PS-3 Memo

May 2, 2019

Question 1

(a) The seller accepts only if $p > c$. So for a given price, the supply is all those houses with an opportunity cost below p. If $p \leq \underline{c}$ then there is no supply, and if $p \geq \bar{c}$, the supply is the whole unit of housing available. Since c is uniformly distributed on $(\underline{c}, \bar{c})$, the probability of this occurring $Pr(p > c)$, and the supply is the cumulative distribution function of c. Hence we have:

$$S(p) = \begin{cases} 0 \text{ if } p \leq c \\ \\ 1 \text{ if } p \geq c \\ \\ \frac{p-\underline{c}}{\Delta c} \text{ if } p \in (\underline{c}, \bar{c}) \end{cases}$$

(b) Similarly, the buyer would accept if $v > p$, then reasoning as before, we have:

$$D(p) = \begin{cases} 0 \text{ if } p \geq v \\ \\ 1 \text{ if } p \leq v \\ \\ \frac{\underline{v}-p}{\Delta v} \text{ if } p \in (\underline{v}, \bar{v}) \end{cases}$$

(c) It is possible that the equilibrium quantity is 0 or 1 (e.g. if $\underline{c} > \bar{v}$), but in the case where there is an "interior" equilibrium quantity, we have :

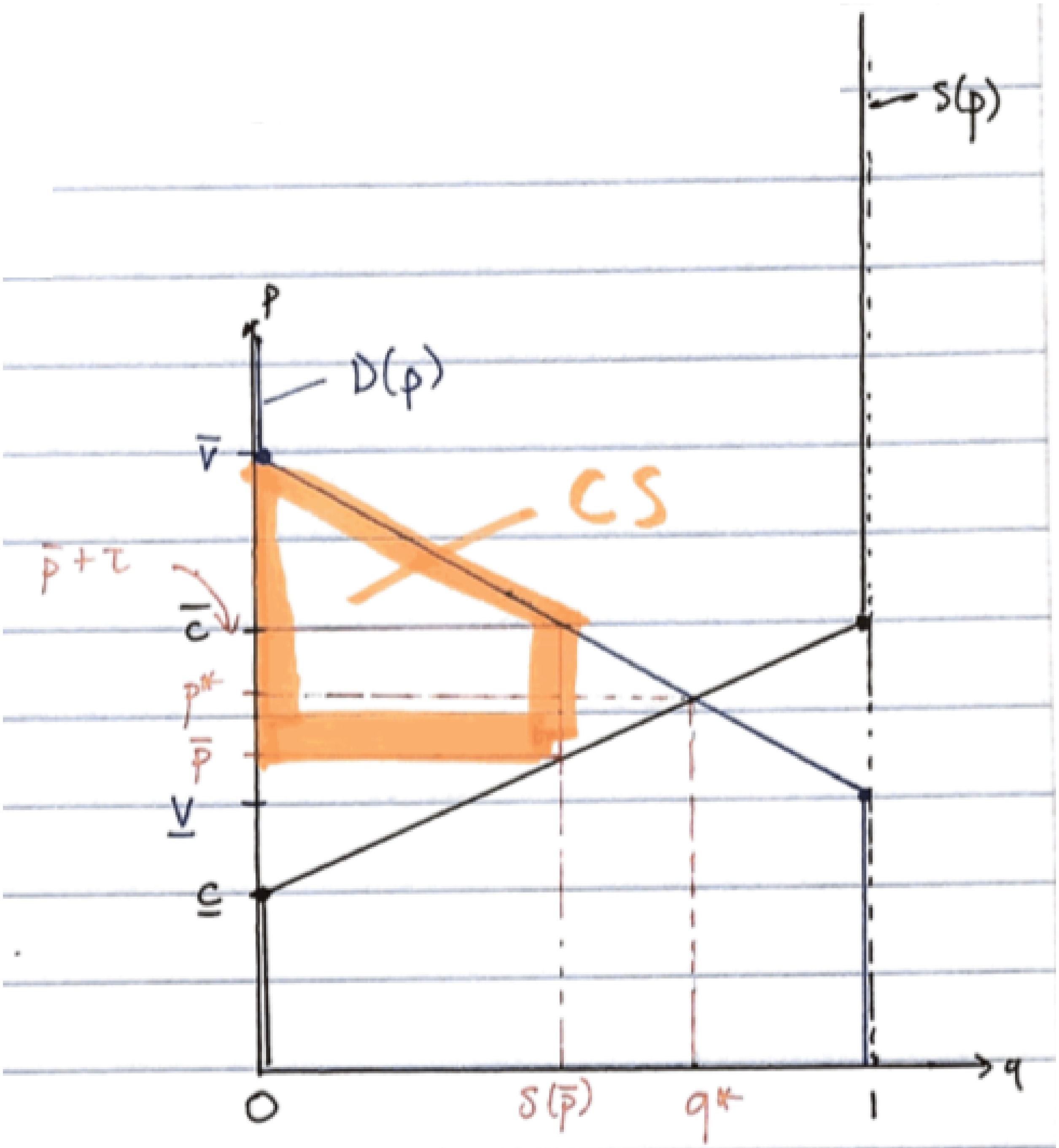
$$S(p) = D(p) \implies p^* = \frac{\Delta c}{\Delta c + \Delta v}\bar{v} + \frac{\Delta v}{\Delta c + \Delta v}\underline{c}$$

and

$$q^* = \frac{\bar{v} - \underline{c}}{\Delta v + \Delta c}$$

(d) To have $S(\bar{p})$ units rented, an equivalent tax τ would solve $D(\bar{p} + \tau) = S(\bar{p})$, i.e.

$$\frac{\underline{v} - (\bar{p} + \tau)}{\Delta v} = \frac{\bar{p} - \underline{c}}{\Delta c} \implies \tau(\bar{p}) = (\bar{v} - \bar{p}) - \Delta v . S(\bar{p})$$



p
D(p)
S(p)
CS
$\bar{v}$
$\bar{p}+\tau$
$\bar{c}$
p^*
$\bar{p}$
$\underline{v}$
$\underline{c}$
0
$S(\bar{p})$
q^*
1
q

Notice how $\bar{p} = p^* \implies \tau(\bar{p} = 0)$. In the diagram above, it is a coincidence that $\bar{p} + \tau = \bar{c}$; this is not a general feature of the model.

The consumer surplus under efficient allocation is the trapezoid under demand and above $\bar{p}$, (highlighed in the figure), which has an area of:

$$CS = \frac{1}{2}[(\bar{v} - \bar{p}) + \tau(p)].S(\bar{p})$$

(e) The producer surplus is just:

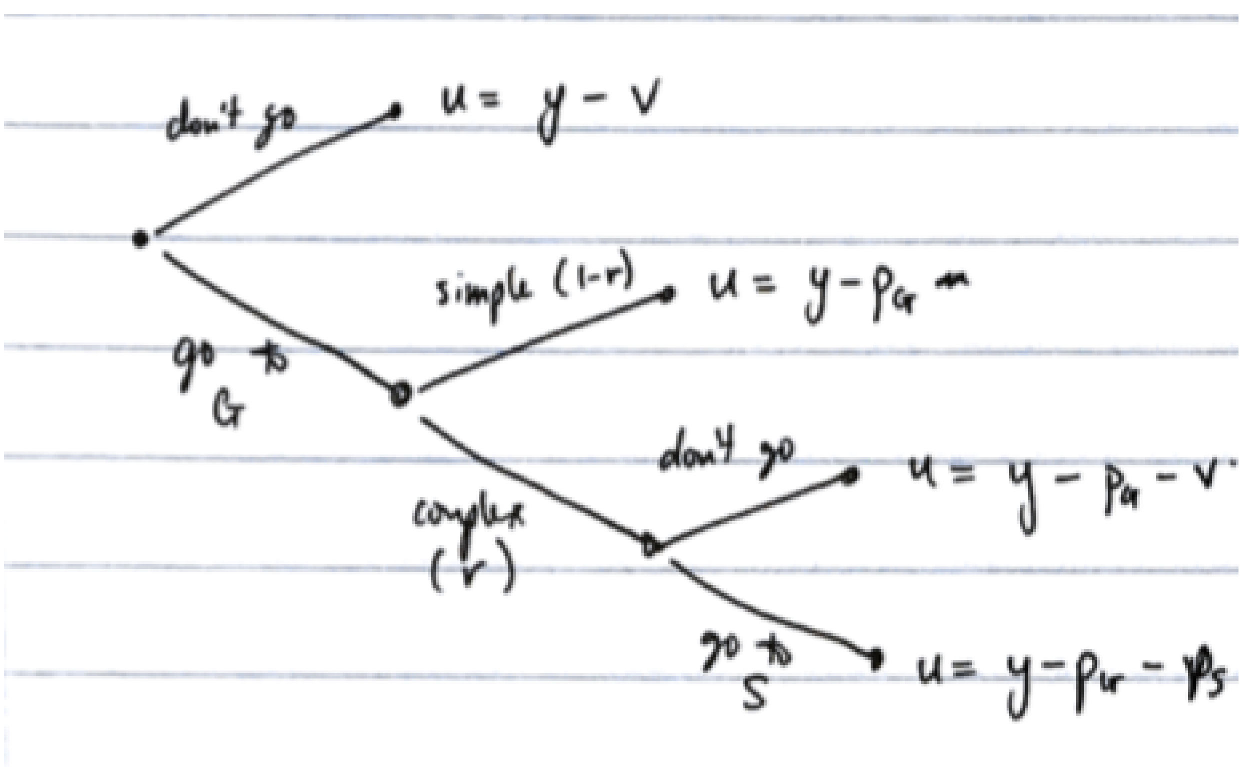
$$PS = \frac{1}{2}(\bar{p} - \underline{c}).S(\bar{p}) = \frac{1}{2}\frac{(\bar{p} - \underline{c})^2}{\Delta c}$$

The deadweight loss is $DWL = \frac{1}{2}[q^* - S(\bar{q})].\tau(\bar{p})$

(f) Producers would not care about the allocation across consumers; they get $\bar{p}$ on each rental, regardless of who pays it.

Question 2

Consider the following decision tree, which follows from the description of the problem:



(a) Once you are at the specialist's door, your choices are:

- go home and get $u = y - p_g - v$, or
- pay p_s and get $u = y - p_g - p_s$.

Obviously, you chose to go to the specialist if $v \geq p_s$.

(b) At the generalist stage, you are comparing an expected utility of :

$$\begin{aligned}
\mathbb{E}(u|\text{go to generalist}) &= (1-r)[y-p_g] + r[y-p_g+\max\{-v,-p_s\}] \\
&= y - p_g + r.\max\{-v,-p_s\}
\end{aligned}$$

If you do not go to the generalist, your utility is just $u = y - v$.So you choose to go the the generalist if:

$$\begin{aligned}
y - p_g + r.\max\{-v,-p_s\} &\geq y - v \\
\iff v + r.\max\{-v,-p_s\} &\geq p_g \\
\iff (1-r)v + r.[v+\max\{-v,-p_s\}] &\geq p_g \\
\iff (1-r)v + r.[\max\{0, v-p_s\}] &\geq p_g
\end{aligned}$$

The LHS is the expected benefit of going to the generalist, while the RHS is the cost.

(c) In this situation the specialist has monopoly power, so he will extract the full willingness to pay of the patient, i.e. $p_s^* = v$.

(d) The payoff of the specialist is $\pi_s = p_s - K$. This must be $\geq w_s$ for specialists to be willing to practice. Free entry drives $\pi_s \to w_s$, so $p_s^* - K^* = w_s \implies K^* = p_s^* - w_s = v - w_s$.

(e) Since we just found $K^* = v - w_s$, then $K^* > 0 \iff v > w_s$. This means that the (ex-post) social benefit of treatment is greater than the (again ex-post) social cost.

(f) Generalist's payoff are $\pi_g = p_g + r.K$, since they get K on a fraction r of their patients. (think of these as per-hour expected payoffs- everything is CRS is this problem). Then we must have: $\pi_g \geq w_g$ for generalists to practice. Under the free entry assumption, we get:

$$\begin{aligned}
p_g^* + r.K^* &= w_g \\
\implies p_g^* &= w_g - rK^* \\
&= w_g - r(v - w_s)
\end{aligned}$$

Yes it is possible for $p_g^* < 0$; it depends on w_g, r, v, w_s.

(g) Now we use the fact that $p_s^* = v$ (because of the monopoly power); then, patients will be willing to go if :

$$\begin{aligned}
(1-r)v + r.\max\{0, v - p_s^*\} &\geq p_g^* \\
\iff (1-r)v + r.0 &\geq w_g - r(v - w_s) \\
\iff v &\geq w_g + r.w_s
\end{aligned}$$

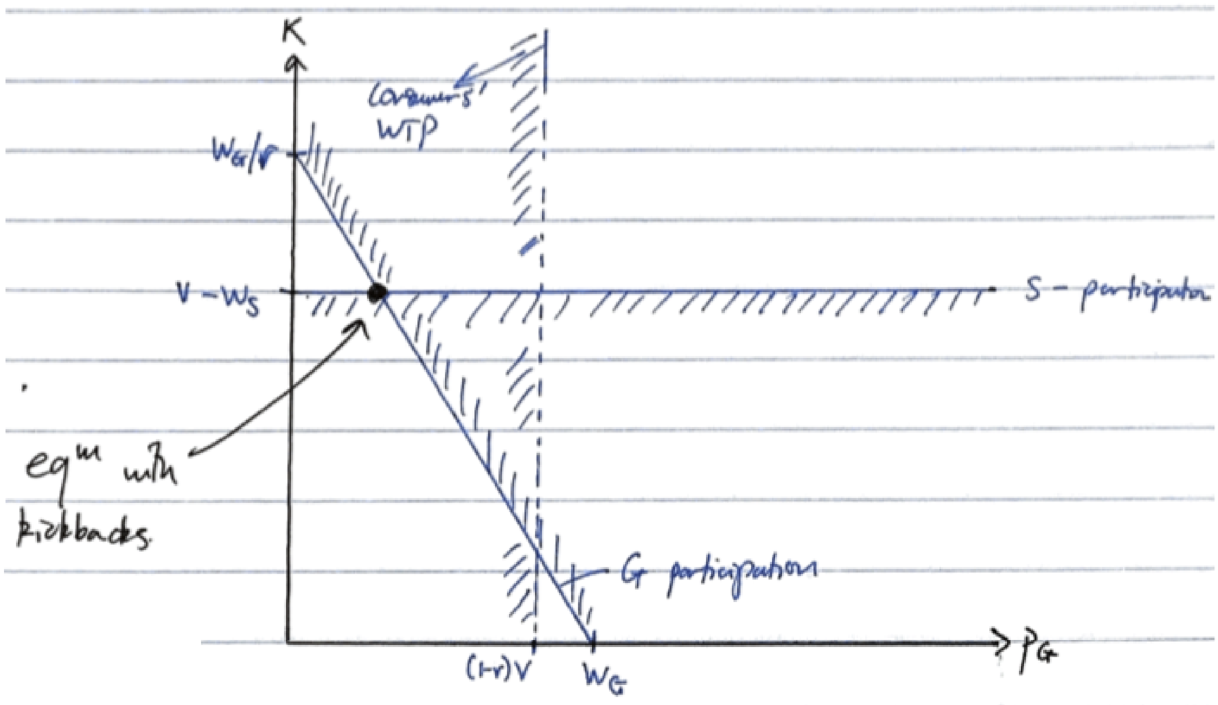
The LHS is the social benefit of treatment, while the RHS is the (ex-ante) social cost. So the industry equilibrium is socially efficient: treatment occurs if and only if the social benefits outweigh the social costs. Interestingly, this happens despite the monopoly power of the specialists.

(h) Here, it is helpful to draw a diagram. We are looking for two equilibrium objects: K^* and p_g^* (since we have $p_S^* = v$ due to the monopoly power of the specialists). There are three constraints:

$$p_g^* + r.k^* \geq w_g \to \text{participation constraint for G} \tag{1}$$

$$v - k^* \geq w_s \to \text{participation constraint for S} \tag{2}$$

$$p_g^* \leq (1-r)v \to \text{patient's willingness to pay} \tag{3}$$



K
Consumers' WTP
W_G/r
$V - W_S$
S - participation
eq^m with kickbacks.
G participation
(1-r)V
W_G
p_G

In the diagram, the equilibrium with kickbacks is depicted.

Now if we ban kickbacks (and force $K^* = 0$), there can be no equilibrium: we'd have $p_g = w_g$ and $p_s = v$, but then patients would not be willing to pay G in the first place.

What is going on? The kickbacks allow for the monopoly distortion to be undone, because specialists have to compete to buy the right to treat patients. Although ex-post, the patients are charged their full WTP(v), the alternative income for generalists drive down prices of overall medical care. When kickbacks are banned, this mechanism of dissipating specialist's rent can no longer function.

(i) We might expect to see generalists and specialists merging into a single practice under these conditions. You could have a single firm employ both G and S at salaries of w_g and w_s respectively, and charging consumers w_g upon entry, plus an additional fee of w_s if their illness turned out to be complex.