Problem Set - 1

Aravind K Mannarswamy

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1 RAND study for measuring price elasticities of demand

According to the course notes, its part of the 'internal validity'. The randomization attempts to remove any bias in the study leading to demand curves that are easy to interpret. If the participants were to choose on their own, they would have chosen a plan that which suits them the best and so measurements of different groups would have been confounded with their choices making it difficult to study from a 'cetirus paribus' condition.

2 RAND study - elasticity of demand for all healthcare

The study clearly shows that the demand of the healthcare decreases with the increase in price. However, the study concluded that the change in price is inelastic(page 20 of the text). Combining these two pieces of information, if the price of healthcare increases by 10%, the quantity of healthcare demanded will likely decrease but it also depends on the type of healthcare. However, the overall spending on healthcare may or may not fall depending on the type.

3 Non-profit hospitals and supplier induced demand

It is difficult to answer this question. But based on UPENN spublication(source: https://ldi.upenn.edu/sumr-blog/understanding-goals-nonprofit-hospitals), it can be inferred that the non-profit physicians could potentially induce more demand than their for-profit counter parts. I am explicitly taking this out of the articles use of the term 'maximizing perquisites'. I do say this is difficult because of the other two aspects given in the text book, namely the cost of guilt and the professional reputation.

4 Information problem and consumer preferences

As such, the term non-profit appears to be synonymous with lower cost of coverage. The term for-profit may not necassarily attract charitable donations which may not be as difficult for non-profit hospitals. Since non-profit entities, being tax exempt and are not supposed to make profits, they may charge the same physician cost but transfer all the revenue to the employees and stakeholders instead of the equity owners like in the case of for-profit hospitals.

5 Supply and demand curve - Assuming competitive markets

5.1 Reducing the cost of producing X-rays

This should result in the increase of demand. It should mean that more X-rays would be taken for diagnosis that may not have necessarily needed one in the past.

5.2 Increased graduations of new doctors

This will result in the decrease in healthcare costs due to the supply of more medical graduates to the labor supply pool.

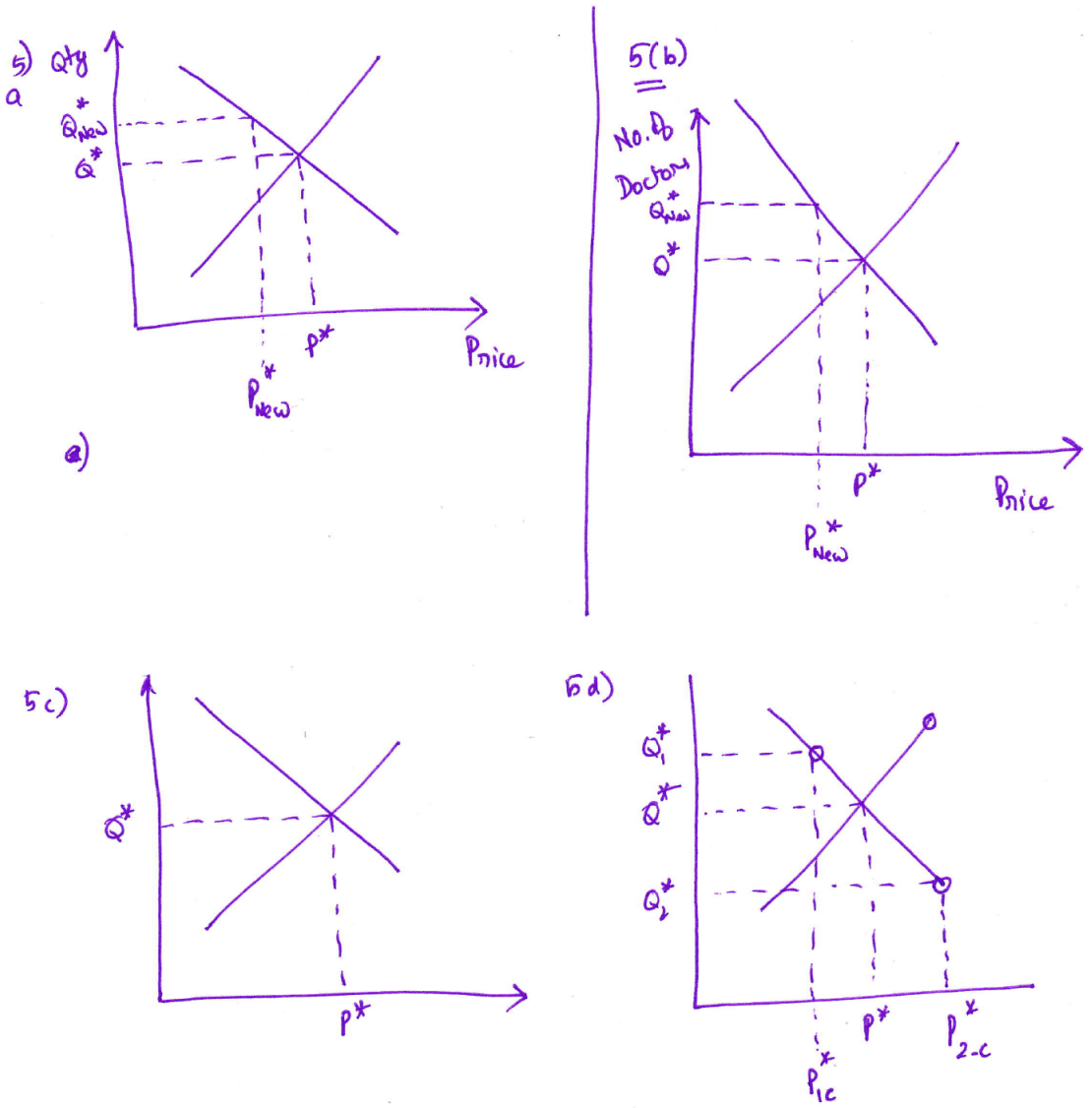


Figure 1: Supply and Demand curves for problem 5

5.3 Elimination of smoking

This one is tricky to answer. In the short run, the number of people who will go to hospital should decrease which in turn will cause the hospitals to charge them more for coping up with the fixed costs. In the long run, this may create a shortage of qualified doctors who can deal with ailments associated with smoking.

5.4 Price ceiling placed on physician fees in the market

This one depends on where the price ceiling is located, if it is more or less than the existing optimal price. If it is higher than the current optimal price, then there shouldn't ne any impact to the demand, however, of that price moves below the current offering price, it will likely increase the demand.

For all these four questions above, we make the most simplest of assumptions and so it is likely that it is not going to reflect reality.

6 Fun with IRR

Table 1: Salary by Profession

Occupation	Period_0	Period_1	Period_2	Period_3
Ophthalmologist	-5	1	10	12
Accountant	2	3	4	5
Starving_Artist	1	1	1	1
Sports_Superstar	15	0	0	0

6.1 Assuming a discount factor of 0.95 - Interpret this assumption

A dollar made today is worth 1 but the same made a year from now is worth 0.95 while that of the following year is worth today 0.95^2 and in general for 'n' years from now is worth 0.95^n.

6.2 IRR

The corresponding interest rate is estimated by solving $1/(1+r) = 0.95$ and $r = 5.2632\%$

6.3 NPV - Ophthalmologist or Accountant

Table 2: NPV

Occupation	Period_0	Period_1	Period_2	Period_3	NPV
Ophthalmologist	-5	0.95	9.03	10.29	15.27
Accountant	2	2.85	3.61	4.29	12.75
Starving_Artist	1	0.95	0.90	0.86	3.71
Sports_Superstar	15	0.00	0.00	0.00	15.00

Choose Opthalmologist over being an accountant for higher NPV.

6.4 IRR - Ophthalmologist or Accountant

I would expect the accountant to have higher IRR.

6.5 Discount factor = 0.6

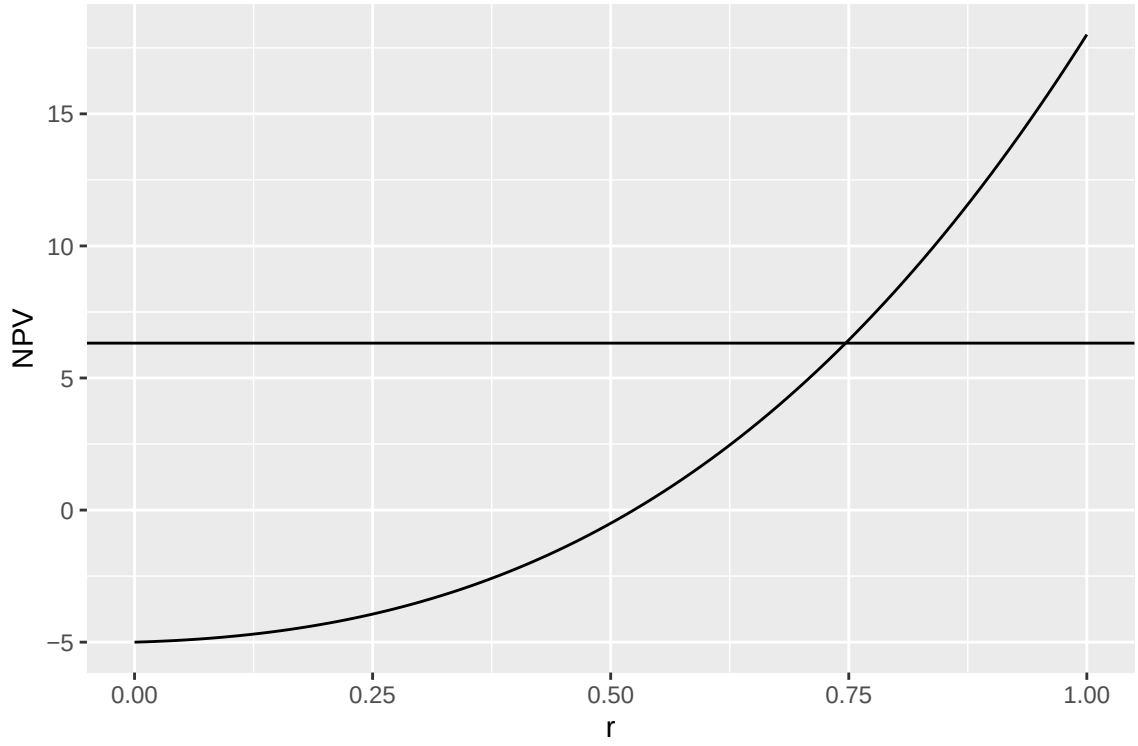
interest rate = 1/0.6 - 1 = 66.67%

Table 3: NPV for discount rate = 0.6

Occupation	Period_0	Period_1	Period_2	Period_3	NPV
Ophthalmologist	-5	0.6	3.60	2.59	1.79
Accountant	2	1.8	1.44	1.08	6.32
Starving_Artist	1	0.6	0.36	0.22	2.18
Sports_Superstar	15	0.0	0.00	0.00	15.00

6.6 Opthalmologist as opposed to an accountant

Using the discount rate of 0.6, the accountants NPV is 6.32. Lets look at the solution graphically as below.



At about 0.7467(solved separately using excel), the NPV of both the ophthalmologist and the accountant will be the same at 6.32.

7 Medical arms race

Table 4: Different Payout Scenarios

A	B	A_payout	B_payout
0	0	0	0
1	0	1800	-300
0	1	-300	1800
1	1	800	800

7.1 Hospital - A's decision to buy

If hospital-B has already bought the machine, A should also buy the machine. Buying the machine will make A 800 richer while not buying it will make A 300 poorer. So A should buy the machine.

7.2 Hospital - A's optimal choice

If Hospital-B doesnt buy the machine, Hospital-A will be 1800 richer by buying the machine and therefore the optimal choice for A would be to buy the machine.

7.3 Payout matrix

Table 5: A

B	0	1
0	A = 0 & B = 0	A = 1800 & B = -300
1	A = -300 & B = 1800	A = 800 & B = 800

`0` refers to not purchasing of the equipment and `1` refers to purchasing the equipment.

7.4 Prisoner's Dilemma

Both the hospitals will buy the machine. The socially optimal outcome will not occur because that will leave the hospital that doesnt buy the machine, exposed to 300 in loss.

7.5 A and B shared owner

If the owner installs the new machine in one of the hospitals, the total expected profit is 1800 - 300 = 1500(for a 1000 investment). If the owner decides to install it in both, then the profit will be 800 + 800 = 1600(for a 2000 investmet which is worse than the first case). Ideally the owner will resort to buying this machine as an independent small lab where both the hospitals could use the same resource.

7.6 Is competition good

Yes, from a consumer perspective, hospital competition is good. A perfect competition should reslut in a net dead weight loss of zero. In other words, the supply will increase till it reaches the optimal price based on the demand and therefore it should drive down the healthcare cost.