



# University of Essex

## SUPPLEMENTARY COURSEWORK 2 QUESTION PAPER

**University of Essex**  
**BSc Banking and Finance**

Module: BE333 (Empirical Finance)

Module Lecturers: Richa Gupta

### **Learning outcomes and pass attainment level:**

On completion of the course of study, students should be able to:

1. Demonstrate an understanding of the importance of economic and financial data and the methods of analysis involved in the building and testing of linear regression models and time series models
2. Perform appropriate statistical tests and analysis, interpret the outcomes, and be aware of the strengths and limitations of the approach adopted in the areas of regression and time series analysis.
3. Demonstrate skills in problem analysis

The coursework option consists of data manipulation and estimation in Eviews. There is no lower word limit, your answers need in general to be brief and to the point.

In your answers to the questions below, you should present your Eviews equation estimation output as it would be in published academic papers. (Examine several such papers, the approaches to presentation are fairly standard.) **Raw Eviews regression output should be included only in an Appendix.** You should also include the studies/books you have utilised in your answers in a “References” section.

Your task is to utilize the data provided and attempt the following.

- i. Form a group of up to 2-3 students.
- ii. Go through the Eview manual and tutorials to understand how to manipulate data and generate results using the software.
- iii. Submit your group work in word document, in font 12 and clearly typed written in Times New Roman font.
- iv. Referencing and citations should be clearly listed in the bibliography to prevent plagiarism.
- v. Cover page with the names and student IDs of all students within the group clearly stated.

vi. Answer the questions.

Open the file given to you by the school. This file contains weekly adjusted closing prices for Citibank stock, and S&P 500, an exchange-traded fund that has identical composition to the S&P 500 index, from 1/1/2001 to 7/9/2021.

Start Eviews and create a new Eviews workfile using the “Dated – regular frequency” option. Import your Excel data into Eviews and rename your two price variables as follows:

Citibank Adj Closing price → eviews variable name: *ct*

SPY Adj Closing price → eviews variable name: *sp*

**Question 1) (15 points)** Construct the weekly log return series, *ctr* and *spr*, for the two securities in Eviews. On these two return series only (not prices), report descriptive statistics using Eviews’ Descriptive Statistics functionality. As stated above, these statistics should be in a nicely formatted table within the main text, with Eviews output in the Appendix as well. Briefly comment on these statistics. Remember that you are looking at weekly returns over a period of close to 17 years, so you should take the perspective of a long-run stock investor and utilise these statistics to comment on how these two securities have performed over this period.

**Question 2) (25 points)** Estimate the following model using OLS in Eviews:

$$ctr_t = \alpha + \beta * spr_t + \varepsilon_t$$

Comment on your regression output. Test for statistical significance of the coefficients. Separately, using a one-sided test at 1% level of significance, state whether you are able to accept/reject the null hypothesis that Citibank stock is neutral or defensive, i.e. the null and alternative hypotheses are:

$$H_0: \beta \leq 1$$

$$H_1: \beta > 1$$

**Question 3) (20 points)** We know that Citibank, along with almost all other mega banks globally, was severely affected by the 2008 financial crisis. Since quite a few of these mega banks were on the edge of insolvency in the 2007-2009 timeframe, stock market investors paid special attention to how these banks’ stocks did during and after the crisis. Moreover, any news of major economic action such as emergency government aid or central bank intervention led to large gyrations in these banks’ stock prices. So

what was once a boring, relatively quiet industry prior to the crisis became one of the most volatile ones during and after the crisis. Using our dataset, we will now check to see if Citibank's stock beta underwent a structural shift as a result of the crisis.

Create the dummy variable *crisis* using the following command on your Eviews command line:

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genr crisis=@year>=2007
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We are thereby assuming that 2007 and beyond is the crisis and post-crisis period. Now estimate the following specification:

$$ctr_t = \alpha + \beta * spr_t + \lambda_1 * crisis_t + \lambda_2 * spr_t * crisis_t + \varepsilon_t$$

Present and comment on your output. Specifically, test the null hypothesis that there has been no structural break due to the financial crisis in the relationship between Citibank stock's return and the market return using an F-test and level of significance of 1%. Is the change in Citibank's stock beta after the crisis consistent with the narrative given in the paragraph at the beginning of this question? Briefly comment.

**Question 4) (15 points)** We will now examine whether the structural break you detected in Question 3 could be due to the nature of the relationship between Citibank return and market return being in fact *non-linear*.

Redo the OLS regression in Question 2. Using Eviews' built-in Ramsey RESET test (use **2** as the number of fitted terms), check to see if a non-linear specification could be more appropriate in this case by interpreting the outcome of the RESET test.

**Question 5) (10 points)** Estimate the following specification:

$$ctr_t = \alpha + \beta * spr_t + \delta * spr_t^2 + \gamma * spr_t^3 + \varepsilon_t$$

Comment on the R-square of the regression, comparing it against what you got in the regressions in Question 1 and Question 3. Finally, using the parameter estimates from your final regression above, graph the prediction curve using Excel, as we did in our RESET test lab. Briefly comment on the non-linearity that you are observing in this graph, how do Citibank returns appear to be reacting to market movements in this sample period?

**Question 6) (15 points)**

'Given that the objective of any econometric modelling exercise is to find the model that most closely 'fits' the data, then adding more lags to an ARMA model will almost invariably lead to a better fit. Therefore a large model is best because it will fit the data more closely.'

Comment on the validity (or otherwise) of this statement.