

Economic Evaluation

Graded satisfactory (4% of course grade) or unsatisfactory (0% of grade).

Satisfactory means a serious attempt made to answer the questions. Your answers need not be lengthy. No credit for late assignments. Academic honesty is required.

**Stata is used in questions 4, 5, 6 and 7 using data in file ass4s25.dta.**

1. Consider the following screening test procedure for cancer applied to 100,000 people of whom 1,000 have cancer. The test is on a strip, with the first test on the strip costing \$20 (including fixed costs of the strip) and subsequent tests on the strip costing \$5. Each test on the strip picks up 80% of cancer cases, and additionally 10% of the time falsely diagnoses cancer. Detection of cancer (rightly or wrongly) leads to a further exact diagnostic test that costs \$200. Correct early detection of cancer by the test is valued at \$20,000.

(a) Is the first test worthwhile? Explain your answer.

(b) Is a second test, performed at the same time as the first test (at a cost of \$5), worthwhile? Explain your answer.

2.(a) What is the advantage, if any, of cost benefit analysis over cost-effectiveness analysis?

(b) What is the advantage, if any, of cost-effectiveness analysis over cost benefit analysis?

(c) What is the difference, if any, between cost-effectiveness analysis for life-years saved and QALY's?

3. The World Health Organization (WHO) is considering sending in teams of experts to deal with an outbreak of a disease in a distant country. Sending more teams will prevent more fatalities, and they estimate the following effectiveness:

Number of teams	0	1	2	3	4	5	6	7	8	9	10
Deaths	1200	500	200	100	60	40	30	25	22	20	20

It costs \$25,000 for each team sent.

(a) Prepare a table with columns: team size, total cost, total lives saved, average cost per life saved, marginal cost, marginal lives saved (per team), marginal cost per life saved.

(b) Suppose saving a life is valued at \$4,000. Plot marginal cost per life saved and marginal benefit per life saved against the total number of lives saved. What is the optimal team size?

(c) Suppose saving a life is valued at \$10,000. What is the optimal number of teams?

(d) What number of teams gives the most “bang for the buck”, i.e. the largest number of lives saved per dollar spent.

4. We use data in file **ass4s25.dta**, from the Rand Health Insurance Experiment, to estimate the demand for health care.

There are 1,314 observations.

We consider individuals in the first year of the experiment who were in one of five plans

outpatient = outpatient medical spending in 2011 dollars (this excludes inpatient hospital)

age = age in years

bad\_health = 1 if health is bad and = 0 otherwise

fam\_income = Family annual income in 1984 dollars

plan = 1 if 0% coinsurance, 2 if 25%, 4 if 50%, 5 if 95%, 6 if individual deductible

coins0 = 1 if have 0% coinsurance (free care) and = 0 otherwise

coins25 = 1 if have 25% coinsurance and = 0 otherwise

coins50 = 1 if have 50% coinsurance and = 0 otherwise

coins95 = 1 if have 95% coinsurance and = 0 otherwise

coinsindiv = 1 if on the individual deductible plan and = 0 otherwise

plan = 1 if 0% coinsurance, 2 if 25%, 4 if 50%, 5 if 95%, 6 if individual deductible.

**We will estimate models in levels and in logs. This will require transforming data, and dealing with zero values and missing values.**

(a) Some data have zero values or missing values (coded as .) To see this give commands

**count if outpatient == .**

**count if outpatient == 0**

**count if age == .**

**count if bad\_health == .**

**count if fam\_inc == .**

**count if fam\_inc == 0**

(b) For the logarithm of outpatient and of income we do the following to avoid taking log of zero

**gen lnout = ln(outpatient + 1)**

**gen lnincome = ln(fam\_income + 1)**

(c) To estimate all models with the same data give the following command

**drop if age == . | fam\_income == . | bad\_health == .**

How many observations were lost?

(d) To verify that we now have no missing observations on the data we will use later give command

**sum outpatient lnout i.plan age bad\_health fam\_income lnincome**

**5. Use the final data obtained after making the changes in question 4.**

(a) Estimate a regression model with just indicator variables for insurance plan. This can be done using the following command

**regress outpatient i.plan, vce(robust)**

(b) Which insurance category was omitted?

(c) Provide an interpretation of the coefficient for the 25% plan.

(d) What was the difference in average spending across the 50% and 95/100% plans?

(e) Are the different insurance plans jointly statistically significant at level 0.05?

**6. Continue to use the final data obtained after making the changes in question 4.**

- (a) Now add as regressors **age bad\_health fam\_income**
- (b) Do these additional variables have the expected sign? Explain your answer.
- (c) Are they individually statistically significant at level 0.05?
- (d) Are they jointly statistically significant at level 0.05?

Give command **test age bad\_health fam\_income**

(e) Because the insurance plans were randomly assigned they should be uncorrelated with other variables in the regression. In that case the coefficients of the plan variables should not change much going from part (a) to part (b). Does this seem to be the case?

(f) We can also directly look at the correlations. Give command **correlate coins\* age bad\_health fam\_inc**

What have we learnt?

**7. Continue to use the final data obtained after making the changes in question 4.**

Now estimate the regression model with dependent variable in logs and with income, in levels or in logs, as a regressor.

For models with logs see **tr132statistics.pdf** topic 12 Regression in logs.

- (a) Give command **regress lnout i.plan age bad\_health fam\_income, vce(robust)**
- (b) Provide an interpretation of the coefficient for the 50% plan.
- (c) Provide an interpretation of the coefficient of **fam\_income**.
- (d) Now estimate the regression model in logs and with log income as a regressor.  
**regress lnout i.plan age bad\_health lnincome, vce(robust)**

(e) What is the income elasticity of demand for outpatient spending?  
Is outpatient health care a normal good?

(f) What, aside from insurance plan, appears to be the biggest determinant of outpatient spending?

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**Extra question not an assignment but relevant for exam**

**8.(a)** Plot the production possibility frontier between home goods (Z) and health (H) similar to the figures in the course notes E.3.

(b) Suppose new medical technology makes it much easier to produce health for a given amount of money spent on health care. On a new production possibility frontier diagram show the effect of this on the level of health and on goods consumption.