of employment.
(which? any!)

c) The effect of period of employment on net wage depends on gender:

$wage_i = \beta_1 + \beta_2\, emp_i + \beta_3 D_i + \beta_4 \underline{D_i \cdot emp_i} + u_i$ (PRM)

multiplicative or interaction dummy variable



$$\widehat{wage}_i = b_1 + b_2\,emp_i + b_3 D_i + b_4 D_i \cdot emp_i \quad \text{(SRM)}$$
$$\widehat{wage}_i = 119.01 + 2.971\,emp_i + 12.570\,D_i + $$
$$+\,0.009\,D_i \cdot emp_i$$

How come?

$p(b_3) = 0.284 > \alpha = 0.05.$ PDF, p. 2.
$p(b_4) = 0.991 > \alpha = 0.05.$

Interpretation (for teaching purposes):

b_2: If the period of employment increases by 1 year, then the net wage of females will increase on average by 2,971 m.u.

b_2+b_4: If the period of employment increases by 1 year, then the net wage of males will increase on average by 2,980 m.u.

b_4: If the period of employment increases by 1 year, then the net wage of males increases on average by 9 m.u. more than that of females.

b_3: For persons with zero years of employment $(emp_i=0)$, the expected net wage of males is 12,570 m.u. higher than that of females.

d) Dummy trap:

$$D_{alt} = \begin{cases} 0; & \text{males} \\ 1; & \text{females} \end{cases}$$

$D + D_{alt} = 1 \Rightarrow$ perfect multicollinearity.

PDF, pp. 3-4.

Slide 12:

y - savings
x_2 - disposable income

$$D = \begin{cases} 0; & \text{years before the independence (1991)} \\ 1; & \text{years after the independence (1991)} \end{cases}$$

Slide 13:

Chow test: $F \sim F_{k, n_1 + n_2 - 2k}$

$\boxed{E2}$ Application of dummy explanatory variables:

$$LIFE_i = \beta_1 + \beta_2 EXP_i + \beta_3 ALCO_i + \beta_4 TOBACCO_i + \beta_5 DEU_i + u_i$$

PDF, pp. 4–5.

$b_5 = 2.14$

$p(b_5) = 0.023 < \alpha = 0.05$

Are the differences between the two groups of countries really only in the average life expectancy at birth or perhaps the values of some of the regression coefficients also depend on placing the country in one of the two groups?

$$LIFE_i = \beta_1 + \beta_2 EXP_i + \beta_3 ALCO_i + \beta_4 TOBACCO_i + \beta_5 DEU_i + \beta_6 DEU_i \cdot EXP_i + \beta_7 DEU_i \cdot ALCO_i + \beta_8 DEU_i \cdot TOBACCO_i + u_i$$

PDF, p.5.

$b_8 = 0.41$

$p(b_8) = 0.005 < \alpha = 0.05$

Should we exclude all the insignificant relationship related to dummy explanatory variables from the model?

$H_0: \beta_j = 0,\ \forall j = 5, 6, 7$ $\quad F = 4.20$

$H_1: \beta_j \neq 0,\ \exists j = 5, 6, 7$ $\quad p(F) = 0.02$ No.

This is fairly obvious. Why?

So, we should probably exclude <u>only</u> β_6 and β_7:

$H_0: \beta_j = 0, \ \forall j = 6,7$ $\quad F = 2.20$

$H_1: \beta_j \neq 0, \ \exists j = 6,7$ $\quad p(F) = 0.13$ Yes.

The <u>final model</u> should then be:

$$LIFE_i = \beta_1 + \beta_2 EXP_i + \beta_3 ALCO_i + \beta_4 TOBACCO_i + \beta_5 DEU_i + \beta_6 DEU_i \cdot TOBACCO_i + u_i$$

$p(b_5) = 0{,}011 < \alpha = 0.05$ PDF, p.6.

$p(b_6) = 0{,}002 < \alpha = 0.05$

Interpretation:

b_4: If the percentage of smokers increases by 1 p.p., then on average, ceteris paribus, the life expectancy at birth in non-EU member states decreases by 0.43 years.

$b_4 + b_6$: If the percentage of smokers increases by 1 p.p., then on average, ceteris paribus, the life expectancy at birth in EU member states does not change ($-0.43 + 0.45 = 0.02$, not statistically significant).