

Health Insurance

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

Satisfactory means a serious attempt made to answer at least 80% of the questions. Your answers need not be lengthy. No credit for late assignments. Academic honesty is required.

Post answers as a single pdf at Canvas / Assignments. Include key Stata output with answers including log file open and close. For how to include key Stata output see [Canvas/Files/Homeworks/Example_Format_for_Assignment_Answers.pdf](#)

QUESTION 8 ANALYZES DATA USING STATA and data in file ass2s25.dta

1. For each of the following types of health insurance give a brief description, pointing out the key features, especially those that are likely to reduce health care consumption.

- (a)** FFS
- (b)** PPO
- (c)** HMO
- (d)** HDHP

2. Arnold believes he faces health costs in the current year of either \$10,000 with probability 0.7 or costs of \$20,000 with probability 0.3.

- (a)** Find the mean and standard deviation of the costs that Arnold faces.
- (b)** Give a definition of risk-aversion.
- (c)** If Arnold is risk-averse, will Arnold purchase an insurance policy that completely covers his losses if the annual premium of the policy is \$13,000? Explain your answer.

3.(a) The company that offered this insurance policy insures 2,500 people with exactly the same distribution of health losses as that of Arnold. Calculate the variability that the insurance company faces in the average claim per individual insured. (Hint: use your answer in question 2 part (a)).

- (b)** It can be shown that 95 percent of the time the average claim size will equal the expected average claim plus or minus 1.96 times the standard deviation of the average claim. Give this range for the insurance company considered in part (a).
- (c)** Is the insurance company taking a large risk in selling this insurance policy?

4. An insurance company has determined that for a group of 10,000 people that it insures the expected loss per person covered is \$10,000 per year. It sells the insurance policy for \$11,500 per year.

- (a)** What is the actuarially fair premium for this policy?
- (b)** What is the loading factor for this insurance policy?
- (c)** Is the loading factor the same as the profit the insurance company makes on the policy? Explain.

5. Martin's utility (U) depends on his income (w) in the following way.

w	0	1	2	3	4	5	6	7	8	9	10
U(w)	0	19	36	51	64	75	84	91	96	99	100

His usual job has income of 10, but he believes there is a 20% chance he'll lose his job and have an income of zero. Thus he has income of 10 (and utility of 100) with probability 0.80 and income of 0 units (and utility of 0) with probability 0.20.

(a) Calculate Martin's expected utility. (Note: expected utility not expected income).

(b) Plot Martin's utility as a function of income.

(c) Now suppose Martin could purchase insurance that fully replaced his income if he lost his job, so he is guaranteed income of 10 units in either state of the world. Show that the actuarially fair premium for this insurance policy is 2 units.

(d) Suppose Martin could purchase this insurance for 3 units, leading to a net certain income of 7 units. Would he be better off by purchasing this insurance? Explain your answer.

6.(a) On an appropriate diagram show the welfare loss due to complete health insurance compared to no health insurance.

(b) Does this welfare loss necessarily mean that society is worse off with full health insurance compared to no health insurance? Explain your answer.

7. Suppose a random experiment finds that average outpatient spending in a 25% coinsurance plan is \$2,400 and is \$3,000 under a free plan.

Compute the arc price elasticity of demand. (See C.5 in the course slides).

For the statistics methods used in the next question see section 10 of tr132statistics.pdf, posted at the Canvas course site under Files / Statistics for 132.

8. Use data in file **ass2s25.dta**, from the Rand Health Insurance Experiment.

We consider individuals 25 or older in the experiment's second year who were in one of 5 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

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.

(a) Give command **regress outpatient coins0 coins25 coins50 coins95 coinsindiv, noconstant**

(b) Compare your answers to **bysort plan: sum outpatient** What have you learnt?

(c) Give command **regress outpatient coins25 coins50 coins95 coinsindiv, vce(robust)**

Show that, for example, the coefficient on **coins25** gives the differences in means between the 25% plan and the free plan (which is omitted from the regression).

(d) Give command **test coins25 coins50 coins95 coinsindiv** immediately after the regression in part (c). What is this testing? What do you conclude at significance level 0.05?