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1. Econometrics complies with the following scientific methodology:

(i) To carefully formulate a question that interests you. For instance, you can try to test the effect of government policy or the outcome of certain medical treatment, or you can try some other aspect of economic theory.

(ii) If the goal is to test a well known economic theory, you should be able to construct a formal economic model. An economic model is constructed from mathematical equations that describe a series of relationships.

(iii) Lay out the econometric model. The variables used will be determined by both economic theory and the availability of data.

(iv) Estimate the model: that is, calculate relying on certain econometric method (e.g. least squares).

(v) Assess the results. This involves hypothesis testing, check how robust your results are, make predictions, etc.

2.

(a) The expected sign of  $\alpha_1$  is negative. As the price goes up, it is expected that the demand for the product should be lower (only if we are dealing with "normal" goods)

(b) The coefficient  $\alpha_0$  indicates the quantity demanded, **on average**, of the product when the price is zero. The coefficient  $\alpha_1$  indicates in how many units the quantity demanded for the product is changed, when there is a unit change in its price.

(c)  $u_i$  is the error term of the econometric model. Here we include all factors affecting the dependent variable (in this case, the quantity demanded) which are not among the independent variables. It mainly includes: intrinsic randomness, measurement errors and / or omitted variables.

3.

$$d_i = \alpha_0 + \alpha_1 \text{ price of coffee}_i + \alpha_2 \text{ price of tea}_i + u_i$$

(a) The subscript  $i$  represents individuals in the sample, in this case, the 1000 companies. The dependent variable is the quantity demanded for coffee. The independent variables are the prices of coffee and tea.

(b) It is expected that  $\alpha_1 < 0$  and  $\alpha_2 > 0$ . For higher coffee prices, it is expected that the demand for coffee should be smaller. For a higher price of tea, it is expected that the demand for coffee should be larger. This is because we assume that tea is a substitute for coffee.

(c) Cross-sectional data.

4. The interpretation of the coefficients in both models is similar to the previous questions. The univariate model will have only one independent variable and the multivariate model will

have two or more. The justification for each one depends on what you are modeling. The error term will collect different information on each case, since the first model does not include one of the variables included in the second. If the added variable is relevant, then the multivariate model is better; the univariate model may reflect a wrong relationship between the dependent and independent variable, since its coefficient will be biased (some of the relevant effects will be now included in the error term, and this will have an impact on the explanation of the  $y$ 's, which goes counter to the basic hypotheses of the CLRM).