ECON5205: Econometrics

Problem Set 1

Assignment instructions

- You must submit your work via the Turnitin link on Moodle by **6:00 pm on Sunday 9th October**. Typed answers are preferred, but neatly and readable hand-written answers are also accepted.
- This assignment will be marked for the course assessment and will be worth 5% of your final mark. **You must include a screen-shot of Stata do-file commands estimating the equations 1, 2, and 3 to your answers. Failure to do so will result in a zero mark for the computing questions.**
- Name, student number, course title and tutor's name should be clearly included in the submission. Your answers including the Stata do-file should not exceed 6 pages. The Assignment is based on the material covered in both lectures and tutorials up to the end of Week 4.
- The assignment is INDIVIDUAL work. You may discuss the assignment with your peers, but you must submit YOUR OWN answers.
- If the answer requires some mathematical calculation show the steps, don't just report the final results.
- This assignment has a total of 5 points awarded.

Imagine we have data that contains salary information and statistics for 269 players in the *National Basketball Association* (NBA).

We are now interested in the determinants of players' salary and we consider the following population regression models:

$$\texttt{Wage} = \alpha_0 + \alpha_1 \texttt{Exper} + \alpha_2 \texttt{Points} + \texttt{U}, \tag{1}$$

$$log(\texttt{Wage}) = \beta_0 + \beta_1 \texttt{Exper} + \beta_2 \texttt{Points} + \texttt{V}, \tag{2}$$

$$log(\texttt{Wage}) = \gamma_0 + \gamma_1 \texttt{Exper} + \gamma_2 \texttt{Exper}^2 + \gamma_3 \texttt{Points} + \texttt{W}, \tag{3}$$

where `Wage` is the annual salary (in thousands of dollars), `Exper` is the NBA experience (number of years since the player started playing in the NBA), `Points` is the number of points per game

1. **(1 point)** Verify that Estimating equation (1) you obtain $\hat{\alpha_0} = -60.7$ and $\hat{\alpha_1} = 86.84$ (you must include a screen-shot of Stata do-file commands estimating the equation). Assume that the Gauss-Markov assumptions hold and interpret $\hat{\alpha_0}$ and $\hat{\alpha_1}$. (Answer in less than 80 words)
2. **(1 point)** Verify that estimating equation (2) you obtain $\hat{\beta_2} = 0.084$ (you must include a screen-shot of Stata do-file commands estimating the equation). Assume that the Gauss-Markov assumptions hold and interpret $\hat{\beta_2}$. (Answer in less than 80 words)
3. **(1 point)** Do you think $E(\texttt{U}|\texttt{Exper}, \texttt{points}) = 0$ is a reasonable assumption? Discuss. How would the interpretation of $\hat{\alpha_1}$ change if $E(\texttt{U}|\texttt{Exper}, \texttt{Points}) \neq 0$ (Answer in less than 150 Words)
4. **(1 point)** Verify that the OLS estimates of equation (3) are $\hat{\gamma_0} = 5.52$, $\hat{\gamma_1} = 0.167$, $\hat{\gamma_2} = -0.007$ and $\hat{\gamma_3} = 0.08$ (you must include a screen-shot of Stata do-file commands estimating the equation). Now consider Victor Oladipo. He is an NBA player with 5 years of experience. He wants to know by how much will his wage change next year when he will have 6 years of experience if he continues to score the same amount of points per game. Use the estimated coefficients to help Victor Oladipo make this prediction. You can assume that the Gauss-Markov assumptions hold.
5. **(0.5 points)** The R^2 of the OLS estimates of equation (2) and (3) are respectively 0.470 and 0.483. Interpret these numbers. Explain why the R^2 is higher for equation (3) than for equation (2). (Answer in less than 100 words)

For studying the determinants of players' salary we consider the following econometric model:

$$log(\texttt{Wage}) = \sigma_0 + \sigma_1 \texttt{Exper} + \sigma_2 \texttt{Age} + \sigma_3 \texttt{Agestart} + \texttt{Z}, \tag{4}$$

where `Agestart` is the age at which the player started playing in the NBA

6. **(0.5 points)** Describe the problem of collinearity and why equation (4) may suffer from it. (Answer in less than 80 words)