Econ 132 Spring 2023   FIRST MIDTERM EXAM (A): SOLUTIONS   Cameron

Version A

1.(a)(i) Either is possible. A risk averse assurance wants to reduce risk (lower coinsurance), but must balance this against the cost of doing so (the price of the insurance policy).
(ii) Covered California.

(b)(i) Carna receives from insurance $0.8 \times (8000 – 5000) = 0.8 \times 3000 = \underline{\$2,400}$.
(ii) This is an example of fee-for-service or indemnity insurance.

(c) $t = (0.90 – 0.72)/\text{sqrt}(0.06^2 + 0.08^2) = 0.18/\text{sqrt}(0.01) = 0.18/0.1 = 1.80$.
Do not Reject H0: means are equal, as $|\,t\,| < 1.96$.
Conclude that the difference is not statistically significant at significance level 5 percent.

2.(a) True   By around five years.

(b) False   U.S. spends much more but given this spending has lower life expectancy and greater infant mortality.

(c) False   In order it is hospitals, physician, pharmaceutical.

(d) True   It is entirely federal funded. In theory funding is from a joint employer / employee and premia for parts B, C, D. In practice also general revenue due to a shortfall.

(e) False   HDHP can be FFS, HMO, PPO or POS.

(f) True   It is around $20,000 per year.

3.(a) Mean $E[X] = 0.8 \times 10 + 0.2 \times 60 = 8 + 12 = \underline{20}$.
Variance $V[X] = 0.8 \times (10–20)^2 + 0.2 \times (60–20)^2 = 0.8 \times 100 + 0.2 \times 1600 = 400$.
St. dev. $\text{St.dev.}[X] = \text{sqrt}(400) = 20$
For average of 100 individuals, standard deviation of average loss $= 20 / \text{sqrt}(100) = 20 / 10 = 2$.
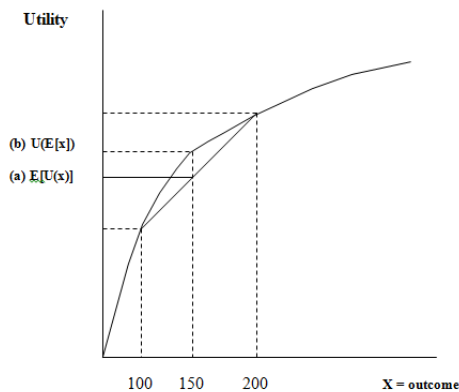95% confidence interval for average loss is $20 +/- 2 \times 2 = (16, 24)$.

(b) Elasticity $= \dfrac{(2000 - 3000) / [(3000 + 2000)/2]}{-(100 – 50) / [(100+50)/2]} = \dfrac{1000/2500}{50/75} = \dfrac{0.4}{2/3} = 0.6$.

(c) Georges utility function is given:

- Expected utility $E[U(x)] = 0.5 \times U(100) + 0.5 \times U(200)$

- Utility of expected outcome $U(E[x]) = U(0.5 \times 100 + 0.5 \times 200) = U(150)$

4.(a) We move from (Q_100, P_100) to (Q_50, P_50).

(i) Change in health expenditure is C + B + F   (equals P_100 × (Q_50 – Q_100)).
(ii) Moral hazard loss is C   (difference between societal cost (P_100) and maximum willing to pay (given by the demand curve).

(b)(i) By randomly assigning people to the different insurance plans (so no choice of plan)..
(ii) The 25% plan (with lower coinsurance).

(c)(i) True. (Smaller price elasticity, less responsive to prices, so less effect of
        increased coinsurance which increases prices).
 (ii) True. (This was the motivation for Paully writing this article)..

5.(i) The 95% plan is the case where coins==1 which is group 1.
From output for Group 1 a 95% confidence interval for mean spending is (616.12, 807.52).

(ii) This is given in the output for diff. A 95% confidence interval for the mean difference in spending between the two plans is (485.45, 820.00).

(iii) Yes. The test statistic is $t=7.65$ with $p=0.000$ from the middle test output. Since $p < 0.01$ we reject the null hypothesis of no difference between the two plans at level 0.01.

(iv) The intercept is 1364.55 and the slope is -652.73.
Reason regression is $y = a + b \times d$.
When $d = 0$ this yields $y = a$ so a is mean spending on group 0 plan which equals 1364.55.
When $d = 1$ this yields $y = a + b$ so $a + b$ is mean spending on group 1 plan which equals 817.
Then by subtraction the slope $b = (a + b) – a = 711.82 – 1364.55 \,{-}{=}\, 652.73$.

(v) Yes. It is 1138.975 from the mean of combined with $n = 2364$ (=1547+817) observations.

(vi) NO. (It is asymmetrically distributed – right skewed as most people have lowish spending and some have extremely high spending).

Multiple choice

Question	1	2	3	4	5	6
Answer	d	b	c	c	c	b

Scores out of 36   Curve (Indication only: Course Grade is based on Total Score!)

75th percentile 27.5 (76 %)   (Ave GPA 2.75 on this curve)   C+   23.5 and above
Median   25.5 (71 %)   A   29 and above C   22 and above
25th percentile 23   (64 %)   A-   27 and above   C-   20.5 and above
                                   B+   26.5 and above   D+   19 and above
                                   B   25.5 and above   D   18 and above
                                   B-   25 and above   D-   17 and above