MPE_QUAM Assessment, spring 2019

Name:

Student's university number (UČO):

Rubric: Answer all questions in a maximum of 2000 words. There are 180 marks in total (90 marks part 1 + 90 marks part 2).

PART 1

1) Briefly outline what is a demand function and what are the two key determinants of demand for a good, ignoring for now the special features of aggregate transport demand models. What does economic theory say about the direction of relationships between demand and the two key detriments?

[10 marks]

2) Why do we model transport demand? Which transport stakeholders utilise demand forecasts and why?

[10 marks]

3) The "price" or user cost of transport in an aggregate demand model is complex. Using the example of rail demand between station pairs, discuss and prioritise the various monetary and non-monetary aspects of the user costs.

[15 marks]

4) Demand forecasts are always wrong! Discuss the sources of error in demand forecasts and suggest ways that analysts can inform decision makers as to the extent of uncertainty in their forecasts.

[15 marks]

5) Below is a simple demand model for rail travel using time series data for one country.

Dependent Variable: LOG(Passenger Km Rail)

	Coefficient	Std. Error	t-Statistic	Prob.
Constant	-4.366	0.613	-7.125	0.000
LOG(Price Rail)	-0.727	0.146	-4.994	0.000
LOG(Household Income)	0.858	0.089	9.637	0.000

a) What is the elasticity of demand with respect to price and with respect to income? Do these match your expectations and why? What is the impact of a 1% increase in price on demand?

[10 marks]

b) Given the statistical output above can you say that there is statistical evidence that the price of rail does influence the quantity of rail km demanded i.e. it is statistically significant? Justify your answer by appealing to the output above.

[10 marks]

6) A colleague suggests the amended specification below, by including the previous year's rail demand as a further explanatory variable.

Dependent Variable: LOG(Passenger Km Rail)

	Coefficient	Std. Error	t-Statistic	Prob.
Constant	-2.258	0.936	-2.413	0.023
LOG(Price Rail)	-0.385	0.241	-1.594	0.123
LOG(Household Income)	0.858	0.089	9.637	0.000
LOG(Passenger Km Rail lagged one Year)	0.584	0.172	3.402	0.002

What is the logic for this change? Does the statistical output support the change? Is there insight for policy makers from including this additional variable? 20 Marks

PART 2

7) State the properties that a cost function should adhere to from a theoretical perspective, and give a brief intuition as to why these properties are required.

[15 marks]

8) You are faced with the following cost function:

$$Ln\ (Cost) = 10 + 0.9\ Ln\ (Track\text{-}km) + 0.2\ Ln\ (Train\text{-}km/Track\text{-}km)$$

What does this function imply concerning the extent of returns to scale and density?

[7 marks]

9) You are faced with the following cost function:

$$Ln\ (Cost) = 10 + 0.4\ Ln\ (Train\text{-}km) + 0.2\ [Ln\ (Train\text{-}km)]^2$$

Show the formula for the elasticity of cost with respect to train-km and compute this elasticity for the output range (train-km) 1 to 10. What does this imply about returns to scale (that is how costs change with the single output, in this case, train-km) over the range of output 1 to 10?

[18 marks]

10) You are given the following cost function:

Ln (Cost) = 10 + 0.4 Ln (Train-km) + 0.2 Ln (Labour Price) + 0.65 Ln (Capital Price)

a. What is wrong with the above cost function in terms of its adherence to the principles of economic theory? Give an example of how the coefficients on the input prices could be changed to bring the cost function into line with economic theory?

[10 marks]

11) You are faced with benchmarking 20 railways for one year using the Corrected Ordinary Least Squares (COLS) method. A colleague has estimated a cost frontier by Ordinary Least Squares and provided you with the residuals from the regression in the supplied spreadsheet (which has been provided to you as part of this assessment – see file "COLS Question 7 spreadsheet.xlsx" in IS).

a. Outline briefly the approach of the COLS method to compute an estimate of economic (cost) efficiency for each railway. You should illustrate the method using a graph.

[10 marks]

b. Using the spreadsheet calculate the average efficiency of the 20 railways using the COLS method.

[10 marks]

c. Do you think the results are reasonable and do they rely on one or two extreme observations? You may wish to use the percentile analysis in the spreadsheet as a way to understand the influence of extreme observations.

[10 marks]

d. Do you think you should consider an alternative approach to shift the OLS line? If so what do you propose? Think about what adjustments economic regulators make to ensure robustness of the analysis.

[10 marks]