Practical Econometrics for Finance and Economics

**Exercises 2**:

1. a) In equation (2.8) of the lecture notes, show that $\mathbb{C}\text{ov}(\nu_{is}, \nu_{it}) = \mathbb{V}\text{ar}(a_i)$ for $s \neq t$. *Hint: You may assume that* $E(a_i) = 0$*, since we have included a constant in (2.6).*

   b) Using your result above, proof equation (2.28) of the lecture notes.

   c) Which practical implication does this have in inference of models estimated by pooled OLS, when there is an unobservable effect?

2. Load the data of Example 2.5 (Effect of Job Training on Firm Scrap Rates) into EViews, telling it that this is a dated panel (the cross sectional identifyer is `fcode` and the time identifyer is `year`.

   Use all the three years (1987, 1988, and 1989) (in 1987 no training). Enhance the model in Example 2.5 by adding a year 1989 dummy, $\texttt{grant}_{i,t-1}$, $\log(\texttt{sales}_{it})$, and $\log(\texttt{employ}_{it})$ as explanatory variables.

   a) i) Write out the model.
      ii) How would you interpret the coefficient of the year dummies?
      iii) How would you interpret the coefficient $\texttt{grant}_{i,t-1}$?

   b) Estimate the model with pooled OLS. What do the results suggest? Explain why estimation by pooled OLS is probably inappropriate in this situation.

   c) Estimate the model using first differencing as in example 2.6 and interpret your results.

   d) Estimate the model using the fixed effects estimator and interpret your results.

   e) Estimate the model using the random effects estimator and interpret your results.

   f) Use the Hausman specification test to test the orthogonality of the random effect.

   g) What is your final conclusion about the effect of job training on firm scrap rates?