Problem set 2:

Instructor: Tuukka Saarimaa

Teacher Assistant: Amin Mohazab

1-

a)

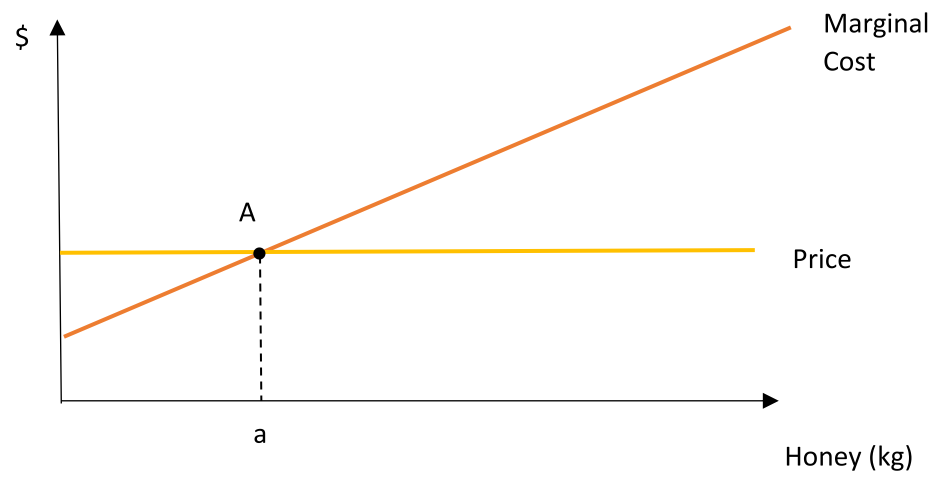

Figure 1

In this case, the firm will make the decisions privately and he will choose point A as the profit-maximizing point, where price is equal to the marginal cost. Moreover, He will produce a (kg) of honey at this point.

b)

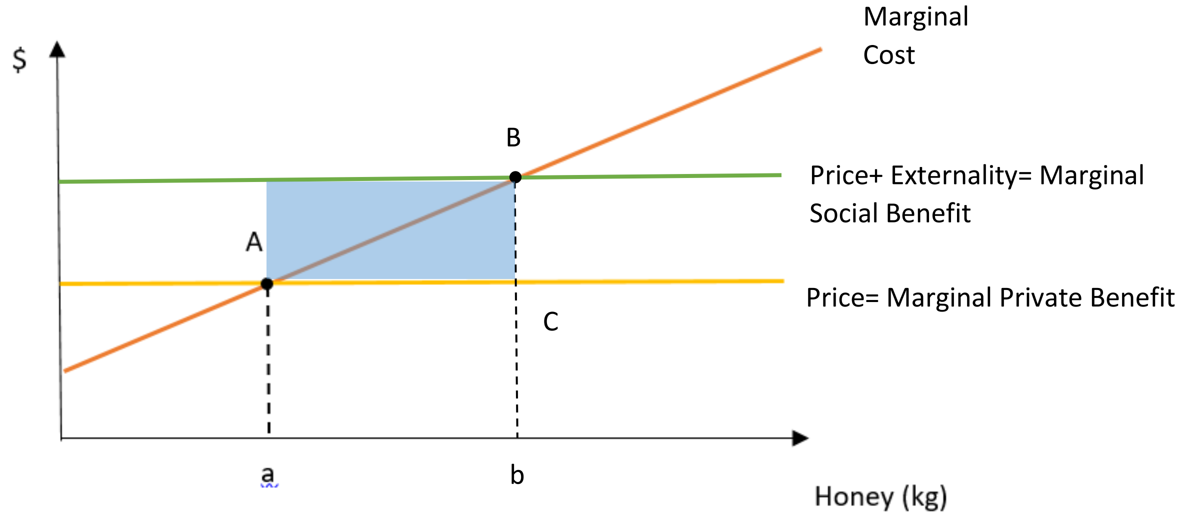

Figure 2

As honey production comes with a positive externality to the neighboring farmer, there is an additional benefit from the beekeeper's action to society as a whole. Hence, the social marginal benefit is above the price the beekeepers receive. The socially optimal outcome would be at point B.

c)
As it is obvious in Figure 2, the triangle ABC is the additional private cost that the Beekeeper will face if he wants to produce at point b. On the other hand, the neighboring farmer has a benefit equal to the blue rectangle at this point. As the blue rectangle is larger than the triangle ABC, It is possible for these two farmers to participate in the private bargaining to increase their profits.
There are many practical limits to bargaining:

- Impediments to collective action: Finding a good representative may not be a serious problem here, because the conflict is between two people not two groups of people.
- Missing Information: Calculating the exact cost and the exact amount of the positive externality that has been imposed (in here the exact amount of pollination).
- Enforcement: How can we determine whether the Beekeeper complied or not?
- Limited Funds: It may not be possible to the neighbor to pay the suitable amount at first.

d)

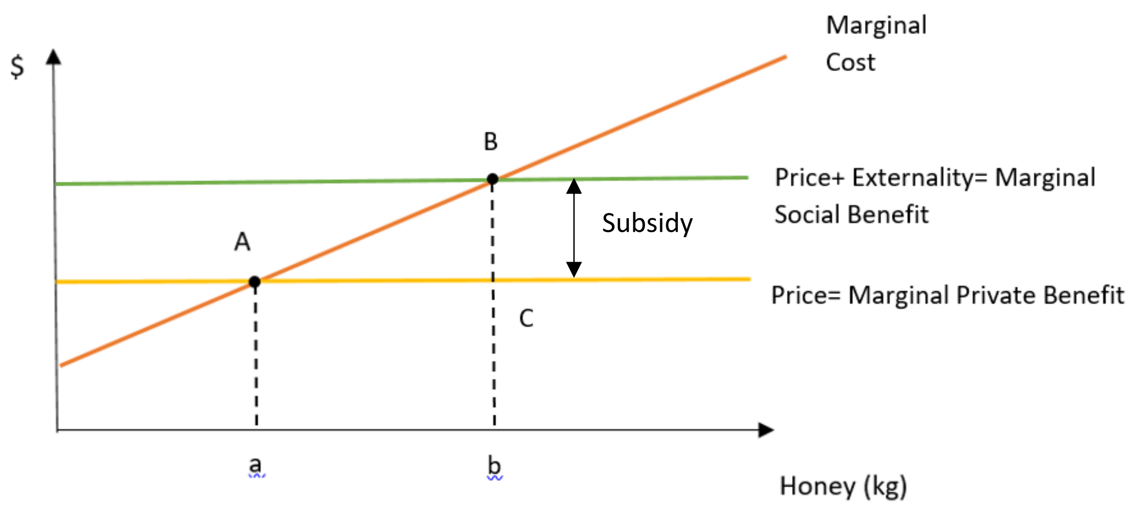

Figure 3

According to the Figure 3, by giving the firm the Pigouvian subsidy equal to the difference between the marginal private benefit and the marginal social benefit, the firm will produce at point B, which is pareto efficient.

The subsidy is paid by the government, so does not affect the cost of the farmer (assuming that the government does not tax the farmers to pay for the subsidy). Compared to the bargaining outcome, the farmer clearly benefits from this arrangement. The beekeeper incurs an additional cost from increasing output, which is offset by the subsidy. The distributional effects depend on how the government finances the subsidy, and whom it taxes.

2-

a. Rival: The capacity of the lecture room is limited. Non-Excludable: for public
b. Non-rival: everyone will hear it. Non-excludable: it is for everyone. (public good)
c. Rival: Limited capacity of the park. Non-Excludable: Everyone can use it
d. Rival: If I chop down a tree, I will restrict your options. Non-Excludable: Anyone can go to the forest and chop down a tree.
e. Rival: If I seat on a place, I will restrict your options to seat. Excludable: Only the people who payed for the play.
f. Rival: If I use a bicycle, I will make it unavailable for you. Excludable: These bicycles are not free.

3-

a. The maximum price that the buyers are willing to pay is the expected value of the car. In here, half of the cars are lemons and other half are good cars so the average price will be :

$$p = 0.5 * 10000 + 0.5 * 0 = 5000$$

b. The sellers value good cars at 8000 Euros, so they do not want to sell their cars at this price (5000 Euros).

c. In this market, the sellers of the good cars will sell their cars at the price of 8000 Euros or higher, and the sellers of the lemons will sell their cars at the price of 1 Euro or higher because they know that their cars are useless. On the other hand, we know that the buyers will not pay more than the expected amount of the cars in the market, which is 5000 euros. Consequently, the sellers of the good cars will leave the market because they refuse to sell their cars in price less than 8000 Euros, and it will resulted into the market failure.

d. If buyers were able to differentiate the good cars from the lemons, they would go to the sellers and bargain over the price and by the end of the day all of the good cars would be sold at the price somewhere between the true value and the price that buyers are willing to pay (5000 Euros).

e. They should somehow signal to the buyers that their cars are good cars, and this signal should be expensive to fake so that the other sellers cannot manipulate this signaling behavior. Many solutions have been proposed such as Extensive quality inspection, CARFAX (vehicle history report) or certified pre-owned programs that offer buyers guaranty of quality.

4-

a. $R = 2000 * 20 = 40000\ (£/year)$

where R is the annual total rent that the landowner receives.

b. $V = \frac{R}{1+0.05} + \frac{R}{(1+0.05)^2} + \cdots = \sum_{t=1}^{\infty} \frac{R}{(1+0.05)^t} \approx \frac{R}{0.05} = 40000 * \left(\frac{1}{0.05}\right) = 800{,}000$

c. $V' = \sum_{t=1}^{\infty} \frac{R-T}{(1+0.05)^t} \approx \frac{R}{0.05} - \frac{T}{0.05} = (40000 - 1000) * \left(\frac{1}{0.05}\right) = 780{,}000$

d. The landowner bears the total burden of the tax.

5-

a.

$$(w_1 - c_1)(1 + r) - c_2 = 0$$

Note: the amount of the consumption in here is equal to the saving from the first period and the return on that saving. In other words:

$$c_2 = (w_1 - c_1) + r * (w_1 - c_1) =$$
$$= saving\ from\ the\ first\ period + return\ on\ the\ saving\ from\ the\ first\ period$$

We can also write the intertemporal budget constraint as follows:

$$w_1 - c_1 = \frac{c_2}{1 + r} \Rightarrow w_1 = c_1 + \frac{c_2}{1 + r}$$

b.

Note: In here, we try to calculate the Net Present Value for the total amount of the tax that the players should pay.

Reminder: We calculate the Net Present Value as follows:

$$NPV = \sum_{t=1}^{n} \frac{R_t}{(1+i)^t}$$

$$Where:$$

$$R_t: Net\ cash\ inflow - outflow\ during\ a\ single\ period\ t$$

$$i: Discount\ rate\ or\ return\ that\ could\ be\ earned\ in\ alternative\ investments$$

$$t: Number\ of\ timer\ periods$$

Now we can calculate the total amount of the tax that each player pays. It is mentioned in the question that both wage and capital income are taxed. This means that in the first period players are going to pay tax over their wages and in the second period they are going to pay tax over their capital incomes (they do not receive wage in the second period and the only things they have in this period are their capitals, which is equal to their savings from the first period plus the return on those savings), so the amount of tax that Matti and Juuso pay are:

$$T_{Matti} = t.w_1 + \frac{t.(w_1 - c_1^M)}{(1+r)}.r = t.w_1 + t.(w_1 - c_1^M)\frac{r}{r+1}$$

$$T_{Juuso} = t.w_1 + \frac{t.\left(w_1 - c_1^J\right)}{(1+r)}.r = t.w_1 + t.\left(w_1 - c_1^J\right)\frac{r}{r+1}$$

Where in the first part we tax their wages and in the second part we tax their capital incomes (their incomes in the second period are equal to the return on their savings from the first period).

Since $c_1^M > c_1^J$ so

$$T_{matti} < T_{Juuso}$$

c.

Let's consider the budget constraint again:

$$w_1 = c_1 + \frac{c_2}{1+r}$$

Same as part b and Since the Consumption tax is proportional to the amount of the consumption:

$$T_{Matti} = t_c.c_1^M + t_c.\frac{c_2^M}{1+r} = t_c.w_1$$

$$T_{Juuso} = t_c.c_1^J + t_c.\frac{c_2^J}{1+r} = t_c.w_1$$

so $T_{Matti} = T_{Juuso}$

The main result here is that the amount of the income tax is higher for the person who saved more and spend less (in here Juuso). Consequently, Income tax penalizes savers and rewards spenders.