Completed
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Econometrics I, ECO341A, Summer 2023
Matlab - Practice 1

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1. Forced expiratory volume (FEV) is an important pulmonary test that measures the volume of air a person can exhale during a forceful breath. The FEV is typically reported in liters per second and expected to increase during the adolescence period. However, certain addictions such as smoking can slow the progression and adversely effect pulmonary functions.

The aim of this exercise is to to learn about the relationship between lung capacity as measured by FEV and smoking based on data of 342 adolescents aged 10-18, present in the file "`FEV Wesley.xlsx`". Based on the attached data, do the following.

(a) Prepare a table that exhibits the mean and standard deviations of `fev` and `age` classified according to smoking status.

(b) Regress `fev` on an `intercept`, `age` and `smoke`. Report the coefficient estimates, standard errors, t-statistics and R^2. What can you infer about the effect of the covariates?

(c) The relationship between FEV and age may be non-linear. So, lets create a variable `agesqr` by squaring the variable `age`. Regress `fev` on an `intercept`, `age`, `agesqr` and `smoke`. Report the coefficient estimates, standard errors, t-statistics and R^2. What can you infer about the effect of the covariates?

(d) The data summary in Part (a) shows that smoking adolescents are on average older and have higher FEV compared to non-smoking adolescents. So, it is necessary to include a variable `ageIntSmoke` which gives the interaction of `age` and `smoke`. Regress `fev` on an `intercept`, `age`, `agesqr`, `smoke` and `ageIntSmoke`. Report the coefficient estimates, standard errors, t-statistics and R^2. What can you infer about the effect of the covariates?

(e) Consider the model in Part (d). Present a figure that displays the fitted regression line for smokers and non-smokers within the range of values of `age`. Label the fitted regression lines. In the same figure, present a scatter plot of `fev` and `age`.

(f) Test the hypothesis: $H_0 : \beta_{\texttt{agesqr}} = \beta_{\texttt{age*smoke}} = 0$ against the alternative H_1 : not H_0. What do you conclude?