**PART A:**

Retrieve from the excel file “Data-for-Part-A.xls” on DUO your individual datasets corresponding to your student ID number. This is a subsample of a dataset from an experiment in which the treatment was randomized depending on entity-specific variables that were not recorded. Suppose we are interested in estimating the effect of on . As is correlated with unobserved entity-specific variables, we have obtained two valid instruments and .

1. What does it mean for and to be valid instruments? (5 marks)
2. Estimate the effect of on by OLS. Comment on the estimate. (5 marks)
3. Estimate the effect of on by fixed effects regression. Comment on the estimate. (10 marks)
4. Estimate the effect of on by TSLS using each instrument individually and using both instruments jointly. Comment on the differences in estimates. (10 marks)
5. In the context of the TSLS regressions in (4), test for weak identification and perform a *J*-test. Comment on the result. (10 marks)
6. Estimate LPM, probit, and logit models for predicting based on and . Using each model, compute the change in the likelihood of associated with a 10% increase in . (10 marks)

**PART B:**

Suppose that you are a portfolio manager holding an equally-weighted portfolio consisting of the 3 stock indices. The aim of this project is to examine the return characteristics of this stock index portfolio.

Collect the closing daily prices of the 3 stock indices for the past 10 years from Datastream. To summarise the data:

* Provide the names of the stock indices you have chosen to hold in your portfolio, with their DataStream IDs.
* In the Appendix, plot the time series of the prices for the 3 stock indices.

Answer ALL of the following questions:

1. Choose an in-sample period and estimate the best-fit time series model for the mean and variance process for your stock index portfolio returns. Carefully discuss the procedure you have adopted to obtain the best model and interpret your results. You can compare your modelling results with relevant academic research articles.

(20 marks)

1. Perform out-of-sample forecasting of your index portfolio returns:

* Using the best mean and variance model specifications obtained from Question 1, forecast the mean and the variance process.
* Explain how you have produced the out-of-sample mean and variance forecasts and what assumptions you have made.
* As an illustration, show mathematically how the forecasts are calculated for a few steps ahead and compare it with the forecasts generated by Eviews.

(20 marks)

1. Evaluate the forecast performance of your best mean and variance model against a naïve benchmark model (such as the random walk). Use appropriate forecast evaluation measures to assess the accuracy of your mean and variance forecasts. Interpret the significance of your results from the perspective of a portfolio manager who hold stock indices.

(10 marks)

**Overall word limit: 4500**